

# Data Validation Package

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October 2008  
Groundwater Sampling at the  
Shirley Basin South, Wyoming,  
Disposal Site

April 2009

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## **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**

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# Sampling Event Summary

**Site:** Shirley Basin South, Wyoming, Disposal Site

**Sampling Period:** October 28–30, 2008

The *Long-Term Surveillance Plan for the U. S. Department of Energy 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 wells 5–SC, 51–SC, 5–DC, and 19–DC, and monitor wells 40–SC, 54–SC, and 10–DC were sampled as specified in the plan. Sampling and analysis was conducted in accordance with *Sampling and Analysis Plan for the U. S. Department of Energy Office of Legacy Management Sites*. Also sampled were six newly installed monitor wells downgradient of the disposal cell (100-SC, 101-SC, 102-SC, 110-DC, 112-DC, and 113-DC). The water level was measured at each sampled well.

Monitor 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. It has been determined using a downhole video camera that well 54–SC is continuously screened through both the Upper Sand and Main Sand aquifers, and its water level indicates that sample results likely represent the Main Sand aquifer.

ACLs have been approved for cadmium, chromium, lead, nickel, radium-226, radium-228, selenium, thorium-230, and uranium in site groundwater. As shown on Table 1, only radium-228 concentrations remains above the ACL in both wells 5–DC and 54–SC. Radium-228 concentrations apparently are related to naturally occurring thorium ore in the Main Sand unit (the primary ore body at the site). No other ACLs were exceeded.

Table 1. Wells with Results Exceeding an ACL

Analyte	ACL <sup>a</sup>	5–DC	54–SC
Radium-228	25.7 pCi/L	31.3 pCi/L	95.6 pCi/L

<sup>a</sup>ACLs for Shirley Basin South Disposal Site.

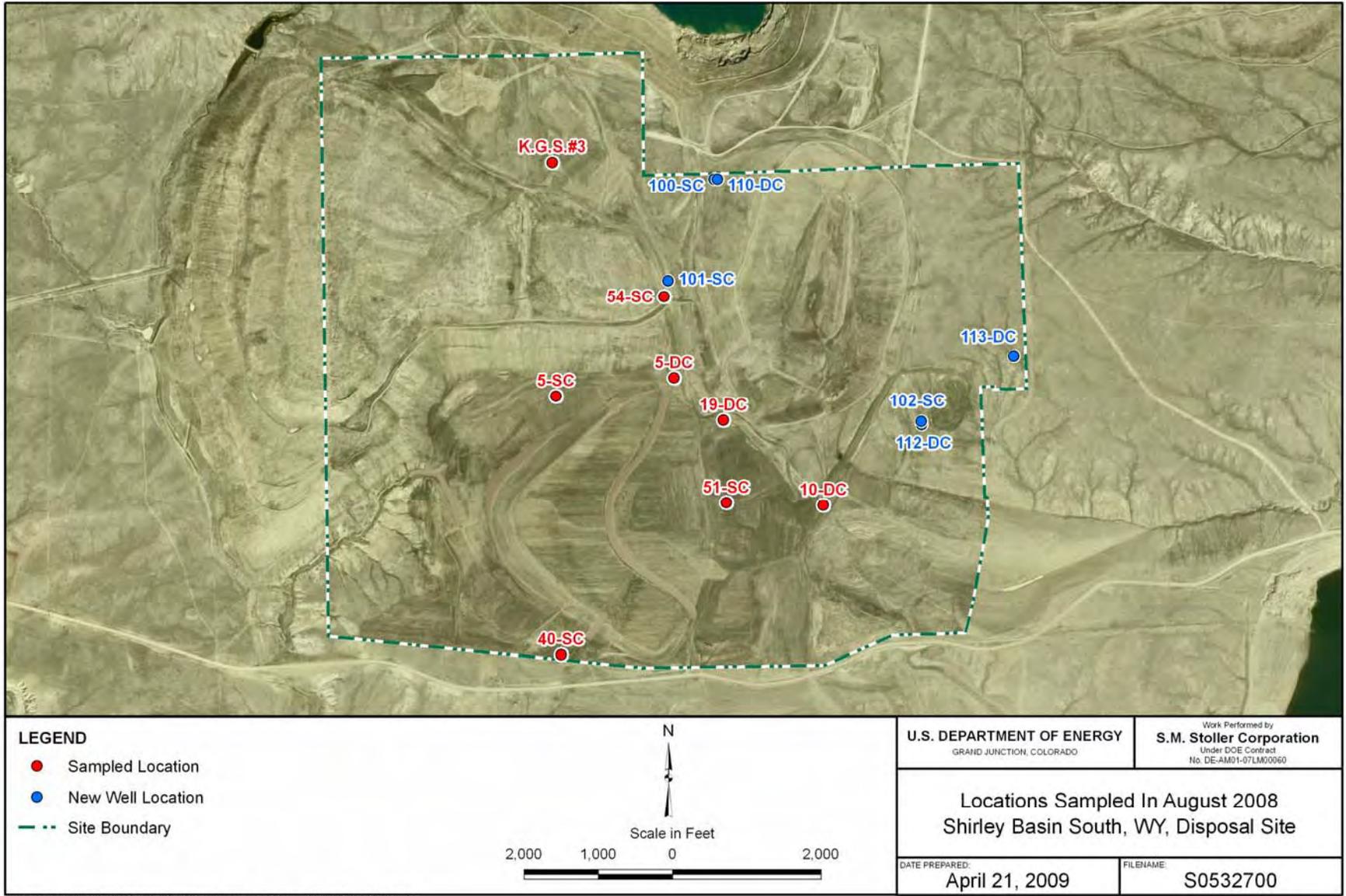
pCi/L picocuries per liter

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 at the site.



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

4/21/09  
Date



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*Shirley Basin South, Wyoming, Disposal Site Sample Location Map*

# Data Assessment Summary

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## Water Sampling Field Activities Verification Checklist

<b>Project</b>	Shirley Basin South, Wyoming	<b>Date(s) of Water Sampling</b>	October 28–30, 2008
<b>Date(s) of Verification</b>	April 2, 2009	<b>Name of Verifier</b>	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 October 20, 2008.
2. Were the sampling locations specified in the planning documents sampled?	No	Wells 51-SC, 101-SC, and 102-SC were not sampled because they were dry.
3. Was a pre-trip calibration conducted as specified in the above-named documents?	Yes	Pre-trip calibration was performed on October 27, 2008.
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?	Yes	
Did the water level stabilize prior to sampling?	Yes	
Did pH, specific conductance, and turbidity measurements stabilize prior to sampling?	No	Well 54-SC pH did not meet stability criteria.
Was the flow rate less than 500 mL/min?	Yes	
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	NA	

## Water Sampling Field Activities Verification Checklist (continued)

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well:		
Was the flow rate less than 500 mL/min?	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 to sample all wells.
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 2940 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 (FDSC) report?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Are field data sheets signed and dated by both team members (hardcopies) or are dates present for the "Date Signed" fields (FDSC)?	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?	Yes	

## Laboratory Performance Assessment

### General Information

Report Number (RIN): 08101885  
Sample Event: October 28–30, 2008  
Site(s): Shirley Basin South, Wyoming  
Laboratory: Paragon Analytics  
Work Order No.: 0811001  
Analysis: Metals, Inorganic, and Radiochemistry  
Validator: Gretchen Baer  
Review Date: December 30, 2008

This validation was performed according to the *Environmental Procedures Catalog*, “Standard Practice for Validation of Laboratory Data,” GT-9(P). The procedure was applied at Level 3, Data 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	SOP712R14	SOP724R10
Radium-228	GPC-A-020	SW-846 9320	SW-846 9320
Sulfate	MIS-A-044	SW-846 9056	SW-846 9056
Thorium Isotopes	ASP-A-008	SOP776R11	SOP714R11
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
0811001-1	100-SC	Cadmium	U	Less than 5 times the method blank
0811001-1	100-SC	Radium-228	J	Yield adjusted by laboratory
0811001-2	10-DC	Cadmium	U	Less than 5 times the method blank
0811001-2	10-DC	Chromium	J	Negative method blank
0811001-2	10-DC	Nickel	J	Negative calibration blank
0811001-2	10-DC	Radium-228	J	Yield adjusted by laboratory
0811001-2	10-DC	Selenium	U	Less than 5 times the method blank
0811001-3	110-DC	Cadmium	U	Less than 5 times the method blank
0811001-3	110-DC	Chromium	J	Negative method blank
0811001-3	110-DC	Nickel	J	Negative calibration blank
0811001-3	110-DC	Radium-228	J	Yield adjusted by laboratory
0811001-4	112-DC	Cadmium	U	Less than 5 times the method blank
0811001-4	112-DC	Chromium	J	Negative method blank
0811001-4	112-DC	Nickel	J	Negative calibration blank
0811001-4	112-DC	Radium-228	J	Yield adjusted by laboratory
0811001-5	113-DC	Cadmium	U	Less than 5 times the method blank
0811001-5	113-DC	Chromium	J	Negative method blank
0811001-5	113-DC	Nickel	J	Negative calibration blank
0811001-5	113-DC	Radium-228	J	Yield adjusted by laboratory
0811001-5	113-DC	Selenium	U	Less than 5 times the method blank
0811001-6	19-DC	Chromium	J	Negative method blank
0811001-6	19-DC	Radium-228	J	Yield adjusted by laboratory
0811001-6	19-DC	Selenium	U	Less than 5 times the method blank
0811001-7	40-SC Duplicate	Cadmium	U	Less than 5 times the method blank
0811001-7	40-SC Duplicate	Chromium	J	Negative method blank
0811001-7	40-SC Duplicate	Radium-226	J	Less than 3 times the MDC
0811001-7	40-SC Duplicate	Radium-228	J	Less than 3 times the MDC
0811001-7	40-SC Duplicate	Thorium-232	J	Less than 3 times the MDC
0811001-8	40-SC	Cadmium	U	Less than 5 times the method blank
0811001-8	40-SC	Chromium	J	Negative method blank
0811001-8	40-SC	Radium-226	J	Less than 3 times the MDC
0811001-8	40-SC	Radium-228	J	Less than 3 times the MDC
0811001-9	54-SC	Nitrate + Nitrite as N	J	Matrix interference
0811001-9	54-SC	Radium-228	J	Yield adjusted by laboratory
0811001-9	54-SC	Selenium	U	Less than 5 times the method blank
0811001-10	5-DC	Nitrate + Nitrite as N	J	Matrix interference
0811001-10	5-DC	Radium-228	J	Yield adjusted by laboratory
0811001-10	5-DC	Selenium	U	Less than 5 times the method blank
0811001-10	5-DC	Thorium-230	J	Less than 3 times the MDC
0811001-10	5-DC	Thorium-232	J	Less than 3 times the MDC
0811001-11	5-SC	Nitrate + Nitrite as N	J	Matrix interference
0811001-11	5-SC	Radium-228	J	Less than 3 times the MDC

## Sample Shipping/Receiving

Paragon Analytics in Fort Collins, Colorado, received 11 water samples on November 1, 2008, accompanied by a Chain of Custody (COC) form. Copies of the three air bills were included in the receiving documentation. 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, with the following exceptions. The filtration status was not listed for any sample; the laboratory assumed that no samples were filtered, but all bottles collected at location 100-SC were filtered in the field. An incorrect sample time was written on the COC form for location 113-DC; the laboratory used the time on the bottle labels, which was correct.

## Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced cooler at 0.8 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses, with the following exceptions. The laboratory noticed that two bottles each for locations 10-DC and 19-DC had pH values that contradicted the bottles' labels, which indicated that the labels had been switched. The laboratory corrected the error and proceeded with sample analysis. For locations 54-SC, 5-DC, and 5-SC, the laboratory noted that the aliquots for total dissolved solids and anions, which are not supposed to be acidified, were received with a pH of 4 or lower. This is typical for samples from these locations; these pH values do not indicate field preservation errors. All samples were analyzed 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 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 November 6, 2008, 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 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 six verification checks. All calibration checks met the acceptance criteria.

#### *Method SW-846 6010B, Chromium and Nickel*

Calibrations were performed on November 5, 2008, using three 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. Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the required frequency, resulting in seven 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 practical quantitation limit (PQL), and all results were within the acceptance range.

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

Calibrations for cadmium, lead, and uranium were performed on November 6, 2008, and for selenium on November 13, 2008, using two 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. Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the required frequency, resulting in 12 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. 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 November 4, 2008, 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. Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the required frequency, resulting in four verification checks. All calibration checks met the acceptance criteria.

#### Radiochemical Analysis

All radiochemical results reported included the calculated two-sigma total propagated uncertainty (TPU) and minimum detectable concentration (MDC). Radiochemical results are qualified with a “J” flag (estimated) when the result is greater than the MDC but less than 3 times the MDC. Radiochemical results are qualified with a “U” flag (not detected) when the result is greater than the MDC but less than the two-sigma TPU.

#### *Radium-226*

Samples were screened for radium-226 by gas flow proportional counting. Plateau voltage determinations were performed in July and September 2008. Efficiency calibrations were performed October through November of 2008. Daily instrument checks met the acceptance criteria. The chemical recoveries met the acceptance criteria of 40 to 110 percent for all samples.

## *Radium-228*

Plateau voltage determinations and detector efficiency calibrations were performed in November 2007. Daily instrument checks performed November 11–13, 2008, met the acceptance criteria. The chemical recoveries met the acceptance criteria of 40 to 110 percent for all samples. Chemical recoveries for several of the samples were adjusted by the laboratory to minimize possible low biases. The results for these samples are qualified with a “J” flag (estimated).

## *Thorium Isotopes*

Alpha spectrometry calibrations were performed on November 5, 2008. Instrument background was determined on November 5, 2008. 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 width at half maximum exceeded 100 kilo-electron 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 kilo-electron 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 PQLs for all analytes with the exception of one calibration blank for chloride, which was slightly above the reporting limit. The samples associated with this blank had chloride concentrations greater than 5 times the blank, so no further qualification is necessary. 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, some blanks results were negative, and the absolute values were greater than the MDL but less than the PQL. The associated results less than 5 times the MDL are flagged with a “J” as estimated values.

## *Radiochemistry*

All radiochemical method blank results were below the MDC.

### 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 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 sample results demonstrate acceptable laboratory precision. The relative percent difference values for the non-radiochemical sample replicates and matrix spike replicates were less than 20 percent for results that are greater than 5 times the PQL, indicating acceptable precision.

The radiochemical relative error ratio (calculated using the one-sigma TPU) for the sample replicates and laboratory control sample replicates was less than three, 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.

### 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 100 times the PQL for ICP-MS or greater than 50 times the PQL for ICP. All evaluated serial dilution data were acceptable.

### Detection Limits/Dilutions

Samples were diluted in a consistent and acceptable manner when required. Samples 54-SC, 5-DC, and 5-SC were analyzed at a 200X dilution for nitrate + nitrite as N due to high matrix interferences, and the results were reported as non-detects. Because of the high level of interference, these results are qualified with a "J" flag as estimated values.

The required detection limits were met for all metals and wet chemistry analytes.

All radiochemical MDCs were calculated using the following equation as specified in *Quality Systems for Analytical Services*.

$$MDC = \frac{4.65 \times \sqrt{\frac{b}{T}}}{K} + \frac{3}{K \times T}$$

Where:

$b$  = background count rate (counts per minute)

$K$  = Efficiency factor

$T$  = Count time in minutes

The calculation of the MDCs using the equation above was verified. All reported MDCs were less than the required MDCs with the exception of thorium isotopes for sample 5-SC. The thorium results for these samples were greater than the reported detection limit.

### Completeness

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

### Chromatography Peak Integration

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

### Electronic Data Deliverable (EDD) File

The EDD file arrived on November 26, 2008. 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.

An error was detected in the EDD. The filtration status for all analytes reported for location 100-SC should have been “Yes” (filtered).

## SAMPLE MANAGEMENT SYSTEM

### EDD Non-Conformance Report

Report Date: 12/24/2006

EDD File: 08101885.xml

EDD Errors: 10

Record	Table	Error Type	Field	Error Description
103	Sample	Incorrect Entry	Filtered	Filtration status is incorrect.
104	Sample	Incorrect Entry	Filtered	Filtration status is incorrect.
105	Sample	Incorrect Entry	Filtered	Filtration status is incorrect.
106	Sample	Incorrect Entry	Filtered	Filtration status is incorrect.
107	Sample	Incorrect Entry	Filtered	Filtration status is incorrect.
108	Sample	Incorrect Entry	Filtered	Filtration status is incorrect.
109	Sample	Incorrect Entry	Filtered	Filtration status is incorrect.
110	Sample	Incorrect Entry	Filtered	Filtration status is incorrect.
111	Sample	Incorrect Entry	Filtered	Filtration status is incorrect.
112	Sample	Incorrect Entry	Filtered	Filtration status is incorrect.

**SAMPLE MANAGEMENT SYSTEM**  
**General Data Validation Report**

RIN: 08101885    Lab Code: PAR    Validator: Gretchen Baer    Validation Date: 12/24/2008  
Project: Shirley Basin South    Analysis Type:  Metals     General Chem     Rad     Organics  
# of Samples: 11    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 3 detection limit failures.

There was 1 duplicate evaluated.

### SAMPLE MANAGEMENT SYSTEM Non-Compliance Report: Detection Limits

RIN: 08101885      Lab Code: PAR

Project: Shirley Basin South

Validation Date: 12/24/2008

Ticket	Location	Lab Sample ID	Method Code	Lab Method	Analyte Name	Result	Qualifier	Reported Detection Limit	Required Detection Limit	Units
GLV 281	5-SC	0811001-11	ASP-A-008	714R11	Thorium-230	528		8.3	1	pCi/L
GLV 281	5-SC	0811001-11	ASP-A-008	714R11	Thorium-232	11.2		1.5	1	pCi/L
GLV 281	5-SC	0811001-11	ASP-A-008	714R11	Thorium-228	58.1		2	1	pCi/L

## SAMPLE MANAGEMENT SYSTEM Metals Data Validation Worksheet

**RIN:** 08101885                      **Lab Code:** PAR                      **Date Due:** 11/29/2008  
**Matrix:** Water                      **Site Code:** SBS                      **Date Completed:** 11/26/2008

Analyte	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								
1CHROMIUM	11/05/2008	-1.1000	1.0000	OK	OK	OK	OK	OK	101.0	101.0	98.0	3.0	90.0		104.0
1CHROMIUM	11/05/2008												95.0		108.0
1NICKEL	11/05/2008	-1.6000	1.0000	OK	OK	OK	OK	OK	102.0	105.0	102.0	3.0	95.0		106.0
1NICKEL	11/05/2008												100.0		109.0
2SELENIUM	11/13/2008	-0.0150	1.0000	OK	OK	OK	OK	OK	86.0	90.0	89.0	2.0	96.0		89.0
CADMIUM	11/06/2008	-0.0020	1.0000	OK	OK	OK	OK	OK	99.0	97.0	98.0	1.0	97.0		111.0
CADMIUM	11/06/2008												84.0		
LEAD	11/06/2008	-0.0090	1.0000	OK	OK	OK	OK	OK	99.0	100.0	101.0	1.0	100.0	2.0	117.0
LEAD	11/06/2008											3.0	104.0		
URANIUM	11/06/2008	0.0000	1.0000	OK	OK	OK	OK	OK	99.0	101.0	105.0	3.0	104.0	10.0	102.0
URANIUM	11/06/2008											3.0	109.0		

**SAMPLE MANAGEMENT SYSTEM**  
**Radiochemistry Data Validation Worksheet**

**RIN:** 08101885                      **Lab Code:** PAR                      **Date Due:** 11/29/2008  
**Matrix:** Water                      **Site Code:** SBS                      **Date Completed:** 11/26/2008

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
40-SC	Radium-226	11/24/2008			94.0			
5-SC	Radium-226	11/24/2008			86.9			
54-SC	Radium-226	11/24/2008			87.2			
10-DC	Radium-226	11/24/2008			91.1			
5-DC	Radium-226	11/24/2008			93.1			
19-DC	Radium-226	11/24/2008			93.4			
110-DC	Radium-226	11/24/2008			96.9			
2940	Radium-226	11/24/2008			96.2			
112-DC	Radium-226	11/24/2008			93.5			
113-DC	Radium-226	11/24/2008			91.1			
100-SC	Radium-226	11/24/2008			95.0			
LCS	Radium-226	11/24/2008			91.2	110.0		
LCS_Duplicate	Radium-226	11/24/2008			92.5	111.0		0.03
Blank	Radium-226	11/24/2008			92.6			
10-DC	Radium-228	11/11/2008			59.3			
19-DC	Radium-228	11/11/2008			65.3			
110-DC	Radium-228	11/11/2008			63.8			
112-DC	Radium-228	11/11/2008			62.8			
113-DC	Radium-228	11/11/2008			60.9			
100-SC	Radium-228	11/11/2008			57.7			
LCS	Radium-228	11/11/2008			63.1	107.0		
LCS_Duplicate	Radium-228	11/11/2008			62.9	110.0		0.16
Blank	Radium-228	11/11/2008			62.7			
40-SC	Radium-228	11/12/2008			63.2			
5-SC	Radium-228	11/12/2008			61.3			
54-SC	Radium-228	11/12/2008			60.9			
5-DC	Radium-228	11/12/2008			56.3			
2940	Radium-228	11/12/2008			63.7			
LCS	Radium-228	11/12/2008			66.6	92.3		
LCS_Duplicate	Radium-228	11/12/2008			60.6	93.1		0.04
Blank	Radium-228	11/12/2008			58.8			
40-SC	Thorium-228	11/07/2008			69.1			

**SAMPLE MANAGEMENT SYSTEM**  
**Radiochemistry Data Validation Worksheet**

**RIN:** 08101885      **Lab Code:** PAR      **Date Due:** 11/29/2008  
**Matrix:** Water      **Site Code:** SBS      **Date Completed:** 11/26/2008

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
54-SC	Thorium-228	11/07/2008			63.7			
10-DC	Thorium-228	11/07/2008			67.7			
5-DC	Thorium-228	11/07/2008			63.3			
19-DC	Thorium-228	11/07/2008			69.3			
110-DC	Thorium-228	11/07/2008			70.8			
112-DC	Thorium-228	11/07/2008			66.0			
113-DC	Thorium-228	11/07/2008			65.2			
100-SC	Thorium-228	11/07/2008			54.8			
113-DC dup	Thorium-228	11/07/2008			60.3			2.28
100-SC dup	Thorium-228	11/07/2008			57.4			0.68
5-SC	Thorium-228	11/08/2008			71.2			
2940	Thorium-228	11/17/2008			59.6			
Blank	Thorium-228	11/17/2008			70.1			
113-DC dup	Thorium-230	11/07/2008						0.74
100-SC dup	Thorium-230	11/07/2008						0.26
LCS	Thorium-230	11/08/2008			67.6	102.0		
113-DC dup	Thorium-232	11/07/2008						0.02
100-SC dup	Thorium-232	11/07/2008						0.01

