Data Validation Package

January 2015
Groundwater Sampling at the Gnome-Coach, New Mexico, Site

December 2015

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Sampling Event Summary

Site: Gnome-Coach, New Mexico, Site

Sampling Period: January 27, 2015

Annual sampling was conducted January 27, 2015, to monitor groundwater for potential radionuclide contamination at the Gnome-Coach site in New Mexico. Samples were collected from wells USGS-1, USGS-4, and USGS-8 during this monitoring event. 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-8 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. Analytical data obtained from this and past sampling events are also available in electronic format on the U.S. Department of Energy Office of Legacy Management Geospatial Environmental Mapping System website at http://gems.lm.doe.gov/#site=GNO.

Richard C. Findlay

Richard C. Findlay, Site Lead
Navarro Research and Engineering, Inc.

12-31-2015

Date

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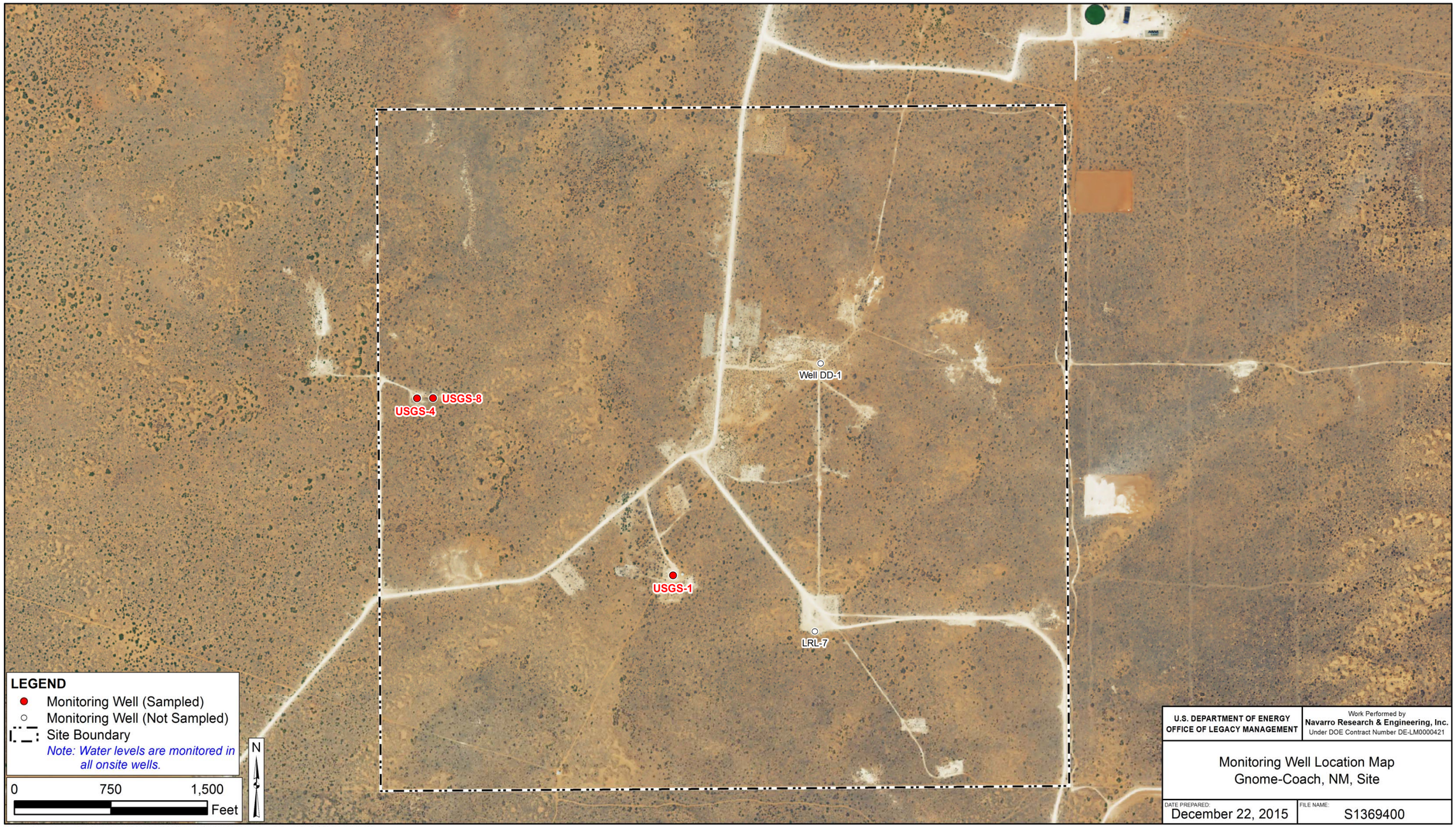

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Gnome-Coach, New Mexico, Sample Location Map

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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**	January 27, 2015
Date(s) of Verification	May 20, 2015	**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 January 8, 2015.
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 January 22, 2015.
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?	Yes	
Did the water level stabilize prior to sampling?	Yes	
Did pH, specific conductance, and turbidity measurements meet criteria prior to sampling?	Yes	
Was the flow rate less than 500 mL/min?	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:		
Was the flow rate less than 500 mL/min?	NA	There were no Category II wells.
Was one pump/tubing volume removed prior to sampling?		
9. Were duplicates taken at a frequency of one per 20 samples?		
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	Yes	A duplicate sample was collected from USGS-8.
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):	15016738
Sample Event:	January 27, 2015
Site(s):	Gnome-Coach Site
Laboratory:	GEL Laboratories, Charleston, South Carolina
Work Order No.:	366100
Analysis:	Metals, Wet Chemistry, Radiochemistry
Validator:	Stephen Donivan
Review Date:	May 20, 2015

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

None of the analytical results required qualification.

