Data Validation Package for the Gunnison, Colorado, Processing Site, April and July 2015

The U.S. Department of Energy (DOE) has prepared a Data Validation Package containing the groundwater and surface water monitoring data generated from the April and July 2015 sampling events at the Gunnison, Colorado, Processing Site. This package includes worksheets and reports that document the sampling activities and validation procedures conducted. **At your request, you are receiving a hard copy of the report.**

The report is also available for your review on the Internet at the DOE Office of Legacy Management (LM) website – http://energy.gov/lm. From the LM website home page, select the LM SITES MAP. Then select Gunnison Sites from the LM SITES list in the right column. The report will be available on the Gunnison, Colorado, Processing Site page under Site Documents and Links.

U.S. DEPARTMENT OF ENERGY | Legacy Management

Data Validation Package

WM-00061

April and July 2015 Groundwater and Surface Water Sampling at the Gunnison, Colorado, Processing Site

February 2016

U.S. DEPARTMENT OF ENERGY | Legacy Management

NMSS20

Contents

This page intentionally left blank

Sampling Event Summary

Site: Gunnison, Colorado, Processing Site

Sampling Period: April 13–16 and July 1, 2015

This event included annual sampling of groundwater and surface water locations at the Gunnison, Colorado, Processing Site. 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 collected from 28 monitoring wells, three domestic wells, and six surface locations in April at the processing site as specified in the draft 2010 *Ground Water Compliance Action Plan for the Gunnison, Colorado, Processing Site*. Domestic wells 0476 and 0477 were sampled in July because the homes were unoccupied in April, and the wells were not in use. Duplicate samples were collected from locations 0113, 0248, and 0477. One equipment blank was collected during this sampling event. Water levels were measured at all monitoring wells that were sampled.

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 requires additional action or follow-up. Interpretation and presentation of results, including an assessment of the natural flushing compliance strategy, will be reported in the upcoming 2015 Verification Monitoring Report.

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

2/29/2016
Date

Data Assessment Summary

Water Sampling Field Activities Verification Checklist

Project	Gunnison, Colorado	**Date(s) of Water Sampling**	April 13–16 & July 1, 2015
Date(s) of Verification	July 6, 2015	**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 March 11, 2015.
2. Were the sampling locations specified in the planning documents sampled?	Yes	Two locations that could not be sampled in April were sampled in July.
3. Were calibrations conducted as specified in the above-named documents?	Yes	Calibrations were performed April 10 and June 30, 2015.
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 monitoring wells were Category I.
Was one pump/tubing volume removed prior to sampling?		
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	Duplicate samples were collected from locations 0113, 0248, and 0477.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	Yes	One equipment blank was collected.
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 chilling was not required.
19. Were water levels measured at the locations specified in the planning documents?	Yes	Water levels were measured in all sampled wells.

Laboratory Performance Assessment

General Information

Report Number (RIN): 15046911
Sample Event: April 13–16, 2015
Site(s): Gunnison, Colorado, Processing Site
Laboratory: ALS Laboratory Group, Fort Collins, Colorado
Work Order No.: 1504375
Analysis: Metals
Validator: Stephen Donivan
Review Date: July 6, 2015

This validation was performed according "Standard Practice for Validation of Environmental Data" found in Appendix A of *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
Manganese	LMM-01	SW-846 3005A	SW-846 6010B
Uranium	LMM-02	SW-846 3005A	SW-846 6020A

Data Qualifier Summary

The analytical results were qualified as listed in Table 2. Refer to the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifier Summary

Sample Number	Location	Analyte	Flag	Reason
1504375-1	0002	Manganese	U	Less than 5 times the method blank
1504375-5	0013	Manganese	U	Less than 5 times the method blank
1504375-11	0102	Manganese	U	Less than 5 times the method blank

Table 2 (continued). Data Qualifier Summary

Sample Number	Location	Analyte	Flag	Reason
1504375-25	0186	Manganese	U	Less than 5 times the method blank
1504375-27	0188	Manganese	U	Less than 5 times the method blank
1504375-30	0250	Uranium	J	Equipment blank result
1504375-31	0251	Uranium	J	Equipment blank result
1504375-37	0795	Uranium	J	Equipment blank result
1504375-40	Equipment blank	Manganese	U	Less than 5 times the calibration blank

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 40 water samples on April 21, 2015, accompanied by a Chain of Custody form. The Chain of Custody form 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 form was complete with 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 at ambient temperature, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses and 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 SW-846 6010B, Manganese
Calibrations were performed on April 23, 2015, 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 April 23, 2015, using two 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 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 known concentration of analyte has been added before analysis. Matrix spike and matrix-spike duplicate (MS/MSD) analysis is 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.