## SAMPLE MANAGEMENT SYSTEM

### Wet Chemistry Data Validation Worksheet

**RIN:** 08101885                      **Lab Code:** PAR                      **Date Due:** 11/29/2008  
**Matrix:** Water                      **Site Code:** SBS                      **Date Completed:** 11/26/2008

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	11/04/2008	0.018	0.9999	OK	OK	OK	OK	OK	101	104			
NITRATE/NITRITE AS N	11/06/2008	-0.006	0.9997	OK	OK	OK	OK	OK	100	92	101	4	
NITRATE/NITRITE AS N	11/06/2008	0.006	0.9999	OK	OK	OK	OK						
SULFATE	11/04/2008	0.108	0.9999	OK	OK	OK	OK	OK	105	109	103	4	
TOTAL DISSOLVED SOLIDS	11/05/2008							OK	97			1	

## Sampling Quality Control Assessment

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

### Sampling Protocol

Sample results for all monitor wells were qualified with an “F” flag in the database, indicating the wells were purged and sampled using the low-flow sampling method. All wells met the Category I criteria with the following exceptions:

- Well 100-SC was classified as Category II.
- The change in pH exceeded the Category I criterion for well 54-SC.

The sample results for these two wells were qualified with a “Q” flag, indicating the data are qualitative because of the sampling technique.

### 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. A duplicate sample was collected from well 40-SC. The non-radiochemical duplicate results were acceptable, meeting the U.S. Environmental Protection Agency recommended laboratory duplicate criteria of less than 20 percent relative difference for results that are greater than 5 times the PQL. The radiochemical duplicate results were acceptable with relative error ratios (calculated using the one-sigma TPU) of less than three.

**SAMPLE MANAGEMENT SYSTEM**  
**Validation Report: Field Duplicates**

Page 1 of 1

RIN: 08101885    Lab Code: PAR    Project: Shirley Basin South    Validation Date: 12/24/2008

Duplicate: 2940

Sample: 40-SC

Analyte	Sample			Duplicate			RPD	RER	Units
	Result	Flag	Error	Result	Flag	Error			
CADMIUM	0.15	B		0.13	B		14.29		UG/L
CHLORIDE	71			67			5.80		MG/L
CHROMIUM	0.72	U		0.72	U				UG/L
LEAD	0.25	B		1.1			125.93		UG/L
NICKEL	9.9	B		11	B		10.53		UG/L
NITRATE/NITRITE AS N	1.2			1.2			0		MG/L
Radium-226	0.599		0.277	0.274		0.175		1.9	pCi/L
Radium-228	1.28		0.532	0.782		0.415		1.4	pCi/L
SELENIUM	5.8			5.9			1.71		UG/L
SULFATE	1900			1900			0		MG/L
Thorium-228	0.395	U	0.363	0.125	U	0.132		1.4	pCi/L
Thorium-230	0.0552	U	0.395	-0.0293	U	0.354		0.3	pCi/L
Thorium-232	0.115	U	0.153	0.115		0.105		0	pCi/L
TOTAL DISSOLVED SOLIDS	3000			3000			0		MG/L
URANIUM	0.32			0.34			6.06		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 Donivan 4-16-2009  
Steve Donivan Date

Data Validation Lead: Gretchen R Baer 4/16/09  
Gretchen Baer Date

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**Attachment 1**  
**Assessment of Anomalous Data**

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## **Potential Outliers Report**

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## Potential Outliers Report

Potential outliers are measurements that are extremely large or small relative to the rest of the data and, therefore, are suspected of misrepresenting the population from which they were collected. Potential outliers 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.

The nitrate+nitire as N result for location 40-SC was identified as potentially anomalous. This location was sampled and analyzed in duplicate with acceptable results. Also, there were no analytical errors associated with these data. The data for this sampling event are acceptable as qualified.

**Data Validation Outliers Report - No Field Parameters**

Laboratory: PARAGON (Fort Collins, CO)

RIN: 08101885

Comparison: All Historical Data

Report Date: 4/2/2009

Site Code	Location Code	Sample Date	Analyte	Current			Historical Maximum			Historical Minimum			Number of Data Points		Normally Distributed	Statistical Outlier
				Result	Qualifiers Lab Data		Result	Qualifiers Lab Data		Result	Qualifiers Lab Data		N	N Below Detect		
SBS01	40-SC	10/29/2008	Nickel	0.0099	B	F	0.19			0.01	B	F	58	30	No	No
SBS01	40-SC	10/29/2008	Nitrate + Nitrite as Nitrogen	1.2		F	0.63		F	0.28		FJ	7	0	Yes	Yes
SBS01	40-SC	10/29/2008	Total Dissolved Solids	3000		F	4000		FJ	3120			9	0	Yes	No
SBS01	5-DC	10/29/2008	Total Dissolved Solids	9200		F	9000		F	6620			6	0	Yes	No
SBS01	5-SC	10/28/2008	Thorium-228	58.1		F	56.7		F	49.6		F	5	0	Yes	No
SBS01	5-SC	10/28/2008	Thorium-232	11.2		F	15.6		F	12		F	5	0	Yes	No

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.

STATISTICAL TESTS:

The distribution of the data is tested for normality or lognormality using the Shapiro-Wilk Test  
 Outliers are identified using Dixon's Test when there are 25 or fewer data points.  
 Outliers are identified using Rosner's Test when there are 26 or more data points.  
 See Data Quality Assessment: Statistical Methods for Practitioners, EPA QC/G-9S, February 2006.

# **Attachment 2**

## **Data Presentation**

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## **Groundwater Quality Data**

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

REPORT DATE: 4/3/2009

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	10/30/2008	N001	180.8 - 220.8	0.000096	B	UF	#	0.000016	
Chloride	mg/L	10/30/2008	N001	180.8 - 220.8	56		F	#	4	
Chromium	mg/L	10/30/2008	N001	180.8 - 220.8	0.00072	U	JF	#	0.00072	
Lead	mg/L	10/30/2008	N001	180.8 - 220.8	0.0025		F	#	0.000016	
Nickel	mg/L	10/30/2008	N001	180.8 - 220.8	0.00096	U	JF	#	0.00096	
Nitrate + Nitrite as Nitrogen	mg/L	10/30/2008	N001	180.8 - 220.8	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	10/30/2008	N001	180.8 - 220.8	139.8			0		
pH	s.u.	10/30/2008	N001	180.8 - 220.8	6.82			0		
Radium-226	pCi/L	10/30/2008	N001	180.8 - 220.8	17.4		F	#	0.2	4.54
Radium-228	pCi/L	10/30/2008	N001	180.8 - 220.8	5.57		JF	#	0.67	1.73
Selenium	mg/L	10/30/2008	N001	180.8 - 220.8	0.00007	B	UF	#	0.000011	
Specific Conductance	umhos/cm	10/30/2008	N001	180.8 - 220.8	2198			0		
Sulfate	mg/L	10/30/2008	N001	180.8 - 220.8	1100		F	#	10	
Temperature	C	10/30/2008	N001	180.8 - 220.8	10.84			0		
Thorium-228	pCi/L	10/30/2008	N001	180.8 - 220.8	0.7	U	F	#	0.7	0.325
Thorium-230	pCi/L	10/30/2008	N001	180.8 - 220.8	0.88	U	F	#	0.88	0.341
Thorium-232	pCi/L	10/30/2008	N001	180.8 - 220.8	0.19	U	F	#	0.19	0.108
Total Dissolved Solids	mg/L	10/30/2008	N001	180.8 - 220.8	1800		F	#	40	
Turbidity	NTU	10/30/2008	N001	180.8 - 220.8	7.91			0		
Uranium	mg/L	10/30/2008	N001	180.8 - 220.8	0.017		F	#	0.0000036	

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

REPORT DATE: 4/3/2009

Location: 100-SC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Cadmium	mg/L	10/30/2008	N001	210	- 225	0.00007	B	UFQ	#	0.000016	
Chloride	mg/L	10/30/2008	N001	210	- 225	870		FQ	#	10	
Chromium	mg/L	10/30/2008	N001	210	- 225	0.015		FQ	#	0.00072	
Lead	mg/L	10/30/2008	N001	210	- 225	0.00018	B	FQ	#	0.000016	
Nickel	mg/L	10/30/2008	N001	210	- 225	0.014	B	FQ	#	0.00096	
Nitrate + Nitrite as Nitrogen	mg/L	10/30/2008	N001	210	- 225	0.55		FQ	#	0.01	
Oxidation Reduction Potential	mV	10/30/2008	N001	210	- 225	742			0		
pH	s.u.	10/30/2008	N001	210	- 225	8.59			0		
Radium-226	pCi/L	10/30/2008	N001	210	- 225	3.06		FQ	#	0.17	0.92
Radium-228	pCi/L	10/30/2008	N001	210	- 225	3.22		JFQ	#	0.69	1.06
Selenium	mg/L	10/30/2008	N001	210	- 225	0.023		FQ	#	0.000022	
Specific Conductance	umhos/cm	10/30/2008	N001	210	- 225	3780			0		
Sulfate	mg/L	10/30/2008	N001	210	- 225	310		FQ	#	25	
Temperature	C	10/30/2008	N001	210	- 225	11.24			0		
Thorium-228	pCi/L	10/30/2008	N001	210	- 225	0.73	U	FQ	#	0.73	0.34
Thorium-230	pCi/L	10/30/2008	N001	210	- 225	0.99	U	FQ	#	0.99	0.432
Thorium-232	pCi/L	10/30/2008	N001	210	- 225	0.24	U	FQ	#	0.24	0.137
Total Dissolved Solids	mg/L	10/30/2008	N001	210	- 225	2200		FQ	#	80	
Turbidity	NTU	10/30/2008	N001	210	- 225	24.7			0		
Uranium	mg/L	10/30/2008	N001	210	- 225	0.065		FQ	#	0.0000036	

