Data Validation Package

May 2012 Groundwater and Surface Water Sampling at the Rulison, Colorado, Site

November 2012

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Sampling Event Summary

Site: Rulison, Colorado, Site

Sampling Period: May 8, 2012

Annual sampling was conducted at the Rulison, Colorado, site for the Long-Term Hydrologic Monitoring Program on May 8, 2012, 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). Two surface water locations, SPR 300 Yrd N of GZ and Sprg 500ft E of GZ were not sampled because of access denial by the land owner. A duplicate sample was collected from location City Springs. Samples were analyzed by GEL Laboratories in Charleston, South Carolina. Samples were analyzed for gamma-emitting radionuclides by high-resolution gamma spectroscopy, and for tritium using the conventional and enrichment methods. Results of this monitoring at the Rulison site demonstrate that groundwater and surface water outside the site boundaries have not been affected by project-related contaminants.

Three sampling locations yielded a reportable value of tritium activity using the electrolytic enrichment tritium analysis method. The values ranged from 20.2 to 22.7 picocuries per liter (pCi/L). These results are consistent with background levels for tritium, well below the EPA drinking water standard for tritium of 20,000 pCi/L. The time-concentration graph for tritium concentrations obtained using the enrichment method show declining concentrations.

All high-resolution gamma spectrometry results for gamma-emitting radionuclides were below detection limits. 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

11-27-12
Date

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Planned Sampling Map at the Rulison, Colorado, Site

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Rulison, CO	**Date(s) of Water Sampling**	May 8, 2012
Date(s) of Verification	October 24, 2012	**Name of Verifier**	Gretchen Baer

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List other documents, SOPs, instructions.		Work Order letter dated April 9, 2012.
2. Were the sampling locations specified in the planning documents sampled?	No	SPR 300 Yrd N of GZ and Sprg 500ft E of GZ were not sampled because of access denial by the land owner.
3. Was a pre-trip calibration conducted as specified in the above-named documents?	Yes	Pre-trip calibration was performed on May 7, 2012.
4. Was an operational check of the field equipment conducted daily?	Yes	
Did the operational checks meet criteria?	Yes	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Was the category of the well documented?	Yes	
7. Were the following conditions met when purging a Category I well:		
Was one pump/tubing volume purged prior to sampling?	Yes	
Did the water level stabilize prior to sampling?	Yes	
Did pH, specific conductance, and turbidity measurements stabilize prior to sampling?	No	Turbidity criteria was not achieved at well CER Test Well so the sample was filtered.
Was the flow rate less than 500 mL/min?	Yes	
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	Yes	

Water Sampling Field Activities Verification Checklist (continued)

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well:	NA	There were no Category II wells.
Was the flow rate less than 500 mL/min?		
Was one pump/tubing volume removed prior to sampling?		
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected at location City Springs.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	NA	An equipment blank was not required.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number?	Yes	Location ID 2611 was used for the duplicate sample.
Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDCS) report?	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

Report Number (RIN):	12044517
Sample Event:	May 8, 2012
Site(s):	Rulison, Colorado, Site
Laboratory:	GEL Laboratories, Charleston, South Carolina
Work Order No.:	304355
Analysis:	Radiochemistry
Validator:	Gretchen Baer
Review Date:	October 24, 2012

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 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 sample results required additional qualification.

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received ten water samples on May 15, 2012, 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 31, 2011, and August 1, 2012. Daily instrument checks performed on May 23, 2012, and August 2 and 6, 2012, met the acceptance criteria.

Enriched Tritium
Instrument quench calibration curves were generated on July 31, 2011. Daily instrument checks performed on July 19 and 20, 2012, 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

A revised EDD file arrived on August 23, 2012, that included corrections to some filtration status fields. 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
Radiochemistry Data Validation Worksheet

RIN: 12044517 **Lab Code:** GEN **Date Due:** 8/13/2012

Matrix: Water **Site Code:** RUL01 **Date Completed:** 8/13/2012

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
Daniel Gardener	Actinium-228	06/03/2012						0.07
Daniel Gardener	Americium-241	06/03/2012						0.83
Blank_Spike	Americium-241	06/05/2012				110.00		
Daniel Gardener	Antimony-125	06/03/2012						0.36
Daniel Gardener	Cerium-144	06/03/2012						0.31
Blank_Spike	Cerium-144	06/05/2012						
Daniel Gardener	Cesium-134	06/03/2012						0.30
Daniel Gardener	Cesium-137	06/03/2012						0.60
Blank_Spike	Cesium-137	06/05/2012				105.00		
Daniel Gardener	Cobalt-60	06/03/2012						0.71
Blank_Spike	Cobalt-60	06/05/2012				102.00		
Daniel Gardener	Europium-152	06/03/2012						0.66
Daniel Gardener	Europium-154	06/03/2012						1.35
Blank_Spike	Europium-154	06/05/2012						
Daniel Gardener	Europium-155	06/03/2012						1.09
Daniel Gardener	Lead-212	06/03/2012						1.60
Blank_Spike	Lead-212	06/05/2012						
Daniel Gardener	Potassium-40	06/03/2012						1.29
Daniel Gardener	Promethium-144	06/03/2012						1.11
Blank_Spike	Promethium-144	06/05/2012						
Daniel Gardener	Promethium-146	06/03/2012						0.14
Daniel Gardener	Ruthenium-106	06/03/2012						1.00
Blank_Spike	Ruthenium-106	06/05/2012						
Daniel Gardener	Thorium-234	06/03/2012						0.56
Daniel Gardener	Tritium	05/23/2012						0.75
Blank_Spike	Tritium	05/23/2012				96.20		
Daniel Gardener	Tritium	05/23/2012					97.6	
Blank	Tritium	05/23/2012	-66.9000	U				
Daniel Gardener	Tritium	07/19/2012			63.0			
Kevin Whelan	Tritium	07/19/2012			63.0			
Tim Jacobs Rand	Tritium	07/19/2012			63.0			
Blank_Spike	Tritium	07/20/2012			63.0	108.00		

