Data Validation Package

July 2016
Groundwater Sampling at the Gunnison, Colorado, Disposal Site

October 2016

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Sampling Event Summary

Site: Gunnison, Colorado, Disposal Site

Sampling Period: July 20–21, 2016

Groundwater sampling at the Gunnison, Colorado, Disposal Site is conducted every 5 years to monitor disposal cell performance. During this event, samples were collected from eight monitoring wells as specified in the 1997 *Long-Term Surveillance Plan for the Gunnison, Colorado, Disposal Site*. Sampling and analyses were conducted as specified in 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). Planned monitoring locations are shown in Attachment 1, Sampling and Analysis Work Order. A duplicate sample was collected from location 0723.

Water levels were measured at all monitoring wells that were sampled and seven additional wells. See Attachment 2, Trip Report for additional details.

The analytical data and associated qualifiers can be viewed in environmental database reports and are also available for viewing with dynamic mapping via the GEMS (Geospatial Environmental Mapping System) website at http://gems.lm.doe.gov/#.

No issues were identified during the data validation process that require additional action or follow-up. An assessment of anomalous data is included in Attachment 3.

As shown in Table 1, uranium concentrations in the disposal site point of compliance (POC) wells remain below the action level of 0.013 mg/L, indicating adequate disposal cell performance.

Table 1. Gunnison Disposal Site Uranium Concentrations

Analyte	Action Level[a]	Location	Concentration[a]
Uranium	0.013	0609	0.004
		0716	0.005
		0720	0.006
		0721	0.001
		0722	0.002
		0723	0.003
		0724	0.001
		0725	0.003

[a] Units are in mg/L.

Sam Campbell

Sam Campbell, Site Lead
Navarro Research and Engineering, Inc.

10/25/2016

Date

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Gunnison, Colorado	**Date(s) of Water Sampling**	July 20–21, 2016
Date(s) of Verification	September 16, 2016	**Name of Verifier**	Stephen Donivan

	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 May 13, 2016.
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 19, 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?	Yes	
Did the water level stabilize prior to sampling?	Yes	
Did pH, specific conductance, and turbidity measurements meet criteria prior to sampling?	Yes	
Was the flow rate less than 500 mL/min?	Yes	

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?	NA	All wells were Category I wells.
Was one pump/tubing volume removed prior to sampling?		
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected from location 0723.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	An equipment blank was not required.
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?	Yes	
19. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Task ID:	GUN08.1-16070001
Sample Event:	July 20–21, 2016
Site(s):	Gunnison, Colorado, Disposal Site
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Work Order No.:	1607449
Analysis:	General Chemistry, Metals
Validator:	Stephen Donivan
Review Date:	September 15, 2016

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 Tables 4–6, 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 2.

Table 2. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Chloride	MIS-A-045	SW-846 9056	SW-846 9056
Metals: Calcium, Iron, Potassium, Magnesium, Manganese, Sodium	LMM-01	SW-846 3005A	SW-846 6010B
Metals: Uranium	LMM-02	SW-846 3005A	SW-846 6020A
Sulfate	MIS-A-045	SW-846 9056	SW-846 9056
Total Dissolved Solids	WCH-A-033	EPA 160.1	EPA 160.1

Data Qualifier Summary

The analytical results were qualified as listed in Table 3. Refer to the sections below for an explanation of the data qualifiers applied.

Table 3. Data Qualifier Summary

Sample Number	Location	Analyte	Flag	Reason
1607449-1	0609	Chloride	J	Matrix spike result
1607449-1	0609	Iron	U	Less than 5 times the method blank
1607449-1	0609	Sulfate	J	Matrix spike result
1607449-3	0720	Iron	U	Less than 5 times the method blank
1607449-6	0723	Iron	U	Less than 5 times the method blank

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado received nine water samples on July 22, 2016 accompanied by a Chain of Custody (COC) form. The COC form was checked to confirm that all of the samples were listed on the forms and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents including the COC form, and the sample tickets had no errors or omissions. Copies of the air waybill labels were included with the receiving documentation.

