

Data Validation Package

**June 2015
Groundwater and Surface Water
Sampling at the
Green River, Utah, Disposal Site**

August 2015



U.S. DEPARTMENT OF
ENERGY

Legacy
Management

This page intentionally left blank

Contents

Sampling Event Summary	1
Data Assessment Summary.....	5
Water Sampling Field Activities Verification Checklist	7
Laboratory Performance Assessment	9
Sampling Quality Control Assessment	16
Certification	18

Attachment 1—Assessment of Anomalous Data

Potential Outliers Report

Attachment 2—Sampling and Analysis Work Order

Attachment 3—Trip Report

This page intentionally left blank

Sampling Event Summary

Site: Green River, Utah, Disposal Site

Sampling Period: June 10–11, 2015

Groundwater samples were collected during the 2015 sampling event from point-of-compliance (POC) wells 0171, 0173, 0176, 0179, 0181, and 0813 to monitor the disposition of contaminants in the middle sandstone unit of the Cedar Mountain Formation. Groundwater samples also were collected from alluvium monitoring wells 0188, 0189, 0192, 0194, and 0707, and basal sandstone monitoring wells 0182, 0184, 0185, and 0588 as a best management practice. Surface locations 0846 and 0847 were sampled to monitor for degradation of water quality in the backwater area of Brown’s Wash and in the Green River immediately downstream of Brown’s Wash. The Green River location 0801 is upstream from the site and is sampled to determine background-threshold values (BTVs). 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>). Water levels were measured at each sampled well.

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/#>.

All six POC wells are completed in the middle sandstone unit of the Cedar Mountain Formation and are monitored to measure contaminant concentrations for comparison to proposed alternate concentration limits (ACLs), as provided in Table 1. Contaminant concentrations in the POC wells remain below their respective ACLs.

Table 1. Analytical Results and Proposed ACL Values for the POC Wells

Well	Arsenic, mg/L		Nitrate + Nitrite as Nitrogen (N), mg/L		Selenium, mg/L		Sulfate, mg/L		Uranium, mg/L	
	ACL	Sample Result	ACL	Sample Result	ACL	Sample Result	ACL	Sample Result	ACL	Sample Result
0171	5.0	0.0008	1,000	43	5.0	0.17	None	4000	4.4	0.13
0173		0.0015		160		0.094		7300		0.016
0176		ND ^b		61		0.81		4000		0.0031
0179		ND		21		0.42		3600		0.16
0181		0.0020		76		0.019		6700		0.022
0813		0.090		0.02		0.0012		3700		0.019

^a ND = Not Detected

The alluvium monitoring wells are sampled as a best management practice. The results are not compared to ACLs because the alluvium is not classified as an aquifer. As expected, some of these wells continue to have elevated concentrations of nitrate and uranium because processing activities contaminated the alluvial groundwater. Analytical results for the alluvium monitoring wells are provided in Table 2. Groundwater in the basal sandstone unit has not been contaminated by site-related activities, but groundwater in this unit is monitored as a best management practice. Analytical results for the basal sandstone monitoring wells are also provided in Table 2.

Table 2. Analytical Results for the Alluvium and Basal Sandstone Monitoring Wells

Well	Arsenic, mg/L	Nitrate + Nitrite as N, mg/L	Selenium, mg/L	Sulfate, mg/L	Uranium, mg/L
Alluvium Monitoring Wells					
0188	ND ^b	9.0	0.031	6,100	0.066
0189	ND	42	0.038	7,700	0.37
0192	ND	66	0.099	7,400	0.48
0194	0.0025	130	0.061	33,000	5.5
0707 (Background)	0.0005	2.7	0.058	8,000	0.029
Basal Sandstone Monitoring Wells					
0182	0.012	ND	ND	640	0.0022
0184 (Background)	0.0017	ND	ND	690	0.0019
0185	0.0029	0.52	ND	530	ND
0588	0.0096	ND	0.0011	650	0.00025

^a ND = Not Detected

Surface water sample results from the 2015 sampling event are provided in Table 3, below. Locations that are monitored are in the ephemeral Brown's Wash (0847, backwater of the Green River) and at the confluence of Brown's Wash and the Green River (0846). Uranium concentrations at these locations are compared to a BTV derived from location 0801 data, which is located on the Green River upstream from the site. Concentrations of other contaminants of concern are compared to applicable surface water standards. Concentrations at locations 0846 and 0847 are below the BTV and surface water standards, which indicates no degradation of water quality resulting from contaminated groundwater discharge.

