LMS/GNO/S00214

Data Validation Package

February 2014
Groundwater Sampling at the Gnome-Coach, New Mexico, Site

July 2014

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Sampling Event Summary

Site: Gnome-Coach, New Mexico, Site

Sampling Period: February 19, 2014

Annual sampling was conducted February 19, 2014, to monitor groundwater for potential radionuclide contamination at the Gnome-Coach site in New Mexico. The sampling was performed as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated). A duplicate sample was collected from well USGS-1 and water levels were measured in all the monitoring wells onsite. Refer to the sample location map for well locations.

Samples were analyzed by GEL Laboratories in Charleston, South Carolina. Samples were analyzed for gamma-emitting radionuclides by high-resolution gamma spectrometry, strontium-90, and tritium. The sample from well USGS-1 was analyzed for tritium using the enrichment method to achieve a lower minimum detectable concentration (MDC). Radionuclide contaminants were detected in wells USGS-4 and USGS-8. The detection of radionuclides in these wells was expected because the U.S. Geological Survey conducted a tracer test between these wells in 1963 using the dissolved radionuclides tritium, strontium-90, and cesium-137 as tracers. Radionuclide time-concentration graphs are included in this report for these wells.

Richard C. Findlay, Site Lead
The S.M. Stoller Corporation,
a wholly owned subsidiary of
Huntington Ingalls Industries

10-29-2014
Date

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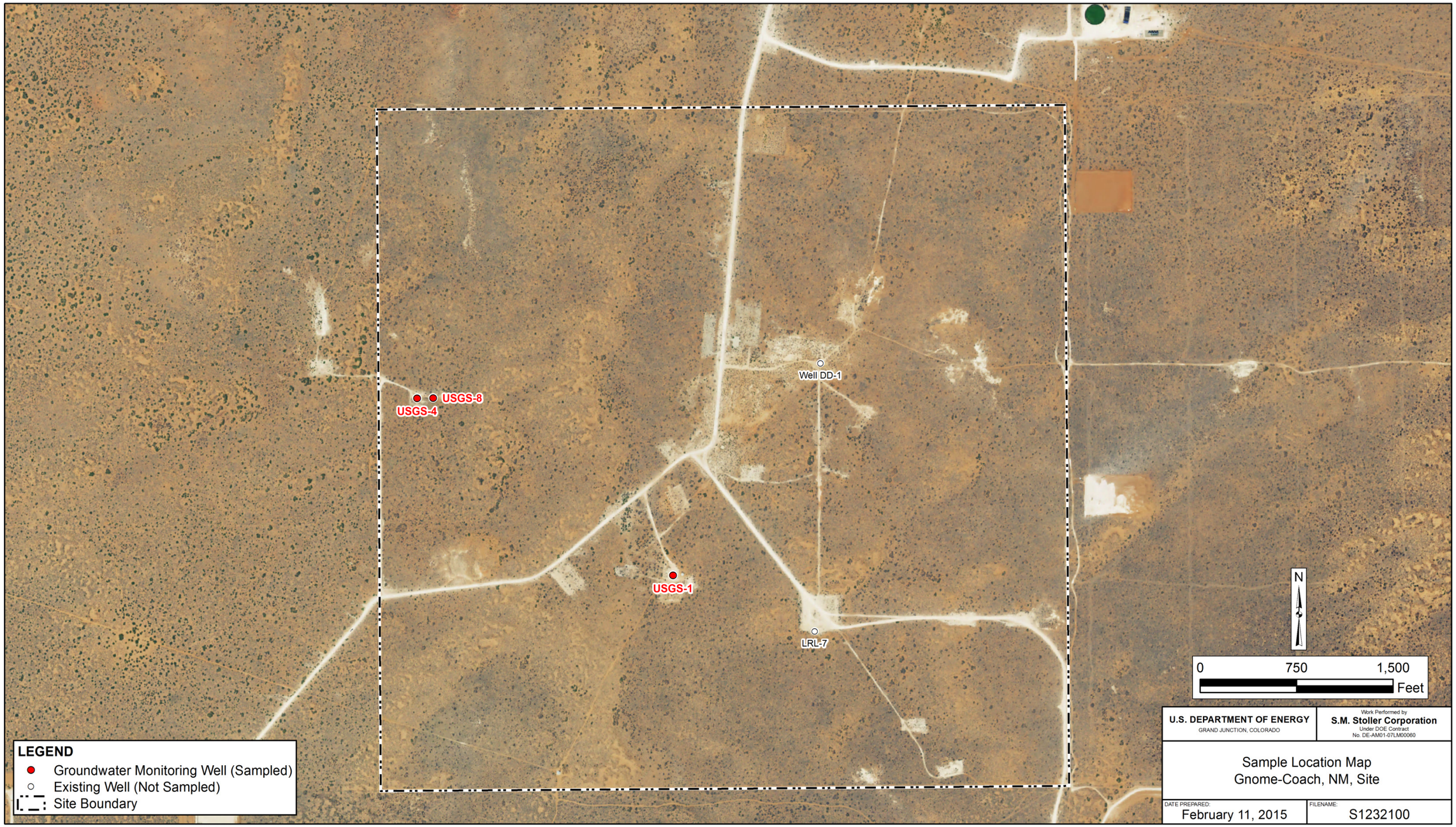