Preservation and Holding Times

The sample shipment was received intact with the temperature inside the chilled cooler at 5.2 °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.

Detection and Quantitation Limits

A method detection limit (MDL) is defined in 40 CFR 136 as the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The MDLs reported by the laboratory were compared to the required MDLs to assess the sensitivity of the analyses and found to be in compliance with contractual requirements.

The practical quantitation limit (PQL) for an analyte, defined as 5 times the MDL, is the lowest concentration that can be quantitatively measured, and is used when evaluating laboratory method performance in the sections below.

Laboratory Instrument Calibration

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the analytes of interest. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis. Initial and continuing calibration standards must be prepared from independent sources to ensure the validity of the calibration. All

laboratory instrument calibrations and calibration verifications were performed correctly in accordance with the cited methods.

Method EPA 160.1, Total Dissolved Solids
There are no initial or continuing calibration requirements associated with the determination of total dissolved solids.

Method SW-846 6010B, Metals
Calibrations were performed on July 26, 2016, using three calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL as required by the cited method. The ICV and CCV checks were made at the required frequency. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range.

Method SW-846 6020A, Uranium
Calibrations were performed on July 27, 2016, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL as required by the cited method. The ICV and CCV checks were made at the required frequency. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries associated with requested analytes were stable and within acceptable ranges.

Method SW-846 9056, Chloride, Sulfate
Calibrations for chloride and sulfate were performed using five calibration standards on July 29, 2016. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. The ICV and CCV checks were made at the required frequency. All calibration checks met the acceptance criteria.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. All method-blank and calibration-blank results associated with the samples were below the PQL for all analytes. In cases where the blank concentration exceeds the MDL, associated sample results that are greater than the MDL but less than 5 times the blank concentration are qualified with a "U" flag as not detected.

Inductively Coupled Plasma Interference Check Sample Analysis

Interference check samples are analyzed to verify the instrumental interelement and background correction factors and assess any bias due to interelement interferences. Interference check samples were analyzed at the required frequency with all results meeting the acceptance criteria.

Matrix Spike Analysis

Matrix spikes are aliquots of environmental samples to which a known concentration of an analyte has been added before analysis. Matrix spike and matrix-spike duplicate (MS/MSD) analysis are used to assess the performance of the method by measuring the effects of interferences caused by the sample matrix and reflects the bias of the method for the particular matrix in question. The MS/MSD data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike concentration. The spike recoveries met the acceptance criteria for all analytes with the exception of chloride and sulfate. The associated sample chloride and sulfate results are qualified with a "J" flag as estimated values.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for replicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. All replicate results met these criteria, demonstrating acceptable precision.

Laboratory Control Samples

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.

Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. Serial dilution data are evaluated to assess bias when the concentration of the undiluted sample is greater than 50 times the MDL. The uranium serial dilution results associated with samples 0002 and 0160 did not meet the acceptance criteria. The associated sample uranium results are qualified with a "J" flag as estimated values.

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 13, 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

Task Code: GUN08.1-16070001 **Lab Code:** PAR **Validator:** Stephen Donivan **Validation Date:** 09-15-2016

Project: Gunnison Disposal Site Monitoring **# Samples:** 9

Analysis Type: [X] General Chemistry [X] 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.

