

# Data Validation Package

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**May 2011**  
**Groundwater and Surface**  
**Water Sampling at the**  
**Rio Blanco, Colorado, Site**

**December 2011**



**U.S. DEPARTMENT OF**  
**ENERGY**

Legacy  
Management

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# Sampling Event Summary

**Site:** Rio Blanco, Colorado, Site

**Sampling Period:** May 16–17, 2011

Annual sampling was conducted at the Rio Blanco, Colorado, site for the Long-Term Hydrologic Monitoring Program on May 16–17, 2011, to monitor groundwater and surface water for potential radionuclide contamination. Sampling and analysis were conducted as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PLN/S04351, continually updated). A duplicate sample was collected from location Johnson Artesian WL. Samples were analyzed by the U.S. Environmental Protection Agency (EPA) Radiation & Indoor Environments National Laboratory in Las Vegas, Nevada. Samples were analyzed for gamma-emitting radionuclides by high-resolution gamma spectrometry, and for tritium using the conventional method. Tritium was not measured using the enrichment method because the EPA laboratory no longer offers that service. Results of this monitoring at the Rio Blanco site demonstrate that groundwater and surface water outside the site boundaries have not been affected by project-related contaminants.

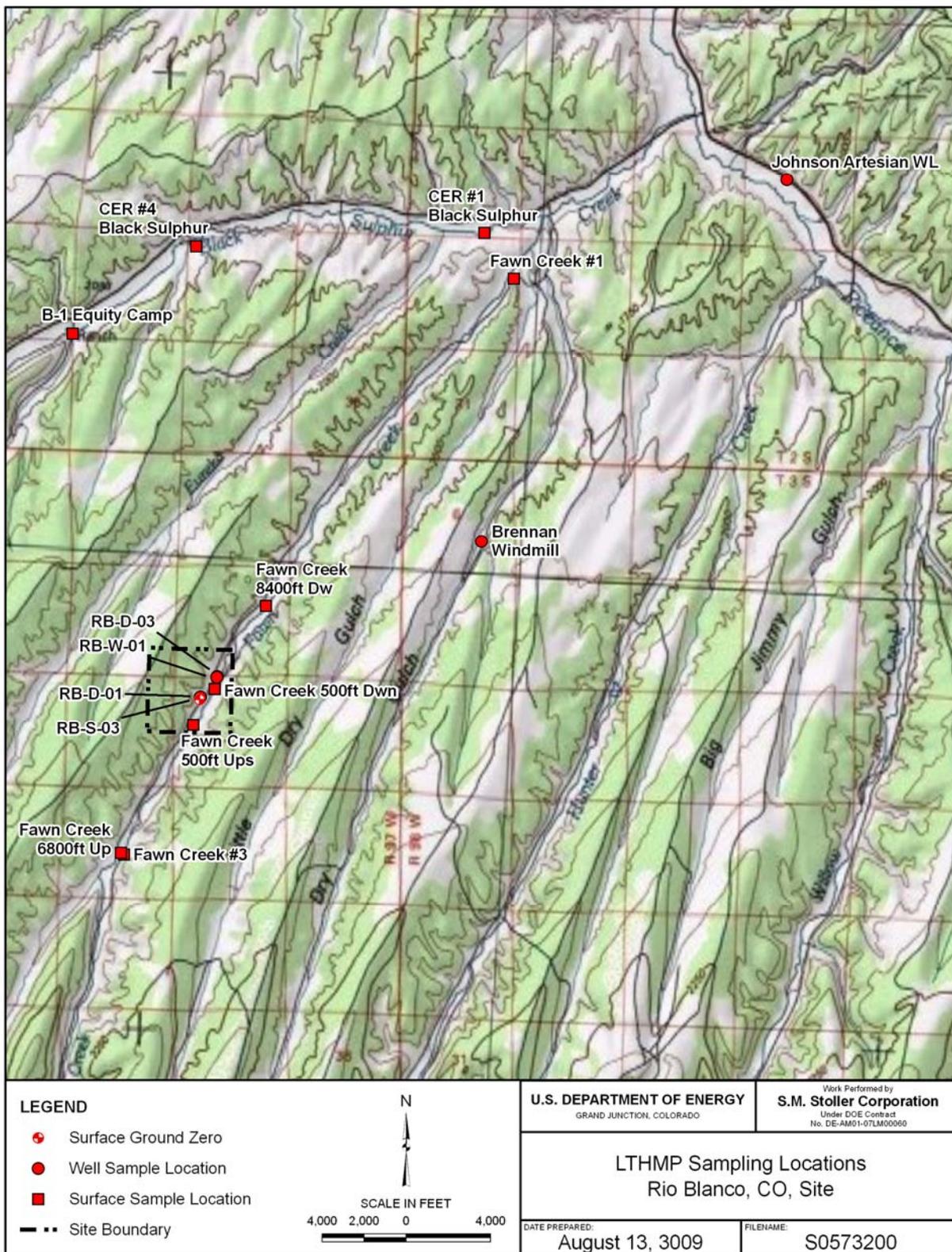
All tritium and all high-resolution gamma spectrometry results for cesium-137 were below detectable concentrations. The results from this sampling event indicate that groundwater and surface water supplies in the area have not been impacted by detonation-related contaminants.