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Gnome-Coach, New Mexico, Sample Location Map

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Gnome-Coach, New Mexico	**Date(s) of Water Sampling**	February 19, 2014
Date(s) of Verification	June 10, 2014	**Name of Verifier**	Stephen Donivan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List any Program Directives or other documents, SOPs, instructions.		Work Order letter dated December 20, 2013. Program Directive GNO-2013-01.
2. Were the sampling locations specified in the planning documents sampled?	Yes	
3. Were calibrations conducted as specified in the above-named documents?	Yes	Calibrations were performed on February 14, 2014.
4. Was an operational check of the field equipment conducted daily?	Yes	
Did the operational checks meet criteria?	Yes	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Were wells categorized correctly?	Yes	The well categories are provided in the sampling protocol section on page 15.
7. Were the following conditions met when purging a Category I well:		
Was one pump/tubing volume purged prior to sampling?	NA	There were no Category I wells.
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?		

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 well USGS-1.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	Dedicated equipment was used to collect all samples.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were the true identities of the QC samples documented?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Was all pertinent information documented on the field data sheets?	Yes	
18. Was the presence or absence of ice in the cooler documented at every sample location?	NA	Sample cooling 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): 14015886
Sample Event: February 19, 2014
Site(s): Gnome-Coach Site
Laboratory: GEL Laboratories, Charleston, South Carolina
Work Order No.: 319540, 319582
Analysis: Radiochemistry
Validator: Steve Donivan
Review Date: May 31, 2013

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
Strontium-90	GPC-A-009	EPA 905.0, Modified	EPA 905.0, Modified
Tritium	LSC-A-001	EPA 906.0, Modified	EPA 906.0, Modified
Tritium, enrichment method	LMR-17	DOE EML HASL 300	DOE EML HASL 300

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 Number	Location	Analyte(s)	Flag	Reason
343670001	USGS-1	Strontium-90	J	Matrix spike recovery
343670004	USGS-1 Duplicate	Strontium-90	J	Matrix spike recovery

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received four water samples on February 26, 2014, accompanied by a Chain of Custody (COC) form. The air waybill numbers were listed on the Sample Receipt and Review Form. The COC form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The COC form was complete with no errors or omissions.

Preservation and Holding Times

The sample shipment was received intact at ambient temperature which complies with requirements. The 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

The method detection limit (MDL) was reported for all metal and wet chemical analytes as required. The MDL, as defined in 40 CFR 136, 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. The practical quantitation limit for these analytes is the lowest concentration that can be reliably measured, and is defined as 5 times the MDL.

For radiochemical analytes (those measured by radiometric counting) the MDL and practical quantitation limits are not applicable, and these results are evaluated using the 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 and of producing a linear curve. 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. Calibration and laboratory spike standards were prepared from independent sources.

Radiochemical Analysis

Gamma Spectrometry
Annual calibration of the detectors used to analyze these samples was performed between July 9 and November 14, 2013. Daily calibration checks were performed on February 28, 2014. Sample USGS-8 was recounted on March 12, 2014, to verify results. The recount verified initial analysis and the initial analysis was reported.

Tritium
The tritium quench calibration curve was generated on August 1, 2013, for quench numbers ranging from 577 to 731. Sample quench values were within the calibration range for all samples. Daily calibration checks were performed on March 14 and April 21, 2014.

Strontium-90
Annual calibration of the detectors used to analyze these samples was performed on March 1, 2013. Daily calibration checks were performed on March 31, 2014.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. The radiochemistry method blank results were less than the DLC.

Matrix Spike Analysis

Matrix spike samples are used to measure method performance in the sample matrix. The matrix spike data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike. The strontium-90 matrix spike prepared from sample USGS-1 did not meet the recovery acceptance criteria. The associated sample and duplicate strontium-90 results are qualified with a "J" flag as estimated values.

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 3, 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. The analytical report included the MDCs for all analytes and all required supporting documentation.

Electronic Data Deliverable (EDD) File

The EDD file arrived on May 27, 2014. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

SAMPLE MANAGEMENT SYSTEM

General Data Validation Report

RIN: 14015886 **Lab Code:** GEN **Validator:** Stephen Donivan **Validation Date:** 06/10/2014

Project: Gnome-Coach Site **Analysis Type:** ☐ Metals ☐ General Chem ☑ Rad ☐ Organics

# of Samples: 4 **Matrix:** Water **Requested Analysis Completed:** Yes

Chain of Custody

Present: OK **Signed:** OK **Dated:** OK

Sample

Integrity: OK **Preservation:** OK **Temperature:** OK

Select Quality Parameters

☑ Holding Times	All analyses were completed within the applicable holding times.
☑ Detection Limits	There are 0 detection limit failures.
☐ Field/Trip Blanks	
☑ Field Duplicates	There was 1 duplicate evaluated.