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. All evaluated serial dilution data 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 April 27, 2015. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

SAMPLE MANAGEMENT SYSTEM

General Data Validation Report

RIN: 15046911 Lab Code: PAR Validator: Stephen Donivan Validation Date: 07/06/2015

Project: Gunnison Analysis Type: ☑ Metals ☐ General Chem ☐ Rad ☐ Organics

# of Samples: 40 Matrix: WATER Requested Analysis Completed: Yes

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation: OK Temperature: OK

Select Quality Parameters

☑ Holding Times	All analyses were completed within the applicable holding times.
☑ Detection Limits	The reported detection limits are equal to or below contract requirements.
☑ Field/Trip Blanks	There was 1 trip/equipment blank evaluated.
☑ Field Duplicates	There were 2 duplicates evaluated.

Figure 1. General Validation Worksheet (15046911)

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 15046911 **Lab Code:** PAR **Date Due:** 05/19/2015

Matrix: Water **Site Code:** GUN01 **Date Completed:** 04/28/2015

Analyte	Method Type	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	CCV	CCB								
Manganese	ICP/ES	04/23/2015	0.0000	1.0000	OK	OK	OK	109.0	103.0	106.0	3.0	96.0	4.0	105.0
Manganese	ICP/ES	04/23/2015			OK	OK	OK	108.0	97.0	100.0	1.0	93.0		112.0
Manganese	ICP/ES	04/23/2015									4.0			
Uranium	ICP/MS	04/23/2015	0.0000	1.0000	OK	OK	OK	101.0	93.0	106.0	3.0	101.0	5.0	110.0
Uranium	ICP/MS	04/23/2015			OK	OK	OK	101.0	116.0	116.0	0.0		0.0	120.0
Uranium	ICP/MS	04/23/2015									1.0			

Int. Calibration curve intercept
R^2 calibration curve correlation coefficient
CCV Continuing calibration verification
CCB Continuing calibration blank
LCS Laboratory control sample
MS Matrix spike
MSD Matrix spike duplicate
RPD Relative percent difference
ISCAB Interference check solution
CRI Reporting limit verification check

Figure 2. Metals Validation Worksheet (15046911)

General Information

Report Number (RIN): 15067187
Sample Event: July 1, 2015
Site(s): Gunnison, Colorado, Processing Site
Laboratory: ALS Laboratory Group, Fort Collins, Colorado
Work Order No.: 1507066
Analysis: Metals
Validator: Stephen Donivan
Review Date: July 28, 2015

This validation was performed according "Standard Practice for Validation of Environmental Data" found in Appendix A of *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 3 and 4, 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 3.

Table 3. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Manganese	LMM-01	SW-846 3005A	SW-846 6010B
Uranium	LMM-02	SW-846 3005A	SW-846 6020A

Data Qualifier Summary

The analytical results were qualified as listed in Table 4. Refer to the sections below for an explanation of the data qualifiers applied.

Table 4. Data Qualifier Summary

Sample Number	Location	Analyte	Flag	Reason
1507066-1	0476	Manganese	U	Less than 5 times the calibration blank

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received three water samples on July 7, 2015, accompanied by a Chain of Custody form. The Chain of Custody form 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 form was complete with 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 at ambient temperature, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses, and 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 SW-846 6010B, Manganese
Calibrations were performed on July 10, 2015, 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 10, 2015, using two 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 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 known concentration of analyte has been added before analysis. Matrix spike and matrix-spike duplicate (MS/MSD) analysis is 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.

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. All evaluated serial dilution data 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 July 16, 2015. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

SAMPLE MANAGEMENT SYSTEM

General Data Validation Report

RIN: 15067187 Lab Code: PAR Validator: Stephen Donivan Validation Date: 07/28/2015

Project: Gunnison Analysis Type: ☑ Metals ☐ General Chem ☐ Rad ☐ Organics

# of Samples: 3 Matrix: WATER Requested Analysis Completed: Yes

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation: OK Temperature: OK

Select Quality Parameters

☑ Holding Times	All analyses were completed within the applicable holding times.
☑ Detection Limits	The reported detection limits are equal to or below contract requirements.
☐ Field/Trip Blanks	
☑ Field Duplicates	There was 1 duplicate evaluated.

