

Data Validation Package

May 2014
Groundwater and Surface
Water Sampling at the
Rio Blanco, Colorado, Site

October 2014



U.S. DEPARTMENT OF
ENERGY

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Attachment 1—Assessment of Anomalous Data

Potential Outliers Report

Attachment 2—Data Presentation

Groundwater Quality Data
Surface Water Quality Data

Attachment 3—Sampling and Analysis Work Order

Attachment 4—Trip Report

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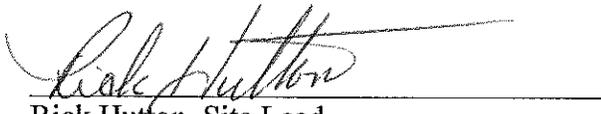
Sampling Event Summary

Site: Rio Blanco, Colorado, Site

Sampling Period: May 27 and June 6, 2014

Annual sampling was conducted at the Rio Blanco, Colorado, site for the Long-Term Hydrologic Monitoring Program May 27 and June 6, 2014, to monitor groundwater and surface water for potential radionuclide contamination. 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). Duplicate samples were collected from locations RB-D-03 and Johnson Artesian WL. Samples were analyzed for gamma-emitting radionuclides by high-resolution gamma spectrometry and for tritium using the conventional and enrichment methods.

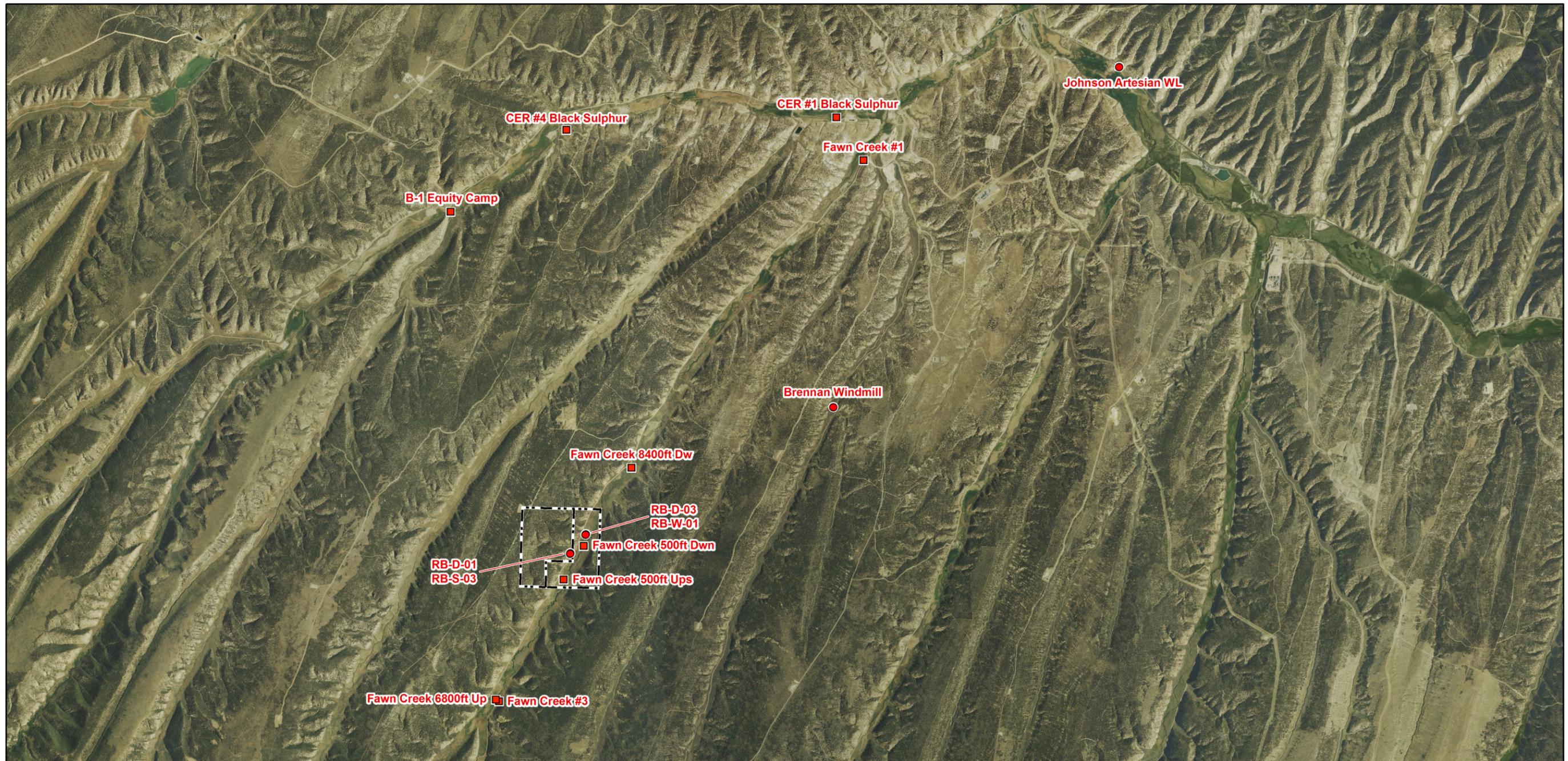
All high-resolution gamma spectrometry results and all tritium results were below detectable concentrations. The results from this sampling event indicate that groundwater and surface water supplies in the area have not been impacted by detonation-related contaminants.



Rick Hutton, Site Lead
The S.M. Stoller Corporation,
a wholly owned subsidiary of
Huntington Ingalls Industries

10-23-14
Date

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LEGEND ● WELL TO BE SAMPLED ■ SURFACE LOCATION TO BE SAMPLED - - - SITE BOUNDARY	N 		U.S. DEPARTMENT OF ENERGY <small>GRAND JUNCTION, COLORADO</small>	<small>Work Performed by</small> S.M. Stoller Corporation <small>Under DOE Contract No. DE-AM01-07LM00080</small>
			Planned Sampling Map Rio Blanco, CO, Site May 2014	
			<small>DATE PREPARED:</small> April 24, 2014	<small>FILENAME:</small> S1174700

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Rio Blanco, Colorado, Site Sample Location Map

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	<u>Rio Blanco, Colorado</u>	Date(s) of Water Sampling	<u>May 27 and June 6, 2014</u>
Date(s) of Verification	<u>September 26, 2014</u>	Name of Verifier	<u>Stephen Donovan</u>

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures? List any Program Directives or other documents, SOPs, instructions.	<u>Yes</u>	<u>Work Order Letter dated May 12, 2014.</u>
2. Were the sampling locations specified in the planning documents sampled?	<u>Yes</u>	
3. Were calibrations conducted as specified in the above-named documents?	<u>Yes</u>	<u>Calibrations were performed on May 22 and June 5, 2014.</u>
4. Was an operational check of the field equipment conducted daily? Did the operational checks meet criteria?	<u>Yes</u> <u>Yes</u>	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	<u>Yes</u>	
6. Were wells categorized correctly?	<u>Yes</u>	
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling? Did the water level stabilize prior to sampling? Did pH, specific conductance, and turbidity measurements meet criteria prior to sampling? Was the flow rate less than 500 mL/min?	<u>Yes</u> <u>Yes</u> <u>Yes</u> <u>Yes</u>	

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	Duplicate samples were collected form locations RB-D-03 and Johnson Artesian WL.
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?	NA	
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	

Laboratory Performance Assessment

General Information

Report Number (RIN): 14056184
Sample Event: May 27, 2014
Site(s): Rio Blanco, Colorado, Site
Laboratory: GEL Laboratories, Charleston, South Carolina
Work Order No.: 349735
Analysis: Radiochemistry
Validator: Stephen Donivan
Review Date: October 25, 2014

This validation was performed according to the *Environmental Procedures Catalog*, (LMS/POL/S04325, continually updated) “Standard Practice for Validation of Environmental Data.” The procedure was applied at Level 3, Data Validation. See attached Data Validation Worksheets for supporting documentation on the data review and validation. 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
Gamma Spectrometry	GAM-A-001	EPA 901.1	EPA 901.1
Tritium	LSC-A-001	EPA 906.0m	EPA 906.0m
Tritium, Enrichment Method	LMR-17	DOE EML HASL 300	DOE EML HASL 300

Data Qualifier Summary

None of the analytical results required qualification.

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received 16 water samples on May 30, 2014, accompanied by a Chain of Custody form. The Chain of Custody was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The Chain of Custody had no errors or omissions.

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. All samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

Radiochemical results are evaluated using the minimum detectable concentration (MDC), Decision Level Concentration (DLC), and Determination Limit (DL). The MDC is a measure of radiochemical method performance and was calculated and reported as specified in *Quality Systems for Analytical Services*. The DLC is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, and is estimated as 3 times the one-sigma total propagated uncertainty. Results that are greater than the MDC, but less than the DLC are qualified with a “U” flag (not detected). The DL for radiochemical results is the lowest concentration that can be reliably measured, and is defined as 3 times the MDC. Results not previously “U” qualified that are less than the DL are qualified with a “J” flag as estimated values.

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

Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods. All calibration and laboratory spike standards were prepared from independent sources.

Radiochemical Analysis

Tritium by Distillation

Instrument quench calibration curves were generated on August 1, 2014. The daily instrument checks performed on August 11, 2014, met the acceptance criteria.