Rick Hutton  
Site Lead, S.M. Stoller Corporation

3-26-12

Date



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Sampling Locations, Rio Blanco, Colorado, Site

# **Data Assessment Summary**

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### Water Sampling Field Activities Verification Checklist

<b>Project</b>	<u>Rio Blanco, Colorado</u>	<b>Date(s) of Water Sampling</b>	<u>May 16–17, 2011</u>
<b>Date(s) of Verification</b>	<u>November 8, 2011</u>	<b>Name of Verifier</b>	<u>Steve Donovan</u>

	<b>Response (Yes, No, NA)</b>	<b>Comments</b>
1. Is the SAP the primary document directing field procedures? List other documents, SOPs, instructions.	<u>Yes</u>	<u>Work Order letter dated April 26, 2011.</u>
2. Were the sampling locations specified in the planning documents sampled?	<u>Yes</u>	
3. Was a pre-trip calibration conducted as specified in the above-named documents?	<u>Yes</u>	<u>Pre-trip calibration was performed May 16, 2011.</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. Was the category of the well documented?	<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 stabilize prior to sampling? Was the flow rate less than 500 mL/min? If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	<u>Yes</u> <u>Yes</u> <u>Yes</u> <u>Yes</u> <u>NA</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	A duplicate sample was collected from location Johnson Artesian WL.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	NA	
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number? Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDCS) report?	Yes	Location ID 2612 was used for the duplicate sample.
	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. Are field data sheets signed and dated by both team members (hardcopies) or are dates present for the "Date Signed" fields (FDCS)?	Yes	
18. Was all other pertinent information documented on the field data sheets?	Yes	
19. Was the presence or absence of ice in the cooler documented at every sample location?	NA	Sample chilling was not required.
20. Were water levels measured at the locations specified in the planning documents?	Yes	

## Laboratory Performance Assessment

### General Information

Requisition No. (RIN): 11053764  
 Sample Event: May 16–17, 2011  
 Site(s): Rio Blanco, Colorado, Site  
 Laboratory: Radiation and Indoor Environments National Laboratory  
 Las Vegas, NV  
 Analysis: Radiochemistry  
 Validator: Steve Donovan  
 Review Date: November 8, 2011

This validation was performed according to the *Environmental Procedures Catalog* (LMS/PRO/S04325, continually updated), “Standard Practice for Validation of Laboratory Data.” The procedure was applied at Level 1, Data Deliverables Examination. All analyses were successfully completed with the following exception. The determination of tritium using the enrichment method was not performed as the Radiation and Indoor Environments National Laboratory no longer provides that service. 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	RQA-302	RQA-302
Tritium	LSC-A-001	RQA-604	RQA-604
Tritium, enrichment method (requested, not performed)	LMR-15	RQA-602	RQA-602

### Data Qualifier Summary

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

*Table 2. Data Qualifier Summary*

Sample	Location	Analyte	Flag	Reason
735639	Fawn Creek 6800ft Up	Cesium-137	U	Less than the Decision Level Concentration
735639	Fawn Creek 6800ft Up	Tritium	U	Less than the Decision Level Concentration
735640	Fawn Creek 500ft Ups	Cesium-137	U	Less than the Decision Level Concentration
735640	Fawn Creek 500ft Ups	Tritium	U	Less than the Decision Level Concentration
735641	Fawn Creek 500ft Dwn	Cesium-137	U	Less than the Decision Level Concentration
735641	Fawn Creek 500ft Dwn	Thalium-208	U	Less than the Decision Level Concentration
735641	Fawn Creek 500ft Dwn	Tritium	U	Less than the Decision Level Concentration
735642	Fawn Creek 8400ft Dw	Cesium-137	U	Less than the Decision Level Concentration
735642	Fawn Creek 8400ft Dw	Tritium	U	Less than the Decision Level Concentration
735643	Fawn Creek #1	Cesium-137	U	Less than the Decision Level Concentration
735643	Fawn Creek #1	Tritium	U	Less than the Decision Level Concentration