Table 3. Analytical Results and Standards/Background Threshold Values for Surface Water

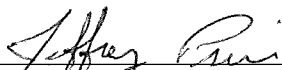
Location	Ammonia as N, mg/L		Arsenic, mg/L		Nitrate + Nitrite as N, mg/L		Selenium, mg/L		Uranium, mg/L	
	Std ^a	Sample Result	Std ^b	Sample Result	Std ^b	Sample Result	Std ^b	Sample Result	BTV ^c	Sample Result
0801 (upstream)	0.5	ND ^d	0.150	0.0012	4	0.14	0.0046	ND	0.00537	0.0012
0846		ND		0.0010		0.14		0.00068		0.0011
0847		0.15		0.0005		0.56		0.0035		0.0017

^a Std = Standard, in milligrams per liter

^b Standards for arsenic, nitrate, and selenium are aquatic wildlife standards from Utah Rule R317-2, Standards of Quality for Waters of the State, Table 2.14.2.

^c Uranium BTV concentration (in milligrams per liter) is based on historical data set (1997–present) from upstream Green River location (0801). BTV values are calculated using ProUCL version 5.0 as provided by EPA.

^d ND = Not Detected.



 Jeffrey Price, Site Lead
 Navarro Research and Engineering, Inc.

April 22, 2016

 Date

This page intentionally left blank

Data Assessment Summary

This page intentionally left blank

Water Sampling Field Activities Verification Checklist

Project	Green River, Utah, Disposal Site	Date(s) of Water Sampling	June 10–11, 2015
Date(s) of Verification	August 6, 2015	Name of Verifier	Stephen Donovan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures? List any Program Directives or other documents, SOPs, instructions.	Yes	Work Order letter dated May 11, 2015.
2. Were the sampling locations specified in the planning documents sampled?	Yes	
3. Were calibrations conducted as specified in the above-named documents?	Yes	Calibrations were performed on June 9, 2015.
4. Was an operational check of the field equipment conducted daily? 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?	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 was collected at location 0179.
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?	Yes	
19. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Report Number (RIN): 15067102
Sample Event: June 10-11, 2015
Site(s): Green River, Utah, Disposal Site
Laboratory: ALS Laboratory Group, Fort Collins, Colorado
Work Order No.: 1506322
Analysis: Metals and Wet Chemistry
Validator: Stephen Donovan
Review Date: August 5, 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, 2, and 3, 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 4.

Table 4. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Ammonia as N	WCH-A-005	EPA 350.1	EPA 350.1
Arsenic, Selenium, Uranium	LMM-02	SW-846 3005A	SW-846 6020A
Nitrate + Nitrite as N	WCH-A-022	EPA 353.2	EPA 353.2
Sulfate	MIS-A-045	SW-846 9056	SW-846 9056

Data Qualifier Summary

Analytical results were qualified as listed in Table 5. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 5. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
All	All	Ammonia as N	J	Sample preservation
All	All	Nitrate + Nitrite as N	J	Sample preservation
All	All	Sulfate	J	Sample preservation
1506322-1	0171	Selenium	J	Serial dilution result
1506322-7	0184	Selenium	U	Less than 5 times the calibration blank
1506322-8	0185	Selenium	U	Less than 5 times the calibration blank
1506322-8	0185	Uranium	U	Less than 5 times the method blank
1506322-13	0588	Uranium	J	PQL verification check result
1506322-15	0801	Selenium	U	Less than 5 times the calibration blank
1506322-20	Equipment Blank	Selenium	U	Less than 5 times the calibration blank

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 20 water samples on June 17, 2015, accompanied by a Chain of Custody form. Copies of the air bills were included in the receiving documentation. 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.

Preservation and Holding Times

The sample shipment was received intact at ambient temperature because of a shipping delay, which does not comply with requirements. The ammonia as N, nitrate + nitrite as N, and sulfate results are qualified with a “J” flag as estimated values. 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 350.1, Ammonia as N

Calibrations were performed using six calibration standards on June 22, 2015. 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.

Method EPA 353.2, Nitrate + Nitrite as N

Calibrations were performed using seven calibration standards on June 24, 2015. 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.

Method SW-846 6020A, Arsenic, Selenium, and Uranium

Calibrations were performed on June 23, 2015, 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 with the exception of uranium. Sample uranium results that are greater than the MDL but less than 5 times the PQL are qualified with a “J” flag as estimated values. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries were stable and within acceptable ranges.

Method SW-846 9056, Sulfate

Calibrations were performed using six calibration standards on June 16, 2015. 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.

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 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, which includes 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 serial dilution data evaluated met the acceptance criteria with the exception of selenium. The associated sample selenium result is qualified with a “J” flag as an estimated value.