Enriched Tritium

Instrument quench calibration curves were generated on August 1, 2014. The daily instrument checks performed on August 25, 2014, met the acceptance criteria. The chemical recoveries were acceptable for all samples.

Gamma Spectrometry

The gamma spectrometry efficiency calibrations were performed within a year prior to sample analysis. All daily calibration and background check results met the acceptance criteria.

Method Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. All method blank results associated with the samples were below the DLC for all analytes.

Matrix Spike Analysis

Matrix spike and matrix spike duplicate samples were analyzed for tritium as a measure of method performance in the sample matrix. All spike results were within the acceptance range.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative error ratio for radiochemical replicate results (calculated using the one-sigma total propagated uncertainty) was less than three, indicating acceptable precision.

Laboratory Control Sample

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

Completeness

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

Electronic Data Deliverable (EDD) File

The EDD file arrived on August 29, 2014. The Sample Management System EDD validation module was used to verify that the EDD files were 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: 14056184 Lab Code: GEN Validator: Stephen Donovan Validation Date: 09/25/2014
Project: Rio Blanco Site Analysis Type: Metals General Chem Rad Organics
of Samples: 16 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
- 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 were 2 duplicates evaluated.

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 14056184 Lab Code: GEN Date Due: 08/28/2014
 Matrix: Water Site Code: RBL01 Date Completed: 08/28/2014

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate RER
2489	Actinium-228	06/05/2014						0.66
2489	Americium-241	06/05/2014						0.71
Blank_Spike	Americium-241	06/05/2014				109.00		
2489	Antimony-125	06/05/2014						1.03
2489	Cerium-144	06/05/2014						0.02
Blank_Spike	Cerium-144	06/05/2014						
2489	Cesium-134	06/05/2014						1.17
2489	Cesium-137	06/05/2014						0.17
Blank_Spike	Cesium-137	06/05/2014				102.00		
2489	Cobalt-60	06/05/2014						0.14
Blank_Spike	Cobalt-60	06/05/2014				104.00		
2489	Europium-152	06/05/2014						1.00
2489	Europium-154	06/05/2014						1.52
Blank_Spike	Europium-154	06/05/2014						
2489	Europium-155	06/05/2014						0.44
2489	Lead-212	06/05/2014						1.53
Blank_Spike	Lead-212	06/05/2014						
2489	Potassium-40	06/05/2014						2.50
2489	Promethium-144	06/05/2014						0.62
Blank_Spike	Promethium-144	06/05/2014						
2489	Promethium-146	06/05/2014						0.30
2489	Ruthenium-106	06/05/2014						0.48
Blank_Spike	Ruthenium-106	06/05/2014						
2489	Thorium-234	06/05/2014						0.63
2489	Tritium	08/12/2014						0.57
Blank_Spike	Tritium	08/12/2014				99.60		
2489	Tritium	08/12/2014					91.2	
Blank	Tritium	08/12/2014	-89.0000	U				
RB-D-03	Tritium	08/25/2014			83.0			
RB-S-03	Tritium	08/25/2014			83.0			
RB-W-01	Tritium	08/25/2014			83.0			
Blank	Tritium	08/25/2014	-0.1100	U	83.0			

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 14056184 **Lab Code:** GEN **Date Due:** 08/28/2014
Matrix: Water **Site Code:** RBL01 **Date Completed:** 08/28/2014

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate RER
Blank_Spike	Tritium	08/27/2014			83.0	99.60		
2489	Uranium-235	06/05/2014						0.14
Blank_Spike	Uranium-235	06/05/2014						
2489	Uranium-238	06/05/2014						0.63
2489	Yttrium-88	06/05/2014						0.54
Blank_Spike	Yttrium-88	06/05/2014						

General Information

Report Number (RIN): 14066256
Sample Event: June 6, 2014
Site(s): Rio Blanco, Colorado, Site
Laboratory: GEL Laboratories, Charleston, South Carolina
Work Order No.: 350317
Analysis: Radiochemistry
Validator: Stephen Donivan
Review Date: October 25, 2014

This validation was performed according to the *Environmental Procedures Catalog*, (LMS/POL/S04325, continually updated) “Standard Practice for Validation of Environmental Data.” The procedure was applied at Level 3, Data Validation. See attached Data Validation Worksheets for supporting documentation on the data review and validation. 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
Gamma Spectrometry	GAM-A-001	EPA 901.1	EPA 901.1
Tritium	LSC-A-001	EPA 906.0m	EPA 906.0m

Data Qualifier Summary

None of the analytical results required qualification.

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received one water sample on June 10, 2014, accompanied by a Chain of Custody form. The Chain of Custody was checked to confirm that the sample was listed with a sample collection date and time, and that signatures and dates were present indicating sample relinquishment and receipt. The Chain of Custody had no errors or omissions.

Preservation and Holding Times

The sample shipment was received intact at ambient temperature, which complies with requirements. The sample aliquots were received in the correct container types and had been preserved correctly for the requested analyses. All analyses were completed within the applicable holding times.

Detection and Quantitation Limits

Radiochemical results are evaluated using the MDC, DLC, and DL. The MDC is a measure of radiochemical method performance and was calculated and reported as specified in *Quality*

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

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

Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods. All calibration and laboratory spike standards were prepared from independent sources.

Radiochemical Analysis

Tritium by Distillation

Instrument quench calibration curves were generated on August 1, 2013. The daily instrument checks performed on July 29, 2014, met the acceptance criteria.

Gamma Spectrometry

The gamma spectrometry efficiency calibrations were performed within a year prior to sample analysis. All daily calibration and background check results met the acceptance criteria.

Method Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. All method blank results associated with the samples were below the DLC for all analytes.

Matrix Spike Analysis

Matrix spike and matrix spike duplicate samples were analyzed for tritium as a measure of method performance in the sample matrix. All spike results were within the acceptance range.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative error ratio for radiochemical replicate results (calculated using the one-sigma total propagated uncertainty) was less than three, indicating acceptable precision.

Laboratory Control Sample

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

Completeness

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

EDD File

The EDD file arrived on September 9, 2014. The Sample Management System EDD validation module was used to verify that the EDD files were 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: 14066256 Lab Code: GEN Validator: Stephen Donovan Validation Date: 09/25/2014

Project: Rio Blanco Site Analysis Type: Metals General Chem Rad Organics

of Samples: 1 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
- 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.

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 14066256 **Lab Code:** GEN **Date Due:** 07/08/2014
Matrix: Water **Site Code:** RBL01 **Date Completed:** 09/08/2014

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate RER
RBD01	Actinium-228	08/22/2014						1.39
Blank_Spike	Americium-241	08/21/2014				113.00		
RBD01	Americium-241	08/22/2014						0.51
RBD01	Antimony-125	08/22/2014						0.51
Blank_Spike	Cerium-144	08/21/2014						
RBD01	Cerium-144	08/22/2014						0.75
RBD01	Cesium-134	08/22/2014						0.12
Blank_Spike	Cesium-137	08/21/2014				103.00		
RBD01	Cesium-137	08/22/2014						1.17
Blank_Spike	Cobalt-60	08/21/2014				102.00		
RBD01	Cobalt-60	08/22/2014						1.31
RBD01	Europium-152	08/22/2014						1.33
Blank_Spike	Europium-154	08/21/2014						
RBD01	Europium-154	08/22/2014						0.86
RBD01	Europium-155	08/22/2014						0.86
Blank_Spike	Lead-212	08/21/2014						
RBD01	Lead-212	08/22/2014						0.59
RBD01	Potassium-40	08/22/2014						0.80
Blank_Spike	Promethium-144	08/21/2014						
RBD01	Promethium-144	08/22/2014						0.78
RBD01	Promethium-146	08/22/2014						0.18
Blank_Spike	Ruthenium-106	08/21/2014						
RBD01	Ruthenium-106	08/22/2014						1.16
RBD01	Thorium-234	08/22/2014						0.29
RBD01	Tritium	07/29/2014			68.0			
Blank_Spike	Tritium	07/29/2014			68.0	105.00		
Blank	Tritium	07/29/2014	1.3000	U	68.0			
Blank_Spike	Uranium-235	08/21/2014						
RBD01	Uranium-235	08/22/2014						0.98
RBD01	Uranium-238	08/22/2014						0.29
Blank_Spike	Yttrium-88	08/21/2014						
RBD01	Yttrium-88	08/22/2014						0.33

Sampling Quality Control Assessment

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

Sampling Protocol

Wells RB-D-01, RB-D-03, RB-S-03, and RB-W-01 were sampled using dedicated bladder pumps or a peristaltic pump with dedicated tubing. Data from these wells are qualified with an “F” flag in the database indicating the wells were purged and sampled using the low-flow sampling method. The data from well RB-W-01 were further qualified with a “Q” flag because this well was classified as Category II. All other sample locations were domestic wells or surface water locations.