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 14015886 **Lab Code:** GEN **Date Due:** 05/27/2014

Matrix: Water **Site Code:** GNO01 **Date Completed:** 05/27/2014

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
USGS-1	Actinium-228	02/28/2014						2.28
USGS-1	Americium-241	02/28/2014						1.01
Blank_Spike	Americium-241	02/28/2014				110.00		
USGS-1	Antimony-125	02/28/2014						1.29
USGS-1	Cerium-144	02/28/2014						1.92
Blank_Spike	Cerium-144	02/28/2014						
USGS-1	Cesium-134	02/28/2014						0.12
USGS-1	Cesium-137	02/28/2014						1.35
Blank_Spike	Cesium-137	02/28/2014				99.10		
USGS-1	Cobalt-60	02/28/2014						1.73
Blank_Spike	Cobalt-60	02/28/2014				101.00		
USGS-1	Europium-152	02/28/2014						0.84
USGS-1	Europium-154	02/28/2014						1.07
Blank_Spike	Europium-154	02/28/2014						
USGS-1	Europium-155	02/28/2014						0.80
USGS-1	Lead-212	02/28/2014						0.64
Blank_Spike	Lead-212	02/28/2014						
USGS-1	Potassium-40	02/28/2014						0.85
USGS-1	Promethium-144	02/28/2014						1.14
Blank_Spike	Promethium-144	02/28/2014						
USGS-1	Promethium-146	02/28/2014						1.86
USGS-1	Ruthenium-106	02/28/2014						1.38
Blank_Spike	Ruthenium-106	02/28/2014						
2443	Strontium-90	03/31/2014			32.0			
USGS-1	Strontium-90	03/31/2014			34.0			
USGS-4	Strontium-90	03/31/2014			32.0			
USGS-8	Strontium-90	03/31/2014			34.0			
Blank_Spike	Strontium-90	03/31/2014			78.0	122.00		
2443	Strontium-90	03/31/2014			38.0		57.9	
Blank	Strontium-90	03/31/2014	-0.0400	U	80.0			
2443	Strontium-90	04/01/2014			30.0			1.27
USGS-1	Thorium-234	02/28/2014						0.16

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 14015886 **Lab Code:** GEN **Date Due:** 05/27/2014

Matrix: Water **Site Code:** GNO01 **Date Completed:** 05/27/2014

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
Blank	Tritium	03/14/2014	51.0000	U				
USGS-4	Tritium	03/14/2014						0.13
Blank_Spike	Tritium	03/14/2014				101.00		
USGS-4	Tritium	03/14/2014					75.7	
USGS-1	Tritium	04/21/2014			66.0			
Blank_Spike	Tritium	04/21/2014			66.0	99.60		
Blank	Tritium	04/21/2014	0.8000	U	66.0			
USGS-1	Uranium-235	02/28/2014						0.31
Blank_Spike	Uranium-235	02/28/2014						
USGS-1	Uranium-238	02/28/2014						0.16
USGS-1	Yttrium-88	02/28/2014						0.85
Blank_Spike	Yttrium-88	02/28/2014						

Sampling Quality Control Assessment

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

Sampling Protocol

Wells USGS-4 and USGS-8 were sampled using dedicated bladder pumps. Data from these wells are qualified with an "F" flag in the database indicating the well was purged and sampled using the low-flow sampling method, and with a "Q" because these are Category II wells. Well USGS-1 was sampled with a high flow dedicated submersible pump. The data from this well were not qualified.

Equipment Blank Assessment

An equipment blank was not required

Field Duplicate Assessment

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. A duplicate sample was collected from location USGS-1. For radiochemical measurements, the relative error ratio (the ratio of the absolute difference between the sample and duplicate results and the sum of the 1-sigma uncertainties) is used to evaluate duplicate results and should be less than 3. All duplicate results met these criteria demonstrating 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: Stephen Donivan — Stephen Donivan — 10-29-2014 — Date

Data Validation Lead: Stephen Donivan — Stephen Donivan — 10-29-2014 — Date

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 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 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. The review should include an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

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

Data Validation Outliers Report - No Field Parameters
Comparison: All historical Data Beginning 01/01/2008
Laboratory: GEL Laboratories
RIN: 14015886
Report Date: 06/10/2014

					Current			Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
						Qualifiers			*Qualifiers*			*Qualifiers*				
Site Code	Location Code	Sample ID	Sample Date	Analyte	Result	*Lab*	*Data*	Result	*Lab*	*Data*	Result	*Lab*	*Data*	N	N Below Detect	
GNO01	USGS-4	N001	02/19/2014	Tritium	7680		FQ	22300			9110		FQ	6	0	No
GNO01	USGS-8	N001	02/19/2014	Tritium	18400		FQ	30000			20900		FQ	6	0	No