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received four water samples on January 30, 2015, 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 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 March and August 2014. Daily calibration checks were performed on February 19, 2015.

Tritium
The tritium quench calibration curve was generated on August 1, 2014 for quench numbers ranging from 568 to 767. Sample quench values were within the calibration range for all samples. Daily calibration checks were performed on February 19 and March 22, 2014.

Strontium-90
Annual calibration of the detectors used to analyze these samples was performed on March 1, 2015. Daily calibration checks were performed on April 6 and 8, 2015.

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 matrix spike data met the recovery acceptance criteria.

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 1, 2015. 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: 15016738 **Lab Code:** GEN **Validator:** Stephen Donivan **Validation Date:** 05/20/2015

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	The reported detection limits are equal to or below contract requirements.
☐ Field/Trip Blanks	
☑ Field Duplicates	There was 1 duplicate evaluated.

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 15016738 **Lab Code:** GEN **Date Due:** 04/30/2015

Matrix: Water **Site Code:** GNO01 **Date Completed:** 04/30/2015

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate RER
USGS-1	Actinium-228	02/19/2015						0.63
USGS-1	Americium-241	02/19/2015						0.52
Blank_Spike	Americium-241	02/19/2015				107.00		
USGS-1	Antimony-125	02/19/2015						1.47
USGS-1	Cerium-144	02/19/2015						1.32
Blank_Spike	Cerium-144	02/19/2015						
USGS-1	Cesium-134	02/19/2015						0.59
USGS-1	Cesium-137	02/19/2015						1.49
Blank_Spike	Cesium-137	02/19/2015				104.00		
USGS-1	Cobalt-60	02/19/2015						0.46
Blank_Spike	Cobalt-60	02/19/2015				104.00		
USGS-1	Europium-152	02/19/2015						0.79
USGS-1	Europium-154	02/19/2015						0.15
Blank_Spike	Europium-154	02/19/2015						
USGS-1	Europium-155	02/19/2015						1.82
USGS-1	Lead-212	02/19/2015						0.28
Blank_Spike	Lead-212	02/19/2015						
USGS-1	Potassium-40	02/19/2015						0.35
USGS-1	Promethium-144	02/19/2015						0.68
Blank_Spike	Promethium-144	02/19/2015						
USGS-1	Promethium-146	02/19/2015						0.17
USGS-1	Ruthenium-106	02/19/2015						0.40
Blank_Spike	Ruthenium-106	02/19/2015						
USGS-1	Strontium-90	04/06/2015			96.0			
Blank_Spike	Strontium-90	04/06/2015			84.0	99.00		
2443	Strontium-90	04/06/2015			81.0			
Blank	Strontium-90	04/06/2015	0.0700	U	84.0			
2443	Strontium-90	04/08/2015			83.0			
USGS-4	Strontium-90	04/08/2015			85.0			
USGS-8	Strontium-90	04/08/2015			85.0			
2443	Strontium-90	04/08/2015			91.0			0
USGS-1	Thorium-234	02/19/2015						0.91

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 15016738 **Lab Code:** GEN **Date Due:** 04/30/2015

Matrix: Water **Site Code:** GNO01 **Date Completed:** 04/30/2015

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate RER
0347	Tritium	02/14/2015						
Blank_Spike	Tritium	02/14/2015				83.50		
0347	Tritium	02/14/2015					102.0	
USGS-1	Tritium	03/22/2015			77.0			
Blank	Tritium	03/22/2015	101.0000	U	77.0			
Blank_Spike	Tritium	03/23/2015			77.0	92.80		
USGS-1	Uranium-235	02/19/2015						1.68
Blank_Spike	Uranium-235	02/19/2015						
USGS-1	Uranium-238	02/19/2015						0.91
USGS-1	Yttrium-88	02/19/2015						2.47
Blank_Spike	Yttrium-88	02/19/2015						

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. 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-8. 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.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 15016738 **Lab Code:** GEN **Project:** Gnome-Coach Site **Validation Date:** 05/20/2015