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 1, 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: 15067102 Lab Code: PAR Validator: Stephen Donovan Validation Date: 08/06/2015
Project: Green River Analysis Type: Metals General Chem Rad Organics
of Samples: 20 Matrix: WATER Requested Analysis Completed: Yes

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation: OK Temperature: NO

Select Quality Parameters

- Holding Times
- Detection Limits
- Field/Trip Blanks
- Field Duplicates

All analyses were completed within the applicable holding times.

The reported detection limits are equal to or below contract requirements.

There was 1 trip/equipment blank evaluated.

There was 1 duplicate evaluated.

Figure 1. General Validation Worksheet

SAMPLE MANAGEMENT SYSTEM
Metals Data Validation Worksheet

RIN: 15067102 Lab Code: PAR Date Due: 07/15/2015
 Matrix: Water Site Code: GRN01 Date Completed: 07/02/2015

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								
Arsenic	ICP/MS	06/23/2015	0.0000	1.0000	OK	OK	OK	103.0	114.0	112.0	2.0	98.0		114.0
Selenium	ICP/MS	06/23/2015	0.0000	1.0000	OK	OK	OK	108.0	108.0	104.0	1.0	111.0	15.0	110.0
Uranium	ICP/MS	06/23/2015	0.0000	1.0000	OK	OK	OK	108.0	86.0	89.0	0.0	101.0	5.0	250.0
Uranium	ICP/MS	06/24/2015	0.0000	1.0000	OK	OK						105.0		200.0

- Int. Calibration curve intercept
- R² 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

SAMPLE MANAGEMENT SYSTEM
Wet Chemistry Data Validation Worksheet

RIN: 15067102 **Lab Code:** PAR **Date Due:** 07/15/2015
Matrix: Water **Site Code:** GRN01 **Date Completed:** 07/02/2015

Analyte	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R ²	CCV	CCB						
AMMONIA AS N	06/22/2015	0.000	1.0000	OK	OK	OK	100.00	79.0	78.0	1.00	
Nitrate+Nitrite as N	06/24/2015	0.000	1.0000	OK	OK	OK	101.00	113.0	115.0	2.00	
SULFATE	06/19/2015	0.000	1.0000	OK	OK	OK	97.00	95.0			
SULFATE	06/20/2015								99.0	1.00	

Int. Calibration curve intercept
R² 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

Figure 3. 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 were qualified with an “F” flag in the database, indicating the wells were purged and sampled using the low-flow sampling method. All wells met the Category I criteria with the following exceptions: wells 0171, 0182, 0184, 0185, 0189, and 0194 were classified as Category II or III because of water level drawdown. The sample results for these wells were qualified with a “Q” flag, indicating the data are qualitative because of the sampling technique.

Equipment Blank

An equipment blank (field ID 2358) was collected after decontamination of the non-dedicated sampling equipment used at surface water locations. There were no analytes detected in the equipment blank. The equipment blank results indicate adequate decontamination of the sampling equipment.

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. A duplicate sample was collected from location 0179. The relative percent difference for duplicate 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. The duplicate results met the criteria, demonstrating acceptable overall precision (Figure 4).

SAMPLE MANAGEMENT SYSTEM
Validation Report: Field Duplicates

Page 1 of 1

RIN: 15067102 Lab Code: PAR Project: Green River Validation Date: 08/06/2015

Duplicate: 2357

Sample: 0179

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
AMMONIA AS N	0.1	U		1	0.1	U		1			MG/L
Arsenic	0.15	U		10	2.4			10			UG/L
Nitrate+Nitrite as N	21			25	22			20	4.65		MG/L
Selenium	420			10	420			10	0		UG/L
SULFATE	3600			100	3600			100	0		MG/L
Uranium	160			10	160			10	0		UG/L

Figure 4. Field Duplicates Worksheet

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 Donovan 4-22-2016
Stephen Donovan Date

Data Validation Lead: Stephen Donovan 4-22-2016
Stephen Donovan Date

Attachment 1

Assessment of Anomalous Data

This page intentionally left blank

Potential Outliers Report

This page intentionally left blank

Potential Outliers Report

Potential outliers are measurements that are extremely large or small relative to the rest of the data and, therefore, are suspected of misrepresenting the population from which they were collected. 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 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.
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.

There were no potential outliers identified, and the data for this event are acceptable as qualified.

