

Data Validation Package

July 2016
Groundwater Sampling at the
Central Nevada Test Area, Nevada

February 2017

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Sampling Event Summary

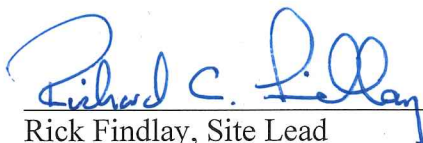
Site: Central Nevada Test Area, Nevada

Sampling Period: July 26–27, 2016

The U.S. Department of Energy Office of Legacy Management conducted annual sampling at the Central Nevada Test Area (CNTA) July 26–27, 2016, in accordance with the *Closure Report, Central Nevada Test Area, Subsurface Corrective Action, Unit 443* completed in 2016. Planned monitoring locations are shown in Attachment 1, Sampling and Analysis Work Order.

Sampling and analyses were conducted as specified in *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated, <http://energy.gov/lm/downloads/sampling-and-analysis-plan-us-department-energy-office-legacy-management-sites>). Samples were submitted to ALS Laboratory Group in Fort Collins, Colorado, for the determination of tritium. A duplicate sample from location HTH-1RC was included with this submittal. See Attachment 2, Trip Report for additional details.

Analytical results from this sampling event are consistent with those of previous events. Tritium was not detected in any of the samples. An assessment of anomalous data is included in Attachment 4.



Rick Findlay, Site Lead
Navarro Research and Engineering, Inc.

3-20-2017

Date

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Central Nevada Test Area	Date(s) of Water Sampling	July 26–27, 2016
Date(s) of Verification	January 23, 2017	Name of Verifier	Stephen Donovan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List any Program Directives or other documents, SOPs, instructions.		Work Order letter dated July 5, 2016. Program Directive CNT-2016-1.
2. Were the sampling locations specified in the planning documents sampled?	Yes	
3. Were field equipment calibrations conducted as specified in the above-named documents?	Yes	Calibrations were performed on July 22, 2016.
4. Was an operational check of the field equipment conducted daily?	Yes	
Did the operational checks meet criteria?	Yes	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Were wells categorized correctly?	Yes	
7. Were the following conditions met when purging a Category I well:		
Was one pump/tubing volume purged prior to sampling?	NA	Low-flow wells were all Category II.
Did the water level stabilize prior to sampling?		
Did pH, specific conductance, and turbidity measurements meet criteria prior to sampling?		
Was the flow rate less than 500 mL/min?		

Water Sampling Field Activities Verification Checklist (continued)

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well:		
Was the flow rate less than 500 mL/min?	Yes	
Was one pump/tubing volume removed prior to sampling?	Yes	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected at location HTH-1RC.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	Dedicated equipment was used for all sample collection.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were the true identities of the QC samples documented?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Was all pertinent information documented on the field data sheets?	Yes	
18. Was the presence or absence of ice in the cooler documented at every sample location?	NA	Sample cooling was not required.
19. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

Task ID: CNT01.1-16070001
Sample Event: July 26–27, 2016
Site(s): Central Nevada Test Area
Laboratory: ALS Laboratory Group, Fort Collins, Colorado
Work Order No.: 1608003
Analysis: Radiochemistry
Validator: Stephen Donivan
Review Date: January 23, 2017

This validation was performed according to “Standard Practice for Validation of Environmental Data” found in Appendix A of the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated, <http://energy.gov/lm/downloads/sampling-and-analysis-plan-us-department-energy-office-legacy-management-sites>). The procedure was applied at Level 3, Data Validation.

This validation includes the evaluation of data quality indicators (DQIs) associated with the data. DQIs are the quantitative and qualitative descriptors that are used to interpret the degree of acceptability or utility of data. Indicators of data quality include the analysis of laboratory control samples to assess accuracy; duplicates and replicates to assess precision; and interference check samples to assess bias (see Figures 1 and 2, Data Validation Worksheets). The DQIs comparability, completeness, and sensitivity are also evaluated in the sections to follow.

All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Tritium	LSC-A-001	SOP 700	SOP 704

Data Qualifier Summary

None of the analytical results required qualification.

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received nine water samples on August 1, 2016, accompanied by a Chain of Custody form. Copies of the air bills were included in the receiving documentation. The Chain of Custody was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The Chain of Custody was complete with no errors or omissions.