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 12044517 **Lab Code:** GEN **Date Due:** 8/13/2012

Matrix: Water **Site Code:** RUL01 **Date Completed:** 8/13/2012

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
Blank	Tritium	07/20/2012	1.7400	U	63.0			
CER Test Well	Tritium	08/02/2012						0.50
Blank_Spike	Tritium	08/02/2012				109.00		
CER Test Well	Tritium	08/02/2012					84.0	
Blank	Tritium	08/02/2012	39.0000	U	63.0			
Daniel Gardener	Uranium-235	06/03/2012						0.79
Blank_Spike	Uranium-235	06/05/2012						
Daniel Gardener	Uranium-238	06/03/2012						0.56
Daniel Gardener	Yttrium-88	06/03/2012						1.75
Blank_Spike	Yttrium-88	06/05/2012						

Sampling Quality Control Assessment

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

Sampling Protocol

Location CER Test Well was sampled using a dedicated bladder pump. Data from this Category I well are qualified with an "F" flag in the database indicating the well was purged and sampled using the low-flow sampling method. 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 City Springs. The relative error ratio for the sample and duplicate was less than 3, indicating acceptable precision.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 12044517 **Lab Code:** GEN **Project:** Rulison Site **Validation Date:** 10/24/2012

Duplicate: 2611 **Sample:** City Springs

Analyte	Sample Result	Flag	Error	Dilution	Duplicate Result	Flag	Error	Dilution	RPD	RER	Units
Actinium-228	-9.97	U	11.4	1.00	-3.62	U	13.0	1.00		0.7	pCi/L
Americium-241	6.56	U	12.9	1.00	2.48	U	19.2	1.00		0.3	pCi/L
Antimony-125	1.34	U	6.33	1.00	7.01	U	7.84	1.00		1.1	pCi/L
Cerium-144	14.0	U	18.6	1.00	-4.23	U	20.8	1.00		1.3	pCi/L
Cesium-134	-1.59	U	2.71	1.00	1.65	U	2.90	1.00		1.6	pCi/L
Cesium-137	-0.906	U	3.10	1.00	0.620	U	2.97	1.00		0.7	pCi/L
Cobalt-60	0.547	U	2.60	1.00	-1.76	U	2.47	1.00		1.3	pCi/L
Europium-152	0.553	U	7.08	1.00	4.85	U	9.30	1.00		0.7	pCi/L
Europium-154	2.17	U	6.97	1.00	2.66	U	6.73	1.00		0.1	pCi/L
Europium-155	-0.0536	U	8.38	1.00	-0.935	U	10.1	1.00		0.1	pCi/L
Lead-212	-6.29	U	6.41	1.00	1.49	U	5.66	1.00		1.8	pCi/L
Potassium-40	-2.03	U	34.2	1.00	-16.6	U	42.5	1.00		0.5	pCi/L
Promethium-144	1.50	U	2.51	1.00	0.278	U	2.60	1.00		0.7	pCi/L
Promethium-146	0.125	U	2.78	1.00	3.47	U	3.63	1.00		1.4	pCi/L
Ruthenium-106	6.41	U	22.7	1.00	3.62	U	24.9	1.00		0.2	pCi/L
Thorium-234	-1.15	U	135	1.00	-230	U	219	1.00		1.7	pCi/L
Tritium	22.6	U	123	1.00	2.92	U	121	1.00		0.2	pCi/L
Uranium-235	-14.8	U	21.6	1.00	-12.9	U	21.6	1.00		0.1	pCi/L
Uranium-238	-1.15	U	135	1.00	-230	U	219	1.00		1.7	pCi/L
Yttrium-88	1.19	U	3.12	1.00	-0.0362	U	2.33	1.00		0.6	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: Steve Donivan — Date: 11-19-2012

Data Validation Lead: Gretchen Baer — Date: 11/19/12

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 RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: CER Test Well WELL CER Test Well

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	05/08/2012	0001	0	-	0	-2.87	U	F	#	22.7	12.4
Americium-241	pCi/L	05/08/2012	0001	0	-	0	-13.2	U	F	#	36.8	22.7
Antimony-125	pCi/L	05/08/2012	0001	0	-	0	1.83	U	F	#	16.7	9.23
Cerium-144	pCi/L	05/08/2012	0001	0	-	0	-22.7	U	F	#	37.5	24.4
Cesium-134	pCi/L	05/08/2012	0001	0	-	0	3.41	U	F	#	7.95	4.18
Cesium-137	pCi/L	05/08/2012	0001	0	-	0	1.38	U	F	#	6.21	3.18
Cobalt-60	pCi/L	05/08/2012	0001	0	-	0	1.08	U	F	#	6.89	3.36
Europium-152	pCi/L	05/08/2012	0001	0	-	0	5.91	U	F	#	17.9	9.83
Europium-154	pCi/L	05/08/2012	0001	0	-	0	-2.01	U	F	#	18.2	9.75
Europium-155	pCi/L	05/08/2012	0001	0	-	0	-3.01	U	F	#	20.3	12.1
Lead-212	pCi/L	05/08/2012	0001	0	-	0	-1.47	U	F	#	12.5	7.12
pH	s.u.	05/08/2012	N001	0	-	0	8.07		F	#		
Potassium-40	pCi/L	05/08/2012	0001	0	-	0	-12.5	U	F	#	62.4	33.9
Promethium-144	pCi/L	05/08/2012	0001	0	-	0	-2	U	F	#	5.21	3.2
Promethium-146	pCi/L	05/08/2012	0001	0	-	0	3.36	U	F	#	8.17	4.33
Ruthenium-106	pCi/L	05/08/2012	0001	0	-	0	31	U	F	#	58.7	31
Specific Conductance	umhos /cm	05/08/2012	N001	0	-	0	375		F	#		
Temperature	C	05/08/2012	N001	0	-	0	10.8		F	#		

