

Data Validation Package

June 2012
Water Sampling at the
Shirley Basin South, Wyoming, Site

September 2012

This page intentionally left blank

Contents

Sampling Event Summary	1
Shirley Basin South, Wyoming, Disposal Site Sample Location Map.....	3
Data Assessment Summary.....	5
Water Sampling Field Activities Verification Checklist.....	7
Laboratory Performance Assessment	9
Sampling Quality Control Assessment.....	21
Certification	23

Attachment 1—Assessment of Anomalous Data

Potential Outliers Report

Attachment 2—Data Presentation

Groundwater Quality Data
Static Water Level Data
Time-Concentration Graphs

Attachment 3—Sampling and Analysis Work Order

Attachment 4—Trip Report

This page intentionally left blank

Sampling Event Summary

Site: Shirley Basin South, Wyoming

Sampling Period: June 26–27, 2012

The 2004 *Long-Term Surveillance Plan for the Shirley Basin South (UMTRCA Title II) Disposal Site, Carbon County, Wyoming*, requires annual monitoring to verify continued compliance with the pertinent alternate concentration limits (ACLs) and Wyoming Class III (livestock use) groundwater protection standards. Point-of-compliance (POC) wells 19-DC, 5-DC, and 5-SC, and monitoring wells 10-DC, 40-SC, 54-SC, and K.G.S.#3 were sampled as specified in the plan. POC well 51-SC was dry at the time of sampling. Also sampled were four of the six newer monitoring wells installed downgradient of the disposal cell in 2008 (100-SC, 110-DC, 112-DC, and 113-DC); downgradient wells 101-SC and 102-SC were dry at the time of sampling. The water level was measured at each sampled well. Sampling and analysis were conducted in accordance with the *Sampling and Analysis Plan for the U. S. Department of Energy Office of Legacy Management Sites* (LMS/PLN/S04351, continually updated).

Monitoring wells with an “SC” suffix are completed in the upper sand aquifer of the Wind River Formation. Wells with a “DC” suffix are completed in the main sand aquifer. The upper and main sandstone units vary in thickness and lateral extent, and coalesce into one unit under the northern portion of the disposal cell and near the former open pit mine northeast of the disposal cell. Well K.G.S.#3 is completed in the lower sand aquifer, which is hydraulically separated from the overlying main sand and upper sand aquifers.

ACLs are approved for cadmium, chromium, lead, nickel, radium-226, radium-228, selenium, thorium-230, and uranium in site groundwater. The only ACLs that were exceeded were for radium-226 and radium-228.

As shown on Table 1, radium-228 concentrations remain above the ACL in well 54-SC, with no apparent trend (see page 60). The former licensee attributed elevated radium-228 levels at the site to natural thorium in the uranium ore. Consequently, the elevated concentrations in the well may represent the reestablishment of equilibrium of groundwater with naturally occurring constituents in the sand units. However, the cause for the elevated radium-228 concentrations continues to be evaluated. The radium-228 concentration in well 5-DC, which has historically been above the ACL, is below the ACL for this event.

Table 1. Wells with Results Exceeding an ACL

Analyte	ACL	110-DC	54-SC
Radium-226	91.3 pCi/L	170 pCi/L	
Radium-228	25.7 pCi/L		86.9 pCi/L

Key:
 ACL = alternate concentration limit
 pCi/L = picocuries per liter

Radium-226 concentrations continue to exceed the ACL in downgradient well 110-DC (Table 1), with no apparent trend during the last six sampling events (see page 59). There are insufficient data to definitively determine why radium-226 is elevated at well 110-DC. The highest radium-226 concentration for all other wells for this sampling event was 18.4 picocuries per liter (pCi/L) in well 10-DC, and for POC wells was 6.9 pCi/L in well 5-SC. This information, combined with low concentrations of sulfate and uranium at the well, suggests that the elevated radium-226 concentrations at well 110-DC do not represent a contaminant plume migrating off site; rather, they more likely represent natural conditions within the ore-bearing sand unit as aquifer recovery continues. However, the cause for the elevated radium-226 concentrations continues to be evaluated.

Concentrations of sulfate and total dissolved solids continue to exceed their respective Wyoming Class III groundwater protection standards for livestock use in wells 5-DC, 5-SC, and 54-SC as they have done throughout the sampling history; however, there is no livestock use of the water from these aquifers at the site, and no constituent concentrations exceed groundwater protection standards at the wells near the site boundary.



Richard K. Johnson
Site Lead, S.M. Stoller Corporation

9/21/12

Date



LEGEND ● Well to be Sampled - - - Site Boundary			U.S. DEPARTMENT OF ENERGY <small>GRAND JUNCTION, COLORADO</small>	<small>Work Performed by</small> S.M. Stoller Corporation <small>Under DGE Contract No. DE-AM01-07-M00063</small>
	Planned Sampling Map Shirley Basin South, WY, Disposal Site June 2012			
	<small>DATE PREPARED:</small> May 17, 2012	<small>FILENAME:</small> S0904700		

M:\LTS\111\0001\16\000\509047\50904700-11x17.mxd smithw 05/17/2012 9:39:34 AM

Shirley Basin South, Wyoming, Disposal Site Sample Location Map

This page intentionally left blank

Data Assessment Summary

This page intentionally left blank

Water Sampling Field Activities Verification Checklist

Project	<u>Shirley Basin South, Wyoming</u>	Date(s) of Water Sampling	<u>June 26-27, 2012</u>
Date(s) of Verification	<u>September 12, 2012</u>	Name of Verifier	<u>Gretchen Baer</u>

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures? List other documents, SOPs, instructions.	<u>Yes</u>	<u>Work Order letter dated May 24, 2012.</u>
2. Were the sampling locations specified in the planning documents sampled?	<u>No</u>	<u>Wells 51-SC, 101-SC, and 102-SC were dry.</u>
3. Was a pre-trip calibration conducted as specified in the above-named documents?	<u>Yes</u>	<u>Pre-trip calibration was performed on June 25, 2012.</u>
4. Was an operational check of the field equipment conducted daily? Did the operational checks meet criteria?	<u>Yes</u> <u>No</u>	 <u>A check indicated a malfunctioning temp probe. All temperature-dependent measurements (ORP, pH, and sp cond) for the affected locations (100-SC and 110-DC) are flagged with a "J".</u>
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	<u>Yes</u>	
6. Was the category of the well documented?	<u>Yes</u>	
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?	 <u>Yes</u> <u>Yes</u> <u>Yes</u> <u>Yes</u> <u>NA</u>	

Water Sampling Field Activities Verification Checklist (continued)

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well:		
Was the flow rate less than 500 mL/min?	Yes	
Was one pump/tubing volume removed prior to sampling?	Yes	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected from well 40-SC.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	NA	Dedicated equipment was used at all locations.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number?	Yes	Location ID 2174 was used for the duplicate sample.
Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDCS) report?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	Samples with turb>10 were filtered per the SAP.
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?	Yes	
20. Were water levels measured at the locations specified in the planning documents?	No	Water levels could not be measured at location K.G.S.#3 due to the quantity of tubing, rope, pipe installed in this well.

Laboratory Performance Assessment

General Information

Report Number (RIN): 12064635
Sample Event: June 26–27, 2012
Site(s): Shirley Basin South, Wyoming
Laboratory: ALS Laboratory Group, Fort Collins, Colorado
Work Order No.: 1206403
Analysis: Metals, Inorganic, and Radiochemistry
Validator: Gretchen Baer
Review Date: September 12, 2012

This validation was performed according to the *Environmental Procedures Catalog* (LMS/PRO/S04325, continually updated), “Standard Practice for Validation of Laboratory Data.” The procedure was applied at Level 3, Data Validation. See attached Data Validation Worksheets for supporting documentation on the data review and validation. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 2.

Table 2. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Cadmium, Lead, Selenium, Uranium	LMM-02	SW-846 3005A	SW-846 6020A
Chloride	MIS-A-039	SW-846 9056	SW-846 9056
Chromium, Nickel	LMM-01	SW-846 3005A	SW-846 6010B
Nitrate + Nitrite as N	WCH-A-022	MCAWW 353.2	MCAWW 353.2
Radium–226	GPC-A-018	SOP712	SOP724
Radium–228	GPC-A-020	SOP749	SOP724
Sulfate	MIS-A-044	SW-846 9056	SW-846 9056
Thorium Isotopes	ASP-A-008	SOP776, SOP777	SOP714
Total Dissolved Solids	WCH-A-033	MCAWW 160.1	MCAWW 160.1

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(s)	Flag	Reason
1206403-1	100-SC	Cadmium	U	Less than 5 times the method blank
1206403-1	100-SC	Chromium	J	Negative calibration blank
1206403-1	100-SC	Lead	U	Less than 5 times the method blank
1206403-1	100-SC	Nickel	J	Negative calibration blank
1206403-2	10-DC	Cadmium	U	Less than 5 times the method blank
1206403-2	10-DC	Chromium	J	Negative calibration blank
1206403-2	10-DC	Nickel	J	Negative calibration blank
1206403-2	10-DC	Radium-228	J	Yield adjusted by laboratory
1206403-3	110-DC	Cadmium	U	Less than 5 times the method blank
1206403-3	110-DC	Chromium	J	Negative calibration blank
1206403-3	110-DC	Nickel	J	Negative calibration blank
1206403-3	110-DC	Radium-228	J	Yield adjusted by laboratory
1206403-4	112-DC	Chromium	J	Negative calibration blank
1206403-4	112-DC	Lead	U	Less than 5 times the method blank
1206403-4	112-DC	Nickel	J	Negative calibration blank
1206403-5	113-DC	Chromium	J	Negative calibration blank
1206403-5	113-DC	Lead	U	Less than 5 times the method blank
1206403-5	113-DC	Nickel	J	Negative calibration blank
1206403-5	113-DC	Radium-228	J	Yield adjusted by laboratory
1206403-6	19-DC	Cadmium	U	Less than 5 times the method blank
1206403-6	19-DC	Chromium	J	Negative calibration blank
1206403-6	19-DC	Lead	U	Less than 5 times the method blank
1206403-6	19-DC	Radium-228	J	Yield adjusted by laboratory
1206403-6	19-DC	Thorium-228	J	Less than the Determination Limit
1206403-7	40-SC Dup, 2174	Cadmium	U	Less than 5 times the method blank
1206403-7	40-SC Dup, 2174	Chromium	J	Negative calibration blank
1206403-7	40-SC Dup, 2174	Lead	U	Less than 5 times the method blank
1206403-7	40-SC Dup, 2174	Radium-228	J	Less than the Determination Limit
1206403-8	40-SC	Cadmium	U	Less than 5 times the method blank
1206403-8	40-SC	Chromium	J	Negative calibration blank
1206403-8	40-SC	Radium-226	J	Less than the Determination Limit
1206403-8	40-SC	Radium-228	J	Less than the Determination Limit
1206403-9	54-SC	Cadmium	J	Reporting limit verification failure
1206403-9	54-SC	Radium-228	J	Yield adjusted by laboratory
1206403-10	5-DC	Cadmium	U	Less than 5 times the method blank
1206403-10	5-DC	Chromium	J	Negative calibration blank
1206403-10	5-DC	Radium-228	J	Yield adjusted by laboratory
1206403-10	5-DC	Thorium-232	J	Less than the Determination Limit
1206403-11	5-SC	Lead	U	Less than 5 times the method blank
1206403-11	5-SC	Radium-228	J	Yield adjusted by laboratory
1206403-12	K.G.S.#3	Chromium	J	Negative calibration blank
1206403-12	K.G.S.#3	Nickel	J	Negative calibration blank
1206403-12	K.G.S.#3	Radium-226	U	Less than the Decision Level Concentration
1206403-12	K.G.S.#3	Radium-228	J	Less than the Determination Limit
All	All	Radium-226	J	Yields adjusted by laboratory

Sample Shipping/Receiving

Twelve water samples were hand-delivered on June 28, 2012, to the ALS Laboratory Group in Fort Collins, Colorado, accompanied by a Chain of Custody (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.

Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced cooler at 0.2 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all metal and wet chemical analytes as required. The MDL, as defined in 40 CFR 136, is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured, and is defined as 5 times the MDL.

For radiochemical analytes (those measured by radiometric counting), the MDL and PQL are not applicable, and these results 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 MDLs for all metal and wet chemical analytes and MDCs for radiochemical analytes demonstrate compliance with contractual requirements. (Some MDCs for thorium at location 5-SC were slightly above the requested limit; however, the sample results were well above reporting limits, so no corrective action is required.)

