

Data Validation Package

January 2012
Groundwater Sampling at the
Gnome-Coach, New Mexico, Site

December 2012



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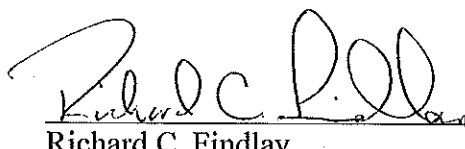
Sampling Event Summary

Site: Gnome-Coach, New Mexico, Site

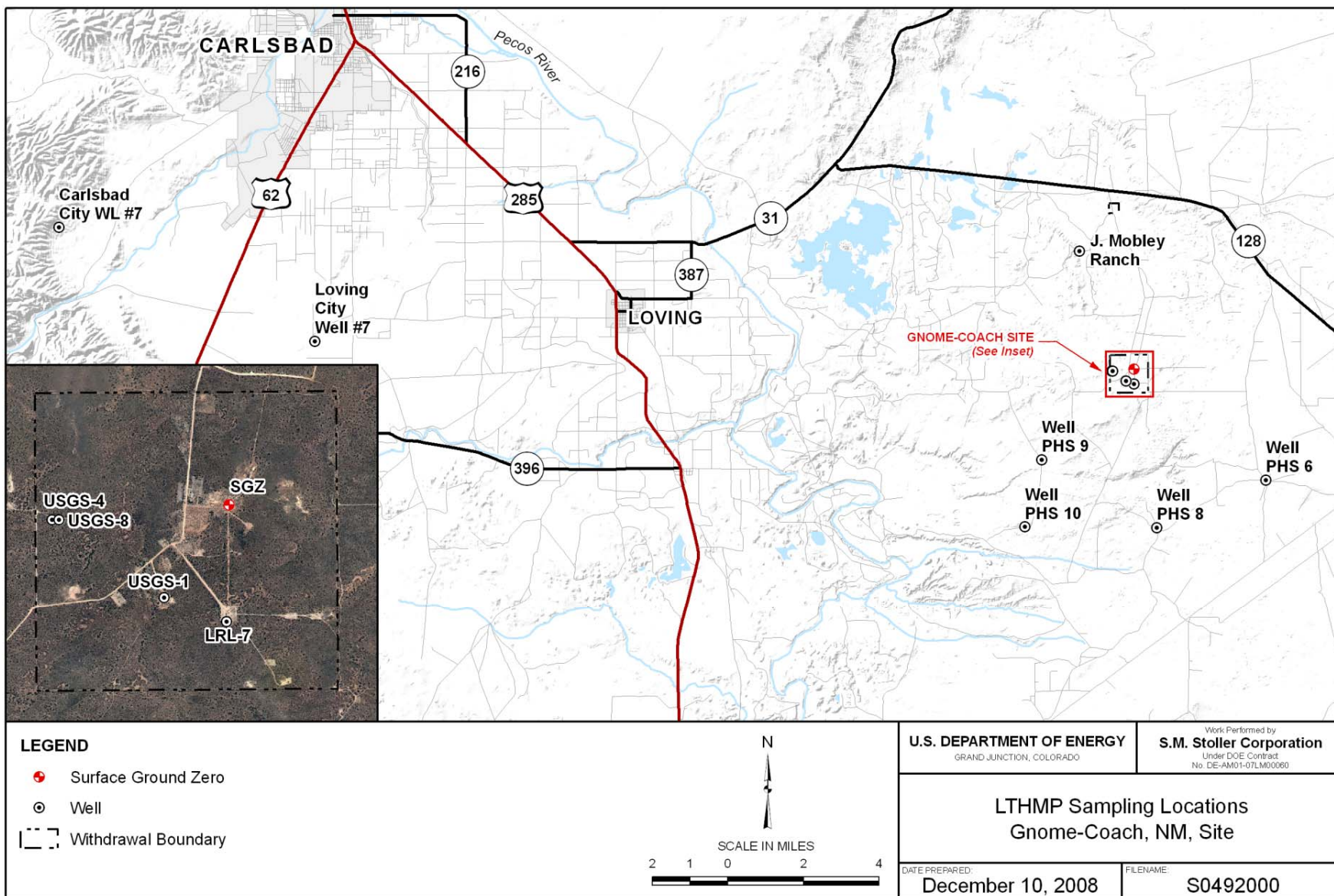
Sampling Period: January 18, 2012

Annual sampling was conducted January 18, 2012, 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/PLN/S04351, continually updated). Well LRL-7 was not sampled per instruction from the site lead. 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 the GEL Laboratories in Charleston, South Carolina. Samples were analyzed for gamma-emitting radionuclides by high-resolution gamma spectrometry, strontium-90, and tritium. Additionally sample 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, S.M. Stoller Corporation

12-21-2012
Date



M:\LTS\111\0080\06\000\S04920\S0492000.mxd coatesc 12/10/2008 11:13:09 AM

Gnome-Coach Sample Location Map

Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Gnome-Coach, New Mexico	Date(s) of Water Sampling	January 18, 2012
Date(s) of Verification	June 1, 2012	Name of Verifier	Steve Donovan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures? List other documents, SOPs, instructions.	Yes	Work Order letter dated December 20, 2011.
2. Were the sampling locations specified in the planning documents sampled?	No	Well LRL-7 was not sampled per instruction from the site lead.
3. Was a pre-trip calibration conducted as specified in the above-named documents?	Yes	Pre-trip calibration was performed on January 13, 2012.
4. Was an operational check of the field equipment conducted daily? Did the operational checks meet criteria?	Yes Yes	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	No	Dissolved oxygen and turbidity were not measured at well USGS-1.
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? 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?	NA NA	Wells were Category II or IV.