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. Duplicate samples were collected from locations RB-D-03 and Johnson Artesian WL. The relative error ratios for the duplicates were less than 3, indicating acceptable precision.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

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RIN: 14056184 Lab Code: GEN Project: Rio Blanco Site Validation Date: 09/25/2014

Duplicate: 2489

Sample: RB-D-03

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Actinium-228	8.69	U	13.3	1.00	-8.2	U	9.72	1.00		2.0	pCi/L
Americium-241	-10.7	U	28.4	1.00	-0.851	U	18.4	1.00		0.6	pCi/L
Antimony-125	-9.25	U	9.87	1.00	-2.2	U	6.93	1.00		1.1	pCi/L
Cerium-144	-6.25	U	21.6	1.00	-7.48	U	17.8	1.00		0.1	pCi/L
Cesium-134	1.17	U	3.07	1.00	2.02	U	3.00	1.00		0.4	pCi/L
Cesium-137	-0.818	U	3.68	1.00	0.741	U	2.38	1.00		0.7	pCi/L
Cobalt-60	-0.886	U	3.00	1.00	0.224	U	2.72	1.00		0.5	pCi/L
Europium-152	2.44	U	9.79	1.00	5.49	U	7.55	1.00		0.5	pCi/L
Europium-154	-2.0	U	9.63	1.00	-4.88	U	6.84	1.00		0.5	pCi/L
Europium-155	4.10	U	12.5	1.00	7.75	U	9.83	1.00		0.4	pCi/L
Lead-212	7.39	U	8.05	1.00	10.8	U	9.59	1.00		0.5	pCi/L
Potassium-40	12.6	U	40.9	1.00	-16.7	U	33.4	1.00		1.1	pCi/L
Promethium-144	-1.06	U	3.09	1.00	-0.216	U	2.54	1.00		0.4	pCi/L
Promethium-146	0.121	U	3.55	1.00	1.98	U	2.91	1.00		0.8	pCi/L
Ruthenium-106	5.63	U	36.1	1.00	-0.999	U	21.4	1.00		0.3	pCi/L
Thorium-234	-19.3	U	222	1.00	0.374	U	269	1.00		0.1	pCi/L
Tritium					41.8	U	207	1.00			pCi/L
Uranium-235	1.25	U	24.7	1.00	16.0	U	24.2	1.00		0.8	pCi/L
Uranium-238	-19.3	U	222	1.00	0.374	U	269	1.00		0.1	pCi/L
Yttrium-88	1.97	U	3.17	1.00	-0.835	U	3.11	1.00		1.2	pCi/L

Duplicate: 2612

Sample: Johnson Artesian WL

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Actinium-228	3.77	U	18.1	1.00	6.66	U	13.0	1.00		0.3	pCi/L
Americium-241	7.16	U	14.8	1.00	-29.6	U	30.1	1.00		2.1	pCi/L
Antimony-125	8.75	U	9.89	1.00	-2.67	U	7.32	1.00		1.8	pCi/L
Cerium-144	11.2	U	20.1	1.00	-6.14	U	21.7	1.00		1.1	pCi/L
Cesium-134	2.65	U	3.46	1.00	0.155	U	3.06	1.00		1.1	pCi/L
Cesium-137	0.940	U	4.24	1.00	1.97	U	3.49	1.00		0.4	pCi/L
Cobalt-60	-1.17	U	3.47	1.00	-1.94	U	2.60	1.00		0.3	pCi/L
Europium-152	14.2	U	12.3	1.00	-2.78	U	7.38	1.00		2.3	pCi/L
Europium-154	-6.82	U	11.3	1.00	8.28	U	8.81	1.00		2.1	pCi/L
Europium-155	-1.66	U	11.2	1.00	-5.55	U	11.8	1.00		0.5	pCi/L
Lead-212	11.4	U	13.0	1.00	1.29	U	5.86	1.00		1.4	pCi/L
Potassium-40	-2.7	U	47.1	1.00	8.66	U	33.4	1.00		0.4	pCi/L
Promethium-144	0.0512	U	2.83	1.00	0.753	U	2.61	1.00		0.4	pCi/L
Promethium-146	3.28	U	4.94	1.00	1.69	U	3.92	1.00		0.5	pCi/L
Ruthenium-106	32.9	U	33.2	1.00	-7.62	U	25.4	1.00		1.9	pCi/L

SAMPLE MANAGEMENT SYSTEM
Validation Report: Field Duplicates

RIN: 14056184 Lab Code: GEN Project: Rio Blanco Site Validation Date: 09/25/2014

Duplicate: 2612

Sample: Johnson Artesian WL

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Thorium-234	20.7	U	137	1.00	171	U	278	1.00		1.0	pCi/L
Tritium	-85.7	U	203	1.00	-102	U	190	1.00		0.1	pCi/L
Uranium-235	10.7	U	30.1	1.00	19.2	U	20.8	1.00		0.5	pCi/L
Uranium-238	20.7	U	137	1.00	171	U	278	1.00		1.0	pCi/L
Yttrium-88	-2.14	U	4.93	1.00	4.20	U	4.20	1.00		1.9	pCi/L

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
Stephen Donovan

10-23-2014
Date

Data Validation Lead:

Stephen Donovan
Stephen Donovan

10-23-2014
Date

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Attachment 1
Assessment of Anomalous Data

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Potential Outliers Report

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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 Outliers Report 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 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.
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.

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Attachment 2

Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Brennan Windmill WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Data	QA	Lab	Detection Limit	Uncertainty
Actinium-228	pCi/L	05/27/2014	N001	0	-	0	4.48	U		#	24.7	14.4
Americium-241	pCi/L	05/27/2014	N001	0	-	0	14.8	U		#	55.7	31.5
Antimony-125	pCi/L	05/27/2014	N001	0	-	0	2.18	U		#	15	9.21
Cerium-144	pCi/L	05/27/2014	N001	0	-	0	9.19	U		#	42.1	24.5
Cesium-134	pCi/L	05/27/2014	N001	0	-	0	-1.01	U		#	5.01	2.78
Cesium-137	pCi/L	05/27/2014	N001	0	-	0	-276	U		#	5.27	2.78
Cobalt-60	pCi/L	05/27/2014	N001	0	-	0	-675	U		#	5.02	2.74
Europium-152	pCi/L	05/27/2014	N001	0	-	0	-67	U		#	17.9	10
Europium-154	pCi/L	05/27/2014	N001	0	-	0	3.52	U		#	16.2	8.08
Europium-155	pCi/L	05/27/2014	N001	0	-	0	0	U		#	25.6	24.2
Lead-212	pCi/L	05/27/2014	N001	0	-	0	3.21	U		#	11.3	8.39
Oxidation Reduction Potential	mV	05/27/2014	N001	0	-	0	-21.9			#		
pH	s.u.	05/27/2014	N001	0	-	0	6.87			#		
Potassium-40	pCi/L	05/27/2014	N001	0	-	0	20.6	U		#	54.1	39.1
Promethium-144	pCi/L	05/27/2014	N001	0	-	0	-1.36	U		#	5.05	2.89
Promethium-146	pCi/L	05/27/2014	N001	0	-	0	2.6	U		#	6.82	4.39
Ruthenium-106	pCi/L	05/27/2014	N001	0	-	0	-8.68	U		#	46.5	27.2
Specific Conductance	umhos /cm	05/27/2014	N001	0	-	0	2276			#		

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Brennan Windmill WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Data	Lab QA	Detection Limit	Uncertainty
Temperature	C	05/27/2014	N001	0	-	0	12.61		#		
Thorium-234	pCi/L	05/27/2014	N001	0	-	0	74.3	U	#	477	274
Tritium	pCi/L	05/27/2014	N001	0	-	0	2.62	U	#	368	208
Turbidity	NTU	05/27/2014	N001	0	-	0	1.48		#		
Uranium-235	pCi/L	05/27/2014	N001	0	-	0	9.82	U	#	40.6	26.6
Uranium-238	pCi/L	05/27/2014	N001	0	-	0	74.3	U	#	477	274
Yttrium-88	pCi/L	05/27/2014	N001	0	-	0	-811	U	#	6.39	3.37

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Johnson Artesian WL WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Actinium-228	pCi/L	05/27/2014	N001	0	-	0	3.77	U		#	35.6	18.1
Actinium-228	pCi/L	05/27/2014	N002	0	-	0	6.66	U		#	23.7	13
Americium-241	pCi/L	05/27/2014	N001	0	-	0	7.16	U		#	27	14.8
Americium-241	pCi/L	05/27/2014	N002	0	-	0	-29.6	U		#	42.7	30.1
Antimony-125	pCi/L	05/27/2014	N001	0	-	0	8.75	U		#	18.9	9.89
Antimony-125	pCi/L	05/27/2014	N002	0	-	0	-2.67	U		#	13	7.32
Cerium-144	pCi/L	05/27/2014	N001	0	-	0	11.2	U		#	35.8	20.1
Cerium-144	pCi/L	05/27/2014	N002	0	-	0	-6.14	U		#	36	21.7
Cesium-134	pCi/L	05/27/2014	N001	0	-	0	2.65	U		#	7.17	3.46
Cesium-134	pCi/L	05/27/2014	N002	0	-	0	0.155	U		#	5.79	3.06
Cesium-137	pCi/L	05/27/2014	N001	0	-	0	0.94	U		#	8.09	4.24
Cesium-137	pCi/L	05/27/2014	N002	0	-	0	1.97	U		#	6.62	3.49
Cobalt-60	pCi/L	05/27/2014	N001	0	-	0	-1.17	U		#	6.55	3.47
Cobalt-60	pCi/L	05/27/2014	N002	0	-	0	-1.94	U		#	4.1	2.6
Europium-152	pCi/L	05/27/2014	N001	0	-	0	14.2	U		#	21.8	12.3
Europium-152	pCi/L	05/27/2014	N002	0	-	0	-2.78	U		#	13.1	7.38
Europium-154	pCi/L	05/27/2014	N001	0	-	0	-6.82	U		#	18.9	11.3
Europium-154	pCi/L	05/27/2014	N002	0	-	0	8.28	U		#	18.3	8.81

