

Data Validation Package

June 2014

**Groundwater, Surface Water, Produced
Water, and Natural Gas Sampling at the
Gasbuggy, New Mexico, Site**

October 2014



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Sampling Event Summary

Site: Gasbuggy Site, Rio Arriba County, New Mexico

Sampling Period: June 17–18, 2014

Annual natural gas and water monitoring was conducted for locations adjacent to Section 36, where the Gasbuggy test was conducted. Four groundwater wells, three surface locations, and seven natural gas wells were sampled. Produced water samples well collected from three of the natural gas wells. Produced water samples were not collected at locations 30-039-21744, 30-039-21620, 30-039-29988, and 30-039-30161 because of insufficient water.

Sampling and analyses were conducted as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites (LMS/PRO/S04351, continually updated)*. Duplicate samples were collected from locations 28.3.33.233 (S) and 30-039-21743.

Refer to Table 1 for produced water sample analytical results. Low levels of gross beta activity were detected in the samples of produced water from the natural gas production wells. The low levels detected are representative of natural background radioactivity and do not indicate the presence of detonation-related radionuclides.

Table 1. Gasbuggy Natural Gas Production Well – Produced Water Sample Analysis Results

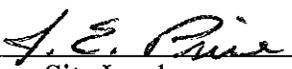
Sample Location (API #)	Collection Date	Tritium (pCi/L)	Gamma Spectrometry, Total (pCi/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)
Indian A No. 002 (30-039-07525)	06/18/2014	ND	ND	ND	20.6 ^a
Schalk 29-4 No. 017 (30-039-21743)	06/18/2014	ND	ND	ND	32.7 ^a
Valencia Canyon Unit No. 037 (30-039-21647)	06/18/2014	ND	ND	ND	33.7 ^a

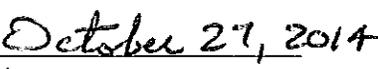
^a Estimated value.

pCi/L = picocuries per liter.

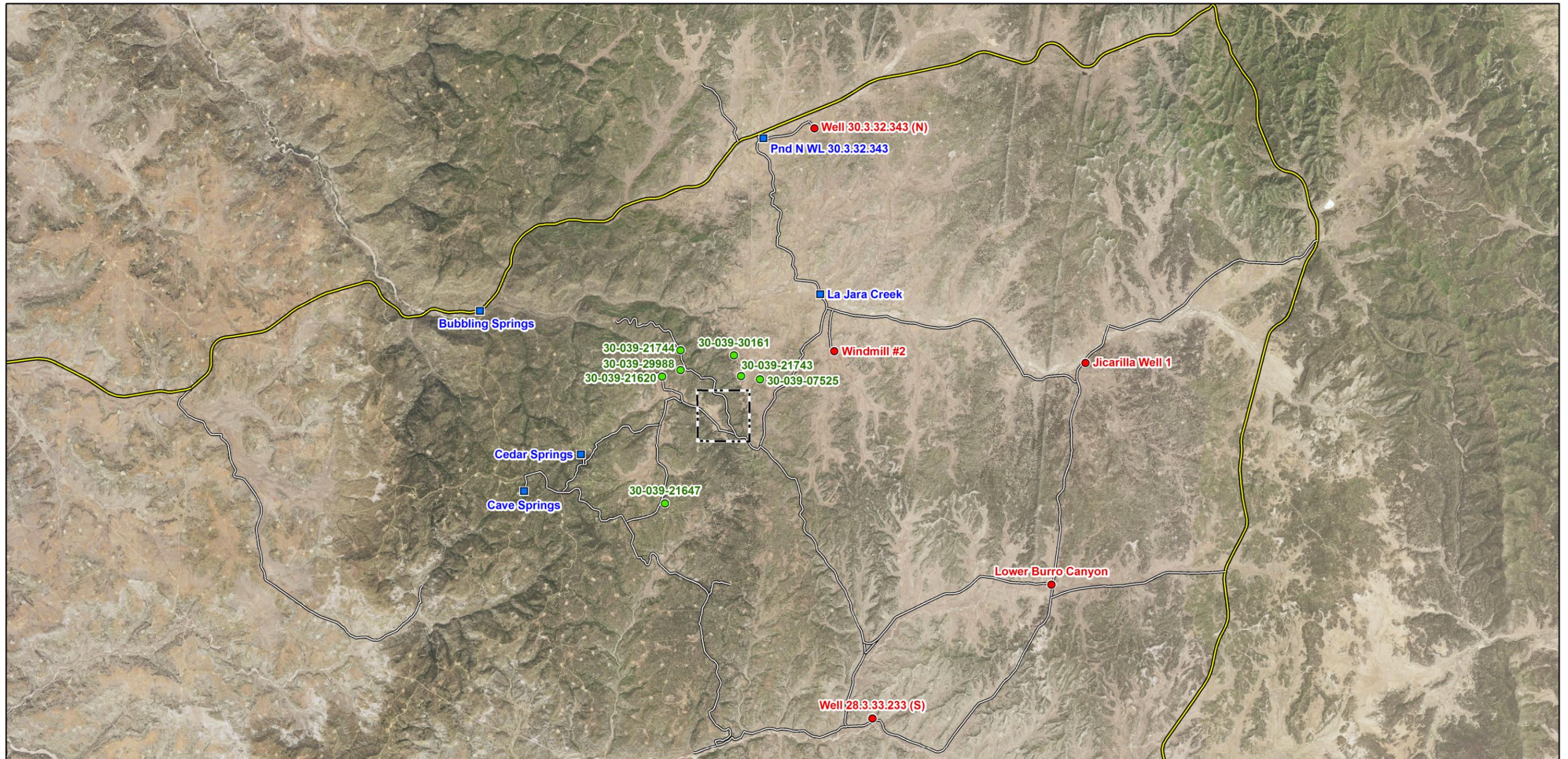
ND = Not detected, below the decision level concentration.

The natural gas samples were analyzed for carbon-14 and tritium. These radionuclides were not detected in any of the samples. The groundwater and surface water samples were analyzed for gamma-emitting nuclides and/or tritium. There were no radionuclides detected in any of these samples.


Jeff Price, Site Lead
The S.M. Stoller Corporation,
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Date

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LEGEND				U.S. DEPARTMENT OF ENERGY <small>GRAND JUNCTION, COLORADO</small>	<small>Work Performed by</small> S.M. Stoller Corporation <small>Under DOE Contract No. DE-AM01-07LM00090</small>
● GROUNDWATER WELL LOCATION ● GAS WELL LOCATION ■ SURFACE WATER LOCATION	= DIRT ROAD = PAVED ROAD - - - SITE BOUNDARY			June 2014 Sampling Locations Gasbuggy, NM, Site	

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Gasbuggy, New Mexico, Sample Location Map

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Gasbuggy, New Mexico	Date(s) of Water Sampling	June 17–18, 2014
Date(s) of Verification	September 29, 2014	Name of Verifier	Stephen Donovan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures? List any Program Directives or other documents, SOPs, instructions.	Yes	Work Order letter dated May 22, 2014; Program Directive GSB-13-01.
2. Were the sampling locations specified in the planning documents sampled?	No	Surface locations Bubbling Springs and Cedar Springs were dry. The windmill at well 28.3.33.233 (N) is not in operation. There was no produced water at four gas wells.
3. Were calibrations conducted as specified in the above-named documents?	Yes	Calibrations were performed on June 13, 2014.
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 was not measured at the groundwater and surface water locations.
6. Were wells categorized correctly?	Yes	All wells were Category IV.
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 meet criteria prior to sampling? Was the flow rate less than 500 mL/min?	NA	