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

Attachment 2
Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 06/10/2014
Location: USGS-1 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	02/19/2014	N001	-17.5	U		#	25.9	18.5
Actinium-228	pCi/L	02/19/2014	N002	3.68	U		#	21	17.1
Alkalinity, Total (as $CaCO_3$)	mg/L	02/19/2014	N001	180			#		
Americium-241	pCi/L	02/19/2014	N001	7.63	U		#	40	24
Americium-241	pCi/L	02/19/2014	N002	-6.66	U		#	18.8	12.6
Antimony-125	pCi/L	02/19/2014	N001	1.87	U		#	15.9	8.78
Antimony-125	pCi/L	02/19/2014	N002	-2.17	U		#	12.6	7.27
Cerium-144	pCi/L	02/19/2014	N001	-24.3	U		#	38.7	27.3
Cerium-144	pCi/L	02/19/2014	N002	2.2	U		#	31.6	18.2
Cesium-134	pCi/L	02/19/2014	N001	0.767	U		#	6.77	3.61
Cesium-134	pCi/L	02/19/2014	N002	1.17	U		#	5.51	2.87
Cesium-137	pCi/L	02/19/2014	N001	4.49	U		#	5.68	4.26
Cesium-137	pCi/L	02/19/2014	N002	-1.54	U		#	4.81	2.97
Cobalt-60	pCi/L	02/19/2014	N001	4.76	U		#	7.21	3.81
Cobalt-60	pCi/L	02/19/2014	N002	-.0483	U		#	5.21	2.71
Dissolved Oxygen	mg/L	02/19/2014	N001	2.16			#		
Europium-152	pCi/L	02/19/2014	N001	7.66	U		#	20.1	11.3
Europium-152	pCi/L	02/19/2014	N002	-1.09	U		#	14.7	8.31

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 06/10/2014
Location: USGS-1 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Europium-154	pCi/L	02/19/2014	N001	0.311	U		#	19.6	10.4
Europium-154	pCi/L	02/19/2014	N002	4.12	U		#	14.2	7.69
Europium-155	pCi/L	02/19/2014	N001	1.2	U		#	20.3	11.4
Europium-155	pCi/L	02/19/2014	N002	3.68	U		#	17.3	9.84
Lead-212	pCi/L	02/19/2014	N001	5.7	U		#	9.83	7.87
Lead-212	pCi/L	02/19/2014	N002	5.06	U		#	8.73	5.51
Oxidation Reduction Potential	mV	02/19/2014	N001	235			#		
pH	s.u.	02/19/2014	N001	7.05			#		
Potassium-40	pCi/L	02/19/2014	N001	22	U		#	66.2	62.3
Potassium-40	pCi/L	02/19/2014	N002	17.4	U		#	39.7	33
Promethium-144	pCi/L	02/19/2014	N001	0.0642	U		#	5.31	2.86
Promethium-144	pCi/L	02/19/2014	N002	2.38	U		#	5.06	2.72
Promethium-146	pCi/L	02/19/2014	N001	2.85	U		#	7.82	4.32
Promethium-146	pCi/L	02/19/2014	N002	1.42	U		#	6.56	3.62
Ruthenium-106	pCi/L	02/19/2014	N001	-8.9	U		#	54.9	30.9
Ruthenium-106	pCi/L	02/19/2014	N002	23.6	U		#	48.2	26
Specific Conductance	umhos /cm	02/19/2014	N001	4530			#		
Strontium-90	pCi/L	02/19/2014	N001	0.0963	U	J	#	0.987	0.541

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 06/10/2014
Location: USGS-1 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Strontium-90	pCi/L	02/19/2014	N002	0.777	U	J	#	1.08	0.669
Temperature	C	02/19/2014	N001	22.9			#		
Thorium-234	pCi/L	02/19/2014	N001	69.1	U		#	393	303
Thorium-234	pCi/L	02/19/2014	N002	-14.4	U		#	199	122
Tritium	pCi/L	02/19/2014	N001	0.0846	U		#	2.4	1.36
Tritium	pCi/L	02/19/2014	N002	186	U		#	298	183
Turbidity	NTU	02/19/2014	N001	5.15			#		
Uranium-235	pCi/L	02/19/2014	N001	0.358	U		#	42.7	25.9
Uranium-235	pCi/L	02/19/2014	N002	8.44	U		#	30.4	21.7
Uranium-238	pCi/L	02/19/2014	N001	69.1	U		#	393	303
Uranium-238	pCi/L	02/19/2014	N002	-14.4	U		#	199	122
Yttrium-88	pCi/L	02/19/2014	N001	0.761	U		#	7.77	3.83
Yttrium-88	pCi/L	02/19/2014	N002	0.309	U		#	5.92	2.9