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Johnson Artesian WL WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Europium-155	pCi/L	05/27/2014	N001	0	-	0	-1.66	U		#	19.4	11.2
Europium-155	pCi/L	05/27/2014	N002	0	-	0	-5.55	U		#	19.8	11.8
Lead-212	pCi/L	05/27/2014	N001	0	-	0	11.4	U		#	13.5	13
Lead-212	pCi/L	05/27/2014	N002	0	-	0	1.29	U		#	10	5.86
Oxidation Reduction Potential	mV	05/27/2014	N001	0	-	0	-140.7			#		
pH	s.u.	05/27/2014	N001	0	-	0	8.23			#		
Potassium-40	pCi/L	05/27/2014	N001	0	-	0	-2.7	U		#	91.8	47.1
Potassium-40	pCi/L	05/27/2014	N002	0	-	0	8.66	U		#	66.6	33.4
Promethium-144	pCi/L	05/27/2014	N001	0	-	0	0.0512	U		#	5.64	2.83
Promethium-144	pCi/L	05/27/2014	N002	0	-	0	0.753	U		#	5.04	2.61
Promethium-146	pCi/L	05/27/2014	N001	0	-	0	3.28	U		#	9.39	4.94
Promethium-146	pCi/L	05/27/2014	N002	0	-	0	1.69	U		#	6.67	3.92
Ruthenium-106	pCi/L	05/27/2014	N001	0	-	0	32.9	U		#	67.3	33.2
Ruthenium-106	pCi/L	05/27/2014	N002	0	-	0	-7.62	U		#	45.3	25.4
Specific Conductance	umhos/cm	05/27/2014	N001	0	-	0	2280			#		
Temperature	C	05/27/2014	N001	0	-	0	18.42			#		
Thorium-234	pCi/L	05/27/2014	N001	0	-	0	20.7	U		#	246	137
Thorium-234	pCi/L	05/27/2014	N002	0	-	0	171	U		#	421	278

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Johnson Artesian WL WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Tritium	pCi/L	05/27/2014	N001	0	-	0	-85.7	U		#	367	203
Tritium	pCi/L	05/27/2014	N002	0	-	0	-102	U		#	347	190
Turbidity	NTU	05/27/2014	N001	0	-	0	1.68			#		
Uranium-235	pCi/L	05/27/2014	N001	0	-	0	10.7	U		#	38.6	30.1
Uranium-235	pCi/L	05/27/2014	N002	0	-	0	19.2	U		#	28	20.8
Uranium-238	pCi/L	05/27/2014	N001	0	-	0	20.7	U		#	246	137
Uranium-238	pCi/L	05/27/2014	N002	0	-	0	171	U		#	421	278
Yttrium-88	pCi/L	05/27/2014	N001	0	-	0	-2.14	U		#	9.06	4.93
Yttrium-88	pCi/L	05/27/2014	N002	0	-	0	4.2	U		#	8.41	4.2

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: RB-D-01 WELL

Parameter	Units	Sample		Depth Range		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)			Lab	Data	QA		
Actinium-228	pCi/L	06/06/2014	N001	16628.77	- 16628.77	0.814	U	F	#	25.7	12.9
Americium-241	pCi/L	06/06/2014	N001	16628.77	- 16628.77	15.1	U	F	#	47.7	25.4
Antimony-125	pCi/L	06/06/2014	N001	16628.77	- 16628.77	-2.38	U	F	#	14.5	8.33
Cerium-144	pCi/L	06/06/2014	N001	16628.77	- 16628.77	-8.28	U	F	#	36.6	21.6
Cesium-134	pCi/L	06/06/2014	N001	16628.77	- 16628.77	-0.296	U	F	#	6.02	3.15
Cesium-137	pCi/L	06/06/2014	N001	16628.77	- 16628.77	2.57	U	F	#	5.19	3.29
Cobalt-60	pCi/L	06/06/2014	N001	16628.77	- 16628.77	-0.842	U	F	#	5.38	2.79
Europium-152	pCi/L	06/06/2014	N001	16628.77	- 16628.77	-9.6	U	F	#	14.2	10.2
Europium-154	pCi/L	06/06/2014	N001	16628.77	- 16628.77	-2.83	U	F	#	20.7	11.3
Europium-155	pCi/L	06/06/2014	N001	16628.77	- 16628.77	-2.33	U	F	#	17.5	11.1
Lead-212	pCi/L	06/06/2014	N001	16628.77	- 16628.77	2.39	U	F	#	11.2	6.74
Oxidation Reduction Potential	mV	06/06/2014	N001	16628.77	- 16628.77	-140		F	#		
pH	s.u.	06/06/2014	N001	16628.77	- 16628.77	7.63		F	#		
Potassium-40	pCi/L	06/06/2014	N001	16628.77	- 16628.77	-23.9	U	F	#	75	41.7
Promethium-144	pCi/L	06/06/2014	N001	16628.77	- 16628.77	-2.86	U	F	#	5.25	3.46
Promethium-146	pCi/L	06/06/2014	N001	16628.77	- 16628.77	-1.31	U	F	#	6.72	3.91
Ruthenium-106	pCi/L	06/06/2014	N001	16628.77	- 16628.77	0.0396	U	F	#	60.9	32.3

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: RB-D-01 WELL

Parameter	Units	Sample		Depth Range		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)			Lab	Data	QA		
Specific Conductance	umhos /cm	06/06/2014	N001	16628.77	- 16628.77	2420		F	#		
Temperature	C	06/06/2014	N001	16628.77	- 16628.77	10.1		F	#		
Thorium-234	pCi/L	06/06/2014	N001	16628.77	- 16628.77	4.87	U	F	#	391	233
Tritium	pCi/L	06/06/2014	N001	16628.77	- 16628.77	2.24	U	F	#	2.63	2.17
Turbidity	NTU	06/06/2014	N001	16628.77	- 16628.77	1.34		F	#		
Uranium-235	pCi/L	06/06/2014	N001	16628.77	- 16628.77	-2.78	U	F	#	33.4	19.8
Uranium-238	pCi/L	06/06/2014	N001	16628.77	- 16628.77	4.87	U	F	#	391	233
Yttrium-88	pCi/L	06/06/2014	N001	16628.77	- 16628.77	1.9	U	F	#	13.2	6.27

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: RB-D-03 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Actinium-228	pCi/L	05/27/2014	N001	0	-	0	8.69	U	F	#	26.9	13.3
Actinium-228	pCi/L	05/27/2014	N002	0	-	0	-8.2	U	F	#	14.8	9.72
Americium-241	pCi/L	05/27/2014	N001	0	-	0	-10.7	U	F	#	42.2	28.4
Americium-241	pCi/L	05/27/2014	N002	0	-	0	-851	U	F	#	31.2	18.4
Antimony-125	pCi/L	05/27/2014	N001	0	-	0	-9.25	U	F	#	14.4	9.87
Antimony-125	pCi/L	05/27/2014	N002	0	-	0	-2.2	U	F	#	12.3	6.93
Cerium-144	pCi/L	05/27/2014	N001	0	-	0	-6.25	U	F	#	38.3	21.6
Cerium-144	pCi/L	05/27/2014	N002	0	-	0	-7.48	U	F	#	28.8	17.8
Cesium-134	pCi/L	05/27/2014	N001	0	-	0	1.17	U	F	#	5.55	3.07
Cesium-134	pCi/L	05/27/2014	N002	0	-	0	2.02	U	F	#	5.99	3
Cesium-137	pCi/L	05/27/2014	N001	0	-	0	-818	U	F	#	5.66	3.68
Cesium-137	pCi/L	05/27/2014	N002	0	-	0	0.741	U	F	#	4.62	2.38
Cobalt-60	pCi/L	05/27/2014	N001	0	-	0	-886	U	F	#	5.51	3
Cobalt-60	pCi/L	05/27/2014	N002	0	-	0	0.224	U	F	#	5.55	2.72
Europium-152	pCi/L	05/27/2014	N001	0	-	0	2.44	U	F	#	17.7	9.79
Europium-152	pCi/L	05/27/2014	N002	0	-	0	5.49	U	F	#	14.3	7.55
Europium-154	pCi/L	05/27/2014	N001	0	-	0	-2	U	F	#	17.9	9.63
Europium-154	pCi/L	05/27/2014	N002	0	-	0	-4.88	U	F	#	11.2	6.84