Preservation and Holding Times

The sample shipment was received intact at ambient temperature which complies with requirements. All samples were preserved correctly. All samples were received in the correct container types and all samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

For radiochemical analytes (those measured by radiometric counting), the results are evaluated using the minimum detectable concentration (MDC), Decision Level Concentration (DLC), and Determination Limit (DL). The MDC is a measure of radiochemical method performance and was calculated and reported as specified in *Quality Systems for Analytical Services*.

The DLC is the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero, and is estimated as 3 times the one-sigma total propagated uncertainty. Results that are greater than the MDC, but less than the DLC are qualified with a “U” flag (not detected). The DL for radiochemical results is the lowest concentration that can be reliably measured, and is defined as 3 times the MDC. Results not previously “U” qualified that are less than the DL are qualified with a “J” flag as estimated values.

The reported MDCs for radiochemical analytes demonstrate compliance with contractual requirements.

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. All calibration and laboratory spike standards were prepared from independent sources.

Radiochemical Analysis

Tritium

The tritium quench calibration curve was generated on December 15, 2015, for quench indicator values ranging from 148 to 254. Nitromethane was added to the samples to adjust the sample quench values within the calibration range for the analysis. A high-energy window (Window 2) was established to monitor for any potential interferences that might be present due to higher energy beta emitters that would bias the results high. All samples had Window 2 count rates that were within the control limits. Daily instrument performance checks were acceptable.

Method Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. The radiochemistry method blank results were less than the DLC.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. For radiochemical measurements, the relative error ratio (the ratio of the absolute difference between the sample and duplicate results and the sum of the 1-sigma uncertainties) is used to evaluate duplicate results and should be less than 3. All replicate results met these criteria, demonstrating acceptable precision.

Laboratory Control Sample

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. All control sample results were acceptable.

Completeness

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

Electronic Data Deliverable (EDD) File

The EDD file arrived on August 30, 2016. The EDD was examined to verify that the file was complete and in compliance with requirements. The contents of the file were compared to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

General Data Validation Report

Page 1 of 1

Task Code: CNT01.1-
16070001

Lab Code: PAR

Validator: Stephen Donovan

Validation Date: 01-23-2017

Project: CNTA Monitoring

Samples: 9

Analysis Type: ☐ General Chemistry ☐ Metals ☐ Organics ☒ Radiochemistry

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation OK Temperature: OK

Check

Summary

Holding Times:	All analyses were completed within the applicable holding times.
Detection Limits:	The reported detection limits are equal to or below the contract required limits.
Field Duplicates:	There was 1 duplicate evaluated.

Figure 1. General Validation Worksheet

Radiochemistry Data Validation Worksheet															
Project: CNTA Monitoring			Task Code: CNT01.1-16070001				Lab Code: PAR					Page 1 of 1 23-Jan-2017			
Sample ID	Analyte	Analysis Date	QC Type	Result Type	Result	Flag	TPU	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	RER	Comments
	Tritium	08-20-2016	LCS	SC	18900.00		2990	99.69		85	115				
	Tritium	08-20-2016	MB	TRG	110.00	U	195								
CNT01.1-16070001-001	Tritium	08-19-2016	MS	SC	17900.00		2830	93.90		85	115				
CNT01.1-16070001-006	Tritium	08-19-2016	R	TRG	104.00	U	192							0.142	

QC Types: LCS: Laboratory Control Sample LCSD: Laboratory Control Sample Duplicate MB: Method Blank MS: Matrix Spike MSD: Matrix Spike Duplicate R: Replicate

Result Types: IS: Internal Standard SC: Spike Analyte TRG: Target analyte

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio TPU: Total Propagated Uncertainty

Figure 2. Radiochemistry Validation Worksheet

Sampling Quality Control Assessment

The following information summarizes and assesses quality control for this sampling event.

Sampling Protocol

Sample results for wells HTH-1RC, MV-1, MV-2, MV-3, MV-4 and MV-5 met the low-flow sampling criteria and were qualified with an “F” flag, indicating the wells were purged and sampled using the low-flow sampling method and with a “Q” flag, indicating the data are considered qualitative because these are Category II wells.