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. All calibration and laboratory spike standards were prepared from independent sources.

Method MCAWW 160.1, Total Dissolved Solids

There is no initial or continuing calibration requirement associated with the determination of total dissolved solids.

Method MCAWW 353.2, Nitrate + Nitrite as N

Calibrations were performed on July 9, 2012, using seven calibration standards. The calibration curve correlation coefficient values were greater than 0.995, and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency, resulting in seven verification checks. All calibration checks met the acceptance criteria.

Method SW-846 6010B, Chromium and Nickel

Calibrations were performed on July 12, 2012, using three calibration standards. The calibration curve correlation coefficient values were greater than 0.995. The absolute values of the intercepts were less than or only slightly above 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency, resulting in 19 verification checks. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL, and all results were within the acceptance range.

Method SW-846 6020A, Cadmium, Lead, Selenium, and Uranium

Calibrations were performed on July 18 and 19, 2012, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995, and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency, resulting in 13 verification checks. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL. All results were within the acceptance range with the exception of cadmium, for which the check result was above the acceptance range. Affected (dilution-factor-corrected) results less than 5 times the PQL and above the MDL are qualified with a “J” flag (estimated). 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.

Method SW-846 9056, Chloride and Sulfate

Calibrations were performed on June 12, 2012, using five calibration standards. The calibration curve correlation coefficient values were greater than 0.995, and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency, resulting in six verification checks. All calibration checks met the acceptance criteria.

Radiochemical Analysis

Radium-226

Samples were screened for radium-226 by gas flow proportional counting. The potential for interference by other alpha-emitting radium isotopes was reduced by allowing a decay period of at least 14 days to elapse. Plateau voltage determinations were performed in October 2011, and efficiency calibrations were performed in January 2012. Daily instrument checks met the acceptance criteria. The chemical recoveries met the acceptance criteria of 40 to 110 percent for all samples. Chemical recoveries were adjusted by the laboratory to minimize possible low biases. The results are qualified with a “J” flag (estimated).

Radium-228

Plateau voltage determinations and detector efficiency calibrations were performed in November and December of 2011. Daily instrument checks performed on July 6, 2012, met the acceptance criteria. The chemical recoveries met the acceptance criteria of 40 to 110 percent for all samples. Chemical recoveries for some samples were adjusted by the laboratory to minimize possible low biases. The results for those samples are qualified with a “J” flag (estimated). For sample 54-SC, the laboratory noted that the alpha count rate exceeded threshold limits, which may indicate a slight high bias for the reported result. This result has been previously qualified.

Thorium Isotopes

Alpha spectrometry calibrations and instrument backgrounds were performed within a month prior to sample analysis. The tracer recoveries met the acceptance criteria of 30 to 110 percent for all samples. The full width at half maximum was reviewed to evaluate the spectral resolution. For several samples, the tracer full width at half maximum exceeded 100 kiloelectron volts, which is expected for isotopes such as thorium-229 with alpha emissions at multiple energies. These tracer peaks did not appear to compromise the data by contributing significantly to the thorium-230 region of interest. The laboratory noted that the thorium-230 results were corrected for thorium-229 contribution based on historical method blank data. All internal standard peaks were within 50 kiloelectron volts of the expected position. The regions of interest for analyte peaks were reviewed. No manual integrations were performed, and all regions of interest were satisfactory.

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.

Metals and Wet Chemistry

All method blank and calibration blank results associated with the samples were below the PQL for all analytes. In cases where a blank concentration exceeds the MDL, the associated sample results are qualified with a “U” flag (not detected) when the sample result is greater than the MDL but less than 5 times the blank concentration. For chromium and nickel, the calibration blanks were negative, and the absolute values were greater than the MDL but less than the PQL. Results less than 5 times the MDL are qualified with a “J” flag (estimated).

Radiochemistry

The radiochemistry method blank results were less than 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 interference and background correction factors. All check sample results met the acceptance criteria.

Matrix Spike Analysis

Matrix spike and matrix spike duplicate (MS/MSD) samples are used to measure method performance in the sample matrix for the metals and wet chemistry analyses. The MS/MSD data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike concentration. The spikes met the recovery and precision criteria for all analytes evaluated.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for non-radiochemical replicate results that are greater than 5 times the PQL should be less than or equal to 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. The replicate results met these criteria. The relative error ratio for radiochemical replicate results (calculated using the one-sigma total propagated uncertainty) was less than 3, indicating acceptable precision.

Laboratory Control Sample

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. All control sample results were acceptable with the exception of a radium-226 control sample, which was recovered above the acceptance range. All radium-226 results have been previously qualified.

Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. Serial dilution data are evaluated when the concentration of the undiluted sample is greater than 50 times the MDL. All evaluated serial dilution data were acceptable.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers. The analytical report included all required supporting documentation, the MDL and PQL for all non-radiochemical analytes, and the MDC for radiochemical analytes.

Chromatography Peak Integration

The integration of analyte peaks was reviewed for all ion chromatography data. All peak integrations were satisfactory.

Electronic Data Deliverable (EDD) File

The EDD file arrived on August 13, 2012. 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: 12064635 Lab Code: PAR Validator: Gretchen Baer Validation Date: 9/10/2012
Project: Shirley Basin South 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

Metals Data Validation Worksheet

RIN: 12064635Lab Code: PARDate Due: 7/26/2012Matrix: WaterSite Code: SBSDate Completed: 8/13/2012

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									
Chromium	ICP/ES	07/12/2012	-1.2500	1.0000	OK	OK	OK	OK	OK	93.0	84.0	84.0	0.0	93.0		105.0	
Nickel	ICP/ES	07/12/2012	-3.5000	1.0000	OK	OK	OK	OK	OK	100.0	92.0	92.0	0.0	94.0		100.0	
Cadmium	ICP/MS	07/18/2012	-0.0100	1.0000	OK	OK	OK	OK	OK	107.0	107.0	106.0	1.0	103.0		147.0	
Lead	ICP/MS	07/18/2012	-0.0670	1.0000	OK	OK	OK	OK	OK	100.0	104.0	103.0	1.0	102.0		86.0	
Selenium	ICP/MS	07/19/2012	-0.0330	1.0000	OK	OK	OK	OK	OK		106.0	103.0	3.0	100.0		99.0	
Selenium	ICP/MS	07/18/2012	-0.0190	1.0000	OK	OK	OK	OK	OK	97.0				102.0		106.0	
Uranium	ICP/MS	07/18/2012	-0.0010	1.0000	OK	OK	OK	OK	OK	103.0	107.0	109.0	1.0	104.0	1.0	110.0	
Uranium	ICP/MS	07/18/2012											1.0				

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 12064635 **Lab Code:** PAR **Date Due:** 7/26/2012
Matrix: Water **Site Code:** SBS **Date Completed:** 8/13/2012

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	ICV	CCV	ICB	CCB						
CHLORIDE	06/12/2012	-0.082	1.0000	OK		OK							
CHLORIDE	06/29/2012					OK	OK	OK	96.00	104.0	103.0	1.00	
CHLORIDE	06/29/2012									102.0			
Nitrate+Nitrite as N	07/09/2012	0.000	0.9999		OK	OK	OK	OK	103.00	105.0	103.0	2.00	
SULFATE	06/12/2012	0.356	0.9999	OK		OK							
SULFATE	06/29/2012					OK	OK	OK	98.00	103.0	102.0	0	
SULFATE	06/29/2012									103.0			
TOTAL DISSOLVED SOLIDS	07/02/2012							OK	99.00			4.00	

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 12064635 Lab Code: PAR Date Due: 7/26/2012
 Matrix: Water Site Code: SBS Date Completed: 8/13/2012

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
100-SC	Radium-226	08/09/2012			87			
10-DC	Radium-226	08/09/2012			86.7			
110-DC	Radium-226	08/09/2012			87.8			
112-DC	Radium-226	08/09/2012			77.3			
113-DC	Radium-226	08/09/2012			86.2			
19-DC	Radium-226	08/09/2012			83.6			
2174	Radium-226	08/09/2012			87.4			
40-SC	Radium-226	08/09/2012			90.5			
54-SC	Radium-226	08/09/2012			70.6			
5-DC	Radium-226	08/09/2012			77.8			
5-SC	Radium-226	08/09/2012			84.1			
K.G.S.#3	Radium-226	08/09/2012			79.4			
Blank_Spike	Radium-226	08/09/2012			87.5	125		
Blank_Spike_Du	Radium-226	08/09/2012			87.3	119		0.31
Blank	Radium-226	08/09/2012	0.0107	U	86.5			
100-SC	Radium-228	07/06/2012			93.6			
10-DC	Radium-228	07/06/2012			102			
110-DC	Radium-228	07/06/2012			102			
112-DC	Radium-228	07/06/2012			104			
113-DC	Radium-228	07/06/2012			103			
19-DC	Radium-228	07/06/2012			104			
2174	Radium-228	07/06/2012			102			
40-SC	Radium-228	07/06/2012			104			
54-SC	Radium-228	07/06/2012			103			
5-DC	Radium-228	07/06/2012			103			
5-SC	Radium-228	07/06/2012			102			
K.G.S.#3	Radium-228	07/06/2012			99.8			
Blank_Spike	Radium-228	07/06/2012			96.1	92.4		
Blank_Spike_Du	Radium-228	07/06/2012			101	93.8		0.09
Blank	Radium-228	07/06/2012	0.231	U	95.3			
100-SC	Thorium-228	07/07/2012			53.2			
10-DC	Thorium-228	07/07/2012			63.1			

SAMPLE MANAGEMENT SYSTEM
Radiochemistry Data Validation Worksheet

RIN: 12064635 Lab Code: PAR Date Due: 7/26/2012
 Matrix: Water Site Code: SBS Date Completed: 8/13/2012

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
110-DC	Thorium-228	07/07/2012			71.7			
112-DC	Thorium-228	07/07/2012			66.5			
113-DC	Thorium-228	07/07/2012			63.5			
19-DC	Thorium-228	07/07/2012			45.9			
2174	Thorium-228	07/07/2012			69.2			
40-SC	Thorium-228	07/07/2012			58			
54-SC	Thorium-228	07/07/2012			78.2			
5-DC	Thorium-228	07/07/2012			72.9			
5-SC	Thorium-228	07/07/2012			65.4			
K.G.S.#3	Thorium-228	07/07/2012			50.7			
54-SC	Thorium-228	07/07/2012			80.5			1.65
Blank	Thorium-228	07/07/2012	0.0174	U	65.9			
Blank_Spike	Thorium-230	07/07/2012			64.6	99		
54-SC	Thorium-230	07/07/2012						0.34
Blank	Thorium-230	07/07/2012	-0.0124	U	65.9			
54-SC	Thorium-232	07/07/2012						0.31
Blank	Thorium-232	07/07/2012	0	U	65.9			

Sampling Quality Control Assessment

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

Sampling Protocol

With the exception of well K.G.S.#3, sample results for all monitoring wells were qualified with an “F” flag in the database, indicating the wells were purged and sampled using the low-flow sampling method. Well K.G.S.#3 could not be sampled with the low-flow method, as explained in the trip report. All results for this well are qualified with a “J” flag (estimated). All low-flow wells met the Category I criteria with the exception of well 100-SC, which was classified as Category II. The sample results for this well are qualified with a “Q” flag, indicating the data are qualitative because of the sampling technique.

An operational check of a field instrument indicated a malfunctioning temperature probe. All temperature-dependent measurements (oxidation reduction potential, pH, and specific conductance) for the affected locations (wells 100-SC and 110-DC) are qualified with a “J” flag as estimated values.

Equipment Blank Assessment

An equipment blank was not required because samples were collected using dedicated equipment.

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 duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. A duplicate sample was collected from location 40-SC. The non-radiochemical duplicate results met the criteria, demonstrating acceptable overall precision. The relative error ratio for radiochemical duplicate results (calculated using the one-sigma total propagated uncertainty) was less than 3, indicating acceptable precision.

