

Office of Environmental Management – Grand Junction



Moab UMTRA Project
Ground Water and Surface Water Monitoring
Report January through June 2015

Revision 0

October 2015



U.S. Department
of Energy

Office of Environmental Management

**Moab UMTRA Project
Ground Water and Surface Water Monitoring Report
January through June 2015**

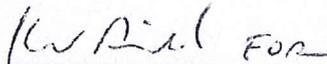
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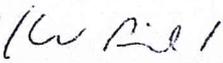
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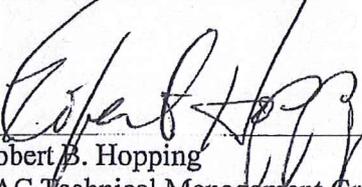
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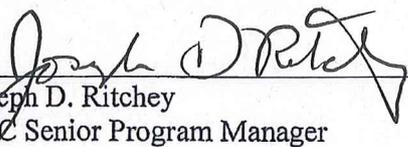
Elizabeth Moran Date
TAC Project Hydrogeologist

 10/5/15

Kenneth G. Pill Date
TAC Ground Water Manager

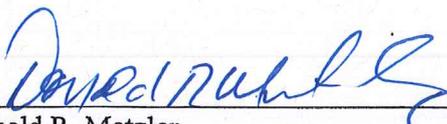
 10/5/15

Robert B. Hopping Date
TAC Technical Management Group/Field Manager

 10/6/15

Joseph D. Ritchey Date
TAC Senior Program Manager

Reviewed by:

 10-7-15

Donald R. Metzler Date
DOE Moab Federal Project Director

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Acronyms and Abbreviations

ALS	ALS Global
bgs	below ground surface
CCB	continuing calibration blank
CCV	continuing calibration verification
CF	Configuration
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeter
COC	chain-of-custody
CRI	reporting limit verification
DOE	U.S. Department of Energy
EB	equipment blank
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
ft	feet or foot
ICB	initial calibration blank
ICP	inductively coupled plasma
ICV	initial calibration verification
IDL	instrument detection limit
LCS	laboratory control sample
μmhos	micromhos
MB	method blank
MDL	method detection limit
MS	matrix spike or mass spectroscopy
MSD	matrix spike duplicate
QC	quality control
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 sites during the first half of 2015. The results of the data validation process are also presented.

Three sampling events were completed during this time frame. The sampling event in March/April included the collection of ground water samples from Configuration (CF) 4 monitoring wells and well points, as well as ground water samples from wells adjacent to the tree plot area in the vicinity of CF3. The second event was conducted in May and included the collection of ground water samples from CF5 extraction wells, and again the collection of ground water samples from wells adjacent to the tree plot area. The third and final event during this time period was conducted in May and June, with samples collected from a variety of site-wide ground water and surface water locations.

The March/April samples were collected from CF4 to determine the effectiveness of the fresh water injection system, by measuring the contaminant concentrations in monitoring wells upgradient and downgradient of the ten CF4 injection wells. Samples were collected from the ground water monitoring wells adjacent to the tree plot area in an attempt to measure the impact of phytoremediation on the ammonia ground water plume. The sample locations are shown on Figure 1.

The May event was conducted to determine the effectiveness of the ground water extraction system. In addition, the concentrations measured at each of the CF5 extraction wells were used to update the ammonia and uranium concentrations for mass removal calculations and contaminant concentration trends. The tree plot monitoring well locations were sampled again to detect any trends in the concentrations during different times of the growing season. These CF5 ground water sampling locations are also shown on Figure 1.

The November/December site-wide event surface water and ground water sampling locations are shown on Figures 2 and 3, respectively. The surface water samples associated with this event were collected 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.

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 these events. 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).



Figure 1. CF4, CF5, and Tree Plot Area Ground Water Sampling Locations



Figure 2. May/June 2015 Surface Water Sampling Locations

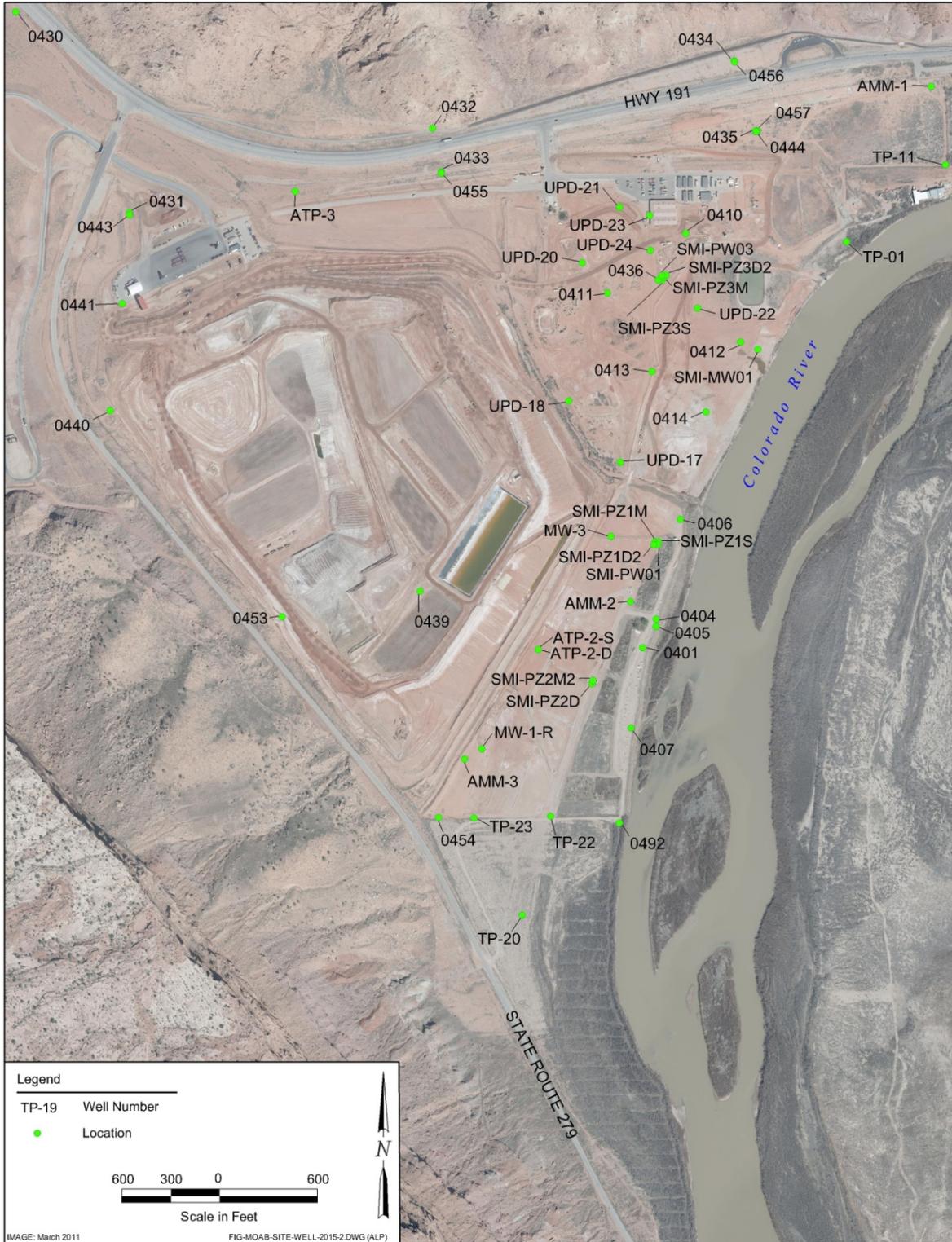


Figure 3. May/June 2015 Site-wide Ground Water Sampling Locations

Appendix A includes Water Sampling Field Activities Verification, Water Quality Data, and the trip report associated with the March/April 2015 CF4 and Tree Plot sampling event. Appendices B and C contain Water Sampling Field Activities Verification, Minimums and Maximums Report, Water Quality Data, Blanks Report, Water Level Data, and the trip reports associated with the May 2015 CF5 and Tree Plot and the May/June 2015 sampling events, respectively. 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.

The Minimums and Maximums Reports were 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.

2.0 Summary of Sampling Events

2.1 March/April 2015 CF4 and Tree Plot Sampling Event

Ground water samples were collected from eight CF4 monitoring wells to determine how effectively the freshwater injection system was diluting the ammonia concentrations, particularly downgradient of the CF4 injection wells. Four ground water samples in the vicinity of the tree plot area (near CF3) were collected to determine if phytoremediation had impacted ammonia concentrations in the downgradient direction.

2.2 May 2015 CF5 and Tree Plot Sampling Event

The analytical results associated with the samples of extracted ground water from the eight CF5 extraction wells were used to update the mass removal calculations.

2.3 May/June 2015 Site-wide Sampling Event

Seventy-two ground water and surface water samples were collected as part of the site-wide event. This event corresponds to the time frame when the Colorado River is generally experiencing peak spring runoff flow conditions.

The 65 ground water samples were collected from a variety of downgradient and cross-gradient locations at various depths. The locations in the vicinity of the northeastern uranium plume were also included. Select samples were analyzed for ammonia using a HACH sension 2 portable pH/ISE probe and meter. All samples were submitted to ALS Global (ALS) laboratory for ammonia and uranium analysis.

The seven surface water samples were collected upstream, downstream, and adjacent to the site during this event.

3.0 Data Assessment

3.1 March/April 2015 CF4 and Tree Plot 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) 1503075
 Laboratory: ALS Global, Fort Collins, Colorado
 Sample Date Group (SDG) Number: 1504106
 Analysis: Metals and Inorganics
 Validator: Elizabeth Moran
 Review Date: 11 August 2015

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

Table 1. March/April 2015 CF4 and Tree Plot Sampling Event Analytes and Methods

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

Data Qualifier Summary

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

Table 2. March/April 2015 CF4 and Tree Plot Sampling Event Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1504106-1 through -18	All in SDG 1504106	Uranium	J	MS-1

"J" indicates results are estimated; it becomes "UJ" for analytical results below the detection limit.

Table 3. March/April 2015 CF4 and Tree Plot Sampling Event Reason Codes for Data Flags

Reason Code	Qualifier (Detects)	Qualifier (Non-detects)	Explanation
MS-1	J	U	Per method requirements, matrix QC was performed for this analysis, however, a sample from this order number was not the selected QC sample. Therefore, the data was not included in the narrative.

"J" indicates results are estimated; it becomes "UJ" for analytical results below the detection limit.

Sample Shipping/Receiving

ALS in Fort Collins, Colorado, received a total of 18 samples for RIN 1503075 in one shipment of one cooler. SDG 1504106 consisted of 18 uranium and 18 ammonia samples that arrived on April 4, 2015 (UPS tracking number 1Z5W1Y510199306897). The SDG was accompanied by a chain-of-custody (COC) form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents, including the COC forms and the sample tickets, had no errors or omissions.

Preservation and Holding Times

SDG 1504106, packed in one cooler, was received intact with a temperature of 2.4°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.

Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data.

All laboratory instrument calibrations were performed correctly in accordance with the cited methods. 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. For ICP-MS analyte uranium, internal standards are also analyzed to indicate the stability of the instruments.

Method SW-846 6020A, Uranium

The calibration for the uranium analyses for SDG 1504106 was performed on April 13, 2015. The initial calibrations were both performed using three calibration standards and three 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 CRI verifications 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 SDG 1504106 was performed using two calibration standards and two blanks on March 19, 2015. The calibration curve had an r^2 value greater than 0.995 and an intercept less than three times the method detection limit (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 (MBs) 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 prior to and during sample analysis. All of the uranium CCBs were less than the instrument detection limit (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). Five of the associated ammonia results were less than five times the highest blank value; however, these sample results were all at or below the RL, which is 0.1 milligrams per liter, 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.

No equipment blanks were collected during this sampling event. All samples were collected using dedicated equipment.

Matrix Spike Analysis

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.

Per method requirements, a matrix quality control (QC) was performed for this analysis. Since a sample from this order number was not selected quality control sample, the matrix QC results were not included in the report. Therefore the uranium data was flagged J for reason MS-1. For ammonia as N analysis in SDG 1504106, one MS was analyzed for the 18 total ammonia samples. A matrix spike recovery was met with sample 1504106-5MS and MSD, and therefore none of the data has to be qualified.

Laboratory Replicate Analysis

The laboratory replicate results demonstrate acceptable laboratory precision. The relative percent difference (RPD) values for the reported matrix spike duplicate (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. A duplicate sample was collected from location UPD-24 (1504106-18). 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. Per national environmental laboratory accreditation requirements provided by the NELAC Institute, an MS may be used in place of an LCS provided the acceptance criteria are as stringent.

Metals Serial Dilution

No serial dilution data was included with the uranium sample data, since the matrix spike/dilution for this sample batch was from another client. This data was flagged MS-1 for this reason.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers.

Electronic Data Deliverable File

The Electronic Data Deliverable (EDD) file arrived on April 14, 2015. The contents of the EDD 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 were four anomalous data points associated with four different locations. Two of the data points were associated with ammonia concentrations below the historic minimum, one above the historic maximum, and one data point had a uranium concentration below the historic minimum. Table 4 presents a summary of the results of the Minimums and Maximums Report for this event.

Table 4. Anomalous Data Associated With the March/April 2015 CF4 and Tree Plot Area Sampling Event

Location	Sample Date	Analyte	Concentration (mg/L)	Historical Minimum (mg/L)	Historical Maximum (mg/L)	Disposition
0732	03/24/2015	Ammonia Total as N	170	0.1	87	New maximum for the data range established; will continue monitoring.
0782	03/23/2015	Ammonia Total as N	1	4	2300	Impacts of Injection System reduced concentration, new minimum for the data range established.
0785	03/23/2015	Uranium	0.0075	0.017	3.2	Impacts of Injection System reduced concentration, new minimum for the data range established.
0786	03/23/2015	Ammonia Total as N	0.19	0.5	820	Impacts of Injection System reduced concentration, new minimum for the data range established.

3.2 May 2015 CF5 and Tree Plot Sampling Event

3.2.1 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

RIN 1505076
 Laboratory: ALS, Fort Collins, Colorado
 SDG Number: 1505408
 Analysis: Inorganics and Metals
 Validator: Elizabeth Moran
 Review Date: 12 August 2015

The samples were prepared and analyzed using accepted procedures as shown in Table 5.

Table 5. May 2015 CF5 and Tree Plot Sampling Event 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 6. Refer to Table 7 for an explanation of the data qualifiers applied.

Table 6. May 2015 CF5 and Tree Plot Sampling Event Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1505048-1 through 15	All in SDG 1505408	Ammonia	J	MS-1

“J” indicates results are estimated and becomes “UJ” for analytical results below the detection limit.

Table 7. May 2015 CF5 and Tree Plot Sampling Event Reason Codes for Data Flags

Reason Code	Qualifier (Detects)	Qualifier (Non-detects)	Explanation
MS-1	J	U	Results for the affected analytes are regarded as estimated because the concentration of the native sample was much greater than the spike added, so the spike recovery may not be accurate.

“J” indicates results are estimated and becomes “UJ” for analytical results below the detection limit.

Sample Shipping/Receiving

ALS in Fort Collins, Colorado, received a total of 15 samples for RIN 1505076 in one shipment consisting of one cooler. SDG 1505408 consisted of 15 uranium and ammonia samples and arrived on May 21, 2015 (UPS tracking number 1Z5W1Y510190845729). The SDG was accompanied by a COC form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents, including the COC forms and the sample tickets, had no errors or omissions.

Preservation and Holding Times

SDG 1505408 was received intact with a temperature of 3.6°C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

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 that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data.

All laboratory instrument calibrations were performed correctly in accordance with the cited methods. Calibration standards were prepared from independent sources. In addition, for ICP analytes (uranium), CRIs verify the linearity of the calibration curve near the RL.

For ICP-MS analytes (uranium), instrument tuning and performance criteria are checked for mass calibration and resolution verifications. For ICP-MS analyte uranium, internal standards are also analyzed to indicate stability of the instruments.

Method SW-846 6020A, Uranium

The calibration for the uranium analyses was performed on May 27, 2015. The initial calibration was performed using five calibration standards and one blank, resulting in calibration curves with r^2 values greater than 0.995. The values of the calibration curve intercepts for uranium were positive and less than three times the IDL.

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 CRI verifications 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 calibration for ammonia as N was performed using three calibration standards and a blank on May 26, 2015. 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

MBs are analyzed to assess any contamination that may have occurred during sample preparation. Both ICBs and CCBs are analyzed to assess instrument contamination prior to and during sample analysis.

All of the uranium and ammonia CCBs were less than the IDL on both of the SDGs. No results had to be qualified.

Equipment Blanks

An 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.

All of the samples were collected with dedicated equipment and no equipment blanks were collected.

MS Analysis

MS samples were prepared and analyzed for all analytes as a measure of method performance in the sample matrix. The spike recoveries met the recovery and precision criteria for uranium. However, on SDG 1505408, the matrix spike failed because the native sample concentration was too high; therefore, the ammonia data in SDG 15054048 was flagged J for reason MS-1.

Laboratory Replicate Analysis

The laboratory replicate results demonstrate acceptable laboratory precision. The 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. A duplicate sample was collected from location 0815 (1505408-11). The duplicate results met the EPA-recommended laboratory duplicate criteria of less than 20 RPD for results that are greater than five times the RL.

Laboratory Control Sample

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. Per national environmental laboratory accreditation requirements provided by the NELAC Institute, an MS may be used in place of an LCS provided the acceptance criteria are as stringent.

Metals SD

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 serial dilution data were acceptable.

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.

EDD Files

The EDD file arrived on May 28, 2015. The contents of the EDD 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.

3.2.2 Minimums and Maximums Report and Anomalous Data Review

The Minimums and Maximums Report for this sampling event is located in Appendix C. Based on the results, there were three anomalous data points from three different locations. All three data points were associated with uranium concentrations above the historic maximum. Table 12 presents a summary of the results of the Minimums and Maximums Report for this event.

3.3 May/June 2015 Site-wide Sampling Event

3.3.1 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

RIN 1411074
 Laboratory: ALS, Fort Collins, Colorado
 SDG Numbers: 1411485, 1412238
 Analysis: Inorganics and Metals
 Validator: Elizabeth Moran
 Review Date: December 31, 2014

The samples were prepared and analyzed using accepted procedures as shown in Table 8.

Table 8. May/June 2015 Site-wide Sampling Event 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 9. Refer to Table 10 for an explanation of the data qualifiers applied.

Table 9. May/June 2015 Site-wide Sampling Event Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1506109-1 through -18	All in SDG 1506109	Uranium	J	MS-1
1507267-1 through -7	All in SDG 1507267	Uranium	J	MS-2
1507017-1, 1507017-2, 1507017-11, 1507017-12, 1507017-13, 1507017-14, 1507267-1	0201, 0218, 0226, CR1, CR2, CR3, CR5	Uranium	J	EB-1
150717-11	CR1	Ammonia	J	EB-1
1506385-10, 1506385-12	0434, 0440	Ammonia	J	CCB-1

"J" indicates results are estimated and becomes "UJ" for analytical results below the detection limit.

Table 10. May/June 2015 Site-wide Sampling Event Reason Codes for Data Flags

Reason Code	Qualifier (Detects)	Qualifier (Non-detects)	Explanation
MS-1	J	U	Results for the affected analytes are regarded as estimated because the concentration of the native sample was much greater than the spike added, so the spike recovery may not be accurate.
MS-2	J	U	A matrix QC was performed with this analysis, but a sample from this order number was not selected as the QC sample.
EB-1	J	U	The ammonia and uranium sample results on the EB were higher than that of the samples that were collected with the equipment.
CCB-1	J	U	CCB-2 was higher than the MDL (0.19 mg/L vs 0.10 mg/L), therefore, all detects <5x blank CCB-2 should be flagged.

"J" indicates results are estimated and becomes "UJ" for analytical results below the detection limit.

Sample Shipping/Receiving

ALS in Fort Collins, Colorado, received a total of 72 samples for RIN 1505077 in four shipments, as shown in Table 11.

Table 11. May/June 2015 Site-wide Sampling Event Shipment and Receipt Summary

SDG	Number of Samples	Arrival Date	UPS Tracking Number(s)
1506109	18	06/05/2015	1Z5W1Y510193085769
1506385	28	06/19/2015	1Z5W1Y510191572209 1Z5W1Y510193808997
1507017	19	07/01/2015	1Z5W1Y510199890155
1507267	7	07/15/2015	1Z5W1Y510195661767

All four of the SDGs were accompanied by a COC form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents, including the COC forms and the sample tickets, had no errors or omissions. It should be noted that in SDG 1507017, sample location UPD-23 was mistakenly labeled on the COC as UPD-22. The actual location UPD-22 was sampled on June 16, 2015 (SDG 1506385, sample number 1506385-27). The sample labeled UPD-22 on SDG 1507017 (sample number 1507017-19) should be location UPD-23, collected on June 22, 2015.

Preservation and Holding Times

SDG 1506109 was received intact with a temperature of 4.2°C, SDG 1505077 was received intact with temperatures of 2.2°C and 1.8°C, SDG 1507017 was received with a temperature of 1.6°C, and SDG 1507267 was received intact with a temperature of 1.6°C which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve.

Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data.

All laboratory instrument calibrations were performed correctly in accordance with the cited methods. Calibration standards were prepared from independent sources. In addition, for ICP analytes (uranium), CRIs verify the linearity of the calibration curve near RL. For ICP-MS analytes (uranium), instrument tuning and performance criteria are checked for mass calibration and resolution verifications. For ICP-MS analyte uranium, internal standards are also analyzed to indicate stability of the instruments.

Method SW-846 6020A, Uranium

The calibration for the uranium analyses were performed on June 11, June 26, July 9 and July 17, 2015. The initial calibrations were both performed using five calibration standards and one blank, resulting in calibration curves with r^2 values greater than 0.995. The values of the calibration curve intercepts for uranium were positive and less than three times the IDL.

ICV and 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 CRI verifications 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 were performed using four calibration standards and a blank on June 9, June 23, July 7 and July 17, 2015. 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

MBs are analyzed to assess any contamination that may have occurred during sample preparation. Both ICBs and CCBs are analyzed to assess instrument contamination prior to and during sample analysis. Detected sample results associated with blanks results greater than the 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.

Uranium SDGs 1506385, 150717, and 1507017 each had at least one CCB that was slightly higher than the IDL; however, none of the sample results were <5x the highest CCB, so no data had to be qualified.

One of the ammonia calibration blanks (CCB-2) on SDG 1506109 had a result that was >5x the detection limit (0.8 mg/L versus the detection limit of 0.1 mg/L). However, there were no sample results that were between the detection limit (0.1 and 0.8 mg/L, so no data had to be qualified. On SDG 1507017, one of the ammonia calibration blanks (CCB-2) had a result of 0.04 mg/L and the MDL is 0.03 mg/L. Therefore, all data that is <5x (less than 0.235 mg/L) the maximum blank concentration should be qualified.

The only sample results that are less than 0.235 mg/L are those that are at or below the detection limit; therefore, no data was flagged. This was also the case for SDG 1507267. Three of the CCBs were higher than the MDL, however the only sample results <5x maximum blank was sample 1507267-1 (0226) and was at or below the detection limit and therefore not flagged.

Equipment Blanks

An 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.

One EB was collected after the surface water tubing was decontaminated. The sample results were elevated in ammonia (2.7 mg/L) and uranium (0.3 mg/L). It should be noted the equipment blank sample was run through the laboratory between two samples of very high ammonia and uranium concentration. All of the surface water sample results (ammonia and uranium) were below the concentration of the equipment blank.

The uranium sample results were flagged (EB-1) because the results were above the detection limit; however, all the sample results were far below the concentration of the equipment blank. For the ammonia analysis, only location CR1 was above the detection limit and therefore, the data had to be flagged. The surface water location ammonia and uranium sample results during the 2015 Site-wide Sampling Event are comparable to the concentrations during previous sampling events. This indicates that the de-conning of the sample tubing did not likely impact the results.

It has been determined that in future sampling events, dedicated equipment will be used to collect all surface water samples.

Matrix Spike Analysis

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 uranium. However, on SDG 1506109, the concentration of the analyte in the native sample was greater than four times the concentration of the matrix spike added during the digestion. Therefore, all of the uranium samples in SDG 1506109 were flagged MS-1.

Only one uranium MS sample was run for a total of 28 samples in SDG 1506385. The procedure requires one MS per 20 samples. This data has not been flagged since the MS met all of the criteria in the *Standard Practice for Laboratory Data*.

The MS from SDG 1505077 was from another client and the matrix QC results were not included in the report. All of the uranium data in SDG 1505077 was flagged MS-2. For the ammonia analysis, SDGs 1506109 and 1506385 only had one MS per 18 samples and two MSs for 28 samples. One sample per 10 percent is suggested for the ammonia analysis. Since the two MS samples met all of the criteria in the *Standard Practice for Laboratory Data*.

Laboratory Replicate Analysis

The laboratory replicate results demonstrate acceptable laboratory precision. The 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 MW-1-R (1506109-14), 0404 (1506385-3), UPD-24 (1506385-28), and MW-3 (1507267-6).

The duplicate results met the EPA- recommended laboratory duplicate criteria of less than 20 RPD for results that are greater than five times the RL.

Laboratory Control Sample

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. Per national environmental laboratory accreditation requirements provided by the NELAC Institute, an MS may be used in place of an LCS provided the acceptance criteria are as stringent.

Metals 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.

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 File

The EDD files arrived on June 12, June 26, July 9, and July 30. The contents of the EDD 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

3.3.2 Minimums and Maximums Report and Anomalous Data Review

The Minimums and Maximums Report for this sampling event is located in Appendix C. Based on the results, there were two anomalous data points from two different locations. Both data points were associated with ammonia concentrations above the historic maximum. Table 12 presents a summary of the results of the Minimums and Maximums Report for this event.

Table 12. Anomalous Data Associated With the May/June 2015 Site-wide Sampling Event

Location	Sample Date	Analyte	Concentration (mg/L)	Historical Minimum (mg/L)	Historical Maximum (mg/L)	Disposition
0435	05/27/2015	Uranium	0.044	0.0014	0.029	Concentration at UMTRA standard; will continue monitoring.
0457	05/27/2015	Uranium	0.0052	0.0014	0.0024	Concentration very low, new maximum for data range established.
TP-11	06/01/2015	Uranium	0.0035	0.00068	0.002	Concentration very low, new maximum for data range established.

4.0 Results

4.1 March/April 2015 CF4 and Tree Plot Sampling Event Results

The observation wells surrounding the CF4 injection wells (Figure 1) and river bed well points were sampled on March 23, 2015, to evaluate the effectiveness of the freshwater injection system. In general, the injection wells are screened and, therefore, deliver freshwater into the subsurface, from 15 to 35 feet (ft) below ground surface (bgs).

The ammonia concentrations are displayed on Figure 4. The results show a significant reduction in concentrations in the downgradient (east) direction, particularly in the zone above 35 ft bgs. In the upgradient direction, concentrations are also impacted by freshwater injection above 35 ft bgs.

The highest ammonia concentration was associated with the sample collected from well 0781 from a depth of 48 ft bgs upgradient of the CF4 injection wells.

Figure 5 presents the ground water mound developed as a result of the freshwater injection system, as measured on March 23, the same time the samples were collected. The ground water elevation data indicate there was a difference of more than 10 ft between the elevation inside the injection wells and upgradient observation wells.

The tree plot area was also sampled in May 2015. All results associated with this area are discussed in Section 4.4.

4.2 May 2015 CF5 and Tree Plot Sampling Event Results

CF5 extraction wells 0810 through 0816 and SMI-PW02 were sampled between May 12 and 13, 2015, to monitor contaminant concentration trends and update the contaminant concentrations used for the mass removal calculations.

Figure 6 presents the extraction rates and associated drawdowns measured when the samples were collected. The ammonia and uranium concentrations are displayed on Figure 7.