Groundwater Quality Data by Location (USEE100) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: CER Test Well WELL CER Test Well

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Thorium-234	pCi/L	05/08/2012	0001	0	-	0	-87.7	U	F	#	294	199
Tritium	pCi/L	05/08/2012	0001	0	-	0	81.5	U	F	#	259	144
Turbidity	NTU	05/08/2012	N001	0	-	0	29.3		F	#		
Uranium-235	pCi/L	05/08/2012	0001	0	-	0	-26.5	U	F	#	38.3	25.9
Uranium-238	pCi/L	05/08/2012	0001	0	-	0	-87.7	U	F	#	294	199
Yttrium-88	pCi/L	05/08/2012	0001	0	-	0	1.97	U	F	#	8.3	3.66

Groundwater Quality Data by Location (USEE100) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Daniel Gardener WELL A Gardner Ranch loc 40 ft to Sou

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	05/08/2012	N001	0	-	0	10.2	U		#	24.6	16.7
Americium-241	pCi/L	05/08/2012	N001	0	-	0	-3.01	U		#	43	27.5
Antimony-125	pCi/L	05/08/2012	N001	0	-	0	6.64	U		#	15.9	8.62
Cerium-144	pCi/L	05/08/2012	N001	0	-	0	2.77	U		#	39.3	22.8
Cesium-134	pCi/L	05/08/2012	N001	0	-	0	-.419	U		#	5.66	3.02
Cesium-137	pCi/L	05/08/2012	N001	0	-	0	1.54	U		#	5.54	2.77
Cobalt-60	pCi/L	05/08/2012	N001	0	-	0	-.7	U		#	5.15	2.69
Europium-152	pCi/L	05/08/2012	N001	0	-	0	4.03	U		#	16.3	8.77
Europium-154	pCi/L	05/08/2012	N001	0	-	0	2.65	U		#	17.5	8.38
Europium-155	pCi/L	05/08/2012	N001	0	-	0	-12.5	U		#	20.7	14.2
Lead-212	pCi/L	05/08/2012	N001	0	-	0	3.67	U		#	10.3	7.27
pH	s.u.	05/08/2012	N001	0	-	0	7.57			#		
Potassium-40	pCi/L	05/08/2012	N001	0	-	0	27.3	U		#	71.1	34.2
Promethium-144	pCi/L	05/08/2012	N001	0	-	0	0.248	U		#	5.39	2.81
Promethium-146	pCi/L	05/08/2012	N001	0	-	0	-2.7	U		#	6.44	4.09
Ruthenium-106	pCi/L	05/08/2012	N001	0	-	0	13.3	U		#	48.4	24.2
Specific Conductance	umhos /cm	05/08/2012	N001	0	-	0	885			#		
Temperature	C	05/08/2012	N001	0	-	0	13.8			#		

Groundwater Quality Data by Location (USEE100) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Daniel Gardener WELL A Gardner Ranch loc 40 ft to Sou

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Thorium-234	pCi/L	05/08/2012	N001	0	-	0	221	U		#	445	365
Tritium	pCi/L	05/08/2012	N001	0	-	0	-5.06	U		#	297	165
Tritium	pCi/L	05/08/2012	N001	0	-	0	21.1			#	2.95	3.66
Turbidity	NTU	05/08/2012	N001	0	-	0	3.29			#		
Uranium-235	pCi/L	05/08/2012	N001	0	-	0	12.1	U		#	34.2	49.3
Uranium-238	pCi/L	05/08/2012	N001	0	-	0	221	U		#	445	365
Yttrium-88	pCi/L	05/08/2012	N001	0	-	0	0.86	U		#	7.34	3.41

Groundwater Quality Data by Location (USEE100) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Kevin Whelan WELL Whelan Ranch Loc

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	05/08/2012	N001	0	-	0	10.7	U		#	20.8	11
Americium-241	pCi/L	05/08/2012	N001	0	-	0	6.04	U		#	20.5	12.1
Antimony-125	pCi/L	05/08/2012	N001	0	-	0	-3.36	U		#	12.1	7.08
Cerium-144	pCi/L	05/08/2012	N001	0	-	0	3.04	U		#	33.3	18.7
Cesium-134	pCi/L	05/08/2012	N001	0	-	0	0.045	U		#	5.19	2.72
Cesium-137	pCi/L	05/08/2012	N001	0	-	0	1.93	U		#	5.16	2.74
Cobalt-60	pCi/L	05/08/2012	N001	0	-	0	0.351	U		#	5.4	2.73
Europium-152	pCi/L	05/08/2012	N001	0	-	0	-1.71	U		#	14.2	7.9
Europium-154	pCi/L	05/08/2012	N001	0	-	0	-2.75	U		#	11.7	6.72
Europium-155	pCi/L	05/08/2012	N001	0	-	0	3.76	U		#	16.3	9.04
Lead-212	pCi/L	05/08/2012	N001	0	-	0	1.92	U		#	10.7	7.79
pH	s.u.	05/08/2012	N001	0	-	0	7.73			#		
Potassium-40	pCi/L	05/08/2012	N001	0	-	0	8.38	U		#	73.8	38.4
Promethium-144	pCi/L	05/08/2012	N001	0	-	0	0.0771	U		#	4.55	2.5
Promethium-146	pCi/L	05/08/2012	N001	0	-	0	-.546	U		#	5.89	3.28
Ruthenium-106	pCi/L	05/08/2012	N001	0	-	0	-18.4	U		#	41.5	26.4
Specific Conductance	umhos /cm	05/08/2012	N001	0	-	0	835			#		
Temperature	C	05/08/2012	N001	0	-	0	11.5			#		