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

REPORT DATE: 4/3/2009

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	10/30/2008	N001	255	- 305	0.00014	B	UF	#	0.000016	
Chloride	mg/L	10/30/2008	N001	255	- 305	340		F	#	10	
Chromium	mg/L	10/30/2008	N001	255	- 305	0.0024	B	JF	#	0.00072	
Lead	mg/L	10/30/2008	N001	255	- 305	0.0018		F	#	0.000016	
Nickel	mg/L	10/30/2008	N001	255	- 305	0.004	B	JF	#	0.00096	
Nitrate + Nitrite as Nitrogen	mg/L	10/30/2008	N001	255	- 305	0.18		F	#	0.01	
Oxidation Reduction Potential	mV	10/30/2008	N001	255	- 305	860.2			0		
pH	s.u.	10/30/2008	N001	255	- 305	6.98			0		
Radium-226	pCi/L	10/30/2008	N001	255	- 305	43		F	#	0.21	10.9
Radium-228	pCi/L	10/30/2008	N001	255	- 305	2.46		JF	#	0.61	0.826
Selenium	mg/L	10/30/2008	N001	255	- 305	0.001		F	#	0.000011	
Specific Conductance	umhos/cm	10/30/2008	N001	255	- 305	3821			0		
Sulfate	mg/L	10/30/2008	N001	255	- 305	1700		F	#	25	
Temperature	C	10/30/2008	N001	255	- 305	9.71			0		
Thorium-228	pCi/L	10/30/2008	N001	255	- 305	0.66	U	F	#	0.66	0.257
Thorium-230	pCi/L	10/30/2008	N001	255	- 305	0.86	U	F	#	0.86	0.369
Thorium-232	pCi/L	10/30/2008	N001	255	- 305	0.2	U	F	#	0.2	0.104
Total Dissolved Solids	mg/L	10/30/2008	N001	255	- 305	3200		F	#	80	
Turbidity	NTU	10/30/2008	N001	255	- 305	9.37			0		
Uranium	mg/L	10/30/2008	N001	255	- 305	0.027		F	#	0.0000036	

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

REPORT DATE: 4/3/2009

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	10/30/2008	N001	203	- 253	0.000087	B	UF	#	0.000016	
Chloride	mg/L	10/30/2008	N001	203	- 253	190		F	#	10	
Chromium	mg/L	10/30/2008	N001	203	- 253	0.00072	U	JF	#	0.00072	
Lead	mg/L	10/30/2008	N001	203	- 253	0.00096		F	#	0.000016	
Nickel	mg/L	10/30/2008	N001	203	- 253	0.00096	U	JF	#	0.00096	
Nitrate + Nitrite as Nitrogen	mg/L	10/30/2008	N001	203	- 253	0.14		F	#	0.01	
Oxidation Reduction Potential	mV	10/30/2008	N001	203	- 253	760			0		
pH	s.u.	10/30/2008	N001	203	- 253	7.77			0		
Radium-226	pCi/L	10/30/2008	N001	203	- 253	21.9		F	#	0.19	5.65
Radium-228	pCi/L	10/30/2008	N001	203	- 253	5.27		JF	#	0.65	1.64
Selenium	mg/L	10/30/2008	N001	203	- 253	0.013		F	#	0.000011	
Specific Conductance	umhos/cm	10/30/2008	N001	203	- 253	2356			0		
Sulfate	mg/L	10/30/2008	N001	203	- 253	820		F	#	25	
Temperature	C	10/30/2008	N001	203	- 253	10.03			0		
Thorium-228	pCi/L	10/30/2008	N001	203	- 253	0.71	U	F	#	0.71	0.313
Thorium-230	pCi/L	10/30/2008	N001	203	- 253	0.89	U	F	#	0.89	0.324
Thorium-232	pCi/L	10/30/2008	N001	203	- 253	0.16	U	F	#	0.16	0.111
Total Dissolved Solids	mg/L	10/30/2008	N001	203	- 253	1700		F	#	80	
Turbidity	NTU	10/30/2008	N001	203	- 253	2.14			0		
Uranium	mg/L	10/30/2008	N001	203	- 253	0.25		F	#	0.000018	

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

REPORT DATE: 4/3/2009

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	10/30/2008	N001	235	-	285	0.000065	B	UF	#	0.000016	
Chloride	mg/L	10/30/2008	N001	235	-	285	12		F	#	4	
Chromium	mg/L	10/30/2008	N001	235	-	285	0.00072	U	JF	#	0.00072	
Lead	mg/L	10/30/2008	N001	235	-	285	0.0035		F	#	0.000016	
Nickel	mg/L	10/30/2008	N001	235	-	285	0.00096	U	JF	#	0.00096	
Nitrate + Nitrite as Nitrogen	mg/L	10/30/2008	N001	235	-	285	0.015		F	#	0.01	
Oxidation Reduction Potential	mV	10/30/2008	N001	235	-	285	105			0		
pH	s.u.	10/30/2008	N001	235	-	285	7.55			0		
Radium-226	pCi/L	10/30/2008	N001	235	-	285	4.33		F	#	0.22	1.24
Radium-228	pCi/L	10/30/2008	N001	235	-	285	4		JF	#	0.67	1.27
Selenium	mg/L	10/30/2008	N001	235	-	285	0.0001		UF	#	0.000011	
Specific Conductance	umhos/cm	10/30/2008	N001	235	-	285	1739			0		
Sulfate	mg/L	10/30/2008	N001	235	-	285	630		F	#	10	
Temperature	C	10/30/2008	N001	235	-	285	9.9			0		
Thorium-228	pCi/L	10/30/2008	N001	235	-	285	0.64	U	F	#	0.64	0.243
Thorium-230	pCi/L	10/30/2008	N001	235	-	285	0.86	U	F	#	0.86	0.427
Thorium-232	pCi/L	10/30/2008	N001	235	-	285	0.24	U	F	#	0.24	0.136
Total Dissolved Solids	mg/L	10/30/2008	N001	235	-	285	1100		F	#	40	
Turbidity	NTU	10/30/2008	N001	235	-	285	6.3			0		
Uranium	mg/L	10/30/2008	N001	235	-	285	0.002		F	#	0.0000036	

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

REPORT DATE: 4/3/2009

Location: 19-DC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	10/29/2008	N001	177	-	237	270			0		
Cadmium	mg/L	10/29/2008	N001	177	-	237	0.00029	B	F	#	0.000016	
Chloride	mg/L	10/29/2008	N001	177	-	237	85		F	#	4	
Chromium	mg/L	10/29/2008	N001	177	-	237	0.00072	U	JF	#	0.00072	
Lead	mg/L	10/29/2008	N001	177	-	237	0.0017		F	#	0.000016	
Nickel	mg/L	10/29/2008	N001	177	-	237	0.15		F	#	0.00096	
Nitrate + Nitrite as Nitrogen	mg/L	10/29/2008	N001	177	-	237	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	10/29/2008	N001	177	-	237	-43.8				0	
pH	s.u.	10/29/2008	N001	177	-	237	6.66				0	
Radium-226	pCi/L	10/29/2008	N001	177	-	237	7.41		F	#	0.2	2.01
Radium-228	pCi/L	10/29/2008	N001	177	-	237	7.24		JF	#	0.63	2.21
Selenium	mg/L	10/29/2008	N001	177	-	237	0.000075	B	UF	#	0.000011	
Specific Conductance	umhos/cm	10/29/2008	N001	177	-	237	4320				0	
Sulfate	mg/L	10/29/2008	N001	177	-	237	2600		F	#	25	
Temperature	C	10/29/2008	N001	177	-	237	9.59				0	
Thorium-228	pCi/L	10/29/2008	N001	177	-	237	0.6	U	F	#	0.6	0.264
Thorium-230	pCi/L	10/29/2008	N001	177	-	237	0.87	U	F	#	0.87	0.356
Thorium-232	pCi/L	10/29/2008	N001	177	-	237	0.079	U	F	#	0.079	0.105
Total Dissolved Solids	mg/L	10/29/2008	N001	177	-	237	4100		F	#	80	
Turbidity	NTU	10/29/2008	N001	177	-	237	8.77				0	
Uranium	mg/L	10/29/2008	N001	177	-	237	0.00038		F	#	0.000036	

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

REPORT DATE: 4/3/2009

Location: 40-SC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	10/29/2008	N001	-	98			0		
Cadmium	mg/L	10/29/2008	N001	-	0.00015	B	UF	#	0.000016	
Cadmium	mg/L	10/29/2008	N002	-	0.00013	B	UF	#	0.000016	
Chloride	mg/L	10/29/2008	N001	-	71		F	#	2	
Chloride	mg/L	10/29/2008	N002	-	67		F	#	2	
Chromium	mg/L	10/29/2008	N001	-	0.00072	U	JF	#	0.00072	
Chromium	mg/L	10/29/2008	N002	-	0.00072	U	JF	#	0.00072	
Lead	mg/L	10/29/2008	N001	-	0.00025	B	F	#	0.000016	
Lead	mg/L	10/29/2008	N002	-	0.0011		F	#	0.000016	
Nickel	mg/L	10/29/2008	N001	-	0.0099	B	F	#	0.00096	
Nickel	mg/L	10/29/2008	N002	-	0.011	B	F	#	0.00096	
Nitrate + Nitrite as Nitrogen	mg/L	10/29/2008	N001	-	1.2		F	#	0.01	
Nitrate + Nitrite as Nitrogen	mg/L	10/29/2008	N002	-	1.2		F	#	0.01	
Oxidation Reduction Potential	mV	10/29/2008	N001	-	39.8			0		
pH	s.u.	10/29/2008	N001	-	6.39			0		
Radium-226	pCi/L	10/29/2008	N001	-	0.599		JF	#	0.2	0.277
Radium-226	pCi/L	10/29/2008	N002	-	0.274		JF	#	0.2	0.175
Radium-228	pCi/L	10/29/2008	N001	-	1.28		JF	#	0.68	0.532
Radium-228	pCi/L	10/29/2008	N002	-	0.782		JF	#	0.66	0.415
Selenium	mg/L	10/29/2008	N001	-	0.0058		F	#	0.000011	
Selenium	mg/L	10/29/2008	N002	-	0.0059		F	#	0.000011	

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

REPORT DATE: 4/3/2009

Location: 40-SC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Specific Conductance	umhos/cm	10/29/2008	N001	-	3194			0		
Sulfate	mg/L	10/29/2008	N001	-	1900		F	#	25	
Sulfate	mg/L	10/29/2008	N002	-	1900		F	#	25	
Temperature	C	10/29/2008	N001	-	10.14			0		
Thorium-228	pCi/L	10/29/2008	N001	-	0.66	U	F	#	0.66	0.363
Thorium-228	pCi/L	10/29/2008	N002	-	0.2	U	F	#	0.2	0.132
Thorium-230	pCi/L	10/29/2008	N001	-	0.87	U	F	#	0.87	0.395
Thorium-230	pCi/L	10/29/2008	N002	-	0.76	U	F	#	0.76	0.354
Thorium-232	pCi/L	10/29/2008	N001	-	0.28	U	F	#	0.28	0.153
Thorium-232	pCi/L	10/29/2008	N002	-	0.115		JF	#	0.062	0.105
Total Dissolved Solids	mg/L	10/29/2008	N001	-	3000		F	#	80	
Total Dissolved Solids	mg/L	10/29/2008	N002	-	3000		F	#	80	
Turbidity	NTU	10/29/2008	N001	-	8.85			0		
Uranium	mg/L	10/29/2008	N001	-	0.00032		F	#	0.000036	
Uranium	mg/L	10/29/2008	N002	-	0.00034		F	#	0.000036	