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 nondedicated equipment?	NA	Dedicated equipment was used at all locations.
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	
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	Samples did not require cooling.
20. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Report Number (RIN): 12014297, 12014298
Sample Event: January 18, 2012
Site(s): Gnome-Coach, New Mexico, Site
Laboratory: GEL Laboratories, Charleston, South Carolina
Work Order No.: 294654, 294648
Analysis: Radiochemistry
Validator: Steve Donovan
Review Date: June 1, 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
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	HASL 300, Modified	HASL 300, Modified

Data Qualifier Summary

None of the sample results required additional qualification.

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received four water samples on January 18, 2012, 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. 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

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 limit 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 August and November 2011. Daily calibration checks were performed on February 3, 2012.

Tritium

The tritium quench calibration curve was generated on July 31, 2011, for quench numbers ranging from 567 to 758. Sample quench values were within the calibration range for all samples. Daily calibration checks were performed on January 31 and March 4, 2012.

Strontium-90

Annual calibration of the detectors used to analyze these samples was performed on March 1, 2011. Daily calibration checks were performed on February 8 and 16, 2012.

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 (MS) samples are used to measure method performance in the sample matrix. The MS data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike. The spike recoveries met the acceptance criteria for all analytes evaluated.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. 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. The relative error ratio for the replicate results 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 MDC for all analytes and all required supporting documentation.

Electronic Data Deliverable (EDD) File

The EDD files arrived on February 22 and April 21, 2012. The Sample Management System EDD validation module was used to verify that the EDD files were complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

SAMPLE MANAGEMENT SYSTEM

General Data Validation Report

RIN: 12014297 Lab Code: GEN Validator: Steve Donovan Validation Date: 3/16/2012
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
- ☒ Detection Limits
- ☐ Field/Trip Blanks
- ☒ Field Duplicates

All analyses were completed within the applicable holding times.

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

There was 1 duplicate evaluated.

SAMPLE MANAGEMENT SYSTEM

Radiochemistry Data Validation Worksheet

Page 1 of 2

RIN: 12014297 Lab Code: GEN Date Due: 2/21/2012
 Matrix: Water Site Code: GNO Date Completed: 2/22/2012

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
USGS-1	Actinium-228	02/04/2012						1.59
USGS-1	Americium-241	02/04/2012						1.25
Blank_Spike	Americium-241	02/04/2012				118.00		
USGS-1	Antimony-125	02/04/2012						0.71
USGS-1	Cerium-144	02/04/2012						0.73
Blank_Spike	Cerium-144	02/04/2012						
USGS-1	Cesium-134	02/04/2012						0.35
USGS-1	Cesium-137	02/04/2012						2.73
Blank_Spike	Cesium-137	02/04/2012				102.00		
USGS-1	Cobalt-60	02/04/2012						1.29
Blank_Spike	Cobalt-60	02/04/2012				103.00		
USGS-1	Europium-152	02/04/2012						0.65
USGS-1	Europium-154	02/04/2012						0.46
Blank_Spike	Europium-154	02/04/2012						
USGS-1	Europium-155	02/04/2012						1.80
USGS-1	Lead-212	02/04/2012						0.32
Blank_Spike	Lead-212	02/04/2012						
USGS-1	Potassium-40	02/04/2012						1.66
USGS-1	Promethium-144	02/04/2012						1.83
Blank_Spike	Promethium-144	02/04/2012						
USGS-1	Promethium-146	02/04/2012						1.32
USGS-1	Ruthenium-106	02/04/2012						1.41
Blank_Spike	Ruthenium-106	02/04/2012						
2858	Strontium-90	02/08/2012			94.0			
USGS-1	Strontium-90	02/08/2012			108.0			
Blank_Spike	Strontium-90	02/08/2012			86.0	119.00		
0601	Strontium-90	02/08/2012			88.0		96.8	
Blank	Strontium-90	02/08/2012	0.5720	U	88.0			
0601	Strontium-90	02/14/2012			91.0			
USGS-4	Strontium-90	02/16/2012			87.0			
USGS-8	Strontium-90	02/16/2012			87.0			
USGS-1	Thorium-234	02/04/2012						0.87

SAMPLE MANAGEMENT SYSTEM

Radiochemistry Data Validation Worksheet

Page 2 of 2

RIN: 12014297 **Lab Code:** GEN **Date Due:** 2/21/2012
Matrix: Water **Site Code:** GNO **Date Completed:** 2/22/2012

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
USGS-1	Tritium	01/31/2012						0
Blank_Spike	Tritium	01/31/2012				89.60		
USGS-1	Tritium	01/31/2012					75.9	
Blank	Tritium	01/31/2012	-20.2000	U				
USGS-1	Uranium-235	02/04/2012						0.23
Blank_Spike	Uranium-235	02/04/2012						
USGS-1	Uranium-238	02/04/2012						0.87
USGS-1	Yttrium-88	02/04/2012						1.12
Blank_Spike	Yttrium-88	02/04/2012						

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

Page 1 of 1

RIN: 12014298

Lab Code: GEN

Date Due: 2/21/2012

Matrix: Water

Site Code: GNO

Date Completed: 4/23/2012

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
USGS-1	Tritium	03/04/2012			69.0			
Blank_Spike	Tritium	03/04/2012			69.0	82.00		
Blank	Tritium	03/04/2012	-0.5520	U	69.0			

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 during this sampling event.