Groundwater Quality Data by Location (USEE100) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Kevin Whelan WELL Whelan Ranch Loc

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Thorium-234	pCi/L	05/08/2012	N001	0	-	0	-127	U		#	196	131
Tritium	pCi/L	05/08/2012	N001	0	-	0	20.2			#	2.83	3.72
Tritium	pCi/L	05/08/2012	N001	0	-	0	-58.3	U		#	297	162
Turbidity	NTU	05/08/2012	N001	0	-	0	1.57			#		
Uranium-235	pCi/L	05/08/2012	N001	0	-	0	-14.4	U		#	32.7	21.1
Uranium-238	pCi/L	05/08/2012	N001	0	-	0	-127	U		#	196	131
Yttrium-88	pCi/L	05/08/2012	N001	0	-	0	1.2	U		#	6.49	3.08

Groundwater Quality Data by Location (USEE100) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Morrissania Ranch WELL Formerly Glen Schwab Ranch/Robert Searcy Ranch; Sauter Douglas; Rothgery, Wayne an Debra; Douglas K. Sauter AP

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	05/08/2012	N001	16512 - 16512	5.43	U		#	22.8	11
Americium-241	pCi/L	05/08/2012	N001	16512 - 16512	9.73	U		#	41.8	25.4
Antimony-125	pCi/L	05/08/2012	N001	16512 - 16512	0.549	U		#	16.7	9.3
Cerium-144	pCi/L	05/08/2012	N001	16512 - 16512	-5.41	U		#	39.6	23.6
Cesium-134	pCi/L	05/08/2012	N001	16512 - 16512	1.82	U		#	6.72	3.38
Cesium-137	pCi/L	05/08/2012	N001	16512 - 16512	1.26	U		#	6.02	3.05
Cobalt-60	pCi/L	05/08/2012	N001	16512 - 16512	1.99	U		#	6.69	3.08
Europium-152	pCi/L	05/08/2012	N001	16512 - 16512	4.77	U		#	18.3	9.93
Europium-154	pCi/L	05/08/2012	N001	16512 - 16512	0.695	U		#	17.1	8.44
Europium-155	pCi/L	05/08/2012	N001	16512 - 16512	-12.7	U		#	20	13.8
Lead-212	pCi/L	05/08/2012	N001	16512 - 16512	9.99	U		#	15.8	12.6
pH	s.u.	05/08/2012	N001	16512 - 16512	8.09			#		
Potassium-40	pCi/L	05/08/2012	N001	16512 - 16512	-36.1	U		#	81.5	49.5
Promethium-144	pCi/L	05/08/2012	N001	16512 - 16512	-.271	U		#	5.26	2.82
Promethium-146	pCi/L	05/08/2012	N001	16512 - 16512	-1.19	U		#	7.18	3.95
Ruthenium-106	pCi/L	05/08/2012	N001	16512 - 16512	16.7	U		#	57.3	29.3
Specific Conductance	umhos /cm	05/08/2012	N001	16512 - 16512	490			#		
Temperature	C	05/08/2012	N001	16512 - 16512	10.5			#		

Groundwater Quality Data by Location (USEE100) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Morrissania Ranch WELL Formerly Glen Schwab Ranch/Robert Searcy Ranch; Sauter Douglas; Rothgery, Wayne an Debra; Douglas K. Sauter AP

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Thorium-234	pCi/L	05/08/2012	N001	16512	-	16512	54.2	U		#	378	311
Tritium	pCi/L	05/08/2012	N001	16512	-	16512	105	U		#	267	154
Turbidity	NTU	05/08/2012	N001	16512	-	16512	2.84			#		
Uranium-235	pCi/L	05/08/2012	N001	16512	-	16512	4.54	U		#	39.2	25.4
Uranium-238	pCi/L	05/08/2012	N001	16512	-	16512	54.2	U		#	378	311
Yttrium-88	pCi/L	05/08/2012	N001	16512	-	16512	0.543	U		#	9.16	4.45

Groundwater Quality Data by Location (USEE100) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Patrick McCarty WELL McCartey Genetics 100 ft South

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	05/08/2012	N001	0	-	0	0.755	U		#	23.1	12.6
Americium-241	pCi/L	05/08/2012	N001	0	-	0	-2.02	U		#	18.9	10.6
Antimony-125	pCi/L	05/08/2012	N001	0	-	0	-3.97	U		#	13.2	8
Cerium-144	pCi/L	05/08/2012	N001	0	-	0	-2.3	U		#	31.1	18
Cesium-134	pCi/L	05/08/2012	N001	0	-	0	0.904	U		#	6.36	3.32
Cesium-137	pCi/L	05/08/2012	N001	0	-	0	0.57	U		#	6.84	3.64
Cobalt-60	pCi/L	05/08/2012	N001	0	-	0	0.111	U		#	5.74	2.91
Europium-152	pCi/L	05/08/2012	N001	0	-	0	3.58	U		#	15.3	8.25
Europium-154	pCi/L	05/08/2012	N001	0	-	0	5.1	U		#	20.1	10
Europium-155	pCi/L	05/08/2012	N001	0	-	0	-.353	U		#	15.3	8.69
Lead-212	pCi/L	05/08/2012	N001	0	-	0	0.136	U		#	10.2	7.43
pH	s.u.	05/08/2012	N001	0	-	0	7.81			#		
Potassium-40	pCi/L	05/08/2012	N001	0	-	0	-.702	U		#	77.6	37.8
Promethium-144	pCi/L	05/08/2012	N001	0	-	0	0.541	U		#	5.17	2.7
Promethium-146	pCi/L	05/08/2012	N001	0	-	0	-.177	U		#	6.08	3.38
Ruthenium-106	pCi/L	05/08/2012	N001	0	-	0	0.728	U		#	45.7	24
Specific Conductance	umhos /cm	05/08/2012	N001	0	-	0	675			#		
Temperature	C	05/08/2012	N001	0	-	0	13.7			#		