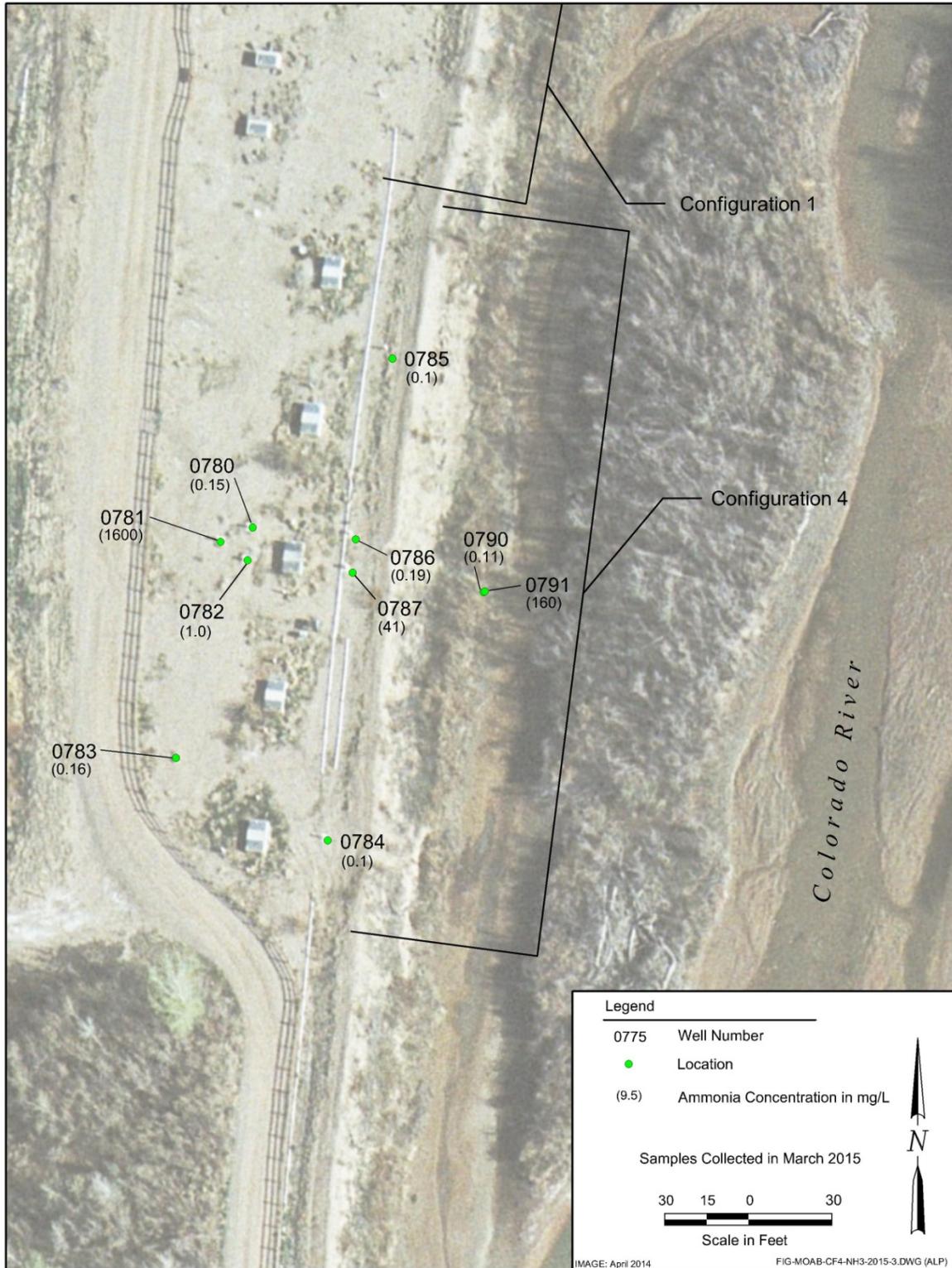


Figure 4. March 2015 CF4 Ground Water Ammonia Concentrations

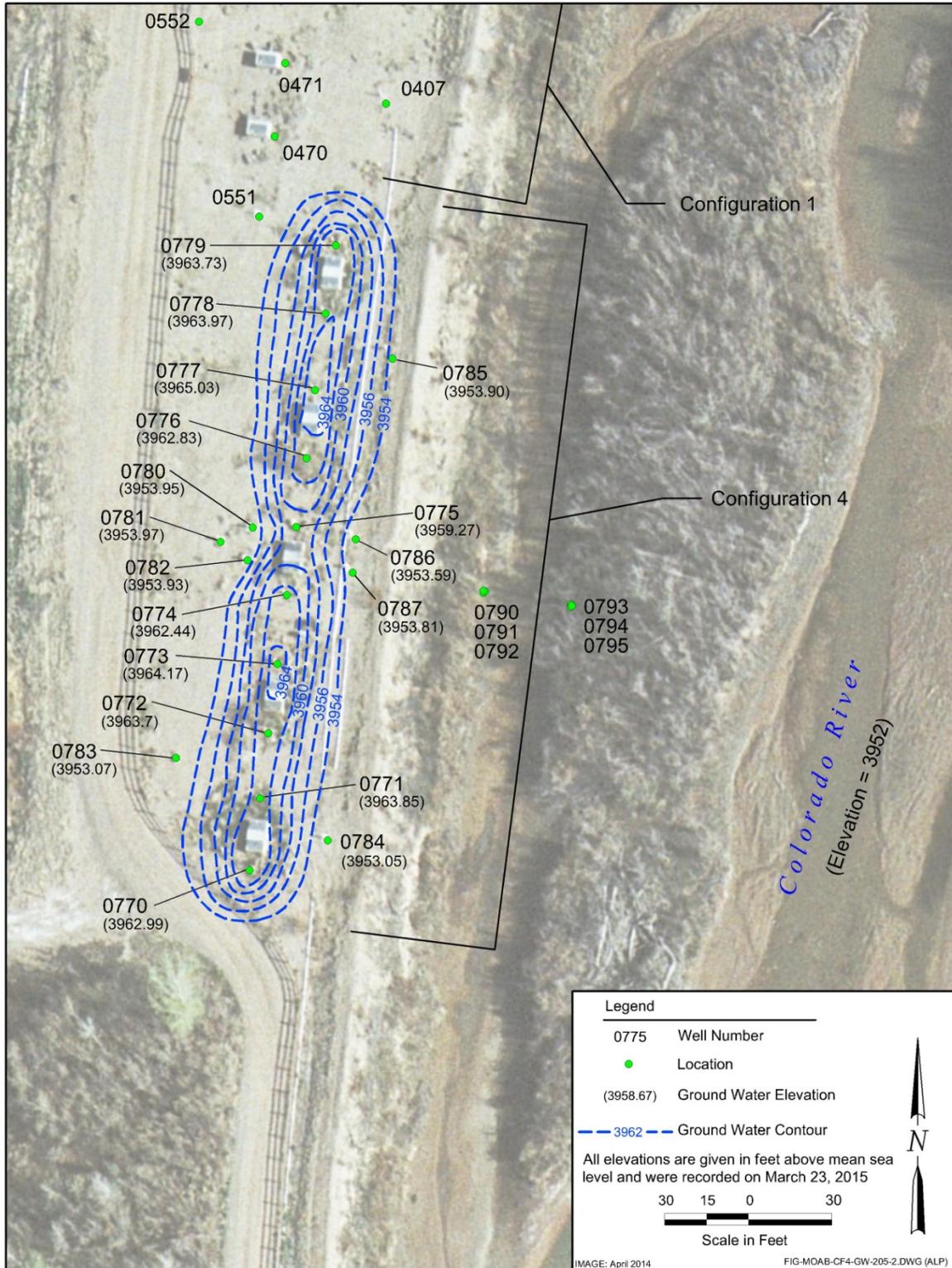


Figure 5. March 2015 CF4 Ground Water Elevation Contour Map During Injection

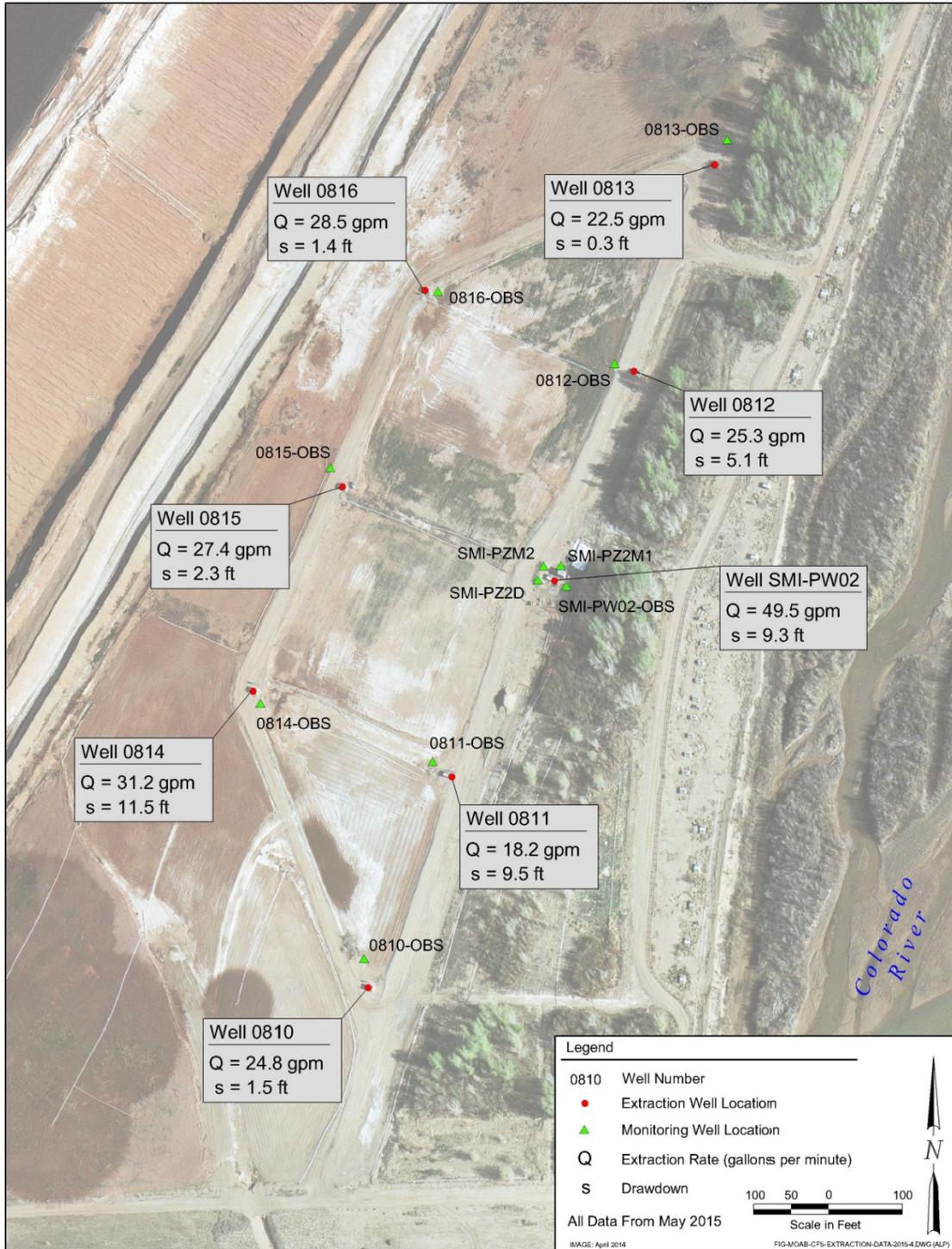


Figure 6. May 2015 CF5 Pumping Rates and Drawdowns

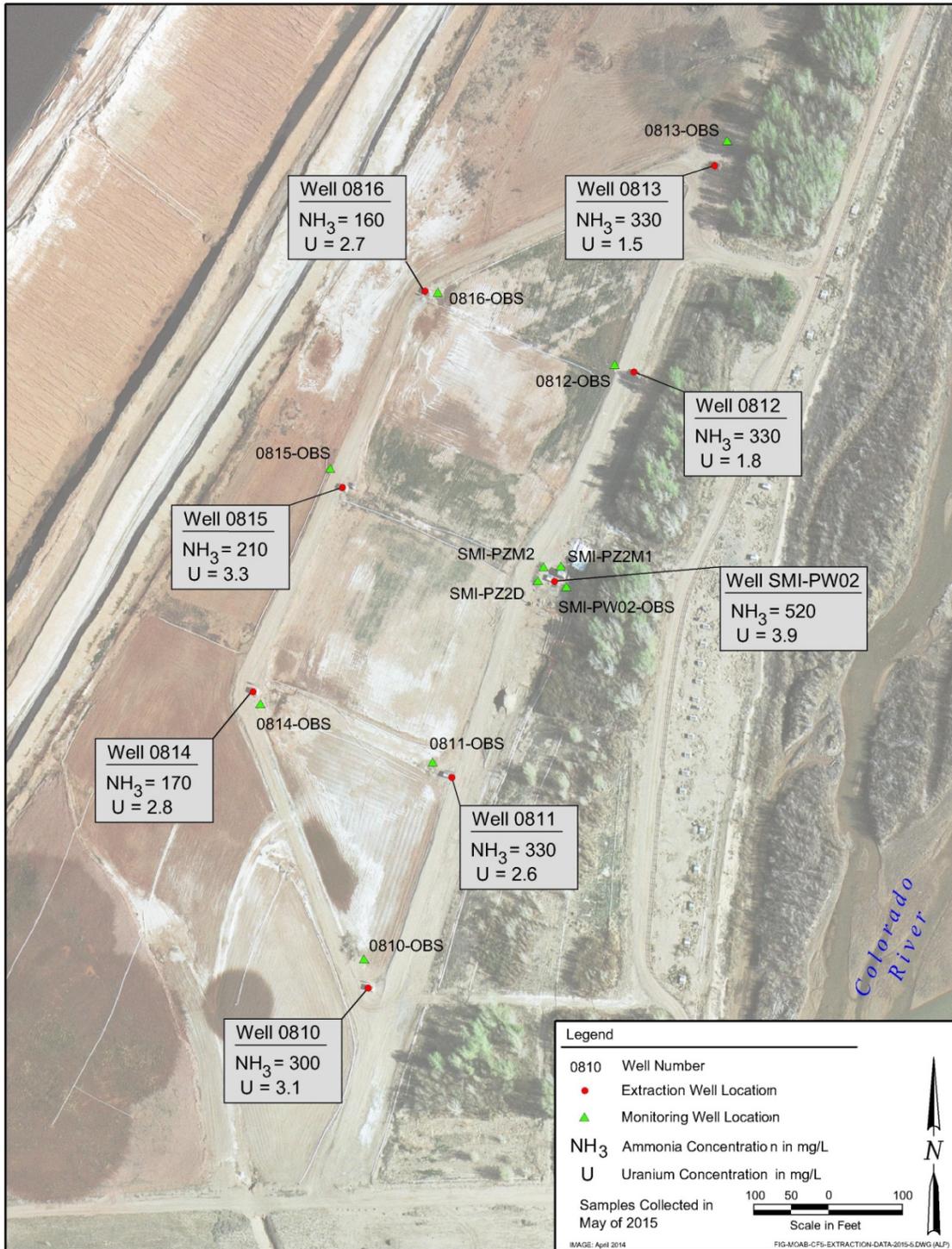


Figure 7. May 2015 CF5 Ammonia and Uranium Concentrations

Time versus concentration plots were generated to display the trends displayed by the CF5 extraction wells during the past 2 years. Figure 8 is the time versus ammonia concentration plot for extraction wells 0810 through 0813 and SMI-PW02, all of which are located along the CF5 southeastern boundary. Figure 9 displays a time versus uranium concentration plot for the same set of wells.

Figures 10 and 11 are the time versus ammonia and uranium concentration plots, respectively, for CF5 wells 0814 through 0816, which are located closer to the base of the tailings pile (Figure 1).

As the plots exhibit, the ammonia and uranium concentrations along the CF5 southeastern boundary have not significantly changed over the past 2 years. Ammonia concentrations in the wells located closer to the base of the tailings pile all showed a similar increase between April and July 2014, and then the concentrations all decreased by May/June 2015.

The uranium concentrations did not change significantly. As of July/August 2014, all ammonia concentrations ranged from 300 to 520 mg/L along the southeastern CF5 boundary and from 160 to 210 mg/L along the base of the tailings pile. The uranium concentrations for all eight extraction wells ranged from 1.5 to 3.9 mg/L.

The results associated with the tree plot area are discussed in Section 4.4.

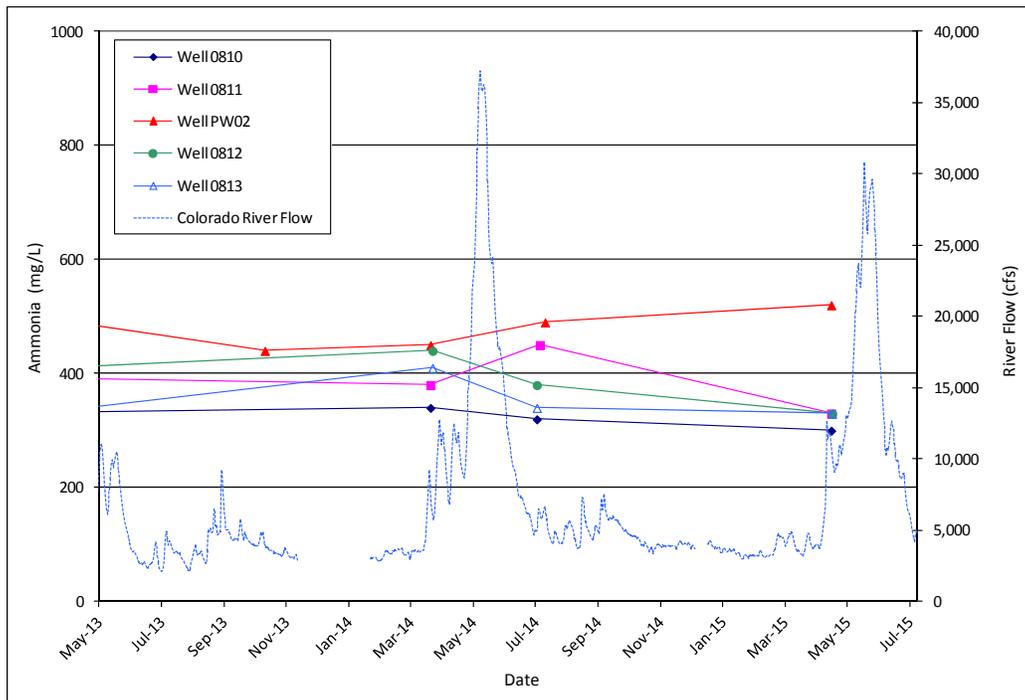


Figure 8. CF5 Extraction Wells 0810, 0811, 0812, 0813, and PW02 Time versus Ammonia Concentration Plot

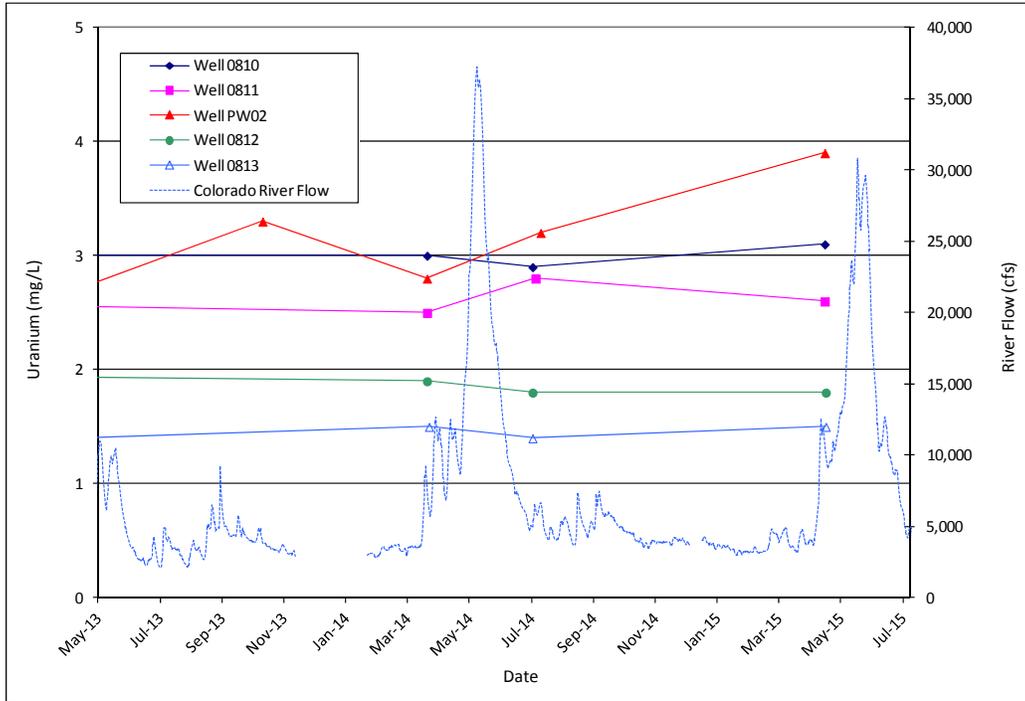


Figure 9. CF5 Extraction Wells 0810, 0811, 0812, 0813, and PW02 Time versus Uranium Concentration Plot

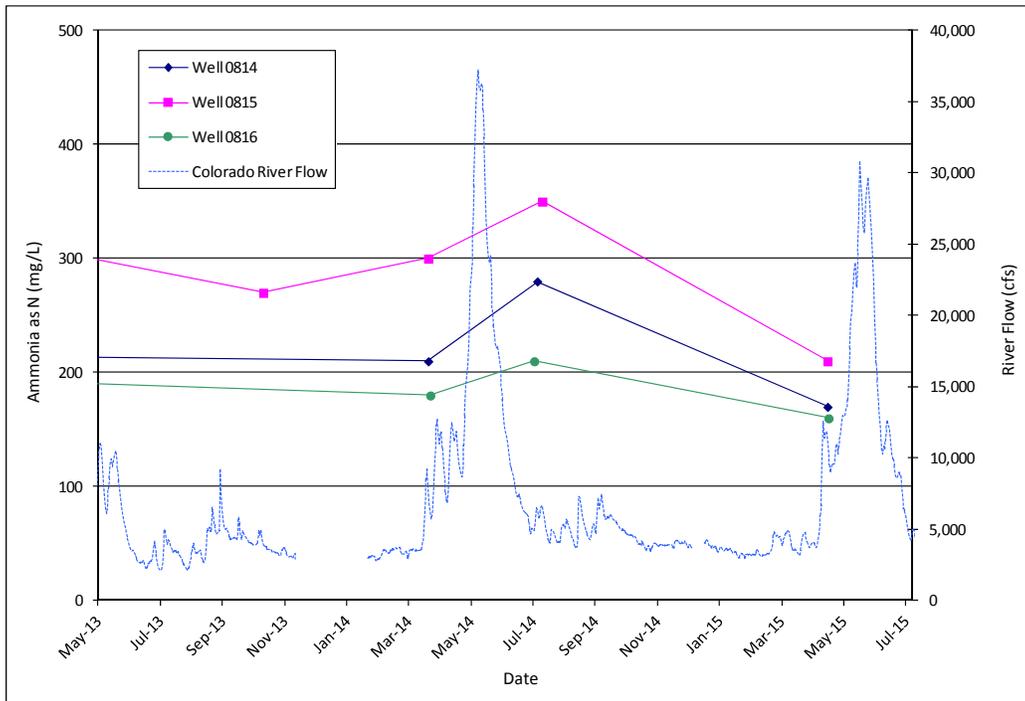


Figure 10. CF5 Extraction Wells 0814, 0815, and 0816 Time versus Ammonia Concentration Plot

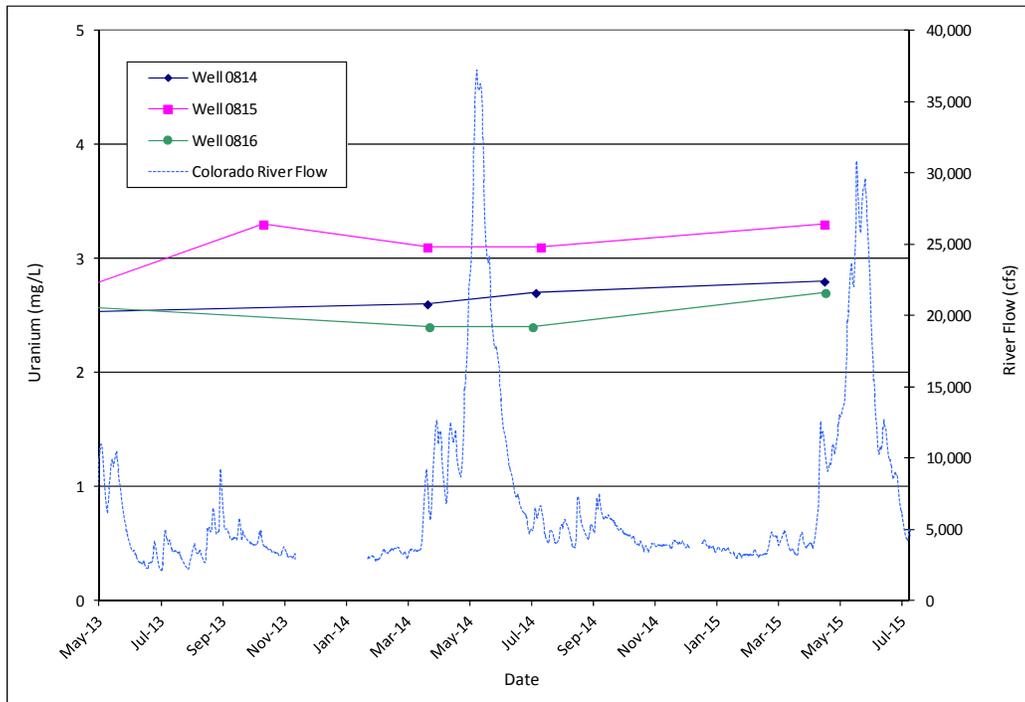


Figure 11. CF5 Extraction Wells 0814, 0815, and 0816 Time versus Uranium Concentration Plot

4.3 May/June 2015 Site-wide Sampling Event

All samples collected during this event were analyzed for both ammonia and uranium. Table 13 presents the site-wide locations and associated concentrations that exceeded the 0.044 mg/L uranium ground water standard, which is based on Table 1 in Title 40 Code of Federal Regulations Part 192, Subpart A (40 CFR 192A), “Standard for the Control of Residual Radioactive Materials from Inactive Uranium Processing Sites,” assuming uranium-234 and uranium-238 activities are in equilibrium.

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. Any results based on analysis using the ammonia probe are also displayed.

4.3.1 Northeastern Base of Tailings Pile

Figures 12 and 13 are time versus ammonia and uranium concentration plots, respectively, for these locations. The ammonia concentrations in the samples collected from UPD-17 and UPD-18 have rebounded since December 2014, from 280 to 290 mg/L to 100 to 160 mg/L. The trend suggests that these locations are impacted by Colorado River flows, with higher ammonia concentrations during base flows and lower concentrations during the spring runoff. The uranium concentrations have exhibited less fluctuation compared to the ammonia concentrations, with samples from both locations having concentrations of 1.5 mg/L (Figure 13).

4.3.2 Northeastern Uranium Plume Area

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

4.3.3 Center of Northeastern Uranium Plume Area

Figures 14 and 15 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 14, the ammonia concentrations have remained consistently below 5 mg/L in the samples collected from wells UPD-20 and 0411.

Concentrations have remained approximately 50 mg/L since November 2013 in samples collected from 0413. Ammonia concentrations in samples collected from well 0414 continue to decrease since August 2014, from 50 mg/L to 14 mg/L in June 2015.