Table 2 (continued). Data Qualifier Summary

Sample	Location	Analyte	Flag	Reason
735644	Fawn Creek #3	Cesium-137	U	Less than the Decision Level Concentration
735644	Fawn Creek #3	Radium-226	U	Less than the Decision Level Concentration
735644	Fawn Creek #3	Tritium	U	Less than the Decision Level Concentration
735645	CER #1 Black Sulphur	Cesium-137	U	Less than the Decision Level Concentration
735645	CER #1 Black Sulphur	Thalium-208	U	Less than the Decision Level Concentration
735645	CER #1 Black Sulphur	Tritium	U	Less than the Decision Level Concentration
735646	CER #4 Black Sulphur	Cesium-137	U	Less than the Decision Level Concentration
735646	CER #4 Black Sulphur	Tritium	U	Less than the Decision Level Concentration
735647	B-1 Equity Camp	Cesium-137	U	Less than the Decision Level Concentration
735647	B-1 Equity Camp	Tritium	U	Less than the Decision Level Concentration
735648	Brennan Windmill	Cesium-137	U	Less than the Decision Level Concentration
735648	Brennan Windmill	Tritium	U	Less than the Decision Level Concentration
735649	Johnson Artesian WL	Cesium-137	U	Less than the Decision Level Concentration
735649	Johnson Artesian WL	Tritium	U	Less than the Decision Level Concentration
735650	RB-D-01	Cesium-137	U	Less than the Decision Level Concentration
735650	RB-D-01	Tritium	U	Less than the Decision Level Concentration
735651	RB-S-03	Cesium-137	U	Less than the Decision Level Concentration
735651	RB-S-03	Lead-212	U	Less than the Decision Level Concentration
735651	RB-S-03	Tritium	U	Less than the Decision Level Concentration
735652	RB-W-01	Cesium-137	U	Less than the Decision Level Concentration
735652	RB-W-01	Lead-212	U	Less than the Decision Level Concentration
735652	RB-W-01	Tritium	U	Less than the Decision Level Concentration
735653	RB-D-03	Cesium-137	U	Less than the Decision Level Concentration
735653	RB-D-03	Lead-212	U	Less than the Decision Level Concentration
735653	RB-D-03	Tritium	U	Less than the Decision Level Concentration
735655	Johnson Artesian WL Dup	Cesium-137	U	Less than the Decision Level Concentration
735655	Johnson Artesian WL Dup	Tritium	U	Less than the Decision Level Concentration

### Sample Shipping/Receiving

The Radiation and Indoor Environments National Laboratory in Las Vegas, Nevada received 16 water samples on May 23, 2011, submitted for the determination of gamma emitting nuclides, tritium, and tritium (enrichment method). The enriched tritium method was not performed as stated above. The analytical report was checked to confirm that all of the samples scheduled were received and analyzed.

### Preservation and Holding Times

The sample shipment was received intact with all samples in the correct container types preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

### Laboratory Instrument Calibration

Data for this RIN were reported at Analysis Service Level B, results only) and do not include calibration data.

## Radiochemical Analysis

Radiochemical results are qualified with a “U” flag (not detected) when the result is greater than the minimum detectable concentration (MDC) but less than the Decision Level Concentration, estimated as 3 times the one-sigma total propagated uncertainty. Results above the Decision Level Concentration and the MDC are qualified with a “J” flag (estimated) when the result is less than Determination Limit (3 times the MDC).

## Completeness

The electronic data deliverable was the only deliverable received for this RIN.

## Electronic Data Deliverable (EDD) File

The EDD file arrived on October 27, 2011. 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.

## **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.

### Equipment Blank Assessment

Equipment blanks are prepared and analyzed to document contamination attributable to the sample collection process. An equipment blank was not required for this sampling event.

### 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. A duplicate sample was collected from location Johnson Artesian WL. The radiochemical relative error ratio (calculated using the one-sigma total propagated uncertainty) was less than three for all duplicates, indicating acceptable precision.