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. The relative error ratio for the sample and duplicate was less than 3, indicating acceptable precision.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

Page 1 of 1

RIN: 12014297 Lab Code: GEN Project: Gnome-Coach Site Validation Date: 3/16/2012

Duplicate: 2858

Sample: USGS-1

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Actinium-228	4.63	U	11.1	1.00	-0.936	U	10.5	1.00		0.7	pCi/L
Americium-241	5.49	U	13.9	1.00	-0.491	U	14.6	1.00		0.6	pCi/L
Antimony-125	-9.05	U	8.69	1.00	2.89	U	6.70	1.00		2.1	pCi/L
Cerium-144	0.745	U	18.4	1.00	9.09	U	18.7	1.00		0.6	pCi/L
Cesium-134	-1.12	U	2.62	1.00	0.526	U	2.59	1.00		0.9	pCi/L
Cesium-137	-2.53	U	3.54	1.00	2.16	U	3.62	1.00		1.8	pCi/L
Cobalt-60	2.74	U	3.35	1.00	-2.2	U	2.92	1.00		2.2	pCi/L
Europium-152	2.28	U	8.43	1.00	0.637	U	7.79	1.00		0.3	pCi/L
Europium-154	-3.33	U	8.46	1.00	-3.49	U	6.74	1.00		0	pCi/L
Europium-155	-4.18	U	10.4	1.00	-0.581	U	9.63	1.00		0.5	pCi/L
Lead-212	0.370	U	6.28	1.00	3.92	U	7.40	1.00		0.7	pCi/L
Potassium-40	25.6	U	42.7	1.00	10.2	U	28.9	1.00		0.6	pCi/L
Promethium-144	0.239	U	2.88	1.00	-0.807	U	2.52	1.00		0.5	pCi/L
Promethium-146	-0.0149	U	3.78	1.00	0.617	U	3.31	1.00		0.2	pCi/L
Ruthenium-106	2.05	U	24.6	1.00	5.75	U	23.8	1.00		0.2	pCi/L
Strontium-90	-0.207	U	0.337	1.00	0.518	U	0.496	1.00		2.4	pCi/L
Thorium-234	171	U	192	1.00	133	U	161	1.00		0.3	pCi/L
Tritium	-11.3	U	122	1.00	34.4	U	131	1.00		0.5	pCi/L
Uranium-235	4.15	U	19.3	1.00	3.91	U	20.3	1.00		0	pCi/L
Uranium-238	171	U	192	1.00	133	U	161	1.00		0.3	pCi/L
Yttrium-88	0.0551	U	2.01	1.00	0.753	U	2.29	1.00		0.4	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:

Steph Doniv
Stephen Donovan

12-12-2012
Date

Data Validation Lead:

Steph Doniv
Stephen Donovan

12-12-2012
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.

Although not identified as potential outliers, the strontium-90 results from locations USGS-4 and USGS-8 are significantly lower than the historical minimums for those locations, and merited further review. The raw data associated with the strontium-90 analysis were thoroughly reviewed. All of the analysis variables such as sample volumes, chemical recoveries, and detector efficiencies had reasonable values, and the reported results verified by re-calculation. Additionally, the laboratory performance evaluation results for the determination of strontium-90 in water show that the laboratory has established a record of providing acceptable strontium-90 analyses. At this time, the data from this event are acceptable as qualified.

Data Validation Outliers Report - No Field Parameters

Comparison: All Historical Data

Laboratory: GEL Laboratories

RIN: 12014297

Report Date: 11/27/2012

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current			Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Qualifiers		Result	Qualifiers		Result	Qualifiers		N	N Below Detect	
GNO01	USGS-1	N001	01/18/2012	Cesium-137	-2.53	U		5	U		-0.8			9	8	No
GNO01	USGS-4	N001	01/18/2012	Strontium-90	884		FQ	15900			2390			32	0	No
GNO01	USGS-4	N001	01/18/2012	Tritium	9110		FQ	1300000			11300		FQ	44	0	No
GNO01	USGS-8	N001	01/18/2012	Strontium-90	1400		FQ	15900			2300			32	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: 11/27/2012