The uranium concentrations have not significantly changed in the samples collected from wells 0413, 0414, and UPD-20 since December 2014 (Figure 15). The sample collected from well UPD-20 remains below 0.1 mg/L

Table 13. May/June 2015 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	6/16/2015	CF2 Vicinity	18	1.1
0403	6/15/2015	CF1 Vicinity	18	0.2
0404	6/16/2015	CF3 Vicinity	18	1.3
0405	7/9/2015	Infiltration Trench / Tree Plot	18	0.44
0406	6/25/2015	CF3 Vicinity	18	1.1
0407	6/15/2015	CF1 Vicinity	17	0.23
0410	6/18/2015	NE Uranium Plume Area	24	0.50
0411	6/18/2015	NE Uranium Plume Area	8	2.1
0412	6/1/2015	NE Uranium Plume Area	10	1.9
0413	6/2/2015	NE Uranium Plume Area	10	3.7
0414	6/1/2015	NE Uranium Plume Area	8	3.7
0439	6/9/2015	On Tailings Pile	118	1.2
0441	6/23/2015	Support Area	117	0.051
0453	6/23/2015	Along SW Site Boundary	80	0.93
0454	6/3/2015	Along SW Site Boundary	13	1.8
0492	6/25/2015	Along S Site Boundary	18	0.051
AMM-2	6/2/2015	CF5 Vicinity	48	2.4
AMM-3	6/3/2015	Near Base of Tailings Pile	48	2.6
MW-1-R	6/3/2015	Near Base of Tailings Pile	13	1.1
MW-3	7/9/2015	CF5 Vicinity	44	3.4
SMI-MW01	6/1/2015	NE Uranium Plume Area	16	5.3
SMI-PW01	6/22/2015	CF5 Vicinity	40	3.1
SMI-PW03	6/18/2015	NE Uranium Plume Area	60	1.9

Table 13. May/June 2015 Site-wide Locations Exceeding the 0.044 mg/L Uranium Ground Water Standard (continued)

Well Number	Date	Location	Sample Depth (ft bgs)	Uranium Concentration (mg/L)
SMI-PZ1D2	6/22/2015	CF5 Vicinity	73	1.8
SMI-PZ1M	6/22/2015	CF5 Vicinity	57	3.4
SMI-PZ1S	6/22/2015	CF5 Vicinity	18	0.74
SMI-PZ2D	6/8/2015	CF5 Vicinity	75	0.48
SMI-PZ2M2	6/8/2015	CF5 Vicinity	56	1.0
SMI-PZ3D2	6/18/2015	NE Uranium Plume Area	78	1.4
SMI-PZ3M	6/18/2015	NE Uranium Plume Area	59	1.1
SMI-PZ3S	6/18/2015	NE Uranium Plume Area	25	1.3
TP-01	6/1/2015	NE Uranium Plume Area	22	0.073
TP-22	7/9/2015	NE Uranium Plume Area	17	0.53
TP-23	6/3/2015	NE Uranium Plume Area	25	3.8
UPD-17	6/17/2015	NE Uranium Plume Area	14	1.5
UPD-18	6/17/2015	NE Uranium Plume Area	13	1.5
UPD-20	6/17/2015	NE Uranium Plume Area	17	0.063
UPD-21	6/17/2015	NE Uranium Plume Area	25	5.5
UPD-22	6/16/2015	NE Uranium Plume Area	9	2.2
UPD-23	6/22/2015	NE Uranium Plume Area	26	0.77
UPD-24	6/18/2015	NE Uranium Plume Area	27	3.9

NE = northeastern; SW = southwestern

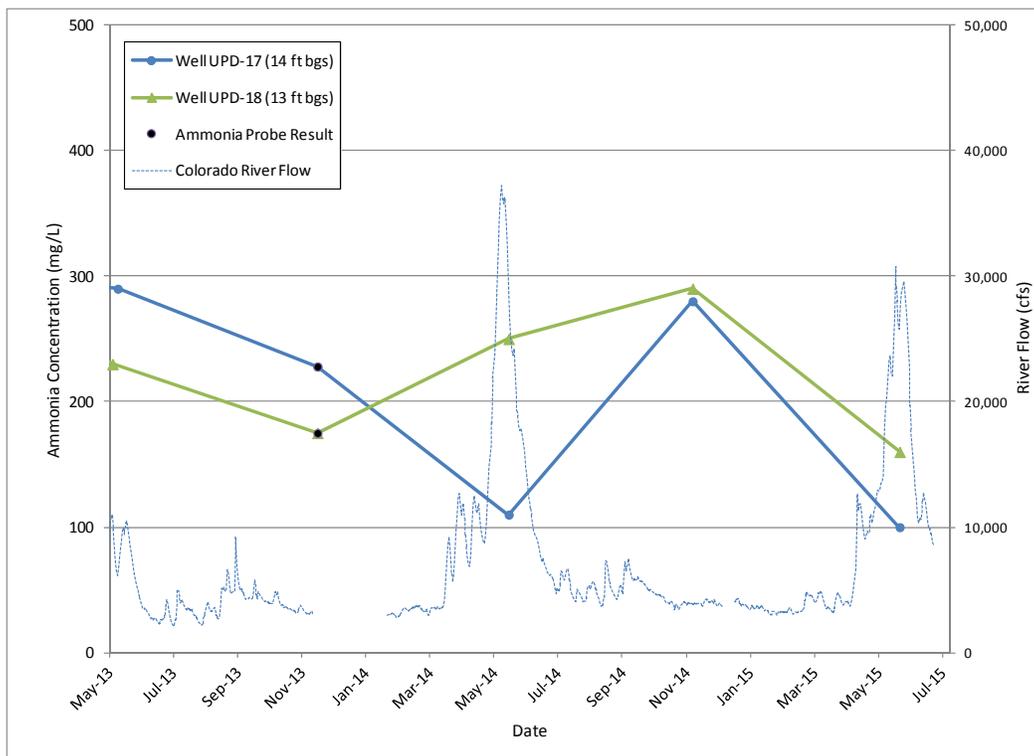


Figure 12. Wells UPD-17 and UPD-18 Time versus Ammonia Concentration Plot

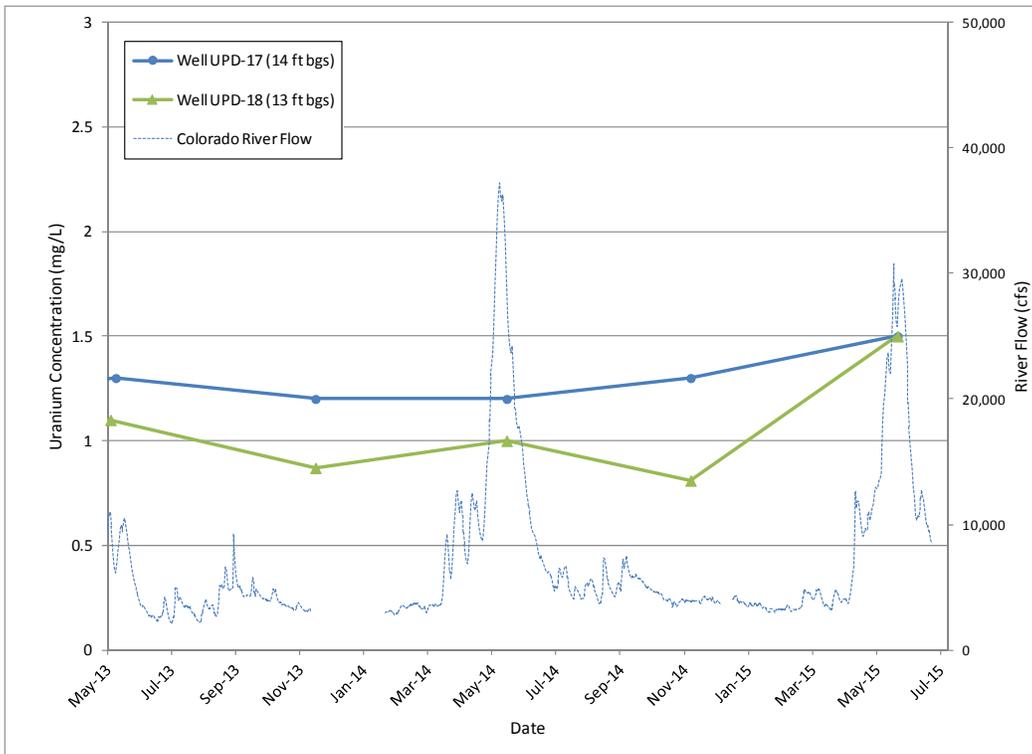


Figure 13. Wells UPD-17 and UPD-18 Time versus Uranium Concentration Plot

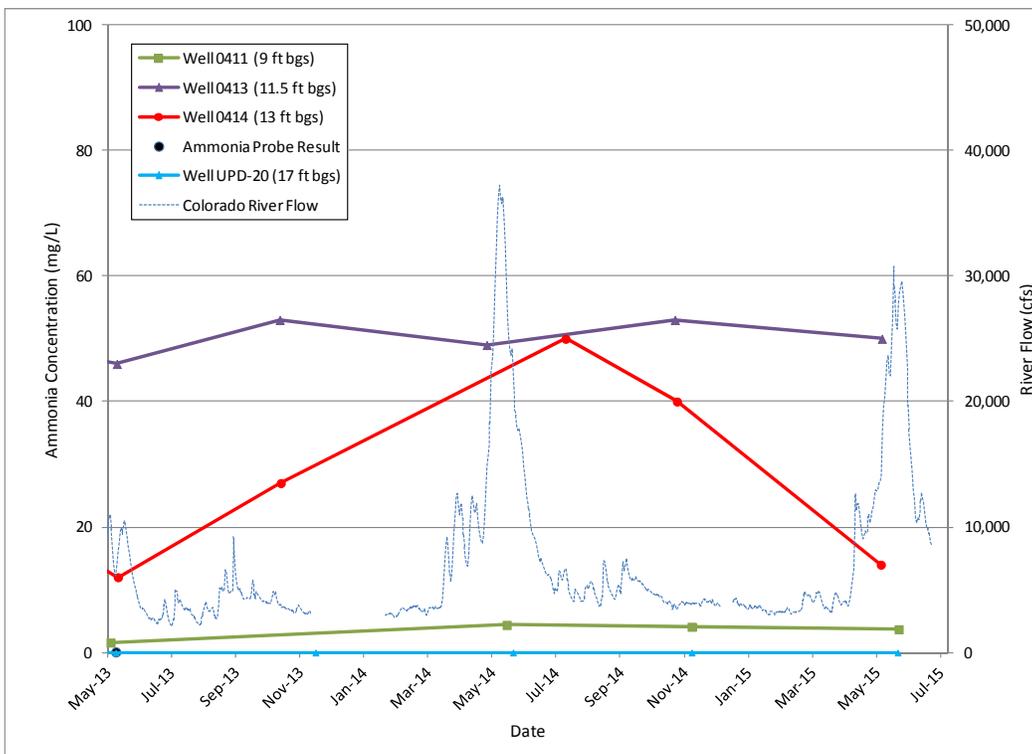


Figure 14. Center of Northeastern Uranium Plume Area Observation Wells 0411, 0413, 0414, and UPD-20 Time versus Ammonia Concentration Plot

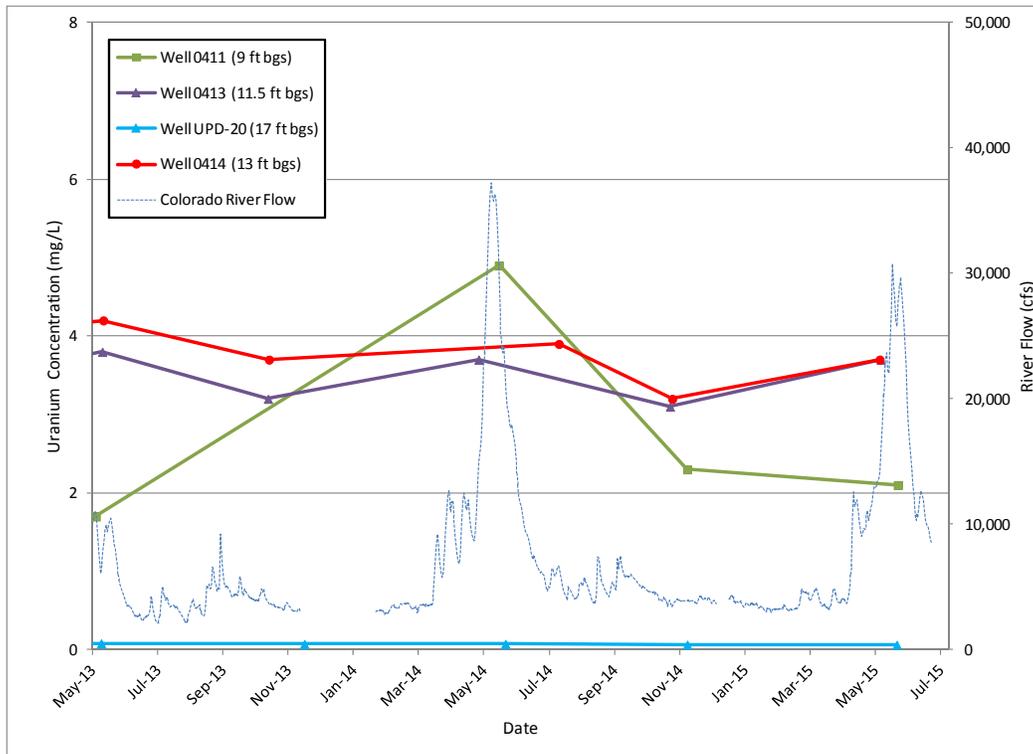


Figure 15. Center of Northeastern Uranium Plume Area Observation Wells 0411, 0413, 0414, and UPD-20 Time versus Uranium Concentration Plot

4.3.4 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 16 and 17, respectively. These wells include 0410, UPD-21, UPD-23, and UPD-24. As shown in Figure 16, the ammonia concentrations in the samples collected from wells 0410, UPD-23, and UPD-24 have not changed significantly and all remain less than 5 mg/L. The concentration in the sample collected from well UPD-21 decreased from 10 to 2.2 mg/L since December 2014, which is comparable to the concentration measured in June 2014.

A similar trend was observed in the uranium concentration in the sample from UPD-21, where the concentration significantly decreased from 18 to 5.5 mg/L between December 2014 and June 2015. The concentration in the sample from UPD-24 also decreased during this same time frame. Figure 17 also displays that the uranium concentrations in samples collected from wells 0410 and UPD-23 remain below 1 mg/L.

4.3.5 Northeastern Edge of Uranium Plume Area

Figures 18 and 19 display ammonia and uranium concentration 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 20 exhibits, with the exception of the ammonia concentration in the sample collected from UPD-22, the concentrations have remained consistent since May 2013. During this time the ammonia concentration from UPD-22 fluctuated from 1.7 to 4.4 mg/L. There is no general trend associated with the uranium concentrations (Figure 19). In the past two years uranium concentrations have decreased in the samples from UPD-22 and 0412, increased in the sample from SMI-MW01, and not significantly changed in the samples from SMI-PZ3S.

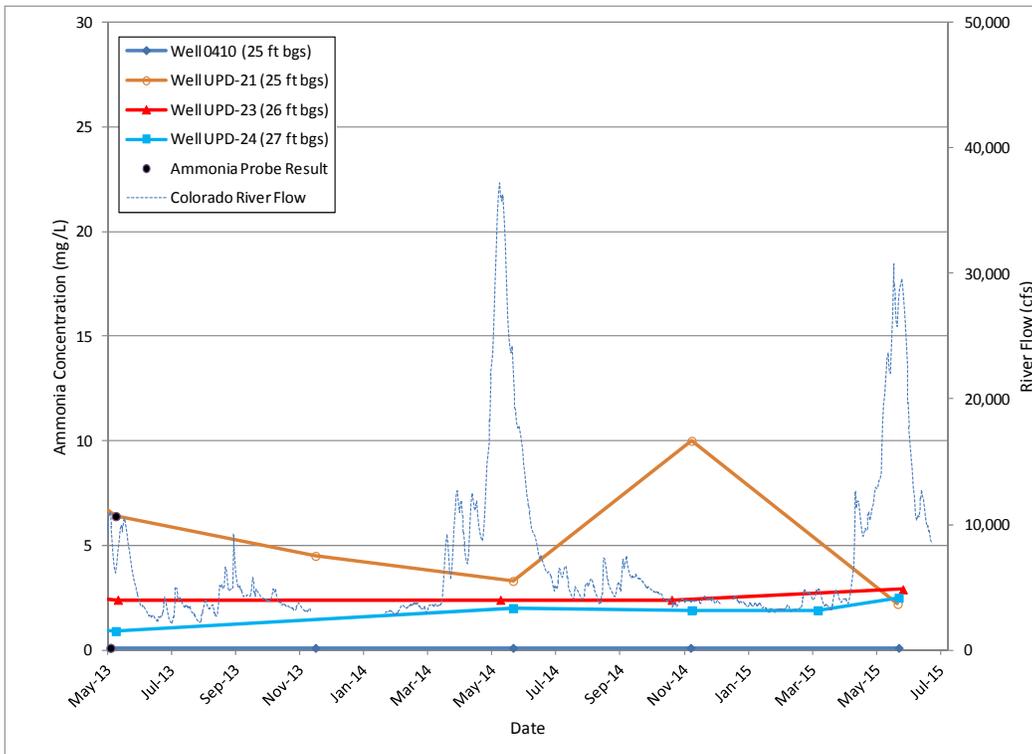


Figure 16. Vicinity of Atlas Building Observation Wells 0410, UPD-21, UPD-23, and UPD-24 Time versus Ammonia Concentration Plot

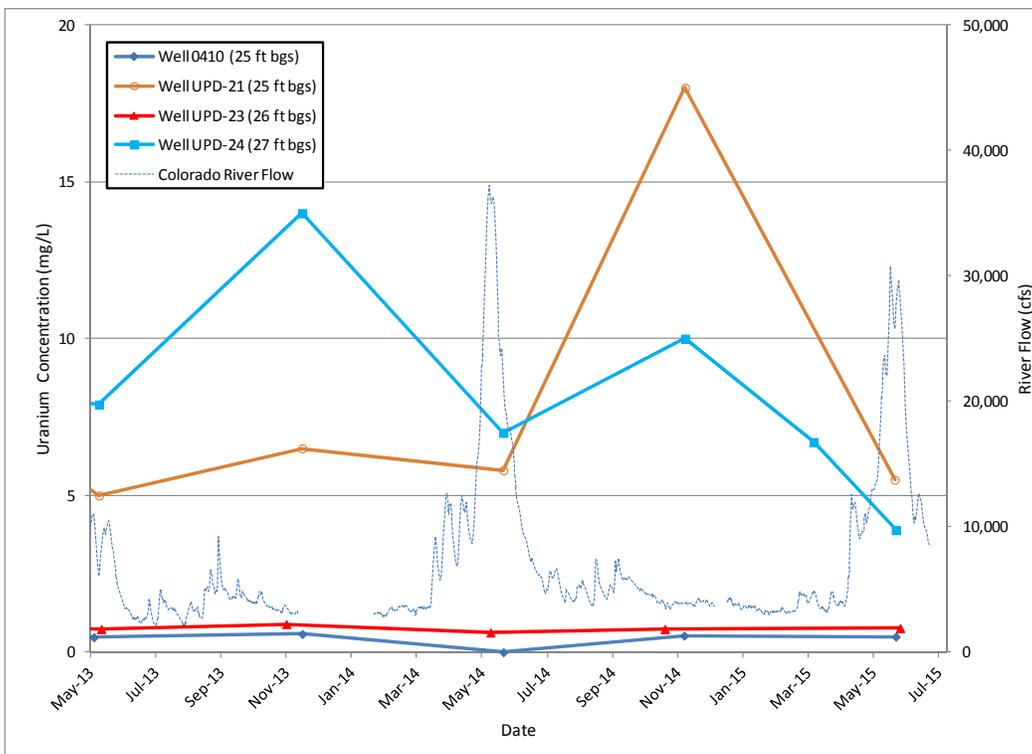


Figure 17. Vicinity of Atlas Building Observation Wells 0410, UPD-21, UPD-23, and UPD-24 Time versus Uranium Concentration Plot

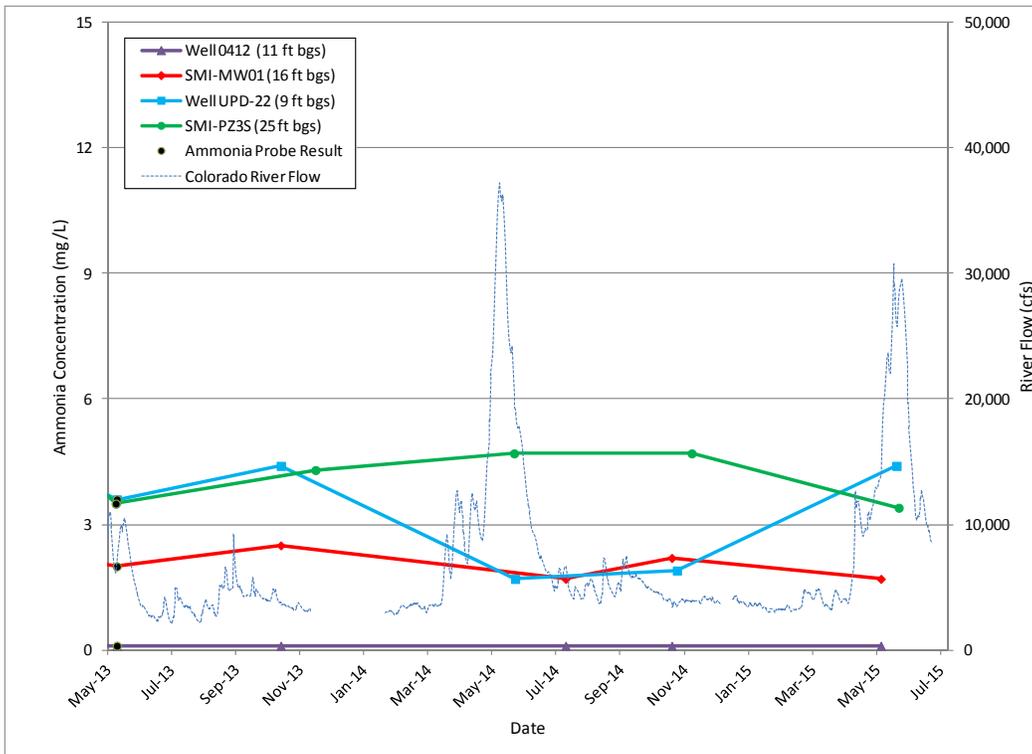


Figure 18. Northeastern Edge of Uranium Area Observation Wells 0412, SMI-MW01, SMI-PZ3S, and UPD-22 Time versus Ammonia Concentration Plot

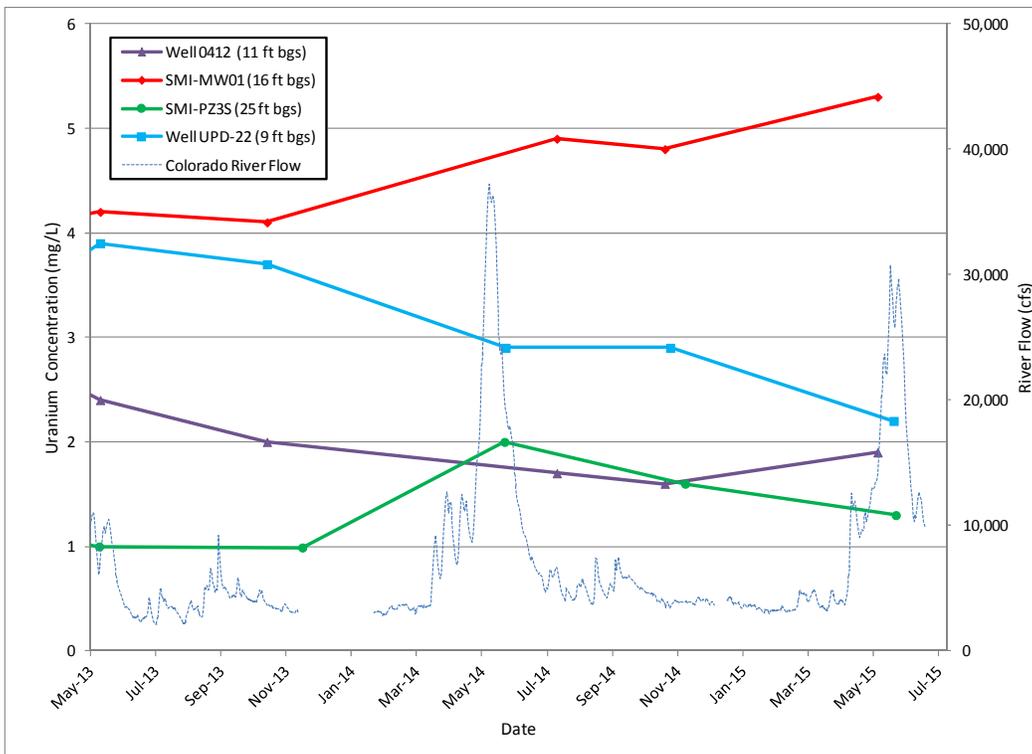


Figure 19. Northeastern Edge of Uranium Area Observation Wells 0412, SMI-MW01, SMI-PZ3S, and UPD-22 Time versus Uranium Concentration Plot

4.3.6 Base of Tailings Pile

The time versus ammonia and uranium concentration plots for the area near the base of the tailings pile are presented in Figures 20 and 21 for wells AMM-3, ATP-2-S, ATP-2-D, and MW-3 (listed from south to north). As Figure 20 exhibits, while there has been some fluctuation over the past 2 years, since May 2013 the ammonia concentrations range from approximately 200 to 500 mg/L. The sample from well ATP-2-D decreased from 460 to 300 mg/L from December 2014 to May 2015. Uranium concentrations in wells ATP-2-S (sample depth 25 ft bgs) and ATP-2-D (sample depth 88 ft bgs) have consistently been below 0.01 mg/L since 2010. Figure 21 suggests the uranium concentrations associated with the sample collected from AMM-3 continues to exhibit a strong seasonal fluctuation, which may be a function of the flooding of this area or irrigation activities over the past 2 years.

4.3.7 Southwestern Boundary

Figures 22 and 23 display the time versus concentration plots for the locations along the southwestern boundary presented in the upgradient to downgradient ground water flow direction (towards the southeast). Ammonia concentrations in the sample collected from well 0440, the furthest upgradient location, have been below 0.1 mg/L since 2009.

Figure 22 displays the gradual increase of the ammonia concentration measured in the sample associated with well 0454 since May 2013, from 220 to 400 mg/L in November 2014 and then a decrease to 340 mg/L in May 2015. Since November 2014 concentrations from 0453 have decreased from 360 to 200 mg/L. The sample collected from well 0440 continues to have a uranium concentration below the 0.044 mg/L UMTRA standard, since 2009. Uranium concentrations continue to fluctuate in samples collected from wells 0453 and 0454 (Figure 23).

4.3.8 Riverbank Area

Figures 24 and 25 are the time versus ammonia and uranium concentration plots, respectively, for the locations sampled along the riverbank, presented from south to north (wells 0492, 0407, 0401, 0404, and TP-01). Because all these wells are located along the river bank, their water chemistry is heavily influenced by the seasonal changes of the Colorado River stage.

Ammonia concentrations historically have been low at the southern and northern ends of the site and increase near the middle. The ammonia concentration measured in the sample from well 0401 did not follow the historical trend, with lower concentrations during the spring runoff. The concentration increased from 290 to 440 mg/L since December 2015. The expected seasonal trend is evident for the uranium concentrations measured at these locations (Figure 25). Samples collected from wells 0492, 0407, 0401, 0404, and TP-01 all had uranium concentrations that decreased since the river experienced base flows in November 2014.

4.3.9 Southern and Off-site Areas

Figures 26 and 27 are the plots for the one location sampled to the south of the site, well TP-20. Samples could not be safely collected in May 2015 from wells TP-17 and TP-19, which are located along the riverbank. Well TP-20 is located approximately 600 ft off the bank. Typically ammonia and uranium concentrations are low at TP-20 because it is located along the southern edge of the contaminant plumes. Ammonia concentrations (Figure 26) remain below 4 mg/L, with no significant changes since May 2013. The uranium concentrations (Figure 29) have consistently been below the 0.044 mg/L UMTRA standard over the past 2 years.