Duplicate: 2443 **Sample:** USGS-8

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Actinium-228	13.4	U	19.2	1.00	4.64	U	11.8	1.00		0.8	pCi/L
Americium-241	-27.8	U	17.3	1.00	12.0	U	38.0	1.00		1.9	pCi/L
Antimony-125	3.08	U	13.0	1.00	2.64	U	10.1	1.00		0.1	pCi/L
Cerium-144	22.3	U	30.6	1.00	9.34	U	27.6	1.00		0.6	pCi/L
Cesium-134	0.146	U	4.30	1.00	1.01	U	2.85	1.00		0.3	pCi/L
Cesium-137	123		17.6	1.00	128		17.6	1.00	3.98	0.4	pCi/L
Cobalt-60	-1.94	U	3.79	1.00	-0.253	U	2.73	1.00		0.7	pCi/L
Europium-152	-1.07	U	14.2	1.00	-1.13	U	9.82	1.00		0	pCi/L
Europium-154	1.87	U	11.6	1.00	-3.4	U	7.41	1.00		0.8	pCi/L
Europium-155	-4.85	U	14.8	1.00	-8.75	U	14.9	1.00		0.4	pCi/L
Lead-212	4.66	U	12.2	1.00	1.49	U	6.73	1.00		0.4	pCi/L
Potassium-40	38.8	U	38.8	1.00	11.4	U	35.5	1.00		1.0	pCi/L
Promethium-144	-0.0427	U	3.83	1.00	0.800	U	2.32	1.00		0.4	pCi/L
Promethium-146	-1.39	U	10.9	1.00	-3.74	U	4.66	1.00		0.4	pCi/L
Ruthenium-106	-5.15	U	36.8	1.00	-14.4	U	26.0	1.00		0.4	pCi/L
Strontium-90	2650		413	1.00	2480		385	1.00	6.63	0.6	pCi/L
Thorium-234	-25.5	U	120	1.00	5.50	U	405	1.00		0.1	pCi/L
Tritium	17400		3430	1.00	16400		3230	1.00	5.92	0.4	pCi/L
Uranium-235	-37	U	33.9	1.00	-2.62	U	30.0	1.00		1.5	pCi/L
Uranium-238	-25.5	U	120	1.00	5.50	U	405	1.00		0.1	pCi/L
Yttrium-88	2.03	U	3.45	1.00	0.00978	U	2.73	1.00		0.9	pCi/L

Certification

All laboratory analytical quality control criteria were met except as qualified in this report. The data qualifiers listed on the SEEPro database reports are defined on the last page of each report. All data in this package are considered validated and available for use.

Laboratory Coordinator: Stephen Donivan — Stephen Donivan — 12-31-2015 — Date

Data Validation Lead: Stephen Donivan — Stephen Donivan — 12-31-2015 — Date

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Attachment 1
Assessment of Anomalous Data

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Potential Outliers Report

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Potential Outliers Report

Potential outliers are measurements that are extremely large or small relative to the rest of the data and, therefore, are suspected of misrepresenting the population from which they were collected. Potential outliers can result from transcription errors, data-coding errors, or measurement system problems. However, outliers can also represent true extreme values of a distribution and can indicate more variability in the population than was expected.

Statistical outlier tests give probabilistic evidence that an extreme value does not "fit" with the distribution of the remainder of the data and is therefore a statistical outlier. These tests should only be used to identify data points that require further investigation. The tests alone cannot determine whether a statistical outlier should be discarded or corrected within a data set.

There are three steps involved in identifying extreme values or outliers:

1. **Identify extreme values that may be potential outliers.** Do this by generating the Outliers Report using the Sample Management System from data in the environmental database. The application compares the new data set (in standard environmental database units) with historical data and lists the new data that fall outside the historical data range. A determination is also made as to whether the data are normally distributed using the Shapiro-Wilk Test.
2. **Apply the appropriate statistical test.** Dixon's Test for extreme values is used to test for statistical outliers when the sample size is less than or equal to 25. This test considers both extreme values that are much smaller than the rest of the data (case 1) and extreme values that are much larger than the rest of the data (case 2). This test is valid only if the data without the suspected outlier are normally distributed. Rosner's Test is a parametric test that is used to detect outliers for sample sizes of 25 or more. This test also assumes that the data without the suspected outliers are normally distributed.
3. **Scientifically review statistical outliers and decide on their disposition.** The review should include an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

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

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Attachment 2
Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 05/20/2015
Location: USGS-1 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	01/27/2015	N001	-8.21	U		#	30.2	16.2
Alkalinity, Total (as $CaCO_3$)	mg/L	01/27/2015	N001	119			#		
Americium-241	pCi/L	01/27/2015	N001	-2.56	U		#	10.3	6
Antimony-125	pCi/L	01/27/2015	N001	4.99	U		#	16.4	8.48
Cerium-144	pCi/L	01/27/2015	N001	18.4	U		#	34.4	19.7
Cesium-134	pCi/L	01/27/2015	N001	1.36	U		#	8.24	4.15
Cesium-137	pCi/L	01/27/2015	N001	-1.76	U		#	6.77	4.73
Cobalt-60	pCi/L	01/27/2015	N001	-.741	U		#	7.55	3.9
Dissolved Oxygen	mg/L	01/27/2015	N001	8.28			#		
Europium-152	pCi/L	01/27/2015	N001	1.25	U		#	17.1	9.05
Europium-154	pCi/L	01/27/2015	N001	-5.31	U		#	20.7	11.5
Europium-155	pCi/L	01/27/2015	N001	4.98	U		#	15.8	8.66
Lead-212	pCi/L	01/27/2015	N001	2.26	U		#	10.4	7.48
Oxidation Reduction Potential	mV	01/27/2015	N001	30			#		
pH	s.u.	01/27/2015	N001	7.18			#		
Potassium-40	pCi/L	01/27/2015	N001	-4.2	U		#	92.2	42.8
Promethium-144	pCi/L	01/27/2015	N001	0.71	U		#	5.92	2.93
Promethium-146	pCi/L	01/27/2015	N001	0.608	U		#	6.94	4.09

