

Data Validation Package

March 2011
Groundwater Sampling at the
Project Shoal Site

July 2011



U.S. DEPARTMENT OF
ENERGY

Legacy
Management

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Sampling Event Summary

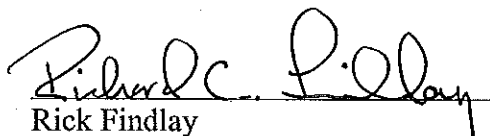
Site: Project Shoal Site

Sampling Period: March 22-23, 2011

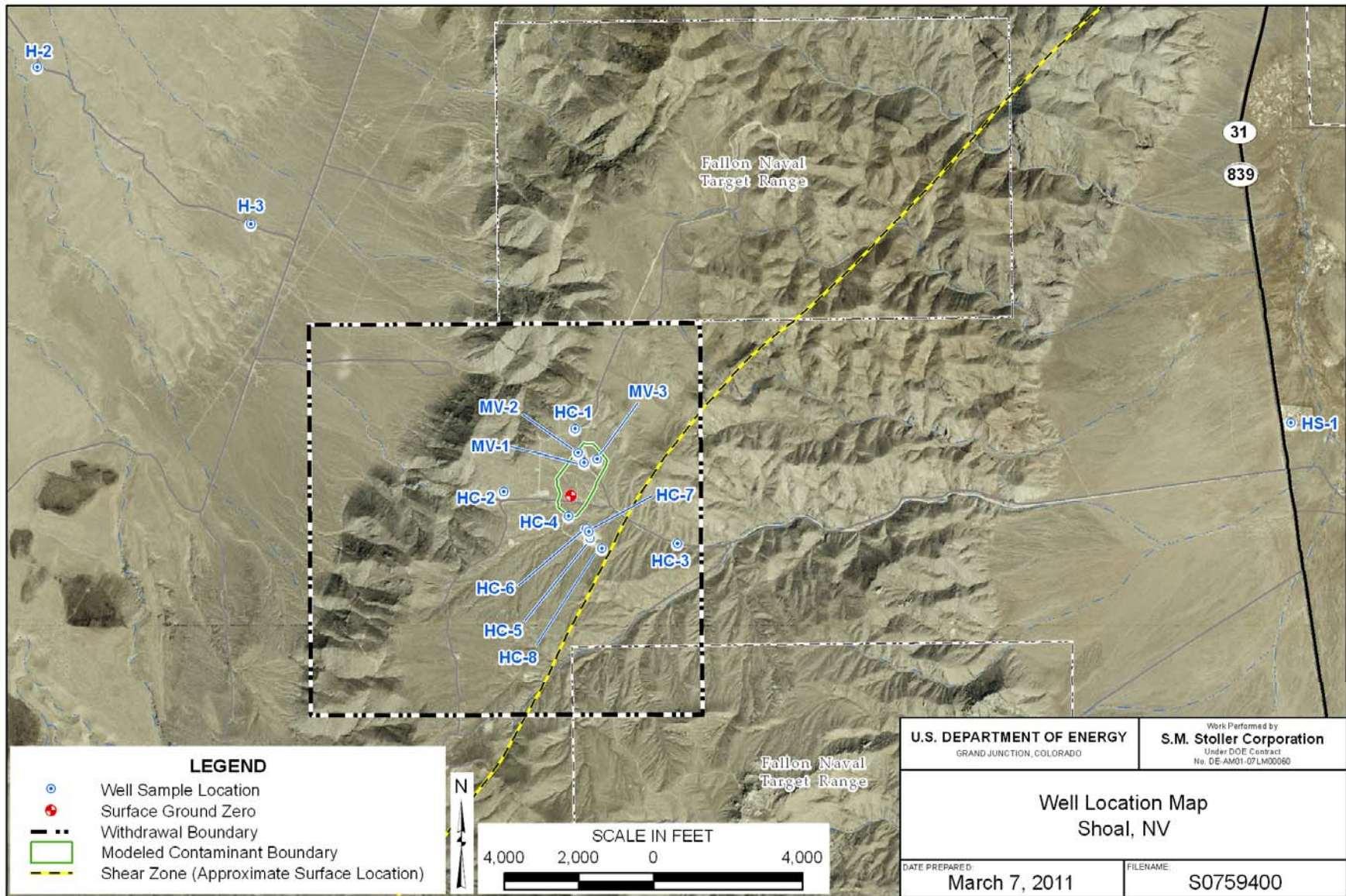
The U.S. Department of Energy Office of Legacy Management conducted annual sampling at the Project Shoal Area (Shoal) in March 2011. Wells HC-1, HC-2, HC-4, HC-5, HC-6, HC-7, MV-1, MV-2, and MV-3 were sampled as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PLN/S04351, continually updated). Two extra tritium samples were collected from well HC-4, one sample (HC-4-200) was collected at about 1/3 of the purge volume (135 gallons), the second sample (HC-4-400) was collected at 2/3 of purge volume (270 gallons). These additional samples were collected prior to completing the well purging process to evaluate the effects well purging has on the analytical results. Samples were not collected from locations HC-3 and HC-8 at the direction of the S.M. Stoller Corporation site lead.

Samples were submitted to ALS Laboratory Group in Fort Collins, Colorado, for the determination of gross alpha, gross beta, tritium, uranium isotopes, and total uranium. A duplicate sample from location MV-1 was included with this submittal.