Table 4. General Validation Worksheet

Metals Data Validation Worksheet

15-Sep-2016

Project: Gunnison Disposal Site Monitoring **Task Code:** GUN08.1-16070001 **Lab Code:** PAR

Analyte	Method	Analysis Date	QC Type	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	ICSAB	Serial Dilution	CRI	Comments
Calcium	SW-846 6010	07-26-2016	LCS	99.00		80	120		20				
Calcium	SW-846 6010	07-26-2016	MB							107	1	104	MB < MDL
Calcium	SW-846 6010	07-26-2016	MS	99.00		80	120		20				
Calcium	SW-846 6010	07-26-2016	MSD		99.00	80	120	0	20				
Calcium	SW-846 6010	07-26-2016	R					0	20				
Iron	SW-846 6010	07-26-2016	LCS	96.00		80	120		20				
Iron	SW-846 6010	07-26-2016	MB							108		101	MB < PQL
Iron	SW-846 6010	07-26-2016	MS	93.00		80	120		20				
Iron	SW-846 6010	07-26-2016	MSD		92.00	80	120	1	20				
Iron	SW-846 6010	07-26-2016	R						20				
Magnesium	SW-846 6010	07-26-2016	LCS	97.00		80	120		20				

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

QC Checks: CRI: Quantitation limit check ICSAB: ICP interference check RPD: Relative Percent Difference

Table 5. Metals Validation Worksheet

Metals Data Validation Worksheet

15-Sep-2016

Project: Gunnison Disposal Site Monitoring **Task Code:** GUN08.1-16070001 **Lab Code:** PAR

Analyte	Method	Analysis Date	QC Type	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	ICSAB	Serial Dilution	CRI	Comments
Magnesium	SW-846 6010	07-26-2016	MB							107	1	99	MB < MDL
Magnesium	SW-846 6010	07-26-2016	MS	96.00		80	120		20				
Magnesium	SW-846 6010	07-26-2016	MSD		96.00	80	120	0	20				
Magnesium	SW-846 6010	07-26-2016	R					0	20				
Manganese	SW-846 6010	07-26-2016	LCS	95.00		80	120		20				
Manganese	SW-846 6010	07-26-2016	MB							92	0	102	MB < MDL
Manganese	SW-846 6010	07-26-2016	MS	99.00		80	120		20				
Manganese	SW-846 6010	07-26-2016	MSD		99.00	80	120	0	20				
Manganese	SW-846 6010	07-26-2016	R						20				
Potassium	SW-846 6010	07-26-2016	LCS	101.00		80	120		20				
Potassium	SW-846 6010	07-26-2016	MB								0	86	MB < MDL
Potassium	SW-846 6010	07-26-2016	MS	115.00		80	120		20				

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

QC Checks: CRI: Quantitation limit check ICSAB: ICP interference check RPD: Relative Percent Difference

Table 5 (continued). Metals Validation Worksheet

Metals Data Validation Worksheet

15-Sep-2016

Project: Gunnison Disposal Site Monitoring **Task Code:** GUN08.1-16070001 **Lab Code:** PAR

Analyte	Method	Analysis Date	QC Type	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	ICSAB	Serial Dilution	CRI	Comments
Potassium	SW-846 6010	07-26-2016	MSD		116.00	80	120	0	20				
Potassium	SW-846 6010	07-26-2016	R					1	20				
Sodium	SW-846 6010	07-26-2016	LCS	101.00		80	120		20				
Sodium	SW-846 6010	07-26-2016	MB								8	96	MB < PQL
Sodium	SW-846 6010	07-26-2016	MS	107.00		80	120		20				
Sodium	SW-846 6010	07-26-2016	MSD		106.00	80	120	0	20				
Sodium	SW-846 6010	07-26-2016	R					1	20				
Uranium	SW-846 6020	07-27-2016	LCS	105.00		80	120		20				
Uranium	SW-846 6020	07-27-2016	MB							101	0	110	MB < PQL
Uranium	SW-846 6020	07-27-2016	MS	101.00		75	125		20				
Uranium	SW-846 6020	07-27-2016	MSD		100.00	75	125	1	20				
Uranium	SW-846 6020	07-27-2016	R					4	20				

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

QC Checks: CRI: Quantitation limit check ICSAB: ICP interference check RPD: Relative Percent Difference