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 05/20/2015
Location: USGS-1 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Ruthenium-106	pCi/L	01/27/2015	N001	-17.4	U		#	60.7	36.5
Specific Conductance	umhos /cm	01/27/2015	N001	4690			#		
Strontium-90	pCi/L	01/27/2015	N001	-.0516	U		#	0.722	0.372
Temperature	C	01/27/2015	N001	23			#		
Thorium-234	pCi/L	01/27/2015	N001	-24	U		#	128	69.5
Tritium	pCi/L	01/27/2015	N001	1.23	U		#	2.24	1.35
Turbidity	NTU	01/27/2015	N001	1.27			#		
Uranium-235	pCi/L	01/27/2015	N001	13.6	U		#	33.7	19.6
Uranium-238	pCi/L	01/27/2015	N001	-24	U		#	128	69.5
Yttrium-88	pCi/L	01/27/2015	N001	-2.91	U		#	10.1	5.87

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 05/20/2015
Location: USGS-4 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	01/27/2015	N001	3.18	U	F	#	19.3	9.43
Alkalinity, Total (as $CaCO_3$)	mg/L	01/27/2015	N001	133		F	#		
Americium-241	pCi/L	01/27/2015	N001	5.42	U	F	#	27.1	16.8
Antimony-125	pCi/L	01/27/2015	N001	5.99	U	F	#	12.9	6.94
Cerium-144	pCi/L	01/27/2015	N001	0.47	U	F	#	33.6	19.4
Cesium-134	pCi/L	01/27/2015	N001	-2.11	U	F	#	4.1	2.62
Cesium-137	pCi/L	01/27/2015	N001	3.46	U	F	#	4.85	3.96
Cobalt-60	pCi/L	01/27/2015	N001	0.498	U	F	#	4.5	2.2
Dissolved Oxygen	mg/L	01/27/2015	N001	4.57		F	#		
Europium-152	pCi/L	01/27/2015	N001	-3.37	U	F	#	11.5	6.96
Europium-154	pCi/L	01/27/2015	N001	0.655	U	F	#	12.4	6.18
Europium-155	pCi/L	01/27/2015	N001	-4.33	U	F	#	17.8	10.7
Lead-212	pCi/L	01/27/2015	N001	4.29	U	F	#	9.68	6.6
Oxidation Reduction Potential	mV	01/27/2015	N001	-40		F	#		
pH	s.u.	01/27/2015	N001	6.83		F	#		
Potassium-40	pCi/L	01/27/2015	N001	-.492	U	F	#	62.6	30.5
Promethium-144	pCi/L	01/27/2015	N001	0	UI	F	#	4.63	8.67
Promethium-146	pCi/L	01/27/2015	N001	-.0107	U	F	#	5.62	3.07

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 05/20/2015
Location: USGS-4 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Ruthenium-106	pCi/L	01/27/2015	N001	7.13	U	F	#	41.9	22.2
Specific Conductance	umhos /cm	01/27/2015	N001	6070		F	#		
Strontium-90	pCi/L	01/27/2015	N001	1740		F	#	0.683	271
Temperature	C	01/27/2015	N001	20.3		F	#		
Thorium-234	pCi/L	01/27/2015	N001	4.44	U	F	#	232	187
Tritium	pCi/L	01/27/2015	N001	6030		F	#	363	1240
Turbidity	NTU	01/27/2015	N001	1.99		F	#		
Uranium-235	pCi/L	01/27/2015	N001	0.462	U	F	#	33.3	21.9
Uranium-238	pCi/L	01/27/2015	N001	4.44	U	F	#	232	187
Yttrium-88	pCi/L	01/27/2015	N001	2.51	U	F	#	6.9	3.12