### 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:

Steve Donovan  
Steve Donovan

1-5-2012  
Date

Data Validation Lead:

Steve Donovan  
Steve Donovan

1-5-2012  
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 may result from transcription errors, data-coding errors, or measurement system problems. However, outliers may also represent true extreme values of a distribution and 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 by generating the Outliers Report using the Sample Management System from data in the SEEPro database. The application compares the new data set with historical data and lists the new data that fall outside the historical data range. A determination is also made if the data are normally distributed using the Shapiro-Wilk Test.
2. Apply the appropriate statistical test. Dixon's Extreme Value test 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.

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: 12/12/2011

Location: Brennan Windmill WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Cesium-137	pCi/L	05/16/2011	N001	0	-	0	0		U	#	1.64	0
Oxidation Reduction Potential	mV	05/16/2011	N001	0	-	0	112.7			#		
pH	s.u.	05/16/2011	N001	0	-	0	7.26			#		
Specific Conductance	umhos/cm	05/16/2011	N001	0	-	0	2101			#		
Temperature	C	05/16/2011	N001	0	-	0	11.37			#		
Tritium	pCi/L	05/16/2011	N001	0	-	0	51.6		U	#	145	86.8
Turbidity	NTU	05/16/2011	N001	0	-	0	2.6			#		

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

REPORT DATE: 12/12/2011

Location: Johnson Artesian WL WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Bismuth-212	pCi/L	05/16/2011	N001	0	-	0	20.4			#		12.7
Cesium-137	pCi/L	05/16/2011	N001	0	-	0	0		U	#	1.87	0
Cesium-137	pCi/L	05/16/2011	N002	0	-	0	0		U	#	2.45	0
Oxidation Reduction Potential	mV	05/16/2011	N001	0	-	0	1.1			#		
pH	s.u.	05/16/2011	N001	0	-	0	8.11			#		
Specific Conductance	umhos /cm	05/16/2011	N001	0	-	0	2225			#		
Temperature	C	05/16/2011	N001	0	-	0	16.02			#		
Tritium	pCi/L	05/16/2011	N001	0	-	0	30.1		U	#	146	86.6
Tritium	pCi/L	05/16/2011	N002	0	-	0	47.9		U	#	146	87.2
Turbidity	NTU	05/16/2011	N001	0	-	0	2.3			#		

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

REPORT DATE: 12/12/2011

Location: RB-D-01 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Cesium-137	pCi/L	05/17/2011	N001	16628.77 - 16628.77	0		UF	#	2.21	0
Oxidation Reduction Potential	mV	05/17/2011	N001	16628.77 - 16628.77	-36.7		F	#		
pH	s.u.	05/17/2011	N001	16628.77 - 16628.77	8.7		F	#		
Potassium-40	pCi/L	05/17/2011	N001	16628.77 - 16628.77	29.1		F	#		14
Specific Conductance	umhos/cm	05/17/2011	N001	16628.77 - 16628.77	19986		F	#		
Temperature	C	05/17/2011	N001	16628.77 - 16628.77	14.56		F	#		
Tritium	pCi/L	05/17/2011	N001	16628.77 - 16628.77	26		UF	#	146	86.1
Turbidity	NTU	05/17/2011	N001	16628.77 - 16628.77	4.64		F	#		

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

REPORT DATE: 12/12/2011

Location: RB-D-03 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Cesium-137	pCi/L	05/17/2011	N001	0	-	0	0		UF	#	2.35	0
Lead-212	pCi/L	05/17/2011	N001	0	-	0	2.37		UF	#		2.49
Oxidation Reduction Potential	mV	05/17/2011	N001	0	-	0	-148.2		F	#		
pH	s.u.	05/17/2011	N001	0	-	0	8.97		F	#		
Specific Conductance	umhos/cm	05/17/2011	N001	0	-	0	838		F	#		
Temperature	C	05/17/2011	N001	0	-	0	9.13		F	#		
Tritium	pCi/L	05/17/2011	N001	0	-	0	23.8		UF	#	145	85.6
Turbidity	NTU	05/17/2011	N001	0	-	0	6.38		F	#		