SAMPLE MANAGEMENT SYSTEM
Validation Report: Field Duplicates

Page 1 of 1

RIN: 12064635 Lab Code: PAR Project: Shirley Basin South Validation Date: 9/10/2012

Duplicate: 2174

Sample: 40-SC

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Cadmium	0.18	B		10	0.12	B		10			UG/L
CHLORIDE	33			50	34			20			MG/L
Chromium	0.51	U		1	0.51	U		1			UG/L
Lead	0.068	U		10	0.08	B		10			UG/L
Nickel	4.8	B		1	5.4			1	11.76		UG/L
Nitrate+Nitrite as N	0.85			1	0.87			1	2.33		MG/L
Radium-226	0.331		0.205	1	0.18	U	0.163	1		1.1	pCi/L
Radium-228	0.642		0.256	1	0.735		0.276	1		0.5	pCi/L
Selenium	3.7			10	3.9			10	5.26		UG/L
SULFATE	1500			50	1500			20	0		MG/L
Thorium-228	0.188	U	0.169	1	0.114	U	0.145	1		0.7	pCi/L
Thorium-230	-0.124	U	0.11	1	-0.0587	U	0.114	1		0.8	pCi/L
Thorium-232	0.0167	U	0.0489	1	0.00623	U	0.0404	1		0.3	pCi/L
TOTAL DISSOLVED SOLIDS	2300			1	2300			1	0		MG/L
Uranium	0.22			10	0.18			10	20.00		UG/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

9-21-2012
Date

Data Validation Lead:

Gretchen Baer
Gretchen Baer

9/21/12
Date

This page intentionally left blank

Attachment 1
Assessment of Anomalous Data

This page intentionally left blank

Potential Outliers Report

This page intentionally left blank

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.

One laboratory result was identified as a potential outlier. Total dissolved solids at location 5-DC was lower than previously observed; however, multiple analytes (including specific conductance, a field measurement) were also low, which indicates the result is likely not an error. The laboratory results from this sampling event are acceptable as qualified.

Two field measurements were identified as potential outliers. The turbidity at K.G.S.#3 was high due to difficulties encountered during sampling. The specific conductance measurement at 110-DC has been qualified for possible instrumentation error. All field data from this event are acceptable as qualified.

Data Validation Outliers Report - No Field Parameters

Comparison: All Historical Data

Laboratory: ALS Laboratory Group

RIN: 12064635

Report Date: 9/13/2012

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current			Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Qualifiers		Result	Qualifiers		Result	Qualifiers		N	N Below Detect	
						Lab	Data		Lab	Data		Lab	Data			
SBS01	110-DC	N001	06/27/2012	Lead	0.0098		F	0.0054		F	0.0018		F	6	0	No
SBS01	40-SC	N002	06/26/2012	Nickel	0.0054		F	0.19			0.0069		F	65	30	No
SBS01	40-SC	N001	06/26/2012	Nickel	0.0048	B	F	0.19			0.0069		F	65	30	No
SBS01	54-SC	N001	06/27/2012	Thorium-228	5.57		F	10.4		F	5.98		F	8	0	No
SBS01	54-SC	N001	06/27/2012	Thorium-232	3.48		F	8.72		F	3.93		F	8	0	No
SBS01	5-DC	0001	06/27/2012	Chloride	71		F	375			78.5			74	0	No
SBS01	5-DC	0001	06/27/2012	Chromium	0.00051	U	FJ	0.25			0.0045	B	F	61	29	No
SBS01	5-DC	0001	06/27/2012	Sulfate	3600		F	13000			3800			74	0	No
SBS01	5-DC	0001	06/27/2012	Thorium-228	1.4		F	8.33		F	1.97		F	8	0	No
SBS01	5-DC	0001	06/27/2012	Thorium-232	0.099		FJ	1.52		F	0.596		F	8	0	No
SBS01	5-DC	0001	06/27/2012	Total Dissolved Solids	5100		F	10000		F	6620			10	0	Yes
SBS01	5-SC	N001	06/27/2012	Thorium-228	47.6		F	58.1		F	47.8		F	9	0	No
SBS01	5-SC	N001	06/27/2012	Thorium-232	10.1		F	15.6		F	11.2		F	9	0	No
SBS01	K.G.S.#3	0001	06/27/2012	Total Dissolved Solids	570		J	517			430		FJ	8	0	No

STATISTICAL TESTS:

The distribution of the data is tested for normality or lognormality using the Shapiro-Wilk Test

Outliers are identified using Dixon's Test when there are 25 or fewer data points.

Outliers are identified using Rosner's Test when there are 26 or more data points.

See *Data Quality Assessment: Statistical Methods for Practitioners*, EPA QC/G-9S, February 2006.

Data Validation Outliers Report - Field Parameters Only

Comparison: All Historical Data

Laboratory: Field Measurements

RIN: 12064635

Report Date: 9/13/2012

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current			Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Qualifiers Lab	Data	Result	Qualifiers Lab	Data	Result	Qualifiers Lab	Data	N	N Below Detect	
SBS01	110-DC	N001	06/27/2012	Oxidation Reduction Potential	-56.6		FJ	860.2			-24.3		F	6	0	No
SBS01	110-DC	N001	06/27/2012	Specific Conductance	1841		FJ	4147		F	3435			6	0	Yes
SBS01	19-DC	N001	06/26/2012	Temperature	16.6		F	12.9		F	9.59			8	0	No
SBS01	54-SC	N001	06/27/2012	Oxidation Reduction Potential	319		F	306.8			1.1		F	8	0	No
SBS01	5-DC	N001	06/27/2012	Oxidation Reduction Potential	313.6		F	271.6		F	13.4		F	7	0	No
SBS01	5-DC	N001	06/27/2012	Turbidity	57.8		F	41.1		F	0.64		F	9	0	No
SBS01	K.G.S.#3	N001	06/27/2012	Turbidity	9999	>	J	46.5			1.52		F	7	0	Yes

STATISTICAL TESTS:

The distribution of the data is tested for normality or lognormality using the Shapiro-Wilk Test

Outliers are identified using Dixon's Test when there are 25 or fewer data points.

Outliers are identified using Rosner's Test when there are 26 or more data points.

See *Data Quality Assessment: Statistical Methods for Practitioners*, EPA QC/G-9S, February 2006.