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

REPORT DATE: 4/3/2009

Location: 5-DC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	10/29/2008	N001	-	0			0		
Cadmium	mg/L	10/29/2008	N001	-	0.00041		F	#	0.000016	
Chloride	mg/L	10/29/2008	N001	-	180		F	#	4	
Chromium	mg/L	10/29/2008	N001	-	0.011		F	#	0.00072	
Lead	mg/L	10/29/2008	N001	-	0.0023		F	#	0.000016	
Nickel	mg/L	10/29/2008	N001	-	1		F	#	0.00096	
Nitrate + Nitrite as Nitrogen	mg/L	10/29/2008	N001	-	2	U	JF	#	2	
Oxidation Reduction Potential	mV	10/29/2008	N001	-	206.1				0	
pH	s.u.	10/29/2008	N001	-	4.5				0	
Radium-226	pCi/L	10/29/2008	N001	-	9.03		F	#	0.19	2.42
Radium-228	pCi/L	10/29/2008	N001	-	31.3		JF	#	0.8	9.35
Selenium	mg/L	10/29/2008	N001	-	0.00015		UF	#	0.000011	
Specific Conductance	umhos/cm	10/29/2008	N001	-	7493				0	
Sulfate	mg/L	10/29/2008	N001	-	6100		F	#	50	
Temperature	C	10/29/2008	N001	-	10.37				0	
Thorium-228	pCi/L	10/29/2008	N001	-	1.97		F	#	0.62	0.63
Thorium-230	pCi/L	10/29/2008	N001	-	1.18		JF	#	0.86	0.564
Thorium-232	pCi/L	10/29/2008	N001	-	0.606		JF	#	0.23	0.291
Total Dissolved Solids	mg/L	10/29/2008	N001	-	9200		F	#	200	
Turbidity	NTU	10/29/2008	N001	-	8.46				0	
Uranium	mg/L	10/29/2008	N001	-	0.051		F	#	0.0000036	

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

REPORT DATE: 4/3/2009

Location: 5-SC WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	10/28/2008	N001	49.3	- 57.7	0			0		
Cadmium	mg/L	10/28/2008	N001	49.3	- 57.7	0.043		F	#	0.00008	
Chloride	mg/L	10/28/2008	N001	49.3	- 57.7	300		F	#	20	
Chromium	mg/L	10/28/2008	N001	49.3	- 57.7	0.3		F	#	0.00072	
Lead	mg/L	10/28/2008	N001	49.3	- 57.7	0.0011	B	F	#	0.000081	
Nickel	mg/L	10/28/2008	N001	49.3	- 57.7	2.5		F	#	0.00096	
Nitrate + Nitrite as Nitrogen	mg/L	10/28/2008	N001	49.3	- 57.7	2	U	JF	#	2	
Oxidation Reduction Potential	mV	10/28/2008	N001	49.3	- 57.7	286.5				0	
pH	s.u.	10/28/2008	N001	49.3	- 57.7	3.4				0	
Radium-226	pCi/L	10/28/2008	N001	49.3	- 57.7	6.28		F	#	0.23	1.75
Radium-228	pCi/L	10/28/2008	N001	49.3	- 57.7	1.73		JF	#	0.71	0.651
Selenium	mg/L	10/28/2008	N001	49.3	- 57.7	0.024		F	#	0.000011	
Specific Conductance	umhos/cm	10/28/2008	N001	49.3	- 57.7	13680				0	
Sulfate	mg/L	10/28/2008	N001	49.3	- 57.7	13000		F	#	100	
Temperature	C	10/28/2008	N001	49.3	- 57.7	8.98				0	
Thorium-228	pCi/L	10/28/2008	N001	49.3	- 57.7	58.1		F	#	2	12.1
Thorium-230	pCi/L	10/28/2008	N001	49.3	- 57.7	528		F	#	8.3	85.5
Thorium-232	pCi/L	10/28/2008	N001	49.3	- 57.7	11.2		F	#	1.5	3.93
Total Dissolved Solids	mg/L	10/28/2008	N001	49.3	- 57.7	19000		F	#	200	
Turbidity	NTU	10/28/2008	N001	49.3	- 57.7	5.81				0	
Uranium	mg/L	10/28/2008	N001	49.3	- 57.7	3.5		F	#	0.00036	

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

REPORT DATE: 4/3/2009

Location: 54-SC WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	10/28/2008	N001	-	0			0		
Cadmium	mg/L	10/28/2008	N001	-	0.0023		FQ	#	0.000016	
Chloride	mg/L	10/28/2008	N001	-	340		FQ	#	20	
Chromium	mg/L	10/28/2008	N001	-	0.17		FQ	#	0.00072	
Lead	mg/L	10/28/2008	N001	-	0.0013		FQ	#	0.000016	
Nickel	mg/L	10/28/2008	N001	-	3.2		FQ	#	0.00096	
Nitrate + Nitrite as Nitrogen	mg/L	10/28/2008	N001	-	2	U	JFQ	#	2	
Oxidation Reduction Potential	mV	10/28/2008	N001	-	306.8			0		
pH	s.u.	10/28/2008	N001	-	3.79			0		
Radium-226	pCi/L	10/28/2008	N001	-	22.1		FQ	#	0.19	5.71
Radium-228	pCi/L	10/28/2008	N001	-	95.6		JFQ	#	0.71	28.4
Selenium	mg/L	10/28/2008	N001	-	0.00018		UFQ	#	0.000011	
Specific Conductance	umhos/cm	10/28/2008	N001	-	8732			0		
Sulfate	mg/L	10/28/2008	N001	-	7700		FQ	#	50	
Temperature	C	10/28/2008	N001	-	10.57			0		
Thorium-228	pCi/L	10/28/2008	N001	-	6.42		FQ	#	0.71	1.37
Thorium-230	pCi/L	10/28/2008	N001	-	4.8		FQ	#	0.88	1.14
Thorium-232	pCi/L	10/28/2008	N001	-	4.83		FQ	#	0.22	1.08
Total Dissolved Solids	mg/L	10/28/2008	N001	-	12000		FQ	#	200	

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

REPORT DATE: 4/3/2009

Location: 54-SC WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Turbidity	NTU	10/28/2008	N001	-	1.27			0		
Uranium	mg/L	10/28/2008	N001	-	0.06	FQ	#	0.0000036		

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

LAB QUALIFIERS:

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

DATA QUALIFIERS:

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

QA QUALIFIER:

- # Validated according to quality assurance guidelines.

## **Static Water Level Data**

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**STATIC WATER LEVELS (USEE700) FOR SITE SBS01, Shirley Basin South Disposal Site**  
**REPORT DATE: 4/2/2009**

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
10-DC		7113.02	10/30/2008	13:10:39	171.4	6941.62	
100-SC		7154.11	10/30/2008	15:15:54	220.36	6933.75	
110-DC		7154.43	10/30/2008	10:55:20	213.42	6941.01	
112-DC		7125.59	10/30/2008	14:05:26	183.95	6941.64	
113-DC		7135.76	10/30/2008	13:45:29	192.3	6943.46	
19-DC		7112.04	10/29/2008	12:55:55	170.9	6941.14	
40-SC		7058.48	10/29/2008	16:40:52	9.6	7048.88	
5-DC		7119.84	10/29/2008	11:55:32	179.2	6940.64	
5-SC		7056.45	10/28/2008	15:15:15	56.77	6999.68	
54-SC		7158.78	10/28/2008	16:10:14	208.51	6950.27	

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

WATER LEVEL FLAGS: D Dry      F FLOWING

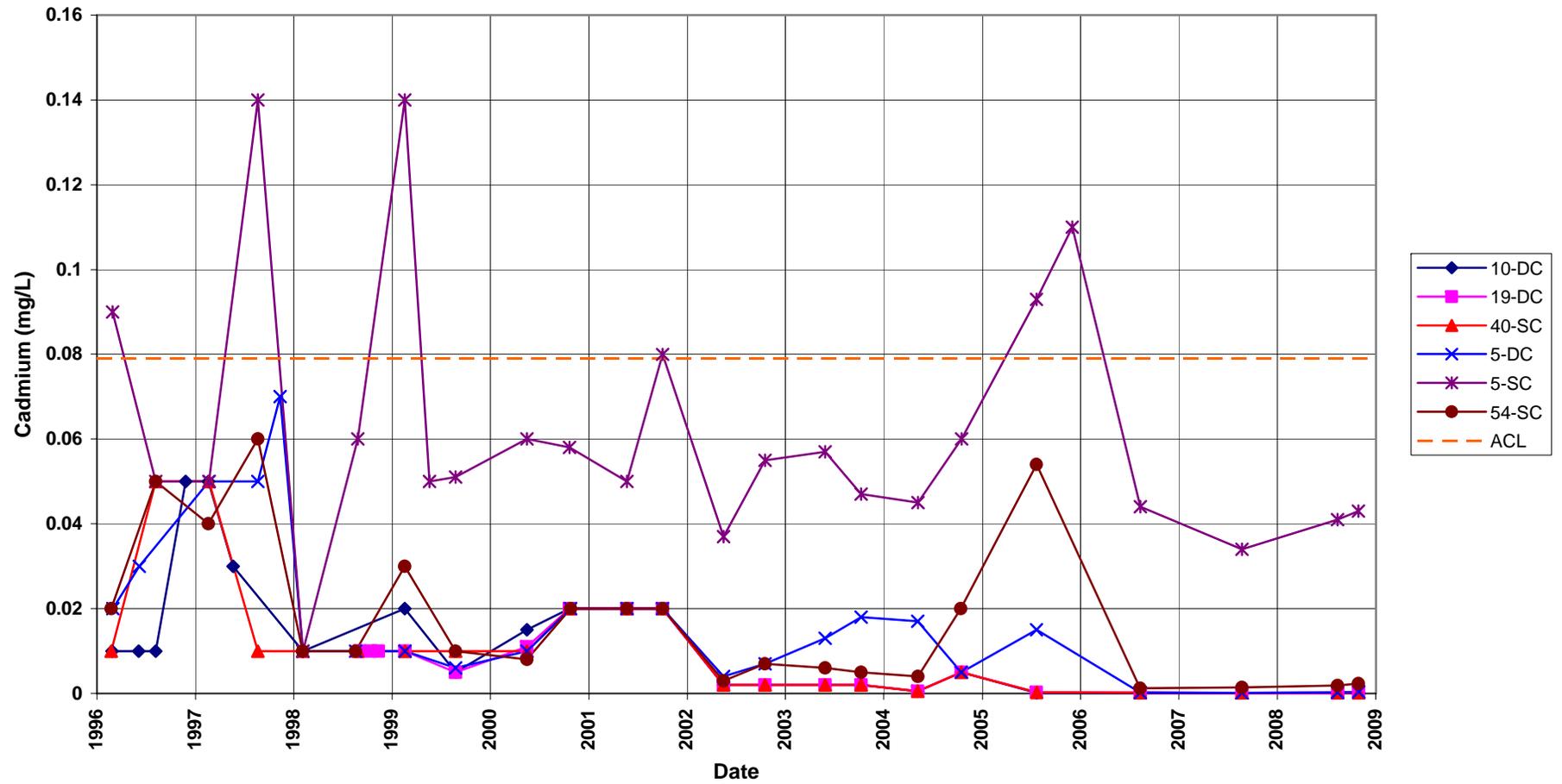
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## **Time-Concentration Graphs**