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? Was one pump/tubing volume removed prior to sampling?	NA	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	Duplicate samples were collected from locations 28.3.33.233 (S) and 30-039-21743.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	Yes	One equipment blank was collected.
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 chilling was not required.
19. Were water levels measured at the locations specified in the planning documents?	NA	

Laboratory Performance Assessment

General Information

Requisition No. (RIN): 14066261
 Sample Event: June 17–18, 2014
 Site(s): Gasbuggy, New Mexico
 Laboratory: ALS Laboratory Group, Fort Collins, Colorado
 Work Order No.: 1406427
 Analysis: Radiochemistry
 Validator: Stephen Donovan
 Review Date: September 29, 2014

This validation was performed according to the *Environmental Procedures Catalog* (LMS/POL/S04325), “Standard Practice for Validation of Environmental Data.” The procedure was applied at Level 2, Data Deliverables Verification. 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 2.

Table 2. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Gross Alpha/Beta	GPC-A-001	PA SOP702R19	PA SOP724R10
Gamma Spectrometry	GAM-A-001	PA SOP739R9	PA SOP713R10
Tritium	LCS-A-001	PA SOP700R10	PA SOP704R9

Data Qualifier Summary

Analytical results were qualified as listed in Table 3. Refer to the sections below for an explanation of the data qualifiers applied.

Table 3. Data Qualifier Summary

Sample Number	Location	Analyte	Flag	Reason
1406427-1	30-039-07525	Gross Beta	J	Less than 3 times the MDC
1406427-2	30-039-21647	Gross Beta	J	Less than 3 times the MDC
1406427-3	30-039-21743	Gross Beta	J	Less than 3 times the MDC
1406427-5	Jicarilla Well 1	Actinium-228	U	Nuclide identification criteria not met
1406427-5	Jicarilla Well 1	Lead-212	U	Nuclide identification criteria not met
1406427-5	Jicarilla Well 1	Potassium-40	U	Nuclide identification criteria not met
1406427-5	Jicarilla Well 1	Thorium-234	U	Nuclide identification criteria not met
1406427-5	Jicarilla Well 1	Yttrium-88	U	Nuclide identification criteria not met
1406427-8	Well 28.3.33.233 (S)	Actinium-228	U	Nuclide identification criteria not met
1406427-8	Well 28.3.33.233 (S)	Uranium-235	U	Nuclide identification criteria not met

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 13 water samples on June 20, 2014, accompanied by a Chain of Custody (COC) form. The COC form was checked to confirm that 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. Copies of the air waybills were included with the receiving documentation.

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. Sample analysis was completed within the applicable holding times.

Detection and Quantitation Limits

Radiochemical analytes (those measured by radiometric counting) are evaluated using the minimum detectable concentration (MDC), Decision Level Concentration (DLC), and Determination Limit (DL). The MDC is a measure of radiochemical method performance and was calculated and reported as specified in *Quality Systems for Analytical Services*. The DLC is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, and is estimated as 3 times the one-sigma total propagated uncertainty. Results that are greater than the MDC, but less than the DLC are qualified with a “U” flag (not detected). The DL for radiochemical results is the lowest concentration that can be reliably measured, and is defined as 3 times the MDC. Results not previously “U” qualified that are less than the DL are qualified with a “J” flag as estimated values.

The reported MDCs for radiochemical analytes demonstrate compliance with contractual requirements with the following exceptions. The required MDCs were not met for gross alpha and gross beta because of the elevated levels of dissolved solids in the samples.

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.

Gamma Spectrometry

Activity concentrations above the MDC were reported in some instances where minimum nuclide identification criteria were not met. Such tentative identifications result when the

software attempts to calculate net activity concentrations for analytes where either one or both of the following criteria are not satisfied: the ‘diagnostic’ peak for a nuclide must be identified above the critical level, or the minimum library peak abundance must be attained. Sample results for gamma-emitting radionuclides that do not meet the identification criteria are qualified with a “U” flag as not detected.

Method Blank

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. All method blank results were below the applicable DLC.

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.

Laboratory Replicate Analysis

Laboratory replicate sample results demonstrate acceptable laboratory precision. The radiochemical relative error ratio (calculated using the one-sigma total propagated uncertainty) for the sample replicates was less than three for all duplicates.

Matrix Spike Analysis

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

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers.

Electronic Data Deliverable (EDD) File

The EDD file arrived on July 15, 2014. 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: 14066261 Lab Code: PAR Validator: Stephen Donovan Validation Date: 09/29/2014
Project: Gasbuggy Site Analysis Type: Metals General Chem Rad Organics
of Samples: 13 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 8 detection limit failures.

Field/Trip Blanks

Field Duplicates

There were 2 duplicates evaluated.

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 14066261 **Lab Code:** PAR **Date Due:** 07/18/2014
Matrix: Water **Site Code:** GSB01 **Date Completed:** 07/16/2014

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate RER
Windmill #2	Actinium-228	07/11/2014						1.49
Windmill #2	Americium-241	07/11/2014						2.58
Blank_Spike	Americium-241	07/11/2014				99.60		
Windmill #2	Antimony-125	07/11/2014						0.18
Windmill #2	Cerium-144	07/11/2014						0.55
Windmill #2	Cesium-134	07/11/2014						1.05
Windmill #2	Cesium-137	07/11/2014						0.04
Blank_Spike	Cesium-137	07/11/2014				102.00		
Windmill #2	Cobalt-60	07/11/2014						0.74
Blank_Spike	Cobalt-60	07/11/2014				96.30		
Windmill #2	Europium-152	07/11/2014						0.44
Windmill #2	Europium-154	07/11/2014						0.61
Windmill #2	Europium-155	07/11/2014						1.10
Blank_Spike	GROSS ALPHA	06/28/2014				105.00		
2644	GROSS ALPHA	06/28/2014					103.0	
Blank	GROSS ALPHA	06/28/2014	0.1500	U				
30-039-21743	GROSS ALPHA	06/29/2014						0.53
Blank_Spike	GROSS BETA	06/28/2014				101.00		
2644	GROSS BETA	06/28/2014					104.0	
Blank	GROSS BETA	06/28/2014	0.5200	U				
30-039-21743	GROSS BETA	06/29/2014						1.40
30-039-21743	H-3	07/12/2014						1.22
Pnd N WL 30.3	H-3	07/12/2014					96.4	
Blank_Spike	H-3	07/13/2014				97.10		
Blank	H-3	07/13/2014	-65.0000	U				
Windmill #2	Lead-212	07/11/2014						2.39
Windmill #2	Potassium-40	07/11/2014						
Windmill #2	Promethium-144	07/11/2014						1.53
Windmill #2	Promethium-146	07/11/2014						0.76
Windmill #2	Ruthenium-106	07/11/2014						1.17
Windmill #2	Thorium-234	07/11/2014						
Windmill #2	Uranium-235	07/11/2014						0.63

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 14066261 **Lab Code:** PAR **Date Due:** 07/18/2014
Matrix: Water **Site Code:** GSB01 **Date Completed:** 07/16/2014

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate RER
Windmill #2	Yttrium-88	07/11/2014						0.74

General Information

Requisition (RIN): 14066260
Sample Event: June 18, 2014
Site(s): Gasbuggy, New Mexico
Laboratory: Isotech Laboratories
Work Order No.: 25635
Analysis: Radiochemistry
Validator: Stephen Donivan
Review Date: September 29, 2014

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 1, Data Deliverables Examination. The data were examined to assess the completeness of the deliverables, identify any reporting errors, and assess the usability of the data based on the results of the field duplicate and the laboratory’s evaluation of their data, as described in the narrative provided. The data are acceptable as received. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 4.