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: RB-D-03 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Europium-155	pCi/L	05/27/2014	N001	0	-	0	4.1	U	F	#	21.8	12.5
Europium-155	pCi/L	05/27/2014	N002	0	-	0	7.75	U	F	#	17.7	9.83
Lead-212	pCi/L	05/27/2014	N001	0	-	0	7.39	U	F	#	14.1	8.05
Lead-212	pCi/L	05/27/2014	N002	0	-	0	10.8	U	F	#	11	9.59
Oxidation Reduction Potential	mV	05/27/2014	N001	0	-	0	-70.4		F	#		
pH	s.u.	05/27/2014	N001	0	-	0	8.25		F	#		
Potassium-40	pCi/L	05/27/2014	N001	0	-	0	12.6	U	F	#	87	40.9
Potassium-40	pCi/L	05/27/2014	N002	0	-	0	-16.7	U	F	#	60.6	33.4
Promethium-144	pCi/L	05/27/2014	N001	0	-	0	-1.06	U	F	#	5.38	3.09
Promethium-144	pCi/L	05/27/2014	N002	0	-	0	-.216	U	F	#	4.82	2.54
Promethium-146	pCi/L	05/27/2014	N001	0	-	0	0.121	U	F	#	6.75	3.55
Promethium-146	pCi/L	05/27/2014	N002	0	-	0	1.98	U	F	#	5.67	2.91
Ruthenium-106	pCi/L	05/27/2014	N001	0	-	0	5.63	U	F	#	59	36.1
Ruthenium-106	pCi/L	05/27/2014	N002	0	-	0	-.999	U	F	#	39.5	21.4
Specific Conductance	umhos/cm	05/27/2014	N001	0	-	0	885		F	#		
Temperature	C	05/27/2014	N001	0	-	0	8.96		F	#		
Thorium-234	pCi/L	05/27/2014	N001	0	-	0	-19.3	U	F	#	395	222
Thorium-234	pCi/L	05/27/2014	N002	0	-	0	0.374	U	F	#	342	269

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: RB-D-03 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
				Lab	Data	QA						
Tritium	pCi/L	05/27/2014	N001	0	-	0	0.219	U	F	#	2.42	1.39
Tritium	pCi/L	05/27/2014	N002	0	-	0	41.8	U	F	#	362	207
Turbidity	NTU	05/27/2014	N001	0	-	0	2.25		F	#		
Uranium-235	pCi/L	05/27/2014	N001	0	-	0	1.25	U	F	#	39.9	24.7
Uranium-235	pCi/L	05/27/2014	N002	0	-	0	16	U	F	#	28.7	24.2
Uranium-238	pCi/L	05/27/2014	N001	0	-	0	-19.3	U	F	#	395	222
Uranium-238	pCi/L	05/27/2014	N002	0	-	0	0.374	U	F	#	342	269
Yttrium-88	pCi/L	05/27/2014	N001	0	-	0	1.97	U	F	#	7.32	3.17
Yttrium-88	pCi/L	05/27/2014	N002	0	-	0	-835	U	F	#	5.83	3.11

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: RB-S-03 WELL

Parameter	Units	Sample		Depth Range		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)			Lab	Data	QA		
Actinium-228	pCi/L	05/27/2014	N001	16628.75	- 16628.75	12.6	U	F	#	23.7	11.9
Americium-241	pCi/L	05/27/2014	N001	16628.75	- 16628.75	15.1	U	F	#	40.8	24.6
Antimony-125	pCi/L	05/27/2014	N001	16628.75	- 16628.75	4.18	U	F	#	13.8	7.13
Cerium-144	pCi/L	05/27/2014	N001	16628.75	- 16628.75	12	U	F	#	34.2	19.3
Cesium-134	pCi/L	05/27/2014	N001	16628.75	- 16628.75	1.04	U	F	#	5.66	2.75
Cesium-137	pCi/L	05/27/2014	N001	16628.75	- 16628.75	-.901	U	F	#	5.06	2.75
Cobalt-60	pCi/L	05/27/2014	N001	16628.75	- 16628.75	-.837	U	F	#	5.76	3.01
Europium-152	pCi/L	05/27/2014	N001	16628.75	- 16628.75	-.406	U	F	#	15.2	8.26
Europium-154	pCi/L	05/27/2014	N001	16628.75	- 16628.75	-4.16	U	F	#	14.1	7.91
Europium-155	pCi/L	05/27/2014	N001	16628.75	- 16628.75	6.34	U	F	#	20.2	11.3
Lead-212	pCi/L	05/27/2014	N001	16628.75	- 16628.75	1.18	U	F	#	10.9	6.77
Oxidation Reduction Potential	mV	05/27/2014	N001	16628.75	- 16628.75	54.6		F	#		
pH	s.u.	05/27/2014	N001	16628.75	- 16628.75	7.78		F	#		
Potassium-40	pCi/L	05/27/2014	N001	16628.75	- 16628.75	0	U	F	#	40.8	53.6
Promethium-144	pCi/L	05/27/2014	N001	16628.75	- 16628.75	-1.03	U	F	#	5.26	2.91
Promethium-146	pCi/L	05/27/2014	N001	16628.75	- 16628.75	0.374	U	F	#	6.55	3.5
Ruthenium-106	pCi/L	05/27/2014	N001	16628.75	- 16628.75	-10.8	U	F	#	45	25.1

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: RB-S-03 WELL

Parameter	Units	Sample		Depth Range		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)			Lab	Data	QA		
Specific Conductance	umhos /cm	05/27/2014	N001	16628.75	- 16628.75	930		F	#		
Temperature	C	05/27/2014	N001	16628.75	- 16628.75	11.42		F	#		
Thorium-234	pCi/L	05/27/2014	N001	16628.75	- 16628.75	-104	U	F	#	354	202
Tritium	pCi/L	05/27/2014	N001	16628.75	- 16628.75	-979	U	F	#	2.34	1.27
Turbidity	NTU	05/27/2014	N001	16628.75	- 16628.75	3.14		F	#		
Uranium-235	pCi/L	05/27/2014	N001	16628.75	- 16628.75	7.99	U	F	#	36.2	23
Uranium-238	pCi/L	05/27/2014	N001	16628.75	- 16628.75	-104	U	F	#	354	202
Yttrium-88	pCi/L	05/27/2014	N001	16628.75	- 16628.75	-3.1	U	F	#	5.83	3.93

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: RB-W-01 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Actinium-228	pCi/L	05/27/2014	0001	0	-	0	3.06	U	FQ	#	23.9	12.2
Americium-241	pCi/L	05/27/2014	0001	0	-	0	-1	U	FQ	#	44.8	27.9
Antimony-125	pCi/L	05/27/2014	0001	0	-	0	1.31	U	FQ	#	15	8.12
Cerium-144	pCi/L	05/27/2014	0001	0	-	0	-2.04	U	FQ	#	32.5	18.8
Cesium-134	pCi/L	05/27/2014	0001	0	-	0	0.18	U	FQ	#	5.38	2.74
Cesium-137	pCi/L	05/27/2014	0001	0	-	0	1.24	U	FQ	#	5.44	2.7
Cobalt-60	pCi/L	05/27/2014	0001	0	-	0	-.927	U	FQ	#	5.01	2.67
Europium-152	pCi/L	05/27/2014	0001	0	-	0	0.119	U	FQ	#	15.1	8.19
Europium-154	pCi/L	05/27/2014	0001	0	-	0	2.96	U	FQ	#	15.4	6.98
Europium-155	pCi/L	05/27/2014	0001	0	-	0	4.48	U	FQ	#	20.3	11.4
Lead-212	pCi/L	05/27/2014	0001	0	-	0	1.01	U	FQ	#	11.3	7.26
Oxidation Reduction Potential	mV	05/27/2014	N001	0	-	0	-90		FQ	#		
pH	s.u.	05/27/2014	N001	0	-	0	7.73		FQ	#		
Potassium-40	pCi/L	05/27/2014	0001	0	-	0	11	U	FQ	#	82.4	40.4
Promethium-144	pCi/L	05/27/2014	0001	0	-	0	1.28	U	FQ	#	5.65	2.89
Promethium-146	pCi/L	05/27/2014	0001	0	-	0	0.549	U	FQ	#	6.96	3.77
Ruthenium-106	pCi/L	05/27/2014	0001	0	-	0	39	U	FQ	#	49.5	22.2
Specific Conductance	umhos/cm	05/27/2014	N001	0	-	0	1483		FQ	#		
Temperature	C	05/27/2014	N001	0	-	0	12.08		FQ	#		

Groundwater Quality Data by Location (USEE100) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: RB-W-01 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Thorium-234	pCi/L	05/27/2014	0001	0	-	0	53	U	FQ	#	353	312
Tritium	pCi/L	05/27/2014	0001	0	-	0	1.3	U	FQ	#	2.35	1.43
Turbidity	NTU	05/27/2014	N001	0	-	0	14.1		FQ	#		
Uranium-235	pCi/L	05/27/2014	0001	0	-	0	0.605	U	FQ	#	37.2	24.2
Uranium-238	pCi/L	05/27/2014	0001	0	-	0	53	U	FQ	#	353	312
Yttrium-88	pCi/L	05/27/2014	0001	0	-	0	0.581	U	FQ	#	7.01	3.35

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

LAB QUALIFIERS:

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

DATA QUALIFIERS:

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

QA QUALIFIER:

- # Validated according to quality assurance guidelines.