Location: USGS-1 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	01/18/2012	N001	13425 - 13425	4.63	U		#	21.4	11.1
Actinium-228	pCi/L	01/18/2012	N002	13425 - 13425	-.936	U		#	20.4	10.5
Americium-241	pCi/L	01/18/2012	N001	13425 - 13425	5.49	U		#	22.5	13.9
Americium-241	pCi/L	01/18/2012	N002	13425 - 13425	-.491	U		#	23.9	14.6
Antimony-125	pCi/L	01/18/2012	N001	13425 - 13425	-9.05	U		#	11.9	8.69
Antimony-125	pCi/L	01/18/2012	N002	13425 - 13425	2.89	U		#	12.7	6.7
Cerium-144	pCi/L	01/18/2012	N001	13425 - 13425	0.745	U		#	32.1	18.4
Cerium-144	pCi/L	01/18/2012	N002	13425 - 13425	9.09	U		#	33.1	18.7
Cesium-134	pCi/L	01/18/2012	N001	13425 - 13425	-1.12	U		#	4.57	2.62
Cesium-134	pCi/L	01/18/2012	N002	13425 - 13425	0.526	U		#	5.14	2.59
Cesium-137	pCi/L	01/18/2012	N001	13425 - 13425	-2.53	U		#	5.69	3.54
Cesium-137	pCi/L	01/18/2012	N002	13425 - 13425	2.16	U		#	6.82	3.62
Cobalt-60	pCi/L	01/18/2012	N001	13425 - 13425	2.74	U		#	6.83	3.35
Cobalt-60	pCi/L	01/18/2012	N002	13425 - 13425	-2.2	U		#	4.69	2.92
Europium-152	pCi/L	01/18/2012	N001	13425 - 13425	2.28	U		#	15.5	8.43
Europium-152	pCi/L	01/18/2012	N002	13425 - 13425	0.637	U		#	14.4	7.79
Europium-154	pCi/L	01/18/2012	N001	13425 - 13425	-3.33	U		#	15.1	8.46
Europium-154	pCi/L	01/18/2012	N002	13425 - 13425	-3.49	U		#	12	6.74

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site

REPORT DATE: 11/27/2012

Location: USGS-1 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Europium-155	pCi/L	01/18/2012	N001	13425 - 13425	-4.18	U		#	17.4	10.4
Europium-155	pCi/L	01/18/2012	N002	13425 - 13425	-.581	U		#	17.1	9.63
Lead-212	pCi/L	01/18/2012	N001	13425 - 13425	0.37	U		#	10.6	6.28
Lead-212	pCi/L	01/18/2012	N002	13425 - 13425	3.92	U		#	9.91	7.4
Oxidation Reduction Potential	mV	01/18/2012	N001	13425 - 13425	180.2			#		
pH	s.u.	01/18/2012	N001	13425 - 13425	7.05			#		
Potassium-40	pCi/L	01/18/2012	N001	13425 - 13425	25.6	U		#	58.2	42.7
Potassium-40	pCi/L	01/18/2012	N002	13425 - 13425	10.2	U		#	61.2	28.9
Promethium-144	pCi/L	01/18/2012	N001	13425 - 13425	0.239	U		#	5.4	2.88
Promethium-144	pCi/L	01/18/2012	N002	13425 - 13425	-.807	U		#	4.57	2.52
Promethium-146	pCi/L	01/18/2012	N001	13425 - 13425	-.0149	U		#	6.76	3.78
Promethium-146	pCi/L	01/18/2012	N002	13425 - 13425	0.617	U		#	6.18	3.31
Ruthenium-106	pCi/L	01/18/2012	N001	13425 - 13425	2.05	U		#	46.8	24.6
Ruthenium-106	pCi/L	01/18/2012	N002	13425 - 13425	5.75	U		#	44.5	23.8
Specific Conductance	umhos /cm	01/18/2012	N001	13425 - 13425	4565			#		
Strontium-90	pCi/L	01/18/2012	N001	13425 - 13425	-.207	U		#	0.728	0.337
Strontium-90	pCi/L	01/18/2012	N002	13425 - 13425	0.518	U		#	0.794	0.496
Temperature	C	01/18/2012	N001	13425 - 13425	22.39			#		

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site

REPORT DATE: 11/27/2012

Location: USGS-1 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Thorium-234	pCi/L	01/18/2012	N001	13425 - 13425	171	U		#	224	192
Thorium-234	pCi/L	01/18/2012	N002	13425 - 13425	133	U		#	197	161
Tritium	pCi/L	01/18/2012	N001	13425 - 13425	-11.3	U		#	240	122
Tritium	pCi/L	01/18/2012	N002	13425 - 13425	34.4	U		#	243	131
Tritium	pCi/L	01/18/2012	N003	13425 - 13425	1.5	U		#	2.33	1.42
Uranium-235	pCi/L	01/18/2012	N001	13425 - 13425	4.15	U		#	33.7	19.3
Uranium-235	pCi/L	01/18/2012	N002	13425 - 13425	3.91	U		#	34.4	20.3
Uranium-238	pCi/L	01/18/2012	N001	13425 - 13425	171	U		#	224	192
Uranium-238	pCi/L	01/18/2012	N002	13425 - 13425	133	U		#	197	161
Yttrium-88	pCi/L	01/18/2012	N001	13425 - 13425	0.0551	U		#	4.57	2.01
Yttrium-88	pCi/L	01/18/2012	N002	13425 - 13425	0.753	U		#	5.27	2.29