Table 4. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Natural Gas Analysis	LMG-01	NA	Gas Chromatography
Carbon-14 and Tritium	LMG-03	Combustion	Liquid Scintillation Counting

Data Qualifier Summary

None of the analytical results required qualification.

Sample Shipping/Receiving

Isotech Laboratories received seven natural gas samples on June 20, 2014, accompanied by a COC 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.

Summary

Seven natural gas samples were received at Isotech Laboratories and analyzed by gas chromatography to determine the natural gas composition. The samples were then combusted with the resulting water collected for analysis. Carbon-14 and tritium were measured in the water collected by liquid scintillation counting. There were no analytical difficulties noted by the laboratory.

Completeness

The results of the gas chromatography analysis were reported in volume percent showing the average sample composition of 85 percent methane.

The carbon-14 results were reported in percent modern carbon. The tritium results were reported in tritium units. Carbon-14 and tritium were not detected in any of the samples.

Sampling Quality Control Assessment

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

Equipment Blank Assessment

One equipment blank was collected and analyzed during this event. There were no analytes detected in this blank.

Field Duplicate Analysis

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates which measure only laboratory performance. Duplicate samples were collected from locations 28.3.33.233 (S) and 30-039-21743. The radiochemical duplicate results had relative error ratios less than three, demonstrating acceptable precision.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

Page 1 of 2

RIN: 14066261 Lab Code: PAR Project: Gasbuggy Site Validation Date: 09/29/2014

Duplicate: 2644

Sample: 30-039-21743

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Actinium-228	16.7	U	15.6	1	14.2	U	14.3	1		0.2	pCi/L
Americium-241	0.828	U	18	1	5.97	U	18	1		0.4	pCi/L
Antimony-125	2.78	U	8.87	1	9.18	U	7.58	1		1.1	pCi/L
Cerium-144	2.68	U	15.6	1	2.37	U	14.1	1		0	pCi/L
Cesium-134	-2.45	U	3.96	1	-3.56	U	5.06	1		0.3	pCi/L
Cesium-137	-3.11	U	3.93	1	-0.576	U	3.51	1		0.9	pCi/L
Cobalt-60	0.461	U	4.99	1	1.41	U	3.91	1		0.3	pCi/L
Europium-152	0.509	U	21.6	1	-6.09	U	20.1	1		0.4	pCi/L
Europium-154	-3.09	U	22.3	1	-9.03	U	19.8	1		0.4	pCi/L
Europium-155	-0.416	U	8.8	1	-0.369	U	8.5	1		0	pCi/L
GROSS ALPHA	2.78	U	13.2	1	8.53	U	15	1		0.6	pCi/L
GROSS BETA	32.7		14.4	1	15.2	U	13.5	1		1.7	pCi/L
H-3	-211	U	191	1	-212	U	191	1		0	pCi/L
Lead-212	0.285	U	8.24	1	2.15	U	7.38	1		0.3	pCi/L
Potassium-40	13.9	U	108	1	12.4	U	80.6	1		0	pCi/L
Promethium-144	2.46	U	4.35	1	2.83	U	3.65	1		0.1	pCi/L
Promethium-146	1.27	U	4.25	1	-1.18	U	3.85	1		0.8	pCi/L
Ruthenium-106	-0.824	U	37.9	1	-17.3	U	33.1	1		0.6	pCi/L
Thorium-234	54.8	U	94.2	1	-31	U	82.8	1		1.3	pCi/L
Uranium-235	5.95	U	21.3	1	10.9	U	14	1		0.4	pCi/L
Yttrium-88	-7.32	U	10.8	1	5.59	U	4.46	1		2.2	pCi/L

Duplicate: 2645

Sample: Well 28.3.33.233 (S)

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Actinium-228	16.3	NQ	10.3	1	16.5	U	11.7	1		0	pCi/L
Americium-241	-0.05	U	2.91	1	6.71	U	15.6	1		0.8	pCi/L
Antimony-125	0.958	U	5.89	1	0.397	U	6.96	1		0.1	pCi/L
Cerium-144	-9.31	U	9.62	1	-5	U	12.4	1		0.5	pCi/L
Cesium-134	2.48	U	2.53	1	0.128	U	3.12	1		1.1	pCi/L
Cesium-137	-0.823	U	2.57	1	0.803	U	3.04	1		0.8	pCi/L
Cobalt-60	-1.68	U	2.73	1	1.86	U	3.26	1		1.6	pCi/L
Europium-152	2.44	U	14.5	1	-8.47	U	16.1	1		1.0	pCi/L
Europium-154	1.71	U	15.3	1	-0.56	U	16.3	1		0.2	pCi/L
Europium-155	5.92	U	4.05	1	-0.0816	U	6.88	1		1.5	pCi/L
H-3	-56.2	U	195	1	-91.9	U	192	1		0.3	pCi/L
Lead-212	-0.22	U	6.55	1	3.11	U	7.9	1		0.6	pCi/L
Potassium-40	10.6	U	61.2	1	-26.2	U	64.7	1		0.8	pCi/L
Promethium-144	2.2	U	2.75	1	0.833	U	3.48	1		0.6	pCi/L

SAMPLE MANAGEMENT SYSTEM
Validation Report: Field Duplicates

RIN: 14066261 Lab Code: PAR Project: Gasbuggy Site Validation Date: 09/29/2014

Duplicate: 2645

Sample: Well 28.3.33.233 (S)

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Promethium-146	-0.832	U	2.84	1	-1.63	U	3.21	1		0.4	pCi/L
Ruthenium-106	-4.36	U	23	1	8.69	U	26.7	1		0.7	pCi/L
Thorium-234	-2.5	U	39.4	1	13.4	U	71.1	1		0.4	pCi/L
Uranium-235	17.3	NQ	9.34	1	9.87	U	12.2	1		0.9	pCi/L
Yttrium-88	0.49	U	3.15	1	-2.16	U	8.48	1		0.6	pCi/L

Certification

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

Laboratory Coordinator: Stephen Donovan 10-15-2014
Stephen Donovan Date

Data Validation Lead: Stephen Donovan 10-15-2014
Stephen Donovan 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 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 GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: Jicarilla Well 1 WELL Mapping Grade GPS