Table 5 (continued). Metals Validation Worksheet

Wet Chemistry Data Validation Worksheet

15-Sep-2016

Project: Gunnison Disposal Site Monitoring **Task Code:** GUN08.1-16070001 **Lab Code:** PAR

Analyte	Method	Analysis Date	QC Type	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	Comments
Chloride	SW-846 9056	07-30-2016	LCS	97.00		90	110		15	
Chloride	SW-846 9056	07-30-2016	LCSD	98.00	98.00	90	110	1	15	
Chloride	SW-846 9056	07-30-2016	MB							MB < MDL
Chloride	SW-846 9056	07-30-2016	MS	80.00		85	115		15	
Chloride	SW-846 9056	07-30-2016	MSD		87.00	85	115	6	15	
Sulfate	SW-846 9056	07-30-2016	LCS	97.00		90	110		15	
Sulfate	SW-846 9056	07-30-2016	LCSD	97.00	97.00	90	110	0	15	
Sulfate	SW-846 9056	07-30-2016	MB							MB < MDL
Sulfate	SW-846 9056	07-30-2016	MS	79.00		85	115		15	
Sulfate	SW-846 9056	07-30-2016	MSD		87.00	85	115	6	15	
Total Dissolved Solids	EPA 160.1	07-26-2016	LCS	90.00		85	115		5	
Total Dissolved Solids	EPA 160.1	07-26-2016	LCSD	93.00	93.00	85	115	3	5	
Total Dissolved Solids	EPA 160.1	07-26-2016	MB							MB < MDL
Total Dissolved Solids	EPA 160.1	07-26-2016	R					1	5	

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

QC Checks: RPD: Relative Percent Difference

Table 6. Wet Chemistry Validation Worksheet

Sampling Quality Control Assessment

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

Sampling Protocol

Sample results for all monitoring wells met the Category I low-flow sampling criteria and were qualified with an "F" flag in the database, indicating the wells were purged and sampled using the low-flow sampling method.

Field Duplicate Analysis

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. The relative percent difference for duplicate results that are greater than 5 times the practical quantitation limit (PQL) should be less than 20 percent. For results that are less than the PQL, the range should be no greater than the PQL. A duplicate sample was collected from location 0723. As shown in Table 7, the duplicate results met these criteria, demonstrating acceptable overall precision.

Validation Report: Field Duplicates

15-Sep-2016

Project: Gunnison Disposal Site Monitoring **Task Code:** GUN08.1-16070001 Lab Code: PAR

	Duplicate: GUN08.1-16070001-009				Sample: GUN08.1-16070001-006 0723						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Calcium	44			1	44			1	0		mg/L
Chloride	13			1	13			1	0		mg/L
Iron	0.087	J		1	0.016	J		1			mg/L
Magnesium	5.1			1	5.1			1	0		mg/L
Manganese	0.0031	J		1	0.00042	J		1			mg/L
Potassium	2.6			1	2.6			1	0		mg/L
Sodium	16			1	16			1	0		mg/L
Sulfate	23			1	23			1	0		mg/L
Total Dissolved Solids	220			1	210			1	4.7		mg/L
Uranium	0.0031			10	0.0032			10	3.2		mg/L

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

Table 7. Field Duplicates Worksheet

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 Donivan — Date: 10-27-2016

Data Validation Lead: Stephen Donivan — Date: 10-27-2016

Attachment 1

Sampling and Analysis Work Order

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May 13, 2016

Task Assignment 103
Control Number 16-0571

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

SUBJECT: Contract No. DE-LM0000421, Navarro Research & Engineering, Inc. (Navarro)
Task Assignment 103 LTS&M-UMTRCA TI & TII Sites, D&D Sites, Other Sites, and Other
June 2016 Environmental Sampling at the Gunnison, Colorado, Disposal Site

REFERENCE: Task Assignment 103, 1-103-1-02-108, Gunnison, Colorado, Disposal Site

Dear Mr. Linard:

The purpose of this letter is to inform you of the upcoming sampling event at the Gunnison, Colorado, Disposal Site. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Gunnison site. Water quality data will be collected at this site as part of the routine environmental sampling currently scheduled to begin the week of June 27, 2016.