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site

REPORT DATE: 11/27/2012

Location: USGS-4 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	01/18/2012	N001	13411 - 13411	0.963	U	FQ	#	23.4	12.5
Americium-241	pCi/L	01/18/2012	N001	13411 - 13411	23.1	U	FQ	#	45.3	28.6
Antimony-125	pCi/L	01/18/2012	N001	13411 - 13411	-4.01	U	FQ	#	13.8	7.95
Cerium-144	pCi/L	01/18/2012	N001	13411 - 13411	-25.4	U	FQ	#	37.7	26.5
Cesium-134	pCi/L	01/18/2012	N001	13411 - 13411	1.23	U	FQ	#	6.2	3.25
Cesium-137	pCi/L	01/18/2012	N001	13411 - 13411	-.789	U	FQ	#	5.62	3.17
Cobalt-60	pCi/L	01/18/2012	N001	13411 - 13411	0.537	U	FQ	#	5.66	2.72
Dissolved Oxygen	mg/L	01/18/2012	N001	13411 - 13411	0.97		FQ	#		
Europium-152	pCi/L	01/18/2012	N001	13411 - 13411	8.04	U	FQ	#	17.3	9.74
Europium-154	pCi/L	01/18/2012	N001	13411 - 13411	3.75	U	FQ	#	17.3	8.47
Europium-155	pCi/L	01/18/2012	N001	13411 - 13411	4.48	U	FQ	#	23.5	13.5
Lead-212	pCi/L	01/18/2012	N001	13411 - 13411	-2.07	U	FQ	#	10.9	6.39
Oxidation Reduction Potential	mV	01/18/2012	N001	13411 - 13411	-48.7		FQ	#		
pH	s.u.	01/18/2012	N001	13411 - 13411	6.77		FQ	#		
Potassium-40	pCi/L	01/18/2012	N001	13411 - 13411	20.6	U	FQ	#	87.5	41.6
Promethium-144	pCi/L	01/18/2012	N001	13411 - 13411	1.04	U	FQ	#	4.93	2.56
Promethium-146	pCi/L	01/18/2012	N001	13411 - 13411	0.326	U	FQ	#	6.77	3.6
Ruthenium-106	pCi/L	01/18/2012	N001	13411 - 13411	-5.89	U	FQ	#	44.1	24.5

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site

REPORT DATE: 11/27/2012

Location: USGS-4 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Specific Conductance	umhos /cm	01/18/2012	N001	13411 - 13411	5919		FQ	#		
Strontium-90	pCi/L	01/18/2012	N001	13411 - 13411	884		FQ	#	0.602	147
Temperature	C	01/18/2012	N001	13411 - 13411	20.32		FQ	#		
Thorium-234	pCi/L	01/18/2012	N001	13411 - 13411	114	U	FQ	#	347	250
Tritium	pCi/L	01/18/2012	N001	13411 - 13411	9110		FQ	#	230	1870
Turbidity	NTU	01/18/2012	N001	13411 - 13411	7.99		FQ	#		
Uranium-235	pCi/L	01/18/2012	N001	13411 - 13411	-24	U	FQ	#	39.8	30.9
Uranium-238	pCi/L	01/18/2012	N001	13411 - 13411	114	U	FQ	#	347	250
Yttrium-88	pCi/L	01/18/2012	N001	13411 - 13411	0.152	U	FQ	#	6.1	2.96

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site

REPORT DATE: 11/27/2012

Location: USGS-8 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	01/18/2012	N001	13409 - 13409	15.8	U	FQ	#	25.3	14.1
Americium-241	pCi/L	01/18/2012	N001	13409 - 13409	-17	U	FQ	#	61.3	37.4
Antimony-125	pCi/L	01/18/2012	N001	13409 - 13409	6.42	U	FQ	#	21.4	12.1
Cerium-144	pCi/L	01/18/2012	N001	13409 - 13409	-22.1	U	FQ	#	58.5	35.7
Cesium-134	pCi/L	01/18/2012	N001	13409 - 13409	-3.85	U	FQ	#	5.35	3.85
Cesium-137	pCi/L	01/18/2012	N001	13409 - 13409	154		FQ	#	6.29	17.9
Cobalt-60	pCi/L	01/18/2012	N001	13409 - 13409	-477	U	FQ	#	5.71	3.06
Dissolved Oxygen	mg/L	01/18/2012	N001	13409 - 13409	0.38		FQ	#		
Europium-152	pCi/L	01/18/2012	N001	13409 - 13409	-1.31	U	FQ	#	22.5	12.9
Europium-154	pCi/L	01/18/2012	N001	13409 - 13409	-5.03	U	FQ	#	18.7	10.9
Europium-155	pCi/L	01/18/2012	N001	13409 - 13409	-15.2	U	FQ	#	32.4	20.9
Lead-212	pCi/L	01/18/2012	N001	13409 - 13409	1.74	U	FQ	#	15.5	9.35
Oxidation Reduction Potential	mV	01/18/2012	N001	13409 - 13409	-159.2		FQ	#		
pH	s.u.	01/18/2012	N001	13409 - 13409	7.53		FQ	#		
Potassium-40	pCi/L	01/18/2012	N001	13409 - 13409	4.55	U	FQ	#	77.7	42.7
Promethium-144	pCi/L	01/18/2012	N001	13409 - 13409	0.686	U	FQ	#	5.63	3.07
Promethium-146	pCi/L	01/18/2012	N001	13409 - 13409	3.88	U	FQ	#	10.5	6
Ruthenium-106	pCi/L	01/18/2012	N001	13409 - 13409	-38	U	FQ	#	59.3	40.4