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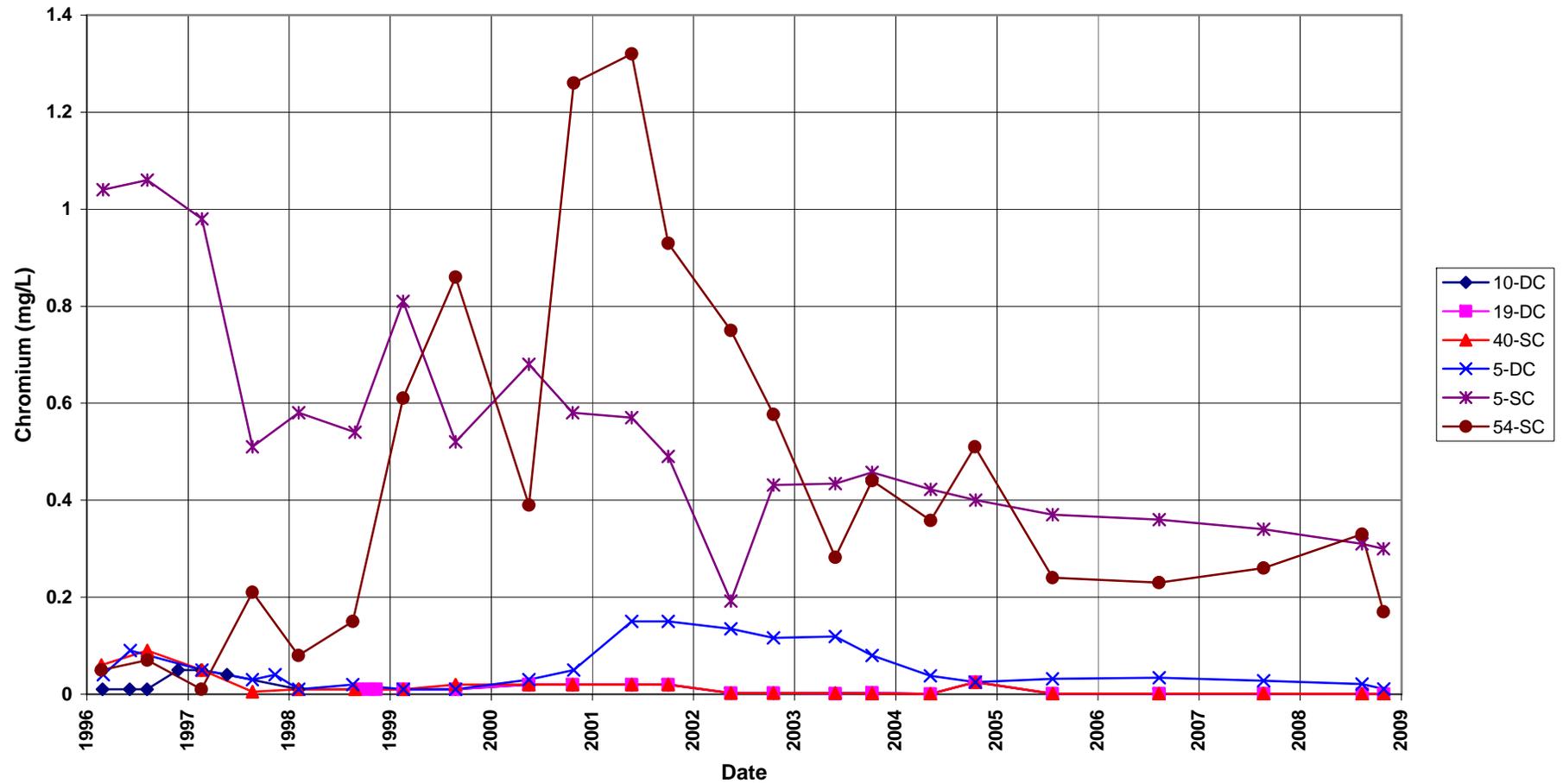
# Shirley Basin South Disposal Site Cadmium Concentration

Alternate Concentration Limit = 0.079 mg/L



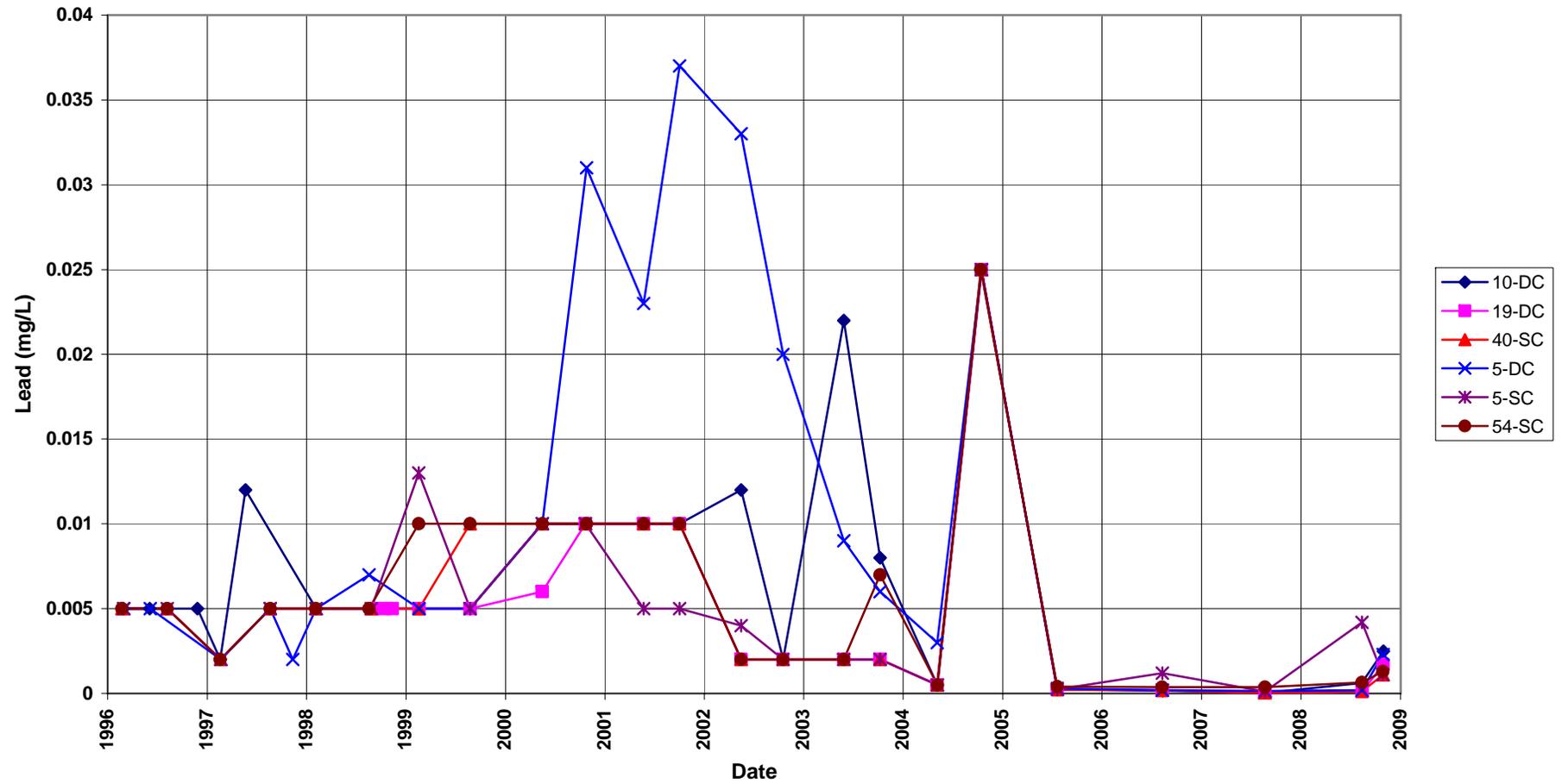
# Shirley Basin South Disposal Site Chromium Concentration

Alternate Concentration Limit = 1.83 mg/L



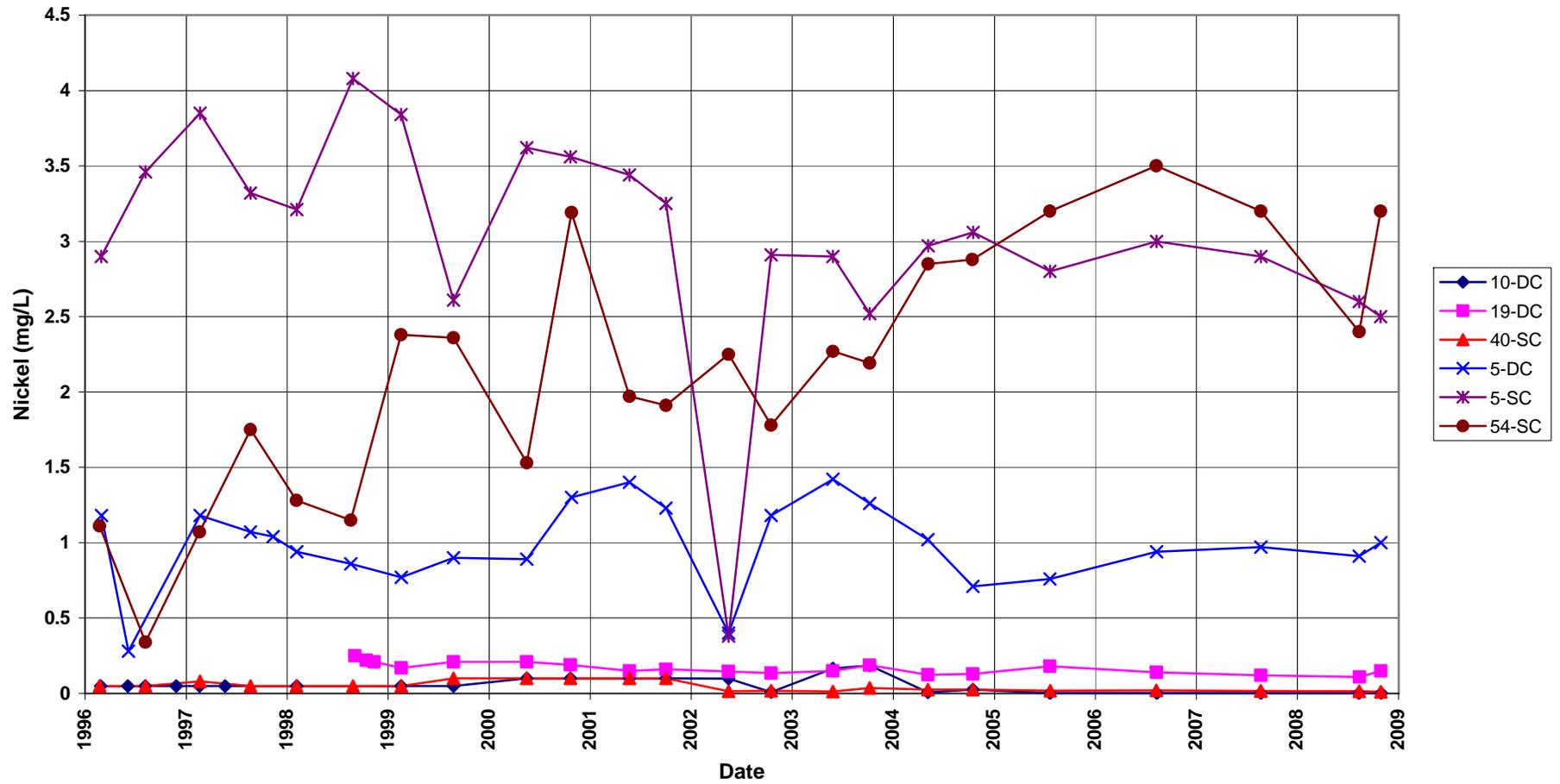
# Shirley Basin South Disposal Site Lead Concentration