As per Program Directive CNT-2016-01, some wells were *not* sampled using low-flow criteria. Wells MV-6 and UC-1-P-1SRC were sampled using a dedicated high-flow submersible pump. The field parameters specified in the directive met the required stability criteria over the final three readings.

Equipment Blank Assessment

Dedicated equipment was used for all sample collection and an equipment blank was not required.

Field Duplicate Assessment

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. Duplicate samples were collected from location HTH-1RC. The relative error ratio (the ratio of the absolute difference between the sample and duplicate results and the sum of the 1-sigma uncertainties) is used to evaluate duplicate results and should be less than 3. The duplicate results met these criteria, demonstrating acceptable precision (Figure 3).

Validation Report: Field Duplicates

Page 1 of 1

23-Jan-2017

Project: CNTA Monitoring

Task Code: CNT01.1-16070001

Lab Code: PAR

Duplicate: CNT01.1-16070001-009					Sample: CNT01.1-16070001-001 HTH-1RC						
Analyte	Result	Qualifiers	Uncert.	Dilution	Result	Qualifiers	Uncert.	Dilution	RPD	RER	Units
Tritium	-2.25	U	190	1	-49.4	U	181	1		0.4	pCi/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Figure 3. Field Duplicates

Certification

All laboratory analytical quality control criteria were met except as qualified in this report. The data qualifiers listed on the environmental database reports are defined on the last page of each report. All data in this package are considered validated and available for use.

Laboratory Coordinator:

Stephen Donovan
Stephen Donovan

2-24-2017
Date

Data Validation Lead:

Stephen Donovan
Stephen Donovan

2-24-2017
Date

Attachment 1

Sampling and Analysis Work Order

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July 5, 2016

Task Assignment 104
Control Number 16-0715

U.S. Department of Energy
Office of Legacy Management
ATTN: Mark Kautsky
Site Manager
2597 Legacy Way
Grand Junction, CO 81503

SUBJECT: Contract No. DE-LM0000421, Navarro Research & Engineering, Inc. (Navarro)
Task Assignment 104 LTS&M-Nevada Off Sites and Monticello Site
July 2016 Environmental Sampling at the Central Nevada Test Area (CNTA),
Nevada

REFERENCE: Task Assignment 104, 1-104-1-04-613, Central Nevada Test Area, Nevada

Dear Mr. Kautsky:

The purpose of this letter is to inform you of the upcoming monitoring event at the CNTA. The letter and attachments provide details on the sampling and hydraulic head monitoring that is planned at the site. Sampling activities for this monitoring event will include the analyses of samples from the site monitoring wells for tritium as specified in the Closure Report. No supplemental activities will be conducted for this monitoring event. Attached are a map and tables that specify the sampling locations and analytes for the annual monitoring event. This monitoring event is scheduled to begin the week of July 25, 2016.

The following list shows the locations scheduled to be sampled during this event.

Monitoring Wells

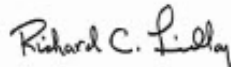
MV-1	MV-2	MV-3	MV-4	MV-5	MV-6
HTH-1RC	UC-1-P-1SRC				

Samples will be collected from wells UC-1-P-1SRC and MV-6 using the dedicated submersible electric pumps. At least one well volume will be removed, and field parameters (temperature, pH, and specific conductance) will be allowed to stabilize before samples are collected. Monitoring wells MV-1, MV-2, MV-3, MV-4, MV-5, and HTH-1RC will be sampled using the dedicated submersible bladder pumps and the low-flow sampling methodology. Before samples are collected from the designated wells the transducer will be downloaded, and a water level will be determined. All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (<http://www.lm.doe.gov/Long-Term-Surveillance-and-Maintenance.aspx#>) and will meet the requirements of the *Closure Report Central Nevada Test Area Subsurface Corrective Action Unit 443*. Refer to Table 2 for the required analyses.

Mark Kautsky
Control Number 16-0715
Page 2

Please contact me at (970) 248-6419 if you have any questions.