Figure 3. General Validation Worksheet (15067187)

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 15067187 **Lab Code:** PAR **Date Due:** 07/21/2015

Matrix: Water **Site Code:** GUN01 **Date Completed:** 07/16/2015

Analyte	Method Type	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	CCV	CCB								
Manganese	ICP/ES	07/10/2015	0.0000	1.0000	OK	OK	OK	115.0	110.0	110.0	0.0	100.0		113.0
Manganese	ICP/ES	07/10/2015										100.0		111.0
Uranium	ICP/MS	07/11/2015	0.0000	1.0000	OK	OK	OK	99.0	99.0	98.0	1.0	106.0	5.0	75.0
Uranium	ICP/MS	07/11/2015									4.0			80.0

Int. Calibration curve intercept
R^2 calibration curve correlation coefficient
CCV Continuing calibration verification
CCB Continuing calibration blank
LCS Laboratory control sample
MS Matrix spike
MSD Matrix spike duplicate
RPD Relative percent difference
ISCAB Interference check solution
CRI Reporting limit verification check

Figure 4. Metals Validation Worksheet (15067187)

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. All private wells were Category IV locations: no purging during sampling or qualification of results is required.

Equipment Blank Assessment

Equipment blanks are prepared and analyzed to document contamination attributable to the sample collection process. One equipment blank was submitted with these samples. Uranium was detected in this blank (Figure 5). Associated sample uranium results that are greater than the MDL but less than 5 times the blanks concentration are qualified with a "J" flag as estimated values.

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. The relative percent difference (RPD) for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than the PQL, the range should be no greater than the PQL. Duplicate samples were collected from locations 0113, 0248, and 0477. The duplicate results met these criteria, demonstrating acceptable overall precision (Figures 6 and 7).

SAMPLE MANAGEMENT SYSTEM

Validation Report: Equipment/Trip Blanks

RIN: 15046911 Lab Code: PAR Project: Gunnison Validation Date: 07/06/2015

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	1504375-40	SW6020	Uranium	0.45		0.029	UG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
1504375-29	NFU 966	0248	27	10		
1504375-30	NFU 976	0250	0.77	10		J
1504375-31	NFV 061	0251	0.74	10		J
1504375-35	NFU 967	0777	3.4	10		
1504375-36	NFU 968	0780	42	10		
1504375-37	NFU 970	0795	0.81	10		J

Figure 5. Equipment Blank Worksheet (15067187)

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 15046911 Lab Code: PAR Project: Gunnison Validation Date: 07/06/2015

Duplicate: 2597 Sample: 0248

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Manganese	220			1	220			1	0		UG/L
Uranium	27			10	27			10	0		UG/L

Duplicate: 2598 Sample: 0113

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Manganese	2300			1	2300			1	0		UG/L
Uranium	190			50	190			50	0		UG/L

Figure 6. Field Duplicates Worksheet (15046911)

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 15067187 Lab Code: PAR Project: Gunnison Validation Date: 07/28/2015

Duplicate: 2646 Sample: 0477

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Manganese	7.8			1	9			1	14.29		UG/L
Uranium	1.6			10	1.4			10	13.33		UG/L

Figure 7. Field Duplicates Worksheet (15067187)

Certification

All laboratory analytical quality control criteria were met except as qualified in this report. The data qualifiers listed on the SEEPro 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 — Stephen Donivan — 3-1-2016 — Date

Data Validation Lead: Stephen Donivan — Stephen Donivan — 3-1-2016 — Date

This page intentionally left blank

Attachment 1

Assessment of Anomalous Data

This page intentionally left blank

Potential Outliers Report

Potential Outliers Report

Potential outliers are measurements that are extremely large or small relative to the rest of the data population and, therefore, are suspected of misrepresenting that population. Potential outliers can result from transcription errors, data-coding errors, or measurement system problems. However, outliers can also represent true extreme values of a distribution and can indicate more variability in the population than was expected.

Statistical outlier tests give probabilistic evidence that an extreme value does not "fit" with the distribution of the remainder of the data and is therefore a statistical outlier. These tests should only be used to identify data points that require further investigation. The tests alone cannot determine whether a statistical outlier should be discarded or corrected within a data set.