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 05/20/2015
Location: USGS-8 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	01/27/2015	N001	13.4	U	F	#	30	19.2
Actinium-228	pCi/L	01/27/2015	N002	4.64	U	F	#	23.1	11.8
Alkalinity, Total (as $CaCO_3$)	mg/L	01/27/2015	N001	36		F	#		
Americium-241	pCi/L	01/27/2015	N001	-27.8	U	F	#	18.7	17.3
Americium-241	pCi/L	01/27/2015	N002	12	U	F	#	60.2	38
Antimony-125	pCi/L	01/27/2015	N001	3.08	U	F	#	23.7	13
Antimony-125	pCi/L	01/27/2015	N002	2.64	U	F	#	18.3	10.1
Cerium-144	pCi/L	01/27/2015	N001	22.3	U	F	#	52.4	30.6
Cerium-144	pCi/L	01/27/2015	N002	9.34	U	F	#	47.3	27.6
Cesium-134	pCi/L	01/27/2015	N001	0.146	U	F	#	8.28	4.3
Cesium-134	pCi/L	01/27/2015	N002	1.01	U	F	#	5.68	2.85
Cesium-137	pCi/L	01/27/2015	N001	123		F	#	7.65	17.6
Cesium-137	pCi/L	01/27/2015	N002	128		F	#	4.82	17.6
Cobalt-60	pCi/L	01/27/2015	N001	-1.94	U	F	#	6.47	3.79
Cobalt-60	pCi/L	01/27/2015	N002	-.253	U	F	#	5.23	2.73
Dissolved Oxygen	mg/L	01/27/2015	N001	5.6		F	#		
Europium-152	pCi/L	01/27/2015	N001	-1.07	U	F	#	22.1	14.2
Europium-152	pCi/L	01/27/2015	N002	-1.13	U	F	#	17.5	9.82

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 05/20/2015
Location: USGS-8 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Europium-154	pCi/L	01/27/2015	N001	1.87	U	F	#	23	11.6
Europium-154	pCi/L	01/27/2015	N002	-3.4	U	F	#	12.8	7.41
Europium-155	pCi/L	01/27/2015	N001	-4.85	U	F	#	25.4	14.8
Europium-155	pCi/L	01/27/2015	N002	-8.75	U	F	#	23.7	14.9
Lead-212	pCi/L	01/27/2015	N001	4.66	U	F	#	15.2	12.2
Lead-212	pCi/L	01/27/2015	N002	1.49	U	F	#	11.6	6.73
Oxidation Reduction Potential	mV	01/27/2015	N001	-60		F	#		
pH	s.u.	01/27/2015	N001	7.21		F	#		
Potassium-40	pCi/L	01/27/2015	N001	38.8	U	F	#	86.4	38.8
Potassium-40	pCi/L	01/27/2015	N002	11.4	U	F	#	77.9	35.5
Promethium-144	pCi/L	01/27/2015	N001	-.0427	U	F	#	7.03	3.83
Promethium-144	pCi/L	01/27/2015	N002	0.8	U	F	#	4.63	2.32
Promethium-146	pCi/L	01/27/2015	N001	-1.39	U	F	#	10.3	10.9
Promethium-146	pCi/L	01/27/2015	N002	-3.74	U	F	#	7.1	4.66
Ruthenium-106	pCi/L	01/27/2015	N001	-5.15	U	F	#	66.4	36.8
Ruthenium-106	pCi/L	01/27/2015	N002	-14.4	U	F	#	42	26
Specific Conductance	umhos /cm	01/27/2015	N001	5990		F	#		
Strontium-90	pCi/L	01/27/2015	N001	2650		F	#	0.707	413

Groundwater Quality Data by Location (USEE100) FOR SITE GNO01, Gnome-Coach Site
REPORT DATE: 05/20/2015
Location: USGS-8 WELL

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Strontium-90	pCi/L	01/27/2015	N002	2480		F	#	0.69	385
Temperature	C	01/27/2015	N001	20.6		F	#		
Thorium-234	pCi/L	01/27/2015	N001	-25.5	U	F	#	214	120
Thorium-234	pCi/L	01/27/2015	N002	5.5	U	F	#	459	405
Tritium	pCi/L	01/27/2015	N001	17400		F	#	363	3430
Tritium	pCi/L	01/27/2015	N002	16400		F	#	355	3230
Turbidity	NTU	01/27/2015	N001	2.01		F	#		
Uranium-235	pCi/L	01/27/2015	N001	-37	U	F	#	47.8	33.9
Uranium-235	pCi/L	01/27/2015	N002	-2.62	U	F	#	44.7	30
Uranium-238	pCi/L	01/27/2015	N001	-25.5	U	F	#	214	120
Uranium-238	pCi/L	01/27/2015	N002	5.5	U	F	#	459	405
Yttrium-88	pCi/L	01/27/2015	N001	2.03	U	F	#	8.44	3.45
Yttrium-88	pCi/L	01/27/2015	N002	0.00978	U	F	#	5.78	2.73

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: 09/28/2015

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
USGS-1		3425.78	01/27/2015	13:00:58	436.99	2988.79
USGS-4		3415.25	01/27/2015	11:10:42	428.48	2986.77
USGS-8		3412.96	01/27/2015	12:00:55	421.29	2991.67
Well DD-1		3398.18	01/27/2015	13:30:00	990.4	2407.78