This page intentionally left blank

Attachment 2

Data Presentation

This page intentionally left blank

Groundwater Quality Data

This page intentionally left blank

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: 10-DC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Cadmium	mg/L	06/26/2012	N001	180.8 - 220.8	0.00014	B	UF	#	0.00012	
Chloride	mg/L	06/26/2012	N001	180.8 - 220.8	56		F	#	4	
Chromium	mg/L	06/26/2012	N001	180.8 - 220.8	0.00051	U	FJ	#	0.00051	
Lead	mg/L	06/26/2012	N001	180.8 - 220.8	0.00087		F	#	0.000068	
Nickel	mg/L	06/26/2012	N001	180.8 - 220.8	0.00093	U	FJ	#	0.00093	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2012	N001	180.8 - 220.8	0.76		F	#	0.01	
Oxidation Reduction Potential	mV	06/26/2012	N001	180.8 - 220.8	-34.1		F	#		
pH	s.u.	06/26/2012	N001	180.8 - 220.8	6.64		F	#		
Radium-226	pCi/L	06/26/2012	N001	180.8 - 220.8	18.4		FJ	#	0.2	4.8
Radium-228	pCi/L	06/26/2012	N001	180.8 - 220.8	4.17		FJ	#	0.29	1.01
Selenium	mg/L	06/26/2012	N001	180.8 - 220.8	0.000032	U	F	#	0.000032	
Specific Conductance	umhos/cm	06/26/2012	N001	180.8 - 220.8	2091		F	#		
Sulfate	mg/L	06/26/2012	N001	180.8 - 220.8	1000		F	#	10	
Temperature	C	06/26/2012	N001	180.8 - 220.8	15.74		F	#		
Thorium-228	pCi/L	06/26/2012	N001	180.8 - 220.8	0.26	U	F	#	0.26	0.151
Thorium-230	pCi/L	06/26/2012	N001	180.8 - 220.8	0.25	U	F	#	0.25	0.108
Thorium-232	pCi/L	06/26/2012	N001	180.8 - 220.8	0.13	U	F	#	0.13	0.0448
Total Dissolved Solids	mg/L	06/26/2012	N001	180.8 - 220.8	1800		F	#	40	
Turbidity	NTU	06/26/2012	N001	180.8 - 220.8	7.89		F	#		
Uranium	mg/L	06/26/2012	N001	180.8 - 220.8	0.015		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: 100-SC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Cadmium	mg/L	06/27/2012	N001	210	- 225	0.00026	B	UFQ	#	0.00012	
Chloride	mg/L	06/27/2012	N001	210	- 225	150		FQ	#	4	
Chromium	mg/L	06/27/2012	N001	210	- 225	0.00051	U	FQJ	#	0.00051	
Lead	mg/L	06/27/2012	N001	210	- 225	0.00046	B	UFQ	#	0.000068	
Nickel	mg/L	06/27/2012	N001	210	- 225	0.0022	B	FQJ	#	0.00093	
Nitrate + Nitrite as Nitrogen	mg/L	06/27/2012	N001	210	- 225	0.015		FQ	#	0.01	
Oxidation Reduction Potential	mV	06/27/2012	N001	210	- 225	-34.2		FQJ	#		
pH	s.u.	06/27/2012	N001	210	- 225	7.3		FQJ	#		
Radium-226	pCi/L	06/27/2012	N001	210	- 225	5.34		FQJ	#	0.2	1.51
Radium-228	pCi/L	06/27/2012	N001	210	- 225	3.66		FQ	#	0.32	0.904
Selenium	mg/L	06/27/2012	N001	210	- 225	0.00015		FQ	#	0.000032	
Specific Conductance	umhos/cm	06/27/2012	N001	210	- 225	1425		FQJ	#		
Sulfate	mg/L	06/27/2012	N001	210	- 225	1100		FQ	#	10	
Thorium-228	pCi/L	06/27/2012	N001	210	- 225	0.31	U	FQ	#	0.31	0.187
Thorium-230	pCi/L	06/27/2012	N001	210	- 225	0.27	U	FQ	#	0.27	0.124
Thorium-232	pCi/L	06/27/2012	N001	210	- 225	0.11	U	FQ	#	0.11	0.0527
Total Dissolved Solids	mg/L	06/27/2012	N001	210	- 225	2000		FQ	#	40	
Turbidity	NTU	06/27/2012	N001	210	- 225	6.69		FQ	#		
Uranium	mg/L	06/27/2012	N001	210	- 225	0.0038		FQ	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: 110-DC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Cadmium	mg/L	06/27/2012	N001	255	- 305	0.00017	B	UF	#	0.00012	
Chloride	mg/L	06/27/2012	N001	255	- 305	210		F	#	10	
Chromium	mg/L	06/27/2012	N001	255	- 305	0.00051	U	FJ	#	0.00051	
Lead	mg/L	06/27/2012	N001	255	- 305	0.0098		F	#	0.000068	
Nickel	mg/L	06/27/2012	N001	255	- 305	0.00093	U	FJ	#	0.00093	
Nitrate + Nitrite as Nitrogen	mg/L	06/27/2012	N001	255	- 305	0.048		F	#	0.01	
Oxidation Reduction Potential	mV	06/27/2012	N001	255	- 305	-56.6		FJ	#		
pH	s.u.	06/27/2012	N001	255	- 305	6.68		FJ	#		
Radium-226	pCi/L	06/27/2012	N001	255	- 305	170		FJ	#	0.18	42.7
Radium-228	pCi/L	06/27/2012	N001	255	- 305	5.62		FJ	#	0.31	1.34
Selenium	mg/L	06/27/2012	N001	255	- 305	0.000095	B	F	#	0.000032	
Specific Conductance	umhos/cm	06/27/2012	N001	255	- 305	1841		FJ	#		
Sulfate	mg/L	06/27/2012	N001	255	- 305	1900		F	#	25	
Thorium-228	pCi/L	06/27/2012	N001	255	- 305	0.48	U	F	#	0.48	0.258
Thorium-230	pCi/L	06/27/2012	N001	255	- 305	0.45	U	F	#	0.45	0.222
Thorium-232	pCi/L	06/27/2012	N001	255	- 305	0.17	U	F	#	0.17	0.0802
Total Dissolved Solids	mg/L	06/27/2012	N001	255	- 305	3400		F	#	80	
Turbidity	NTU	06/27/2012	N001	255	- 305	7.27		F	#		
Uranium	mg/L	06/27/2012	N001	255	- 305	0.011		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: 112-DC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Cadmium	mg/L	06/26/2012	N001	203	- 253	0.00012	U	F	#	0.00012	
Chloride	mg/L	06/26/2012	N001	203	- 253	53		F	#	4	
Chromium	mg/L	06/26/2012	N001	203	- 253	0.00051	U	FJ	#	0.00051	
Lead	mg/L	06/26/2012	N001	203	- 253	0.00015	B	UF	#	0.000068	
Nickel	mg/L	06/26/2012	N001	203	- 253	0.00093	U	FJ	#	0.00093	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2012	N001	203	- 253	0.025		F	#	0.01	
Oxidation Reduction Potential	mV	06/26/2012	N001	203	- 253	-91.4		F	#		
pH	s.u.	06/26/2012	N001	203	- 253	7.19		F	#		
Radium-226	pCi/L	06/26/2012	N001	203	- 253	18.2		FJ	#	0.23	4.76
Radium-228	pCi/L	06/26/2012	N001	203	- 253	3.68		F	#	0.29	0.899
Selenium	mg/L	06/26/2012	N001	203	- 253	0.000046	B	F	#	0.000032	
Specific Conductance	umhos/cm	06/26/2012	N001	203	- 253	2278		F	#		
Sulfate	mg/L	06/26/2012	N001	203	- 253	1200		F	#	10	
Temperature	C	06/26/2012	N001	203	- 253	17.19		F	#		
Thorium-228	pCi/L	06/26/2012	N001	203	- 253	0.23	U	F	#	0.23	0.126
Thorium-230	pCi/L	06/26/2012	N001	203	- 253	0.23	U	F	#	0.23	0.119
Thorium-232	pCi/L	06/26/2012	N001	203	- 253	0.068	U	F	#	0.068	0.0408
Total Dissolved Solids	mg/L	06/26/2012	N001	203	- 253	2000		F	#	40	
Turbidity	NTU	06/26/2012	N001	203	- 253	0.94		F	#		
Uranium	mg/L	06/26/2012	N001	203	- 253	0.022		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: 113-DC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Cadmium	mg/L	06/26/2012	N001	235 - 285	0.00012	U	F	#	0.00012	
Chloride	mg/L	06/26/2012	N001	235 - 285	7.4		F	#	0.4	
Chromium	mg/L	06/26/2012	N001	235 - 285	0.00051	U	FJ	#	0.00051	
Lead	mg/L	06/26/2012	N001	235 - 285	0.00031	B	UF	#	0.000068	
Nickel	mg/L	06/26/2012	N001	235 - 285	0.00093	U	FJ	#	0.00093	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2012	N001	235 - 285	2.3		F	#	0.05	
Oxidation Reduction Potential	mV	06/26/2012	N001	235 - 285	-42.1		F	#		
pH	s.u.	06/26/2012	N001	235 - 285	7.44		F	#		
Radium-226	pCi/L	06/26/2012	N001	235 - 285	3.41		FJ	#	0.17	1.02
Radium-228	pCi/L	06/26/2012	N001	235 - 285	2.32		FJ	#	0.3	0.599
Selenium	mg/L	06/26/2012	N001	235 - 285	0.000032	U	F	#	0.000032	
Specific Conductance	umhos/cm	06/26/2012	N001	235 - 285	1490		F	#		
Sulfate	mg/L	06/26/2012	N001	235 - 285	640		F	#	10	
Temperature	C	06/26/2012	N001	235 - 285	19.56		F	#		
Thorium-228	pCi/L	06/26/2012	N001	235 - 285	0.31	U	F	#	0.31	0.182
Thorium-230	pCi/L	06/26/2012	N001	235 - 285	0.24	U	F	#	0.24	0.127
Thorium-232	pCi/L	06/26/2012	N001	235 - 285	0.062	U	F	#	0.062	0.0449
Total Dissolved Solids	mg/L	06/26/2012	N001	235 - 285	1100		F	#	40	
Turbidity	NTU	06/26/2012	N001	235 - 285	2.19		F	#		
Uranium	mg/L	06/26/2012	N001	235 - 285	0.0011		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: 19-DC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Cadmium	mg/L	06/26/2012	N001	177 - 237	0.00017	B	UF	#	0.00012	
Chloride	mg/L	06/26/2012	N001	177 - 237	62		F	#	10	
Chromium	mg/L	06/26/2012	N001	177 - 237	0.00051	U	FJ	#	0.00051	
Lead	mg/L	06/26/2012	N001	177 - 237	0.00013	B	UF	#	0.000068	
Nickel	mg/L	06/26/2012	N001	177 - 237	0.23		F	#	0.00093	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2012	N001	177 - 237	0.026		F	#	0.01	
Oxidation Reduction Potential	mV	06/26/2012	N001	177 - 237	-85.8		F	#		
pH	s.u.	06/26/2012	N001	177 - 237	6.64		F	#		
Radium-226	pCi/L	06/26/2012	N001	177 - 237	5.84		FJ	#	0.2	1.65
Radium-228	pCi/L	06/26/2012	N001	177 - 237	4.56		FJ	#	0.3	1.1
Selenium	mg/L	06/26/2012	N001	177 - 237	0.000052	B	F	#	0.000032	
Specific Conductance	umhos/cm	06/26/2012	N001	177 - 237	2917		F	#		
Sulfate	mg/L	06/26/2012	N001	177 - 237	1700		F	#	25	
Temperature	C	06/26/2012	N001	177 - 237	16.6		F	#		
Thorium-228	pCi/L	06/26/2012	N001	177 - 237	0.396		FJ	#	0.33	0.248
Thorium-230	pCi/L	06/26/2012	N001	177 - 237	0.29	U	F	#	0.29	0.13
Thorium-232	pCi/L	06/26/2012	N001	177 - 237	0.087	U	F	#	0.087	0.0621
Total Dissolved Solids	mg/L	06/26/2012	N001	177 - 237	2700		F	#	80	
Turbidity	NTU	06/26/2012	N001	177 - 237	6.27		F	#		
Uranium	mg/L	06/26/2012	N001	177 - 237	0.00049		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: 40-SC WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Cadmium	mg/L	06/26/2012	N001	-	0.00018	B	UF	#	0.00012	
Cadmium	mg/L	06/26/2012	N002	-	0.00012	B	UF	#	0.00012	
Chloride	mg/L	06/26/2012	N001	-	33		F	#	10	
Chloride	mg/L	06/26/2012	N002	-	34		F	#	4	
Chromium	mg/L	06/26/2012	N001	-	0.00051	U	FJ	#	0.00051	
Chromium	mg/L	06/26/2012	N002	-	0.00051	U	FJ	#	0.00051	
Lead	mg/L	06/26/2012	N001	-	0.000068	U	F	#	0.000068	
Lead	mg/L	06/26/2012	N002	-	0.00008	B	UF	#	0.000068	
Nickel	mg/L	06/26/2012	N001	-	0.0048	B	F	#	0.00093	
Nickel	mg/L	06/26/2012	N002	-	0.0054		F	#	0.00093	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2012	N001	-	0.85		F	#	0.01	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2012	N002	-	0.87		F	#	0.01	
Oxidation Reduction Potential	mV	06/26/2012	N001	-	142.3		F	#		
pH	s.u.	06/26/2012	N001	-	6.11		F	#		
Radium-226	pCi/L	06/26/2012	N001	-	0.331		FJ	#	0.19	0.205
Radium-226	pCi/L	06/26/2012	N002	-	0.21	U	FJ	#	0.21	0.163
Radium-228	pCi/L	06/26/2012	N001	-	0.642		FJ	#	0.31	0.256
Radium-228	pCi/L	06/26/2012	N002	-	0.735		FJ	#	0.31	0.276
Selenium	mg/L	06/26/2012	N001	-	0.0037		F	#	0.00032	
Selenium	mg/L	06/26/2012	N002	-	0.0039		F	#	0.00032	
Specific Conductance	umhos/cm	06/26/2012	N001	-	2499		F	#		

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: 40-SC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data QA		
Sulfate	mg/L	06/26/2012	N001	-	1500		F #	25	
Sulfate	mg/L	06/26/2012	N002	-	1500		F #	10	
Temperature	C	06/26/2012	N001	-	8.72		F #		
Thorium-228	pCi/L	06/26/2012	N001	-	0.26	U	F #	0.26	0.169
Thorium-228	pCi/L	06/26/2012	N002	-	0.24	U	F #	0.24	0.145
Thorium-230	pCi/L	06/26/2012	N001	-	0.25	U	F #	0.25	0.11
Thorium-230	pCi/L	06/26/2012	N002	-	0.23	U	F #	0.23	0.114
Thorium-232	pCi/L	06/26/2012	N001	-	0.099	U	F #	0.099	0.0489
Thorium-232	pCi/L	06/26/2012	N002	-	0.056	U	F #	0.056	0.0404
Total Dissolved Solids	mg/L	06/26/2012	N001	-	2300		F #	40	
Total Dissolved Solids	mg/L	06/26/2012	N002	-	2300		F #	40	
Turbidity	NTU	06/26/2012	N001	-	1.73		F #		
Uranium	mg/L	06/26/2012	N001	-	0.00022		F #	0.000029	
Uranium	mg/L	06/26/2012	N002	-	0.00018		F #	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: 5-DC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers		Detection Limit	Uncertainty
						Lab	Data QA		
Cadmium	mg/L	06/27/2012	0001	-	0.0004		UF #	0.00012	
Chloride	mg/L	06/27/2012	0001	-	71		F #	10	
Chromium	mg/L	06/27/2012	0001	-	0.00051	U	FJ #	0.00051	
Lead	mg/L	06/27/2012	0001	-	0.00078		F #	0.000068	
Nickel	mg/L	06/27/2012	0001	-	0.24		F #	0.00093	
Nitrate + Nitrite as Nitrogen	mg/L	06/27/2012	0001	-	0.01	U	F #	0.01	
Oxidation Reduction Potential	mV	06/27/2012	N001	-	313.6		F #		
pH	s.u.	06/27/2012	N001	-	3.66		F #		
Radium-226	pCi/L	06/27/2012	0001	-	4.05		FJ #	0.2	1.21
Radium-228	pCi/L	06/27/2012	0001	-	15.8		FJ #	0.32	3.67
Selenium	mg/L	06/27/2012	0001	-	0.0073		F #	0.00032	
Specific Conductance	umhos/cm	06/27/2012	N001	-	4618		F #		
Sulfate	mg/L	06/27/2012	0001	-	3600		F #	25	
Temperature	C	06/27/2012	N001	-	19.16		F #		
Thorium-228	pCi/L	06/27/2012	0001	-	1.4		F #	0.22	0.344
Thorium-230	pCi/L	06/27/2012	0001	-	0.22	U	F #	0.22	0.139
Thorium-232	pCi/L	06/27/2012	0001	-	0.099		FJ #	0.049	0.0646
Total Dissolved Solids	mg/L	06/27/2012	0001	-	5100		F #	200	
Turbidity	NTU	06/27/2012	N001	-	57.8		F #		
Uranium	mg/L	06/27/2012	0001	-	0.0046		F #	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: 5-SC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
							Lab	Data QA		
Cadmium	mg/L	06/27/2012	N001	49.3	- 57.7	0.037		F #	0.00012	
Chloride	mg/L	06/27/2012	N001	49.3	- 57.7	300		F #	20	
Chromium	mg/L	06/27/2012	N001	49.3	- 57.7	0.23		F #	0.00051	
Lead	mg/L	06/27/2012	N001	49.3	- 57.7	0.00008	B	UF #	0.000068	
Nickel	mg/L	06/27/2012	N001	49.3	- 57.7	2.5		F #	0.00093	
Nitrate + Nitrite as Nitrogen	mg/L	06/27/2012	N001	49.3	- 57.7	0.01	U	F #	0.01	
Oxidation Reduction Potential	mV	06/27/2012	N001	49.3	- 57.7	306.6		F #		
pH	s.u.	06/27/2012	N001	49.3	- 57.7	3.25		F #		
Radium-226	pCi/L	06/27/2012	N001	49.3	- 57.7	6.9		FJ #	0.21	1.91
Radium-228	pCi/L	06/27/2012	N001	49.3	- 57.7	2.02		FJ #	0.33	0.539
Selenium	mg/L	06/27/2012	N001	49.3	- 57.7	0.052		F #	0.00032	
Specific Conductance	umhos/cm	06/27/2012	N001	49.3	- 57.7	11677		F #		
Sulfate	mg/L	06/27/2012	N001	49.3	- 57.7	11000		F #	50	
Temperature	C	06/27/2012	N001	49.3	- 57.7	10.09		F #		
Thorium-228	pCi/L	06/27/2012	N001	49.3	- 57.7	47.6		F #	1.9	8.06
Thorium-230	pCi/L	06/27/2012	N001	49.3	- 57.7	405		F #	1.7	63.6
Thorium-232	pCi/L	06/27/2012	N001	49.3	- 57.7	10.1		F #	0.57	2.1
Total Dissolved Solids	mg/L	06/27/2012	N001	49.3	- 57.7	18000		F #	400	
Turbidity	NTU	06/27/2012	N001	49.3	- 57.7	9.71		F #		
Uranium	mg/L	06/27/2012	N001	49.3	- 57.7	3		F #	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: 54-SC WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Cadmium	mg/L	06/27/2012	N001	-	0.0013		FJ	#	0.00012	
Chloride	mg/L	06/27/2012	N001	-	350		F	#	20	
Chromium	mg/L	06/27/2012	N001	-	0.16		F	#	0.00051	
Lead	mg/L	06/27/2012	N001	-	0.00055		F	#	0.000068	
Nickel	mg/L	06/27/2012	N001	-	2.5		F	#	0.00093	
Nitrate + Nitrite as Nitrogen	mg/L	06/27/2012	N001	-	0.02	U	F	#	0.02	
Oxidation Reduction Potential	mV	06/27/2012	N001	-	319		F	#		
pH	s.u.	06/27/2012	N001	-	3.59		F	#		
Radium-226	pCi/L	06/27/2012	N001	-	17		FJ	#	0.24	4.46
Radium-228	pCi/L	06/27/2012	N001	-	86.9		FJ	#	0.31	20
Selenium	mg/L	06/27/2012	N001	-	0.03		F	#	0.00032	
Specific Conductance	umhos/cm	06/27/2012	N001	-	8205		F	#		
Sulfate	mg/L	06/27/2012	N001	-	7300		F	#	50	
Temperature	C	06/27/2012	N001	-	21.15		F	#		
Thorium-228	pCi/L	06/27/2012	N001	-	5.57		F	#	0.75	1.17
Thorium-230	pCi/L	06/27/2012	N001	-	2.4		F	#	0.78	0.724
Thorium-232	pCi/L	06/27/2012	N001	-	3.48		F	#	0.15	0.758
Total Dissolved Solids	mg/L	06/27/2012	N001	-	11000		F	#	200	
Turbidity	NTU	06/27/2012	N001	-	6.29		F	#		
Uranium	mg/L	06/27/2012	N001	-	0.042		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SBS01, Shirley Basin South Disposal Site