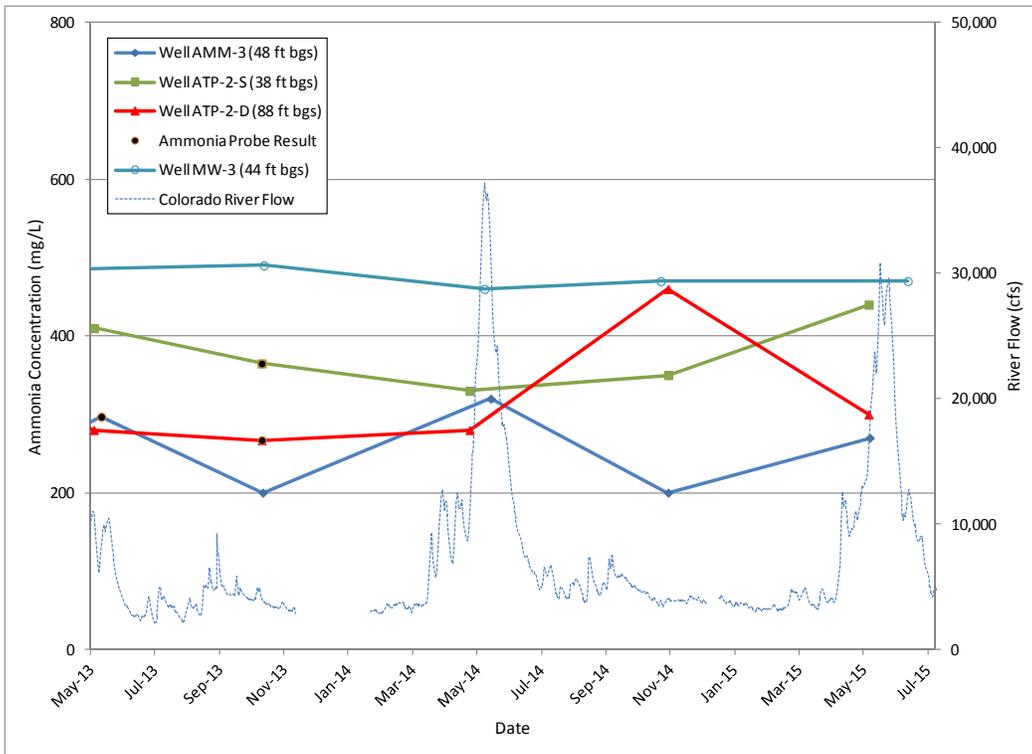


Figure 20. Base of Tailings Pile Observation Wells AMM-3, ATP-2-S, ATP-2-D, and MW-3 Time versus Ammonia Concentration Plot

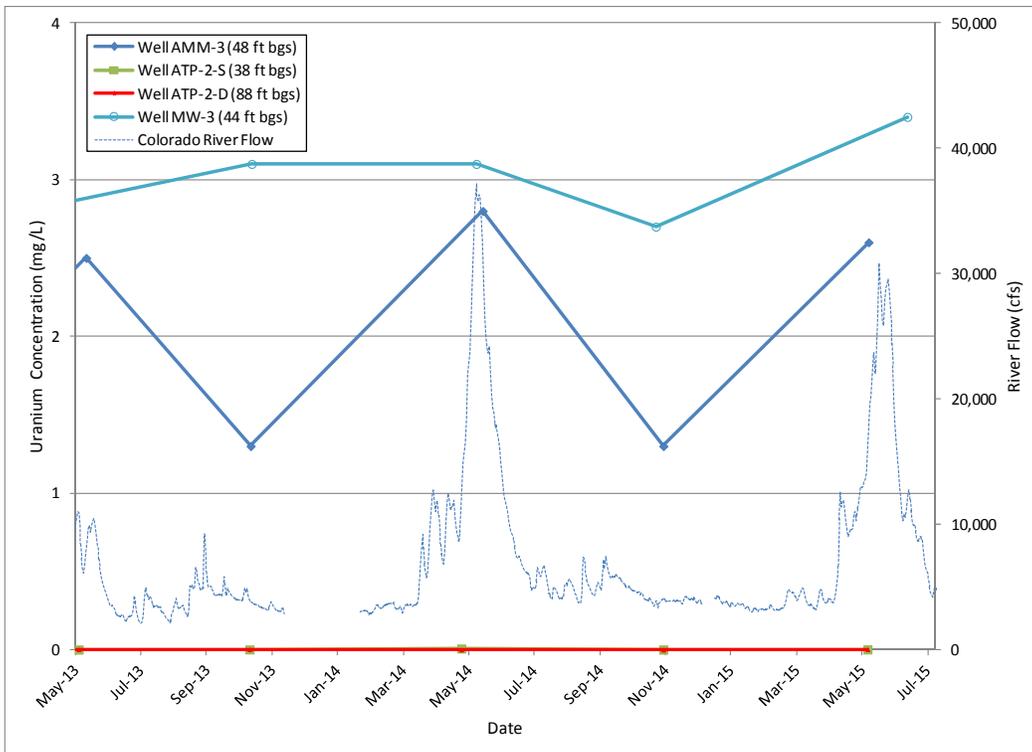


Figure 21. Base of Tailings Pile Observation Wells AMM-3, ATP-2-S, ATP-2-D, and MW-3 Time versus Uranium Concentration Plot

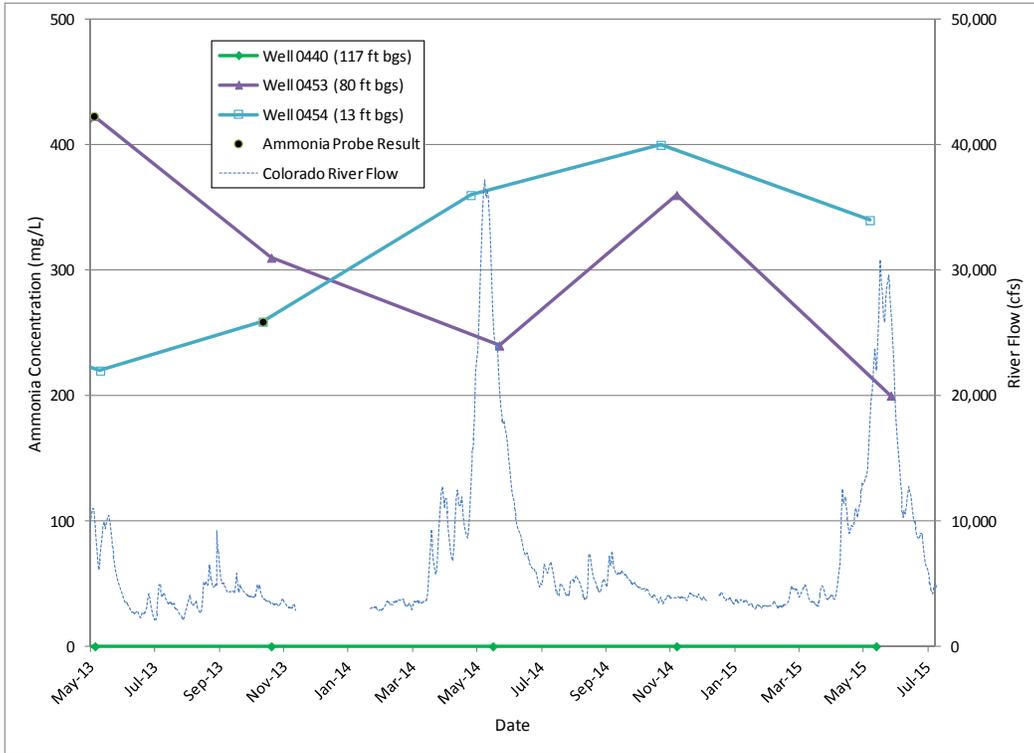


Figure 22. Southwestern Boundary Observation Wells 0453, 0454, and 0440 Time versus Ammonia Concentration Plot

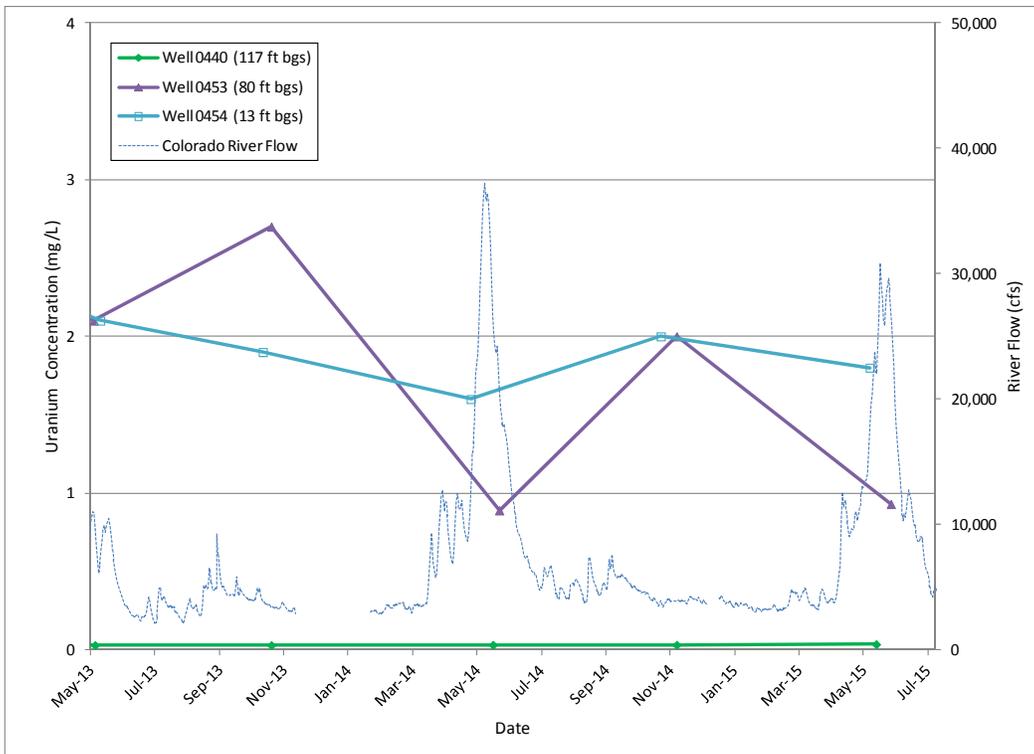


Figure 23. Southwestern Boundary Observation Wells 0453, 0454, and 0440 Time versus Uranium Concentration Plot

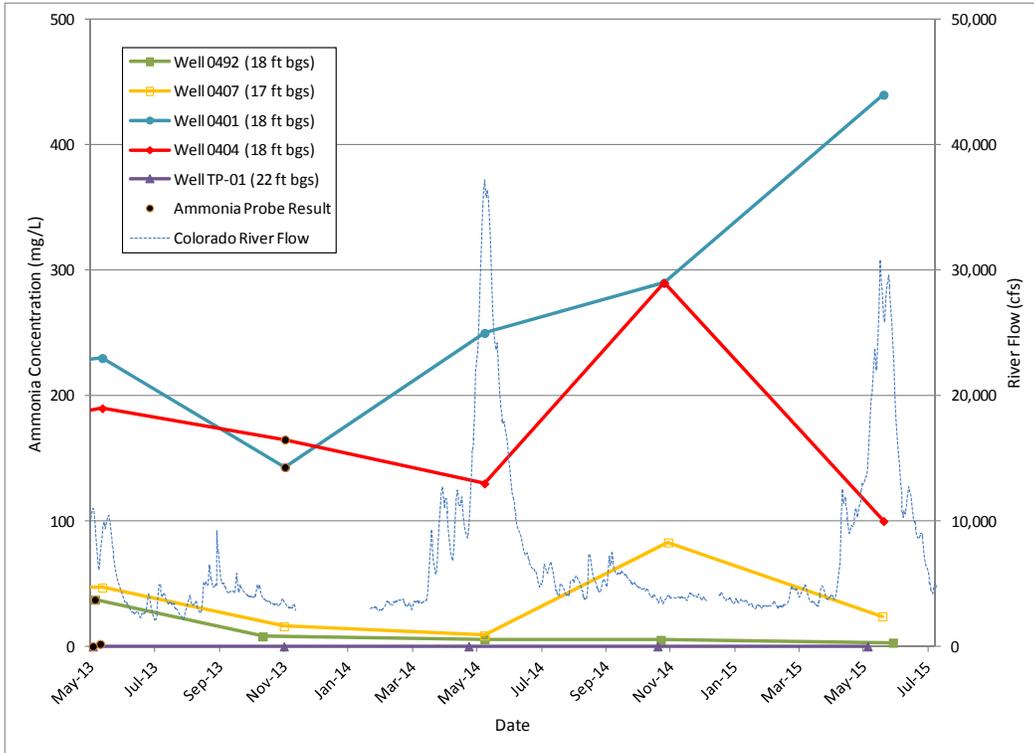


Figure 24. Riverbank Observation Wells 0492, 0407, 0401, 0404, and TP-01 Time versus Ammonia Concentration Plot

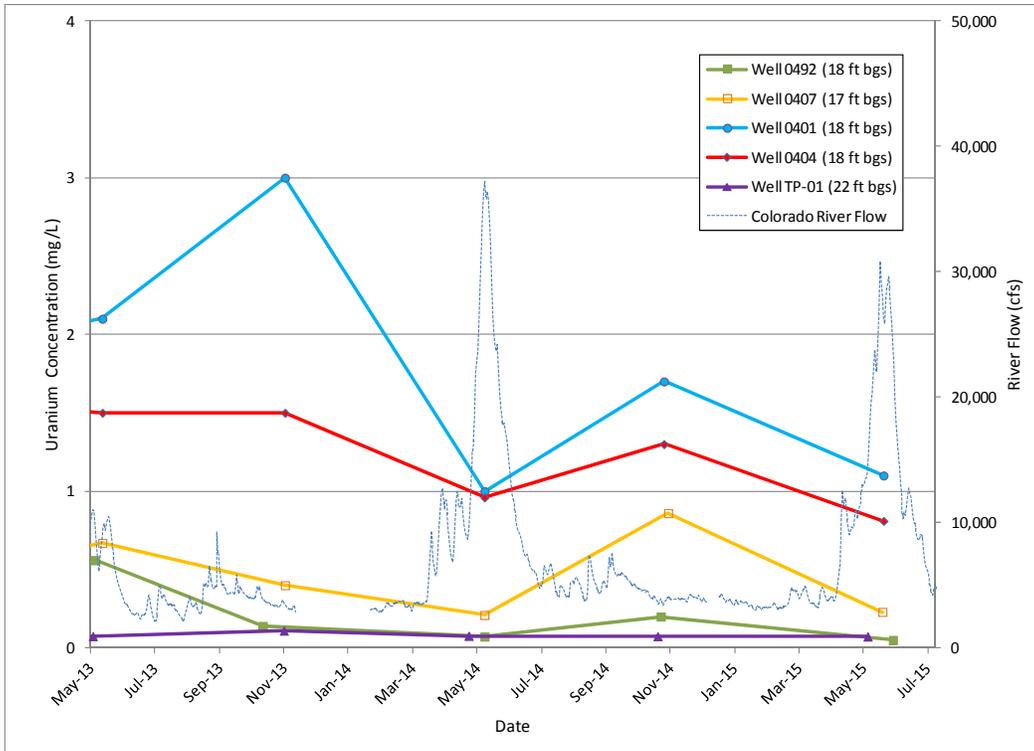


Figure 25. Riverbank Observation Wells 0492, 0407, 0401, 0404, and TP-01 Time versus Uranium Concentration Plot

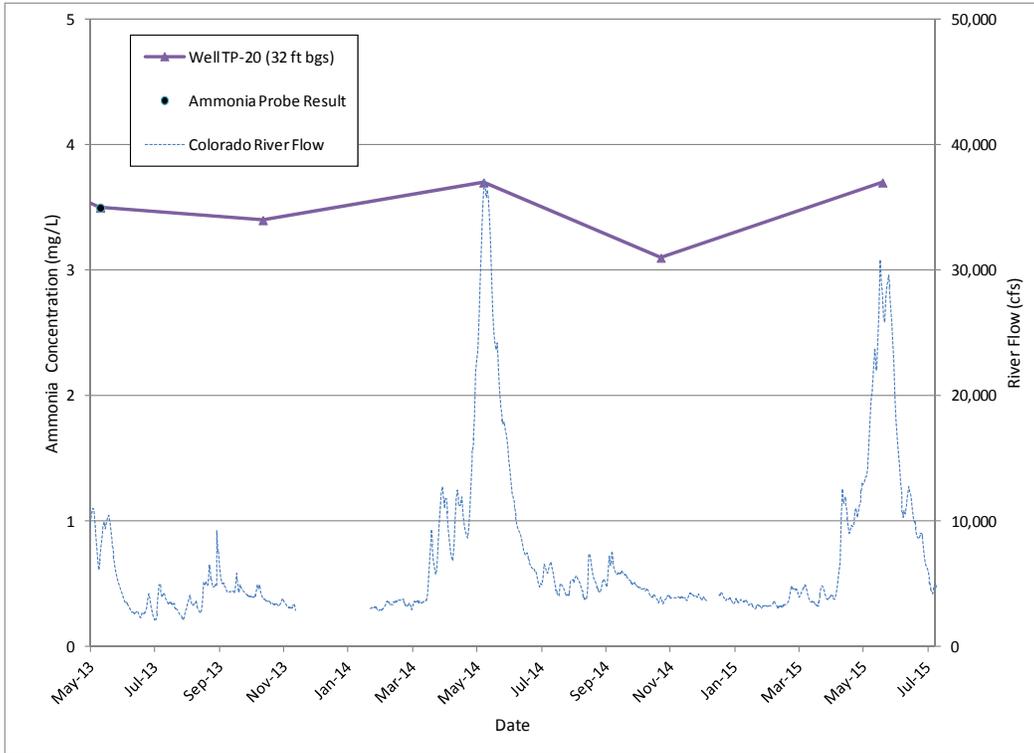


Figure 26. South of Site Observation Well TP-20
Time versus Ammonia Concentration Plot

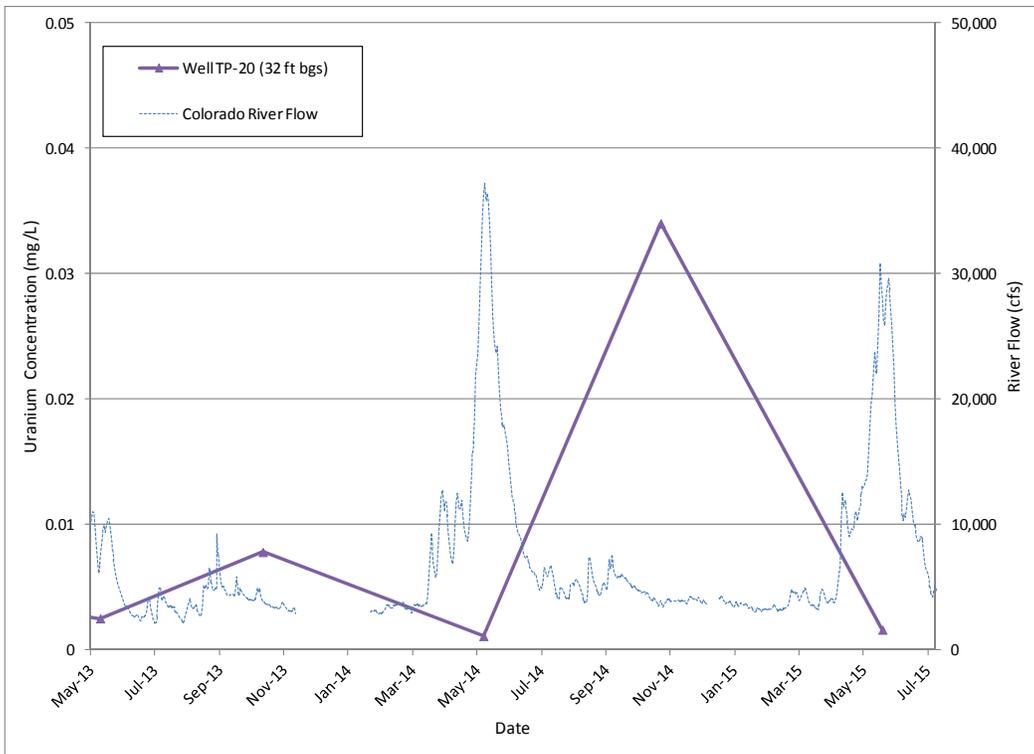


Figure 27. South of Site Observation Well TP-20
Time versus Uranium Concentration Plot

4.3.10 Surface Water Sampling Results

Table 14 presents the ammonia results from the surface water sampling conducted in May/June of 2015 from locations 0201, 0218, 0226, CR1, CR2, CR3, and CR5 (as shown on Figure 2). The ammonia concentrations and comparisons to the applicable EPA criteria for both acute and chronic concentrations (along with the temperature and pH data used to calculate these concentrations) are shown in Table 14. The ammonia concentrations measured during this event, all of which were below 1 mg/L, were below both the acute and chronic criteria.

Table 14. May/June 2015 Surface Water Ammonia Concentrations and Comparisons to EPA Acute and Chronic Criteria

Location	Date	Temp (°C)	pH	Ammonia as N (mg/L)	EPA - Acute Total as N (mg/L)*	EPA - Chronic Total as N (mg/L)**
0201	6/24/15	19.4	7.98	<0.1	8.8	0.83
0218	6/24/15	18.5	8.06	<0.1	7.3	0.71
0226	7/8/15	21.7	8.00	<0.1	8.8	0.68
CR1	6/24/15	18.6	7.22	0.29	31	1.8
CR2	6/24/15	20.5	7.92	<0.1	11	0.84
CR3	6/24/15	18.8	8.06	<0.1	7.3	0.71
CR5	6/24/15	19.8	8.02	<0.1	8.8	0.78

*U.S. EPA Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater State (Effective April 2013), Table N.4., Temperature and pH-Dependent Values, Acute Concentration of Total Ammonia as N (mg/L)

**U.S. EPA Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater State (Effective April 2013), Table 6., Temperature and pH-Dependent Values, Chronic Concentration of Total Ammonia as N (mg/L)

4.4 Tree Plot Area Ground Water Sampling Results

In an attempt to determine if the revegetation tree plots through phytoremediation reduces the ammonia concentrations in ground water, samples were collected from wells 0682, 0683 (both have a sample depth of 28 ft bgs), 0684, 0732, 0733 (sample depth of 18 ft bgs) on March 24 and May 18. These locations are just downgradient of the tree plot in the vicinity of CF3 (Figure 1). Water chemistry data from well AMM-2 (sample depth of 48 ft bgs) was also useful because it's located just upgradient of the tree plot area.

The influence of phytoremediation on the ground water system is difficult to determine because of the other hydrogeologic impacts to this area. Flood irrigation has taken place inside the tree plot since 2005/2006, and upgradient to the tree plot since 2010 (when the CF5 well field was installed). Ground water extraction from CF5 (in particular well 0813 which is located approximately 50 ft upgradient of the tree plot) also plays a role. In addition, this area is in close proximity to the river bank and Moab Wash. Previous investigations have shown that ground water underlying this area is impacted by a freshwater lens that develops when the spring runoff river stage is above average, further reducing the ammonia concentrations.

Figure 28 presents the ammonia concentrations measured since 2005 from wells located upgradient and downgradient of the tree plot. The concentration data are plotted with the river stage over this same time period. Typically this area is subjected to flood irrigation between April and September. With the limited data from these wells since 2009 (no sampling occurred due to site extraction and injection operations taking place in other areas of the well field), it is difficult to quantify the impacts of phytoremediation at this time. Subsequent and more frequent sampling of these locations has been scheduled.

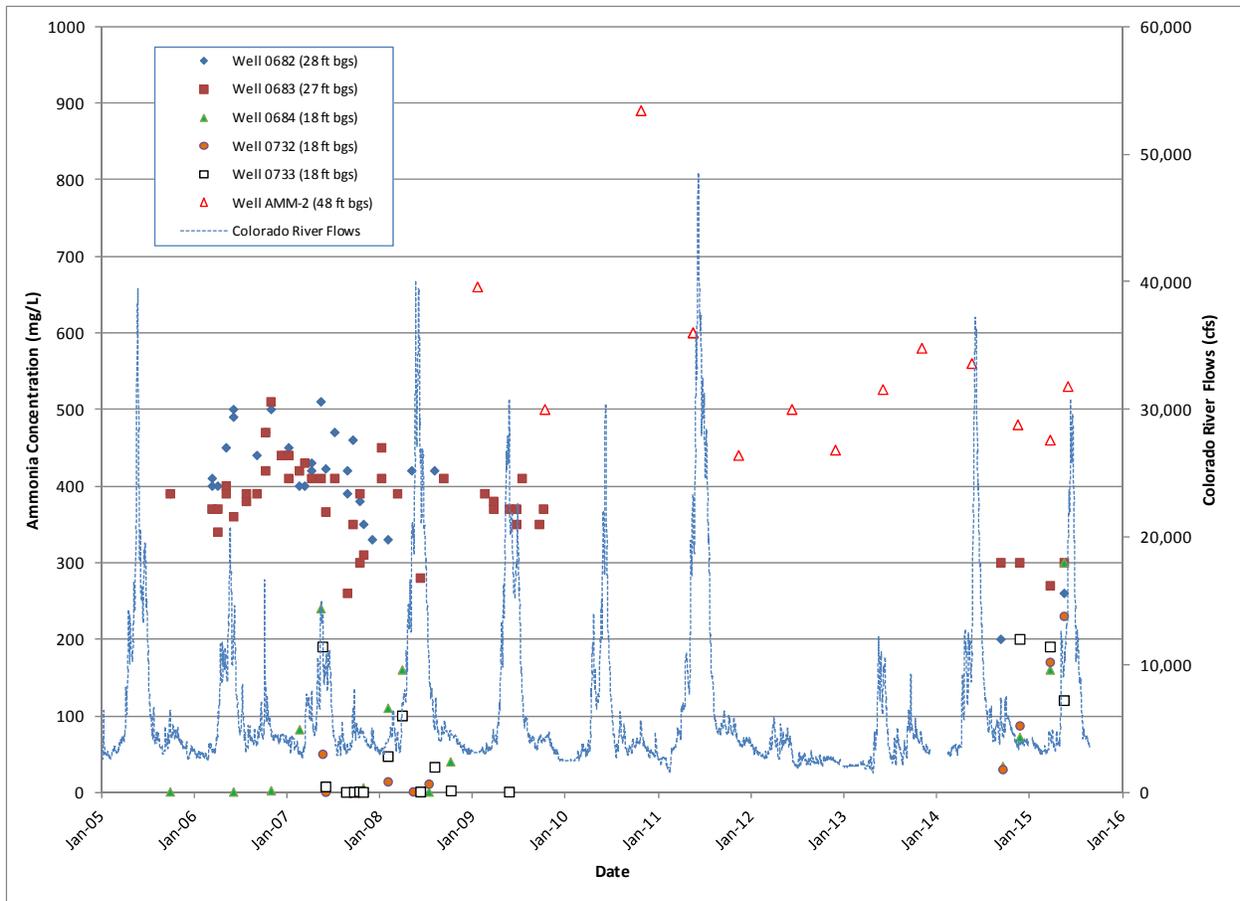


Figure 28. Ground Water Ammonia Concentrations in the Vicinity of the Tree Plot Area

4.5 Ammonia Probe Analysis Results

Previous field results indicated that samples with a high specific conductance impact the instrument accuracy of the Sension2 portable meter with an ammonia gas-sensing, combination probe (model 51927-00). Site-wide samples that had a specific conductance below 20,000 micromhos per centimeter ($\mu\text{mhos/cm}$) and analyzed for ammonia using this equipment are presented in Table 20. Sample splits were collected and submitted to ALS for ammonia analysis to determine how the measured concentrations compared to each other, with the results also provided in Table 15.

Figure 29 is a graphical representation displaying the comparison between the ammonia results generated from the analytical laboratory and the ammonia probe. The analytical laboratory and the ammonia probe comparison result with the trendline having an r^2 value of 0.835. This suggests the ammonia field probe provides comparable results for samples with a specific conductance below 20,000 $\mu\text{mhos/cm}$. The fact that the trendline lies below the dashed line representing a perfect match between the two data sets in Figure 29 suggests the field probe tends to measure lower concentrations compared to the method used by the analytical laboratory.

*Table 15. May/June 2015 Site-wide Ammonia Field Analysis
Results Compared to Analytical Laboratory Results*

Well Number	Date	Ammonia Concentration (mg/L)	
		Analytical Laboratory Results	Field Results
0401	6/16/2015	440	286
0403	6/15/2015	34	30.7
0404	6/16/2015	100	184
0406	6/25/2015	130	127
0407	6/15/2015	24	23.8
0411	6/18/2015	3.7	4.2
0413	6/2/2015	50	47.9
0414	6/1/2015	14	12.7
0439	6/9/2015	6.1	5.45
0453	6/23/2015	200	212
0492	6/25/2015	3	3.1
AMM-3	6/3/2015	270	249
SMI-MW01	6/1/2015	1.7	2.2
SMI-PZ1S	6/22/2015	84	93.5
SMI-PZ3M	6/18/2015	97	111
SMI-PZ3S	6/18/2015	3.4	4.6
UPD-17	6/17/2015	100	115
UPD-18	6/17/2015	160	191

4.6 Ground Water Surface

Water level data were collected between June 15 and 23, 2015, when the Colorado River mean daily flows ranged from 25,800 to 29,600 cubic feet per second (cfs), and the river stage at the site ranged from 3,962.9 to 3,964.2 cfs.