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

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Time-Concentration Graphs

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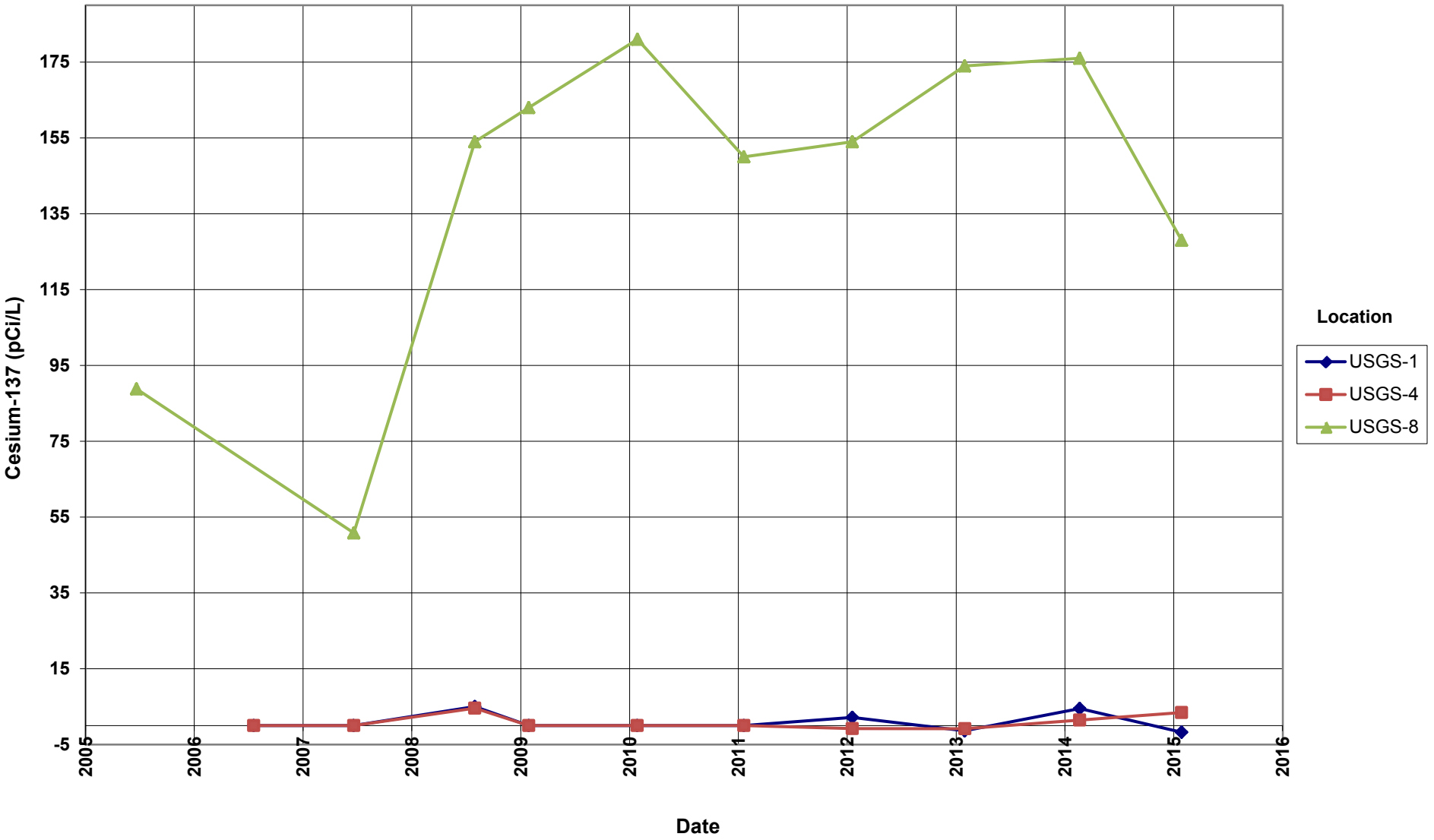
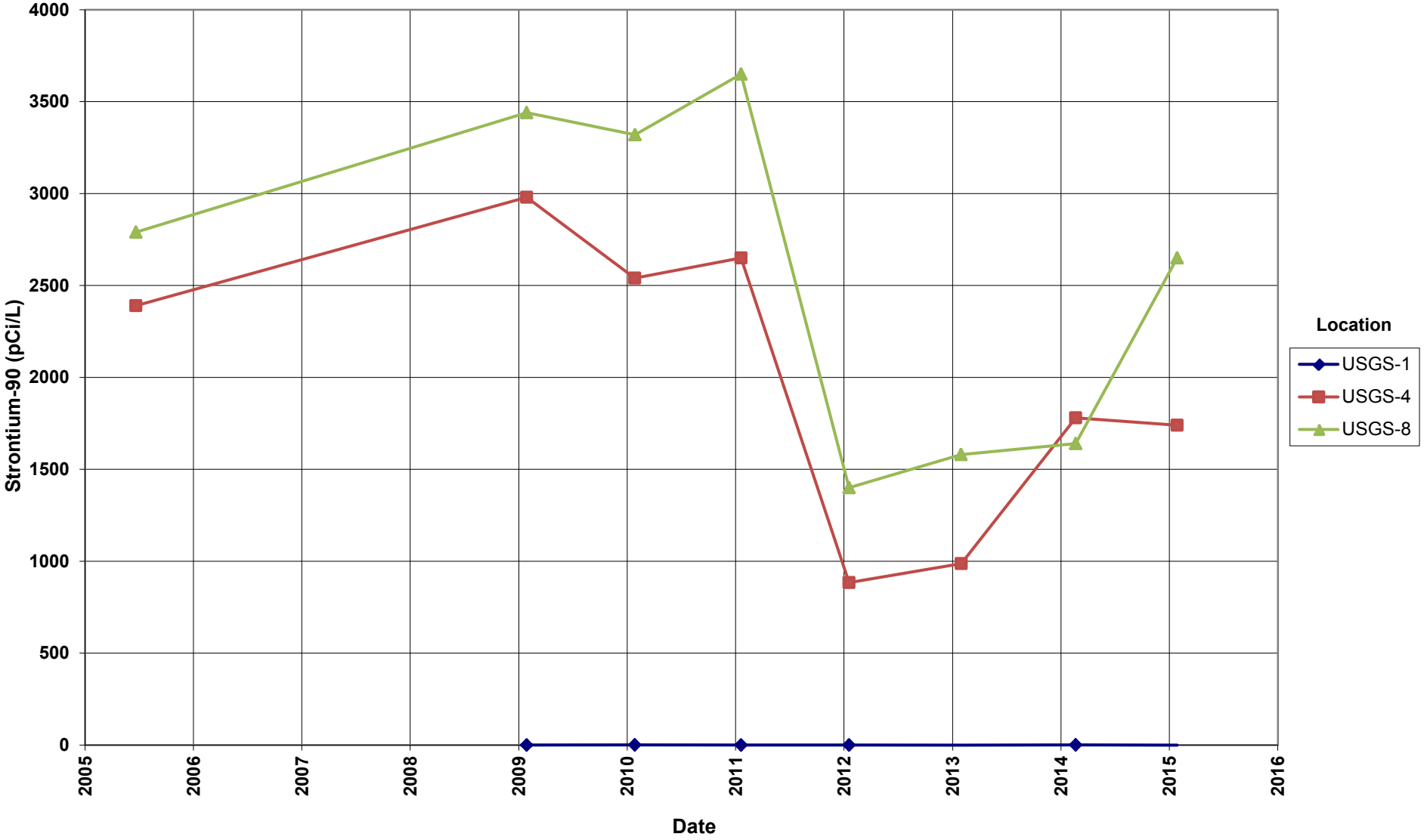
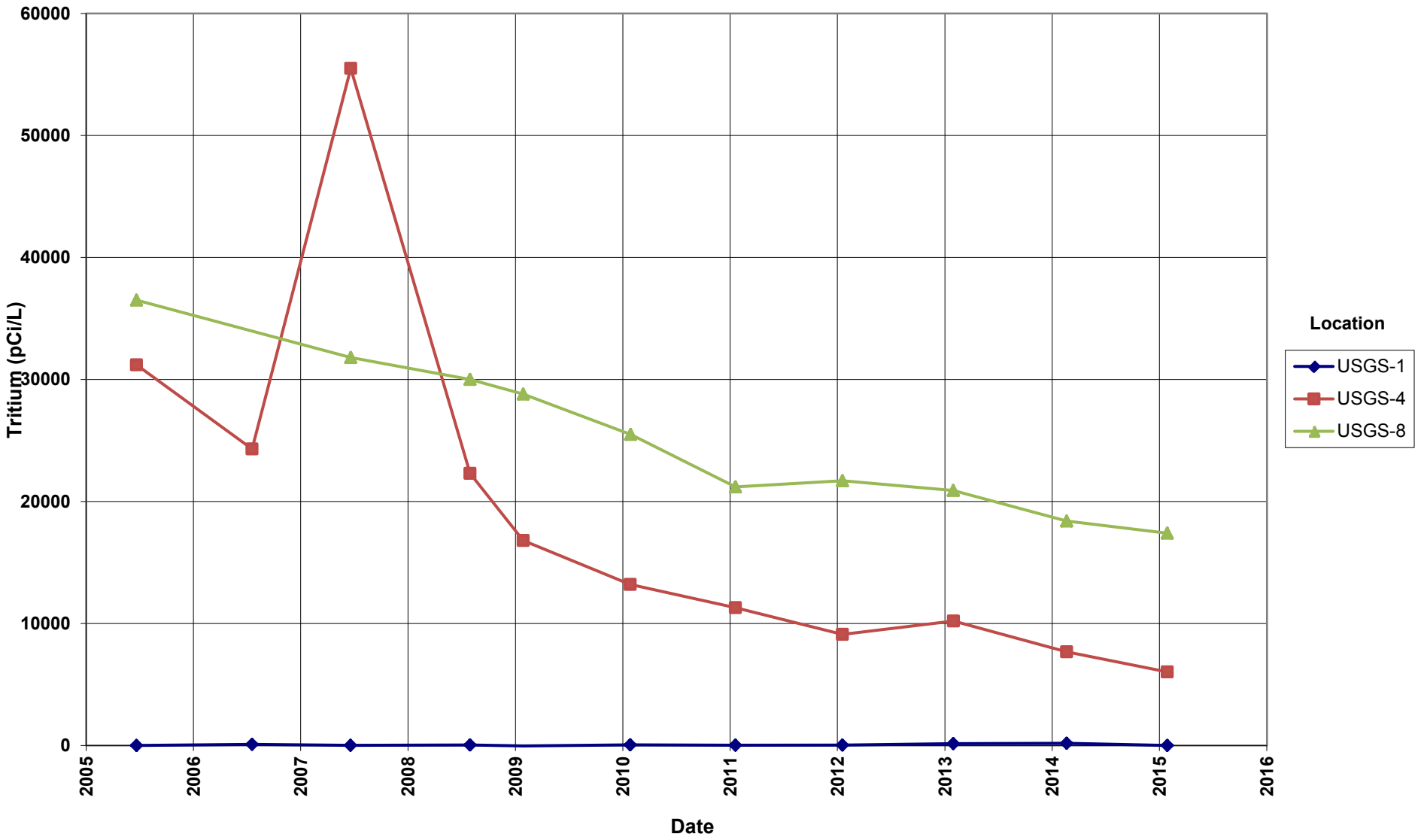
Gnome-Coach Site
Cesium-137 Concentration