REPORT DATE: 9/13/2012

Location: K.G.S.#3 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Cadmium	mg/L	06/27/2012	0001	420 - 450	0.00012	U	J	#	0.00012	
Chloride	mg/L	06/27/2012	0001	420 - 450	11		J	#	1	
Chromium	mg/L	06/27/2012	0001	420 - 450	0.00051	U	J	#	0.00051	
Lead	mg/L	06/27/2012	0001	420 - 450	0.000068	U	J	#	0.000068	
Nickel	mg/L	06/27/2012	0001	420 - 450	0.00093	U	J	#	0.00093	
Nitrate + Nitrite as Nitrogen	mg/L	06/27/2012	0001	420 - 450	0.093		J	#	0.01	
Radium-226	pCi/L	06/27/2012	0001	420 - 450	0.269		UJ	#	0.19	0.187
Radium-228	pCi/L	06/27/2012	0001	420 - 450	0.895		J	#	0.32	0.309
Selenium	mg/L	06/27/2012	0001	420 - 450	0.000073	B	J	#	0.000032	
Sulfate	mg/L	06/27/2012	0001	420 - 450	300		J	#	2.5	
Thorium-228	pCi/L	06/27/2012	0001	420 - 450	0.33	U	J	#	0.33	0.162
Thorium-230	pCi/L	06/27/2012	0001	420 - 450	0.26	U	J	#	0.26	0.156
Thorium-232	pCi/L	06/27/2012	0001	420 - 450	0.1	U	J	#	0.1	0.0501
Total Dissolved Solids	mg/L	06/27/2012	0001	420 - 450	570		J	#	20	
Turbidity	NTU	06/27/2012	N001	420 - 450	9999	>	J	#		
Uranium	mg/L	06/27/2012	0001	420 - 450	0.00017		J	#	0.000029	

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: Estimated 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.