Sincerely,

 Rick C. Findlay
2016.07.05 15:03:18 -06'00'

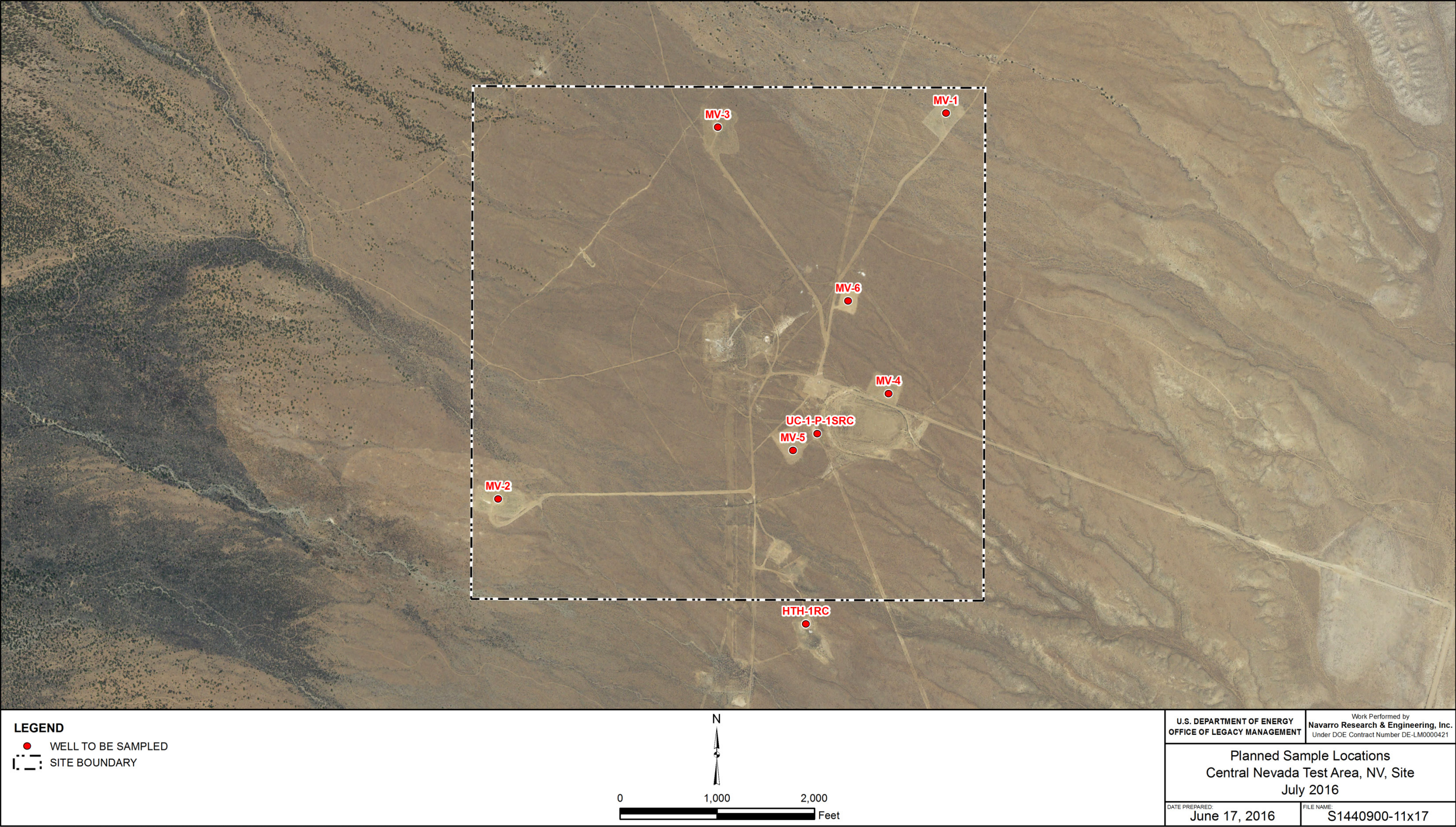
Richard C. Findlay
LMS Site Lead

RF/lcg/bkb

Enclosures

cc: (electronic)

Christina Pennal, DOE
Ken Karp, Navarro
Beverly Cook, Navarro
Steve Donovan, Navarro
Rick Findlay, Navarro
Lauren Goodknight, Navarro
Sam Marutzky, Navarro
Diana Osborne, Navarro
EDD Delivery
rc-grand.junction
File: CNT 400.02



Central Nevada Test Area, Nevada, Planned Sample Locations Map

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**Table 1 - Sampling Frequencies for Locations at
Central Nevada Test Area, Nevada**