Gnome-Coach Site
Strontium-90 Concentration




Gnome-Coach Site
Tritium Concentration
60000
50000
40000
30000
20000
10000
0
Tritium (pCi/L)
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Date
Location
USGS-1
USGS-4
USGS-8

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Attachment 3
Sampling and Analysis Work Order

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Stoller

January 8, 2015

Task Assignment 104
Control Number 15-0237

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-LM0000415, The S.M. Stoller Corporation, a wholly owned subsidiary of Huntington Ingalls Industries (Stoller)
Task Assignment 104 LTS&M - Nevada Offsites and Monticello
January 2015 Environmental Sampling at the Gnome-Coach, New Mexico, Site

REFERENCE: Task Assignment 104, 3-104-1-07-617-4-02, 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 monitoring at the site. Water quality data will be collected from this site as part of the routine environmental sampling currently scheduled to begin the week of January 26, 2015.

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*. Access agreements are covered under the cooperative agreement.

Please contact me at (970) 248-6419 if you have any questions.

Sincerely,

Richard C. Findlay
Rick C. Findlay
2015.01.08 07:16:49
-07'00'

Richard C. Findlay
Site Lead

RCF/lcg/lb

Enclosures (3)

cc: (electronic)
Christina Pennal, DOE
Steve Donivan, Stoller
Richard Findlay, Stoller
Lauren Goodknight, Stoller
Diana Osborne, Stoller
EDD Delivery
rc-grand.junction
File: GNO 400.02

A SUBSIDIARY OF HUNTINGTON INGALLS INDUSTRIES
2597 Legacy Way • Grand Junction, CO 81503-1789 • Telephone (970) 248-6000 • Fax (970) 248-6040

Sampling Frequencies for Locations at 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
Enriched Tritium	USGS-1 only		10 pCi/L	Liquid Scintillation	LMR-15

Constituent Sampling Breakdown

Site	Gnome-Coach				
Analyte	**Groundwater**	**Surface Water**	**Required Detection Limit (mg/L)**	**Analytical Method**	**Line Item Code**
Uranium					
Vanadium					
Zinc					
Total No. of Analytes	4	0			

Notes: 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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Stoller Newport News Nuclear

Memorandum

DATE: February 4, 2015

TO: Rick Findlay

FROM: Jeff Price

SUBJECT: Trip Report (LTHMP Sampling)

Site: Gnome/Coach, NM

Dates of Sampling Event: January 26-29, 2015

Team Members: Rob Rice 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 Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites.

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-8	Duplicate	Groundwater	NCQ 052

RIN Number Assigned: RIN 15016738.

Sample Shipment: Samples were shipped to GEL Laboratories on January 29, 2015.

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

Site Code	Well ID	Date	Time	DTW (ft)	Comments
GNO01	USGS-1	1/27/2015	12:40	436.99	Pump not running; pump was off when crew arrived.
GNO01	USGS-4	1/27/2015	10:35	428.48	
GNO01	USGS-8	1/27/2015	11:30	421.29	
GNO01	DD-1	1/27/2015	13:30	990.40	Transducer removed post water level.

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

Site Specific Information: The damaged concrete pad was removed and replaced with a new (6-foot x 6-foot x 6-inch thick) concrete pad at well DD-1. The damaged well casing was excavated to a depth of 32 inches and replaced with a section of three inch schedule 80 pvc pipe. The pvc was slipped over the existing steel casing (very snug fig) and was sealed with several wraps of 2 inch 10 mil black plastic tape. Also, the original 2.5 inch steel well casing has completely corroded with only minor structural integrity remaining.

Picture 1. Steel well casing 32 inches below grade.

Picture 2. New PVC casing installed.

Picture 3. With steel protective casing prior to placing concrete.

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