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site

REPORT DATE: 11/27/2012

Location: USGS-8 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Specific Conductance	umhos /cm	01/18/2012	N001	13409 - 13409	5870		FQ	#		
Strontium-90	pCi/L	01/18/2012	N001	13409 - 13409	1400		FQ	#	0.579	229
Temperature	C	01/18/2012	N001	13409 - 13409	20.47		FQ	#		
Thorium-234	pCi/L	01/18/2012	N001	13409 - 13409	26.9	U	FQ	#	516	313
Tritium	pCi/L	01/18/2012	N001	13409 - 13409	21700		FQ	#	244	4300
Turbidity	NTU	01/18/2012	N001	13409 - 13409	3.37		FQ	#		
Uranium-235	pCi/L	01/18/2012	N001	13409 - 13409	20.6	U	FQ	#	60.4	35.3
Uranium-238	pCi/L	01/18/2012	N001	13409 - 13409	26.9	U	FQ	#	516	313
Yttrium-88	pCi/L	01/18/2012	N001	13409 - 13409	-.965	U	FQ	#	6.87	3.75

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. J Estimated value.
Q Qualitative result due to sampling technique. R Unusable result.
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: 11/27/2012

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
LRL-7		3442.42	01/18/2012	10:30:00	469.49	2972.93
USGS-4		3415.25	01/18/2012	12:10:04	426.66	2988.59
USGS-8		3412.96	01/18/2012	12:45:55	419.79	2993.17
Well DD-1		3398.18	03/07/2012	10:20:00	1023.5	2374.68