Constituent concentrations are consistent with concentrations previously observed. The determination of tritium detection is made by comparing sample tritium results to the decision level concentration (DLC) calculated at the 99% confidence level. For sample results greater than the DLC (3 times the one-sigma total propagated uncertainty) a sample concentration of zero is not a probable result. Sample tritium results did not exceed the DLC for any wells except HC-4, where the concentration was 554 picocuries per liter. This is consistent with past results. Results shown on the time-concentration plot included in this report indicate that this is not an unusual occurrence for well HC-4. The presence of tritium in HC-4 is due to its proximity to the nuclear detonation location.


Rick Findlay
Site Lead, S.M. Stoller Corporation

1-11-2012
Date



Project Shoal Site Sample Location Map

Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Project Shoal, Nevada	Date(s) of Water Sampling	March 22–23, 2011
Date(s) of Verification	July 6, 2011	Name of Verifier	Steve Donovan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures? List other documents, SOPs, instructions.	Yes	Work Order letter dated March 4, 2011.
2. Were the sampling locations specified in the planning documents sampled?	No	Locations HC-3 and HC-8 were not sampled at the direction of the site lead.
3. Was a pre-trip calibration conducted as specified in the above-named documents?	No	Daily calibration was performed March 22, 23, 25, 2011
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?	Yes	
6. Was the category of the well documented?	Yes	
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling? Did the water level stabilize prior to sampling? Did pH, specific conductance, and turbidity measurements stabilize prior to sampling? Was the flow rate less than 500 mL/min? If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	NA	Wells HC-1, HC-2, and HC-6 were sampled using dedicated double check ball bailers.

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	Wells HC-4, HC-5, HC-7, MV-1, MV-2, and MV-3 were sampled using dedicated high-flow submersible pumps after one well casing volume had been purged.
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected from location MV-1.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	NA	An equipment blank was not required.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number? Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDCS) report?	Yes Yes	Location ID 2894 was used for the QC sample.
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Are field data sheets signed and dated by both team members (hardcopies) or are dates present for the "Date Signed" fields (FDCS)?	Yes	
18. Was all other pertinent information documented on the field data sheets?	Yes	
19. Was the presence or absence of ice in the cooler documented at every sample location?	NA	Sample chilling was not required.
20. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Report Number (RIN): 11033655
Sample Event: March 22–23, 2011
Site(s): Shoal Site, Nevada
Laboratory: ALS Laboratory Group, Fort Collins, CO
Work Order No.: 1103370
Analysis: Metals and Radiochemistry
Validator: Steve Donovan
Review Date: May 19, 2011

This validation was performed according to the *Environmental Procedures Catalog* (LMS/PRO/S04325), “Standard Practice for Validation of Laboratory Data.” The procedure was applied at Level 3, Data Validation. See attached Data Validation Worksheets for supporting documentation on the data review and validation. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Gross Alpha/Beta	GPC-A-001	EPA 900.0	EPA 900.0
Tritium	LCS-A-001	EPA 906.0	EPA 906.0
Uranium	LMM-02	SW-846 3005A	SW-846 6020
Uranium Isotopes	ASP-A-024	EPA 908.0, Modified	EPA 908.0, Modified

Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
1103370-2	HC-1	Gross Alpha	J	Less than the determination limit
1103370-2	HC-1	Gross Beta	J	Less than the determination limit
1103370-4	HC-4	Tritium	J	Less than the determination limit
1103370-6	HC-5	Gross Beta	J	Less than the determination limit
1103370-11	MV-3	Uranium-235	U	Less than the decision level concentration

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 12 water samples on March 31, 2011, accompanied by a Chain of Custody (COC) form. The COC form was checked to confirm that all of the samples were listed on the form 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. A copy of the air waybill label was included with the receiving documentation.

Preservation and Holding Times

The sample shipment was received intact at ambient temperature, which complies with requirements. The sample was received in the correct container type and had been preserved correctly for the requested analyses. Sample analyses were completed within the applicable holding times.

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.

Method SW-846 6020, Uranium

Calibration for uranium was performed on April 11, 2011, using four calibration standards, resulting in a calibration curve with a correlation coefficient (r^2) value greater than 0.995. The absolute value of the calibration curve intercept was less than 3 times the method detection limit (MDL). Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the required frequency, resulting in five calibration checks. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the beginning of each analytical sequence to verify the linearity of the calibration curve near the practical quantitation limit (PQL). All results were within the acceptance range. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries associated with requested analytes were stable and within acceptable ranges.

Radiochemical Analysis

Radiochemical results are qualified with a “U” flag (not detected) when the result is greater than the minimum detectable concentration (MDC) but less than the decision level concentration, estimated as 3 times the one-sigma total propagated uncertainty. Results above the decision level concentration and the MDC are qualified with a “J” flag (estimated) when the result is less than the determination limit (3 times the MDC).

Alpha Spectrometry

Alpha spectrometry calibrations were performed on April 5, 2011. Instrument background was determined on April 5, 2011. All daily instrument calibration and background checks met the acceptance criteria. The chemical recoveries met the acceptance criteria of 30 to 110 percent for all samples. The full width at half maximum (FWHM) was reviewed to evaluate the spectral resolution. All FWHM values were below 100, demonstrating acceptable resolution. All internal standard peaks were within 50 keV of the expected position. The regions of interest (ROIs) for analyte peaks were reviewed. No manual integrations were performed, and all ROIs were satisfactory.