Data Validation Outliers Report - No Field Parameters

Comparison: All historical Data Beginning 01/01/2005

Laboratory: ALS Laboratory Group

RIN: 15067102

Report Date: 08/06/2015

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
GRN01	0171	N001	06/10/2015	Arsenic	0.00079	J	FQ	0.00240	F	0.00083	B	F	18	3	No	
GRN01	0176	N001	06/10/2015	Arsenic	0.00015	U	F	0.00120	F	0.00025		FQ	9	0	NA	
GRN01	0176	N001	06/10/2015	Sulfate	4000		FJ	3900	F	3700		F	5	0	No	
GRN01	0176	N001	06/10/2015	Uranium	0.00310		F	0.00270	F	0.00220		F	9	0	No	
GRN01	0181	N001	06/10/2015	Sulfate	6700		FJ	6200	F	4400		F	7	0	No	
GRN01	0182	N001	06/11/2015	Selenium	0.00032	U	FQ	0.00015	FQ	0.000065	B	FQ	5	0	No	
GRN01	0182	N001	06/11/2015	Uranium	0.00220		FQ	0.00130	FQ	0.0007		FQ	5	0	No	
GRN01	0184	N001	06/11/2015	Selenium	0.00045	J	UFQ	0.00035	FQ	0.00018		FQ	5	0	No	
GRN01	0189	N001	06/10/2015	Arsenic	0.00015	U	FQ	0.00210	FQ	0.00036		FQ	10	0	NA	
GRN01	0189	N001	06/10/2015	Sulfate	7700		FQJ	7200	F	6200		FQ	5	0	No	
GRN01	0192	N001	06/10/2015	Nitrate + Nitrite as Nitrogen	66.0		FJ	190	F	72.0		F	10	0	No	
GRN01	0192	N001	06/10/2015	Sulfate	7400		FJ	6700	F	4800		F	6	0	No	
GRN01	0846	0001	06/11/2015	Arsenic	0.001			0.00460		0.00110			11	0	NA	
GRN01	0847	0001	06/11/2015	Arsenic	0.00049	J		0.00250		0.00094	J		12	0	No	

STATISTICAL TESTS:

The distribution of the data is tested for normality or lognormality 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 lognormally distributed.

Attachment 2

Sampling and Analysis Work Order

This page intentionally left blank



Stoller Newport News Nuclear

May 11, 2015

Task Assignment 103
Control Number 15-0522

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
June 2015 Environmental Sampling at the Green River, Utah, Disposal Site

REFERENCE: Task Assignment 103, 3-103-1-02-107, Green River, Utah, Disposal Site

Dear Mr. Linard:

The purpose of this letter is to inform you of the upcoming sampling event at Green River, Utah. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Green River disposal 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 8, 2015.

The following lists show the monitoring wells and surface locations scheduled for sampling during this event.

MONITORING WELLS

171 Cm	176 Cm	181 Cm	184 Cb	188 Al	192 Al	588 Cb	813 Cm
173 Cm	179 Cm	182 Cb	185 Cb	189 Al	194 Al	707 Al	

*NOTE: Al = Alluvium; Cb = Cedar Mountain Basal Sandstone Member; Cm = Middle Sandstone Unit

SURFACE LOCATIONS

801 846 847

Water levels will be collected from additional (non-sampled) wells as shown in the attachment. All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*.

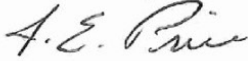
A SUBSIDIARY OF HUNTINGTON INGALLS INDUSTRIES

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

Joshua Linard
Control Number 15-0522
Page 2

Please contact me at (970) 248-6592 if you have any questions.

Sincerely,



Jeffrey E. Price
Site Lead

JP/lcg/lb

Enclosures (3)

cc: (electronic)

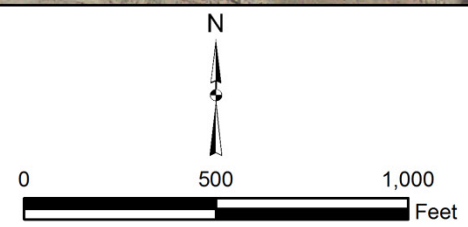
Christina Pennal, DOE
Steve Donovan, SN3
Lauren Goodknight, SN3
Diana Osborne, SN3
Jeffrey Price, SN3
EDD Delivery
rc-grand.junction
File: GRN 400.02

A SUBSIDIARY OF HUNTINGTON INGALLS INDUSTRIES

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



- Legend**
- WELL TO BE SAMPLED
 - WELL TO BE SAMPLED - WATER LEVEL ONLY
 - SURFACE LOCATION TO BE SAMPLED
 - - - SITE BOUNDARY



U.S. DEPARTMENT OF ENERGY OFFICE OF LEGACY MANAGEMENT	Work Performed by Stoller Newport News Nuclear, Inc. Under DOE Contract Number DE-LM0000415
Planned Sampling Map Green River, UT, Disposal Site June 2015	
DATE PREPARED: May 1, 2015	FILE NAME: S1291500-11x17

Green River, Utah, Disposal Site Sample Location Map

This page intentionally left blank

**Sampling Frequencies for Locations at
Green River, Utah**

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
171			X			
173			X			
176			X			
179			X			
180					X	WL only
181			X			
182			X			
183					X	WL only
184			X			
185			X			
188			X			
189			X			
192			X			
194			X			
582					X	no WL
588			X			
707			X			
813			X			
817					X	no WL
Surface Locations						
801			X			
846			X			
847			X			

Annual sampling conducted in June

Site-wide water levels. Do water levels first prior to sampling. Record exact time that water levels are measured.