FLOW CODES: B BACKGROUND
 N UNKNOWN

C CROSS GRADIENT
 O ON SITE

D DOWN GRADIENT
 U UPGRADIENT

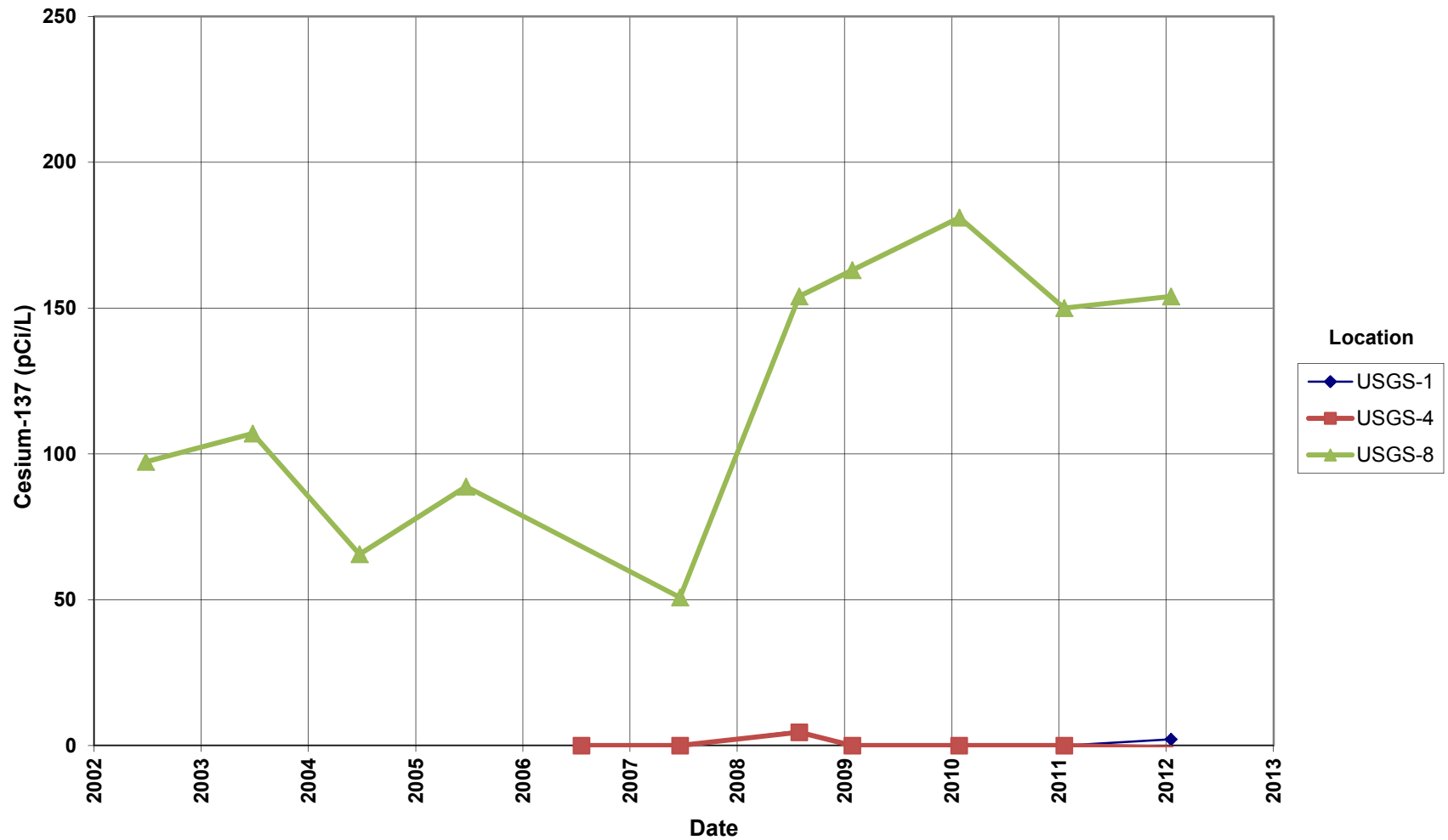
F OFF SITE

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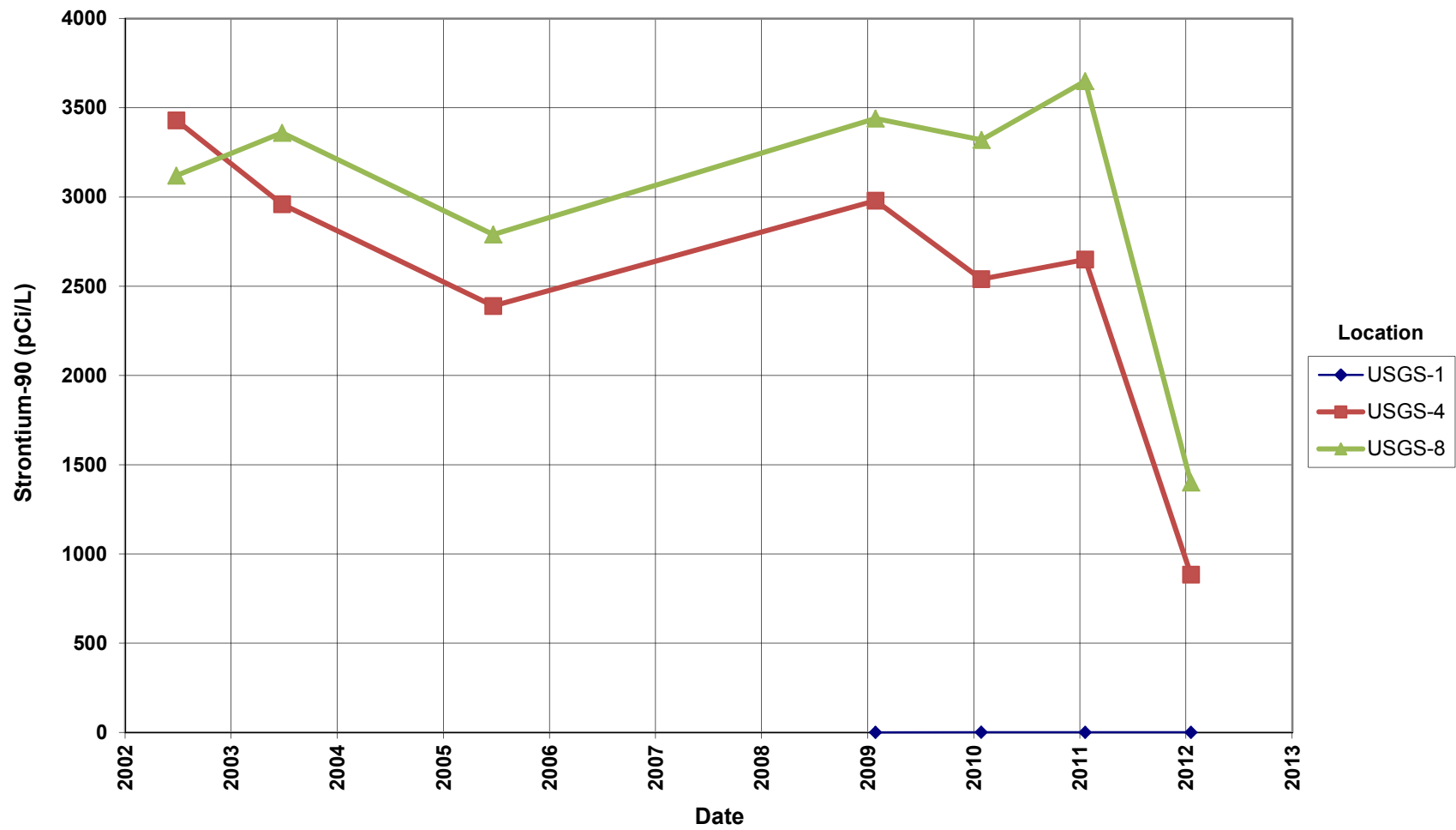
Time-Concentration Graphs