Gross Alpha/Beta

Plateau calibrations were performed on November 21, 2010. Alpha and beta attenuation calibrations were completed on January 11, 2011, covering a range of 0 to 148.1 milligrams (mg). All standards were counted to a minimum of 10,000 counts. All calibration and background checks met acceptance criteria. The sample residual mass was between 43.4 mg and 86.1 mg for all samples.

Tritium

The tritium quench calibration curve was generated on February 20, 2010, for quench indicator values ranging from 141.5 to 259.5. Sample quench values were not within the calibration range for the original analysis. The samples were spiked with nitromethane to increase the quench to values within the calibration range and re-analyzed with acceptable results.

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.

Uranium

All method blank and initial and continuing calibration blank results associated with the samples were below the MDL.

Radiochemical Analysis

All radiochemical method blank results were below the decision level concentration.

Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Analysis

ICP interference check samples ICSA and ICSAB were analyzed at the required frequency to verify the instrumental interelement and background correction factors. All check sample results met the acceptance criteria.

Matrix Spike Analysis

Matrix spike samples were analyzed for gross alpha, gross beta, and tritium to determine the method performance in the sample matrix. The matrix spike recoveries were within the acceptance limit for these analytes.

Laboratory Replicate Analysis

The laboratory replicate sample results demonstrate acceptable laboratory precision. The relative percent difference values for the laboratory non-radiochemical replicate sample results were less than 20 percent relative difference for results that are greater than 5 times the PQL. The radiochemical relative error ratio for all laboratory replicate samples was less than three, indicating acceptable precision.

Laboratory Control Samples

Laboratory control samples (LCS) were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. The LCS results were acceptable for all analyses.

Detection Limits/Dilutions

No dilutions were required for sample analysis. The required detection limits were achieved for all analytes.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers. Both filtered and unfiltered sample aliquots were analyzed.

Electronic Data Deliverable (EDD) File

The EDD file with the complete data arrived on April 30, 2011. 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 that 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: 11033655 Lab Code: PAR Validator: Steve Donovan Validation Date: 5/19/2011
Project: Shoal Site Analysis Type: ☒ Metals ☐ General Chem ☒ Rad ☐ Organics
of Samples: 12 Matrix: WATER Requested Analysis Completed: Yes

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation: OK Temperature: OK

Select Quality Parameters

- ☒ Holding Times
- ☒ Detection Limits
- ☐ Field/Trip Blanks
- ☒ Field Duplicates

All analyses were completed within the applicable holding times.

There are 0 detection limit failures.

There was 1 duplicate evaluated.

SAMPLE MANAGEMENT SYSTEM

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Metals Data Validation Worksheet

RIN: 11033655

Lab Code: PAR

Date Due: 4/28/2011

Matrix: Water

Site Code: SHL01

Date Completed: 5/3/2011

Analyte	Method Type	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	ICV	CCV	ICB	CCB								
Uranium	ICP/MS	04/11/2011	0.0000	1.0000	OK	OK	OK	OK	OK	102.0	97.0	104.0	2.0	101.0	4.0	70.0
Uranium	ICP/MS	04/11/2011											0.0			100.0

SAMPLE MANAGEMENT SYSTEM

Radiochemistry Data Validation Worksheet

Page 1 of 1

RIN: 11033655 Lab Code: PAR Date Due: 4/28/2011
 Matrix: Water Site Code: SHL01 Date Completed: 5/3/2011

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
HC-4	GROSS ALPHA	04/14/2011						0.47
Blank_Spike	GROSS ALPHA	04/14/2011				75.10		
HC-6	GROSS ALPHA	04/14/2011					87.3	
Blank	GROSS ALPHA	04/14/2011	0.2800	U				
HC-4	GROSS BETA	04/14/2011						0.34
Blank_Spike	GROSS BETA	04/14/2011				92.30		
HC-6	GROSS BETA	04/14/2011					97.0	
Blank	GROSS BETA	04/14/2011	-0.1170	U				
HC-4	H-3	04/22/2011						0.11
HC-4-400	H-3	04/23/2011						0.29
HC-7	H-3	04/23/2011					108.0	
Blank_Spike	H-3	04/24/2011				104.00		
Blank	H-3	04/24/2011	-44.0000	U				
2894	U-234	04/06/2011			87.1			
HC-1	U-234	04/07/2011			76.0			
HC-2	U-234	04/07/2011			61.4			
HC-4	U-234	04/07/2011			91.1			
HC-5	U-234	04/07/2011			86.1			
HC-6	U-234	04/07/2011			77.2			
HC-7	U-234	04/07/2011			80.9			
MV-1	U-234	04/07/2011			82.2			
MV-2	U-234	04/07/2011			80.5			
MV-3	U-234	04/07/2011			78.8			
Blank_Spike	U-234	04/07/2011			76.9	95.60		
Blank_Spike_Du	U-234	04/07/2011			74.6	96.20		0.10
Blank	U-234	04/07/2011	0.0180	U	84.9			
Blank	U-235	04/07/2011	-0.0010	U				
Blank	U-238	04/07/2011	0.0210	U				
Blank_Spike	Uranium-238	04/07/2011				98.20		
Blank_Spike_Du	Uranium-238	04/07/2011				98.00		0

Sampling Quality Control Assessment

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

Sampling Protocol

Wells HC-4, HC-5, HC-7, MV-1, MV-2, and MV-3 were sampled using dedicated high-flow submersible pumps after one well casing volume had been purged and field parameters had stabilized. Two extra tritium samples were collected from well HC-4, one was collected at about 1/3 of the purge volume (135 gallons), the second was collected at 2/3 of purge volume (270 gallons). The tritium results for these extra samples are qualified with a “L” flag because less than one well casing volume was purged prior to sampling. Wells HC-1, HC-2, and HC-6 were sampled using a depth-specific bailer.