Because ground water elevations during spring runoff flows conditions fluctuate significantly during this time of the year, only the data collected during this time frame were used to generate the ground water surface contour map displayed as Figure 30.

Ground water flow direction and gradient displayed in this contour map is comparable to historical contour maps previously generated using data during this time of year.

4.7 Contaminant Distribution

Figures 31 and 32 are maps showing shallow ground water ammonia and uranium plumes, respectively, using data collected during the May/June 2015 site-wide event. Contaminant distribution is generally comparable to previous plume maps generated using data collected during the past 2 years.

While Figure 32 displays the result associated with well ATP-2-S, this uranium 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 shallowest ground water.

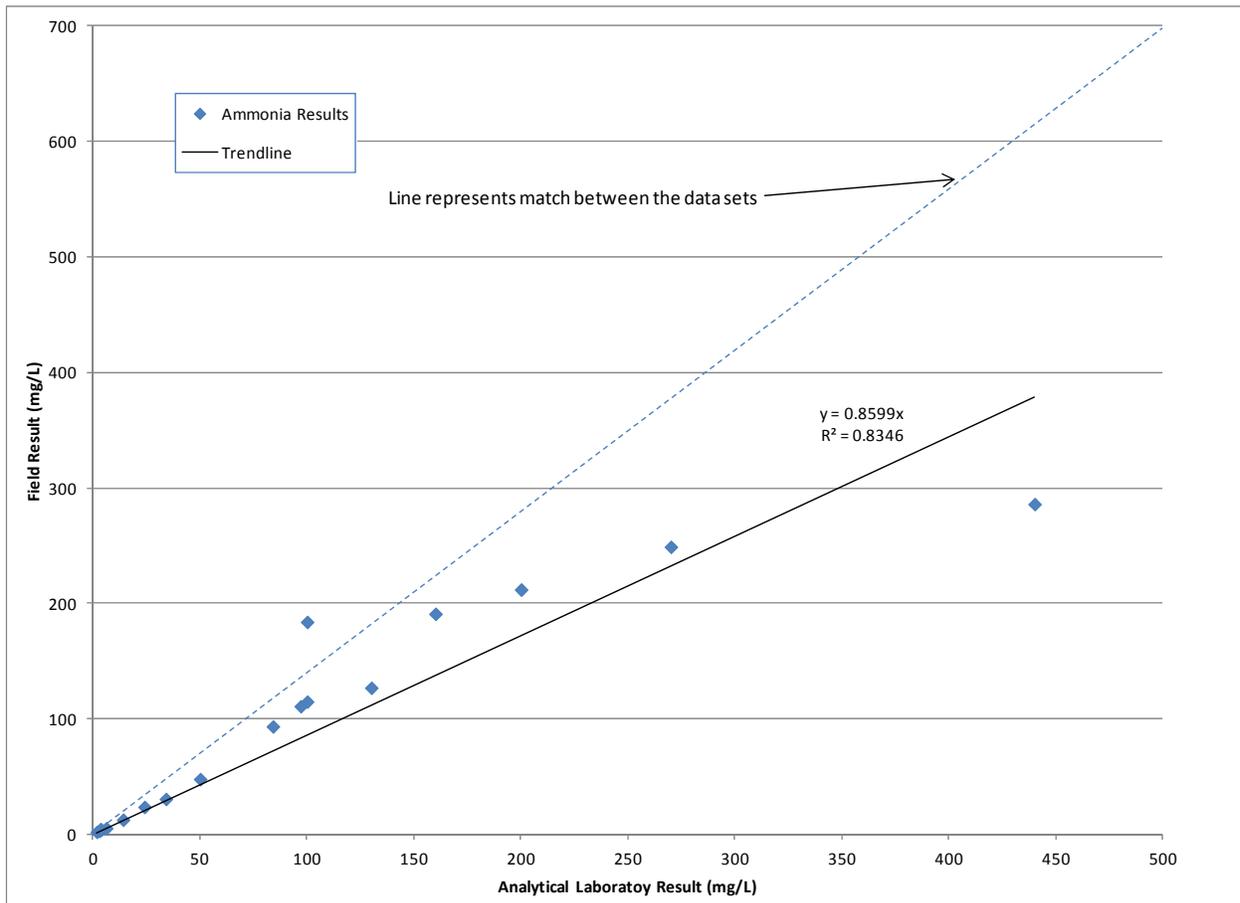


Figure 29. Graphical Comparison of Ammonia Results Generated from the Analytical Laboratory and Field Analyses

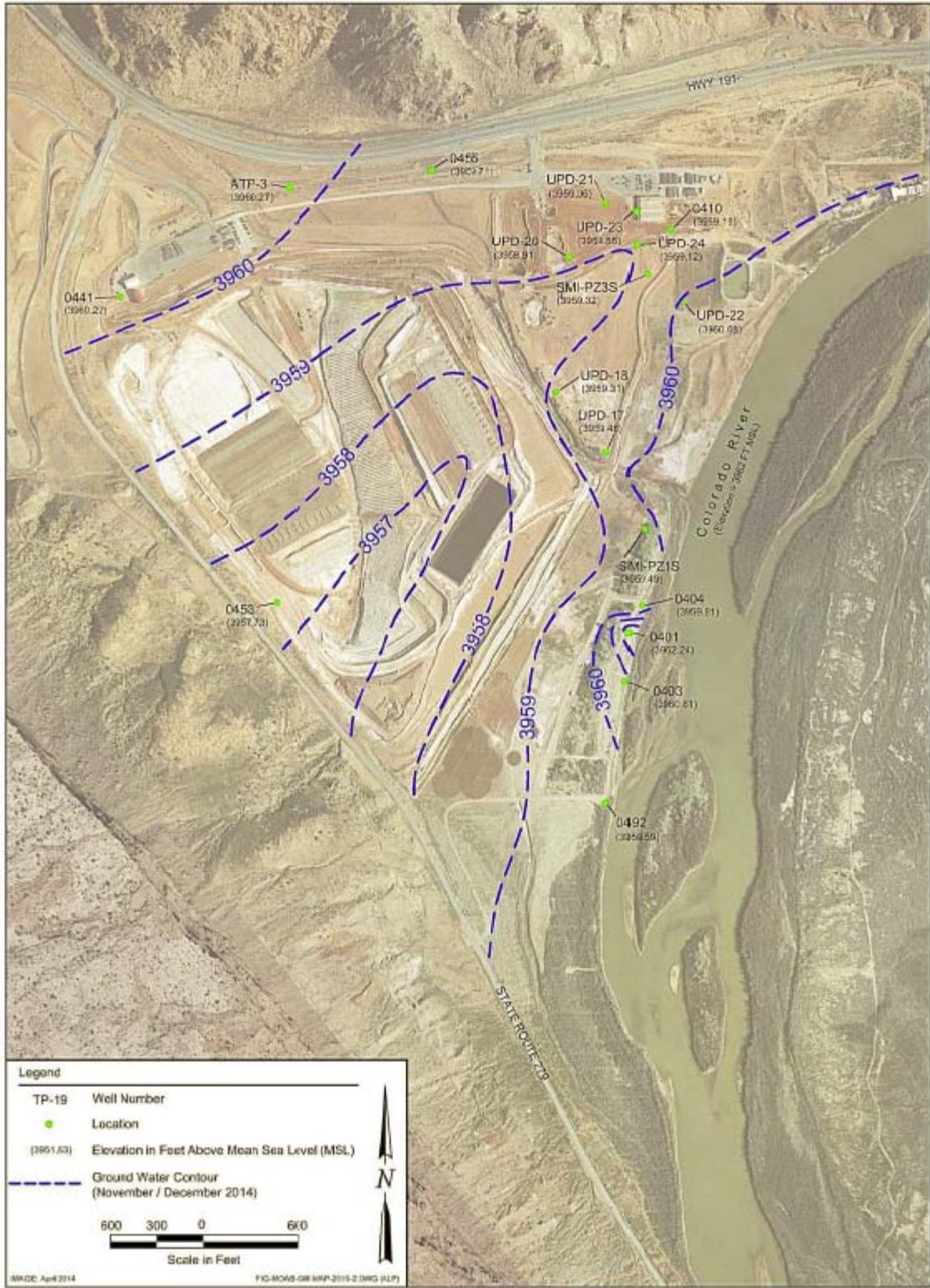


Figure 30. Site-wide Ground Water Elevations, June 15 through 23, 2015

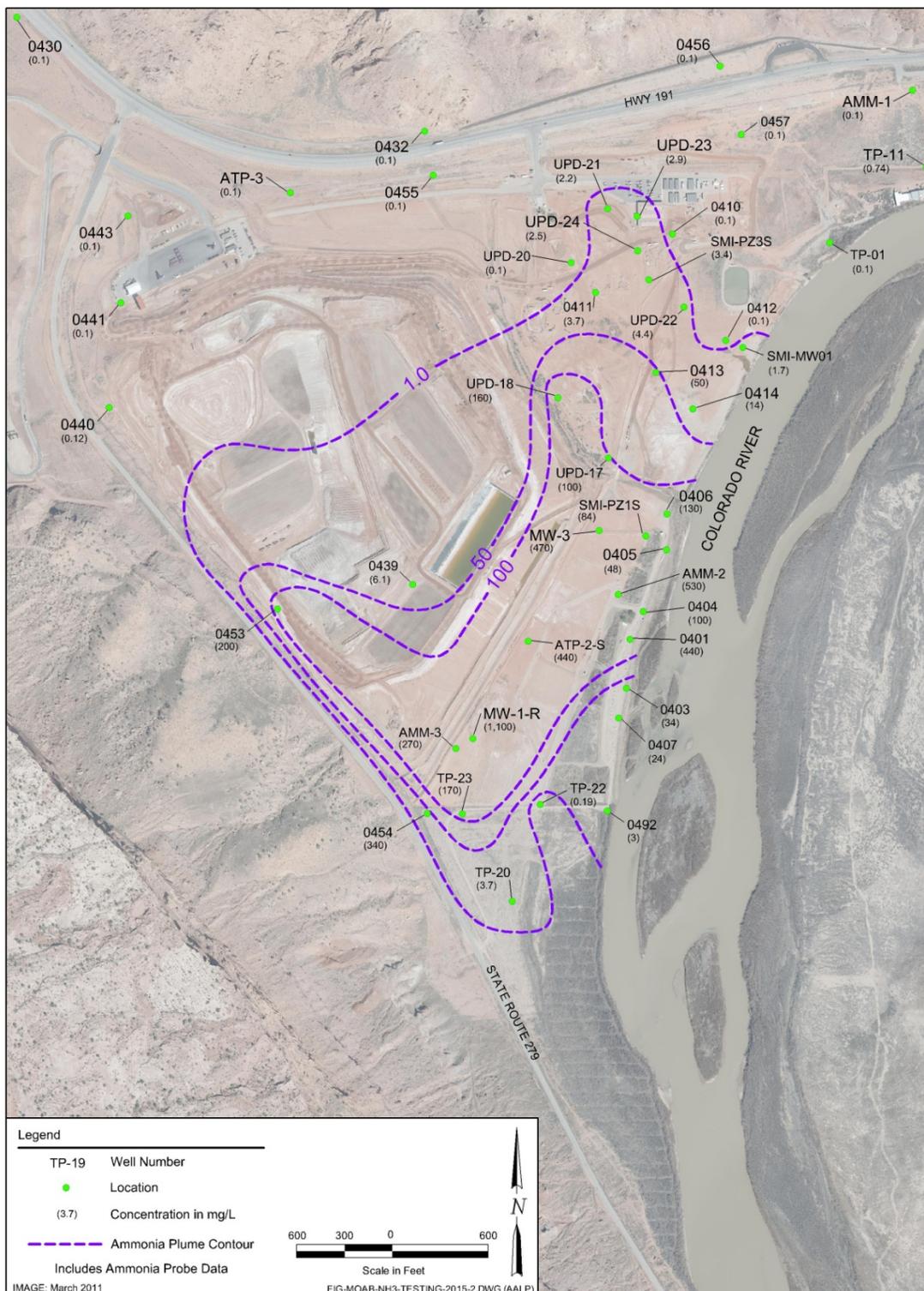


Figure 31. Ammonia Plume in Shallow Ground Water May/June 2015

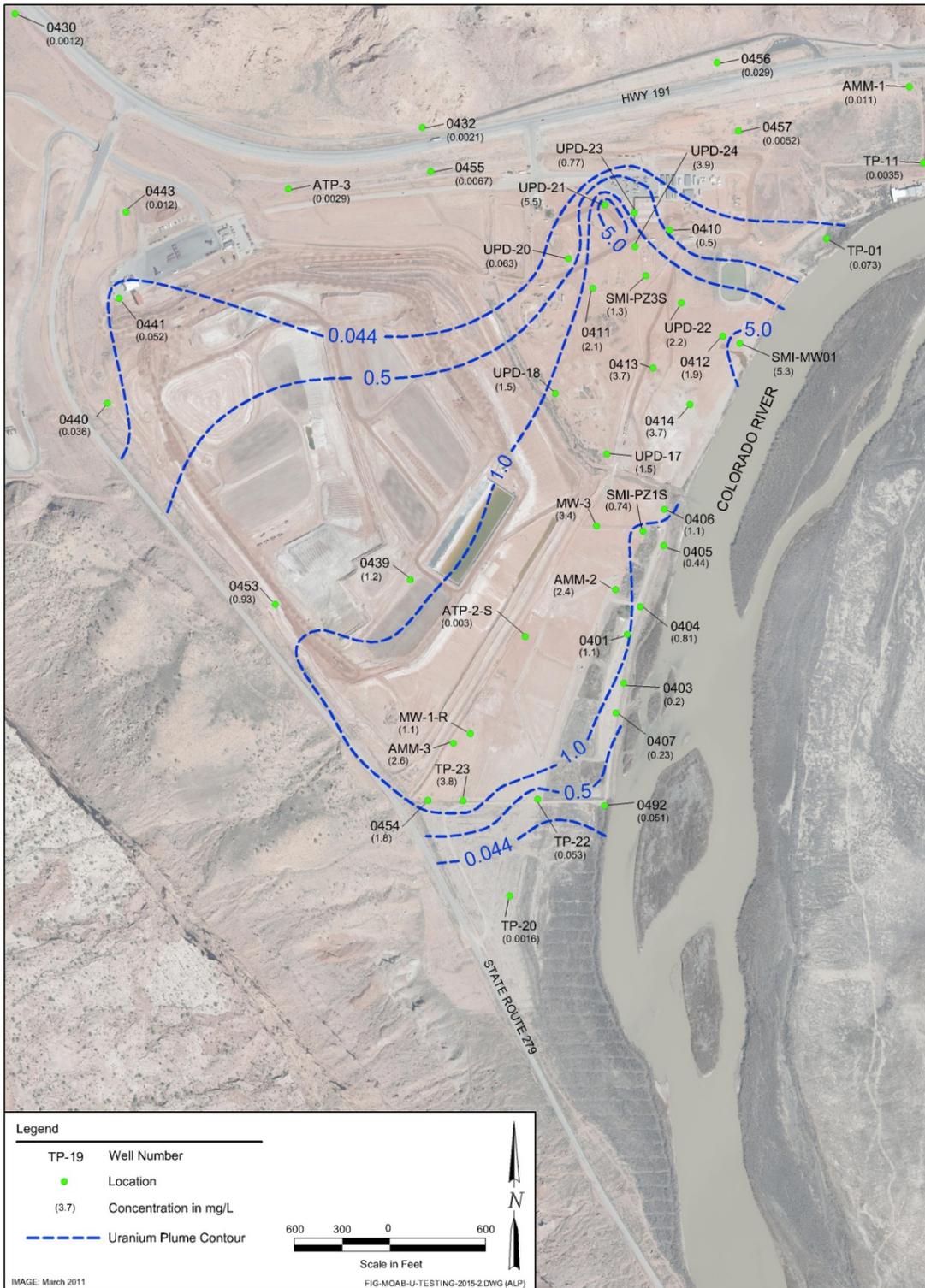


Figure 32. Uranium Plume in Shallow Ground Water May/June 2015

5.0 Conclusions

5.1 March/April 2015 CF4 and Tree Plot Area Sampling Event

The rationale for collecting ground water samples from observation wells surrounding the CF4 injection wells and river bed well points in late March 2015 was to evaluate the effectiveness of the freshwater injection system. At the time of the sampling event, the system had been actively injecting filtered freshwater since January 2015. The results indicate the injection system reduced the ammonia concentrations within the subsurface shallow zone (15 to 35 ft bgs). Water elevation data confirmed up to 11 ft of mounding was generated from this system.

Four ground water samples in the vicinity of the tree plot area (near CF3) were also sampled during this event to determine if phytoremediation had impacted ammonia concentrations in the downgradient direction. These results were included with subsequent May 2015 sampling results.

With the exception of three samples analyzed for ammonia (two of which were more than 50 percent below the historical minimum and one 50 percent above the historical maximum) and one for uranium (which was more than 50 percent below the historical minimum), all ammonia and uranium concentrations associated with this event were within 50 percent of historical ranges during this sampling event.

5.2 May 2015 CF5 and Tree Plot Area Ground Water Sampling Event

All eight CF5 wells were sampled to monitor contaminant concentration trends and update the contaminant concentrations used for the mass removal calculations. Ammonia and uranium concentrations in general have not significantly changed over the past 2 years.

Five ground water samples downgradient of the tree plot area (near CF3) were sampled to determine if phytoremediation had impacted ammonia concentrations. The influence of phytoremediation on the ground water system is difficult to determine because of the other hydrogeologic impacts to the tree plot area in the vicinity of CF3. Flood irrigation between the months of April and September has taken place inside the tree plot since 2005/2006, and upgradient to the tree plot since 2010. CF5 ground water extraction and the area's close proximity to the riverbank further impact the ammonia concentrations.

With the limited data from wells 0682, 0683, 0684, 0732, and 0733 since 2009, no noticeable impacts of phytoremediation are evident based on the available data. Subsequent and more frequent sampling of these locations has been scheduled.

All ammonia and uranium concentrations associated with this event were within 50 percent of historical ranges during this sampling event.

5.3 May/June 2015 Site-wide Sampling Event

The rationale for conducting the May/June 2015 site-wide sampling event was to collect data from the site when the Colorado River typically experiences near peak spring runoff 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.

In general, with the exception of the locations in the vicinity of the Colorado River bank, the ammonia and uranium concentrations did not significantly change since the previous site-wide sampling event in November/December 2014. Concentrations associated with locations impacted by the river stage tend to decrease, especially during above average spring runoff flows.

With the exception of two samples analyzed for ammonia (which were more than 50 percent above the historical maximum), 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 below the applicable EPA criteria (for a suitable habitat) for both acute and chronic concentrations.

6.0 References

40 CFR 192A (Code of Federal Regulations), “Standards for the Control of Residual Radioactive Materials from Inactive Uranium Processing Sites.”

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

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

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

Appendix A.
March/April 2015 CF4 and Tree Plot Area Ground Water 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	March/April 2015 CF4 and Tree Plot Area Sampling Event/1503075	Date(s) of Water Sampling	March 23 through April 2, 2015
Date(s) of Verification	September 1, 2015	Name of Verifier	Ken Pill
		Response (Yes, No, NA)	Comments
1.	Is the Sampling Analysis Plan (SAP) the primary document directing field procedures? List other documents, standard operating procedures, instructions.	Yes	
		NA	
2.	Were the sampling locations specified in the planning documents sampled?	Yes	
3.	Was a pre-trip calibration conducted as specified in the aforementioned documents?	Yes	
4.	Was an operational check of the field equipment conducted in accordance with the SAP? Did the operational checks meet criteria?	Yes	
		Yes	
5.	Were the number and types (alkalinity, temperature, electrical conductivity, pH, turbidity, dissolved oxygen, oxidation reduction potential) of field measurements taken as specified?	Yes	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	
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	One duplicate was collected for 17 samples.

Appendix A. Water Sampling Field Activities Verification (continued)

Sampling Event/RIN	March/April 2015 CF4 and Tree Plot Area Sampling Event/1503075	Date(s) of Water Sampling	March 23 through April 2, 2015
Date(s) of Verification	September 1, 2015	Name of Verifier	Ken Pill
		Response (Yes, No, NA)	Comments
10.	Were EBs taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	All sample were collected using dedicated equipment.
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	
13.	Was the true identity of the samples recorded on the quality assurance sample log?	Yes	
14.	Were samples collected in the containers specified?	Yes	
15.	Were samples filtered and preserved as specified?	Yes	
16.	Were the number and types of samples collected as specified?	Yes	
17.	Were COC records completed, and was sample custody maintained?	Yes	
18.	Are field data sheets signed and dated by both team members?	Yes	
19.	Was all other pertinent information documented on the field data sheets?	Yes	
20.	Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
21.	Were water levels measured at the locations specified in the planning documents?	Yes	

Appendix A. Minimums and Maximums Report

Data Validation Minimums and Maximums Report - No Field Parameters

Laboratory: ALS

RIN: 1503075

Comparison: All Historical Data

Report Date: 9/24/2015

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	0732	03/24/2015	Ammonia Total as N	170		87		0.1	U	J	13	1	
MOA01	0782	03/23/2015	Ammonia Total as N	1		2300		4			39	0	
MOA01	0783	03/23/2015	Ammonia Total as N	0.1	U	380	F	0.16			15	0	
MOA01	0783	03/23/2015	Uranium	0.047		3.7	F	0.063			16	0	
MOA01	0785	03/23/2015	Uranium	0.0075		3.2	F	0.017			21	0	
MOA01	0786	03/23/2015	Ammonia Total as N	0.19		820	J	0.5			37	0	
MOA01	UPD-24	04/02/2015	Ammonia Total as N	2.4		2		0.93			5	0	
MOA01	UPD-24	04/02/2015	Uranium	6.7		14		7			6	0	
MOA01	UPD-24	04/02/2015	Uranium	6.8		14		7			6	0	

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

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

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated

Appendix A. Minimums and Maximums Report (*continued*)

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.		

Appendix A. Water Quality Data

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

REPORT DATE: 9/24/2015

Location: 0683 WELL Configuration 3

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	03/24/2015	0001	28 -	270			#	50	
Oxidation Reduction Potential	mV	03/24/2015	N001	28 -	198			#		
pH	s.u.	03/24/2015	N001	28 -	6.67			#		
Specific Conductance	umhos/cm	03/24/2015	N001	28 -	13011			#		
Temperature	C	03/24/2015	N001	28 -	15.45			#		
Turbidity	NTU	03/24/2015	N001	28 -	3.17			#		
Uranium	mg/L	03/24/2015	0001	28 -	1.3		J	#	0.00029	

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

REPORT DATE: 9/24/2015

Location: 0684 WELL Configuration 3

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	03/24/2015	0001	18 -	160			#	10	
Oxidation Reduction Potential	mV	03/24/2015	N001	18 -	199			#		
pH	s.u.	03/24/2015	N001	18 -	6.61			#		
Specific Conductance	umhos/cm	03/24/2015	N001	18 -	12947			#		
Temperature	C	03/24/2015	N001	18 -	15			#		
Turbidity	NTU	03/24/2015	N001	18 -	1.29			#		
Uranium	mg/L	03/24/2015	0001	18 -	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: 9/24/2015

Location: 0732 WELL Infiltration Trench

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	03/24/2015	0001	18 -	170			#	10	
Oxidation Reduction Potential	mV	03/24/2015	N001	18 -	198			#		
pH	s.u.	03/24/2015	N001	18 -	6.57			#		
Specific Conductance	umhos/cm	03/24/2015	N001	18 -	13219			#		
Temperature	C	03/24/2015	N001	18 -	14.62			#		
Turbidity	NTU	03/24/2015	N001	18 -	0.67			#		
Uranium	mg/L	03/24/2015	0001	18 -	1.3		J	#	0.00029	

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

REPORT DATE: 9/24/2015

Location: 0733 WELL Infiltration Trench

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	03/24/2015	0001	18 -	190			#	50	
Oxidation Reduction Potential	mV	03/24/2015	N001	18 -	202			#		
pH	s.u.	03/24/2015	N001	18 -	6.62			#		
Specific Conductance	umhos/cm	03/24/2015	N001	18 -	12452			#		
Temperature	C	03/24/2015	N001	18 -	15.16			#		
Turbidity	NTU	03/24/2015	N001	18 -	1.31			#		
Uranium	mg/L	03/24/2015	0001	18 -	1.1		J	#	0.00029	

Appendix A. Water Quality Data (continued)

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

REPORT DATE: 9/24/2015

Location: 0780 WELL Configuration 4

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	03/23/2015	0001	28	-	0.15			#	0.1	
Oxidation Reduction Potential	mV	03/23/2015	N001	28	-	111			#		
pH	s.u.	03/23/2015	N001	28	-	7.74			#		
Specific Conductance	umhos/cm	03/23/2015	N001	28	-	1290			#		
Temperature	C	03/23/2015	N001	28	-	11.93			#		
Turbidity	NTU	03/23/2015	N001	28	-	5.59			#		
Uranium	mg/L	03/23/2015	0001	28	-	0.018		J	#	0.000029	

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

REPORT DATE: 9/24/2015

Location: 0781 WELL Configuration 4

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	03/23/2015	0001	48	-	1600			#	50	
Oxidation Reduction Potential	mV	03/23/2015	N001	48	-	247			#		
pH	s.u.	03/23/2015	N001	48	-	6.7			#		
Specific Conductance	umhos/cm	03/23/2015	N001	48	-	74710			#		
Temperature	C	03/23/2015	N001	48	-	12.75			#		
Turbidity	NTU	03/23/2015	N001	48	-	3.5			#		
Uranium	mg/L	03/23/2015	0001	48	-	2.2		J	#	0.00029	

Appendix A. Water Quality Data (continued)

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

REPORT DATE: 9/24/2015

Location: 0782 WELL Configuration 4

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	03/23/2015	0001	32	-	1			#	0.1	
Oxidation Reduction Potential	mV	03/23/2015	N001	32	-	115			#		
pH	s.u.	03/23/2015	N001	32	-	7.36			#		
Specific Conductance	umhos/cm	03/23/2015	N001	32	-	1265			#		
Temperature	C	03/23/2015	N001	32	-	11.75			#		
Turbidity	NTU	03/23/2015	N001	32	-	0.91			#		
Uranium	mg/L	03/23/2015	0001	32	-	0.017		J	#	0.000029	

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

REPORT DATE: 9/24/2015

Location: 0783 WELL Configuration 4

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	03/23/2015	0001	18	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	03/23/2015	N001	18	-	127			#		
pH	s.u.	03/23/2015	N001	18	-	7.49			#		
Specific Conductance	umhos/cm	03/23/2015	N001	18	-	1222			#		
Temperature	C	03/23/2015	N001	18	-	10.78			#		
Turbidity	NTU	03/23/2015	N001	18	-	7.34			#		
Uranium	mg/L	03/23/2015	0001	18	-	0.047		J	#	0.000029	

Appendix A. Water Quality Data (continued)

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

REPORT DATE: 9/24/2015

Location: 0784 WELL Configuration 4

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	03/23/2015	0001	18	-	0.1			#	0.1	
Oxidation Reduction Potential	mV	03/23/2015	N001	18	-	68			#		
pH	s.u.	03/23/2015	N001	18	-	7.44			#		
Specific Conductance	umhos/cm	03/23/2015	N001	18	-	1339			#		
Temperature	C	03/23/2015	N001	18	-	9.41			#		
Turbidity	NTU	03/23/2015	N001	18	-	1.21			#		
Uranium	mg/L	03/23/2015	0001	18	-	0.014		J	#	0.000029	

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

REPORT DATE: 9/24/2015

Location: 0785 WELL Configuration 4

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	03/23/2015	0001	18	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	03/23/2015	N001	18	-	195			#		
pH	s.u.	03/23/2015	N001	18	-	7.37			#		
Specific Conductance	umhos/cm	03/23/2015	N001	18	-	1291			#		
Temperature	C	03/23/2015	N001	18	-	9.43			#		
Turbidity	NTU	03/23/2015	N001	18	-	2.37			#		
Uranium	mg/L	03/23/2015	0001	18	-	0.0075		J	#	0.000029	

Appendix A. Water Quality Data (continued)

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

REPORT DATE: 9/24/2015

Location: 0786 WELL Configuration 4

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	03/23/2015	0001	28	-	0.19			#	0.1	
Oxidation Reduction Potential	mV	03/23/2015	N001	28	-	202			#		
pH	s.u.	03/23/2015	N001	28	-	7.65			#		
Specific Conductance	umhos/cm	03/23/2015	N001	28	-	1270			#		
Temperature	C	03/23/2015	N001	28	-	11.77			#		
Turbidity	NTU	03/23/2015	N001	28	-	0.51			#		
Uranium	mg/L	03/23/2015	0001	28	-	0.0082		J	#	0.000029	

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

REPORT DATE: 9/24/2015

Location: 0787 WELL Configuration 4

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	03/23/2015	0001	36	-	41			#	2.5	
Oxidation Reduction Potential	mV	03/23/2015	N001	36	-	34			#		
pH	s.u.	03/23/2015	N001	36	-	8.23			#		
Specific Conductance	umhos/cm	03/23/2015	N001	36	-	1662			#		
Temperature	C	03/23/2015	N001	36	-	11.65			#		
Turbidity	NTU	03/23/2015	N001	36	-	3.02			#		
Uranium	mg/L	03/23/2015	0001	36	-	0.048		J	#	0.000029	

Appendix A. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/24/2015
Location: 0790 WELL Configuration 4, CONVERTED TO WELL POINT 9/12/06

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	04/02/2015	0001	3 - 3	0.11			#	0.1	
Oxidation Reduction Potential	mV	04/02/2015	N001	3 - 3	-36			#		
pH	s.u.	04/02/2015	N001	3 - 3	7.5			#		
Specific Conductance	umhos/cm	04/02/2015	N001	3 - 3	1273			#		
Temperature	C	04/02/2015	N001	3 - 3	9.98			#		
Turbidity	NTU	04/02/2015	N001	3 - 3	8.4			#		
Uranium	mg/L	04/02/2015	0001	3 - 3	0.038		J	#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/24/2015
Location: 0791 WELL Configuration 4, CONVERTED TO WELL POINT 9/12/06

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	04/02/2015	0001	5.3 - 5.3	160			#	10	
Oxidation Reduction Potential	mV	04/02/2015	N001	5.3 - 5.3	-177			#		
pH	s.u.	04/02/2015	N001	5.3 - 5.3	10.03			#		
Specific Conductance	umhos/cm	04/02/2015	N001	5.3 - 5.3	5757			#		
Temperature	C	04/02/2015	N001	5.3 - 5.3	11.84			#		
Turbidity	NTU	04/02/2015	N001	5.3 - 5.3	336			#		
Uranium	mg/L	04/02/2015	0001	5.3 - 5.3	0.18		J	#	0.000029	

Appendix A. Water Quality Data (continued)

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

REPORT DATE: 9/24/2015

Location: AMM-2 WELL East of pile along road.