Alternate Concentration Limit = 0.05 mg/L

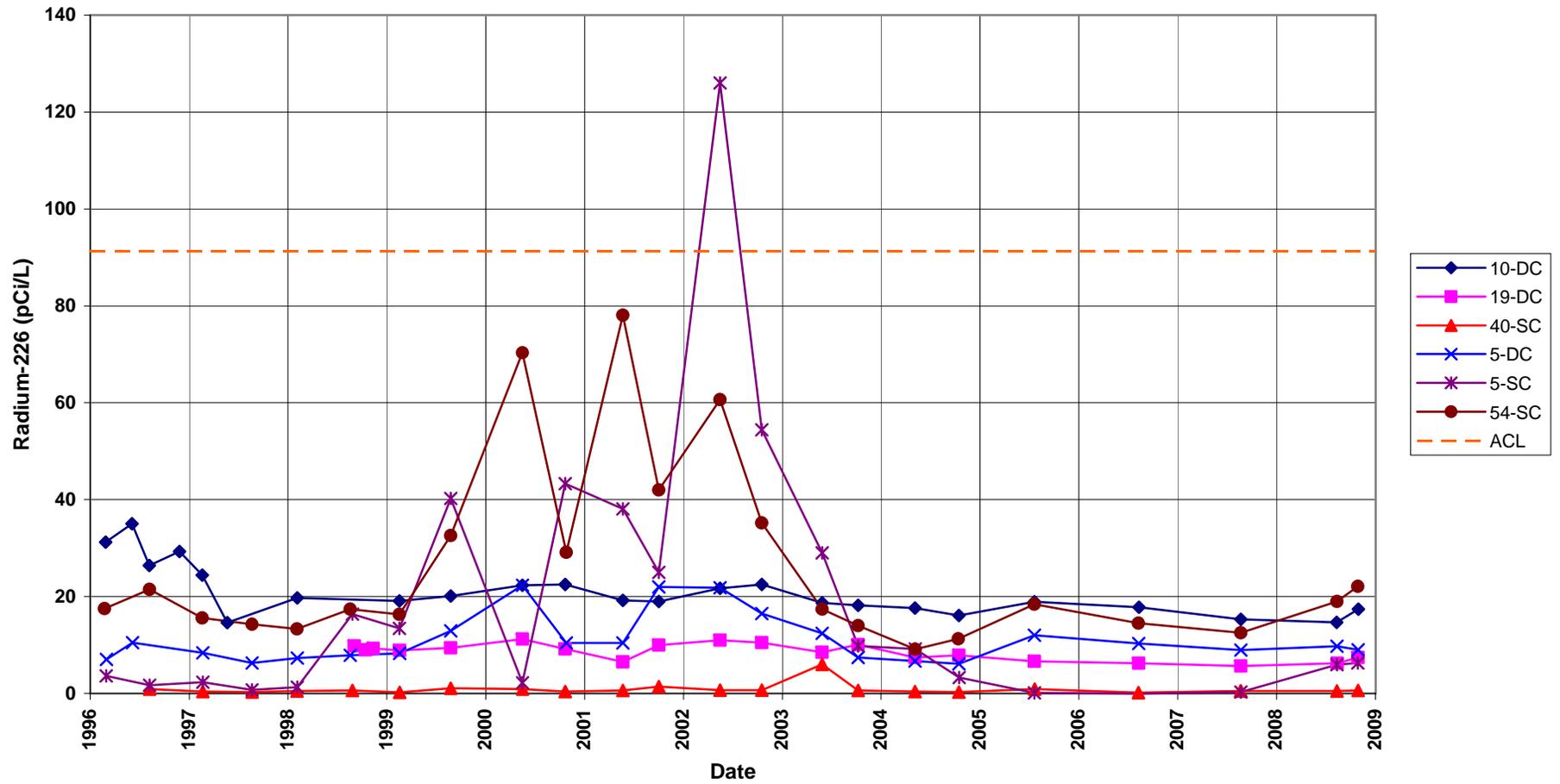


# Shirley Basin South Disposal Site Nickel Concentration

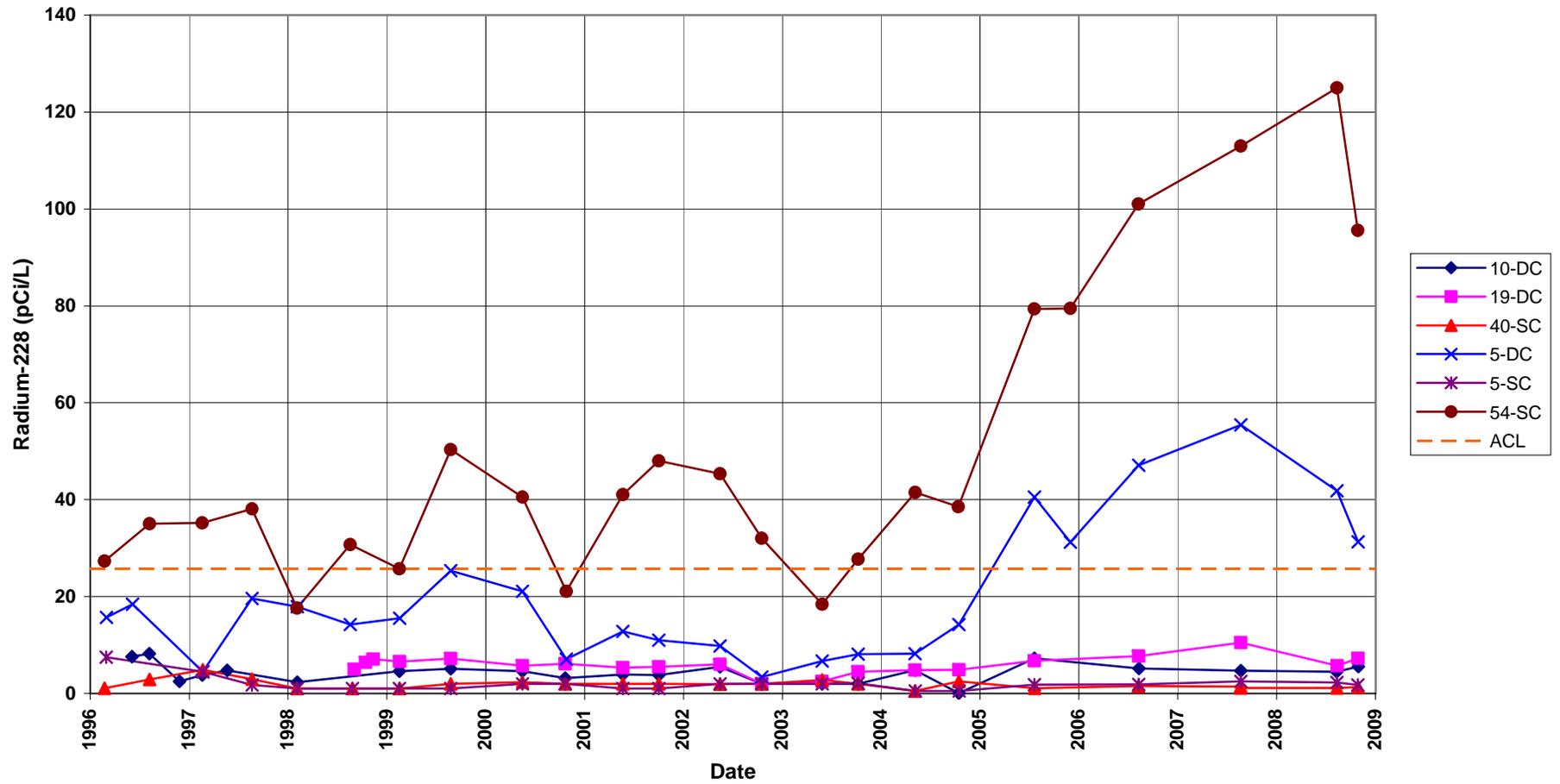
Alternate Concentration Limit = 6.15 mg/L



Shirley Basin South Disposal Site  
Radium-226 Concentration  
Alternate Concentration Limit = 91.3 mg/L