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. The relative percent difference for non-radiochemical duplicate results that are greater than 5 times the PQL should be less than 20 percent, and for results less than 5 times the PQL, the range should be no greater than the PQL. The radiochemical duplicate results should have a relative error ratio less than 3. A duplicate sample was collected from location MV-1. The duplicate results met these criteria, demonstrating acceptable overall precision.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

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RIN: 11033655 Lab Code: PAR Project: Shoal Site Validation Date: 5/19/2011

Duplicate: 2894

Sample: MV-1

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
GROSS ALPHA	16.6		3.07	1	14.3		2.75	1	14.89	1.1	pCi/L
GROSS BETA	10.4		2.05	1	10.2		2.13	1	1.94	0.1	pCi/L
H-3	-77.5	U	206	1	-90.1	U	212	1		0.1	pCi/L
U-234	10.8		1.86	1	10.4		1.78	1	3.77	0.3	pCi/L
Uranium	25			10	25			10	0		UG/L
Uranium-235	0.463		0.14	1	0.399		0.124	1	14.85	0.7	pCi/L
Uranium-238	8.89		1.55	1	8.77		1.51	1	1.36	0.1	pCi/L

Certification

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

Laboratory Coordinator:

Steve Donovan
Steve Donovan

7-20-2011

Date

Data Validation Lead:

Steve Donovan
Steve Donovan

7-20-2011

Date

Attachment 1

Assessment of Anomalous Data

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Potential Outliers Report

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Potential Outliers Report

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

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

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

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

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

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Attachment 2

Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location (USEE100) FOR SITE SHL01, Shoal Site

REPORT DATE: 7/6/2011

Location: HC-1 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Gross Alpha	pCi/L	03/22/2011	N001	1094	- 1324.8	2.19		J	#	1.2	1.07
Gross Beta	pCi/L	03/22/2011	N001	1094	- 1324.8	4.9		J	#	1.9	1.55
Oxidation Reduction Potential	mV	03/22/2011	N001	1094	- 1324.8	150			#		
pH	s.u.	03/22/2011	N001	1094	- 1324.8	8.3			#		
Specific Conductance	µmhos/cm	03/22/2011	N001	1094	- 1324.8	310			#		
Temperature	C	03/22/2011	N001	1094	- 1324.8	17.9			#		
Tritium	pCi/L	03/22/2011	N001	1094	- 1324.8	-81.8	U		#	360	212
Turbidity	NTU	03/22/2011	N001	1094	- 1324.8	61.8			#		
Uranium	mg/L	03/22/2011	N001	1094	- 1324.8	0.0016			#	0.000029	
Uranium-234	pCi/L	03/22/2011	N001	1094	- 1324.8	0.9			#	0.035	0.212
Uranium-235	pCi/L	03/22/2011	N001	1094	- 1324.8	0.0125	U		#	0.035	0.0268
Uranium-238	pCi/L	03/22/2011	N001	1094	- 1324.8	0.609			#	0.039	0.16

Groundwater Quality Data by Location (USEE100) FOR SITE SHL01, Shoal Site

REPORT DATE: 7/6/2011

Location: HC-2 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Dissolved Oxygen	mg/L	03/22/2011	N001	955	- 1223	6.6			#		
Gross Alpha	pCi/L	03/22/2011	N001	955	- 1223	197			#	1.5	31.8
Gross Beta	pCi/L	03/22/2011	N001	955	- 1223	206			#	2.9	33.1
Oxidation Reduction Potential	mV	03/22/2011	N001	955	- 1223	105.2			#		
pH	s.u.	03/22/2011	N001	955	- 1223	6.6			#		
Specific Conductance	µmhos/cm	03/22/2011	N001	955	- 1223	673			#		
Temperature	C	03/22/2011	N001	955	- 1223	17.12			#		
Tritium	pCi/L	03/22/2011	N001	955	- 1223	-37.9	U		#	360	212
Turbidity	NTU	03/22/2011	N001	955	- 1223	511			#		
Uranium	mg/L	03/22/2011	N001	955	- 1223	0.12			#	0.00015	
Uranium-234	pCi/L	03/22/2011	N001	955	- 1223	45.2			#	0.049	7.74
Uranium-235	pCi/L	03/22/2011	N001	955	- 1223	2.33			#	0.051	0.491
Uranium-238	pCi/L	03/22/2011	N001	955	- 1223	45.3			#	0.037	7.77