The following list shows the monitoring wells (with zone of completion) scheduled for sampling during this event.

MONITORING WELLS*

0609 Gc	0716 Gc	0720 Tg	0721 Tg	0722 Tg	0723 Tg	0724 Tg	0725 Tg

*NOTE: Gc = Clayey gravel; Tg = Tertiary gravels

All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. Access agreements are being reviewed and are expected to be complete by the beginning of fieldwork. Additional water levels will be measured at monitoring wells indicated in the attachment.

2597 Legacy Way - Grand Junction, CO 81503-1789 -Telephone (970) 248-6000 - Fax (970) 248-6040

Please contact me at (970) 248-6654 if you have any questions.

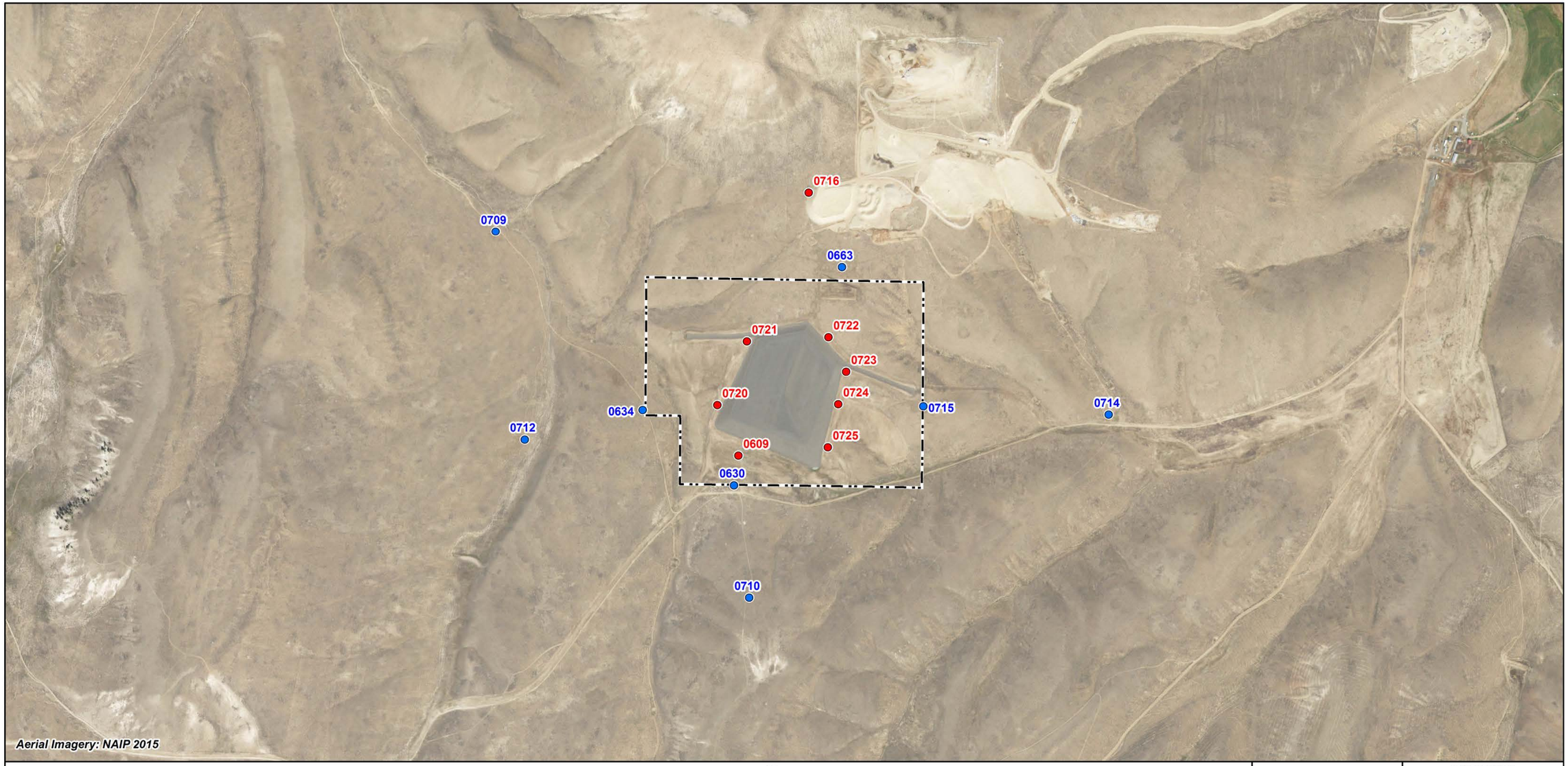
Sincerely,

Sam Campbell
LMS Site Lead

SC/lcg/bkb

Enclosures (3)

cc: (electronic)
Christina Pennal, DOE
Sam Campbell, Navarro
Jeff Carman, Navarro
Beverly Cook, Navarro
Steve Donivan, Navarro
Lauren Goodknight, Navarro
Sam Marutzky, Navarro
Diana Osborne, Navarro
EDD Delivery
rc-grand.junction
File: GUN400.02



Legend

- WELL TO BE SAMPLED
- WELL TO BE SAMPLED - WATER LEVEL ONLY
- SITE BOUNDARY

N

0 1,000 2,000 Feet

U.S. DEPARTMENT OF ENERGY OFFICE OF LEGACY MANAGEMENT	Work Performed by **Navarro Research & Engineering, Inc.** Under DOE Contract Number DE-LM0000421