This page intentionally left blank

Static Water Level Data

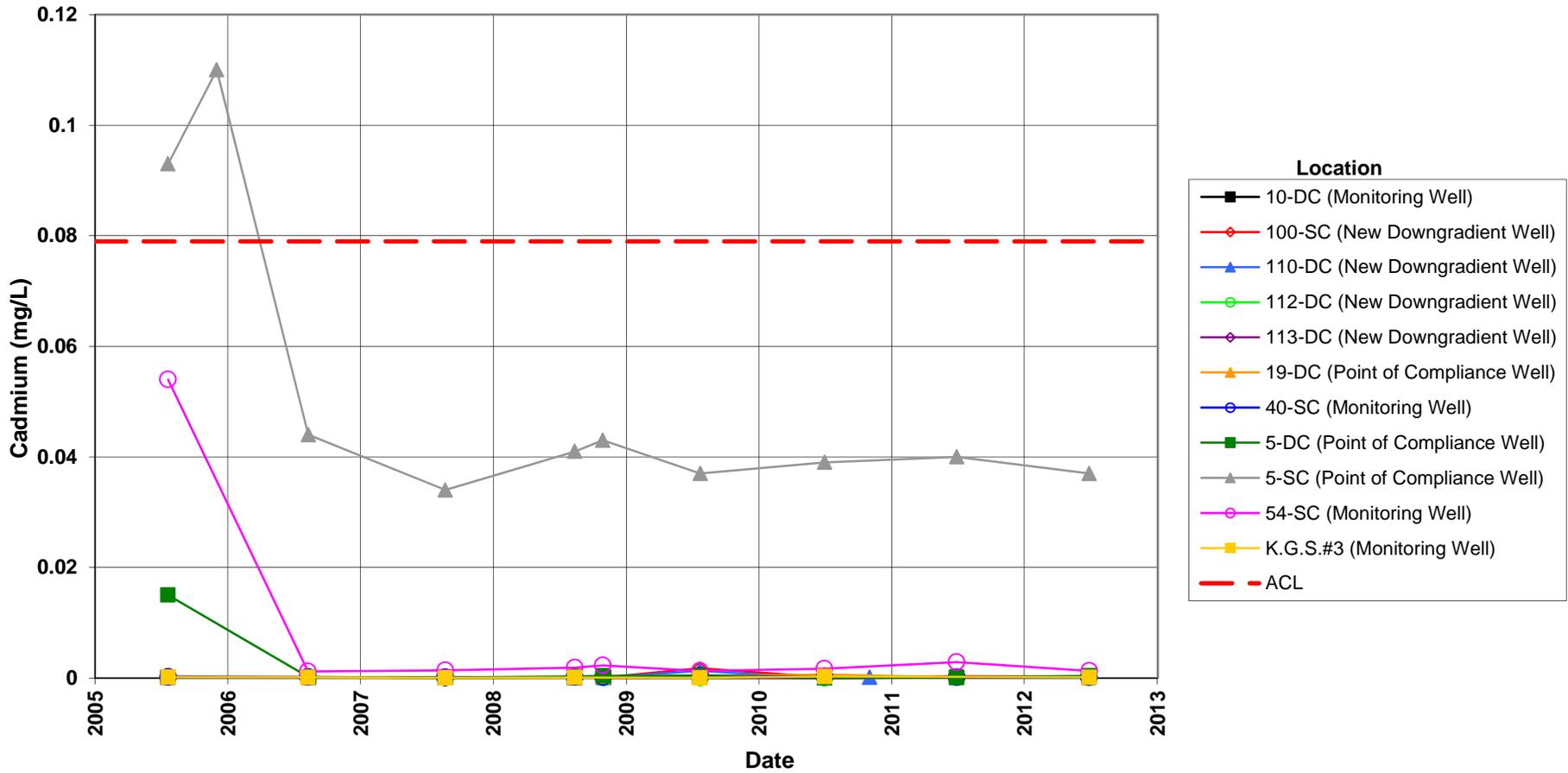
This page intentionally left blank

This page intentionally left blank

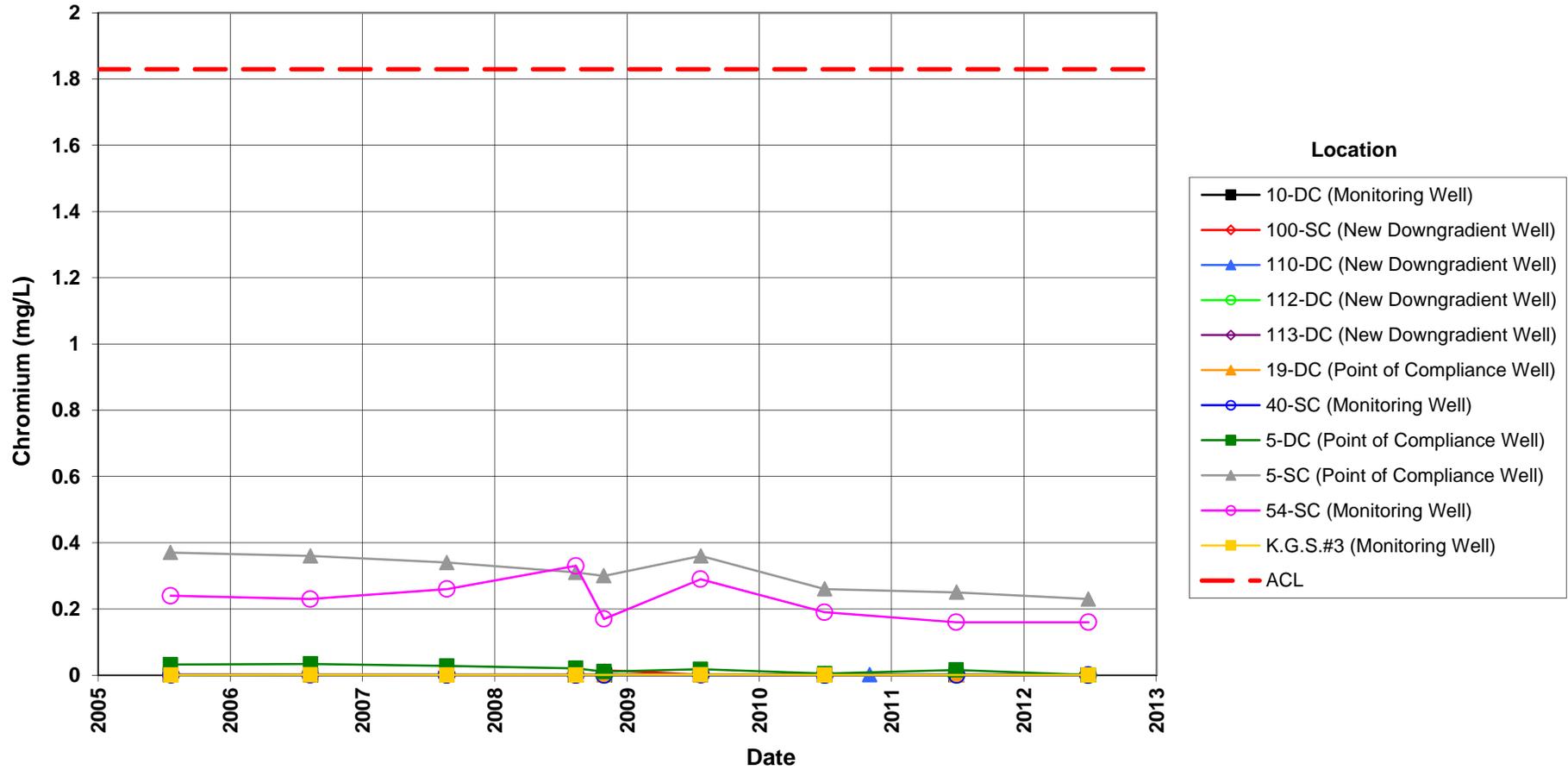
Time-Concentration Graphs

This page intentionally left blank

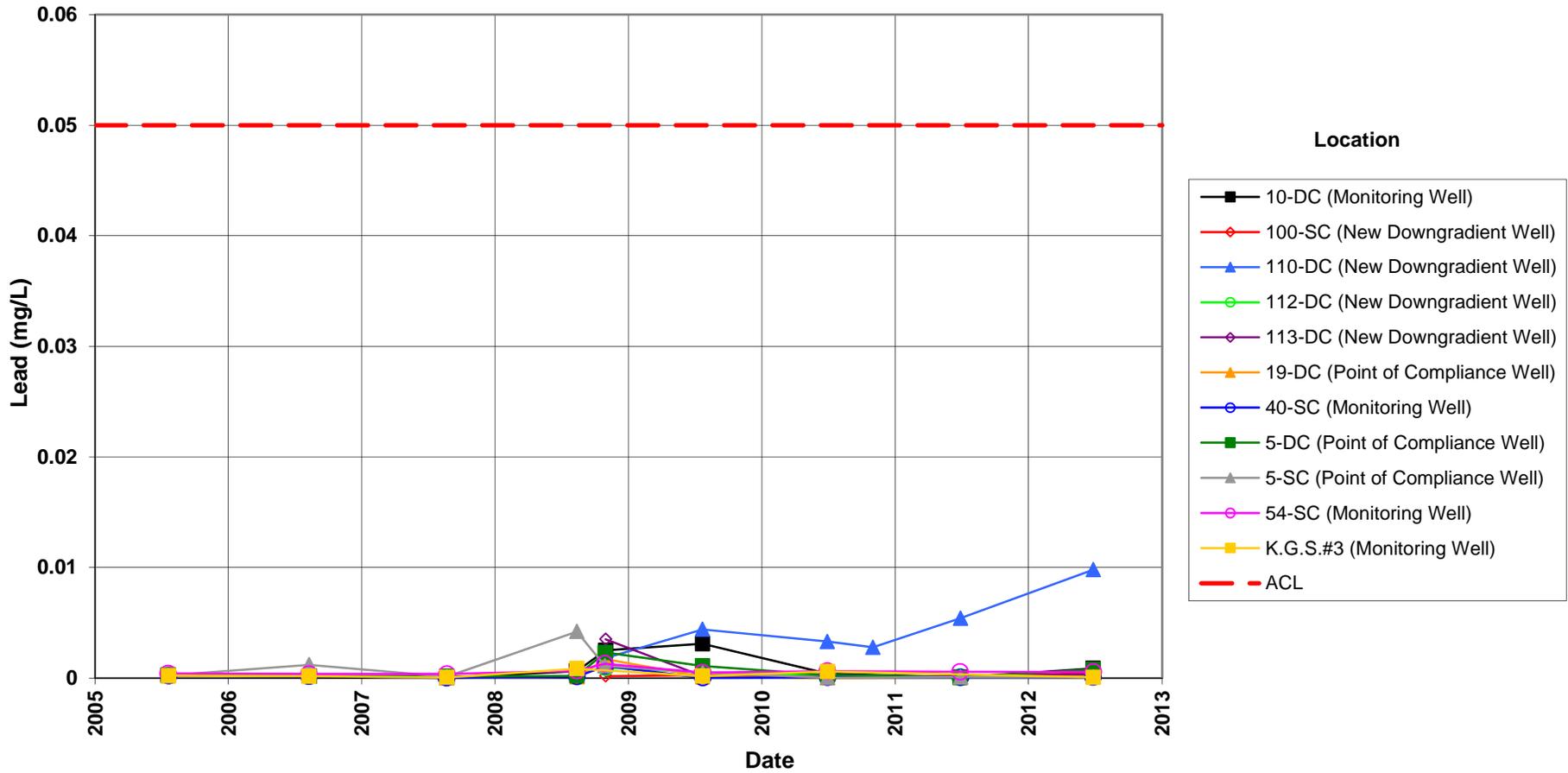
**Shirley Basin South Disposal Site
Cadmium Concentration**
Alternate Concentration Limit (ACL) = 0.079 mg/L



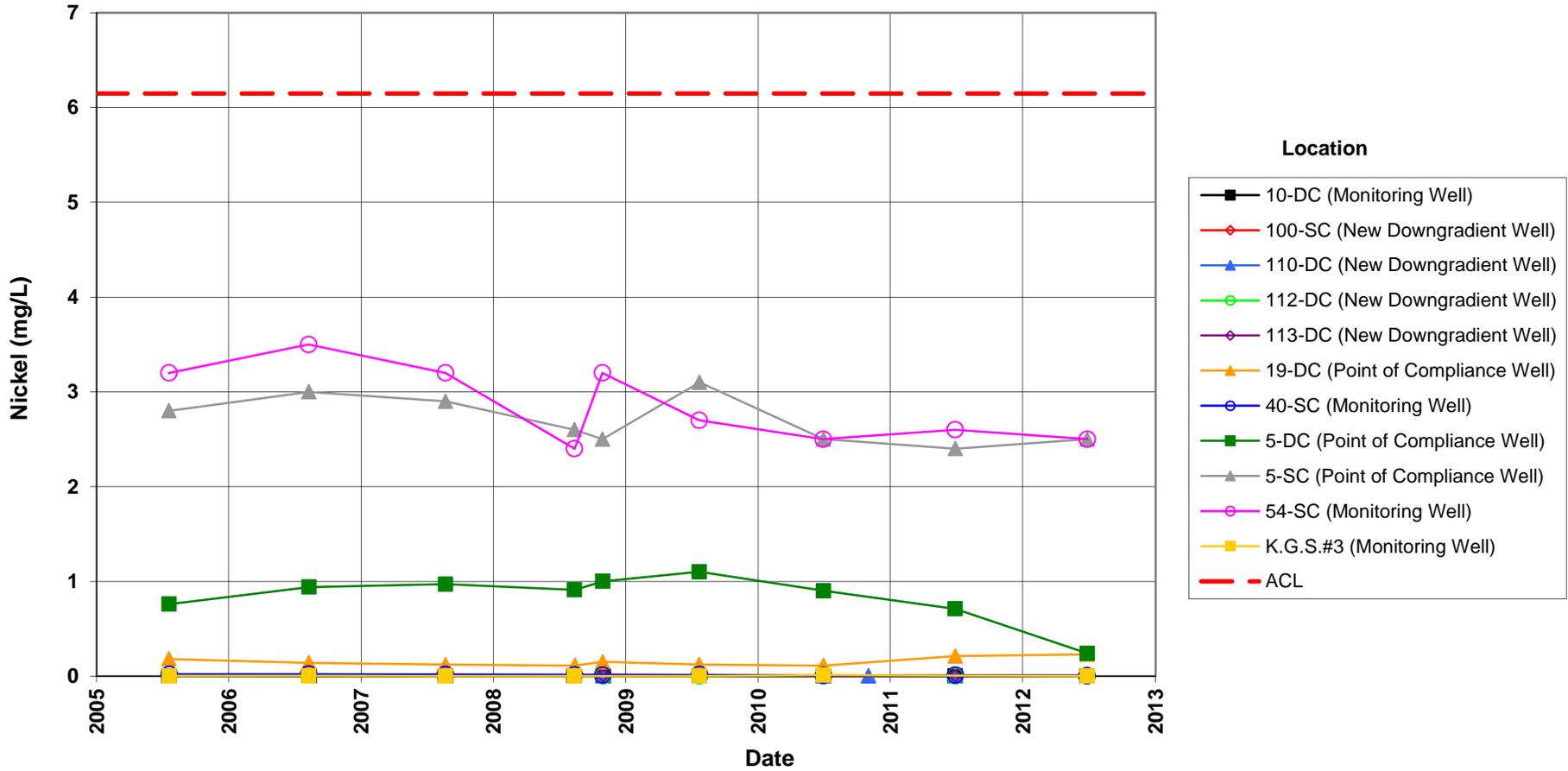
**Shirley Basin South Disposal Site
Chromium Concentration**
Alternate Concentration Limit (ACL) = 1.83 mg/L



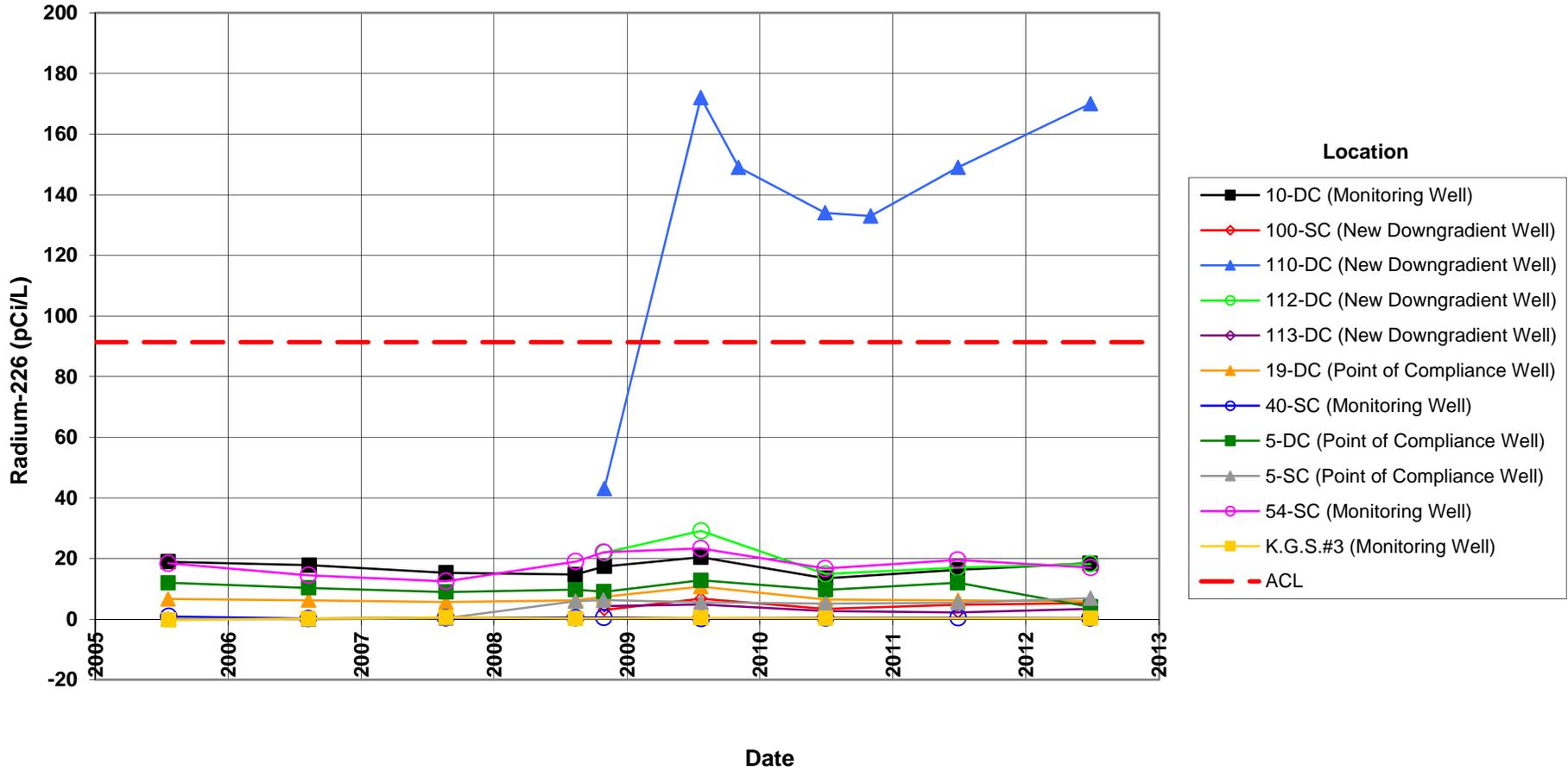
**Shirley Basin South Disposal Site
Lead Concentration**
Alternate Concentration Limit (ACL) = 0.05 mg/L