There are three steps involved in identifying extreme values or outliers:

1. **Identify extreme values that may be potential outliers.** Do this by generating the Data Validation Outliers Report (see below) using the Sample Management System from data in the environmental database. The application compares the new data set (in standard environmental database units) with historical data and lists the historical range and the new data that fall outside the historical data range. A determination is also made as to whether the data in the population are normally distributed using the Shapiro-Wilk Test. Data that are not normally distributed are identified on the report with "NA" in the Statistical Outlier column.
2. **Apply the appropriate statistical test.** Dixon's Test for extreme values is used to test for statistical outliers when the sample size is less than or equal to 25. This test considers both extreme values that are much smaller than the rest of the data (case 1) and extreme values that are much larger than the rest of the data (case 2). This test is valid only if the data without the suspected outlier are normally distributed. Rosner's Test is a parametric test that is used to detect outliers for sample sizes of 25 or more. This test also assumes that the data without the suspected outliers are normally distributed. See *Data Quality Assessment: Statistical Methods for Practitioners,* EPA QA/G-9S, http://www.epa.gov/sites/production/files/2015-08/documents/g9s-final.pdf.
3. **Scientifically review statistical outliers and decide on their disposition.** The review should include an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

The laboratory result for manganese from location 0160 was identified as a potential outlier. The data associated with this result was further reviewed. Laboratory analysis included manganese data generated by two independent methods, SW-846 6010B and SW-846 6020A. The manganese results for this sample from the two methods were in agreement, indicating that the reported manganese result accurately represents the true concentration in the sample.

Potential anomalies in the field parameters were also examined for patterns of repeated high or low bias, which suggest a systematic error due to instrument malfunction. No such patterns were found and the data for this RIN are acceptable as qualified.

Data Validation Outliers Report - No Field Parameters
Comparison: All historical Data Beginning 01/01/2005
Laboratory: ALS Laboratory Group
RIN: 15046911
Report Date: 07/06/2015

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum	Qualifiers		Historical Minimum	Qualifiers		Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
GUN01	0012R	N001	04/16/2015	Manganese	0.670			0.650		F	0.00970		F	8	0	No
GUN01	0064	N001	04/14/2015	Manganese	0.00250	J		0.560		F	0.00340	B	F	10	0	No
GUN01	0106	N001	04/15/2015	Manganese	4.50			9.60		F	4.60		F	10	0	No
GUN01	0106	N001	04/15/2015	Uranium	0.0380			0.0320		F	0.00140		F	10	0	No
GUN01	0136	N001	04/14/2015	Manganese	2.60			2.10		F	0.00053	U	FG	10	1	NA
GUN01	0160	N001	04/14/2015	Manganese	0.880			0.130		F	0.00053	U	F	10	2	Yes
GUN01	0161	N001	04/14/2015	Manganese	0.00240	J		0.0630		F	0.00290	B	F	13	0	No
GUN01	0248	N001	04/14/2015	Uranium	0.0270			0.0190			0.00420			10	0	No
GUN01	0478	N001	04/15/2015	Manganese	1.10			1.000			0.380			7	0	No
GUN01	0780	N001	04/15/2015	Uranium	0.0420			0.0370			0.0130			10	0	No

STATISTICAL TESTS:
The distribution of the data is tested for normality or log-normality using the Shapiro-Wilk Test
Outliers are identified using Dixon's Test when there are 25 or fewer data points.
Outliers are identified using Rosner's Test when there are 26 or more data points.
See Data Quality Assessment: Statistical Methods for Practitioners, EPA QC/G-9S, February 2006.

NA: Data are not normally or log normally distributed.

Attachment 2

Sampling and Analysis Work Order

This page intentionally left blank

Stoller Newport News Nuclear

March 11, 2015

Task Assignment 103
Control Number 15-0399

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-LM0000415, Stoller Newport News Nuclear, Inc. (SN3), a wholly owned subsidiary of Huntington Ingalls Industries, Inc.
Task Assignment 103 LTS&M - UMTRCA TI & TII, D&D, Others, and AS&T
April 2015 Environmental Sampling at the Gunnison, Colorado, Processing Site

REFERENCE: Task Assignment 103, 3-103-1-02-108, Gunnison, Colorado, Processing Site

Dear Mr. Linard:

The purpose of this letter is to inform you of the upcoming sampling event at the Gunnison, Colorado, processing site. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the site. Water quality data will be collected at this site as part of the routine environmental sampling currently scheduled to begin the week of April 13, 2015.

The following lists show the monitoring wells, along with zone of completion, surface locations, and private wells scheduled for sampling during this event.