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

REPORT DATE: 12/12/2011

Location: RB-S-03 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Cesium-137	pCi/L	05/17/2011	N001	16628.75 - 16628.75	0		UF	#	2.15	0
Lead-212	pCi/L	05/17/2011	N001	16628.75 - 16628.75	3.01		UF	#		2.65
Oxidation Reduction Potential	mV	05/17/2011	N001	16628.75 - 16628.75	-158.9		F	#		
pH	s.u.	05/17/2011	N001	16628.75 - 16628.75	8.41		F	#		
Specific Conductance	umhos/cm	05/17/2011	N001	16628.75 - 16628.75	851		F	#		
Temperature	C	05/17/2011	N001	16628.75 - 16628.75	10.78		F	#		
Tritium	pCi/L	05/17/2011	N001	16628.75 - 16628.75	36.2		UF	#	147	87.1
Turbidity	NTU	05/17/2011	N001	16628.75 - 16628.75	3.21		F	#		

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

REPORT DATE: 12/12/2011

Location: RB-W-01 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID	(Ft BLS)	Lab	Data		QA			
Cesium-137	pCi/L	05/17/2011	0001	0	-	0	0	UFQ	#	2.28	0
Lead-212	pCi/L	05/17/2011	0001	0	-	0	2.03	UFQ	#		2.65
Oxidation Reduction Potential	mV	05/17/2011	N001	0	-	0	-135.7	FQ	#		
pH	s.u.	05/17/2011	N001	0	-	0	8.28	FQ	#		
Specific Conductance	umhos/cm	05/17/2011	N001	0	-	0	1429	FQ	#		
Temperature	C	05/17/2011	N001	0	-	0	11.36	FQ	#		
Tritium	pCi/L	05/17/2011	0001	0	-	0	31.7	UFQ	#	144	85.6
Turbidity	NTU	05/17/2011	N001	0	-	0	54.1	FQ	#		

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: 12/12/2011

Location: B-1 Equity Camp SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Cesium-137	pCi/L	05/16/2011	N001	0	U	#	2.26	0
Oxidation Reduction Potential	mV	05/16/2011	N001	-17.3		#		
pH	s.u.	05/16/2011	N001	7.63		#		
Specific Conductance	umhos/cm	05/16/2011	N001	1066		#		
Temperature	C	05/16/2011	N001	9.47		#		
Tritium	pCi/L	05/16/2011	N001	-9.98	U	#	146	84.4
Turbidity	NTU	05/16/2011	N001	2.05		#		

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

REPORT DATE: 12/12/2011

Location: CER #1 Black Sulphur SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Cesium-137	pCi/L	05/16/2011	N001	0	U	#	2.43	0
Dissolved Oxygen	mg/L	05/16/2011	N001	7.54		#		
Oxidation Reduction Potential	mV	05/16/2011	N001	62.7		#		
pH	s.u.	05/16/2011	N001	7.54		#		
Specific Conductance	umhos/cm	05/16/2011	N001	1606		#		
Temperature	C	05/16/2011	N001	10.84		#		
Thallium-208	pCi/L	05/16/2011	N001	1.14	U	#		1.42
Tritium	pCi/L	05/16/2011	N001	52.3	U	#	147	87.9
Turbidity	NTU	05/16/2011	N001	4.56		#		

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

REPORT DATE: 12/12/2011

Location: CER #4 Black Sulphur SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Cesium-137	pCi/L	05/16/2011	N001	0	U	#	2.37	0
Oxidation Reduction Potential	mV	05/16/2011	N001	34.1		#		
pH	s.u.	05/16/2011	N001	7.77		#		
Specific Conductance	umhos/cm	05/16/2011	N001	1339		#		
Temperature	C	05/16/2011	N001	9.27		#		
Tritium	pCi/L	05/16/2011	N001	52.3	U	#	147	88.1
Turbidity	NTU	05/16/2011	N001	2.08		#		

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

REPORT DATE: 12/12/2011

Location: Fawn Creek #1 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Cesium-137	pCi/L	05/16/2011	N001	0	U	#	2.13	0
Oxidation Reduction Potential	mV	05/16/2011	N001	81.8		#		
pH	s.u.	05/16/2011	N001	7.65		#		
Specific Conductance	umhos/cm	05/16/2011	N001	1458		#		
Temperature	C	05/16/2011	N001	9.71		#		
Tritium	pCi/L	05/16/2011	N001	62.2	U	#	146	88.3
Turbidity	NTU	05/16/2011	N001	227		#		