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 06/10/2014
Location: USGS-4 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	02/19/2014	N001	11.2	U	FQ	#	27.7	14.3
Alkalinity, Total (as $CaCO_3$)	mg/L	02/19/2014	N001	90		FQ	#		
Americium-241	pCi/L	02/19/2014	N001	24	U	FQ	#	59.7	37.9
Antimony-125	pCi/L	02/19/2014	N001	-5.33	U	FQ	#	14.1	8.49
Cerium-144	pCi/L	02/19/2014	N001	-6.29	U	FQ	#	39.6	23.1
Cesium-134	pCi/L	02/19/2014	N001	1.19	U	FQ	#	6.37	3.76
Cesium-137	pCi/L	02/19/2014	N001	1.46	U	FQ	#	5.85	3.01
Cobalt-60	pCi/L	02/19/2014	N001	-3.17	U	FQ	#	4.49	3.23
Dissolved Oxygen	mg/L	02/19/2014	N001	2.76		FQ	#		
Europium-152	pCi/L	02/19/2014	N001	2.7	U	FQ	#	16.1	8.98
Europium-154	pCi/L	02/19/2014	N001	5.16	U	FQ	#	16.5	8.51
Europium-155	pCi/L	02/19/2014	N001	9.11	U	FQ	#	27.4	15.7
Lead-212	pCi/L	02/19/2014	N001	6.13	U	FQ	#	10.7	6.94
Oxidation Reduction Potential	mV	02/19/2014	N001	-60		FQ	#		
pH	s.u.	02/19/2014	N001	6.81		FQ	#		
Potassium-40	pCi/L	02/19/2014	N001	24.5	U	FQ	#	46.4	43.1
Promethium-144	pCi/L	02/19/2014	N001	-2.82	U	FQ	#	4.46	3.07
Promethium-146	pCi/L	02/19/2014	N001	-3.65	U	FQ	#	6.06	4.02

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 06/10/2014
Location: USGS-4 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Ruthenium-106	pCi/L	02/19/2014	N001	-10.5	U	FQ	#	44.5	29.8
Specific Conductance	umhos /cm	02/19/2014	N001	5850		FQ	#		
Strontium-90	pCi/L	02/19/2014	N001	1780		FQ	#	0.986	295
Temperature	C	02/19/2014	N001	21.8		FQ	#		
Thorium-234	pCi/L	02/19/2014	N001	243	U	FQ	#	492	391
Tritium	pCi/L	02/19/2014	N001	7680		FQ	#	300	1560
Turbidity	NTU	02/19/2014	N001	8.43		FQ	#		
Uranium-235	pCi/L	02/19/2014	N001	-7.95	U	FQ	#	40.2	25
Uranium-238	pCi/L	02/19/2014	N001	243	U	FQ	#	492	391
Yttrium-88	pCi/L	02/19/2014	N001	1.03	U	FQ	#	7.99	3.92

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 06/10/2014
Location: USGS-8 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	02/19/2014	N001	-7.69	U	FQ	#	21.5	13
Alkalinity, Total (as $CaCO_3$)	mg/L	02/19/2014	N001	30		FQ	#		
Americium-241	pCi/L	02/19/2014	N001	5.02	U	FQ	#	42	27.5
Antimony-125	pCi/L	02/19/2014	N001	4.16	U	FQ	#	20.1	11.1
Cerium-144	pCi/L	02/19/2014	N001	-7.83	U	FQ	#	46.4	27.9
Cesium-134	pCi/L	02/19/2014	N001	-1.22	U	FQ	#	5.44	3.17
Cesium-137	pCi/L	02/19/2014	N001	176		FQ	#	5.79	19.7
Cobalt-60	pCi/L	02/19/2014	N001	0	U	FQ	#	5.71	0
Dissolved Oxygen	mg/L	02/19/2014	N001	2.11		FQ	#		
Europium-152	pCi/L	02/19/2014	N001	-11	U	FQ	#	19	12.4
Europium-154	pCi/L	02/19/2014	N001	-.848	U	FQ	#	15.1	7.79
Europium-155	pCi/L	02/19/2014	N001	-7.62	U	FQ	#	25.7	18
Lead-212	pCi/L	02/19/2014	N001	2.97	U	FQ	#	13.2	9.21
Oxidation Reduction Potential	mV	02/19/2014	N001	-125		FQ	#		
pH	s.u.	02/19/2014	N001	7.32		FQ	#		
Potassium-40	pCi/L	02/19/2014	N001	1.85	U	FQ	#	73	36
Promethium-144	pCi/L	02/19/2014	N001	2.43	U	FQ	#	5.51	2.93
Promethium-146	pCi/L	02/19/2014	N001	-2.41	U	FQ	#	8.53	5.07
Ruthenium-106	pCi/L	02/19/2014	N001	-5.4	U	FQ	#	49.5	27.8