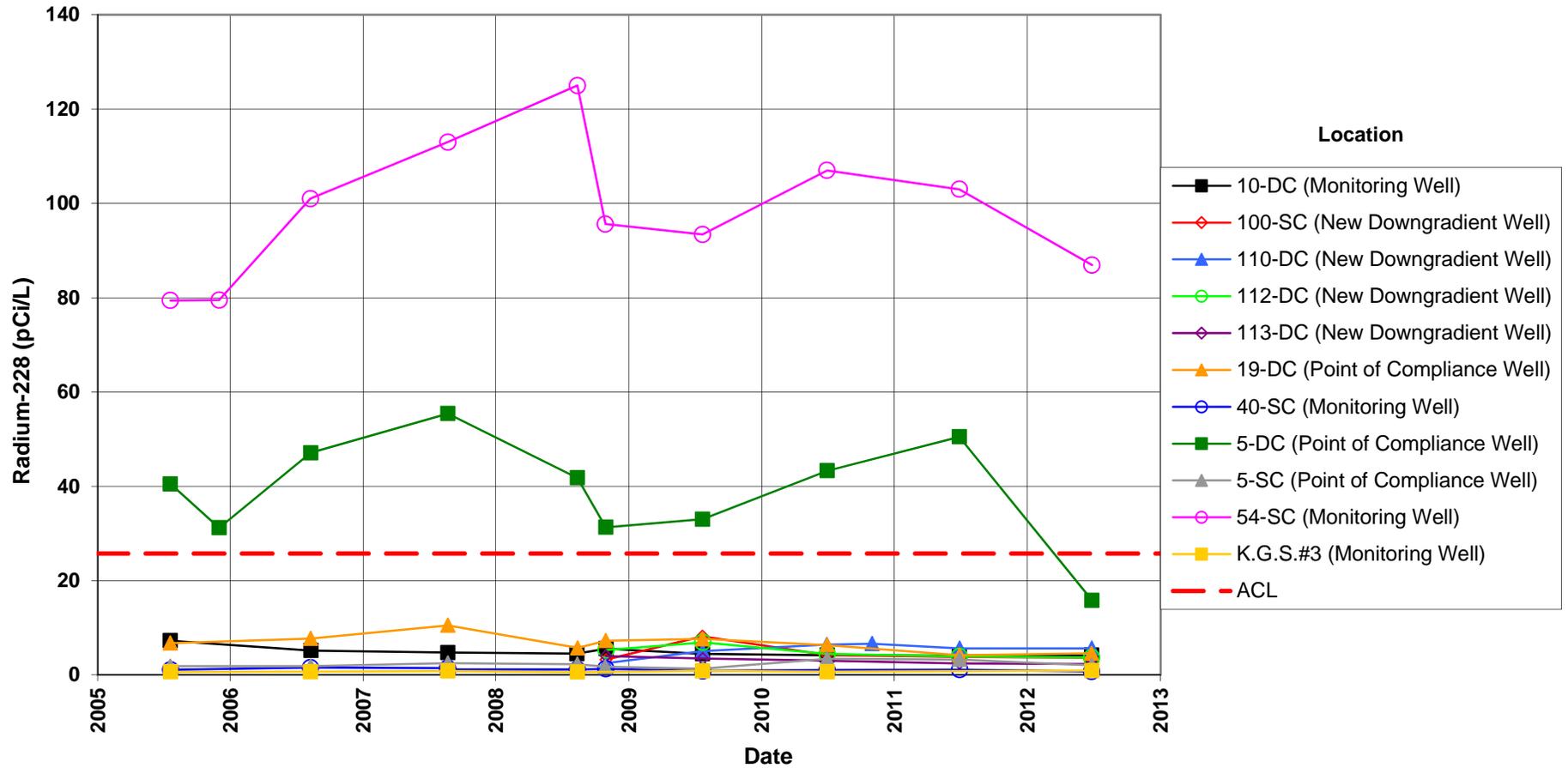
**Shirley Basin South Disposal Site
Nickel Concentration**
Alternate Concentration Limit (ACL) = 6.15 mg/L



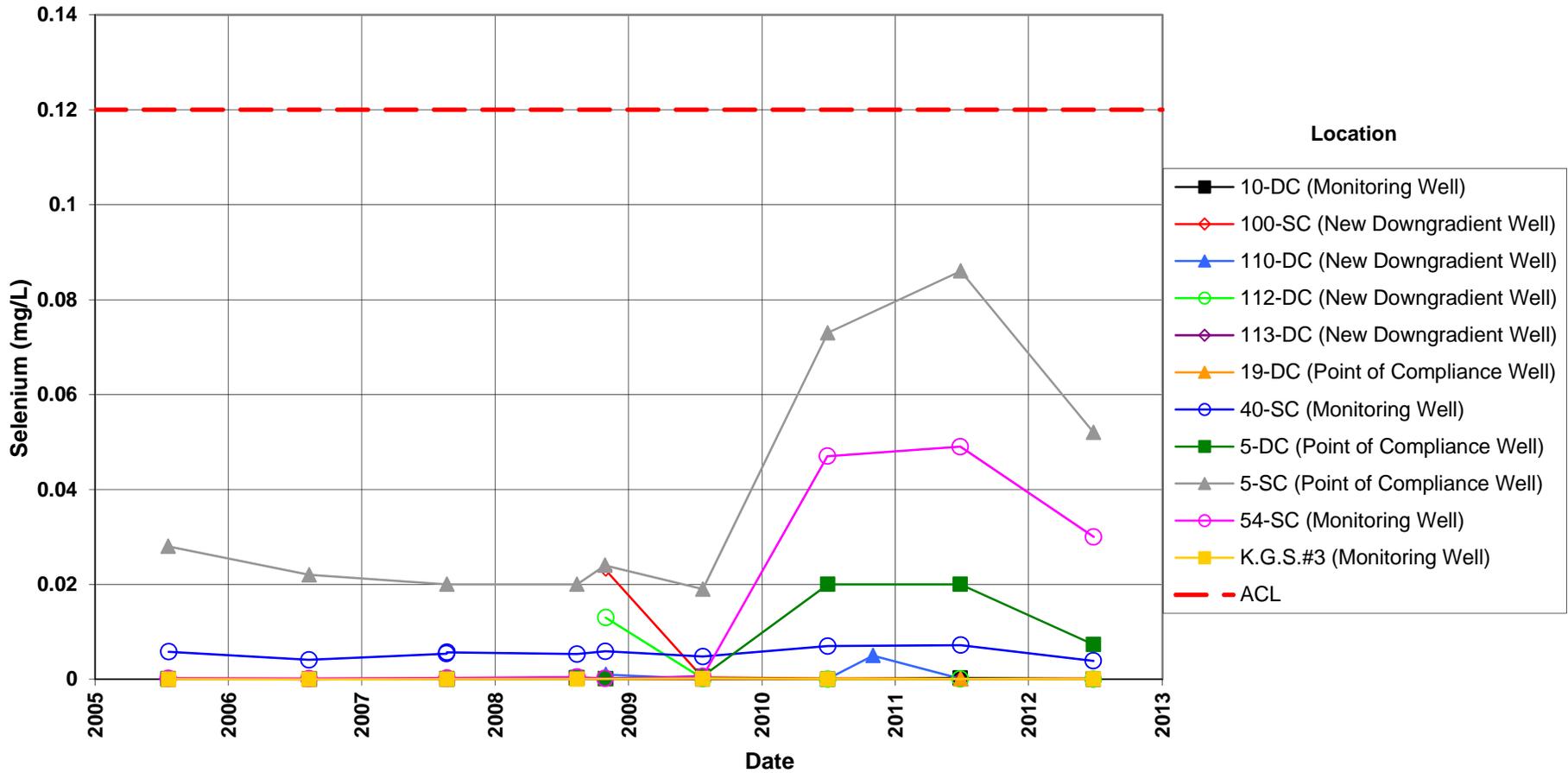
**Shirley Basin South Disposal Site
Radium-226 Concentration**
Alternate Concentration Limit (ACL) = 91.3 pCi/L



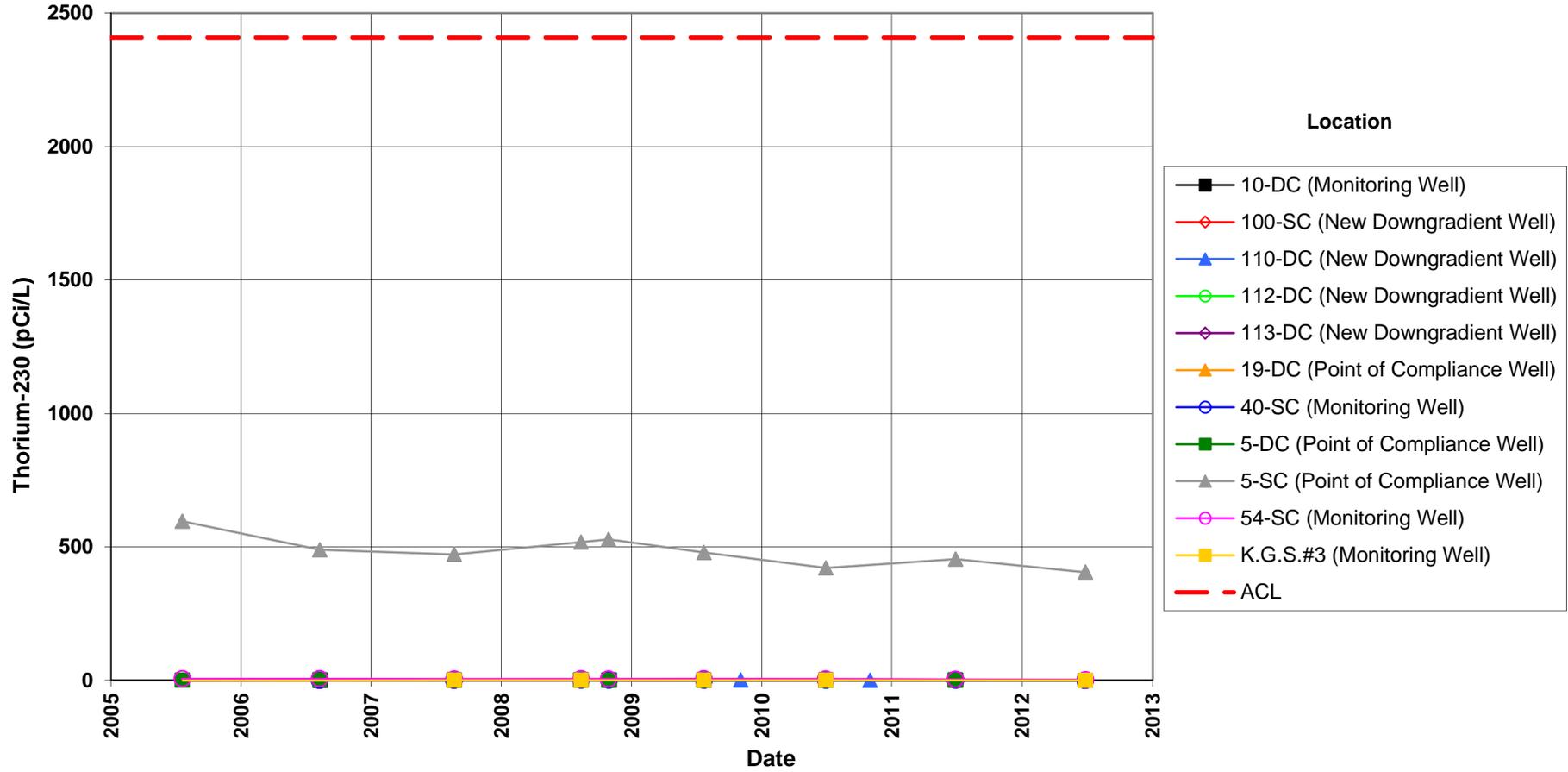
**Shirley Basin South Disposal Site
Radium-228 Concentration**
Alternate Concentration Limit (ACL) = 25.7 pCi/L