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

REPORT DATE: 12/12/2011

Location: Fawn Creek #3 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Cesium-137	pCi/L	05/17/2011	N001	0		U	#	2.37	0
Oxidation Reduction Potential	mV	05/17/2011	N001	182.4			#		
pH	s.u.	05/17/2011	N001	6.89			#		
Radium-226	pCi/L	05/17/2011	N001	28.3	J	U	#		35.1
Specific Conductance	umhos/cm	05/17/2011	N001	1341			#		
Temperature	C	05/17/2011	N001	8.98			#		
Tritium	pCi/L	05/17/2011	N001	43.8		U	#	145	86.8
Turbidity	NTU	05/17/2011	N001	2.84			#		

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

REPORT DATE: 12/12/2011

Location: Fawn Creek 500ft Dwn SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Cesium-137	pCi/L	05/17/2011	0001	0		U	#	2.19	0
Oxidation Reduction Potential	mV	05/17/2011	N001	135.2			#		
pH	s.u.	05/17/2011	N001	8.39			#		
Specific Conductance	umhos/cm	05/17/2011	N001	928			#		
Temperature	C	05/17/2011	N001	13.15			#		
Thallium-208	pCi/L	05/17/2011	0001	1.09		U	#		1.33
Tritium	pCi/L	05/17/2011	0001	93.8		U	#	146	89.2
Turbidity	NTU	05/17/2011	N001	898			#		

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

REPORT DATE: 12/12/2011

Location: Fawn Creek 500ft Ups SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Cesium-137	pCi/L	05/17/2011	0001	0	U	#	2.2	0
Oxidation Reduction Potential	mV	05/17/2011	N001	135.1		#		
pH	s.u.	05/17/2011	N001	8.4		#		
Specific Conductance	umhos/cm	05/17/2011	N001	923		#		
Temperature	C	05/17/2011	N001	11.81		#		
Tritium	pCi/L	05/17/2011	0001	19.9	U	#	145	85.7
Turbidity	NTU	05/17/2011	N001	988		#		

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

REPORT DATE: 12/12/2011

Location: Fawn Creek 6800ft Up SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Cesium-137	pCi/L	05/17/2011	0001	0		U	#	2.31	0
Lead-214	pCi/L	05/17/2011	0001	4.97	J		#		2.62
Oxidation Reduction Potential	mV	05/17/2011	N001	132.1			#		
pH	s.u.	05/17/2011	N001	8.41			#		
Specific Conductance	umhos/cm	05/17/2011	N001	872			#		
Temperature	C	05/17/2011	N001	11.52			#		
Tritium	pCi/L	05/17/2011	0001	43.6	J	U	#	145	86.4
Turbidity	NTU	05/17/2011	N001	891			#		

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

REPORT DATE: 12/12/2011

Location: Fawn Creek 8400ft Dw SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Cesium-137	pCi/L	05/17/2011	0001	0		U	#	2.24	0
Oxidation Reduction Potential	mV	05/17/2011	N001	-37.6			#		
pH	s.u.	05/17/2011	N001	8.56			#		
Specific Conductance	umhos/cm	05/17/2011	N001	1172			#		
Temperature	C	05/17/2011	N001	13.94			#		
Tritium	pCi/L	05/17/2011	0001	74		U	#	146	88.5
Turbidity	NTU	05/17/2011	N001	289			#		

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.

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**Attachment 3**  
**Sampling and Analysis Work Order**

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established 1959

Task Order LM00-502  
Control Number 11-0595

April 26, 2011

U.S. Department of Energy  
Office of Legacy Management  
ATTN: Art Kleinrath  
Site Manager  
955 Mound Road  
Miamisburg, OH 45342

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)  
May 2011 Environmental Sampling at Rio Blanco, Colorado

REFERENCE: Task Order LM00-502-07-618, Rio Blanco, CO, 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 and surface locations at this site as part of the routine environmental sampling scheduled to begin the week of May 9, 2011.

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

**Monitor Wells**

On-site

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

Off-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 Dwn

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.

Art Kleinrath  
Control Number 11-0595  
Page 2

Please contact me at (970) 248-6477 if you have any questions or concerns.