Constituent Sampling Breakdown

Site	Green River		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water			
Approx. No. Samples/yr	15	3			
<i>Field Measurements</i>					
Alkalinity	X	X			
Dissolved Oxygen					
Redox Potential	X	X			
pH	X	X			
Specific Conductance	X	X			
Turbidity	X	X			
Temperature	X	X			
<i>Laboratory Measurements</i>					
Aluminum					
Ammonia as N (NH3-N)	X	X	0.1	EPA 350.1	WCH-A-005
Arsenic	X	X	0.0001	SW-846 6020	LMM-02
Calcium					
Chloride					
Chromium					
Gross Alpha					
Gross Beta					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO3+NO2)-N	X	X	0.05	EPA 353.1	WCH-A-022
Potassium					
Radium-226					
Radium-228					
Selenium	X	X	0.0001	SW-846 6020	LMM-02
Silica					
Sodium					
Strontium					
Sulfate	X	X	0.5	SW-846 9056	MIS-A-044
Sulfide					
Total Dissolved Solids					
Total Organic Carbon					
Uranium	X	X	0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
Total No. of Analytes	6	6			

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

Attachment 3

Trip Report

This page intentionally left blank



Memorandum

DATE: June 30, 2015

TO: Jeff Price

FROM: Jennifer Graham

SUBJECT: Well Sampling Report

Site: Green River, Utah, Disposal Site

Dates of Event: June 10 and 11, 2015

Team Members: Jeff Price and Jennifer Graham

Number of Locations Sampled: 15 monitoring wells and 3 surface water samples were collected for arsenic, uranium, selenium, ammonia as N, nitrate + nitrite as N, and sulfate. These locations were identified on the sampling notification letter dated May 11, 2015

Locations Not Sampled/Reason: All locations were sampled.

Location Specific Information:

Location IDs	Comments
0847	Location was collected at the location shown on the map.
0171	Well previously listed in the database as a Cat I. Well did not meet water level stability during sampling and was sampled as Cat II.
0192	Purge water contained organic particulate.

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
2357	NHR 496	0179	Duplicate	Groundwater
2358	NHR 497	Associated with 0801, 0846, 0847	Rinsate/EQ Blank	Surface Water

Report Identification Number (RIN) Assigned: All samples were assigned to RIN 15067102. Field data sheets can be found in \\crow\RAApps\SMS\15067102\FieldData.

Sample Shipment: Samples were shipped from Grand Junction to ALS Laboratory Group on June 15, 2015.

Water Level Measurements: Water levels were measured at all wells. Water level only measurements were collected for 2 out of 4 locations; 0582 and 0817 were not collected because packers are installed to prevent the artesian wells from flowing. The artesian water pressure is measured with dedicated pressure transducers. Additional water levels were taken at 0174, 0175, 0180, and 0183. Water level data can be found in \\crow\RAApps\SMS\FDCS\WATER LEVELS\GRN01_6122015.pdf

Well Inspection Summary: All sampled wells were in adequate condition.

Field Variance: No variances occurred from the standard procedures.

Equipment: All equipment functioned properly.

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

Regulatory: Josh Linard (DOE site manager) and Darina Palacio from DOE were on site to observe sampling operations on June 10, 2015.

Dean Henderson, Hydrogeologist with the State of Utah Department of Environmental Quality was present on June 11, 2015, to observe sampling operations.

Institutional Controls: No issues identified.

Disposal Cell/ Drainage Structure Integrity: No issues observed.

Fences, Gates, Locks: All appeared to be in working condition.

Trespassing/Site Disturbances: Nothing to note.

Site Issues:

Vegetation/Noxious Weed Concerns: None observed.

Maintenance Requirements: None observed.

Access Issues: None

Safety Issues: None

Corrective Action Taken: None.

Future Actions Required or Suggested: Well 0192 may need to be redeveloped in the future.

(JG/lcg)

cc: (electronic)
Josh Linard, DOE
Steve Donovan, SN3
Jeff Price, SN3
EDD Delivery