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	03/24/2015	0001	48	-	460			#	50	
Oxidation Reduction Potential	mV	03/24/2015	N001	48	-	217			#		
pH	s.u.	03/24/2015	N001	48	-	6.73			#		
Specific Conductance	umhos/cm	03/24/2015	N001	48	-	18971			#		
Temperature	C	03/24/2015	N001	48	-	15.15			#		
Turbidity	NTU	03/24/2015	N001	48	-	21.7			#		
Uranium	mg/L	03/24/2015	0001	48	-	1.9		J	#	0.00029	

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

REPORT DATE: 9/24/2015

Location: SMI-PZ1S WELL Baseline Area

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	03/24/2015	0001	18	-	150			#	50	
Oxidation Reduction Potential	mV	03/24/2015	N001	18	-	201			#		
pH	s.u.	03/24/2015	N001	18	-	6.82			#		
Specific Conductance	umhos/cm	03/24/2015	N001	18	-	10351			#		
Temperature	C	03/24/2015	N001	18	-	12.63			#		
Turbidity	NTU	03/24/2015	N001	18	-	9.87			#		
Uranium	mg/L	03/24/2015	0001	18	-	1.1		J	#	0.00029	

Appendix A. Water Quality Data *(continued)*

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/24/2015
Location: UPD-24 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	04/02/2015	0001	27	-	1.9			#	0.1	
Ammonia Total as N	mg/L	04/02/2015	0002	27	-	2.4			#	0.1	
Oxidation Reduction Potential	mV	04/02/2015	N001	27	-	-32.5			#		
pH	s.u.	04/02/2015	N001	27	-	7.41			#		
Specific Conductance	umhos/cm	04/02/2015	N001	27	-	4568			#		
Temperature	C	04/02/2015	N001	27	-	17.53			#		
Turbidity	NTU	04/02/2015	N001	27	-	1.64			#		
Uranium	mg/L	04/02/2015	0001	27	-	6.7		J	#	0.00029	
Uranium	mg/L	04/02/2015	0002	27	-	6.8		J	#	0.00029	

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: 9/28/2015						
Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date Time	Depth From Top of Casing (Ft)	Water Elevation (MSL)	Water Level Flag
0780	O	3968.45	03/23/2015	14.50	3953.95	
0781	O	3968.56	03/23/2015	14.59	3953.97	
0782	O	3968.46	03/23/2015	14.53	3953.93	
0783	O	3966.16	03/23/2015	13.09	3953.07	
0784	O	3968.73	03/23/2015	15.68	3953.05	
0785	O	3969.24	03/23/2015	15.34	3953.9	
0786	O	3968.14	03/23/2015	14.55	3953.59	
0787	O	3968.43	03/23/2015	14.62	3953.81	
0790	O	3958.23	04/02/2015	7.19	3951.04	
0791	O	3957.73	04/02/2015	5.74	3951.99	
0683	O	3970.73	04/02/2015	13.95	3956.78	
0684	O	3970.22	04/02/2015	13.88	3956.34	
0732	O	3968.99	04/02/2015	12.17	3956.82	
0733	O	3964.45	04/02/2015	11.68	3952.77	
AMM-2	O	3968.50	04/02/2015	9.61	3958.89	
SMI-PZ1S	O	3969.13	04/02/2015	9.43	3959.7	
UPD-24	O	3977.1	04/02/2015	20.95	3956.15	

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. March/April 2015 CF4 and Tree Plot Area Ground Water Sampling Event
Trip Report



Date: September 01, 2015
To: K. Pill
From: James Ritchey
Subject: March 2015 Sampling Trip Report
Site: Moab – Interim Action Well Field Sampling – March 2015
Date of Sampling Event: March 23 – April 02, 2015
Team Members: Elizabeth Moran, James Ritchey
RIN Number Assigned: All samples were assigned to RIN 1503075.
Sample Shipment: All samples were shipped in one cooler overnight UPS to ALS Laboratory from Moab, Utah on April 02, 2015 (Tracking No. 1Z5W1Y510199006897).

July 2014 Configuration 4 Sampling

Number of Locations Sampled: Eight observation wells (0780, 0781, 0782, 0783, 0784, 0785, 0786, and 0787) and two well points (WPs) (0790 and 0791) were sampled during the March 2015 Sampling Event.

Locations Not Sampled: Well point 0792 was dry and could not be sampled.

Field Variance: None.

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

Well No.	Date	Time	Depth to Water (ft btoc)	Sample Depth (ft bgs)
0780	03/23/2015	09:57	14.50	28
0781	03/23/2015	09:39	14.59	48
0782	03/23/2015	10:13	14.53	32
0783	03/23/2015	11:41	13.09	18
0784	03/23/2015	11:19	15.68	18
0785	03/23/2015	10:26	15.34	18
0786	03/23/2015	10:44	14.55	28
0787	03/23/2015	11:01	14.62	36

**Appendix A. March/April 2015 CF4 and Tree Plot Area Ground Water Sampling Event
Trip Report (continued)**

Location-Specific Information – Well Point Sampling: The table below presents the water level, stick up height, and depth to the river surface prior to the initial purge.

Well Point No.	Date	Time	Depth to Water (ft btoc)	Stick Up Height (ft)	Depth to River Surface (ft btoc)
0790	04/02/2015	09:00	7.19	2.85	Dry
0791	04/02/2015	09:54	5.74	3.16	Dry

September 2014 Tree Plot Sampling

Number of Locations Sampled: Six observation wells (0683, 0684, 0732, 0733, AMM-2, and SMI-PZ1S) and were sampled during the March 2015 Sampling Event.

Locations Not Sampled: None.

Field Variance: None.

Quality Control Sample Cross Reference: None.

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

Well No.	Date	Time	Depth to Water (ft btoc)	Pump Intake Depth (ft bgs)
0683	03/24/2015	09:28	13.95	28
0684	03/24/2015	09:49	13.88	18
0732	03/24/2015	10:07	12.17	18
0733	03/24/2015	10:27	11.68	18
AMM-2	03/24/2015	09:03	9.61	48
SMI-PZ1S	03/24/2015	10:51	9.43	18

April 2014 Miscellaneous Sampling

Number of Locations Sampled: One observation wells (UPD-24) and one duplicate were sampled during the March 2015 Sampling Event.

Locations Not Sampled: None.

Field Variance: None.

**Appendix A. March/April 2015 CF4 and Tree Plot Area Ground Water Sampling Event
Trip Report (continued)**

Quality Control Sample Cross Reference: Following is the false identification assigned to the quality control sample:

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2000	UPD-24	Duplicate from 27 ft bgs	Ground Water	MAR 018

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

Name	Date	Time	Depth to Water (ft btoc)	Sample Depth (bgs)
UPD-24	04/02/2015	12:02	20.95	27

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

Date	Daily Mean Flow (cfs)
3/23/2015	4,540
3/24/2015	4,590
3/25/2015	4,470
3/26/2015	4,530
3/27/2015	4,270
3/28/2015	3,920
3/29/2015	4,020
3/30/2015	4,260
3/31/2015	4,480
4/1/2015	4,740
4/2/2015	4,730

Equipment Issues: None.

Corrective Action Required/Taken: None.

Appendix B.
May 2015 CF5 and Tree Plot Area Ground Water Sampling Event

Water Sampling Field Activities Verification
Minimums and Maximums Report
Water Quality Data
Water Level Data
Trip Report

Appendix B. Water Sampling Field Activities Verification

Sampling Event/RIN	May 2015 CF5 and Tree Plot Sampling Event/1507076	Date(s) of Water Sampling	May 12 through 18, 2015
Date(s) of Verification	September 1, 2015	Name of Verifier	Ken Pill
		Response (Yes, No, NA)	Comments
1.	Is the Sampling Analysis Plan (SAP) the primary document directing field procedures? List other documents, standard operating procedures, instructions.	Yes NA	
2.	Were the sampling locations specified in the planning documents sampled?	Yes	
3.	Was a pre-trip calibration conducted as specified in the aforementioned documents?	Yes	
4.	Was an operational check of the field equipment conducted in accordance with the SAP? Did the operational checks meet criteria?	Yes Yes	
5.	Were the number and types (alkalinity, temperature, electrical conductivity, pH, turbidity, dissolved oxygen, oxidation reduction potential) of field measurements taken as specified?	Yes	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 Yes 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?	NA NA	
9.	Were duplicates taken at a frequency of one per 20 samples?	Yes	One duplicate was collected for 14 samples.

Appendix B. Water Sampling Field Activities Verification (continued)

Sampling Event/RIN	May 2015 CF5 and Tree Plot Sampling Event/1507076	Date(s) of Water Sampling	May 12 through 18, 2015
Date(s) of Verification	September 1, 2015	Name of Verifier	Ken Pill
		Response (Yes, No, NA)	Comments
10. Were EBs taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?		NA	All samples were collected using dedicated equipment.
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	

Appendix B. Minimums and Maximums Report

Data Validation Minimums and Maximums Report - No Field Parameters

Laboratory: ALS
 RIN: 1505076
 Comparison: All Historical Data
 Report Date: 9/21/2015

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	0682	05/18/2015	Uranium	1.6			3.1	F		1.9			30	0
MOA01	0684	05/18/2015	Ammonia Total as N	300			240	F		0.43		J	14	0
MOA01	0732	05/18/2015	Ammonia Total as N	230			170			0.1	U	J	14	1
MOA01	0812	05/13/2015	Ammonia Total as N	330			620			350			17	0
MOA01	0814	05/12/2015	Ammonia Total as N	170			900	J		200			17	0

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

LAB QUALIFIERS:

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

DATA QUALIFIERS:

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

Appendix B. Water Quality Data

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

REPORT DATE: 9/22/2015

Location: 0682 WELL Configuration 3

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	05/18/2015	0001	28	-	260		J	#	50	
Oxidation Reduction Potential	mV	05/18/2015	N001	28	-	86			#		
pH	s.u.	05/18/2015	N001	28	-	6.7			#		
Specific Conductance	umhos/cm	05/18/2015	N001	28	-	14177			#		
Temperature	C	05/18/2015	N001	28	-	15.88			#		
Turbidity	NTU	05/18/2015	N001	28	-	1.42			#		
Uranium	mg/L	05/18/2015	0001	28	-	1.6			#	0.00029	

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

REPORT DATE: 9/22/2015

Location: 0683 WELL Configuration 3

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	05/18/2015	0001	27	-	300		J	#	50	
Oxidation Reduction Potential	mV	05/18/2015	N001	27	-	80			#		
pH	s.u.	05/18/2015	N001	27	-	6.71			#		
Specific Conductance	umhos/cm	05/18/2015	N001	27	-	14082			#		
Temperature	C	05/18/2015	N001	27	-	16.15			#		
Turbidity	NTU	05/18/2015	N001	27	-	2.41			#		
Uranium	mg/L	05/18/2015	0001	27	-	1.6			#	0.00029	

Appendix B. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0684 WELL Configuration 3

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	05/18/2015	0001	18	-	300		J	#	10	
Oxidation Reduction Potential	mV	05/18/2015	N001	18	-	71			#		
pH	s.u.	05/18/2015	N001	18	-	6.7			#		
Specific Conductance	umhos/cm	05/18/2015	N001	18	-	14065			#		
Temperature	C	05/18/2015	N001	18	-	15.78			#		
Turbidity	NTU	05/18/2015	N001	18	-	2.64			#		
Uranium	mg/L	05/18/2015	0001	18	-	1.5			#	0.00029	

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

REPORT DATE: 9/22/2015

Location: 0732 WELL Infiltration Trench

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	05/18/2015	0001	18	-	230		J	#	10	
Oxidation Reduction Potential	mV	05/18/2015	N001	18	-	66			#		
pH	s.u.	05/18/2015	N001	18	-	6.64			#		
Specific Conductance	umhos/cm	05/18/2015	N001	18	-	13720			#		
Temperature	C	05/18/2015	N001	18	-	15.34			#		
Turbidity	NTU	05/18/2015	N001	18	-	1.6			#		
Uranium	mg/L	05/18/2015	0001	18	-	1.4			#	0.00029	

Appendix B. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0733 WELL Infiltration Trench

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	05/18/2015	0001	18	-	120		J	#	50	
Oxidation Reduction Potential	mV	05/18/2015	N001	18	-	62			#		
pH	s.u.	05/18/2015	N001	18	-	6.74			#		
Specific Conductance	umhos/cm	05/18/2015	N001	18	-	7520			#		
Temperature	C	05/18/2015	N001	18	-	15.11			#		
Turbidity	NTU	05/18/2015	N001	18	-	1.26			#		
Uranium	mg/L	05/18/2015	0001	18	-	0.82			#	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0810 WELL Configuration 5

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	05/12/2015	0001	10.4	- 40.4	300		J	#	50	
Oxidation Reduction Potential	mV	05/12/2015	N001	10.4	- 40.4	50			#		
pH	s.u.	05/12/2015	N001	10.4	- 40.4	6.7			#		
Specific Conductance	umhos/cm	05/12/2015	N001	10.4	- 40.4	32151			#		
Temperature	C	05/12/2015	N001	10.4	- 40.4	17.9			#		
Turbidity	NTU	05/12/2015	N001	10.4	- 40.4	5.42			#		
Uranium	mg/L	05/12/2015	0001	10.4	- 40.4	3.1			#	0.00029	

Appendix B. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0811 WELL Configuration 5

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/12/2015	0001	8.6 - 38.6	330		J	#	50	
Oxidation Reduction Potential	mV	05/12/2015	N001	8.6 - 38.6	33			#		
pH	s.u.	05/12/2015	N001	8.6 - 38.6	6.73			#		
Specific Conductance	umhos/cm	05/12/2015	N001	8.6 - 38.6	22381			#		
Temperature	C	05/12/2015	N001	8.6 - 38.6	17.3			#		
Turbidity	NTU	05/12/2015	N001	8.6 - 38.6	6.11			#		
Uranium	mg/L	05/12/2015	0001	8.6 - 38.6	2.6			#	0.00029	

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

REPORT DATE: 9/22/2015

Location: 0812 WELL Configuration 5

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/13/2015	0001	14.2 - 44.2	330		J	#	50	
Oxidation Reduction Potential	mV	05/13/2015	N001	14.2 - 44.2	63			#		
pH	s.u.	05/13/2015	N001	14.2 - 44.2	6.72			#		
Specific Conductance	umhos/cm	05/13/2015	N001	14.2 - 44.2	16714			#		
Temperature	C	05/13/2015	N001	14.2 - 44.2	15.51			#		
Turbidity	NTU	05/13/2015	N001	14.2 - 44.2	3.65			#		
Uranium	mg/L	05/13/2015	0001	14.2 - 44.2	1.8			#	0.00029	

Appendix B. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0813 WELL Configuration 5

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/13/2015	0001	14.4 - 44.4	330		J	#	50	
Oxidation Reduction Potential	mV	05/13/2015	N001	14.4 - 44.4	-18			#		
pH	s.u.	05/13/2015	N001	14.4 - 44.4	6.71			#		
Specific Conductance	umhos/cm	05/13/2015	N001	14.4 - 44.4	15310			#		
Temperature	C	05/13/2015	N001	14.4 - 44.4	15.35			#		
Turbidity	NTU	05/13/2015	N001	14.4 - 44.4	0.83			#		
Uranium	mg/L	05/13/2015	0001	14.4 - 44.4	1.5			#	0.00029	

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

REPORT DATE: 9/22/2015

Location: 0814 WELL Configuration 5

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/12/2015	0001	12.4 - 42.4	170		J	#	20	
Oxidation Reduction Potential	mV	05/12/2015	N001	12.4 - 42.4	48			#		
pH	s.u.	05/12/2015	N001	12.4 - 42.4	6.83			#		
Specific Conductance	umhos/cm	05/12/2015	N001	12.4 - 42.4	23445			#		
Temperature	C	05/12/2015	N001	12.4 - 42.4	17.98			#		
Turbidity	NTU	05/12/2015	N001	12.4 - 42.4	1.34			#		
Uranium	mg/L	05/12/2015	0001	12.4 - 42.4	2.8			#	0.00029	

Appendix B. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0815 WELL Configuration 5

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/12/2015	0001	21.7 - 51.7	210		J	#	10	
Ammonia Total as N	mg/L	05/12/2015	0002	21.7 - 51.7	190			#	50	
Oxidation Reduction Potential	mV	05/12/2015	N001	21.7 - 51.7	51			#		
pH	s.u.	05/12/2015	N001	21.7 - 51.7	6.82			#		
Specific Conductance	umhos /cm	05/12/2015	N001	21.7 - 51.7	25604			#		
Temperature	C	05/12/2015	N001	21.7 - 51.7	17.63			#		
Turbidity	NTU	05/12/2015	N001	21.7 - 51.7	0.96			#		
Uranium	mg/L	05/12/2015	0001	21.7 - 51.7	3.3			#	0.00029	
Uranium	mg/L	05/12/2015	0002	21.7 - 51.7	3.3			#	0.00029	

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

REPORT DATE: 9/22/2015

Location: 0816 WELL Configuration 5

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/13/2015	0001	20.9 - 50.9	160		J	#	50	
Oxidation Reduction Potential	mV	05/13/2015	N001	20.9 - 50.9	42			#		
pH	s.u.	05/13/2015	N001	20.9 - 50.9	6.82			#		
Specific Conductance	umhos /cm	05/13/2015	N001	20.9 - 50.9	22933			#		
Temperature	C	05/13/2015	N001	20.9 - 50.9	17.46			#		
Turbidity	NTU	05/13/2015	N001	20.9 - 50.9	6.22			#		
Uranium	mg/L	05/13/2015	0001	20.9 - 50.9	2.7			#	0.00029	

Appendix B. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: SMI-PW02 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/12/2015	0001	20.04 - 60.04	520		J	#	20	
Oxidation Reduction Potential	mV	05/12/2015	N001	20.04 - 60.04	33			#		
pH	s.u.	05/12/2015	N001	20.04 - 60.04	6.71			#		
Specific Conductance	umhos/cm	05/12/2015	N001	20.04 - 60.04	35122Blanks Report			#		
Temperature	C	05/12/2015	N001	20.04 - 60.04	18.01			#		
Turbidity	NTU	05/12/2015	N001	20.04 - 60.04	2.73			#		
Uranium	mg/L	05/12/2015	0001	20.04 - 60.04	3.9			#	0.00029	

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

REPORT DATE: 9/22/2015

Location: SMI-PZ1S WELL Baseline Area

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/18/2015	0001	18 -	130		J	#	50	
Oxidation Reduction Potential	mV	05/18/2015	N001	18 -	84			#		
pH	s.u.	05/18/2015	N001	18 -	6.82			#		
Specific Conductance	umhos/cm	05/18/2015	N001	18 -	8869			#		
Temperature	C	05/18/2015	N001	18 -	14.19			#		
Turbidity	NTU	05/18/2015	N001	18 -	10			#		
Uranium	mg/L	05/18/2015	0001	18 -	1.3			#	0.00029	

BLS = below land surface; umhos/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.

Appendix B. Water Quality Data (*continued*)

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 B. Water Level Data

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site						
REPORT DATE: 3/15/2015						
Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date Time	Depth From Top of Casing (Ft)	Water Elevation (MSL)	Water Level Flag
0810	O	3961.88	05/12/2015	8.41	3953.47	
0811	O	3962.82	05/12/2015	15.65	3947.17	
0812	O	3963.12	05/13/2015	13.27	3949.85	
0813	O	3964.45	05/13/2015	8.83	3955.62	
0814	O	3960.98	05/12/2015	17.53	3943.45	
0815	O	3963.14	05/12/2015	10.44	3952.7	
0816	O	3961.87	05/13/2015	8.32	3953.55	
SMI-PW02	O	3966.73	05/12/2015	21.09	3945.64	
0682	O	3970.18	05/18/2015	12.52	3957.66	
0683	O	3970.73	05/18/2015	12.97	3957.76	
0684	O	3970.22	05/18/2015	12.94	3957.28	
0732	O	3968.99	05/18/2015	11.13	3957.86	
0733	O	3964.45	05/18/2015	10.61	3953.84	
SMI-PZ1S	O	3969.13	05/18/2015	9.44	3959.69	

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

**Appendix B. May 2015 CF5 and Tree Plot Area Ground Water Sampling Event
Trip Report**



Date: September 01, 2015
To: Ken Pill
From: James Ritchey
Subject: May 2015 Sampling Trip Report
Site: Moab – Interim Action Well Field Sampling – May 2015
Date of Sampling Event: May 12 – 18, 2015
Team Members: Elizabeth Moran, James Ritchey
RIN Number Assigned: All samples were assigned to RIN 1505076.
Sample Shipment: All samples were shipped in one cooler overnight UPS to ALS Global from Moab, Utah, on May 20, 2015 (Tracking No. 1Z5W1Y510190845729).

May 2015 Configuration 5 Sampling

Number of Locations Sampled: Eight extraction wells (0810, 0811, 0812, 0813, 0814, 0815, 0816, and SMI-PW02) and one duplicate were sampled during the May 2015 Monthly Sampling Event.

Locations Not Sampled: None.

Field Variance: None.

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

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2000	0815	Duplicate from 21.7 – 51.7 ft bgs	Ground Water	May 005

**Appendix B. May 2015 CF5 and Tree Plot Area Ground Water Sampling Event
Trip Report (continued)**

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

Well No.	Date	Time	Depth to Water (ft btoc)	Pump Intake Depth (ft bgs)
0810	05/12/2015	12:25	8.41	10.4 – 40.4
0811	05/12/2015	12:35	15.65	8.6 – 38.6
0812	05/13/2015	10:40	13.27	14.2 – 44.2
0813	05/13/2015	11:00	8.83	14.4 – 44.4
0814	05/12/2015	14:45	17.53	12.4 – 42.4
0815	05/12/2015	14:35	10.44	21.7 – 51.7
0816	05/13/2015	11:10	8.32	20.9 – 50.9
SMI-PW02	05/12/2015	12:40	21.09	20.0 – 60.0

May 2015 Tree Plot Sampling

Number of Locations Sampled: Six observation wells (0682, 0683, 0684, 0732, 0733, and SMI-PZ1S) were sampled during the May 2015 Sampling Event.

Locations Not Sampled: None.

Field Variance: None.

Quality Control Sample Cross Reference: None.

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

Well No.	Date	Time	Depth to Water (ft btoc)	Pump Intake Depth (ft bgs)
0682	05/18/2015	15:20	12.52	28
0683	05/18/2015	12:45	12.97	27
0684	05/18/2015	13:05	12.94	18
0732	05/18/2015	13:30	11.13	18
0733	05/18/2015	13:45	10.61	18
SMI-PZ1S	05/18/2015	15:40	9.44	18

**Appendix B. May 2015 CF5 and Tree Plot Area Ground Water Sampling Event
Trip Report (continued)**

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

Date	Daily Mean Flow (cfs)
5/12/2015	11,100
5/13/2015	10,200
5/14/2015	9,540
5/15/2015	9,040
5/16/2015	9,300
5/17/2015	9,640
5/18/2015	9,540

Equipment Issues: None.

Corrective Action Required/Taken: None.

Appendix C.
May/June 2015 Site-wide Sampling Event

Water Sampling Field Activities Verification
Minimums and Maximums Report
Water Quality Data
Water Level Data
Equipment Blank Report
Trip Report

Appendix C. Water Sampling Field Activities Verification

Sampling Event/RIN	May/June 2015 Site-wide Sampling Event/1505077	Date(s) of Water Sampling	May 27 through July 9, 2015
Date(s) of Verification	September 1, 2015	Name of Verifier	Ken Pill
		Response (Yes, No, NA)	Comments
1.	Is the Sampling Analysis Plan (SAP) the primary document directing field procedures?	Yes	
2.	List other documents, standard operating procedures, instructions.	NA	
3.	Were the sampling locations specified in the planning documents sampled?	Yes	
4.	Was a pre-trip calibration conducted as specified in the aforementioned documents?	Yes	
5.	Was an operational check of the field equipment conducted in accordance with the SAP?	Yes	
6.	Did the operational checks meet criteria?	Yes	
7.	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.
8.	Was the category of the well documented?	Yes	
9.	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 Yes NA	
10.	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	
11.	Were duplicates taken at a frequency of one per 20 samples?	Yes	Four duplicates were collected for 67 samples.