Groundwater Quality Data by Location (USEE100) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Patrick McCarty WELL McCartey Genetics 100 ft South

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Thorium-234	pCi/L	05/08/2012	N001	0	-	0	-107	U		#	181	120
Tritium	pCi/L	05/08/2012	N001	0	-	0	24.6	U		#	274	134
Turbidity	NTU	05/08/2012	N001	0	-	0	2.55			#		
Uranium-235	pCi/L	05/08/2012	N001	0	-	0	7.82	U		#	31.1	17.7
Uranium-238	pCi/L	05/08/2012	N001	0	-	0	-107	U		#	181	120
Yttrium-88	pCi/L	05/08/2012	N001	0	-	0	1.97	U		#	7.71	3.47

Groundwater Quality Data by Location (USEE100) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Tim Jacobs Ranch New WELL Jacobs Residence loc is 100 ft S

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	05/08/2012	N001	0	-	0	11.6	U		#	21.7	11.3
Americium-241	pCi/L	05/08/2012	N001	0	-	0	6.77	U		#	22.4	14.3
Antimony-125	pCi/L	05/08/2012	N001	0	-	0	1.93	U		#	13.4	6.99
Cerium-144	pCi/L	05/08/2012	N001	0	-	0	-1.88	U		#	32	17.9
Cesium-134	pCi/L	05/08/2012	N001	0	-	0	0.817	U		#	5.89	3.06
Cesium-137	pCi/L	05/08/2012	N001	0	-	0	0.174	U		#	4.58	2.38
Cobalt-60	pCi/L	05/08/2012	N001	0	-	0	2.04	U		#	5.98	2.84
Europium-152	pCi/L	05/08/2012	N001	0	-	0	-6.57	U		#	13.4	8.74
Europium-154	pCi/L	05/08/2012	N001	0	-	0	2.77	U		#	16.7	8.17
Europium-155	pCi/L	05/08/2012	N001	0	-	0	-8.04	U		#	15.6	9.78
Lead-212	pCi/L	05/08/2012	N001	0	-	0	-2.85	U		#	9.31	5.79
pH	s.u.	05/08/2012	N001	0	-	0	7.91			#		
Potassium-40	pCi/L	05/08/2012	N001	0	-	0	-13.7	U		#	53	28.5
Promethium-144	pCi/L	05/08/2012	N001	0	-	0	1.49	U		#	5.46	2.85
Promethium-146	pCi/L	05/08/2012	N001	0	-	0	1.7	U		#	6.17	3.19
Ruthenium-106	pCi/L	05/08/2012	N001	0	-	0	5	U		#	46.1	24
Specific Conductance	umhos /cm	05/08/2012	N001	0	-	0	400			#		
Temperature	C	05/08/2012	N001	0	-	0	12.3			#		

Groundwater Quality Data by Location (USEE100) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Tim Jacobs Ranch New WELL Jacobs Residence loc is 100 ft S

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Thorium-234	pCi/L	05/08/2012	N001	0	-	0	48.1	U		#	215	134
Tritium	pCi/L	05/08/2012	N001	0	-	0	20.3	U		#	297	167
Tritium	pCi/L	05/08/2012	N001	0	-	0	22.7			#	2.47	3.86
Turbidity	NTU	05/08/2012	N001	0	-	0	1.44			#		
Uranium-235	pCi/L	05/08/2012	N001	0	-	0	16.9	U		#	32.1	20.3
Uranium-238	pCi/L	05/08/2012	N001	0	-	0	48.1	U		#	215	134
Yttrium-88	pCi/L	05/08/2012	N001	0	-	0	-.682	U		#	6.72	3.42

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

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 RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Battlement Creek SURFACE LOCATION Battlement Creek Loc.

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	05/08/2012	0001	11.6	U		#	26.2	13.7
Americium-241	pCi/L	05/08/2012	0001	-20.9	U		#	38.3	28
Antimony-125	pCi/L	05/08/2012	0001	-5.09	U		#	14.2	8.59
Cerium-144	pCi/L	05/08/2012	0001	10.2	U		#	39	22.1
Cesium-134	pCi/L	05/08/2012	0001	1.75	U		#	5.92	2.91
Cesium-137	pCi/L	05/08/2012	0001	-.0662	U		#	5.61	3.07
Cobalt-60	pCi/L	05/08/2012	0001	-.0936	U		#	6.69	3.54
Europium-152	pCi/L	05/08/2012	0001	3.93	U		#	16.9	9.07
Europium-154	pCi/L	05/08/2012	0001	-2.85	U		#	16	8.89
Europium-155	pCi/L	05/08/2012	0001	-2.02	U		#	20.6	11.8
Lead-212	pCi/L	05/08/2012	0001	2.3	U		#	12	6.76
pH	s.u.	05/08/2012	N001	8.14			#		
Potassium-40	pCi/L	05/08/2012	0001	-3.41	U		#	83.3	41.2
Promethium-144	pCi/L	05/08/2012	0001	2.18	U		#	6.54	3.41
Promethium-146	pCi/L	05/08/2012	0001	1.32	U		#	6.82	3.6
Ruthenium-106	pCi/L	05/08/2012	0001	-12.1	U		#	50.3	29.6
Specific Conductance	umhos/cm	05/08/2012	N001	150			#		
Temperature	C	05/08/2012	N001	5.5			#		

Surface Water Quality Data by Location (USEE102) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Battlement Creek SURFACE LOCATION Battlement Creek Loc.