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Actinium-228	pCi/L	06/17/2014	N001	17084	- 17084	30.2	NQ	U	#	17	11.9
Americium-241	pCi/L	06/17/2014	N001	17084	- 17084	3.95	U		#	50	29.9
Antimony-125	pCi/L	06/17/2014	N001	17084	- 17084	2.28	U		#	12	6.8
Cerium-144	pCi/L	06/17/2014	N001	17084	- 17084	4.9	U		#	23	14.1
Cesium-134	pCi/L	06/17/2014	N001	17084	- 17084	-2.25	U		#	5.3	3.07
Cesium-137	pCi/L	06/17/2014	N001	17084	- 17084	-1.34	U		#	5	2.84
Cobalt-60	pCi/L	06/17/2014	N001	17084	- 17084	-2.7	U		#	6.2	3.43
Europium-152	pCi/L	06/17/2014	N001	17084	- 17084	16.1	U		#	28	17.1
Europium-154	pCi/L	06/17/2014	N001	17084	- 17084	-11.6	U		#	28	15.8
Europium-155	pCi/L	06/17/2014	N001	17084	- 17084	-.456	U		#	12	7.18
Lead-212	pCi/L	06/17/2014	N001	17084	- 17084	14.1	NQ	U	#	6.8	4.76
Oxidation Reduction Potential	mV	06/17/2014	N001	17084	- 17084	175			#		
pH	s.u.	06/17/2014	N001	17084	- 17084	8.45			#		
Potassium-40	pCi/L	06/17/2014	N001	17084	- 17084	173	NQ	U	#	55	46.3
Promethium-144	pCi/L	06/17/2014	N001	17084	- 17084	1.65	U		#	5.5	3.33
Promethium-146	pCi/L	06/17/2014	N001	17084	- 17084	0.216	U		#	5.6	3.27
Ruthenium-106	pCi/L	06/17/2014	N001	17084	- 17084	-11.6	U		#	49	28.5
Specific Conductance	umhos /cm	06/17/2014	N001	17084	- 17084	1585			#		

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: Jicarilla Well 1 WELL Mapping Grade GPS

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Temperature	C	06/17/2014	N001	17084 - 17084	13.3			#		
Thorium-234	pCi/L	06/17/2014	N001	17084 - 17084	133	NQ	U	#	60	41.9
Tritium	pCi/L	06/17/2014	N001	17084 - 17084	-107	U		#	330	193
Turbidity	NTU	06/17/2014	N001	17084 - 17084	1.57			#		
Uranium-235	pCi/L	06/17/2014	N001	17084 - 17084	0.203	U		#	23	13.7
Yttrium-88	pCi/L	06/17/2014	N001	17084 - 17084	6.56	NQ	U	#	5.8	3.83

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: Lower Burro Canyon WELL Mapping Grade GPS

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Actinium-228	pCi/L	06/17/2014	0001	0	-	0	3.13	U		#	31	18.6
Americium-241	pCi/L	06/17/2014	0001	0	-	0	-7.1	U		#	26	15.4
Antimony-125	pCi/L	06/17/2014	0001	0	-	0	0.793	U		#	12	7.21
Cerium-144	pCi/L	06/17/2014	0001	0	-	0	1.01	U		#	21	12.7
Cesium-134	pCi/L	06/17/2014	0001	0	-	0	-1.41	U		#	5.3	3.05
Cesium-137	pCi/L	06/17/2014	0001	0	-	0	-.106	U		#	5.2	3.05
Cobalt-60	pCi/L	06/17/2014	0001	0	-	0	2	U		#	4.6	2.18
Europium-152	pCi/L	06/17/2014	0001	0	-	0	4.73	U		#	27	15.6
Europium-154	pCi/L	06/17/2014	0001	0	-	0	-1.53	U		#	29	16.9
Europium-155	pCi/L	06/17/2014	0001	0	-	0	2.24	U		#	12	7
Lead-212	pCi/L	06/17/2014	0001	0	-	0	0.469	U		#	13	7.66
Oxidation Reduction Potential	mV	06/17/2014	N001	0	-	0	180			#		
pH	s.u.	06/17/2014	N001	0	-	0	8.01			#		
Potassium-40	pCi/L	06/17/2014	0001	0	-	0	-36.4	U		#	110	62.2
Promethium-144	pCi/L	06/17/2014	0001	0	-	0	0.678	U		#	5.8	3.41
Promethium-146	pCi/L	06/17/2014	0001	0	-	0	1.52	U		#	5.2	3.1
Ruthenium-106	pCi/L	06/17/2014	0001	0	-	0	-18.7	U		#	48	27
Specific Conductance	umhos /cm	06/17/2014	N001	0	-	0	2815			#		

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: Lower Burro Canyon WELL Mapping Grade GPS

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Temperature	C	06/17/2014	N001	0	-	0	18.9			#		
Thorium-234	pCi/L	06/17/2014	0001	0	-	0	21.6	U		#	110	66
Tritium	pCi/L	06/17/2014	0001	0	-	0	-63.1	U		#	330	192
Turbidity	NTU	06/17/2014	N001	0	-	0	12			#		
Uranium-235	pCi/L	06/17/2014	0001	0	-	0	20.9	U		#	31	19.3
Yttrium-88	pCi/L	06/17/2014	0001	0	-	0	3.64	U		#	6.2	3.86

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: Well 28.3.33.233 (S) WELL Mapping Grade GPS

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Actinium-228	pCi/L	06/17/2014	N001	0	-	0	16.3	NQ	U	#	16	10.3
Actinium-228	pCi/L	06/17/2014	N002	0	-	0	16.5	U		#	18	11.7
Americium-241	pCi/L	06/17/2014	N001	0	-	0	-0.05	U		#	4.9	2.91
Americium-241	pCi/L	06/17/2014	N002	0	-	0	6.71	U		#	26	15.6
Antimony-125	pCi/L	06/17/2014	N001	0	-	0	0.958	U		#	10	5.89
Antimony-125	pCi/L	06/17/2014	N002	0	-	0	0.397	U		#	12	6.96
Cerium-144	pCi/L	06/17/2014	N001	0	-	0	-9.31	U		#	17	9.62
Cerium-144	pCi/L	06/17/2014	N002	0	-	0	-5	U		#	21	12.4
Cesium-134	pCi/L	06/17/2014	N001	0	-	0	2.48	U		#	4.3	2.53
Cesium-134	pCi/L	06/17/2014	N002	0	-	0	0.128	U		#	5.3	3.12
Cesium-137	pCi/L	06/17/2014	N001	0	-	0	-0.823	U		#	4.5	2.57
Cesium-137	pCi/L	06/17/2014	N002	0	-	0	0.803	U		#	5.1	3.04
Cobalt-60	pCi/L	06/17/2014	N001	0	-	0	-1.68	U		#	4.9	2.73
Cobalt-60	pCi/L	06/17/2014	N002	0	-	0	1.86	U		#	5.4	3.26
Europium-152	pCi/L	06/17/2014	N001	0	-	0	2.44	U		#	25	14.5
Europium-152	pCi/L	06/17/2014	N002	0	-	0	-8.47	U		#	29	16.1
Europium-154	pCi/L	06/17/2014	N001	0	-	0	1.71	U		#	26	15.3
Europium-154	pCi/L	06/17/2014	N002	0	-	0	-0.56	U		#	28	16.3

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: Well 28.3.33.233 (S) WELL Mapping Grade GPS