Ground Water Quality Data by Location (USEE100) FOR SITE SHL01, Shoal Site

REPORT DATE: 11/8/2011

Location: HC-4 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Gross Alpha	pCi/L	03/23/2011	N001	1013	- 1294	3.82			#	1	1.11
Gross Beta	pCi/L	03/23/2011	N001	1013	- 1294	6.16			#	1.5	1.46
Oxidation Reduction Potential	mV	03/23/2011	N001	1013	- 1294	-230			#		
pH	s.u.	03/23/2011	N001	1013	- 1294	7.45			#		
Specific Conductance	umhos /cm	03/23/2011	N001	1013	- 1294	765			#		
Temperature	C	03/23/2011	N001	1013	- 1294	20.7			#		
Tritium (HC-4)	pCi/L	03/23/2011	N001	1013	- 1294	554		J	#	360	244
Tritium (HC-4-400)	pCi/L	03/23/2011	N003	1013	- 1294	209	U	L	#	360	221
Tritium (HC-2-200)	pCi/L	03/23/2011	N006	1013	- 1294	324	U	L	#	360	228
Turbidity	NTU	03/23/2011	N001	1013	- 1294	30.4			#		
Uranium	mg/L	03/23/2011	N001	1013	- 1294	0.0089			#	0.000029	
Uranium-234	pCi/L	03/23/2011	N001	1013	- 1294	2.69			#	0.041	0.499
Uranium-235	pCi/L	03/23/2011	N001	1013	- 1294	0.144			#	0.039	0.0657
Uranium-238	pCi/L	03/23/2011	N001	1013	- 1294	2.86			#	0.03	0.527

Groundwater Quality Data by Location (USEE100) FOR SITE SHL01, Shoal Site

REPORT DATE: 7/6/2011

Location: HC-5 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Gross Alpha	pCi/L	03/23/2011	N001	3385.03 - 3530.63	1.32	U		#	2.1	1.3
Gross Beta	pCi/L	03/23/2011	N001	3385.03 - 3530.63	3.58		J	#	3.2	2.09
Oxidation Reduction Potential	mV	03/23/2011	N001	3385.03 - 3530.63	64			#		
pH	s.u.	03/23/2011	N001	3385.03 - 3530.63	8.28			#		
Specific Conductance	µmhos/cm	03/23/2011	N001	3385.03 - 3530.63	980			#		
Temperature	C	03/23/2011	N001	3385.03 - 3530.63	27.1			#		
Tritium	pCi/L	03/23/2011	N001	3385.03 - 3530.63	-236	U		#	360	209
Turbidity	NTU	03/23/2011	N001	3385.03 - 3530.63	1.77			#		
Uranium	mg/L	03/23/2011	N001	3385.03 - 3530.63	0.00045			#	0.000029	
Uranium-234	pCi/L	03/23/2011	N001	3385.03 - 3530.63	0.264			#	0.038	0.0897
Uranium-235	pCi/L	03/23/2011	N001	3385.03 - 3530.63	0.0113	U		#	0.032	0.0241
Uranium-238	pCi/L	03/23/2011	N001	3385.03 - 3530.63	0.117			#	0.038	0.0568

Groundwater Quality Data by Location (USEE100) FOR SITE SHL01, Shoal Site

REPORT DATE: 7/6/2011

Location: HC-6 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Gross Alpha	pCi/L	03/23/2011	N001	1115.98 - 1232.3	20.4			#	1.8	3.85
Gross Beta	pCi/L	03/23/2011	N001	1115.98 - 1232.3	15.5			#	3.4	3.37
Oxidation Reduction Potential	mV	03/23/2011	N001	1115.98 - 1232.3	100.6			#		
pH	s.u.	03/23/2011	N001	1115.98 - 1232.3	8.04			#		
Specific Conductance	µmhos/cm	03/23/2011	N001	1115.98 - 1232.3	1024			#		
Temperature	C	03/23/2011	N001	1115.98 - 1232.3	19			#		
Tritium	pCi/L	03/23/2011	N001	1115.98 - 1232.3	-23.2	U		#	360	213
Turbidity	NTU	03/23/2011	N001	1115.98 - 1232.3	13.9			#		
Uranium	mg/L	03/23/2011	N001	1115.98 - 1232.3	0.037			#	0.000029	
Uranium-234	pCi/L	03/23/2011	N001	1115.98 - 1232.3	15.4			#	0.042	2.62
Uranium-235	pCi/L	03/23/2011	N001	1115.98 - 1232.3	0.636			#	0.05	0.173
Uranium-238	pCi/L	03/23/2011	N001	1115.98 - 1232.3	13.5			#	0.042	2.3

Groundwater Quality Data by Location (USEE100) FOR SITE SHL01, Shoal Site

REPORT DATE: 7/6/2011

Location: HC-7 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Gross Alpha	pCi/L	03/23/2011	N001	1106.47 - 1223.6	10.6			#	1.6	2.31
Gross Beta	pCi/L	03/23/2011	N001	1106.47 - 1223.6	9.35			#	2.8	2.38
Oxidation Reduction Potential	mV	03/23/2011	N001	1106.47 - 1223.6	-275			#		
pH	s.u.	03/23/2011	N001	1106.47 - 1223.6	8.2			#		
Specific Conductance	µmhos/cm	03/23/2011	N001	1106.47 - 1223.6	1225			#		
Temperature	C	03/23/2011	N001	1106.47 - 1223.6	21.3			#		
Tritium	pCi/L	03/23/2011	N001	1106.47 - 1223.6	-134	U		#	360	209
Turbidity	NTU	03/23/2011	N001	1106.47 - 1223.6	2.42			#		
Uranium	mg/L	03/23/2011	N001	1106.47 - 1223.6	0.013			#	0.000029	
Uranium-234	pCi/L	03/23/2011	N001	1106.47 - 1223.6	5.9			#	0.044	1.05
Uranium-235	pCi/L	03/23/2011	N001	1106.47 - 1223.6	0.167			#	0.021	0.0766
Uranium-238	pCi/L	03/23/2011	N001	1106.47 - 1223.6	4.78			#	0.031	0.869