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Thorium-234	pCi/L	05/08/2012	0001	7.63	U		#	350	231
Tritium	pCi/L	05/08/2012	0001	3.01	U		#	268	125
Turbidity	NTU	05/08/2012	N001	13.5			#		
Uranium-235	pCi/L	05/08/2012	0001	-41.1	U		#	38.5	31.9
Uranium-238	pCi/L	05/08/2012	0001	7.63	U		#	350	231
Yttrium-88	pCi/L	05/08/2012	0001	-3.05	U		#	7.09	4.41

Surface Water Quality Data by Location (USEE102) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: City Springs SURFACE LOCATION Parachute Springs Loc in Bldg

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	05/08/2012	N001	-9.97	U		#	18	11.4
Actinium-228	pCi/L	05/08/2012	N002	-3.62	U		#	22.7	13
Americium-241	pCi/L	05/08/2012	N001	6.56	U		#	23.7	12.9
Americium-241	pCi/L	05/08/2012	N002	2.48	U		#	35.3	19.2
Antimony-125	pCi/L	05/08/2012	N001	1.34	U		#	12	6.33
Antimony-125	pCi/L	05/08/2012	N002	7.01	U		#	14.4	7.84
Cerium-144	pCi/L	05/08/2012	N001	14	U		#	31.3	18.6
Cerium-144	pCi/L	05/08/2012	N002	-4.23	U		#	35.7	20.8
Cesium-134	pCi/L	05/08/2012	N001	-1.59	U		#	4.59	2.71
Cesium-134	pCi/L	05/08/2012	N002	1.65	U		#	5.75	2.9
Cesium-137	pCi/L	05/08/2012	N001	-.906	U		#	5.74	3.1
Cesium-137	pCi/L	05/08/2012	N002	0.62	U		#	5.7	2.97
Cobalt-60	pCi/L	05/08/2012	N001	0.547	U		#	5.36	2.6
Cobalt-60	pCi/L	05/08/2012	N002	-1.76	U		#	3.96	2.47
Europium-152	pCi/L	05/08/2012	N001	0.553	U		#	13.2	7.08
Europium-152	pCi/L	05/08/2012	N002	4.85	U		#	17.1	9.3
Europium-154	pCi/L	05/08/2012	N001	2.17	U		#	14.6	6.97
Europium-154	pCi/L	05/08/2012	N002	2.66	U		#	14.4	6.73

Surface Water Quality Data by Location (USEE102) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: City Springs SURFACE LOCATION Parachute Springs Loc in Bldg

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Europium-155	pCi/L	05/08/2012	N001	-.0536	U		#	15.1	8.38
Europium-155	pCi/L	05/08/2012	N002	-.935	U		#	17.8	10.1
Lead-212	pCi/L	05/08/2012	N001	-6.29	U		#	9.32	6.41
Lead-212	pCi/L	05/08/2012	N002	1.49	U		#	10.3	5.66
pH	s.u.	05/08/2012	N001	7.37			#		
Potassium-40	pCi/L	05/08/2012	N001	-2.03	U		#	67	34.2
Potassium-40	pCi/L	05/08/2012	N002	-16.6	U		#	78.4	42.5
Promethium-144	pCi/L	05/08/2012	N001	1.5	U		#	4.96	2.51
Promethium-144	pCi/L	05/08/2012	N002	0.278	U		#	4.98	2.6
Promethium-146	pCi/L	05/08/2012	N001	0.125	U		#	5.22	2.78
Promethium-146	pCi/L	05/08/2012	N002	3.47	U		#	6.65	3.63
Ruthenium-106	pCi/L	05/08/2012	N001	6.41	U		#	43	22.7
Ruthenium-106	pCi/L	05/08/2012	N002	3.62	U		#	47.9	24.9
Specific Conductance	umhos/cm	05/08/2012	N001	555			#		
Temperature	C	05/08/2012	N001	13.4			#		
Thorium-234	pCi/L	05/08/2012	N001	-1.15	U		#	246	135
Thorium-234	pCi/L	05/08/2012	N002	-230	U		#	306	219
Tritium	pCi/L	05/08/2012	N001	22.6	U		#	252	123

Surface Water Quality Data by Location (USEE102) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: City Springs SURFACE LOCATION Parachute Springs Loc in Bldg

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Tritium	pCi/L	05/08/2012	N002	2.92	U		#	260	121
Turbidity	NTU	05/08/2012	N001	0.84			#		
Uranium-235	pCi/L	05/08/2012	N001	-14.8	U		#	30.2	21.6
Uranium-235	pCi/L	05/08/2012	N002	-12.9	U		#	33.2	21.6
Uranium-238	pCi/L	05/08/2012	N001	-1.15	U		#	246	135
Uranium-238	pCi/L	05/08/2012	N002	-230	U		#	306	219
Yttrium-88	pCi/L	05/08/2012	N001	1.19	U		#	6.79	3.12
Yttrium-88	pCi/L	05/08/2012	N002	-.0362	U		#	5.13	2.33

Surface Water Quality Data by Location (USEE102) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Potter Ranch SURFACE LOCATION Potter Ranch loc is 100 ft E