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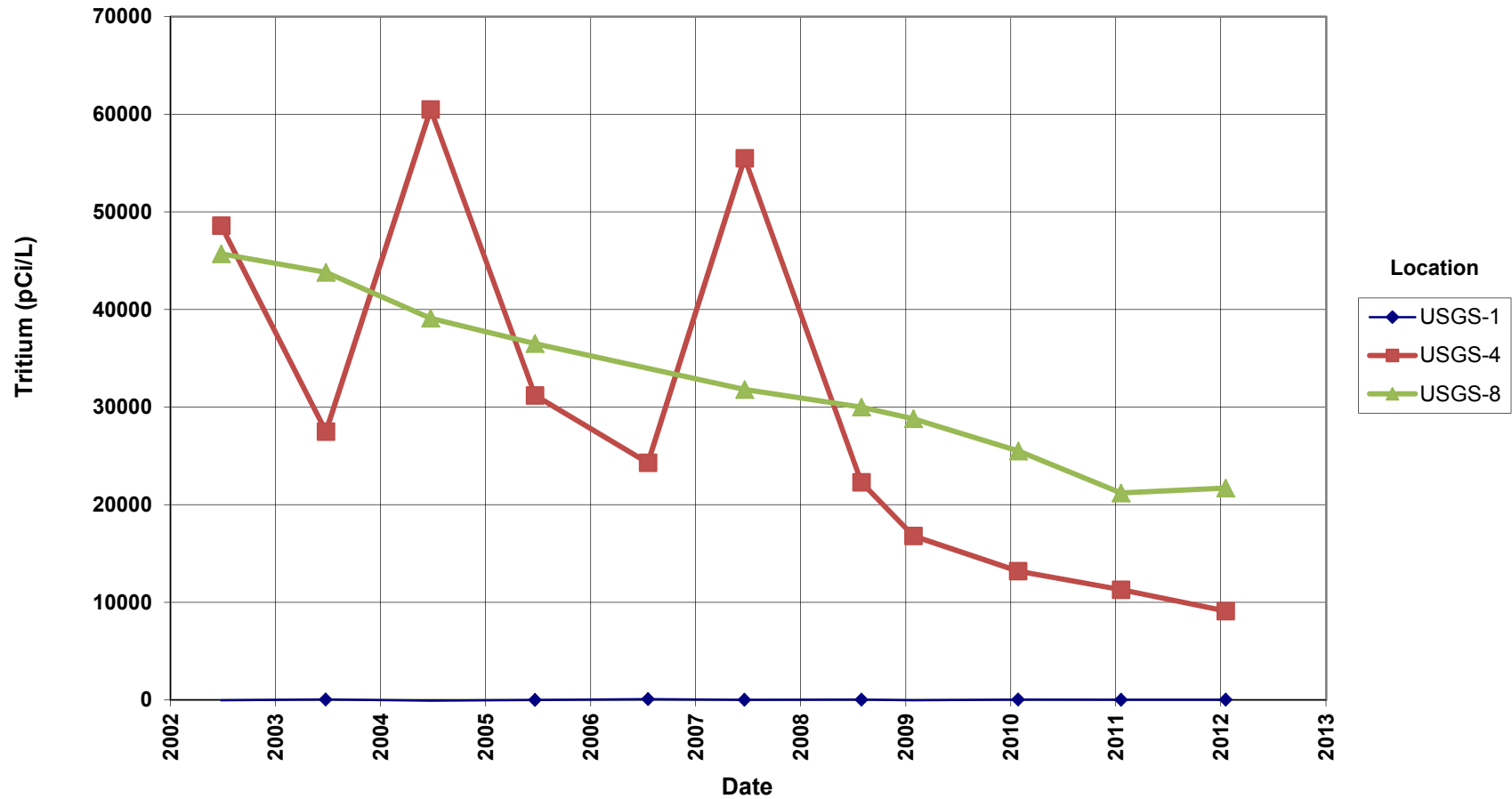
Gnome-Coach Site
Cesium-137 Concentration
Maximum Contaminant Level (MCL) = 200 pCi/L



Gnome-Coach Site
Strontium-90 Concentration
Maximum Contaminant Level (MCL) = 8 pCi/L



Gnome-Coach Site
Tritium Concentration
Maximum Contaminant Level (MCL) = 20,000 pCi/L



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Attachment 3
Sampling and Analysis Work Order

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established 1959

Task Order LM00-502
Control Number 12-0238

December 20, 2011

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

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)
January 2012 Environmental Sampling at the Gnome-Coach, New Mexico Site

REFERENCE: Task Order 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 this site as part of the routine environmental sampling currently scheduled to begin the week of January 16, 2012.

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

Monitoring Wells

LRL-7 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,

2011.12.20 15:13:06 -07'00'

Rick Findlay
Site Lead

RF/lcg/dc

Enclosures (3)

cc: (electronic)
Karl Stoeckle, DOE
Steve Donovan, Stoller
Rick Findlay, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
Mark Plessinger, 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
USGS-1			X			Electric pump; add a sample port to the plumbing
USGS-4			X			Bladder pump
USGS-8			X			Bladder pump

Annual sampling conducted in January

Constituent Sampling Breakdown

Site	Gnome-Coach		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water			
Approx. No. Samples/yr	4	0			
Field Measurements					
Alkalinity					
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
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.

Attachment 4

Trip Report

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Memorandum

Control Number N/A

DATE: February 6, 2012
TO: Rick Findlay
FROM: Jeff Price
SUBJECT: Trip Report (LTHMP Sampling)

Site: Gnome/Coach, NM

Dates of Sampling Event: January 17-19, 2012

Team Members: David Atkinson 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.

Locations Not Sampled/Reason: LRL-7 was not sampled per instruction of site lead.

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
2858	USGS-1	Duplicate	Groundwater	KCR 334

RIN Number Assigned: RIN 12014297 and 12014298 (enriched tritium).

Sample Shipment: Samples were shipped to GEL Laboratories on January 23, 2012.

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

Site Code	Well ID	Date	DTW (ft)	Comments
GNO01	USGS-1	1/18/12	434.10	Running dedicated submersible pump
GNO01	USGS-4	1/18/12	426.66	
GNO01	USGS-8	1/18/12	419.79	Changed casing elevation after measurement
GNO01	LRL-7	1/18/12	469.49	

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

Site Specific Information: The surface casing was modified at USGS-8 to incorporate a weather-proof and locked steel box. The steel box will contain the extra transducer cable and will allow for much better access to the pump and pressure transducer. This change also facilitated the installation of 460 feet of 2 inch schedule-80 PVC pipe and 10 feet of 2 inch schedule-80 20 slot screen. The PVC pipe will house the transducer and be used to measure the water level.

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