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Europium-155	pCi/L	06/17/2014	N001	0	-	0	5.92	U		#	6.4	4.05
Europium-155	pCi/L	06/17/2014	N002	0	-	0	-0.816	U		#	12	6.88
Lead-212	pCi/L	06/17/2014	N001	0	-	0	-0.22	U		#	11	6.55
Lead-212	pCi/L	06/17/2014	N002	0	-	0	3.11	U		#	13	7.9
Oxidation Reduction Potential	mV	06/17/2014	N001	0	-	0	165			#		
pH	s.u.	06/17/2014	N001	0	-	0	7.53			#		
Potassium-40	pCi/L	06/17/2014	N001	0	-	0	10.6	U		#	100	61.2
Potassium-40	pCi/L	06/17/2014	N002	0	-	0	-26.2	U		#	110	64.7
Promethium-144	pCi/L	06/17/2014	N001	0	-	0	2.2	U		#	4.5	2.75
Promethium-144	pCi/L	06/17/2014	N002	0	-	0	0.833	U		#	5.9	3.48
Promethium-146	pCi/L	06/17/2014	N001	0	-	0	-0.832	U		#	4.9	2.84
Promethium-146	pCi/L	06/17/2014	N002	0	-	0	-1.63	U		#	5.6	3.21
Ruthenium-106	pCi/L	06/17/2014	N001	0	-	0	-4.36	U		#	40	23
Ruthenium-106	pCi/L	06/17/2014	N002	0	-	0	8.69	U		#	45	26.7
Specific Conductance	umhos/cm	06/17/2014	N001	0	-	0	2225			#		
Temperature	C	06/17/2014	N001	0	-	0	14.3			#		
Thorium-234	pCi/L	06/17/2014	N001	0	-	0	-2.5	U		#	66	39.4
Thorium-234	pCi/L	06/17/2014	N002	0	-	0	13.4	U		#	120	71.1

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: Well 28.3.33.233 (S) WELL Mapping Grade GPS

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Tritium	pCi/L	06/17/2014	N001	0 - 0	-56.2	U		#	330	195
Tritium	pCi/L	06/17/2014	N002	0 - 0	-91.9	U		#	330	192
Turbidity	NTU	06/17/2014	N001	0 - 0	0.82			#		
Uranium-235	pCi/L	06/17/2014	N001	0 - 0	17.3	NQ	U	#	16	9.34
Uranium-235	pCi/L	06/17/2014	N002	0 - 0	9.87	U		#	20	12.2
Yttrium-88	pCi/L	06/17/2014	N001	0 - 0	0.49	U		#	5.4	3.15
Yttrium-88	pCi/L	06/17/2014	N002	0 - 0	-2.16	U		#	14	8.48

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: Windmill #2 WELL Mapping Grade GPS

Parameter	Units	Sample		Depth Range		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)	Lab		Data	QA			
Actinium-228	pCi/L	06/17/2014	0001	16949	-	16949	-2.12	U	#	38	22.7
Americium-241	pCi/L	06/17/2014	0001	16949	-	16949	-0.817	U	#	4.8	2.84
Antimony-125	pCi/L	06/17/2014	0001	16949	-	16949	2.81	U	#	11	5.76
Cerium-144	pCi/L	06/17/2014	0001	16949	-	16949	-1.72	U	#	16	9.68
Cesium-134	pCi/L	06/17/2014	0001	16949	-	16949	-1.01	U	#	4.6	2.61
Cesium-137	pCi/L	06/17/2014	0001	16949	-	16949	-1.33	U	#	4.4	2.51
Cobalt-60	pCi/L	06/17/2014	0001	16949	-	16949	-2.32	U	#	5.1	2.77
Europium-152	pCi/L	06/17/2014	0001	16949	-	16949	-7.32	U	#	25	13.8
Europium-154	pCi/L	06/17/2014	0001	16949	-	16949	-10.7	U	#	28	15.5
Europium-155	pCi/L	06/17/2014	0001	16949	-	16949	1.77	U	#	6.7	4
Lead-212	pCi/L	06/17/2014	0001	16949	-	16949	3.6	U	#	11	6.82
Oxidation Reduction Potential	mV	06/17/2014	N001	16949	-	16949	190		#		
pH	s.u.	06/17/2014	N001	16949	-	16949	8.69		#		
Potassium-40	pCi/L	06/17/2014	0001	16949	-	16949	-7.13	U	#	110	62.4
Promethium-144	pCi/L	06/17/2014	0001	16949	-	16949	-0.712	U	#	4.6	2.69
Promethium-146	pCi/L	06/17/2014	0001	16949	-	16949	0.527	U	#	4.7	2.8
Ruthenium-106	pCi/L	06/17/2014	0001	16949	-	16949	0	U	#	41	24.1
Specific Conductance	umhos/cm	06/17/2014	N001	16949	-	16949	1330		#		

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: Windmill #2 WELL Mapping Grade GPS

Parameter	Units	Sample		Depth Range		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID	(Ft BLS)			Lab	Data		
Temperature	C	06/17/2014	N001	16949	- 16949	14.8		#		
Thorium-234	pCi/L	06/17/2014	0001	16949	- 16949	18.7	U	#	69	41.9
Tritium	pCi/L	06/17/2014	0001	16949	- 16949	1.69	U	#	330	194
Turbidity	NTU	06/17/2014	N001	16949	- 16949	12.5		#		
Uranium-235	pCi/L	06/17/2014	0001	16949	- 16949	10.7	U	#	34	16.4
Yttrium-88	pCi/L	06/17/2014	0001	16949	- 16949	2.14	U	#	5.3	3.23

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

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

QA QUALIFIER:

- # Validated according to quality assurance guidelines.

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Surface Water Quality Data

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Surface Water Quality Data by Location (USEE102) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: Cave Springs SURFACE LOCATION Mapping Grade GPS

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Oxidation Reduction Potential	mV	06/17/2014	N001	155		#		
pH	s.u.	06/17/2014	N001	7.7		#		
Specific Conductance	umhos/cm	06/17/2014	N001	475		#		
Temperature	C	06/17/2014	N001	22.1		#		
Tritium	pCi/L	06/17/2014	N001	-10.2	U	#	330	196
Turbidity	NTU	06/17/2014	N001	7.44		#		

Surface Water Quality Data by Location (USEE102) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: La Jara Creek SURFACE LOCATION Mapping Grade GPS

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Oxidation Reduction Potential	mV	06/17/2014	N001	215		#		
pH	s.u.	06/17/2014	N001	8.14		#		
Specific Conductance	umhos/cm	06/17/2014	N001	5820		#		
Temperature	C	06/17/2014	N001	15.7		#		
Tritium	pCi/L	06/17/2014	0001	-69.4	U	#	330	193
Turbidity	NTU	06/17/2014	N001	34.9		#		

Surface Water Quality Data by Location (USEE102) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: Pnd N WL 30.3.32.343 SURFACE LOCATION Mapping Grade GPS

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Oxidation Reduction Potential	mV	06/17/2014	N001	150		#		
pH	s.u.	06/17/2014	N001	10.18		#		
Specific Conductance	umhos/cm	06/17/2014	N001	530		#		
Temperature	C	06/17/2014	N001	21.5		#		
Tritium	pCi/L	06/17/2014	0001	-134	U	#	330	191
Turbidity	NTU	06/17/2014	N001	145		#		

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

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

QA QUALIFIER:

- # Validated according to quality assurance guidelines.