Planned Sample Locations Gunnison, CO, Disposal Site June 2016	
DATE PREPARED: April 29, 2016	FILE NAME: S1415200-11x17

Gunnison, Colorado, Disposal Site Sample Location Map

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Sampling Frequencies for Locations at Gunnison, Colorado

Location ID	Quarterly	Semiannually	Annually	Every 5 years	Not Sampled	Notes
Monitoring Wells						
GUN08						
609				X after 5/15		BKGD; next in 2016
630					X	WLs ONLY; next in 2016
634					X	WLs ONLY; next in 2016
663					X	WLs ONLY; next in 2016
709					X	WLs ONLY; next in 2016
710					X	WLs ONLY; next in 2016
712					X	WLs ONLY; next in 2016
714					X	WLs ONLY; next in 2016
715					X	WLs ONLY; next in 2016
716				X after 5/15		BKGD; next in 2016
720				X after 5/15		POC; next in 2016
721				X after 5/15		POC; next in 2016
722				X after 5/15		POC; next in 2016
723				X after 5/15		POC; next in 2016
724				X after 5/15		POC; next in 2016
725				X after 5/15		POC; next in 2016

GUN08 (Disposal site) sampling must not be conducted before May 15th due to CDOW requirements regarding access to this site during Sage Grouse mating.