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
MV-1				X		Bladder pump
MV-2				X		Bladder pump
MV-3				X		Bladder pump
MV-4				X		Bladder pump
MV-5				X		Bladder pump
MV-6				X		Electric pump
HTH-1RC				X		Bladder pump
HTH-2					X	
UC-1-P-1SRC				X		Electric pump
UC-1-P-2SR					X	
Piezometers						
MV-1UPZ					X	
MV-1LPZ					X	
MV-2UPZ					X	
MV-2LPZ					X	
MV-3UPZ					X	
MV-3LPZ					X	
MV-4PZ					X	
MV-5PZ					X	
HTH-1UPZ					X	
HTH-1LPZ					X	

Sampling conducted in July

**Table 2 - Analytical Suite for Sample Locations
at Central Nevada Test Areal, Nevada**

Analyte	Measurement by Location Type		Laboratory Requirements			Laboratory	
	Groundwater	Surface Water	Required Detection Limit	Analytical Method	Line Item Code	ALS	University of Arizona
Approx. No. Samples/yr	8	0					
Field Measurements							
Alkalinity	X						
Dissolved Oxygen	X						
Redox Potential	X						
pH	X						
Specific Conductance	X						
Turbidity	X						
Temperature	X						
Laboratory Measurements							
Aluminum							
Ammonia as N (NH ₃ -N)							
Bromide							
Calcium							
Chloride							
Chromium							
Gamma Spec							
Gross Alpha							
Gross Beta							
Iodine-129							
Iron							
Lead							
Magnesium							
Manganese							
Molybdenum							
Nickel							
Nitrate + Nitrite as N (NO ₃ +NO ₂)-N							
Potassium							
Selenium							
Silica							
Sodium							
Strontium							
Sulfate							
Sulfide							
Tritium	X		400 pCi/L	Liquid Scintillation	LSC-A-001	X	
Tritium, enriched							
Uranium							
Vanadium							
Zinc							
Total No. of Analytes	1	0					

Note: All private well samples are to be unfiltered. The total number of analytes does not include field parameters.

Attachment 2

Trip Report

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To: Rick Findlay, Navarro
From: Jennifer Graham, Navarro
Date: August 8, 2016
CC: Mark Kautsky, DOE
Steve Donivan, Navarro
Rex Hodges, Navarro
EDD Delivery
Re: Sampling Trip Report

Site: Central Nevada Test Area (CNTA)

Dates of Event: July 25–27, 2016

Team Members: Rick Findlay, Jeff Price, David Atkinson, and Jennifer Graham, Navarro

Number of Locations Sampled: Samples were collected from all 8 of the locations identified on the sampling notification letter.

Locations Not Sampled/Reason: None.

Location Specific Information: Nothing to note.

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

False ID	Sample ID	True ID	Sample Type	Matrix
2670	CNT01.1-16070001-009	HTH-1RC	Duplicate	GW

Task Code Assigned: Samples were assigned to Task Code CNT01.1-16070001. Field data sheets can be found in <\\crow\sms\CNT01.1-16070001\FieldData>.

Sample Shipment: Samples were shipped overnight via FedEx from Grand Junction, CO, to ALS Laboratory in Fort Collins, CO, on July 28, 2016.

Water Level Measurements: All water levels were taken in the field by R. Findlay prior to sample collection. PDF versions of the water level forms can be found in <\\crow\sms\CNT01.1-16070001\FieldData>.

Well Inspection Summary: Nothing to note.

Sampling Method: Samples were collected according to the following:

- *Sampling and Analysis Plan (SAP) for the U. S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated).

- Program Directive *CNT-2016-01*
- Edge Version 6.4.2 was used for this event.

Field Variance: None. Samples were collected according to the SAP and *CNT-2016-01*.

Equipment: All equipment functioned properly.

Stakeholder/Regulatory/DOE: Nothing to note.

Institutional Controls:

Fences, Gates, and Locks: The fences around the UC-1 and UC-4 mud pits were in good condition.

Signs: No issues were observed.

Trespassing/Site Disturbances: None observed.

Disposal Cell/Drainage Structure Integrity: The UC-1 and UC-4 mud pits were inspected and in good condition.

Safety Issues: None.

Access Issues: None.

General Information: The site roads, wells boxes, and monument at surface ground zero were all observed as being in good condition.