Sincerely,



Rick Hutton  
Site Manager

RH/lcg/dc

Enclosures (3)

cc: (electronic)  
Steve Donovan, Stoller  
Bev Gallagher, Stoller  
Lauren Goodknight, Stoller  
Rick Hutton, Stoller  
EDD Delivery  
rc-grand.junction  
File: RBL 410.02(A)

## Sampling Frequencies for Locations at Rio Blanco, Colorado

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
<b>Monitoring Wells</b>						
<b>On-Site</b>						
RB-D-01			X			
RB-D-03			X			
RB-S-03			X			
RB-W-01			X			
<b>Off-Site</b>						
Johnson Artesian WL			X			
Brennan Windmill			X			
<b>Surface Locations</b>						
<b>On-Site</b>						
Fawn Creek 500ft Dwn			X			
Fawn Creek 500ft Ups			X			
<b>Off-Site</b>						
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			

Sampling conducted in May

### Constituent Sampling Breakdown

Site	Rio Blanco		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water			
<b>Approx. No. Samples/yr</b>	6	9			
<b>Field Measurements</b>					
Alkalinity					
Dissolved Oxygen					
Redox Potential					
pH	X	X			
Specific Conductance	X	X			
Turbidity					
Temperature	X	X			
<b>Laboratory Measurements</b>					
Aluminum					
Ammonia as N (NH3-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 <sub>3</sub> +NO <sub>2</sub> )-N					
Potassium					
Selenium					
Silica					
Sodium					
Strontium					
Sulfate					
Sulfide					
Total Dissolved Solids					
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					
<b>Total No. of Analytes</b>	<b>3</b>	<b>3</b>			

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

# **Attachment 4**

## **Trip Report**

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## Memorandum

Control Number N/A

DATE: May 26, 2011  
 TO: Rick Hutton  
 FROM: Jeff Price  
 SUBJECT: Trip Report (LTHMP Sampling)

**Site:** Rio Blanco, CO

**Dates of Sampling Event:** May 16-17, 2011.

**Team Members:** Dan Sellers and Jeff Price.

**Number of Locations Sampled:** 2 on-site wells, 4 private wells, and 9 surface locations.

**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 Well	Duplicate	Groundwater	JGZ 246

**RIN Number Assigned:** Samples were assigned to RIN 11053764.

**Sample Shipment:** Samples were shipped on May 19, 2011.

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

Site Code	Well ID	Date	Time	DTW (ft)	Comments
RBL01	RB-W-01	5/17/2011	14:40	18.25	Peristaltic.
RBL01	RB-D-03	5/17/2011	15:35	4.15	Peristaltic.
RBL01	RB-S-03	5/17/2011	16:10	39.49	Dedicated bladder pump.
RBL01	RB-D-01	5/17/2011	14:40	56.16	Dedicated bladder pump & drop tube.

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

## **Trip Summary**

Dan Sellers and Jeff Price drove from the Grand Junction office to the Rio Blanco site and began sampling on May 16, 2011. The sampling crew returned the next day and completed the sampling. All samples will be analyzed by the EPA lab in Las Vegas for tritium and gamma spec; a select set of sample locations will also be analyzed for enriched tritium. Copies of the sample collection logs and chain of custody documentation are maintained at the Grand Junction office. In general, the sampling event went well, the weather was pleasant, and all samples were collected in accordance with the LM sampling and analysis plan.

It appears that well RB-W-01 does not have a good hydraulic connection with the aquifer. During the well micro-purging and sampling, the static water level was steadily lowered. This is an indication that the steel casing well perforations have most likely corroded to the point where water can no longer efficiently enter the well. This has probably been a problem for some time since the property owner drilled a replacement well (the replacement well makes plenty of water). A bore-hole camera could be used to assess the well condition.

## **Sample Locations**

RB-D-01 (On-site well)  
RB-S-03 (On-site well)  
RB-D-03 (Private well)  
RB-W-01 (Private well)  
Johnson Artesian Well (Private well)  
Brennan Windmill (Private well)  
Fawn Creek 500ft Dwn (Surface Location)  
Fawn Creek 500ft Ups (Surface Location)  
B-1 Equity Camp (Surface Location)  
CER #1 Black Sulphur (Surface Location)  
CER #4 Black Sulphur (Surface Location)  
Fawn Creek #1 (Surface Location)  
Fawn Creek #3 (Surface Location)  
Fawn Creek 6800ft Up (Surface Location)  
Fawn Creek 8400ft Dw (Surface Location)

(JP/lcg)

cc: (electronic)  
Art Kleinrath, DOE  
Bev Gallagher, Stoller  
Steve Donovan, Stoller  
Jack Duray, Stoller  
Rick Findlay, Stoller  
Rex Hodges, Stoller  
Mark Plessinger, Stoller  
EDD Delivery