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	05/08/2012	N001	-3.48	U		#	19.2	10.9
Americium-241	pCi/L	05/08/2012	N001	3.78	U		#	25.6	13.6
Antimony-125	pCi/L	05/08/2012	N001	-2.84	U		#	13.2	7.53
Cerium-144	pCi/L	05/08/2012	N001	-11.6	U		#	31.7	19.4
Cesium-134	pCi/L	05/08/2012	N001	-1.83	U		#	5.05	3
Cesium-137	pCi/L	05/08/2012	N001	0.22	U		#	5.58	3.04
Cobalt-60	pCi/L	05/08/2012	N001	1.02	U		#	5.83	2.76
Europium-152	pCi/L	05/08/2012	N001	-.436	U		#	13.5	7.27
Europium-154	pCi/L	05/08/2012	N001	3.5	U		#	17.9	8.65
Europium-155	pCi/L	05/08/2012	N001	-5.32	U		#	17	10.1
Lead-212	pCi/L	05/08/2012	N001	-.53	U		#	10.5	6.05
pH	s.u.	05/08/2012	N001	7.68			#		
Potassium-40	pCi/L	05/08/2012	N001	11	U		#	76.9	36.3
Promethium-144	pCi/L	05/08/2012	N001	-.304	U		#	4.68	2.46
Promethium-146	pCi/L	05/08/2012	N001	0.46	U		#	5.93	3.13
Ruthenium-106	pCi/L	05/08/2012	N001	10.5	U		#	47.8	25
Specific Conductance	umhos/cm	05/08/2012	N001	550			#		
Temperature	C	05/08/2012	N001	12.7			#		

Surface Water Quality Data by Location (USEE102) FOR SITE RUL01, Rulison Site
REPORT DATE: 11/1/2012
Location: Potter Ranch SURFACE LOCATION Potter Ranch loc is 100 ft E

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Thorium-234	pCi/L	05/08/2012	N001	-67.3	U		#	251	139
Tritium	pCi/L	05/08/2012	N001	15	U		#	256	122
Turbidity	NTU	05/08/2012	N001	0.98			#		
Uranium-235	pCi/L	05/08/2012	N001	-.0052	U		#	33.7	20.3
Uranium-238	pCi/L	05/08/2012	N001	-67.3	U		#	251	139
Yttrium-88	pCi/L	05/08/2012	N001	-1.48	U		#	6.14	3.45

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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Time-Concentration Graph

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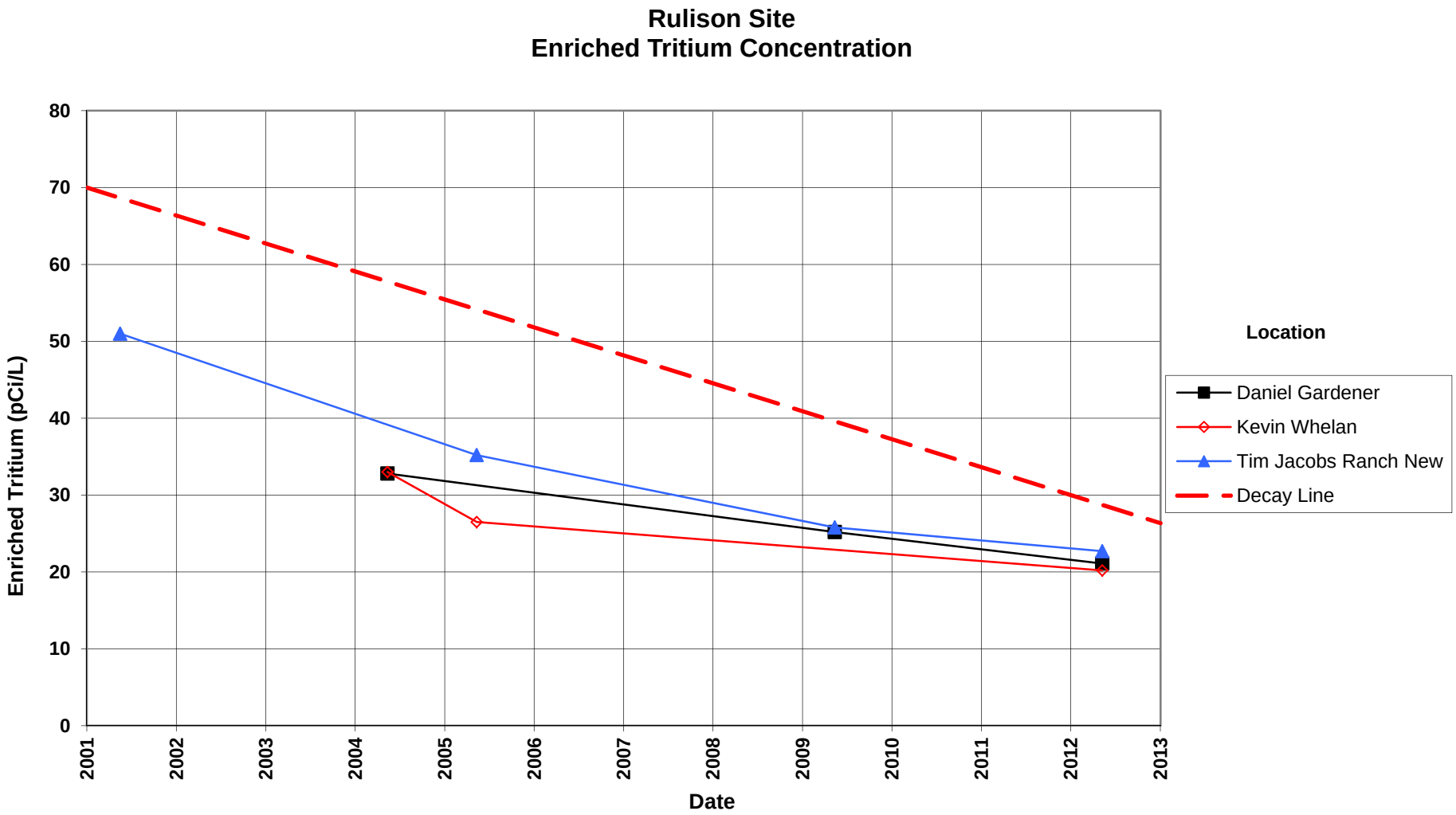
Rulison Site
Enriched Tritium Concentration
Enriched Tritium (pCi/L)
80
70
60
50
40
30
20
10
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
Daniel Gardener
Kevin Whelan
Tim Jacobs Ranch New
Decay Line