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Produced Water Quality Data

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Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-07525 WELL Indian A No. 002; N-30-29N-3W; Producing Well

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Actinium-228	pCi/L	06/18/2014	N001	0	-	0	-553	U		#	39	23.3
Americium-241	pCi/L	06/18/2014	N001	0	-	0	32	U		#	53	32.8
Antimony-125	pCi/L	06/18/2014	N001	0	-	0	2.51	U		#	14	7.64
Cerium-144	pCi/L	06/18/2014	N001	0	-	0	10.1	U		#	26	15.5
Cesium-134	pCi/L	06/18/2014	N001	0	-	0	-4.11	U		#	5.9	3.33
Cesium-137	pCi/L	06/18/2014	N001	0	-	0	-3.31	U		#	5.8	3.2
Cobalt-60	pCi/L	06/18/2014	N001	0	-	0	0.748	U		#	6.2	3.59
Europium-152	pCi/L	06/18/2014	N001	0	-	0	1.29	U		#	29	16.5
Europium-154	pCi/L	06/18/2014	N001	0	-	0	1.15	U		#	33	19.3
Europium-155	pCi/L	06/18/2014	N001	0	-	0	2.08	U		#	15	8.86
Gross Alpha	pCi/L	06/18/2014	N001	0	-	0	20.2	U		#	21	14.1
Gross Beta	pCi/L	06/18/2014	N001	0	-	0	20.6		J	#	20	13
Lead-212	pCi/L	06/18/2014	N001	0	-	0	5.38	U		#	8.3	5.1
Potassium-40	pCi/L	06/18/2014	N001	0	-	0	13.9	U		#	170	101
Promethium-144	pCi/L	06/18/2014	N001	0	-	0	-.946	U		#	6.6	3.83
Promethium-146	pCi/L	06/18/2014	N001	0	-	0	-1.22	U		#	6.6	3.79
Ruthenium-106	pCi/L	06/18/2014	N001	0	-	0	-6	U		#	54	31.1
Thorium-234	pCi/L	06/18/2014	N001	0	-	0	37.6	U		#	140	85.7
Tritium	pCi/L	06/18/2014	N001	0	-	0	15.3	U		#	330	196
Uranium-235	pCi/L	06/18/2014	N001	0	-	0	-3.56	U		#	29	17.1
Yttrium-88	pCi/L	06/18/2014	N001	0	-	0	1.64	U		#	7.1	4.2

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-21647 WELL VALENCIA CANYON UNIT No. 037; M-14-28N-4W; Producing Well

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Actinium-228	pCi/L	06/18/2014	N001	0	-	0	13.6	U		#	20	9.69
Americium-241	pCi/L	06/18/2014	N001	0	-	0	-8.06	U		#	44	26
Antimony-125	pCi/L	06/18/2014	N001	0	-	0	-4.89	U		#	13	7.54
Cerium-144	pCi/L	06/18/2014	N001	0	-	0	-3.5	U		#	26	15.4
Cesium-134	pCi/L	06/18/2014	N001	0	-	0	-.196	U		#	8.1	4.8
Cesium-137	pCi/L	06/18/2014	N001	0	-	0	-.317	U		#	5.8	3.39
Cobalt-60	pCi/L	06/18/2014	N001	0	-	0	-.676	U		#	6.5	3.73
Europium-152	pCi/L	06/18/2014	N001	0	-	0	11.5	U		#	29	17.5
Europium-154	pCi/L	06/18/2014	N001	0	-	0	-12.3	U		#	32	17.8
Europium-155	pCi/L	06/18/2014	N001	0	-	0	2.6	U		#	15	8.72
Gross Alpha	pCi/L	06/18/2014	N001	0	-	0	2.17	U		#	19	10.8
Gross Beta	pCi/L	06/18/2014	N001	0	-	0	33.7		J	#	21	14.2
Lead-212	pCi/L	06/18/2014	N001	0	-	0	1.7	U		#	15	9.29
Potassium-40	pCi/L	06/18/2014	N001	0	-	0	-42.6	U		#	140	81.2
Promethium-144	pCi/L	06/18/2014	N001	0	-	0	-1.86	U		#	6.1	3.53
Promethium-146	pCi/L	06/18/2014	N001	0	-	0	-.493	U		#	6.6	3.88
Ruthenium-106	pCi/L	06/18/2014	N001	0	-	0	-7.48	U		#	52	30.1
Thorium-234	pCi/L	06/18/2014	N001	0	-	0	-22.4	U		#	150	86.7
Tritium	pCi/L	06/18/2014	N001	0	-	0	-15.6	U		#	330	195
Uranium-235	pCi/L	06/18/2014	N001	0	-	0	16.8	U		#	24	14.7
Yttrium-88	pCi/L	06/18/2014	N001	0	-	0	3.46	U		#	6.4	3.93

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-21743 WELL SCHALK 29-4 No. 017; I-25-29N-4W; Producing Well

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Actinium-228	pCi/L	06/18/2014	N001	0	-	0	16.7	U		#	25	15.6
Actinium-228	pCi/L	06/18/2014	N002	0	-	0	14.2	U		#	23	14.3
Americium-241	pCi/L	06/18/2014	N001	0	-	0	0.828	U		#	30	18
Americium-241	pCi/L	06/18/2014	N002	0	-	0	5.97	U		#	30	18
Antimony-125	pCi/L	06/18/2014	N001	0	-	0	2.78	U		#	16	8.87
Antimony-125	pCi/L	06/18/2014	N002	0	-	0	9.18	U		#	14	7.58
Cerium-144	pCi/L	06/18/2014	N001	0	-	0	2.68	U		#	26	15.6
Cerium-144	pCi/L	06/18/2014	N002	0	-	0	2.37	U		#	24	14.1
Cesium-134	pCi/L	06/18/2014	N001	0	-	0	-2.45	U		#	6.9	3.96
Cesium-134	pCi/L	06/18/2014	N002	0	-	0	-3.56	U		#	8.7	5.06
Cesium-137	pCi/L	06/18/2014	N001	0	-	0	-3.11	U		#	6.9	3.93
Cesium-137	pCi/L	06/18/2014	N002	0	-	0	-.576	U		#	6	3.51
Cobalt-60	pCi/L	06/18/2014	N001	0	-	0	0.461	U		#	8.6	4.99
Cobalt-60	pCi/L	06/18/2014	N002	0	-	0	1.41	U		#	6.6	3.91
Europium-152	pCi/L	06/18/2014	N001	0	-	0	0.509	U		#	38	21.6
Europium-152	pCi/L	06/18/2014	N002	0	-	0	-6.09	U		#	35	20.1
Europium-154	pCi/L	06/18/2014	N001	0	-	0	-3.09	U		#	39	22.3
Europium-154	pCi/L	06/18/2014	N002	0	-	0	-9.03	U		#	34	19.8

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-21743 WELL SCHALK 29-4 No. 017; I-25-29N-4W; Producing Well