Appendix C. Water Sampling Field Activities Verification (continued)

Sampling Event/RIN	May/June 2015 Site-wide Sampling Event/1505077	Date(s) of Water Sampling	May 27 through July 9, 2015
Date(s) of Verification	September 1, 2015	Name of Verifier	Ken Pill
	Response (Yes, No, NA)	Comments	
12. Were EBs taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	Yes	One EB was collected for the seven samples collected using non-dedicated equipment.	
13. Were trip blanks prepared and included with each shipment of volatile organic compound samples?	NA		
14. 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		
15. Were samples collected in the containers specified?	Yes		
16. Were samples filtered and preserved as specified?	Yes		
17. Were the number and types of samples collected as specified?	NA		
18. Were COC records completed, and was sample custody maintained?	Yes		
19. Are field data sheets signed and dated by both team members?	Yes		
20. Was all other pertinent information documented on the field data sheets?	NA		
21. Was the presence or absence of ice in the cooler documented at every sample location?	Yes		
22. Were water levels measured at the locations specified in the planning documents?	Yes		

Appendix C. Minimums and Maximums Report

Data Validation Minimums and Maximums Report - No Field Parameters

Laboratory: ALS

RIN: 1505077

Comparison: All Historical Data

Report Date: 9/22/2015

Site Code	Location Code	Sample Date	Analyte	Current		Historical Maximum			Historical Minimum			Count	
				Result	Qualifiers Lab Data	Result	Qualifiers Lab Data	Result	Qualifiers Lab Data	N	N Below Detect		
MOA01	0406	06/25/2015	Ammonia Total as N	130		510		150			18	0	
MOA01	0432	06/10/2015	Uranium	0.0021		0.002	F	0.0017			10	0	
MOA01	0435	05/27/2015	Uranium	0.044		0.029		0.0101			10	0	
MOA01	0441	06/23/2015	Uranium	0.052		0.047		0.025			7	0	
MOA01	0455	06/23/2015	Uranium	0.0067		0.0053		0.0021			9	0	
MOA01	0456	06/23/2015	Uranium	0.029		0.027	J	0.0166			9	0	
MOA01	0457	05/27/2015	Uranium	0.0052		0.0024		0.0014			12	0	
MOA01	0492	06/25/2015	Uranium	0.051		6	F	0.073			33	0	
MOA01	CR1	06/24/2015	Ammonia Total as N	0.29		0.25		0.003	U J		45	38	
MOA01	CR2	06/24/2015	Uranium	0.0018		0.093		0.002			17	0	
MOA01	CR5	06/24/2015	Uranium	0.0012		0.0115		0.0013			44	0	
MOA01	SMI-PW03	06/18/2015	Ammonia Total as N	200		150	J	21			19	0	
MOA01	SMI-PZ1S	06/22/2015	Ammonia Total as N	84		565		100			31	0	
MOA01	SMI-PZ3M	06/18/2015	Ammonia Total as N	97		84		34			16	0	
MOA01	TP-11	06/01/2015	Uranium	0.0035		0.002		0.00068			11	0	
MOA01	TP-22	07/09/2015	Uranium	0.53		0.39		0.21			9	0	

Appendix C. Minimums and Maximums Report *(continued)*

Data Validation Minimums and Maximums Report - No Field Parameters

Laboratory: ALS

RIN: 1505077

Comparison: All Historical Data

Report Date: 9/22/2015

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	UPD-17	06/17/2015	Ammonia Total as N	100		300		110		6	0
MOA01	UPD-18	06/17/2015	Ammonia Total as N	160		310		210		6	0
MOA01	UPD-18	06/17/2015	Uranium	1.5		1.4		0.81		8	0
MOA01	UPD-20	06/17/2015	Uranium	0.063		0.97		0.064		8	0
MOA01	UPD-21	06/17/2015	Ammonia Total as N	2.2		74		3.3		6	0
MOA01	UPD-22	06/16/2015	Uranium	2.2		3.9		2.4		8	0
MOA01	UPD-24	06/18/2015	Ammonia Total as N	2.5		2.4		0.93		7	0
MOA01	UPD-24	06/18/2015	Ammonia Total as N	2.9		2.4		0.93		7	0
MOA01	UPD-24	06/18/2015	Uranium	3.9		14		6.7		8	0
MOA01	UPD-24	06/18/2015	Uranium	4.1		14		6.7		8	0

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

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

LAB QUALIFIERS:

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

Appendix C. Minimums and Maximums Report *(continued)*

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.		

Appendix C. Water Quality Data

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

REPORT DATE: 9/22/2015

Location: 0201 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/24/2015	0001	0 - 0	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/24/2015	N001	0 - 0	40			#		
pH	s.u.	06/24/2015	N001	0 - 0	7.98			#		
Specific Conductance	umhos/cm	06/24/2015	N001	0 - 0	341			#		
Temperature	C	06/24/2015	N001	0 - 0	19.43			#		
Turbidity	NTU	06/24/2015	N001	0 - 0	999	>		#		
Uranium	mg/L	06/24/2015	0001	0 - 0	0.0017			J #	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0218 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/24/2015	0001	0 - 0	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/24/2015	N001	0 - 0	56			#		
pH	s.u.	06/24/2015	N001	0 - 0	8.06			#		
Specific Conductance	umhos/cm	06/24/2015	N001	0 - 0	337			#		
Temperature	C	06/24/2015	N001	0 - 0	18.47			#		
Turbidity	NTU	06/24/2015	N001	0 - 0	230			#		
Uranium	mg/L	06/24/2015	0001	0 - 0	0.0015			J #	0.000029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: 0226 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	07/08/2015	0001	0 - 0	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	07/08/2015	N001	0 - 0	65.6			#		
pH	s.u.	07/08/2015	N001	0 - 0	8			#		
Specific Conductance	umhos/cm	07/08/2015	N001	0 - 0	602			#		
Temperature	C	07/08/2015	N001	0 - 0	21.71			#		
Turbidity	NTU	07/08/2015	N001	0 - 0	999	>		#		
Uranium	mg/L	07/08/2015	0001	0 - 0	0.0026			J #	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: 0401 WELL Configuration 2

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/16/2015	0001	18 -	440			#	50	
Oxidation Reduction Potential	mV	06/16/2015	N001	18 -	67			#		
pH	s.u.	06/16/2015	N001	18 -	6.93			#		
Specific Conductance	umhos/cm	06/16/2015	N001	18 -	12980			#		
Temperature	C	06/16/2015	N001	18 -	16.96			#		
Turbidity	NTU	06/16/2015	N001	18 -	2.09			#		
Uranium	mg/L	06/16/2015	0001	18 -	1.1			#	0.00029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0403 WELL Configuration 1

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/15/2015	0001	18	-	34			#	2	
Oxidation Reduction Potential	mV	06/15/2015	N001	18	-	-54			#		
pH	s.u.	06/15/2015	N001	18	-	7.8			#		
Specific Conductance	umhos/cm	06/15/2015	N001	18	-	1400			#		
Temperature	C	06/15/2015	N001	18	-	16.75			#		
Turbidity	NTU	06/15/2015	N001	18	-	3.81			#		
Uranium	mg/L	06/15/2015	0001	18	-	0.2			#	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0404 WELL Configuration 3

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/16/2015	0001	18	-	100			#	10	
Ammonia Total as N	mg/L	06/16/2015	0002	18	-	100			#	5	
Oxidation Reduction Potential	mV	06/16/2015	N001	18	-	67			#		
pH	s.u.	06/16/2015	N001	18	-	6.89			#		
Specific Conductance	umhos/cm	06/16/2015	N001	18	-	7529			#		
Temperature	C	06/16/2015	N001	18	-	16.53			#		
Turbidity	NTU	06/16/2015	N001	18	-	1.63			#		
Uranium	mg/L	06/16/2015	0001	18	-	0.81			#	0.000029	
Uranium	mg/L	06/16/2015	0002	18	-	0.81			#	0.000029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: 0405 WELL Baseline Area

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	07/09/2015	0001	18	-	48			#	1	
Oxidation Reduction Potential	mV	07/09/2015	N001	18	-	56			#		
pH	s.u.	07/09/2015	N001	18	-	7.13			#		
Specific Conductance	umhos/cm	07/09/2015	N001	18	-	3352			#		
Temperature	C	07/09/2015	N001	18	-	14.33			#		
Turbidity	NTU	07/09/2015	N001	18	-	1.24			#		
Uranium	mg/L	07/09/2015	0001	18	-	0.44		J	#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: 0406 WELL Baseline Area

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/25/2015	0001	18	-	130			#	10	
Oxidation Reduction Potential	mV	06/25/2015	N001	18	-	120			#		
pH	s.u.	06/25/2015	N001	18	-	7.03			#		
Specific Conductance	umhos/cm	06/25/2015	N001	18	-	8578			#		
Temperature	C	06/25/2015	N001	18	-	16.65			#		
Turbidity	NTU	06/25/2015	N001	18	-	25.3			#		
Uranium	mg/L	06/25/2015	0001	18	-	1.1			#	0.00029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0407 WELL Configuration 1

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/15/2015	0001	17	-	24			#	2	
Oxidation Reduction Potential	mV	06/15/2015	N001	17	-	-33			#		
pH	s.u.	06/15/2015	N001	17	-	7.42			#		
Specific Conductance	umhos/cm	06/15/2015	N001	17	-	1800			#		
Temperature	C	06/15/2015	N001	17	-	16.26			#		
Turbidity	NTU	06/15/2015	N001	17	-	3.27			#		
Uranium	mg/L	06/15/2015	0001	17	-	0.23			#	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0410 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/18/2015	0001	23.5	-	0.1	U		#	0.1	
Uranium	mg/L	06/18/2015	0001	23.5	-	0.5			#	0.000029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0411 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/18/2015	0001	8	-	3.7			#	0.1	
Oxidation Reduction Potential	mV	06/18/2015	N001	8	-	98.7			#		
pH	s.u.	06/18/2015	N001	8	-	7.55			#		
Specific Conductance	umhos/cm	06/18/2015	N001	8	-	6173			#		
Temperature	C	06/18/2015	N001	8	-	20.4			#		
Turbidity	NTU	06/18/2015	N001	8	-	21.9			#		
Uranium	mg/L	06/18/2015	0001	8	-	2.1			#	0.00029	

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

REPORT DATE: 9/22/2015

Location: 0412 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/01/2015	0001	9.5	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/01/2015	N001	9.5	-	114			#		
pH	s.u.	06/01/2015	N001	9.5	-	7.7			#		
Specific Conductance	umhos/cm	06/01/2015	N001	9.5	-	1700			#		
Temperature	C	06/01/2015	N001	9.5	-	17.55			#		
Turbidity	NTU	06/01/2015	N001	9.5	-	606			#		
Uranium	mg/L	06/01/2015	0001	9.5	-	1.9		J	#	0.00029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0413 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/02/2015	0001	10.5 -	50			#	2.5	
Oxidation Reduction Potential	mV	06/02/2015	N001	10.5 -	61			#		
pH	s.u.	06/02/2015	N001	10.5 -	7.71			#		
Specific Conductance	umhos/cm	06/02/2015	N001	10.5 -	6286			#		
Temperature	C	06/02/2015	N001	10.5 -	16.23			#		
Turbidity	NTU	06/02/2015	N001	10.5 -	3.94			#		
Uranium	mg/L	06/02/2015	0001	10.5 -	3.7		J	#	0.00029	

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

REPORT DATE: 9/22/2015

Location: 0414 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/01/2015	0001	7.5 -	14			#	1	
Oxidation Reduction Potential	mV	06/01/2015	N001	7.5 -	94			#		
pH	s.u.	06/01/2015	N001	7.5 -	7.15			#		
Specific Conductance	umhos/cm	06/01/2015	N001	7.5 -	10201			#		
Temperature	C	06/01/2015	N001	7.5 -	16			#		
Turbidity	NTU	06/01/2015	N001	7.5 -	2.03			#		
Uranium	mg/L	06/01/2015	0001	7.5 -	3.7		J	#	0.00029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0430 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/11/2015	0001	101	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/11/2015	N001	101	-	-23			#		
pH	s.u.	06/11/2015	N001	101	-	7.24			#		
Specific Conductance	umhos/cm	06/11/2015	N001	101	-	7364			#		
Temperature	C	06/11/2015	N001	101	-	18.82			#		
Turbidity	NTU	06/11/2015	N001	101	-	0.87			#		
Uranium	mg/L	06/11/2015	0001	101	-	0.012			#	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0431 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/10/2015	0001	91	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/10/2015	N001	91	-	130.6			#		
pH	s.u.	06/10/2015	N001	91	-	7.02			#		
Specific Conductance	umhos/cm	06/10/2015	N001	91	-	39380			#		
Temperature	C	06/10/2015	N001	91	-	18.52			#		
Turbidity	NTU	06/10/2015	N001	91	-	0.91			#		
Uranium	mg/L	06/10/2015	0001	91	-	0.011			#	0.000029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0432 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/10/2015	0001	55	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/10/2015	N001	55	-	-38.4			#		
pH	s.u.	06/10/2015	N001	55	-	7.51			#		
Specific Conductance	umhos/cm	06/10/2015	N001	55	-	3662			#		
Temperature	C	06/10/2015	N001	55	-	20.17			#		
Turbidity	NTU	06/10/2015	N001	55	-	4.13			#		
Uranium	mg/L	06/10/2015	0001	55	-	0.0021			#	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0433 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/23/2015	0001	99	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/23/2015	N001	99	-	77			#		
pH	s.u.	06/23/2015	N001	99	-	7.58			#		
Specific Conductance	umhos/cm	06/23/2015	N001	99	-	4939			#		
Temperature	C	06/23/2015	N001	99	-	19.9			#		
Turbidity	NTU	06/23/2015	N001	99	-	2.58			#		
Uranium	mg/L	06/23/2015	0001	99	-	0.0021			#	0.000029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0434 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/10/2015	0001	35 -	0.22		J	#	0.1	
Oxidation Reduction Potential	mV	06/10/2015	N001	35 -	-12.4			#		
pH	s.u.	06/10/2015	N001	35 -	7.06			#		
Specific Conductance	umhos/cm	06/10/2015	N001	35 -	52123			#		
Temperature	C	06/10/2015	N001	35 -	20.29			#		
Turbidity	NTU	06/10/2015	N001	35 -	1.66			#		
Uranium	mg/L	06/10/2015	0001	35 -	0.024			#	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0435 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	05/27/2015	0001	173 -	1.8			#	0.1	
Oxidation Reduction Potential	mV	05/27/2015	N001	173 -	-83			#		
pH	s.u.	05/27/2015	N001	173 -	7.07			#		
Specific Conductance	umhos/cm	05/27/2015	N001	173 -	120521			#		
Temperature	C	05/27/2015	N001	173 -	18.49			#		
Turbidity	NTU	05/27/2015	N001	173 -	1.54			#		
Uranium	mg/L	05/27/2015	0001	173 -	0.044		J	#	0.000029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0436 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	07/08/2015	0001	197 -	3.6			#	0.1	
Oxidation Reduction Potential	mV	07/08/2015	N001	197 -	-156.1			#		
pH	s.u.	07/08/2015	N001	197 -	6.99			#		
Specific Conductance	umhos/cm	07/08/2015	N001	197 -	120475			#		
Temperature	C	07/08/2015	N001	197 -	20.15			#		
Turbidity	NTU	07/08/2015	N001	197 -	6.78			#		
Uranium	mg/L	07/08/2015	0001	197 -	0.0097		J	#	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0439 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/09/2015	0001	118 -	6.1			#	0.5	
Oxidation Reduction Potential	mV	06/09/2015	N001	118 -	115			#		
pH	s.u.	06/09/2015	N001	118 -	6.92			#		
Specific Conductance	umhos/cm	06/09/2015	N001	118 -	11595			#		
Temperature	C	06/09/2015	N001	118 -	18.29			#		
Turbidity	NTU	06/09/2015	N001	118 -	6.38			#		
Uranium	mg/L	06/09/2015	0001	118 -	1.2			#	0.00029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: 0440 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/09/2015	0001	117 -	0.12		J	#	0.1	
Oxidation Reduction Potential	mV	06/09/2015	N001	117 -	120			#		
pH	s.u.	06/09/2015	N001	117 -	7.2			#		
Specific Conductance	umhos/cm	06/09/2015	N001	117 -	9587			#		
Temperature	C	06/09/2015	N001	117 -	19.33			#		
Turbidity	NTU	06/09/2015	N001	117 -	4.51			#		
Uranium	mg/L	06/09/2015	0001	117 -	0.036			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: 0441 WELL Queue/Support Area

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/23/2015	0001	117 -	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/23/2015	N001	117 -	64.9			#		
pH	s.u.	06/23/2015	N001	117 -	7.25			#		
Specific Conductance	umhos/cm	06/23/2015	N001	117 -	11988			#		
Temperature	C	06/23/2015	N001	117 -	19.86			#		
Turbidity	NTU	06/23/2015	N001	117 -	3.03			#		
Uranium	mg/L	06/23/2015	0001	117 -	0.052			#	0.000029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0443 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/10/2015	0001	73	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/10/2015	N001	73	-	123.7			#		
pH	s.u.	06/10/2015	N001	73	-	7.29			#		
Specific Conductance	umhos/cm	06/10/2015	N001	73	-	7180			#		
Temperature	C	06/10/2015	N001	73	-	18.48			#		
Turbidity	NTU	06/10/2015	N001	73	-	3.12			#		
Uranium	mg/L	06/10/2015	0001	73	-	0.012			#	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0444 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	05/27/2015	0001	116	-	1.7			#	0.1	
Oxidation Reduction Potential	mV	05/27/2015	N001	116	-	-86			#		
pH	s.u.	05/27/2015	N001	116	-	7.12			#		
Specific Conductance	umhos/cm	05/27/2015	N001	116	-	116453			#		
Temperature	C	05/27/2015	N001	116	-	20.89			#		
Turbidity	NTU	05/27/2015	N001	116	-	3.62			#		
Uranium	mg/L	05/27/2015	0001	116	-	0.016		J	#	0.000029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0453 WELL Contaminated Area

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/23/2015	0001	80	-	200			#	10	
Oxidation Reduction Potential	mV	06/23/2015	N001	80	-	120			#		
pH	s.u.	06/23/2015	N001	80	-	7.18			#		
Specific Conductance	umhos/cm	06/23/2015	N001	80	-	33980			#		
Temperature	C	06/23/2015	N001	80	-	19.67			#		
Turbidity	NTU	06/23/2015	N001	80	-	3.56			#		
Uranium	mg/L	06/23/2015	0001	80	-	0.93			#	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0454 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/03/2015	0001	13	-	340			#	20	
Oxidation Reduction Potential	mV	06/03/2015	N001	13	-	46			#		
pH	s.u.	06/03/2015	N001	13	-	6.89			#		
Specific Conductance	umhos/cm	06/03/2015	N001	13	-	68153			#		
Temperature	C	06/03/2015	N001	13	-	18.82			#		
Turbidity	NTU	06/03/2015	N001	13	-	4.03			#		
Uranium	mg/L	06/03/2015	0001	13	-	1.8		J	#	0.00029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0455 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/23/2015	0001	46	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/23/2015	N001	46	-	61.6			#		
pH	s.u.	06/23/2015	N001	46	-	7.7			#		
Specific Conductance	umhos/cm	06/23/2015	N001	46	-	2999			#		
Temperature	C	06/23/2015	N001	46	-	24.46			#		
Turbidity	NTU	06/23/2015	N001	46	-	999	>		#		
Uranium	mg/L	06/23/2015	0001	46	-	0.0067			#	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0456 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/23/2015	0001	53	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/23/2015	N001	53	-	92.5			#		
pH	s.u.	06/23/2015	N001	53	-	7.48			#		
Specific Conductance	umhos/cm	06/23/2015	N001	53	-	8795			#		
Temperature	C	06/23/2015	N001	53	-	22.84			#		
Turbidity	NTU	06/23/2015	N001	53	-	999	>		#		
Uranium	mg/L	06/23/2015	0001	53	-	0.029			#	0.000029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: 0457 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	05/27/2015	0001	29	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	05/27/2015	N001	29	-	15			#		
pH	s.u.	05/27/2015	N001	29	-	7.76			#		
Specific Conductance	umhos/cm	05/27/2015	N001	29	-	5887			#		
Temperature	C	05/27/2015	N001	29	-	18.12			#		
Turbidity	NTU	05/27/2015	N001	29	-	1.86			#		
Uranium	mg/L	05/27/2015	0001	29	-	0.0052		J	#	0.000029	

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

REPORT DATE: 9/22/2015

Location: 0492 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/25/2015	0001	18	-	3			#	0.1	
Oxidation Reduction Potential	mV	06/25/2015	N001	18	-	75			#		
pH	s.u.	06/25/2015	N001	18	-	7.58			#		
Specific Conductance	umhos/cm	06/25/2015	N001	18	-	974			#		
Temperature	C	06/25/2015	N001	18	-	17.42			#		
Turbidity	NTU	06/25/2015	N001	18	-	1.73			#		
Uranium	mg/L	06/25/2015	0001	18	-	0.051			#	0.000029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site											
REPORT DATE: 9/22/2015											
Location: AMM-1 WELL NE corner of DOE property.											
Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers Lab	Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	06/01/2015	0001	19	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/01/2015	N001	19	-	54			#		
pH	s.u.	06/01/2015	N001	19	-	6.89			#		
Specific Conductance	umhos /cm	06/01/2015	N001	19	-	33426			#		
Temperature	C	06/01/2015	N001	19	-	18.4			#		
Turbidity	NTU	06/01/2015	N001	19	-	2.01			#		
Uranium	mg/L	06/01/2015	0001	19	-	0.011		J	#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site											
REPORT DATE: 9/22/2015											
Location: AMM-2 WELL East of pile along road.											
Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers Lab	Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	06/02/2015	0001	48	-	530			#	50	
Oxidation Reduction Potential	mV	06/02/2015	N001	48	-	56			#		
pH	s.u.	06/02/2015	N001	48	-	6.9			#		
Specific Conductance	umhos /cm	06/02/2015	N001	48	-	23513			#		
Temperature	C	06/02/2015	N001	48	-	17.34			#		
Turbidity	NTU	06/02/2015	N001	48	-	9.46			#		
Uranium	mg/L	06/02/2015	0001	48	-	2.4		J	#	0.00029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: AMM-3 WELL Near SE corner of pile.

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/03/2015	0001	48	-	270			#	10	
Oxidation Reduction Potential	mV	06/03/2015	N001	48	-	98			#		
pH	s.u.	06/03/2015	N001	48	-	6.94			#		
Specific Conductance	umhos/cm	06/03/2015	N001	48	-	19616			#		
Temperature	C	06/03/2015	N001	48	-	19.82			#		
Turbidity	NTU	06/03/2015	N001	48	-	28.3			#		
Uranium	mg/L	06/03/2015	0001	48	-	2.6		J	#	0.00029	

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

REPORT DATE: 9/22/2015

Location: ATP-2-D WELL Piezometer; see boring ATP-2

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/02/2015	0001	88	-	300			#	20	
Oxidation Reduction Potential	mV	06/02/2015	N001	88	-	-268			#		
pH	s.u.	06/02/2015	N001	88	-	8			#		
Specific Conductance	umhos/cm	06/02/2015	N001	88	-	130195			#		
Temperature	C	06/02/2015	N001	88	-	18.96			#		
Turbidity	NTU	06/02/2015	N001	88	-	38.9			#		
Uranium	mg/L	06/02/2015	0001	88	-	0.0029		J	#	0.000029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: ATP-2-S WELL Piezometer; see boring ATP-2

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/02/2015	0001	25	-	440			#	20	
Oxidation Reduction Potential	mV	06/02/2015	N001	25	-	60			#		
pH	s.u.	06/02/2015	N001	25	-	9.06			#		
Specific Conductance	umhos/cm	06/02/2015	N001	25	-	16789			#		
Temperature	C	06/02/2015	N001	25	-	20.46			#		
Turbidity	NTU	06/02/2015	N001	25	-	7.38			#		
Uranium	mg/L	06/02/2015	0001	25	-	0.003		J	#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: ATP-3 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/23/2015	0001	51	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/23/2015	N001	51	-	-0.2			#		
pH	s.u.	06/23/2015	N001	51	-	7.63			#		
Specific Conductance	umhos/cm	06/23/2015	N001	51	-	2540			#		
Temperature	C	06/23/2015	N001	51	-	19.33			#		
Turbidity	NTU	06/23/2015	N001	51	-	1.8			#		
Uranium	mg/L	06/23/2015	0001	51	-	0.0029			#	0.000029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: CR1 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/24/2015	0001	0 - 0	0.29		J	#	0.1	
Oxidation Reduction Potential	mV	06/24/2015	N001	0 - 0	133			#		
pH	s.u.	06/24/2015	N001	0 - 0	7.22			#		
Specific Conductance	umhos/cm	06/24/2015	N001	0 - 0	362			#		
Temperature	C	06/24/2015	N001	0 - 0	18.62			#		
Turbidity	NTU	06/24/2015	N001	0 - 0	181			#		
Uranium	mg/L	06/24/2015	0001	0 - 0	0.0015		J	#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: CR2 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/24/2015	0001	0 - 0	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/24/2015	N001	0 - 0	93			#		
pH	s.u.	06/24/2015	N001	0 - 0	7.92			#		
Specific Conductance	umhos/cm	06/24/2015	N001	0 - 0	342			#		
Temperature	C	06/24/2015	N001	0 - 0	20.47			#		
Turbidity	NTU	06/24/2015	N001	0 - 0	592			#		
Uranium	mg/L	06/24/2015	0001	0 - 0	0.0018		J	#	0.000029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: CR3 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/25/2015	0001	0 - 0	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/25/2015	N001	0 - 0	85			#		
pH	s.u.	06/25/2015	N001	0 - 0	8.06			#		
Specific Conductance	umhos/cm	06/25/2015	N001	0 - 0	339			#		
Temperature	C	06/25/2015	N001	0 - 0	18.75			#		
Turbidity	NTU	06/25/2015	N001	0 - 0	243			#		
Uranium	mg/L	06/25/2015	0001	0 - 0	0.0013			J #	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: CR5 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/24/2015	0001	0 - 0	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/24/2015	N001	0 - 0	70.4			#		
pH	s.u.	06/24/2015	N001	0 - 0	8.02			#		
Specific Conductance	umhos/cm	06/24/2015	N001	0 - 0	336			#		
Temperature	C	06/24/2015	N001	0 - 0	19.81			#		
Turbidity	NTU	06/24/2015	N001	0 - 0	159			#		
Uranium	mg/L	06/24/2015	0001	0 - 0	0.0012			J #	0.000029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: MW-1-R WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/03/2015	0001	13	-	1100			#	50	
Ammonia Total as N	mg/L	06/03/2015	0002	13	-	1100			#	50	
Oxidation Reduction Potential	mV	06/03/2015	N001	13	-	144			#		
pH	s.u.	06/03/2015	N001	13	-	6.95			#		
Specific Conductance	umhos /cm	06/03/2015	N001	13	-	40580			#		
Temperature	C	06/03/2015	N001	13	-	15.77			#		
Turbidity	NTU	06/03/2015	N001	13	-	42			#		
Uranium	mg/L	06/03/2015	0001	13	-	1.1			#	0.00029	
Uranium	mg/L	06/03/2015	0002	13	-	0.96		J	#	0.00029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: MW-3 WELL See borehole 8

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	07/09/2015	0001	44	-	470			#	50	
Ammonia Total as N	mg/L	07/09/2015	0002	44	-	490			#	20	
Oxidation Reduction Potential	mV	07/09/2015	N001	44	-	78			#		
pH	s.u.	07/09/2015	N001	44	-	6.88			#		
Specific Conductance	umhos/cm	07/09/2015	N001	44	-	27426			#		
Temperature	C	07/09/2015	N001	44	-	18.6			#		
Turbidity	NTU	07/09/2015	N001	44	-	5.11			#		
Uranium	mg/L	07/09/2015	0001	44	-	3.4			#	0.00029	
Uranium	mg/L	07/09/2015	0002	44	-	3.2		J	#	0.00029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: SMI-MW01 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/01/2015	0001	16	-	1.7			#	0.1	
Oxidation Reduction Potential	mV	06/01/2015	N001	16	-	110			#		
pH	s.u.	06/01/2015	N001	16	-	7.32			#		
Specific Conductance	umhos/cm	06/01/2015	N001	16	-	5550			#		
Temperature	C	06/01/2015	N001	16	-	21.38			#		
Turbidity	NTU	06/01/2015	N001	16	-	50.1			#		
Uranium	mg/L	06/01/2015	0001	16	-	5.3		J	#	0.00029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: SMI-PW01 WELL Baseline Area