MONITORING WELLS*

0002 Al	0013 Al	0065 Al	0106 Al	0126 Al	0136 Al	0181 Al	0187 Al
0005 Al	0062 Al	0066 Al	0112 Al	0127 Al	0160 Al	0183 Al	0188 Al
0006 Al	0063 Al	0102 Al	0113 Al	0135 Al	0161 Al	0186 Al	0189 Al
012R Al	0064 Al	0105 Al	0125 Al				

DOMESTIC WELLS*

0476 Nr	0477 Nr	0478 Nr	0667 Al	0683 Nr

*NOTE: Al = Alluvium; Nr = No recovery of data for classifying

SURFACE LOCATIONS

0248	0250	0251	0777	0780	0795

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.

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

Sincerely,

Sam Campbell

Sam Campbell
Site Lead

SC/lcg/bkb

Enclosures (3)

cc: (electronic)
Christina Pennal, DOE
Sam Campbell, SN3
Steve Donivan, SN3
Lauren Goodknight, SN3
Diana Osborne, SN3
EDD Delivery
rc-grand.junction
File: GUN410.02

A SUBSIDIARY OF HUNTINGTON INGALLS INDUSTRIES
2597 Legacy Way • Grand Junction, CO 81503-1789 • Telephone (970) 248-6000 • Fax (970) 248-6040

LEGEND

- MONITORING WELL
- DOMESTIC WELL
- SURFACE LOCATION
- FORMER SURFACE LOCATION - NO LONGER SAMPLED

FORMER MILLSITE BOUNDARY

N

SCALE IN FEET
0 500 1,000

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AM01-07LM00060
Planned Sampling Map Gunnison, CO, Processing Site April 2014	
DATE PREPARED: September 4, 2014	FILENAME: S1155300

M:\LTS\111\0001\16\000\S11553\S1155300-11x17.mxd smithw 09/04/2014 2:01:24 PM

Gunnison, Colorado, Processing Site Planned Sampling Map

This page intentionally left blank

Sampling Frequencies for Locations at Gunnison, Colorado

Location ID	Quarterly	Semiannually	Annually	Every 5 years	Not Sampled	Notes
Monitoring Wells						
GUN01						
002			X			
005			X			
006			X			
012R			X			
013			X			
062			X			
063			X			
064			X			
065			X			
066			X			
102			X			
105			X			
106			X			
112			X			
113			X			
125			X			
126			X			
127			X			
135			X			
136			X			
160			X			
161			X			
181			X			
183			X			
186			X			
187			X			
188			X			
189			X			
Surface Locations						
GUN01						
248			X			
250			X			
251			X			
777			X			
780			X			
795			X			
Domestic Wells						
GUN01						
476			X			
477			X			
478			X			
667			X			
683			X			

GUN01 (Processing site) Sampling conducted in April

Constituent Sampling Breakdown

	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 3

Trip Reports

This page intentionally left blank

Stoller Newport News Nuclear

Memorandum

DATE: May 7, 2015

TO: Sam Campbell

FROM: Jennifer Graham

SUBJECT: Trip Report

Site: Gunnison, Colorado, Processing Site

Dates of Sampling Event: April 13–16, 2015

Team Members: Sam Campbell, Eric Szabelski, and Jennifer Graham

Number of Locations Sampled: Samples were collected from 28 monitoring wells, 6 surface water locations, and 3 domestic wells of the 39 locations identified on the sampling notification letter.

Locations Not Sampled/Reason: Domestic wells 0476 and 0477 were not sampled because the homes were vacant and the pumps were turned off and winterized.

Location Specific Information:

Location IDs	Comments
0127, 0135	Locations contained black organic particulate in both purge water and sample collected. Water smelled like sulfur.
0005	Location contained black and brown organic particulate in both purge water and sample collected. Water smelled like sulfur. Had trouble meeting turbidity criteria. Purged 5.5 L of water to meet turbidity before sampling.
0160	Location contained yellow to yellow-orange organic particulate in both purge water and sample collected. Had trouble meeting turbidity criteria. Purged 11.2 L of water to meet turbidity before sampling.
0012R	Difficulty meeting turbidity criteria. Purged 7.6 L of water to meet turbidity before sampling.
0478, 0667, 0683	Collection of these samples came from the exterior tap.
0189	Location required very low flow rate and was sampled at <100 mL/min
0186	Well had initial pH > 11l; purged 9.3 L of water before pH stabilized in well

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

False ID	Ticket Number	True ID	Sample Type	Associated Matrix
2597	NFU 971	0248	Duplicate	Groundwater
2598	NFU 972	0113	Duplicate	Groundwater
2695	NFV 064	Equipment Blank	Equipment Blank	Surface Water

Requisition Identification Number (RIN) Assigned: Samples were assigned to RIN 15046911. Field data sheets can be found in \\crow\RAApps\SMS\15046911\FieldData.