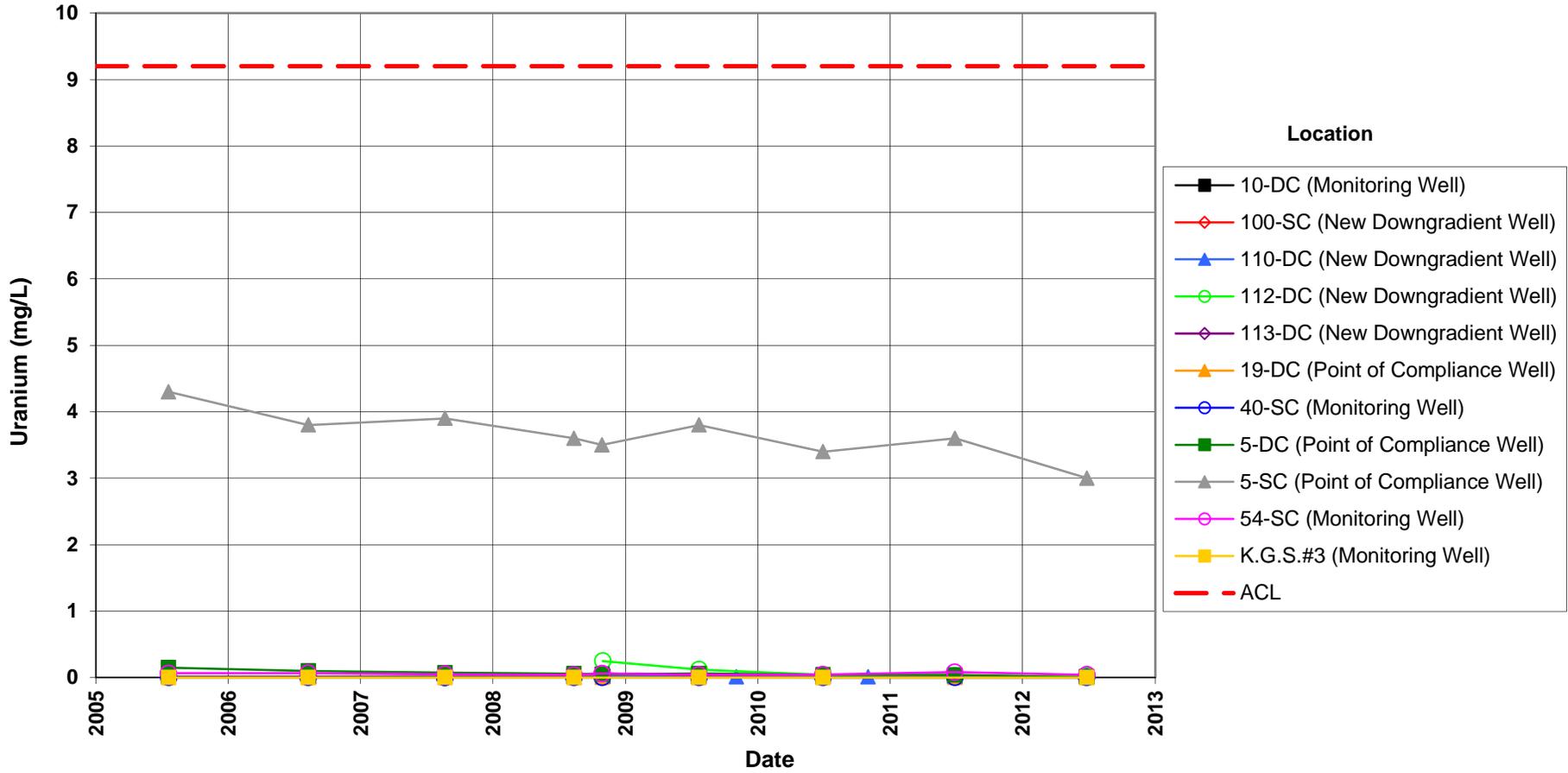
**Shirley Basin South Disposal Site
Selenium Concentration**
Alternate Concentration Limit (ACL) = 0.12 mg/L



**Shirley Basin South Disposal Site
Thorium-230 Concentration**
Alternate Concentration Limit (ACL) = 2,409 pCi/L



**Shirley Basin South Disposal Site
Uranium Concentration**
Alternate Concentration Limit (ACL) = 9.2 mg/L



This page intentionally left blank

Attachment 3
Sampling and Analysis Work Order

This page intentionally left blank



established 1959

Task Order LM00-501
Control Number 12-0654

May 24, 2012

U.S. Department of Energy
Office of Legacy Management
ATTN: Scott Surovchak
Site Manager
11025 Dover St., Ste. 1000
Westminster, CO 80021-5573

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)
June 2012 Environmental Sampling at the Shirley Basin South, Wyoming, Site

REFERENCE: Task Order LM00-501-03-223-402, Shirley Basin South, Wyoming, Disposal
Site

Dear Mr. Surovchak:

The purpose of this letter is to inform you of the upcoming sampling event at Shirley Basin South, Wyoming. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Shirley Basin South site. Water quality data will be collected from monitoring wells at this site as part of the routine environmental sampling currently scheduled to begin the week of June 25, 2012.

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

Monitoring Wells*

40-SC	51-SC	10-DC	5-DC	19-DC	5-SC	54-SC
100-SC	101-SC	102-SC	110-DC	112-DC	113-DC	K.G.S.#3

*NOTE: SC wells are completed in the upper sand aquifer of the Wind River Formation; DC wells are completed in the main sand aquifer of the Wind River Formation.

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) 248-6022 if you have any questions.

Sincerely,

Richard K. Johnson
Site Lead

The S.M. Stoller Corporation 2597 Legacy Way Grand Junction, CO 81503 (970) 248-6000 Fax (970) 248-6040

Scott Surovchak
Control Number 12-0654
Page 2

RKJ/lcg/lb

Enclosures (3)

cc: (electronic)

Karl Stoeckle, DOE
Steve Donovan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
Richard Johnson, Stoller
EDD Delivery
re-grand.junction
File: SBS 410.02 (A)

Sampling Frequencies for Locations at Shirley Basin South, Wyoming

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
100-SC			X			
101-SC			X			
102-SC			X			
110-DC			X			
112-DC			X			
113-DC			X			
40-SC			X			
5-SC			X			
51-SC			X			
54-SC			X			
10-DC			X			
5-DC			X			
19-DC			X			
K.G.S.#3			X			

Sampling conducted in June

Constituent Sampling Breakdown

Site	Shirley Basin South		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
	Groundwater	Surface Water			
Analyte					
Approx. No. Samples/yr	14	0			
Field Measurements					
Alkalinity					
Dissolved Oxygen					
Redox Potential	X				
pH	X				
Specific Conductance	X				
Turbidity	X				
Temperature	X				
Laboratory Measurements					
Aluminum					
Ammonia as N (NH3-N)					
Cadmium	X		0.001	SW-846 6020	LMM-02
Calcium					
Chloride	X		0.5	SW-846 9056	MIS-A-039
Chromium	X		0.005	SW-846 6010	LMM-01
Gross Alpha					
Gross Beta					
Iron					
Lead	X		0.002	SW-846 6020	LMM-02
Magnesium					
Manganese					
Molybdenum					
Nickel	X		0.02	SW-846 6010	LMM-01
Nickel-63					
Nitrate + Nitrite as N (NO3+NO2)-N	X		0.05	EPA 353.1	WCH-A-022
Potassium					
Radium-226	X		1 pCi/L	Gas Proportional Counter	GPC-A-018
Radium-228	X		1 pCi/L	Gas Proportional Counter	GPC-A-020
Selenium	X		0.0001	SW-846 6020	LMM-02
Silica					
Sodium					
Strontium					
Sulfate	X		0.5	SW-846 9056	MIS-A-044
Sulfide					
Thorium-230	X		1 pCi/L	Alpha Spectrometry	ASP-A-008
Total Dissolved Solids	X		10	SM2540 C	WCH-A-033
Total Organic Carbon					
Uranium	X		0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
Total No. of Analytes	13	0			

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

Attachment 4

Trip Report

This page intentionally left blank

Memorandum

DATE: July 5, 2012
 TO: Dick Johnson
 FROM: Jeff Walters
 SUBJECT: Sampling Trip Report

Site: Shirley Basin South, WY.

Dates of Sampling Event: June 25 – 28, 2012

Team Members: Chaz Gunning and Jeff Walters

Number of Locations Sampled: 11 monitoring wells were sampled for Cd, Cr, Pb, Ni, Se, U, Cl, SO4, Th-230, Ra-226, Ra-228, TDS, and (NO3+NO2)-N.

Locations Not Sampled/Reason: Monitoring wells 51-SC, 101-SC, and 102-SC were dry.

Location Specific Information:

TICKET NUMBER	SAMPLE DATE	LOCATION	Description & Comments
KHY 862	6/26/2012	40-SC	CAT I
KHY 863	6/27/2012	5-SC	CAT I
KHY 873	6/26/2012	51-SC	Dry- Manual TD was 105.6, but not absolutely clear that was the bottom.
KHY 871	6/27/2012	54-SC	CAT I
KHY 864	6/26/2012	10-DC	CAT I
KHY 865	6/27/2012	5-DC	CAT I- Wasn't pumping initially. Had to pull pump to dislodge check ball and clear intake screen by widening slots. Bottom half of screened intake broke off. Couldn't pump from full depth, pulled pump up approx. 10ft and sampled from there, around 205ft depth.
KHY 866	6/26/2012	19-DC	CAT I
KHY 870	6/27/2012	100-SC	CAT II- Pulled up pump approx. 8ft. Would not pump below that level. Temperature reading was way off from normal groundwater ranges, so it was deleted. Flow cell in direct afternoon sun.
KHY 874	6/27/2012	101-SC	Dry. No pump in well.
KHY 875	6/26/2012	102-SC	Dry- WL 182.3, not enough water to sample. No pump in well.
KHY 867	6/27/2012	110-DC	CAT I- Pulled pump up approx. 8ft. Would not pump below that level. Erased temperature readings because they were way off from normal groundwater ranges; flow cell was in direct afternoon sunlight.
KHY 868	6/26/2012	112-DC	CAT I
KHY 869	6/26/2012	113-DC	CAT I- Hasp is broken off lid of protective casing, will not lock.
KHY 876	6/27/2012	K.G.S.#3	CAT IV- Water level not measured. Did not want to get indicator wrapped around the rope, 0.25" twin tubing, or 1.5" stand pipe. Water became black at about 110 gallons. Recommend a program directive to purge one equipment volume, reach stabilization, and then collect samples.

Field Variance: K.G.S.#3 is a production well that is equipped with an electric submersible pump (belonging to the grazing lease holder) and a dedicated bladder pump. The bladder pump clogs with black solids constantly, making the pump useless. Therefore, the electric pump was used to purge one equipment volume before collecting stabilization parameter readings. After stabilization was achieved, water was collected for the sample containers. The flow rate from the submersible pump was about three gallons per minute. The electric pump does not allow low flow sampling, so this well, its components, and characteristics will be reviewed and procedures formalized via a program directive if necessary.

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
2174	40-SC	Duplicate	Groundwater	KHY 872

RIN Number Assigned: All samples were assigned to RIN 12064635.

Sample Shipment: Samples were hand delivered to ALS Laboratory Group in Ft Collins, CO, on June 28, 2012.

Well Inspection Summary: Well inspections were conducted at all sampled wells. Well 113-DC has a broken hasp on the protective cover and cannot be locked. All other wells were in good condition.

Equipment: Monitoring well 40-SC is equipped with dedicated tubing and purged/sampled with a peristaltic pump. Monitoring well K.G.S.#3 is equipped with an electric submersible pump (with a 125 volt nema 5-15P installed). All other wells are equipped with dedicated bladder pumps. The YSI temperature reading became abnormally high during sampling of the last two wells. It stayed high through the post calibration check. This caused some failure of the post calibration checks. The temperature readings were deleted from wells 100-SC and 110-DC to prevent erroneous readings from loading into SMS. All other equipment and meters operated adequately.

Water Level Measurements: A water level was not collected from K.G.S.#3 to prevent the water level indicator from wrapping around and getting caught in the four lines running downhole in the well. Water levels collected in all other sampled wells are in the Field Data Collection System (FDCS) Water Sampling Logs.

Institutional Controls: All gates were appropriately closed and locked during the sampling event.

Fences, Gates, Locks: All were in good condition.

Signs: No missing or vandalized signs were observed.

Trespassing/Site Disturbances: An employee from the ranch east of the site was riding a horse on the cell property. He said there was a broken fence between the two properties and he was looking for five of his cows.

Dick Johnson
July 5, 2012
Page 3

Site Issues:

Disposal Cell/Drainage Structure Integrity: NA
Vegetation/Noxious Weed Concerns: NA

Maintenance Requirements: Monitoring wells 100-SC, 110-DC, 112-DC, and 113-DC need aluminum 2 inch x 4 inch support disks. Monitoring well 51-SC needs an aluminum 2 inch x 6 inch support disk. The bladder pumps in these wells are currently held up by bailing wire. Monitoring well 113-DC needs the protective casing hasp repaired. It is broken off of the lid and cannot lock.

Note: Monitoring well K.G.S.#3 needs to have a 1.5 inch flexible hose and a hose clamp brought to the site and attached to the hose barb on the pump discharge line when purging and sampling. The hose will have to be removed after sampling so the grazing lease holder can connect his hose when he needs water from the well.

Corrective Action Taken: None.

JW/lcg

cc: (electronic)
Scott Surovchak, DOE
Steve Donovan, Stoller
Dick Johnson, Stoller
EDD Delivery

This page intentionally left blank