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Attachment 3
Sampling and Analysis Work Order

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Stoller

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Task Order LM00-502
Control Number 12-0537

April 9, 2012

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, S.M. Stoller Corporation (Stoller)
May 2012 Environmental Sampling at Rulison, Colorado, Site

REFERENCE: Task Order LM00-502-07-619, Rulison, Colorado, Site

Dear Mr. Kleinrath:

The purpose of this letter is to inform you of the upcoming sampling event at Rulison, Colorado. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Rulison 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 7, 2012.

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

Monitor Wells
Off-Site

CER Test Well	Daniel Gardener	Kevin Whelan	Morrissania Ranch
Patrick McCarty	Tim Jacobs Ranch New		

Municipal Water Supply
City Springs

Surface Water
On-Site

Spr 300 Yrd N of GZ	Sprg 500ft E of GZ

Off-Site

Battlement Creek	Potter Ranch

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.

The S.M. Stoller Corporation 2597 Legacy Way Grand Junction, CO 81503 (970) 248-6000 Fax (970) 248-6040

Please call me at (970) 248-6477 with any questions.

Sincerely,

Rick Hutton
Site lead

RH/lcg/dc

Enclosures (3)

cc: (electronic)
Karl Stoeckle, DOE
Steve Donivan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
Rick Hutton, Stoller
EDD Delivery
rc-grand.junction
File: RUL 410.02(A)

The S.M. Stoller Corporation 2597 Legacy Way Grand Junction, CO 81503 (970) 248-6000 Fax (970) 248-6040

Sampling Frequencies for Locations at Rulison, Colorado

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
Off-Site						
CER Test Well			X			
Daniel Gardener			X			
Kevin Whelan			X			
Morrissania Ranch			X			
Patrick McCarty			X			
Tim Jacobs Ranch New			X			
Municipal Water Supply						
City Springs			X			
Surface Locations						
On-Site						
Spr 300 Yrd N Of GZ			X			
Sprg 500ft E of GZ			X			
Off-Site						
Battlement Creek			X			
Potter Ranch			X			

Sampling conducted in May

Constituent Sampling Breakdown

Site	Rulison				
Analyte	Groundwater	Surface Water	Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Approx. No. Samples/yr	9	4			
Field Measurements					
Alkalinity					
Dissolved Oxygen					
Redox Potential					
pH	X	X			
Specific Conductance	X	X			
Turbidity	X				
Temperature	X	X			
Laboratory Measurements					
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 (NO3+NO2)-N					
Potassium					
Radium-226					
Radium-228					
Selenium					
Silica					
Sodium					
Strontium					
Sulfate					
Sulfide					
Total Dissolved Solids					
Total Organic Carbon					
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.

Attachment 4
Trip Report

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Stoller
Grand Junction Office
established 1959

Memorandum

Control Number N/A

DATE: May 17, 2012

TO: Rick Hutton

FROM: Jeff Price

SUBJECT: Trip Report (LTHMP Sampling)

Site: Rulison, CO

Dates of Sampling Event: May 8, 2012

Team Members: Lauren Goodknight, Rick Hutton, and Jeff Price.

Number of Locations Sampled: 6 wells and 3 surface water locations.

Locations Not Sampled/Reason: Springs 300 yards north of ground zero and 500 feet east of ground zero were not sampled because of access denial by the land owner.

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
2611	City Springs	Duplicate	Surface water	KFT 169

RIN Number Assigned: Samples were assigned to RIN 12044517.

Sample Shipment: Samples were shipped to GEL Laboratories on May 14, 2012.

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

Site Code	Well ID	Date	Time	DTW (ft)	Comments
RUL01	CER Test Well	5/08/2012	09:25	31.74	

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

Trip Summary

Lauren Goodknight, Rick Hutton, and Jeff Price drove from the Grand Junction office and sampled the Rulison site on Tuesday, May 8. All samples will be analyzed by GEL Laboratories for tritium and gamma spec; a select set of sample locations will also be analyzed for enriched tritium. Copies of the sample collection logs, field data sheets, and chain of custody documentation are maintained at the Grand Junction office. In general, the sampling trip went well, the weather was mild, and all samples were collected in accordance with the LM sampling and analysis plan. The following are notes and observations from the trip:

- Trash accumulation around the CER well is extensive. It appears that house hold goods are being dumped all around the wellhead and the site.
- Wesley Kent (local stakeholder that lives near GZ), came by the CER well during the sampling activities to see what was happening at the location. He mentioned that he would like a copy of the 2011 LTHM Report. He said that he would consider sampling of springs on his property. Mr. Kent was sent a link (at his request) to view the 2011 report.

Sample Locations

CER Test (private well)
Daniel Gardener (private well)
Kevin Whelan (private well)
Morrissania Ranch (private well)
Patrick McCarty (private well)
Tim Jacobs Ranch New (private well)
City Springs (spring)
Battlement Creek (creek)
Potter Ranch (spring)

(JP/lcg)

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