Sample Shipment: Samples were shipped overnight via FedEx from Grand Junction to ALS Laboratory Group on April 20, 2015.

Water Level Measurements: Water levels were measured in all sampled monitoring wells.

Dataloggers: One datalogger was downloaded and checked for accuracy at monitoring well 0006. Data and information from the datalogger can be viewed electronically using SEEPro.

Well Inspection Summary: All wells were in good condition with the exception of monitoring well 0183 which had a damaged flush-mount protective-casing cover.

Labels were faded at monitoring wells 0002 and 0102. The wells were relabeled.

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: The battery in the peristaltic pump would not hold a charge, so the pump was plugged into one of the power points on the sampling vehicle during the sampling event. All other equipment functioned properly during this sampling event.

Stakeholder/Regulatory/DOE: DOE site manager J. Linard was onsite April 15 to observe sampling event.

Institutional Controls:

Fences, Gates, and Locks: All landowner gates were left as found.
Signs: N/A
Trespassing/Site Disturbances: N/A
Disposal Cell/Drainage Structure Integrity: N/A

Access Issues:

- Gunnison County Airport personnel, D. Fry was present on April 14 to monitor activities while on airport grounds.

- Tracey Hildreth was contacted prior to accessing wells in the pasture south of the gravel company. Tracey leases the land from the gravel company and operates a cattle ranch on the property. Gates on property were left as found
- Golf course personnel were contacted prior to accessing wells on the golf course.

Safety Issues: None.

General Information: Nothing to note.

Immediate Actions Taken: Coordinates were collected with GPS instrumentation at former surface water location 0792, which had only estimated coordinates. Coordinates were also collected at new surface location 0251.

Road base material was manually placed around wells 0135 and 0136, which are located in a low area that often holds ponded water. The road base was placed to stabilize the protective casing and to provide a dry area for sampling equipment. The ground height was raised about 2 feet using approximately 5.5 tons of road base. Tracey Hildreth (rancher) was consulted before placement of road base and agreed with placement plan. Photos of before and after work completion are shown below:

Before **After**

Future Actions Required or Suggested: A flush-mount protective cover was purchased for monitoring well 0183; however, the cover was the wrong size and not installed; a new cover for the well is still needed.

The following monitoring wells need to be redeveloped: 0005, 0127, 0135, 0160, and 0186.

(JG/lcg)

cc: (electronic)
Josh Linard, DOE
Sam Campbell, SN3
Steve Donivan, SN3
EDD Delivery

Stoller Newport News Nuclear

Memorandum

DATE: July 9, 2015

TO: Distribution

FROM: Sam Campbell

SUBJECT: Trip Report

Site: Gunnison, Colorado, Processing Site

Dates of Sampling Event: July 1, 2015

Team Members: Sam Campbell.

Number of Locations Sampled: Two domestic wells (0476 and 0477) were sampled; these wells were not sampled during the April sampling event because the homes were vacant. This event was conducted in conjunction with the annual inspection of the Gunnison disposal cell.

Locations Not Sampled/Reason: None.

Location Specific Information: Samples were collected from exterior taps on the house using Category IV sampling protocol.

Quality Control Sample Cross Reference: One duplicate sample was collected at location 0477. The false location number assigned to the duplicate was 2646 and ticket number NHW-686.

Requisition Index Number (RIN) Assigned: Samples were assigned to RIN 15067187. Field data sheets can be found in \\crow\RAApps\SMS\15067187\FieldData.

Sample Shipment: Samples were shipped overnight via FedEx from Grand Junction to ALS Laboratory on July 6, 2015.

Water Level Measurements: Domestic wells – water levels were not measured.

Well Inspection Summary: Domestic wells – inspection was not conducted.

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

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

Equipment: All equipment functioned properly.

Stakeholder/Regulatory/DOE: Josh Linard (DOE) and Rob Evans (NRC) observed sampling activities.

Institutional Controls:

Fences, Gates, and Locks: N/A
Signs: N/A
Trespassing/Site Disturbances: N/A
Disposal Cell/Drainage Structure Integrity: N/A

Safety Issues: None.

Access Issues: None.

General Information: Nothing to note.

Immediate Actions Taken: None.

Future Actions Required or Suggested: None.

(SC/lcg)

cc: (electronic)
Josh Linard, DOE
Sam Campbell, SN3
Steve Donivan, SN3
EDD Delivery