Immediate Actions Taken:

- Brush was removed from around well at locations MV-3 and MV-4.
- Concrete monument was returned to its vertical orientation. This monument is located near UC-3.

Future Actions Required or Suggested: None.

Attachment 3

Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location For Site CNT01, Central Nevada Test Area Site**Location: HTH-1RC**

Report Date: 01/25/2017

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity	mg/L	07/26/2016	F	N	199				FQ	Y
Dissolved Oxygen	mg/L	07/26/2016	F	N	1.75				FQ	Y
ORP	mV	07/26/2016	F	N	-84.4				FQ	Y
pH	s.u.	07/26/2016	F	N	7.70				FQ	Y
Specific Conductance	uS/cm	07/26/2016	F	N	564				FQ	Y
Temperature	C	07/26/2016	F	N	17.48				FQ	Y
Tritium	pCi/L	07/26/2016	D	N	-2.25	190	320	U	FQ	Y
Tritium	pCi/L	07/26/2016	F	N	-49.4	181	307	U	FQ	Y
Turbidity	NTU	07/26/2016	F	N	3.39				FQ	Y

Groundwater Quality Data by Location For Site CNT01, Central Nevada Test Area Site**Location: MV-1**

Report Date: 01/25/2017

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity	mg/L	07/27/2016	F	N	305				FQ	Y
Dissolved Oxygen	mg/L	07/27/2016	F	N	0.04				FQ	Y
ORP	mV	07/27/2016	F	N	-43				FQ	Y
pH	s.u.	07/27/2016	F	N	9.24				FQ	Y
Phen Alkalinity	mg/L	07/27/2016	F	N	26					Y
Specific Conductance	umhos/cm	07/27/2016	F	N	461				FQ	Y
Temperature	C	07/27/2016	F	N	17.67				FQ	Y
Tritium	pCi/L	07/27/2016	F	N	111	192	317	U	FQ	Y
Turbidity	NTU	07/27/2016	F	N	4.11				FQ	Y

Groundwater Quality Data by Location For Site CNT01, Central Nevada Test Area Site**Location: MV-2**

Report Date: 01/25/2017

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity	mg/L	07/26/2016	F	N	235				FQ	Y
Dissolved Oxygen	mg/L	07/26/2016	F	N	0.28				FQ	Y
ORP	mV	07/26/2016	F	N	-147				FQ	Y
pH	s.u.	07/26/2016	F	N	10.82				FQ	Y
Phen Alkalinity	mg/L	07/26/2016	F	N	137					Y
Specific Conductance	umhos/cm	07/26/2016	F	N	1800				FQ	Y
Temperature	C	07/26/2016	F	N	17.75				FQ	Y
Tritium	pCi/L	07/26/2016	F	N	16.9	185	311	U	FQ	Y
Turbidity	NTU	07/26/2016	F	N	2.80				FQ	Y

Groundwater Quality Data by Location For Site CNT01, Central Nevada Test Area Site**Location: MV-3**

Report Date: 01/25/2017

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity	mg/L	07/27/2016	F	N	412				FQ	Y
Dissolved Oxygen	mg/L	07/27/2016	F	N	0.92				FQ	Y
ORP	mV	07/27/2016	F	N	-48.3				FQ	Y
pH	s.u.	07/27/2016	F	N	6.56				FQ	Y
Specific Conductance	uS/cm	07/27/2016	F	N	898				FQ	Y
Temperature	C	07/27/2016	F	N	18.63				FQ	Y
Tritium	pCi/L	07/27/2016	F	N	-53.8	182	309	U	FQ	Y
Turbidity	NTU	07/27/2016	F	N	6.86				FQ	Y

Groundwater Quality Data by Location For Site CNT01, Central Nevada Test Area Site**Location: MV-4**

Report Date: 01/25/2017

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity	mg/L	07/26/2016	F	N	194				FQ	Y
Dissolved Oxygen	mg/L	07/26/2016	F	N	1.83				FQ	Y
ORP	mV	07/26/2016	F	N	-116.3				FQ	Y
pH	s.u.	07/26/2016	F	N	9.00				FQ	Y
Phen Alkalinity	mg/L	07/26/2016	F	N	75					Y
Specific Conductance	uS/cm	07/26/2016	F	N	443				FQ	Y
Temperature	C	07/26/2016	F	N	20.32				FQ	Y
Tritium	pCi/L	07/26/2016	F	N	79	189	314	U	FQ	Y
Turbidity	NTU	07/26/2016	F	N	6.54				FQ	Y