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/22/2015	0001	40	-	750			#	20	
Oxidation Reduction Potential	mV	06/22/2015	N001	40	-	43.9			#		
pH	s.u.	06/22/2015	N001	40	-	6.9			#		
Specific Conductance	umhos/cm	06/22/2015	N001	40	-	33570			#		
Temperature	C	06/22/2015	N001	40	-	21.09			#		
Turbidity	NTU	06/22/2015	N001	40	-	4.64			#		
Uranium	mg/L	06/22/2015	0001	40	-	3.1			#	0.00029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: SMI-PW03 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/18/2015	0001	60	-	200			#	20	
Oxidation Reduction Potential	mV	06/18/2015	N001	60	-	70.9			#		
pH	s.u.	06/18/2015	N001	60	-	7.17			#		
Specific Conductance	umhos/cm	06/18/2015	N001	60	-	22091			#		
Temperature	C	06/18/2015	N001	60	-	20.2			#		
Turbidity	NTU	06/18/2015	N001	60	-	9.27			#		
Uranium	mg/L	06/18/2015	0001	60	-	1.9			#	0.00029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: SMI-PZ1D2 WELL Baseline Area

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/22/2015	0001	73	-	1500			#	50	
Oxidation Reduction Potential	mV	06/22/2015	N001	73	-	43.6			#		
pH	s.u.	06/22/2015	N001	73	-	6.72			#		
Specific Conductance	umhos/cm	06/22/2015	N001	73	-	89745			#		
Temperature	C	06/22/2015	N001	73	-	18.15			#		
Turbidity	NTU	06/22/2015	N001	73	-	22.1			#		
Uranium	mg/L	06/22/2015	0001	73	-	1.8			#	0.00029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: SMI-PZ1M WELL Baseline Area

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/22/2015	0001	57	-	870			#	50	
Oxidation Reduction Potential	mV	06/22/2015	N001	57	-	46.2			#		
pH	s.u.	06/22/2015	N001	57	-	6.88			#		
Specific Conductance	umhos/cm	06/22/2015	N001	57	-	34741			#		
Temperature	C	06/22/2015	N001	57	-	17.93			#		
Turbidity	NTU	06/22/2015	N001	57	-	7.77			#		
Uranium	mg/L	06/22/2015	0001	57	-	3.4			#	0.00029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: SMI-PZ1S WELL Baseline Area

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/22/2015	0001	18	-	84			#	2.5	
Oxidation Reduction Potential	mV	06/22/2015	N001	18	-	49.2			#		
pH	s.u.	06/22/2015	N001	18	-	7.14			#		
Specific Conductance	umhos/cm	06/22/2015	N001	18	-	4756			#		
Temperature	C	06/22/2015	N001	18	-	14.9			#		
Turbidity	NTU	06/22/2015	N001	18	-	8.76			#		
Uranium	mg/L	06/22/2015	0001	18	-	0.74			#	0.000029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: SMI-PZ2D WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/08/2015	0001	75	-	400			#	50	
Oxidation Reduction Potential	mV	06/08/2015	N001	75	-	122			#		
pH	s.u.	06/08/2015	N001	75	-	6.85			#		
Specific Conductance	umhos/cm	06/08/2015	N001	75	-	120966			#		
Temperature	C	06/08/2015	N001	75	-	17.88			#		
Turbidity	NTU	06/08/2015	N001	75	-	2.09			#		
Uranium	mg/L	06/08/2015	0001	75	-	0.48			#	0.000029	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: SMI-PZ2M2 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/08/2015	0001	56	-	510			#	50	
Oxidation Reduction Potential	mV	06/08/2015	N001	56	-	115			#		
pH	s.u.	06/08/2015	N001	56	-	6.79			#		
Specific Conductance	umhos/cm	06/08/2015	N001	56	-	102729			#		
Temperature	C	06/08/2015	N001	56	-	18.03			#		
Turbidity	NTU	06/08/2015	N001	56	-	3.24			#		
Uranium	mg/L	06/08/2015	0001	56	-	1			#	0.00029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: SMI-PZ3D2 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/18/2015	0001	78	-	450			#	10	
Oxidation Reduction Potential	mV	06/18/2015	N001	78	-	89.4			#		
pH	s.u.	06/18/2015	N001	78	-	7.06			#		
Specific Conductance	umhos/cm	06/18/2015	N001	78	-	26816			#		
Temperature	C	06/18/2015	N001	78	-	12.5			#		
Turbidity	NTU	06/18/2015	N001	78	-	1.68			#		
Uranium	mg/L	06/18/2015	0001	78	-	1.4			#	0.00029	

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

REPORT DATE: 9/22/2015

Location: SMI-PZ3M WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/18/2015	0001	59	-	97			#	2	
Oxidation Reduction Potential	mV	06/18/2015	N001	59	-	84.4			#		
pH	s.u.	06/18/2015	N001	59	-	7.32			#		
Specific Conductance	umhos/cm	06/18/2015	N001	59	-	16147			#		
Temperature	C	06/18/2015	N001	59	-	20.7			#		
Turbidity	NTU	06/18/2015	N001	59	-	3.25			#		
Uranium	mg/L	06/18/2015	0001	59	-	1.1			#	0.00029	

Appendix C. Water Quality Data (continued)

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: SMI-PZ3S WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/18/2015	0001	25	-	3.4			#	0.1	
Oxidation Reduction Potential	mV	06/18/2015	N001	25	-	88.1			#		
pH	s.u.	06/18/2015	N001	25	-	8.1			#		
Specific Conductance	umhos/cm	06/18/2015	N001	25	-	5146			#		
Temperature	C	06/18/2015	N001	25	-	18.8			#		
Turbidity	NTU	06/18/2015	N001	25	-	3.21			#		
Uranium	mg/L	06/18/2015	0001	25	-	1.3			#	0.00015	

General Water Quality Data by Location (USEE105) FOR SITE MOA01, Moab Site
REPORT DATE: 9/22/2015
Location: TP-01 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/01/2015	0001	22	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/01/2015	N001	22	-	68			#		
pH	s.u.	06/01/2015	N001	22	-	7.48			#		
Specific Conductance	umhos/cm	06/01/2015	N001	22	-	7394			#		
Temperature	C	06/01/2015	N001	22	-	16.27			#		
Turbidity	NTU	06/01/2015	N001	22	-	1.48			#		
Uranium	mg/L	06/01/2015	0001	22	-	0.073		J	#	0.000029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: TP-11 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/01/2015	0001	30	-	0.74			#	0.1	
Oxidation Reduction Potential	mV	06/01/2015	N001	30	-	24			#		
pH	s.u.	06/01/2015	N001	30	-	7.32			#		
Specific Conductance	umhos/cm	06/01/2015	N001	30	-	20616			#		
Temperature	C	06/01/2015	N001	30	-	16.78			#		
Turbidity	NTU	06/01/2015	N001	30	-	9.4			#		
Uranium	mg/L	06/01/2015	0001	30	-	0.0035		J	#	0.000029	

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

REPORT DATE: 9/22/2015

Location: TP-20 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/15/2015	0001	32	-	3.7			#	0.1	
Oxidation Reduction Potential	mV	06/15/2015	N001	32	-	-17			#		
pH	s.u.	06/15/2015	N001	32	-	7.14			#		
Specific Conductance	umhos/cm	06/15/2015	N001	32	-	141047			#		
Temperature	C	06/15/2015	N001	32	-	19.81			#		
Turbidity	NTU	06/15/2015	N001	32	-	9.56			#		
Uranium	mg/L	06/15/2015	0001	32	-	0.0016			#	0.000029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: TP-22 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	07/09/2015	0001	17	-	0.19			#	0.1	
Oxidation Reduction Potential	mV	07/09/2015	N001	17	-	60			#		
pH	s.u.	07/09/2015	N001	17	-	6.87			#		
Specific Conductance	umhos/cm	07/09/2015	N001	17	-	38788			#		
Temperature	C	07/09/2015	N001	17	-	18.9			#		
Turbidity	NTU	07/09/2015	N001	17	-	442			#		
Uranium	mg/L	07/09/2015	0001	17	-	0.53		J	#	0.000029	

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

REPORT DATE: 9/22/2015

Location: TP-23 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/03/2015	0001	25	-	170			#	10	
Oxidation Reduction Potential	mV	06/03/2015	N001	25	-	123			#		
pH	s.u.	06/03/2015	N001	25	-	6.99			#		
Specific Conductance	umhos/cm	06/03/2015	N001	25	-	53877			#		
Temperature	C	06/03/2015	N001	25	-	20.1			#		
Turbidity	NTU	06/03/2015	N001	25	-	14.8			#		
Uranium	mg/L	06/03/2015	0001	25	-	3.8		J	#	0.00029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: UPD-17 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/17/2015	0001	14.5 -	100			#	10	
Oxidation Reduction Potential	mV	06/17/2015	N001	14.5 -	91.2			#		
pH	s.u.	06/17/2015	N001	14.5 -	6.79			#		
Specific Conductance	umhos/cm	06/17/2015	N001	14.5 -	11318			#		
Temperature	C	06/17/2015	N001	14.5 -	18.2			#		
Turbidity	NTU	06/17/2015	N001	14.5 -	1.8			#		
Uranium	mg/L	06/17/2015	0001	14.5 -	1.5			#	0.00015	

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

REPORT DATE: 9/22/2015

Location: UPD-18 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Ammonia Total as N	mg/L	06/17/2015	0001	13 -	160			#	20	
Oxidation Reduction Potential	mV	06/17/2015	N001	13 -	84.1			#		
pH	s.u.	06/17/2015	N001	13 -	7			#		
Specific Conductance	umhos/cm	06/17/2015	N001	13 -	12405			#		
Temperature	C	06/17/2015	N001	13 -	18.9			#		
Turbidity	NTU	06/17/2015	N001	13 -	10.1			#		
Uranium	mg/L	06/17/2015	0001	13 -	1.5			#	0.00015	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: UPD-20 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/17/2015	0001	17	-	0.1	U		#	0.1	
Oxidation Reduction Potential	mV	06/17/2015	N001	17	-	59.1			#		
pH	s.u.	06/17/2015	N001	17	-	7.4			#		
Specific Conductance	umhos/cm	06/17/2015	N001	17	-	4804			#		
Temperature	C	06/17/2015	N001	17	-	22.6			#		
Turbidity	NTU	06/17/2015	N001	17	-	20.7			#		
Uranium	mg/L	06/17/2015	0001	17	-	0.063			#	0.000029	

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

REPORT DATE: 9/22/2015

Location: UPD-21 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/17/2015	0001	25	-	2.2			#	0.1	
Oxidation Reduction Potential	mV	06/17/2015	N001	25	-	645			#		
pH	s.u.	06/17/2015	N001	25	-	7.47			#		
Specific Conductance	umhos/cm	06/17/2015	N001	25	-	3957			#		
Temperature	C	06/17/2015	N001	25	-	21.5			#		
Turbidity	NTU	06/17/2015	N001	25	-	9.49			#		
Uranium	mg/L	06/17/2015	0001	25	-	5.5			#	0.00029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: UPD-22 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/16/2015	0001	9	-	4.4			#	0.1	
Oxidation Reduction Potential	mV	06/16/2015	N001	9	-	107			#		
pH	s.u.	06/16/2015	N001	9	-	7.75			#		
Specific Conductance	umhos/cm	06/16/2015	N001	9	-	3762			#		
Temperature	C	06/16/2015	N001	9	-	17.6			#		
Turbidity	NTU	06/16/2015	N001	9	-	4.91			#		
Uranium	mg/L	06/16/2015	0001	9	-	2.2			#	0.00029	

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

REPORT DATE: 9/22/2015

Location: UPD-23 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/22/2015	0001	28	-	2.9			#	0.1	
Oxidation Reduction Potential	mV	06/22/2015	N001	28	-	51.9			#		
pH	s.u.	06/22/2015	N001	28	-	7.46			#		
Specific Conductance	umhos/cm	06/22/2015	N001	28	-	3599			#		
Temperature	C	06/22/2015	N001	28	-	24.25			#		
Turbidity	NTU	06/22/2015	N001	28	-	14.9			#		
Uranium	mg/L	06/22/2015	0001	28	-	0.77			#	0.000029	

Appendix C. Water Quality Data (continued)

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

REPORT DATE: 9/22/2015

Location: UPD-24 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Ammonia Total as N	mg/L	06/18/2015	0001	27	-	2.5			#	0.1	
Ammonia Total as N	mg/L	06/18/2015	0002	27	-	2.9			#	0.1	
Oxidation Reduction Potential	mV	06/18/2015	N001	27	-	104.2			#		
pH	s.u.	06/18/2015	N001	27	-	7.67			#		
Specific Conductance	umhos/cm	06/18/2015	N001	27	-	4832			#		
Temperature	C	06/18/2015	N001	27	-	18.4			#		
Turbidity	NTU	06/18/2015	N001	27	-	2.44			#		
Uranium	mg/L	06/18/2015	0001	27	-	3.9			#	0.00029	
Uranium	mg/L	06/18/2015	0002	27	-	4.1			#	0.00029	

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

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

LAB QUALIFIERS:

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

DATA QUALIFIERS:

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

QA QUALIFIER:

- # Validated according to quality assurance guidelines.

Appendix C. Water Level Data

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site							
REPORT DATE: 3/15/2015							
Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Time	Depth From Top of Casing (Ft)	Water Elevation (MSL)	Water Level Flag
0401	O	3969.60	6/16/2015		7.36	3962.24	
0403	O	3968.95	6/15/2015		8.34	3960.61	
0404	O	3968.30	6/16/2015		8.49	3959.81	
0405	O	3968.47	7/9/2015		11.42	3957.05	
0406	O	3964.59	6/25/2015		4.44	3960.15	
0407	O	3969.09	6/15/2015		8.96	3960.13	
0410	O	3981.05	6/18/2015		21.9	3959.15	
0411	O	3962.43	6/18/2015		6.37	3956.06	
0412	O	3962.48	6/1/2015		5.68	3956.80	
0413	O	3963.19	6/2/2015		6.96	3956.23	
0414	U	3959.20	6/1/2015		2.75	3956.45	
0430	O	4022.10	6/11/2015		60.47	3961.63	
0431	O	4007.04	6/10/2015		47.25	3959.79	
0432	O	4001.47	6/10/2015		41.69	3959.78	
0433	U	3989.99	6/23/2015		30.13	3959.86	
0434	O	3990.21	6/10/2015		32.95	3957.26	
0435	U	3971.67	5/27/2015		13.15	3958.52	
0436	O	3970.80	7/8/2015		8.11	3962.69	
0439	O	4055.27	6/9/2015		91.12	3964.15	
0440	O	4070.71	6/9/2015		110.92	3959.79	
0441	O	4008.77	6/23/2015		48.5	3960.27	
0443	O	4006.72	6/10/2015		46.42	3960.30	
0444	O	3970.99	5/27/2015		13.6	3957.39	
0453	O	4031.29	6/23/2015		73.56	3957.73	
0454	O	3966.53	6/3/2015		10.91	3955.62	
0455	O	3990.20	6/26/2015		30.49	3959.71	
0456	U	3990.46	6/26/2015		32.3	3958.16	

Appendix C. Water Level Data *(continued)*

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site							
REPORT DATE: 3/15/2015							
Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date Time	Depth From Top of Casing (Ft)	Water Elevation (MSL)	Water Level Flag	
0457	O	3971.30	5/27/2015	14.24	3957.06		
0492	O	3967.56	6/25/2015	7.97	3959.59		
AMM-1	O	3972.02	6/1/2015	15.28	3956.74		
AMM-2	O	3964.09	6/2/2015	7.82	3956.27		
AMM-3	O	3962.90	6/3/2015	6.05	3956.85		
ATP-2-D	O	3962.17	6/2/2015	4.8	3957.37		
ATP-2-S	O	3962.17	6/2/2015	13.37	3948.80		
ATP-3	O	3998.29	6/26/2015	38.02	3960.27		
MW-1-R	D	3962.60	6/3/2015	5.34	3957.26		
MW-3	O	3965.98	7/9/2015	8.92	3957.06		
SMI-MW01	O	3960.22	6/1/2015	3.34	3956.88		
SMI-PW01	O	3963.96	6/22/2015	4.01	3959.95		
SMI-PW03	O	3975.04	6/18/2015	15.8	3959.24		
SMI-PZ1D2	O	3963.77	6/22/2015	4.65	3959.12		
SMI-PZ1M	O	3963.16	6/22/2015	2.89	3960.27		
SMI-PZ1S	O	3964.13	6/22/2015	4.64	3959.49		
SMI-PZ2D	O	3967.38	6/8/2015	11.66	3955.72		
SMI-PZ2M2	O	3967.18	6/8/2015	10.36	3956.82		
SMI-PZ3D2	O	3975.13	6/18/2015	15.79	3959.34		
SMI-PZ3M	O	3975.23	6/18/2015	15.78	3959.45		
SMI-PZ3S	O	3975.03	6/18/2015	15.71	3959.32		
TP-11	O	3967.51	6/1/2015	9.9	3957.61		
TP-20	O	3967.55	6/15/2015	11.3	3956.25		
TP-22	O	3966.51	7/9/2015	10.24	3956.27		
TP-23	O	3962.60	6/3/2015	6.77	3955.83		
UPD-17		3967.44	6/17/2015	7.96	3959.48		
UPD-18		3969.00	6/17/2015	9.69	3959.31		
UPD-20		3978.73	6/19/2015	19.82	3958.91		
UPD-21		3981.45	6/17/2015	22.39	3959.06		

Appendix C. Water Level Data *(continued)*

STATIC WATER LEVELS (USEE700) FOR SITE MOA01, Moab Site							
REPORT DATE: 3/15/2015							
Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Time	Depth From Top of Casing (Ft)	Water Elevation (MSL)	Water Level Flag
UPD-22		3966.20	6/16/2015		6.12	3960.08	
UPD-23		3982.38	6/22/2015		22.83	3959.55	
UPD-24		3977.10	6/18/2015		17.98	3959.12	

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

Appendix C. Equipment Blank Report

BLANKS REPORT
LAB: ALS
RIN: 1505077
Report Date: 9/22/2015

Parameter	Site Code	Location ID	Sample Date	Sample ID	Units	Result	Qualifiers Lab Data	Detection Limit	Uncertainty	Sample Type
Ammonia Total as N	MOA01	0999	07/13/2015	0001	mg/L	2.7		.1		E
Uranium	MOA01	0999	07/13/2015	0001	mg/L	.3		.000029		E

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.

Appendix C. May/June 2015 CF4 Site-wide Sampling Event Trip Report



Date: September 02, 2015
To: Ken Pill
From: James Ritchey
Subject: May 2015 Site Wide Sampling Event
Site: Moab – Site Wide Sampling Event –May 2015
Date of Sampling Event: May 27 – July 09, 2015
Team Members: E. Moran, K. Pill, and J. Ritchey
RIN Number Assigned: All samples were assigned to RIN 1505077.
Sample Shipment: Samples coolers were shipped overnight UPS to ALS Laboratory from Moab, Utah, on June 04, 18, and 30, and on July 14 of 2015 (Tracking numbers 1Z5W1Y510193085769, 1Z5W1Y510191572209, 1Z5W1Y510199890155, and 1Z5W1Y510195661767).

Number of Locations Sampled: The purpose of the Site Wide Sampling Event is to update contaminant plume maps. A total of 67 locations (seven surface samples and 60 monitoring wells) were sampled during this event. Including four duplicates and one equipment blank, a total of 72 samples were collected during the May 2015 sampling event.

Locations Not Sampled/Reason: Well TP-17 could not be safely accessed and was not sampled.

Field Variance: None.

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

False ID	True ID	Sample Type	Associated Matrix
2000	MW-1-R	Duplicate from 13 ft bgs	Ground Water
2001	0404	Duplicate from 18 ft bgs	Ground Water
2002	UPD-24	Duplicate from 27 ft bgs	Ground Water
2003	MW-3	Duplicate from 44 ft bgs	Ground Water
2004	NA	Equipment Blank	De-ionized Water

Appendix C. May/June 2015 CF4 Site-wide Sampling Event Trip Report (continued)

Location Specific Information: All of the observation wells were sampled using a peristaltic pump and dedicated tubing unless otherwise noted. The surface water samples were collected with dedicated surface water tubing that was decontaminated with Alconox® and de-ionized water between locations. The table below provides additional information:

Location	Date	Sample Depth (ft bgs)	Comments
0201	6/24/2015	–	~ 6in deep, muddy substrate.
0218	6/24/2015	–	~ 6in deep, muddy substrate.
0226	7/6/2015	–	3ft from bank, 12in deep.
0401	6/16/2015	18	
0403	6/15/2015	18	Well near river, mixing with freshwater.
0404	6/16/2015	18	Duplicate 2001.
0405	7/9/2015	18	
0406	6/25/2015	18	
0407	6/15/2015	17	The well is close to the river, so there is likely some mixing going on.
0410	6/18/2015	23.5	Collected two 250 mL bottles unfiltered.
0411	6/18/2015	8	Dry after ~0.5 L. 10:10 – Collected two 250 mL bottles not filtered. 11:40 – Collected one 250 mL bottle, not filtered.
0412	6/1/2015	9.5	
0413	6/2/2015	10.5	
0414	6/1/2015	7.5	
0430	6/11/2015	101	Sampled with bladder pump.
0431	6/10/2015	91	Sampled with bladder pump.
0432	6/10/2015	55	
0433	6/23/2015	99	Sampled with bladder pump.
0434	6/10/2015	35	
0435	5/27/2015	173	Sulfur odor. Sampled with bladder pump.
0436	7/8/2015	197	Sulfur odor.
0439	6/9/2015	118	Sampled with bladder pump.
0440	6/9/2015	117	Sampled with bladder pump.
0441	6/23/2015	53	Sampled with bladder pump.
0443	6/10/2015	73	Sampled with bladder pump.
0444	5/27/2015	116	
0453	6/23/2015	80	Sampled with bladder pump.
0454	6/3/2015	13	Sulfur odor.
0455	6/26/2015	46	Sampled with inertia pump. Line clogged after 1L purged. Collected two 250 mL bottles unfiltered.
0456	6/26/2015	53	Sampled with inertia pump. Collected two 250 mL bottles unfiltered.

Appendix C. May/June 2015 CF4 Site-wide Sampling Event Trip Report (continued)

Location	Date	Sample Depth (ft bgs)	Comments
0492	6/25/2015	18	Well is near the river and the changing conductivity likely represents mixing.
AMM-1	6/1/2015	19	
AMM-2	6/2/2015	48	
ATP-2-D	6/2/2015	88	Water is gray.
ATP-2-S	6/2/2015	25	
ATP-3	6/26/2015	51	Sampled with bladder pump.
CR1	6/24/2015	–	~ 3ft deep, sandy substrate.
CR2	6/24/2015	–	~ 1 ft deep, muddy substrate.
CR3	6/25/2015	–	~ 2ft from shore, ~ 6in deep.
CR5	6/24/2015	–	
MW-1-R	6/3/2015	13	Duplicate 2000
MW-3	7/9/2015	44	Duplicate 2003
SMI-MW01	6/1/2015	16	
SMI-PW01	6/22/2015	40	
SMI-PW03	6/18/2015	60	
SMI-PZ1D2	6/22/2015	73	
SMI-PZ1M	6/22/2015	57	
SMI-PZ1S	6/22/2015	18	
SMI-PZ2D	6/8/2015	75	
SMI-PZ2M2	6/8/2015	56	
SMI-PZ3D2	6/18/2015	78	
SMI-PZ3M	6/18/2015	59	
SMI-PZ3S	6/18/2015	25	
TP-01	6/1/2015	22	Water level not obtainable.
TP-11	6/1/2015	30	
TP-20	6/15/2015	32	
TP-22	7/9/2015	17	
TP-23	6/3/2015	25	
UPD-17	6/17/2015	14.5	Water level indicator issues. Water level questionable.
UPD-18	6/17/2015	13	
UPD-20	6/19/2015	17	Slow recharge. Collected four 125 ML bottles unfiltered.
UPD-21	6/17/2015	25	Slow recharge. Collected five 125 ML bottles unfiltered.
UPD-22	6/16/2015	9	
UPD-23	6/22/2015	25	Collected four 125 mL bottles unfiltered.
UPD-24	6/18/2015	27	Duplicate 2002.

ft bgs = feet below ground surface

Appendix C. May/June 2015 CF4 Site-wide Sampling Event Trip Report (continued)

Water Level Measurements: Water level data are provided in the table below. These data represent depth to water (ft btoc) measurements.

Well No.	Date	Depth to Water (ft btoc)
0401	6/16/2015	7.36
0403	6/15/2015	8.34
0404	6/16/2015	8.49
0405	7/9/2015	11.42
0406	6/25/2015	4.44
0407	6/15/2015	8.96
0410	6/18/2015	21.90
0411	6/18/2015	6.37
0412	6/1/2015	5.68
0413	6/2/2015	6.96
0414	6/1/2015	2.75
0430	6/11/2015	60.47
0431	6/10/2015	47.25
0432	6/10/2015	41.69
0433	6/23/2015	30.13
0434	6/10/2015	32.95
0435	5/27/2015	13.15
0436	7/8/2015	8.11
0439	6/9/2015	91.12
0440	6/9/2015	110.92
0441	6/23/2015	48.50
0443	6/10/2015	46.42
0444	5/27/2015	13.60
0453	6/23/2015	73.56
0454	6/3/2015	10.91
0455	6/26/2015	30.49
0456	6/26/2015	32.30
0457	5/27/2015	14.24
0492	6/25/2015	7.97
AMM-1	6/1/2015	15.28
AMM-2	6/2/2015	7.82
AMM-3	6/3/2015	6.05
ATP-2-D	6/2/2015	4.80
ATP-2-S	6/2/2015	13.37

Appendix C. May/June 2015 CF4 Site-wide Sampling Event Trip Report (continued)

Well No.	Date	Depth to Water (ft btoc)
ATP-3	6/26/2015	38.02
MW-1-R	6/3/2015	5.34
MW-3	7/9/2015	8.92
SMI-MW01	6/1/2015	3.34
SMI-PW01	6/22/2015	4.01
SMI-PW03	6/18/2015	15.80
SMI-PZ1D2	6/22/2015	4.65
SMI-PZ1M	6/22/2015	2.89
SMI-PZ1S	6/22/2015	4.64
SMI-PZ2D	6/8/2015	11.66
SMI-PZ2M2	6/8/2015	10.36
SMI-PZ3D2	6/18/2015	15.79
SMI-PZ3M	6/18/2015	15.78
SMI-PZ3S	6/18/2015	15.71
TP-01	6/1/2015	Water level not obtainable.
TP-11	6/1/2015	9.90
TP-20	6/15/2015	11.30
TP-22	7/9/2015	10.24
TP-23	6/3/2015	6.77
UPD-17	6/17/2015	7.96
UPD-18	6/17/2015	9.69
UPD-20	6/19/2015	19.82
UPD-21	6/17/2015	22.39
UPD-22	6/16/2015	6.12
UPD-23	6/22/2015	22.83
UPD-24	6/18/2015	17.98

Appendix C. May/June 2015 CF4 Site-wide Sampling Event Trip Report (*continued*)

Well Inspection Summary: A well inspection was not conducted.

Equipment: None.

Regulatory: None. **Site Issues:** According to the USGS Cisco Gaging Station (Station No. 09180500), the mean daily Colorado River flow during this sampling event is provided below:

Date	Daily Mean Flow (cfs)
5/27/2015	13,000
5/28/2015	12,900
5/29/2015	13,000
5/30/2015	13,500
5/31/2015	13,600
6/1/2015	14,100
6/2/2015	No Data
6/3/2015	17,700
6/4/2015	19,600
6/5/2015	20,300
6/6/2015	21,800
6/7/2015	23,200
6/8/2015	23,700
6/9/2015	22,200
6/10/2015	22,000
6/11/2015	24,500
6/12/2015	26,800
6/13/2015	30,800
6/14/2015	29,200
6/15/2015	28,000
6/16/2015	26,200
6/17/2015	25,800
6/18/2015	27,800
6/19/2015	28,800
6/20/2015	29,100
6/21/2015	29,600
6/22/2015	28,700
6/23/2015	27,400
6/24/2015	26,100
6/25/2015	24,400
6/26/2015	22,700
6/27/2015	19,700
6/28/2015	17,800
6/29/2015	16,600

Appendix C. May/June 2015 CF4 Site-wide Sampling Event Trip Report (*continued*)

Date	Daily Mean Flow (cfs)
6/30/2015	15,500
7/1/2015	14,400
7/2/2015	13,000
7/3/2015	12,200
7/4/2015	10,700
7/5/2015	10,300
7/6/2015	10,800
7/7/2015	10,600
7/8/2015	11,200
7/9/2015	12,100

Corrective Action Required/Taken: None.