Groundwater Quality Data by Location (USEE100) FOR SITE SHL01, Shoal Site

REPORT DATE: 7/6/2011

Location: MV-1 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Gross Alpha	pCi/L	03/22/2011	N001	1572.73 - 1726.54	16.6			#	0.91	3.07
Gross Alpha	pCi/L	03/22/2011	N002	1572.73 - 1726.54	14.3			#	1.1	2.75
Gross Beta	pCi/L	03/22/2011	N001	1572.73 - 1726.54	10.4			#	1.6	2.05
Gross Beta	pCi/L	03/22/2011	N002	1572.73 - 1726.54	10.2			#	1.9	2.13
Oxidation Reduction Potential	mV	03/22/2011	N001	1572.73 - 1726.54	-34.5			#		
pH	s.u.	03/22/2011	N001	1572.73 - 1726.54	7.84			#		
Specific Conductance	µmhos/cm	03/22/2011	N001	1572.73 - 1726.54	728			#		
Temperature	C	03/22/2011	N001	1572.73 - 1726.54	21.74			#		
Tritium	pCi/L	03/22/2011	N001	1572.73 - 1726.54	-77.5	U		#	350	206
Tritium	pCi/L	03/22/2011	N002	1572.73 - 1726.54	-90.1	U		#	360	212
Turbidity	NTU	03/22/2011	N001	1572.73 - 1726.54	1.43			#		
Uranium	mg/L	03/22/2011	N001	1572.73 - 1726.54	0.025			#	0.000029	
Uranium	mg/L	03/22/2011	N002	1572.73 - 1726.54	0.025			#	0.000029	
Uranium-234	pCi/L	03/22/2011	N001	1572.73 - 1726.54	10.8			#	0.03	1.86
Uranium-234	pCi/L	03/22/2011	N002	1572.73 - 1726.54	10.4			#	0.04	1.78
Uranium-235	pCi/L	03/22/2011	N001	1572.73 - 1726.54	0.463			#	0.035	0.14
Uranium-235	pCi/L	03/22/2011	N002	1572.73 - 1726.54	0.399			#	0.038	0.124
Uranium-238	pCi/L	03/22/2011	N001	1572.73 - 1726.54	8.89			#	0.035	1.55
Uranium-238	pCi/L	03/22/2011	N002	1572.73 - 1726.54	8.77			#	0.028	1.51

Groundwater Quality Data by Location (USEE100) FOR SITE SHL01, Shoal Site

REPORT DATE: 7/6/2011

Location: MV-2 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Gross Alpha	pCi/L	03/22/2011	N001	1819.87 - 1990.64	9.92			#	1.3	2.43
Gross Beta	pCi/L	03/22/2011	N001	1819.87 - 1990.64	7.85			#	2	1.99
Oxidation Reduction Potential	mV	03/22/2011	N001	1819.87 - 1990.64	-135			#		
pH	s.u.	03/22/2011	N001	1819.87 - 1990.64	8.07			#		
Specific Conductance	µmhos/cm	03/22/2011	N001	1819.87 - 1990.64	485			#		
Temperature	C	03/22/2011	N001	1819.87 - 1990.64	22.8			#		
Tritium	pCi/L	03/22/2011	N001	1819.87 - 1990.64	-71.3	U		#	350	207
Turbidity	NTU	03/22/2011	N001	1819.87 - 1990.64	1.15			#		
Uranium	mg/L	03/22/2011	N001	1819.87 - 1990.64	0.023			#	0.000029	
Uranium-234	pCi/L	03/22/2011	N001	1819.87 - 1990.64	10.1			#	0.051	1.73
Uranium-235	pCi/L	03/22/2011	N001	1819.87 - 1990.64	0.471			#	0.034	0.139
Uranium-238	pCi/L	03/22/2011	N001	1819.87 - 1990.64	8.65			#	0.041	1.5

Groundwater Quality Data by Location (USEE100) FOR SITE SHL01, Shoal Site

REPORT DATE: 7/6/2011

Location: MV-3 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Gross Alpha	pCi/L	03/22/2011	N001	1463.59 - 1634.75	4.98			#	1.1	1.29
Gross Beta	pCi/L	03/22/2011	N001	1463.59 - 1634.75	5.26			#	1.7	1.41
Oxidation Reduction Potential	mV	03/22/2011	N001	1463.59 - 1634.75	-100.5			#		
pH	s.u.	03/22/2011	N001	1463.59 - 1634.75	8.06			#		
Specific Conductance	µmhos/cm	03/22/2011	N001	1463.59 - 1634.75	763			#		
Temperature	C	03/22/2011	N001	1463.59 - 1634.75	21.03			#		
Tritium	pCi/L	03/22/2011	N001	1463.59 - 1634.75	-107	U		#	350	204
Turbidity	NTU	03/22/2011	N001	1463.59 - 1634.75	0.98			#		
Uranium	mg/L	03/22/2011	N001	1463.59 - 1634.75	0.0058			#	0.000029	
Uranium-234	pCi/L	03/22/2011	N001	1463.59 - 1634.75	2.55			#	0.047	0.494
Uranium-235	pCi/L	03/22/2011	N001	1463.59 - 1634.75	0.064		U	#	0.055	0.0499
Uranium-238	pCi/L	03/22/2011	N001	1463.59 - 1634.75	2.2			#	0.036	0.436

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 SHL01, Shoal Site
REPORT DATE: 7/6/2011