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
				Lab	Data	QA						
Europium-155	pCi/L	06/18/2014	N001	0	-	0	-0.416	U		#	15	8.8
Europium-155	pCi/L	06/18/2014	N002	0	-	0	-0.369	U		#	14	8.5
Gross Alpha	pCi/L	06/18/2014	N001	0	-	0	2.78	U		#	23	13.2
Gross Alpha	pCi/L	06/18/2014	N002	0	-	0	8.53	U		#	25	15
Gross Beta	pCi/L	06/18/2014	N001	0	-	0	32.7		J	#	22	14.4
Gross Beta	pCi/L	06/18/2014	N002	0	-	0	15.2	U		#	22	13.5
Lead-212	pCi/L	06/18/2014	N001	0	-	0	0.285	U		#	14	8.24
Lead-212	pCi/L	06/18/2014	N002	0	-	0	2.15	U		#	12	7.38
Potassium-40	pCi/L	06/18/2014	N001	0	-	0	13.9	U		#	180	108
Potassium-40	pCi/L	06/18/2014	N002	0	-	0	12.4	U		#	140	80.6
Promethium-144	pCi/L	06/18/2014	N001	0	-	0	2.46	U		#	7.2	4.35
Promethium-144	pCi/L	06/18/2014	N002	0	-	0	2.83	U		#	6	3.65
Promethium-146	pCi/L	06/18/2014	N001	0	-	0	1.27	U		#	7.1	4.25
Promethium-146	pCi/L	06/18/2014	N002	0	-	0	-1.18	U		#	6.6	3.85
Ruthenium-106	pCi/L	06/18/2014	N001	0	-	0	-0.824	U		#	65	37.9
Ruthenium-106	pCi/L	06/18/2014	N002	0	-	0	-17.3	U		#	57	33.1
Thorium-234	pCi/L	06/18/2014	N001	0	-	0	54.8	U		#	160	94.2
Thorium-234	pCi/L	06/18/2014	N002	0	-	0	-31	U		#	140	82.8

Groundwater Quality Data by Location (USEE100) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-21743 WELL SCHALK 29-4 No. 017; I-25-29N-4W; Producing Well

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Tritium	pCi/L	06/18/2014	N001	0	-	0	-211	U		#	330	191
Tritium	pCi/L	06/18/2014	N002	0	-	0	-212	U		#	330	191
Uranium-235	pCi/L	06/18/2014	N001	0	-	0	5.95	U		#	35	21.3
Uranium-235	pCi/L	06/18/2014	N002	0	-	0	10.9	U		#	23	14
Yttrium-88	pCi/L	06/18/2014	N001	0	-	0	-7.32	U		#	18	10.8
Yttrium-88	pCi/L	06/18/2014	N002	0	-	0	5.59	U		#	7.1	4.46

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

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

QA QUALIFIER:

- # Validated according to quality assurance guidelines.

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Natural Gas Quality Data

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Gas Matrix Chemistry Data by Location (USEE510) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-07525 WELL, Natural Gas Well - Vertical, Indian A No. 002; N-30-29N-3W; Producing Well

Parameter	Units	Sample Date	Sample ID	Ticket Number	Elev. Range (Ft)	Matrix Subtype	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Carbon-14	pMC	06/18/2014	0001	MHT 732	-	NATURAL GAS - DRY	0.2	U		#		
Tritium	pCi/L	06/18/2014	0001	MHT 732	-	NATURAL GAS - DRY	0.0514	U		#		

Gas Matrix Chemistry Data by Location (USEE510) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-21620 WELL, Natural Gas Well - Vertical, SCHALK 29-4 No. 007; K-26-29N-4W; Producing Well

Parameter	Units	Sample Date	Sample ID	Ticket Number	Elev. Range (Ft)	Matrix Subtype	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Carbon-14	pMC	06/18/2014	0001	MHT 734	-	NATURAL GAS - DRY	0.2	U		#		
Tritium	pCi/L	06/18/2014	0001	MHT 734	-	NATURAL GAS - DRY	0.0514	U		#		

Gas Matrix Chemistry Data by Location (USEE510) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-21647 WELL, Natural Gas Well - Vertical, VALENCIA CANYON UNIT No. 037; M-14-28N-4W; Producing Well

Parameter	Units	Sample Date	Sample ID	Ticket Number	Elev. Range (Ft)	Matrix Subtype	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Carbon-14	pMC	06/18/2014	0001	MHT 735	-	NATURAL GAS - DRY	0.2	U		#		
Tritium	pCi/L	06/18/2014	0001	MHT 735	-	NATURAL GAS - DRY	0.0514	U		#		

Gas Matrix Chemistry Data by Location (USEE510) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-21743 WELL, Natural Gas Well - Vertical, SCHALK 29-4 No. 017; I-25-29N-4W; Producing Well

Parameter	Units	Sample Date	Sample ID	Ticket Number	Elev. Range (Ft)	Matrix Subtype	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Carbon-14	pMC	06/18/2014	0001	MHT 737	-	NATURAL GAS - DRY	0.2	U		#		
Tritium	pCi/L	06/18/2014	0001	MHT 737	-	NATURAL GAS - DRY	0.0514	U		#		

Gas Matrix Chemistry Data by Location (USEE510) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-21744 WELL, Natural Gas Well - Vertical, SCHALK 29-4 No. 014; B-26-29N-4W; Producing Well

Parameter	Units	Sample Date	Sample ID	Ticket Number	Elev. Range (Ft)	Matrix Subtype	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Carbon-14	pMC	06/18/2014	0001	MHT 733	-	NATURAL GAS - DRY	0.2	U		#		
Tritium	pCi/L	06/18/2014	0001	MHT 733	-	NATURAL GAS - DRY	0.0514	U		#		

Gas Matrix Chemistry Data by Location (USEE510) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-29988 WELL, Natural Gas Well - Angle, MANY CANYONS 29 04 26 No. 133; J-26-29N-4W; Producing Well, New Well 9/07

Parameter	Units	Sample Date	Sample ID	Ticket Number	Elev. Range (Ft)	Matrix Subtype	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Carbon-14	pMC	06/18/2014	0001	MHT 738	-	NATURAL GAS - DRY	0.2	U		#		
Tritium	pCi/L	06/18/2014	0001	MHT 738	-	NATURAL GAS - DRY	0.0514	U		#		

Gas Matrix Chemistry Data by Location (USEE510) FOR SITE GSB01, Gasbuggy Site

REPORT DATE: 09/29/2014

Location: 30-039-30161 WELL, Natural Gas Well - Angle, MANY CANYONS 29 4 25 No. 123; G-25-29N-4W; Producing Well, New Well 06/07

Parameter	Units	Sample		Ticket Number	Elev. Range (Ft)	Matrix Subtype	Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID					Lab	Data QA		
Carbon-14	pMC	06/18/2014	0001	MHT 736	-	NATURAL GAS - DRY	0.2	U	#		
Tritium	pCi/L	06/18/2014	0001	MHT 736	-	NATURAL GAS - DRY	0.0514	U	#		

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

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

QA QUALIFIER:

- # Validated according to quality assurance guidelines.