Surface Water Quality Data

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Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: B-1 Equity Camp SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Actinium-228	pCi/L	05/27/2014	N001	-5.11	U	#	19.6	11.8
Americium-241	pCi/L	05/27/2014	N001	3.71	U	#	18.6	10.4
Antimony-125	pCi/L	05/27/2014	N001	4.16	U	#	12.3	6.72
Cerium-144	pCi/L	05/27/2014	N001	14	U	#	30.6	18.1
Cesium-134	pCi/L	05/27/2014	N001	0.324	U	#	4.96	2.89
Cesium-137	pCi/L	05/27/2014	N001	0.175	U	#	4.65	2.47
Cobalt-60	pCi/L	05/27/2014	N001	-828	U	#	4.61	2.55
Europium-152	pCi/L	05/27/2014	N001	-1.26	U	#	13.9	7.88
Europium-154	pCi/L	05/27/2014	N001	6.36	U	#	13.3	6.78
Europium-155	pCi/L	05/27/2014	N001	-5.08	U	#	15.4	9.77
Lead-212	pCi/L	05/27/2014	N001	4.01	U	#	8.47	6.91
Oxidation Reduction Potential	mV	05/27/2014	N001	-11		#		
pH	s.u.	05/27/2014	N001	7.22		#		
Potassium-40	pCi/L	05/27/2014	N001	-16	U	#	60.3	31.3
Promethium-144	pCi/L	05/27/2014	N001	0.569	U	#	4.55	2.42
Promethium-146	pCi/L	05/27/2014	N001	3.15	U	#	6.15	3.66
Ruthenium-106	pCi/L	05/27/2014	N001	-3.12	U	#	42.3	23.1
Specific Conductance	umhos/cm	05/27/2014	N001	1118		#		

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: B-1 Equity Camp SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Temperature	C	05/27/2014	N001	10.44		#		
Thorium-234	pCi/L	05/27/2014	N001	-103	U	#	189	131
Tritium	pCi/L	05/27/2014	N001	-6.07	U	#	360	203
Turbidity	NTU	05/27/2014	N001	2.67		#		
Uranium-235	pCi/L	05/27/2014	N001	-4.63	U	#	31.3	21.2
Uranium-238	pCi/L	05/27/2014	N001	-103	U	#	189	131
Yttrium-88	pCi/L	05/27/2014	N001	1.73	U	#	6.82	3.32

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: CER #1 Black Sulphur SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Actinium-228	pCi/L	05/27/2014	N001	-9.78	U	#	25.9	15.4
Americium-241	pCi/L	05/27/2014	N001	-1.52	U	#	12.7	8.27
Antimony-125	pCi/L	05/27/2014	N001	7.55	U	#	18.5	10.1
Cerium-144	pCi/L	05/27/2014	N001	-.301	U	#	36.5	20.6
Cesium-134	pCi/L	05/27/2014	N001	-.376	U	#	7.94	4.22
Cesium-137	pCi/L	05/27/2014	N001	-1.34	U	#	6.53	3.76
Cobalt-60	pCi/L	05/27/2014	N001	2.85	U	#	8.42	4.08
Europium-152	pCi/L	05/27/2014	N001	0	U	#	19.3	23.6
Europium-154	pCi/L	05/27/2014	N001	-2.1	U	#	18.8	10
Europium-155	pCi/L	05/27/2014	N001	1.66	U	#	19.6	11
Lead-212	pCi/L	05/27/2014	N001	2.97	U	#	11.8	8.84
Oxidation Reduction Potential	mV	05/27/2014	N001	-40.4		#		
pH	s.u.	05/27/2014	N001	7.88		#		
Potassium-40	pCi/L	05/27/2014	N001	23.8	U	#	87.8	57.4
Promethium-144	pCi/L	05/27/2014	N001	2.24	U	#	7.24	3.85
Promethium-146	pCi/L	05/27/2014	N001	-2.85	U	#	7.34	4.47
Ruthenium-106	pCi/L	05/27/2014	N001	-3.12	U	#	57.3	31.4
Specific Conductance	umhos/cm	05/27/2014	N001	1484		#		

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: CER #1 Black Sulphur SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Temperature	C	05/27/2014	N001	17.76		#		
Thorium-234	pCi/L	05/27/2014	N001	4.09	U	#	170	140
Tritium	pCi/L	05/27/2014	N001	-25.2	U	#	361	203
Turbidity	NTU	05/27/2014	N001	3.01		#		
Uranium-235	pCi/L	05/27/2014	N001	6.05	U	#	41.3	24.3
Uranium-238	pCi/L	05/27/2014	N001	4.09	U	#	170	140
Yttrium-88	pCi/L	05/27/2014	N001	2.01	U	#	8.45	3.74

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: CER #4 Black Sulphur SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Actinium-228	pCi/L	05/27/2014	N001	-7.29	U	#	18.5	15.3
Americium-241	pCi/L	05/27/2014	N001	-.476	U	#	26.8	16.5
Antimony-125	pCi/L	05/27/2014	N001	9.68	U	#	15.9	9.07
Cerium-144	pCi/L	05/27/2014	N001	-6.77	U	#	33.4	19.8
Cesium-134	pCi/L	05/27/2014	N001	0.904	U	#	6.08	3.16
Cesium-137	pCi/L	05/27/2014	N001	2.79	U	#	5.11	3.82
Cobalt-60	pCi/L	05/27/2014	N001	2.75	U	#	6.02	2.91
Europium-152	pCi/L	05/27/2014	N001	0	U	#	16.6	28
Europium-154	pCi/L	05/27/2014	N001	-.911	U	#	18.3	9.67
Europium-155	pCi/L	05/27/2014	N001	0.381	U	#	18.7	10.6
Lead-212	pCi/L	05/27/2014	N001	6.39	U	#	9.42	7.33
Oxidation Reduction Potential	mV	05/27/2014	N001	3.7		#		
pH	s.u.	05/27/2014	N001	7.34		#		
Potassium-40	pCi/L	05/27/2014	N001	5.72	U	#	65.8	36.7
Promethium-144	pCi/L	05/27/2014	N001	2.65	U	#	5.25	2.77
Promethium-146	pCi/L	05/27/2014	N001	1.69	U	#	6.71	3.62
Ruthenium-106	pCi/L	05/27/2014	N001	-4.17	U	#	44.8	24.1
Specific Conductance	umhos/cm	05/27/2014	N001	1399		#		

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: CER #4 Black Sulphur SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Temperature	C	05/27/2014	N001	8.9		#		
Thorium-234	pCi/L	05/27/2014	N001	62.4	U	#	232	208
Tritium	pCi/L	05/27/2014	N001	-144	U	#	357	193
Turbidity	NTU	05/27/2014	N001	1.79		#		
Uranium-235	pCi/L	05/27/2014	N001	2.88	U	#	37.6	24
Uranium-238	pCi/L	05/27/2014	N001	62.4	U	#	232	208
Yttrium-88	pCi/L	05/27/2014	N001	-.564	U	#	4.82	2.51

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek #1 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Actinium-228	pCi/L	05/27/2014	N001	-1.17	U	#	36.7	22.6
Americium-241	pCi/L	05/27/2014	N001	2.39	U	#	58.3	38.8
Antimony-125	pCi/L	05/27/2014	N001	11.1	U	#	26.8	16.6
Cerium-144	pCi/L	05/27/2014	N001	-1.43	U	#	70.4	41.9
Cesium-134	pCi/L	05/27/2014	N001	-1.13	U	#	9.32	5.42
Cesium-137	pCi/L	05/27/2014	N001	2.21	U	#	9.12	8.57
Cobalt-60	pCi/L	05/27/2014	N001	-5.27	U	#	6.27	4.98
Europium-152	pCi/L	05/27/2014	N001	-4.52	U	#	28.6	17
Europium-154	pCi/L	05/27/2014	N001	13.9	U	#	29.6	17.4
Europium-155	pCi/L	05/27/2014	N001	12.8	U	#	37.2	24
Lead-212	pCi/L	05/27/2014	N001	-4.66	U	#	19.5	13.2
Oxidation Reduction Potential	mV	05/27/2014	N001	-7.2		#		
pH	s.u.	05/27/2014	N001	7.39		#		
Potassium-40	pCi/L	05/27/2014	N001	-40.2	U	#	91.2	56.5
Promethium-144	pCi/L	05/27/2014	N001	1.54	U	#	7.48	4.14
Promethium-146	pCi/L	05/27/2014	N001	3.97	U	#	12.2	6.95
Ruthenium-106	pCi/L	05/27/2014	N001	-19.6	U	#	71.7	43
Specific Conductance	umhos/cm	05/27/2014	N001	1641		#		

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek #1 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Temperature	C	05/27/2014	N001	10.55		#		
Thorium-234	pCi/L	05/27/2014	N001	539	U	#	542	505
Tritium	pCi/L	05/27/2014	N001	-38.6	U	#	358	200
Turbidity	NTU	05/27/2014	N001	1.03		#		
Uranium-235	pCi/L	05/27/2014	N001	-59.7	U	#	69.6	51.5
Uranium-238	pCi/L	05/27/2014	N001	539	U	#	542	505
Yttrium-88	pCi/L	05/27/2014	N001	1.09	U	#	9.5	4.93