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
HC-1		5309.21	03/22/2011	09:55:43	1062.6	4246.61
HC-2		5347.12	03/22/2011	16:55:25	1084.75	4262.37
HC-4		5260.9	03/23/2011	15:15:33	1009.95	4250.95
HC-5		5247.37	03/23/2011	09:40:29	1367.9	3879.47
HC-6		5228.68	03/23/2011	11:55:50	967.8	4260.88
HC-7		5229.72	03/23/2011	12:55:17	967.88	4261.84
MV-1		5257.54	03/22/2011	18:35:13	992.05	4265.49
MV-2		5266.62	03/22/2011	13:40:38	1001.25	4265.37
MV-3		5261.5	03/22/2011	15:35:24	974.42	4287.08

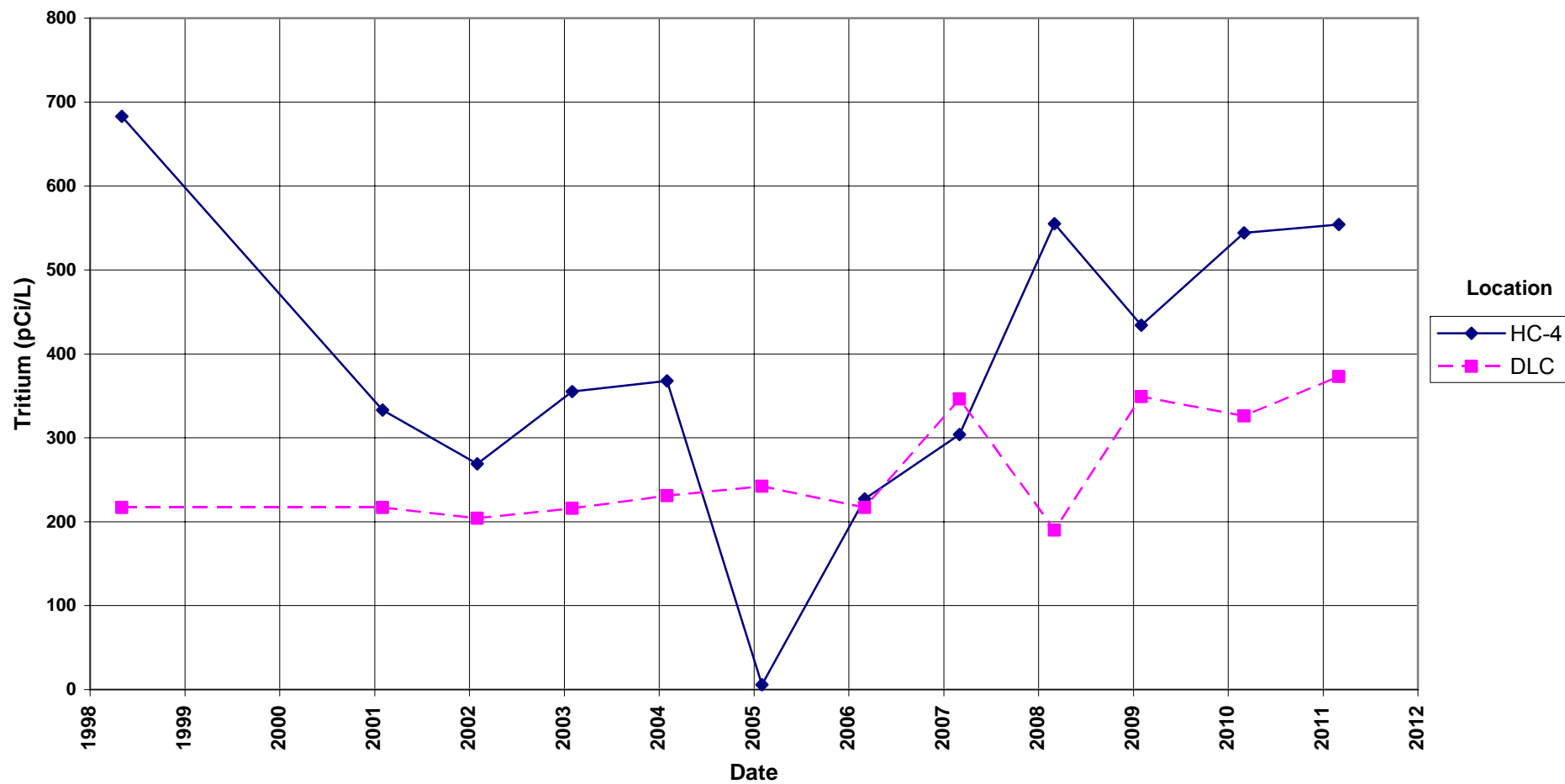
FLOW CODES: B BACKGROUND C CROSS GRADIENT D DOWNGRADIENT
F OFF SITE N UNKNOWN O ON SITE
U UPGRADIENT

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Time-Concentration Graphs

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Shoal Site
Tritium Concentration
DLC - Decision Level Concentration



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Attachment 3

Sampling and Analysis Work Order

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established 1959

Task Order LM00-502
Control Number 11-0406

March 4, 2011

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

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)
March 2011 Environmental Sampling at Shoal, Nevada

REFERENCE: Task Order LM00-502-07-621, Shoal, NV, Site

Dear Mr. Kautsky:

The purpose of this letter is to inform you of the upcoming sampling event at Shoal, Nevada. Enclosed are the map and tables specifying sample locations and analytes for routine monitoring at the Shoal site. Water quality data will be collected from monitoring wells at this site as part of the routine environmental sampling currently scheduled to start on or about March 10, 2011.