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Equipment Blank Data

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BLANKS REPORT

LAB: PARAGON/ALS LABORATORY GROUP (Fort Collins, CO)

RIN: 14066261

Report Date: 09/29/2014

Parameter	Site Code	Location ID	Sample		Units	Result	Qualifiers		Detection Limit	Uncertainty	Sample Type
			Date	ID			Lab	Data			
Tritium	GSB01	0999	06/18/2014	N001	pCi/L	-126	U		330	192	E

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

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

SAMPLE TYPES:

- E Equipment Blank.

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Attachment 3
Sampling and Analysis Work Order

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May 22, 2014

Task Order LM00-502
Control Number 14-0580

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, The S.M. Stoller Corporation, a wholly owned subsidiary of Huntington Ingalls Industries (Stoller)
June 2014 Environmental Sampling at Gasbuggy, New Mexico, Site

REFERENCE: Task Order LM00-502-07-616, Gasbuggy, New Mexico, Site

Dear Ms. Dayvault:

The purpose of this letter is to inform you of the upcoming sampling event at Gasbuggy, New Mexico. Enclosed are the map and tables specifying sample locations and analytes for routine monitoring at the Gasbuggy site. Sampling is currently scheduled to begin on June 17, 2014.

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

Monitoring Wells

Jicarilla Well 1 Lower Burro Canyon Well 30.3.32.343 (N) Well 28.3.33.233 (S)
Windmill #2

Surface Locations

Bubbling Springs Cave Springs Cedar Springs La Jara Creek
Pnd N WL 30.3.32.343

Gas and Produced Water Locations

30-039-07525 30-039-21620 30-039-21647 30-039-21743
30-039-21744 30-039-29988 30-039-30161

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 being reviewed and are expected to be complete by the beginning of fieldwork.

Please contact me at (970) 248-6592 if you have any questions or concerns.

Jalena Dayvault
Control Number 14-0580
Page 2

Sincerely,

 Jeff Price
2014.05.22
15:27:23 -06'00'

Jeff Price
Site Lead

JP/lcg/lb

Enclosures (3)

cc: (electronic)
Christina Pennal, DOE
Steve Donovan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
Jeff Price, Stoller
EDD Delivery
re-grand.junction
File: GSB 410.02(A)

Sampling Frequencies for Locations at Gasbuggy, New Mexico

Location ID	Quarterly	Semiannually	Annually	Every 5 Years	Not Sampled	Notes
Monitoring Wells						
Jicarilla Well 1				X		Windmill; next in 6/2014
Lower Burro Canyon				X		Windmill; next in 6/2014
Well 30.3.32.343 (N)				X		Windmill; next in 6/2014
Well 28.3.33.233 (S)				X		Windmill; next in 6/2014
Windmill #2				X		Windmill; next in 6/2014
Surface Locations						
Bubbling Springs				X		Next in 6/2014
Cave Springs				X		Next in 6/2014
Cedar Springs				X		Next in 6/2014
La Jara Creek				X		Next in 6/2014
Pnd N WL 30.3.32.343				X		Next in 6/2014
Gas and Produced Water Locations						
30-039-21744			X			
30-039-21620			X			
30-039-29988			X			
30-039-30161			X			
30-039-21743			X			
30-039-07525			X			
30-039-21647			X			

Annual GAS sampling conducted in June; water sampling every 5 years

Constituent Sampling Breakdown

Site	Gasbuggy				Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water	Gas	Produced Water			
Approx. No. Samples/yr	5	5	7	7			
<i>Field Measurements</i>							
Alkalinity							
Dissolved Oxygen	X	X					
Redox Potential							
pH	X	X					
Specific Conductance	X	X					
Turbidity	X						
Temperature	X	X					
<i>Laboratory Measurements</i>							
Aluminum							
Ammonia as N (NH ₃ -N)							
Calcium							
Carbon-14			X		NA	Accelerator Mass Spectrometry	LMR-16
Chloride							
Chromium							
Gamma Spec	X			X	10 pCi/L	Gamma Spectrometry	GAM-A- 001
Gross Alpha				X	2 pCi/L	EPA 900.0	GPC-A- 001
Gross Beta				X	4 pCi/L	EPA 900.0	GPC-A- 001
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							
Total Dissolved Solids							
Total Organic Carbon							
Tritium	X	X	X	X	400 pCi/L	Liquid Scintillation	LSC-A- 001

Constituent Sampling Breakdown

Site	Gasbuggy				Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water	Gas	Produced Water			
Uranium							
Vanadium							
Zinc							
Total No. of Analytes	2	1	2	4			

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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Memorandum

DATE: July 7, 2014
TO: Distribution
FROM: Jeff Price
SUBJECT: Trip Report (LTHMP Sampling)

Site: Gasbuggy, NM

Dates of Sampling Event: June 16-19, 2014

Team Members: David Atkinson and Jeff Price.

Number of Locations Sampled: Four groundwater wells, three surface locations, produced water from three natural gas wells, and natural gas from seven wells.

Locations Not Sampled/Reason: Bubbling Springs and Cedar Springs were dry; the windmill at Jicarilla Well North is not in operation; and there was no produced water at four gas wells.

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
2645	28.3.33.233 (S)	Duplicate	Groundwater	MHT 752
2644	30-039-21743	Duplicate	Produced Water	MHT 746
2649	N/A	Equipment Blank	N/A	MHU 936

RIN Number Assigned: Samples were assigned to RIN 14066261 (water) and RIN 14066260 (natural gas).

Sample Shipment: Samples were shipped on June 19, 2014.

Water Level Measurements: Water levels were not measured.

Trip Summary: The 2014 Gasbuggy, NM, hydrologic and natural gas sampling event was conducted during the week of June 16, 2014. Jalena Dayvault, DOE LM, and Jeff Price and David Atkinson (Stoller) participated in the sampling event. All the surface and groundwater samples were collected on June 17; all of the natural gas and produced water samples were collected on June 18. The following table lists the natural gas wells that were sampled.

Gas Well ID (API #)	Alternate Gas Well ID	Gas Well Operator	Point of Contact (Field Representative)	Notes
30-039-21744	B-26-29N-4W Schalk 29-4 No. 014	Schalk Development	Steve Atencio	Natural Gas only
30-039-21620	K-26-29N-4W Schalk 29-4 No. 007	Schalk Development	Steve Atencio	Natural Gas only
30-039-29988	J-26-29N-4W Many Canyons 29 04 26 No. 133	Black Hills Gas Resources, Inc.	Andrew Glinn	Natural Gas only
30-039-30161	G-25-29N-4W Many Canyons 29 4 25 No. 123	Black Hills Gas Resources, Inc.	Andrew Glinn	Natural Gas only
30-039-21743	I-25-29N-4W Schalk 29-4 No. 17	Schalk Development	Steve Atencio	Natural Gas and Produced Water
30-039-07525	N-30-29N-3W Indian A No. 002	WPX Energy	Matt Basye	Natural Gas and Produced Water
30-039-21647	M-14-28N-4W Valencia Canyon Unit No. 037	ConocoPhillips	Bobby Heinen Roman Lucero	Natural Gas and Produced Water

All gas samples will be analyzed for tritium and carbon-14; produced water samples, will be analyzed for tritium, gross alpha, gross beta, and gross gamma. Surface water samples will be analyzed for tritium; groundwater samples will be analyzed for tritium and gross gamma.

(JP/lcg)

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