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 06/10/2014
Location: USGS-8 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Specific Conductance	umhos /cm	02/19/2014	N001	5680		FQ	#		
Strontium-90	pCi/L	02/19/2014	N001	1640		FQ	#	0.986	261
Temperature	C	02/19/2014	N001	22.2		FQ	#		
Thorium-234	pCi/L	02/19/2014	N001	313	U	FQ	#	339	443
Tritium	pCi/L	02/19/2014	N001	18400		FQ	#	299	3640
Turbidity	NTU	02/19/2014	N001	9.13		FQ	#		
Uranium-235	pCi/L	02/19/2014	N001	-7.7	U	FQ	#	47.7	28.7
Uranium-238	pCi/L	02/19/2014	N001	313	U	FQ	#	339	443
Yttrium-88	pCi/L	02/19/2014	N001	-1.73	U	FQ	#	6.27	3.64

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.

Static Water Level Data

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STATIC WATER LEVELS (USEE700) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 06/10/2014

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Time	Date	Depth From Top of Casing (Ft)	Water Elevation (Ft)
USGS-1		3425.78	02/19/2014	12:30:34	439.90	2985.7
USGS-4		3415.25	02/19/2014	13:00:46	427.12	2988.13
USGS-8		3412.96	02/19/2014	13:45:45	420.02	2992.94