Groundwater Quality Data by Location For Site CNT01, Central Nevada Test Area Site**Location: MV-5**

Report Date: 01/25/2017

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity	mg/L	07/26/2016	F	N	175				FQ	Y
Dissolved Oxygen	mg/L	07/26/2016	F	N	2.08				FQ	Y
ORP	mV	07/26/2016	F	N	-158.1				FQ	Y
pH	s.u.	07/26/2016	F	N	9.68				FQ	Y
Phen Alkalinity	mg/L	07/26/2016	F	N	80					Y
Specific Conductance	uS/cm	07/26/2016	F	N	546				FQ	Y
Temperature	C	07/26/2016	F	N	18.35				FQ	Y
Tritium	pCi/L	07/26/2016	F	N	84.6	192	318	U	FQ	Y
Turbidity	NTU	07/26/2016	F	N	5.80				FQ	Y

Groundwater Quality Data by Location For Site CNT01, Central Nevada Test Area Site**Location: MV-6**

Report Date: 01/25/2017

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity	mg/L	07/26/2016	F	N	108					Y
Dissolved Oxygen	mg/L	07/26/2016	F	N	4.08					Y
ORP	mV	07/26/2016	F	N	39					Y
pH	s.u.	07/26/2016	F	N	7.49					Y
Specific Conductance	umhos/cm	07/26/2016	F	N	197					Y
Temperature	C	07/26/2016	F	N	20.94					Y
Tritium	pCi/L	07/26/2016	F	N	175	186	302	U		Y
Turbidity	NTU	07/26/2016	F	N	0.99					Y

Groundwater Quality Data by Location For Site CNT01, Central Nevada Test Area Site

Location: UC-1-P-1SRC

Report Date: 01/25/2017

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity	mg/L	07/26/2016	F	N	165					Y
Dissolved Oxygen	mg/L	07/26/2016	F	N	6.24					Y
ORP	mV	07/26/2016	F	N	18					Y
pH	s.u.	07/26/2016	F	N	7.19					Y
Specific Conductance	umhos/cm	07/26/2016	F	N	301					Y
Temperature	C	07/26/2016	F	N	18.91					Y
Tritium	pCi/L	07/26/2016	F	N	103	196	324	U		Y
Turbidity	NTU	07/26/2016	F	N	9.17					Y

SAMPLE TYPE: D = Duplicate E = Equipment Blank F = Field Sample FB = Field Blank TB = Trip Blank

FRACTION: D = Dissolved N = NA T = Total

MDC / MDL: MDC = Radiochemical minimum detectable concentration MDL = Non-radiochemical minimum detection limit

LAB QUALIFIERS (details can be found in laboratory report):

* = One or more quality control criteria failed (e.g., laboratory control sample, surrogate spike, or calibration verification recovery).

B = Blank contamination. The reported result is associated with a contaminated blank.

D = Result is from the analysis of a diluted sample.

H = Holding time was exceeded.

J = The reported result is an estimated value (e.g., matrix interference was observed or the analyte was detected at a concentration outside the quantitation range).

U = Analytical result is below the MDC or MDL.

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 not detected.

G = Possible grout contamination, pH > 9

Q = Qualitative result due to sampling technique.

X = Location is undefined.

J = Estimated value

R = Rejected, unusable result

QA QUALIFIER: Yes = Validated, acceptable as qualified.

Attachment 4

Assessment of Anomalous Data

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Potential Outliers Report

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Potential Outliers Report

Potential outliers are results that lie outside the historical range, possibly due to transcription errors, data calculation errors, or measurement system problems. However, outliers can also represent true values outside the historical range. Potential outliers are identified by generating the Data Validation Outliers Report from data in the environmental database. The new data are compared to historical values and data that fall outside the historical data range are listed on the report along with the historical minimum and maximum values. The potential outliers are further reviewed and may be subject to statistical evaluation using the ProUCL application developed by the EPA (<https://www.epa.gov/land-research/proucl-software>). The review also includes an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values. There were no potential outliers identified, and the data for this event are acceptable as qualified.

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