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek #3 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Actinium-228	pCi/L	05/27/2014	N001	29.3	U	#	30.8	23
Americium-241	pCi/L	05/27/2014	N001	-1.07	U	#	10.8	6.55
Antimony-125	pCi/L	05/27/2014	N001	-4.84	U	#	15.5	9.11
Cerium-144	pCi/L	05/27/2014	N001	-7.53	U	#	30.3	17.7
Cesium-134	pCi/L	05/27/2014	N001	2.89	U	#	7.91	3.93
Cesium-137	pCi/L	05/27/2014	N001	-1.51	U	#	7.74	5.23
Cobalt-60	pCi/L	05/27/2014	N001	1.96	U	#	8.19	3.86
Europium-152	pCi/L	05/27/2014	N001	-.147	U	#	16.9	9.07
Europium-154	pCi/L	05/27/2014	N001	-4.62	U	#	17.3	10.1
Europium-155	pCi/L	05/27/2014	N001	-1.33	U	#	14.8	8.25
Lead-212	pCi/L	05/27/2014	N001	5.56	U	#	9.78	8.17
Oxidation Reduction Potential	mV	05/27/2014	N001	79.8		#		
pH	s.u.	05/27/2014	N001	6.96		#		
Potassium-40	pCi/L	05/27/2014	N001	-6.54	U	#	82.3	43.1
Promethium-144	pCi/L	05/27/2014	N001	-1.4	U	#	5.6	3.32
Promethium-146	pCi/L	05/27/2014	N001	2.1	U	#	7.28	3.75
Ruthenium-106	pCi/L	05/27/2014	N001	7.53	U	#	61.3	32.6
Specific Conductance	umhos/cm	05/27/2014	N001	1468		#		

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek #3 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Temperature	C	05/27/2014	N001	11.27		#		
Thorium-234	pCi/L	05/27/2014	N001	72.1	U	#	135	109
Tritium	pCi/L	05/27/2014	N001	34.7	U	#	358	205
Turbidity	NTU	05/27/2014	N001	0.83		#		
Uranium-235	pCi/L	05/27/2014	N001	7.98	U	#	31.2	19.2
Uranium-238	pCi/L	05/27/2014	N001	72.1	U	#	135	109
Yttrium-88	pCi/L	05/27/2014	N001	1.53	U	#	9.74	4.58

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek 500ft Dwn SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Actinium-228	pCi/L	05/27/2014	N001	-.288	U	#	18.4	10.2
Americium-241	pCi/L	05/27/2014	N001	2.07	U	#	18.3	13.3
Antimony-125	pCi/L	05/27/2014	N001	-1.18	U	#	12.9	7.11
Cerium-144	pCi/L	05/27/2014	N001	10.1	U	#	30.6	17.3
Cesium-134	pCi/L	05/27/2014	N001	1.86	U	#	5.67	2.98
Cesium-137	pCi/L	05/27/2014	N001	-.105	U	#	5.19	2.92
Cobalt-60	pCi/L	05/27/2014	N001	-.741	U	#	3.68	2.01
Europium-152	pCi/L	05/27/2014	N001	-1.62	U	#	14	8.18
Europium-154	pCi/L	05/27/2014	N001	-.0603	U	#	15.1	7.87
Europium-155	pCi/L	05/27/2014	N001	-6.72	U	#	15.1	9.35
Lead-212	pCi/L	05/27/2014	N001	7.12	U	#	10.4	8.85
Oxidation Reduction Potential	mV	05/27/2014	N001	39.7		#		
pH	s.u.	05/27/2014	N001	8.12		#		
Potassium-40	pCi/L	05/27/2014	N001	-9.91	U	#	60.5	29.9
Promethium-144	pCi/L	05/27/2014	N001	0.241	U	#	4.34	2.47
Promethium-146	pCi/L	05/27/2014	N001	3.07	U	#	5.81	2.64
Ruthenium-106	pCi/L	05/27/2014	N001	-4.74	U	#	38.3	21.3
Specific Conductance	umhos/cm	05/27/2014	N001	1467		#		

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek 500ft Dwn SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Temperature	C	05/27/2014	N001	21.6		#		
Thorium-234	pCi/L	05/27/2014	N001	109	U	#	184	140
Tritium	pCi/L	05/27/2014	N001	-56	U	#	358	199
Turbidity	NTU	05/27/2014	N001	9.81		#		
Uranium-235	pCi/L	05/27/2014	N001	7.51	U	#	28.9	19.3
Uranium-238	pCi/L	05/27/2014	N001	109	U	#	184	140
Yttrium-88	pCi/L	05/27/2014	N001	2.97	U	#	7.36	3.55

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek 500ft Ups SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Actinium-228	pCi/L	05/27/2014	N001	-4.18	U	#	18.4	11.2
Americium-241	pCi/L	05/27/2014	N001	14.3	U	#	34.5	21.7
Antimony-125	pCi/L	05/27/2014	N001	6.38	U	#	13.6	8.1
Cerium-144	pCi/L	05/27/2014	N001	9.58	U	#	34.5	21.1
Cesium-134	pCi/L	05/27/2014	N001	1.76	U	#	5.08	2.73
Cesium-137	pCi/L	05/27/2014	N001	-1.84	U	#	5.59	3.25
Cobalt-60	pCi/L	05/27/2014	N001	-1.14	U	#	4.94	2.8
Europium-152	pCi/L	05/27/2014	N001	-3.12	U	#	14.6	9.88
Europium-154	pCi/L	05/27/2014	N001	1.57	U	#	14.7	7.28
Europium-155	pCi/L	05/27/2014	N001	5.35	U	#	17.8	10.3
Lead-212	pCi/L	05/27/2014	N001	7.06	U	#	8.15	6
Oxidation Reduction Potential	mV	05/27/2014	N001	25.4		#		
pH	s.u.	05/27/2014	N001	8.09		#		
Potassium-40	pCi/L	05/27/2014	N001	-9.27	U	#	62.8	36.8
Promethium-144	pCi/L	05/27/2014	N001	-.201	U	#	4.57	2.49
Promethium-146	pCi/L	05/27/2014	N001	-.379	U	#	5.64	3.03
Ruthenium-106	pCi/L	05/27/2014	N001	-4.36	U	#	39.1	21.4
Specific Conductance	umhos/cm	05/27/2014	N001	1453		#		

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek 500ft Ups SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Temperature	C	05/27/2014	N001	20.74		#		
Thorium-234	pCi/L	05/27/2014	N001	-134	U	#	294	187
Tritium	pCi/L	05/27/2014	N001	34.6	U	#	358	204
Turbidity	NTU	05/27/2014	N001	6.7		#		
Uranium-235	pCi/L	05/27/2014	N001	9.91	U	#	31.6	19.5
Uranium-238	pCi/L	05/27/2014	N001	-134	U	#	294	187
Yttrium-88	pCi/L	05/27/2014	N001	-1.27	U	#	5.42	3

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek 6800ft Up SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Actinium-228	pCi/L	05/27/2014	N001	10.3	U	#	22.5	11.8
Americium-241	pCi/L	05/27/2014	N001	11.7	U	#	49.3	29.7
Antimony-125	pCi/L	05/27/2014	N001	1.19	U	#	15.2	8.18
Cerium-144	pCi/L	05/27/2014	N001	-15.8	U	#	33.2	21.4
Cesium-134	pCi/L	05/27/2014	N001	0.692	U	#	5.11	2.48
Cesium-137	pCi/L	05/27/2014	N001	-2.01	U	#	4.37	2.85
Cobalt-60	pCi/L	05/27/2014	N001	-.807	U	#	6.59	3.64
Europium-152	pCi/L	05/27/2014	N001	5.43	U	#	16.8	8.96
Europium-154	pCi/L	05/27/2014	N001	-.448	U	#	13.2	6.59
Europium-155	pCi/L	05/27/2014	N001	-.277	U	#	19.8	11.2
Lead-212	pCi/L	05/27/2014	N001	0.135	U	#	11	6.03
Oxidation Reduction Potential	mV	05/27/2014	N001	95.7		#		
pH	s.u.	05/27/2014	N001	7.22		#		
Potassium-40	pCi/L	05/27/2014	N001	26.7	U	#	75.5	35.4
Promethium-144	pCi/L	05/27/2014	N001	-.71	U	#	4.95	2.68
Promethium-146	pCi/L	05/27/2014	N001	1.8	U	#	6.54	3.41
Ruthenium-106	pCi/L	05/27/2014	N001	-11.5	U	#	48.2	28.5
Specific Conductance	umhos/cm	05/27/2014	N001	1373		#		

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek 6800ft Up SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Temperature	C	05/27/2014	N001	13.5		#		
Thorium-234	pCi/L	05/27/2014	N001	65.6	U	#	412	252
Tritium	pCi/L	05/27/2014	N001	-52.3	U	#	354	197
Turbidity	NTU	05/27/2014	N001	1.86		#		
Uranium-235	pCi/L	05/27/2014	N001	-16.5	U	#	36.1	26.6
Uranium-238	pCi/L	05/27/2014	N001	65.6	U	#	412	252
Yttrium-88	pCi/L	05/27/2014	N001	0.566	U	#	6.51	3.01