FLOW CODES: B BACKGROUND C CROSS GRADIENT D DOWN GRADIENT F OFFSITE
N UNKNOWN O ONSITE U UPGRADIENT

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Time-Concentration Graphs

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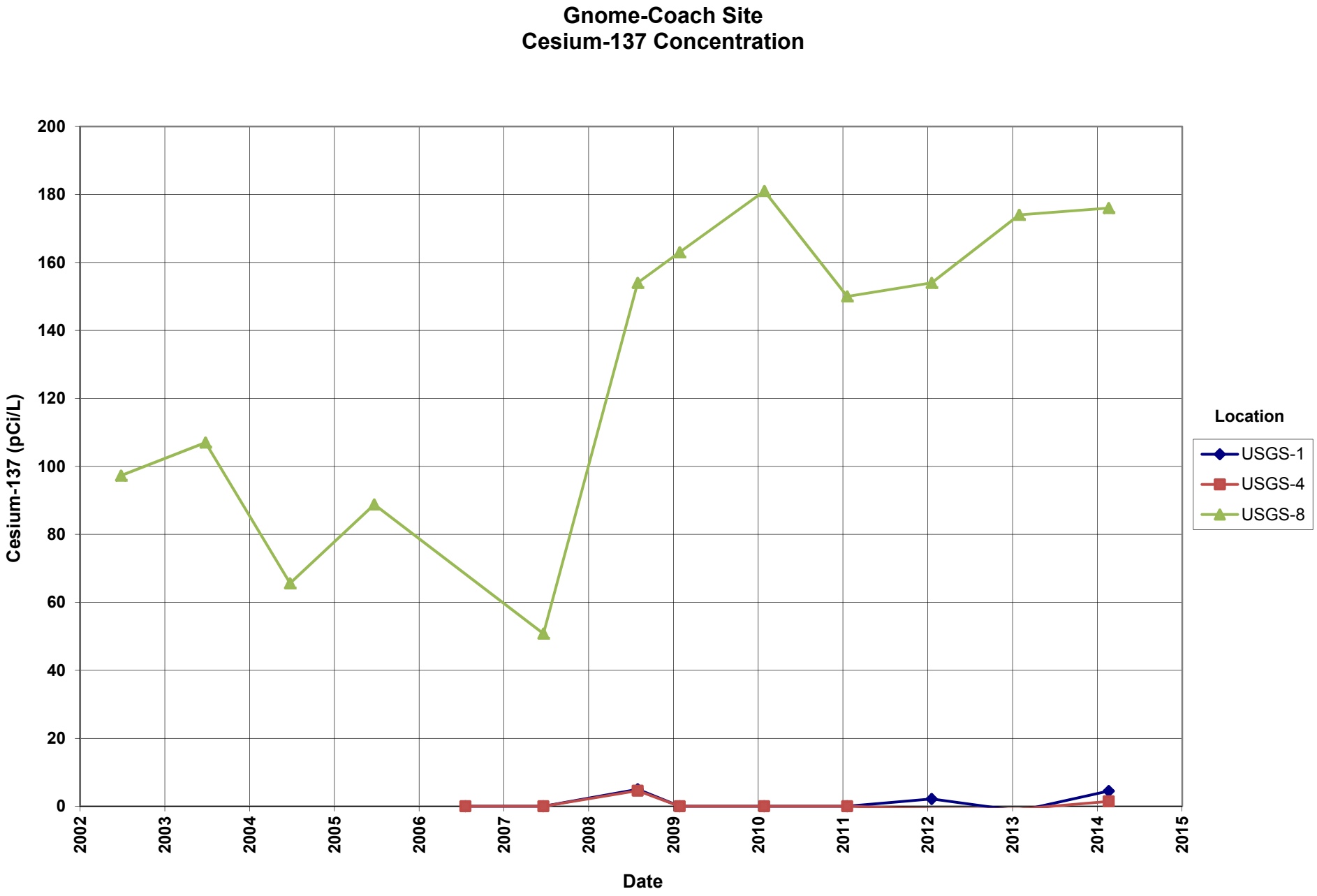
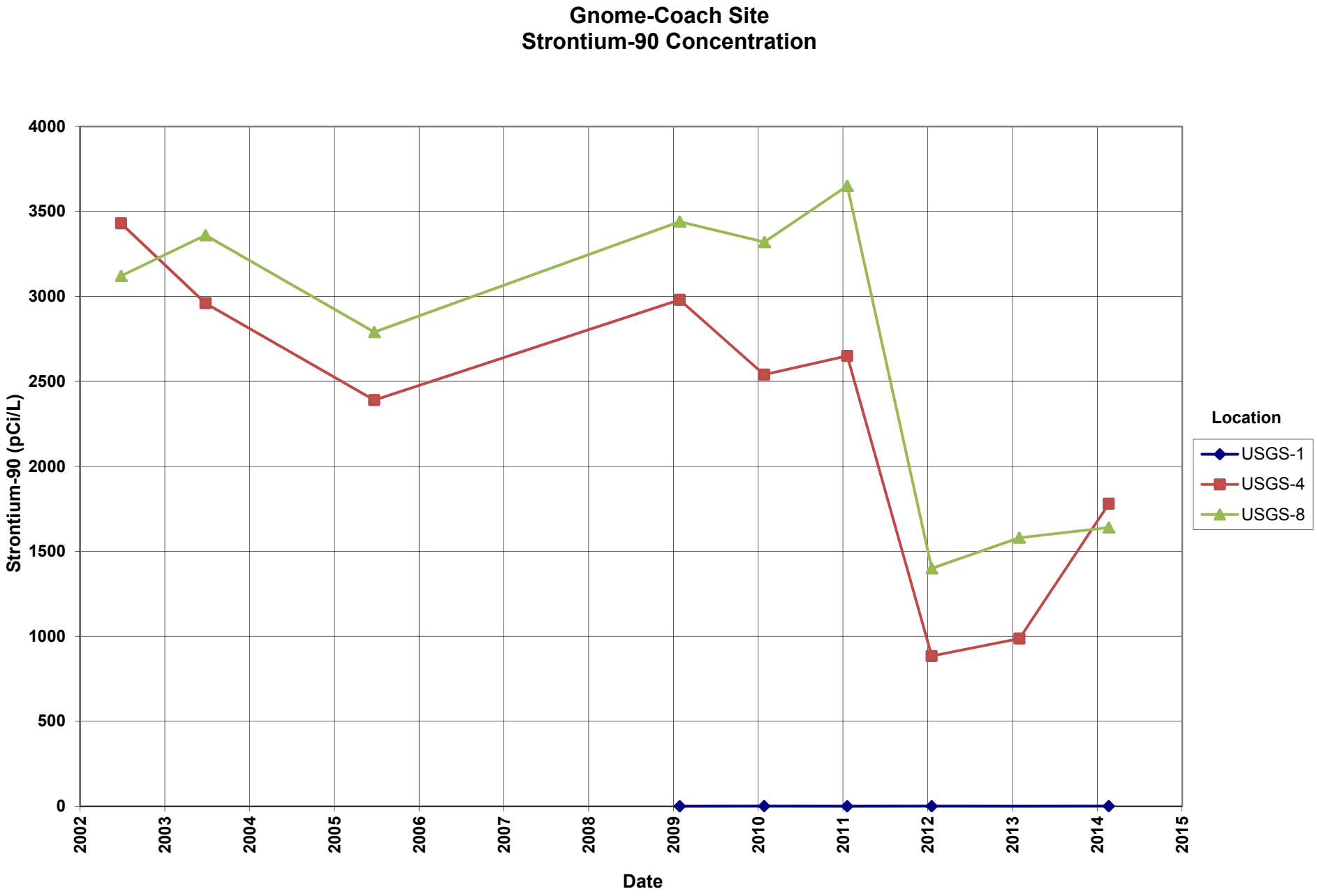

Gnome-Coach Site
Cesium-137 Concentration
Cesium-137 (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Date
Location
USGS-1
USGS-4
USGS-8


Gnome-Coach Site
Strontium-90 Concentration
Strontium-90 (pCi/L)
4000
3500
3000
2500
2000
1500
1000
500
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Date
Location
USGS-1
USGS-4
USGS-8

Gnome-Coach Site
Tritium Concentration
70000
60000
50000
40000
30000
20000
10000
0
Tritium (pCi/L)
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Date
Location
USGS-1
USGS-4
USGS-8

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Attachment 3
Sampling and Analysis Work Order

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Task Order LM00-502
Control Number 14-0212