Constituent Sampling Breakdown

Site	Gunnison					
Analyte	Groundwater		Surface Water	Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Approx. No. Samples/yr	33 (41 every 5th year)		6			
Field Measurements						
Alkalinity						
Dissolved Oxygen						
Redox Potential	X	X	X			
pH	X	X	X			
Specific Conductance	X	X	X			
Turbidity	X	X	X			
Temperature	X	X	X			
Laboratory Measurements	*GUN01*	*GUN08*	*GUN01*			
Aluminum						
Ammonia as N (NH3-N)						
Calcium		X		5	SW-846 6010	LMM-01
Chloride		X		0.5	SW-846 9056	WCH-A-039
Chromium						
Gross Alpha						
Gross Beta						
Iron		X		0.05	SW-846 6020	LMM-02
Lead						
Magnesium		X		5	SW-846 6010	LMM-01
Manganese	X	X	X	0.005	SW-846 6010	LMM-01
Molybdenum						
Nickel						
Nickel-63						
Nitrate + Nitrite as N (NO3+NO2)-N						
Potassium		X		1	SW-846 6010	LMM-01
Radium-226						
Radium-228						
Selenium						
Silica						
Sodium		X		1	SW-846 6010	LMM-01
Strontium						
Sulfate		X		0.5	SW-846 9056	MIS-A-044
Sulfide						
Total Dissolved Solids		X		10	SM2540 C	WCH-A-033
Total Organic Carbon						
Uranium	X	X	X	0.0001	SW-846 6020	LMM-02
Vanadium						
Zinc						
Total No. of Analytes	2	10	2			

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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memo

NAVARRO

To: Sam Campbell, Navarro
From: Gretchen Baer, Navarro
Date: November 17, 2016
CC: Josh Linard, DOE
Steve Donivan, Navarro
EDD Delivery
Re: Sampling Trip Report

Site: Gunnison, Colorado, Disposal Site

Dates of Sampling Event: July 20 and 21, 2016

Team Members: Sam Campbell and Gretchen Baer, Navarro

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

Locations Not Sampled/Reason: All scheduled locations were sampled.

Location Specific Information: Nothing to note.

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

False ID	Sample ID	True ID	Sample Type	Matrix
2158	GUN08.1-16070001-009	0723	Duplicate	GW

Task Code Assigned: Samples were assigned to Task Code GUN08.1-16070001. Field data sheets can be found in \\crow\RAApps\SMS\GUN08.1-16070001\FieldData.

Sample Shipment: Samples were shipped overnight via FedEx from Grand Junction, CO, to ALS Laboratory in Fort Collins, CO, on July 21, 2016.

Water Level Measurements: Water levels were measured in all sampled wells. Water level measurements were also planned for these 8 locations: 0630, 0634, 0663, 0709, 0710, 0712, 0714, and 0715. Water levels were measured in these wells, with one exception: at 0712, the riser is damaged, which prevented a water level measurement from being taken. See Well Inspection Summary, below. PDF versions of the water level forms can be found in \\crow\RAApps\SMS\GUN08.1-16070001\FieldData.

Well Inspection Summary: At well 0712, the riser is broken (see Figure 1). It needs to be cut off and re-surveyed. A PDF version of the inspection form for well 0712 can be found in \\crow\RAApps\SMS\GUN08.1-16070001\FieldData.

Sampling Method: Samples were collected according to the *Sampling and Analysis Plan (SAP) for the U. S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated).

Field Variance: None. Samples were collected according to the SAP.

Equipment: All sampling equipment functioned properly. EDGE version 6.5.1 was used to collect field data. An issue with the EDGE software resulted in loss of some field data at one location. Field data were recollected prior to leaving the location.

Stakeholder/Regulatory/DOE: J. Linard (DOE) observed sampling at some locations on July 20, 2016.

Institutional Controls:

Fences, Gates, and Locks: All gates were locked and in good condition.
Signs: No issues were observed.
Trespassing/Site Disturbances: None observed
Disposal Cell/Drainage Structure Integrity: No issues observed

Safety Issues: None

Access Issues: None

General Information: Nothing to note.

Immediate Actions Taken: None

Future Actions Required or Suggested: At location 0712, the top of the riser is broken. It needs to be cut down to make the top edge level, and then it needs to be re-surveyed. This item has been added to the Operation and Maintenance Punch List found at \\lm\projects\SamplingProg\Maintenance for tracking and future resolution.

Figure 1. Damaged Riser at Monitoring Well 0712

Attachment 3

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. The review also includes an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

None of the analytical results were outside the historical range. The data for this event are acceptable as qualified.

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