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek 8400ft Dw SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Actinium-228	pCi/L	05/27/2014	0001	-6.88	U	#	23.8	12.9
Americium-241	pCi/L	05/27/2014	0001	11.8	U	#	46.9	27.1
Antimony-125	pCi/L	05/27/2014	0001	4.69	U	#	15.7	8.29
Cerium-144	pCi/L	05/27/2014	0001	-15.4	U	#	32.3	20.7
Cesium-134	pCi/L	05/27/2014	0001	-3.1	U	#	5.06	3.52
Cesium-137	pCi/L	05/27/2014	0001	2.17	U	#	6.09	3.03
Cobalt-60	pCi/L	05/27/2014	0001	-2.07	U	#	4.67	2.99
Europium-152	pCi/L	05/27/2014	0001	4.94	U	#	17.7	9.46
Europium-154	pCi/L	05/27/2014	0001	-4.12	U	#	16.8	9.1
Europium-155	pCi/L	05/27/2014	0001	3.24	U	#	19.4	10.9
Lead-212	pCi/L	05/27/2014	0001	6.44	U	#	11.8	7.48
Oxidation Reduction Potential	mV	05/27/2014	N001	-70.2		#		
pH	s.u.	05/27/2014	N001	8.17		#		
Potassium-40	pCi/L	05/27/2014	0001	19.4	U	#	70.8	48
Promethium-144	pCi/L	05/27/2014	0001	-.203	U	#	5.37	2.87
Promethium-146	pCi/L	05/27/2014	0001	-.224	U	#	6.95	3.84
Ruthenium-106	pCi/L	05/27/2014	0001	-6.5	U	#	44.9	24.4
Specific Conductance	umhos/cm	05/27/2014	N001	1453		#		

Surface Water Quality Data by Location (USEE102) FOR SITE RBL01, Rio Blanco Site

REPORT DATE: 10/02/2014

Location: Fawn Creek 8400ft Dw SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Temperature	C	05/27/2014	N001	24.41		#		
Thorium-234	pCi/L	05/27/2014	0001	239	U	#	426	245
Tritium	pCi/L	05/27/2014	0001	-67.8	U	#	359	199
Turbidity	NTU	05/27/2014	N001	11.7		#		
Uranium-235	pCi/L	05/27/2014	0001	8.1	U	#	37.2	23.4
Uranium-238	pCi/L	05/27/2014	0001	239	U	#	426	245
Yttrium-88	pCi/L	05/27/2014	0001	0.976	U	#	7.76	3.57

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

LAB QUALIFIERS:

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

DATA QUALIFIERS:

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

QA QUALIFIER:

- # Validated according to quality assurance guidelines.

Attachment 3
Sampling and Analysis Work Order

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May 12, 2014

Task Order LM00-502
Control Number 14-0563

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

SUBJECT: Contract No. DE-AM01-07LM00060, The S.M. Stoller Corporation, a wholly owned subsidiary of Huntington Ingalls Industries (Stoller)
Task Order LM00-502 – Other Defense Activities – Other Sites
May 2014 Environmental Sampling at Rio Blanco, Colorado, Site

REFERENCE: Task Order LM00-502-07-620, Rio Blanco, Colorado Site

Dear Mr. Kleinrath:

The purpose of this letter is to inform you of the upcoming sampling event at Rio Blanco, Colorado. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Rio Blanco site. Water quality data will be collected from monitoring wells, a municipal water supply well, and surface locations at this site as part of the routine environmental sampling scheduled to begin the week of May 26, 2014.

The following lists show the locations scheduled for sampling during this event.

MONITORING WELLS

Off-Site

RB-D-01 RB-D-03 RB-S-03 RB-W-01

On-Site

Johnson Artesian WL Brennan Windmill

SURFACE WATER

On-Site

Fawn Creek 500ft Dwn Fawn Creek 500ft Ups

Off-Site

B-1 Equity Camp CER #1 Black Sulphur CER #4 Black Sulphur Fawn Creek #1
Fawn Creek #3 Fawn Creek 6800ft Up Fawn Creek 8400ft Dw

Art Kleinrath
Control Number 14-0563
Page 2

All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. Notification for access to locations on private property will be conducted prior to the beginning of fieldwork.

Please contact me at 970-248-6477 if you have any questions.

Sincerely,

Rick Hutton  Digitally signed by Rick Hutton
DN: c=us, o=u.s. government, ou=department of
energy, ou=Energy IT Services, ou=Legacy
Management, ou=People, cn=Rick Hutton
Date: 2014.05.12 15:32:28 -06'00'

Rick Hutton
Site Lead

RH/dc

Enclosure

cc: (electronic)

Christina Pennal, DOE
Steve Donovan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
EDD Delivery
rc-grand.junction
File: RBL 410.02(A)

A SUBSIDIARY OF HUNTINGTON INGALLS INDUSTRIES

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

Sampling Frequencies for Locations at Rio Blanco, Colorado

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
On-Site						
RB-D-01			X			
RB-D-03			X			
RB-S-03			X			
RB-W-01			X			
Off-Site						
Johnson Artesian WL			X			
Brennan Windmill			X			
Surface Locations						
On-Site						
Fawn Creek 500ft Dwn			X			
Fawn Creek 500ft Ups			X			
Off-Site						
B-1 Equity Camp			X			
CER #1 Black Sulphur			X			
CER #4 Black Sulphur			X			
Fawn Creek #1			X			
Fawn Creek #3			X			
Fawn Creek 6800ft Up			X			
Fawn Creek 8400ft Dw			X			

Constituent Sampling Breakdown

Site	Rio Blanco		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water			
Approx. No. Samples/yr	6	9			
<i>Field Measurements</i>					
Alkalinity					
Dissolved Oxygen					
Redox Potential					
pH	X	X			
Specific Conductance	X	X			
Turbidity	X				
Temperature	X	X			
<i>Laboratory Measurements</i>					
Aluminum					
Ammonia as N (NH ₃ -N)					
Calcium					
Chloride					
Chromium					
Gamma Spec	X	X	10 pCi/L	Gamma Spectrometry	GAM-A-001
Gross Alpha					
Gross Beta					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO ₃ +NO ₂)-N					
Potassium					
Radium-226					
Radium-228					
Selenium					
Silica					
Sodium					
Strontium					
Sulfate					
Sulfide					
Total Dissolved Solids					
Total Organic Carbon					

Constituent Sampling Breakdown

Site	Rio Blanco		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water			
Tritium	X	X	400 pCi/L	Liquid Scintillation	LSC-A-001
Tritium, enriched	25% of the samples	25% of the samples	10 pCi/L	Liquid Scintillation	LMR-15
Uranium					
Vanadium					
Zinc					
Total No. of Analytes	3	3			

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

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Attachment 4
Trip Report

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Memorandum

DATE: June 10, 2014
TO: Rick Hutton
FROM: Lauren Goodknight
SUBJECT: Trip Report (LTHMP Sampling)

Site: Rio Blanco, CO

Dates of Sampling Event: May 27 and June 6, 2014.

Team Members: Lauren Goodknight, Dan Sellers, Jeff Price, and Tashina Jasso

Number of Locations Sampled: 2 on-site wells, 4 private wells, and 9 surface locations. All samples will be analyzed for tritium and gamma spec; a select set of samples will also be analyzed for enriched tritium (RB-D-01, RB-D-03, RB-S-03, and RB-W-01).

Sampling Method: Information about how samples were collected at each location can be viewed electronically from the FDCS folder found at <\\crow\SMS\14056184\FieldData>.

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

Site Specific Information: The bladder pump in well RB-D-01 was replaced and still did not pump sufficient water for a sample. On June 6, 2014, a 500 mL bladder pump was placed in the well; still would not pump. Approximately 100' of drop tube was cut off. The well was purged and a sample was collected.

Locations Not Sampled/Reason: None.

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

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2612	Johnson Artesian WL	Duplicate	Groundwater	MGR 853
2489	RB-D-03	Duplicate	Groundwater	MGR 854

RIN Number Assigned: Samples collected in May were assigned to RIN 14056184. The one sample collected in June was assigned RIN 14066256.

Sample Shipment: The May samples were shipped overnight FedEx from Grand Junction, Colorado, to GEL Laboratories in Charleston, SC., on May 29, 2014. The sample collected in June was shipped on June 9, 2014.

Water Level Measurements: Water levels are presented in the following table.

Site Code	Well ID	Date	Time	DTW (ft)	Comments
RBL01	RB-W-01	5/27/2014	14:08	18.90	Peristaltic
RBL01	RB-D-03	5/27/2014	13:41	4.61	Peristaltic
RBL01	RB-S-03	5/27/2014	11:16	39.87	Dedicated bladder pump
RBL01	RB-D-01	6/6/2014	10:10	56.47	Dedicated bladder pump & drop tube

DTW = Depth to Water (all measurements obtained from north top of casing)
 Ft = Feet
 ID = Identification

The water level measurements were recorded in FDCS and uploaded to SEEPro database.

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

Institutional Controls:

- Fences, Gates, Locks:** None.
- Signs:** None
- Trespassing/Site Disturbances:** N/A

Site Issues:

- Disposal Cell/Drainage Structure Integrity:** N/A
- Vegetation/Noxious Weed Concerns:** N/A
- Maintenance Requirements:** None.
- Access Issues:** None
- Safety Issues:** None.

cc: (electronic)
 Art Kleinrath, DOE
 Steve Donivan, Stoller
 Rick Findlay, Stoller
 Bev Gallagher, Stoller
 Rex Hodges, Stoller
 Rick Hutton, Stoller
 Michelle Morton, Stoller
 EDD Delivery