December 20, 2013

U. S. Department of Energy
Office of Legacy Management
ATTN: Jalena Dayvault
Site Lead
2597 Legacy Way
Grand Junction, CO 81503

SUBJECT: Contract No. DE-AM01-07LM00060, S. M. Stoller Corporation (Stoller)
Task Order LM00-502 – Other Defense Activities – Other Sites
January 2014 Environmental Sampling at the Gnome-Coach, New Mexico, Site

REFERENCE: LM-502-07-617, Gnome-Coach, New Mexico, Site

Dear Ms. Dayvault:

The purpose of this letter is to inform you of the upcoming sampling event at the Gnome-Coach, New Mexico, site. Enclosed are the map and tables specifying sample locations and analytes for routine monitoring. Water quality data will be collected from monitoring wells at the site as part of the routine environmental sampling scheduled to begin the week of January 27, 2014.

The following list shows the monitoring wells scheduled to be sampled during this event.

Monitoring Wells
USGS-1 USGS-4 USGS-8

All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. Well and property owners have been notified of the scheduled sampling event.

If you have any questions, please call me at 970-248-6419.

Sincerely,

Richard C. Findlay
Rick C. Findlay
2013.12.19 16:41:19
-07'00'

Richard C. Findlay
Site Lead

RF/lcg/dc
Enclosures (3)

cc: (electronic)
Christina Pennal, DOE
Steve Donivan, Stoller
Rick Findlay, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
Rick Hutton, Stoller
EDD Delivery
rc-grand.junction
File: GNO 410.02(A)

Sampling Frequencies for Locations at Gnome-Coach, New Mexico

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
LRL-7					X	Bladder pump; not sampled per R. Findlay, 1/11/12
USGS-1			X			Electric pump
USGS-4			X			Bladder pump
USGS-8			X			Bladder pump

Annual sampling conducted in January

Constituent Sampling Breakdown

Site	Gnome-Coach				
Analyte	**Groundwater**	**Surface Water**	**Required Detection Limit (mg/L)**	**Analytical Method**	**Line Item Code**
Approx. No. Samples/yr	3	0			
Field Measurements					
Alkalinity	X				
Dissolved Oxygen	X				
Redox Potential	X				
pH	X				
Specific Conductance	X				
Turbidity	X				
Temperature	X				
Laboratory Measurements					
Aluminum					
Ammonia as N (NH_3-N)					
Calcium					
Chloride					
Chromium					
Gamma Spec	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-90	X		1 pCi/L	Gas Proportional Counter	GPC-A-009
Sulfate					
Sulfide					
Total Dissolved Solids					
Total Organic Carbon					
Tritium	X		400 pCi/L	Liquid Scintillation	LSC-A-001

Constituent Sampling Breakdown

Site	Gnome-Coach				
Analyte	**Groundwater**	**Surface Water**	**Required Detection Limit (mg/L)**	**Analytical Method**	**Line Item Code**
Approx. No. Samples/yr	3	0			
Laboratory Measurements (continued)					
Enriched Tritium	USGS-1 only		10 pCi/L	Liquid Scintillation	LMR-15
Uranium					
Vanadium					
Zinc					
Total No. of Analytes	4	0			

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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Grand Junction Office
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Memorandum

Control Number N/A

DATE: February 26, 2013

TO: Rick Findlay

FROM: Jeff Price

SUBJECT: Trip Report (LTHMP Sampling)

Site: Gnome/Coach, NM

Dates of Sampling Event: February 19, 2014

Team Members: Joe Treviño and Jeff Price.

Number of Locations Sampled/Analysis: Samples collected from 3 onsite monitoring wells will be analyzed for gamma spectrometry, tritium, enriched tritium (USGS-1 only), and strontium-90. Samples were collected and monitoring well purge water was contained as specified in the program directive.

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
2443	USGS-1	Duplicate	Groundwater	MCY 568

RIN Number Assigned: RIN 14015886.

Sample Shipment: Samples were shipped to GEL Laboratories on February 24, 2014.

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

Site Code	Well ID	Date	DTW (ft)	Comments
GNO01	LRL-7	2/18/2014	463.03	Well not sampled
GNO01	LRL-7	2/19/2014	463.04	Well not sampled
GNO01	USGS-1	2/18/2014	440.08	Pump running
GNO01	USGS-1	2/19/2014	439.90	Pump running
GNO01	USGS-4	2/18/2014	427.25	
GNO01	USGS-4	2/19/2014	427.12	
GNO01	USGS-8	2/18/2014	420.15	
GNO01	USGS-8	2/19/2014	420.02	

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

Site Specific Information: A locking steel protective box was installed over the DD-1 well casing (similar to the other wells at the site). A land surveyor was onsite (February 18-19) to survey the well heads and provide top-of-casing elevations for the monitoring wells onsite.

cc: (electronic)
Jalena Dayvault, DOE
Steve Donivan, Stoller
EDD Delivery