The following list shows the locations scheduled for sampling during this event.

Monitoring Wells

HC-1	HC-3	HC-5	HC-7	MV-1	MV-2	MV-3
HC-2	HC-4	HC-6	HC-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*.

Please call me with any questions at (970) 248-6419.

Sincerely,

Richard C. Findlay
Site Lead

RF/lcg/dc
Enclosures (3)

Mark Kautsky
Control Number 11-0406
Page 2

cc: (electronic)

Cheri Bahrke, Stoller
Steve Donovan, Stoller
Rick Findlay, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
EDD Delivery
rc-grand.junction
File: SHL 410.02 (A)

<p>Sampling Frequencies for Locations at Shoal, Nevada</p>

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
H-2					X	Download transducers
H-3					X	Download transducers
HC-1			X			Download transducers
HC-2			X			Download transducers
HC-3			X			Download transducers
HC-4			X			Download transducers
HC-5			X			Download transducers
HC-6			X			Download transducers
HC-7			X			Download transducers
HC-8			X			Download transducers
MV-1			X			Download transducers
MV-2			X			Download transducers
MV-3			X			Download transducers
Piezometers						
MV-1PZ					X	Download transducers
MV-2PZ					X	
MV-3PZ					X	Download transducers

Sampling conducted in March

Constituent Sampling Breakdown

Site	Shoal Site		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water			
Approx. No. Samples/yr	11				
Field Measurements					
Alkalinity					
Dissolved Oxygen					
Redox Potential					
pH	X				
Specific Conductance	X				
Turbidity	X				
Temperature	X				
Laboratory Measurements					
Aluminum					
Ammonia as N (NH3-N)					
Bromide					
Calcium					
Carbon-14					
Chloride					
Chromium					
Gamma Spec					
Gross Alpha	X		2 pCi/L	EPA 900.0	GPC-A-001
Gross Beta					
Iodine-129					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Nitrate + Nitrite as N (NO3+NO2)-N					
Potassium					
Selenium					
Sodium					
Strontium					
Sulfate					
Total Dissolved Solids					
Total Organic Carbon					
Tritium	X		400 pCi/L	Liquid Scintillation	LSC-A-001
Tritium, enriched					
Uranium-234, -235, -238	X		1 pCi/L	Alpha Spectrometry	ASP-A-024
Uranium	X		0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
Total No. of Analytes	4	0			

Note: All private well samples are to be unfiltered. The total number of analytes does not include field parameters.

Attachment 4

Trip Report

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Memorandum

Control Number N/A

DATE: April 5, 2010
TO: Rick Findlay
FROM: Jeff Price
SUBJECT: Trip Report (LTHMP Sampling)

Site: Shoal, Nevada

Dates of Sampling Event: March 21–24, 2011

Team Members: Dan Sellers and Jeff Price

Number of Locations Sampled: 9 on-site wells.

Locations Not Sampled/Reason: S.M. Stoller Corporation site lead directed sampling crew (while in the field) to not sample HC-3 and HC-8.

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
2894	MV-1	Duplicate	Groundwater	JES 280

RIN Number Assigned: Samples were assigned to RIN 11033655.

Sample Shipment: Samples were shipped on March 30, 2011.

Trip Summary: Dan Sellers and Jeff Price drove from the Grand Junction office to Fallon on March 21, 2011. Sampling activities began on March 22 and completed the next day. Two extra tritium samples were collected from HC-4, one was collected at about 1/3 of the purge volume (135 gallons), the second was collected at 2/3 of purge volume (270 gallons). Sampling crew returned to Grand Junction on March 23. Sitewide water level measurements and transducer downloading were completed by Rick Findlay and Rex Hodges on March 19. Wells HC-1, HC-2, and HC-6 were sampled using dedicated double check ball bailers attached to dedicated stainless steel cable.

Samples will be analyzed by ALS Laboratory Group for tritium, total uranium, isotopic uranium, and gross alpha/beta.

Water Level Measurements: The following table presents water level measurements collected prior to the beginning of sampling.

Well Number	Time	Depth to Water	Comments
MV-2PZ	10:15	1146.94	Installed transducer #156366
MV-2	11:05	1001.25	Serial number (S/N) 115907
MV-1PZ	12:15	977.18	S/N 115866
MV-1	12:35	992.05	S/N 115861
MV-3	13:05	974.42	S/N 117947
MV-3PZ	13:30	973.95	S/N 115868; replaced w/ 114607
HC-8	14:05	1370.85	S/N 115865
HC-5	14:50	1367.90	S/N 115828
HC-7	15:20	967.88	S/N 114756
HC-6	15:45	967.80	S/N 115856
HC-4	16:15	1009.95	S/N 117881
HC-2	16:45	1084.75	S/N 115838
HC-1	17:10	1062.60	S/N 115833 w/Baro 115872
HC-3	17:40	1179.59	S/N 115839
H-3	18:40	325.53	S/N 114612
H-2	19:20	110.00	S/N 113777 w/Baro 115874; started new tests for transducer and barometer

(JP/lcg)

cc: (electronic)
Mark Kautsky, DOE
Paul Darr, Stoller
Steve Donovan, Stoller
Jack Duray, Stoller
Rick Findlay, Stoller
Rex Hodges, Stoller
Mark Plessinger, Stoller
EDD Delivery