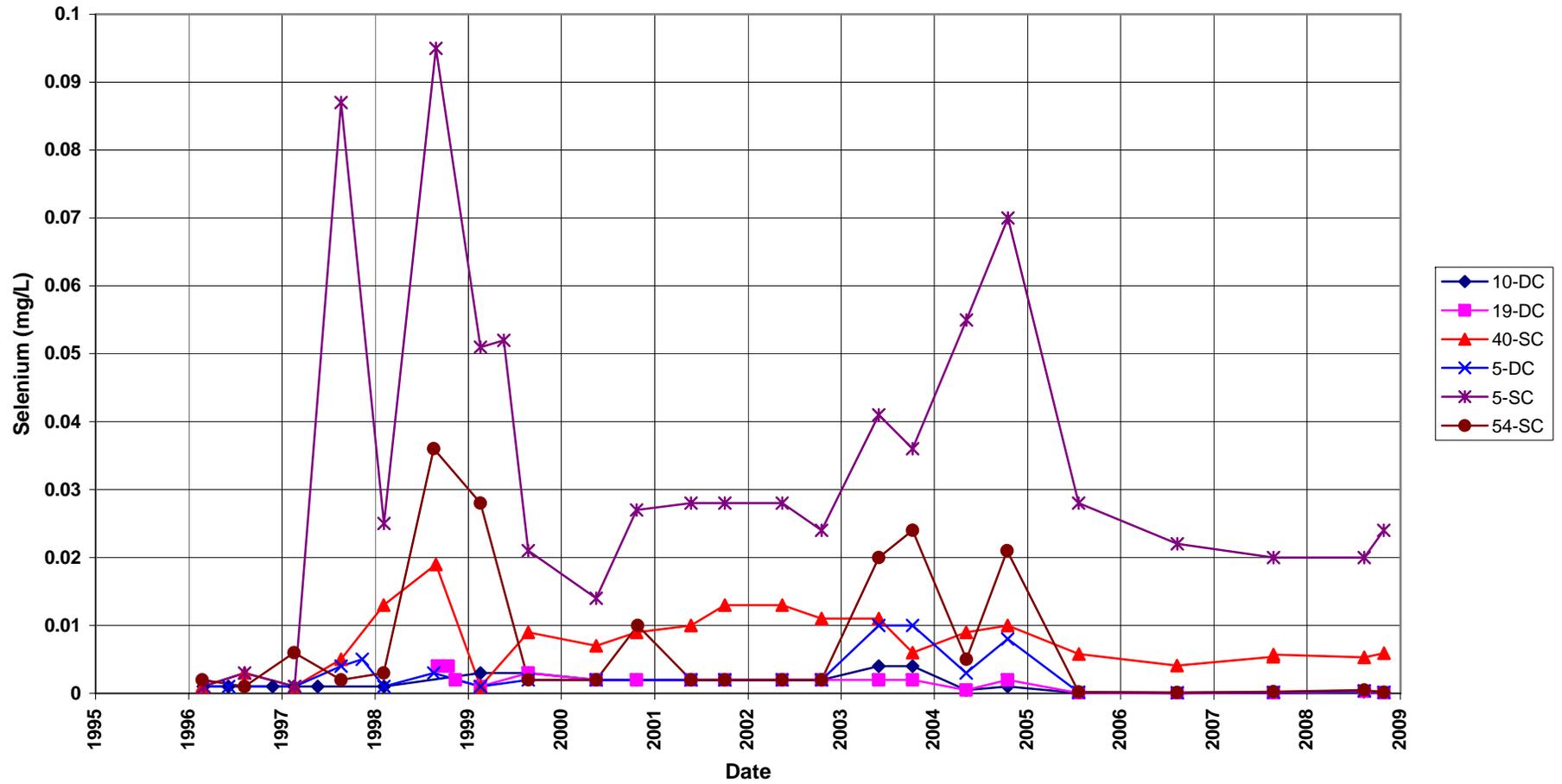


**Shirley Basin South Disposal Site**  
**Radium-228 Concentration**  
 Alternate Concentration Limit = 25.7 pCi/L



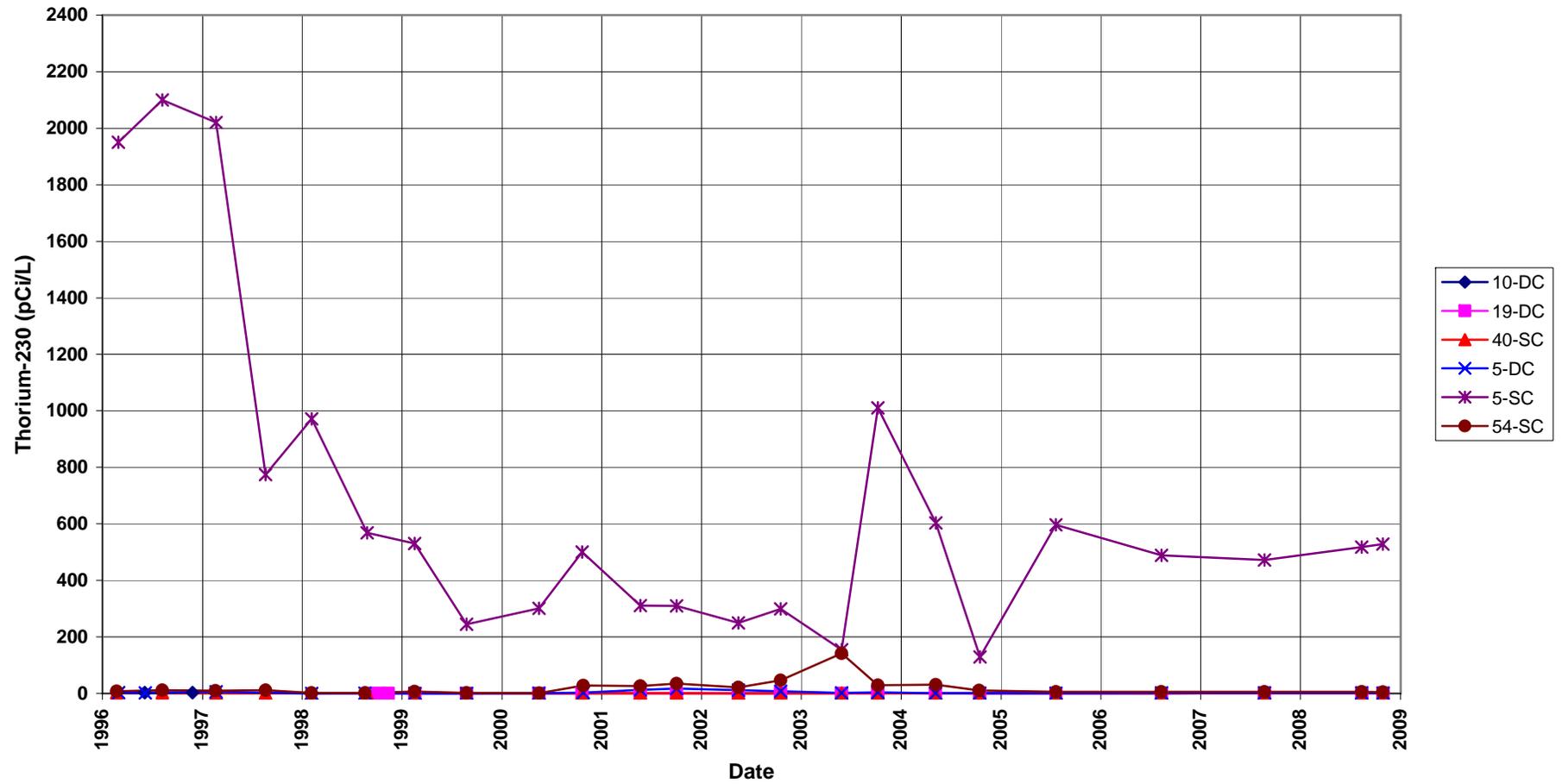
# Shirley Basin South Disposal Site Selenium Concentration

Alternate Concentration Limit = 0.12 mg/L



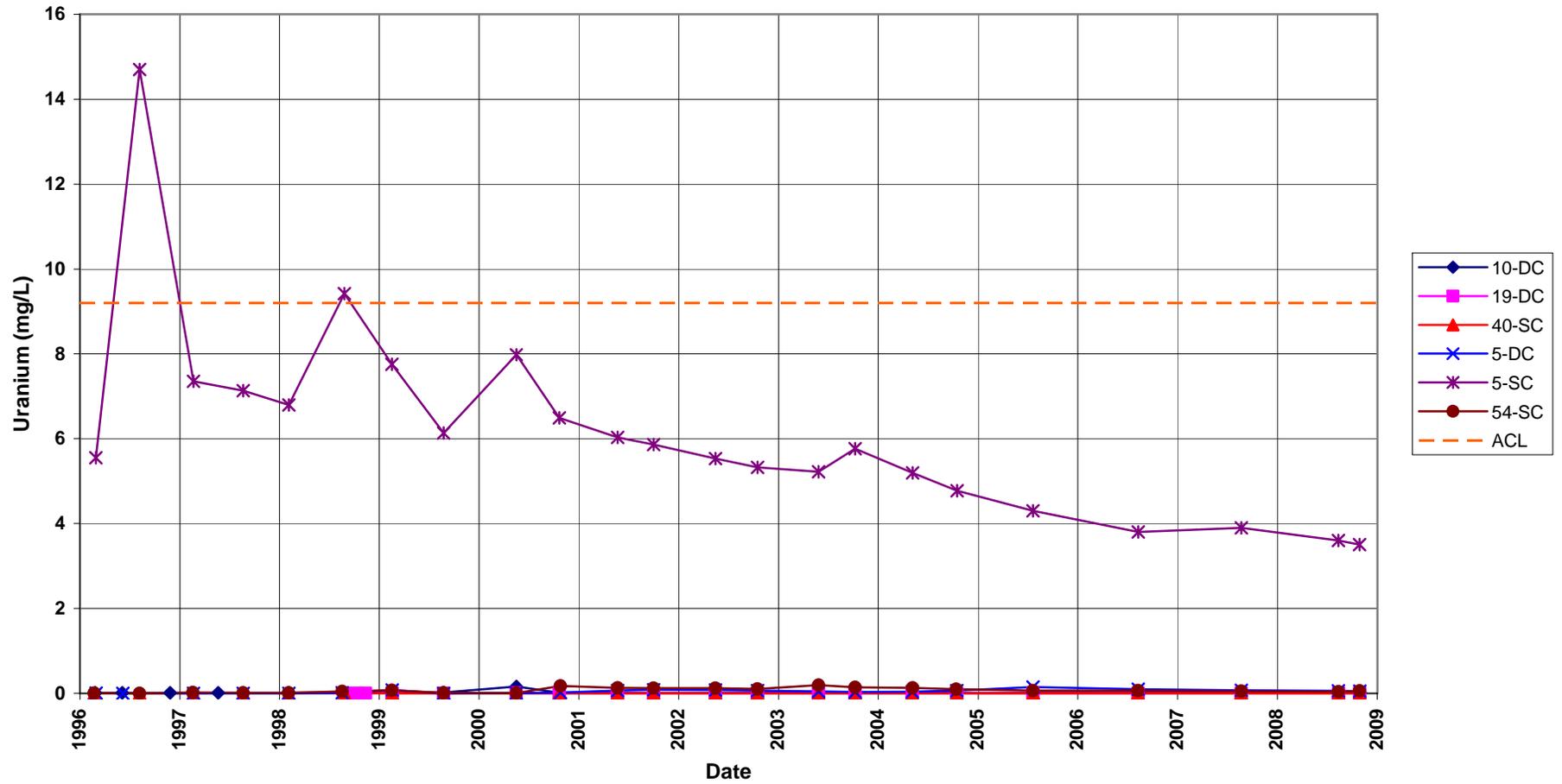
# Shirley Basin South Disposal Site Thorium-230 Concentration

Alternate Concentration Limit = 2409 pCi/L



# Shirley Basin South Disposal Site Uranium Concentration

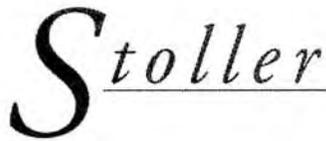
Alternate Concentration Limit = 9.2 mg/L



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**Attachment 3**  
**Sampling and Analysis Work Order**

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established 1959

Task Order LM00-501  
Control Number 09-0102

October 20, 2008

U.S. Department of Energy  
Office of Legacy Management  
ATTN: Scott Surovchak  
Site Manager  
11025 Dover Street, Suite 1000  
Westminster, CO 80021

SUBJECT: Contract No. DE-AM01-07LM00060, Stoller  
October 2008 Additional Environmental Sampling at Shirley Basin South,  
Wyoming

Reference: Task Order LM00-501-03-223-402, Shirley Basin South, WY, 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 this additional monitoring at the Shirley Basin South Disposal site. Monitoring will be performed to provide baseline data for the newly installed wells. Routine monitoring for the entire network will resume in August 2009. This sampling event is currently scheduled for the week of October 27, 2008.

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

**Monitor 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	

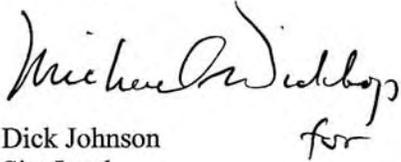
\*NOTE: SC wells are completed in the upper sand aquifer of the Wind River Formation; DC wells are completed in the main sand aquifer of the Wind River Formation.

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.

Scott Surovchak  
Control Number 09-0102  
Page 2

If you have any questions, please call me at 970-248-6022.

Sincerely,

A handwritten signature in cursive script that reads "Dick Johnson" with a small "for" written below it.

Dick Johnson  
Site Lead

DJ/lcg/hc  
Enclosures (3)

cc: (electronic)  
Cheri Bahrke, Stoller  
Steve Donovan, Stoller  
Bev Gallagher, Stoller  
Lauren Goodknight, Stoller  
Dick Johnson, Stoller  
EDD Delivery

cc w/o enclosures:  
Records SBS 410.02 (rc-grand.junction)

\\Condor\home\L40048\My Documents\Ground Water\SBS\0810sbs-ltr.doc

Site	Shirley Basin South		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
	Groundwater	Surface Water			
<b>Analyte</b>					
<b>Approx. No. Samples/yr</b>	8	0			
<b>Field Measurements</b>					
Alkalinity					
Dissolved Oxygen					
Redox Potential	X				
pH	X				
Specific Conductance	X				
Turbidity	X				
Temperature	X				
<b>Laboratory Measurements</b>					
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					
<b>Total No. of Analytes</b>	13	0			

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

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# **Attachment 4 Trip Report**

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## Memorandum

Control Number N/A

DATE: December 8, 2008

TO: Dick Johnson

FROM: Daniel L Sellers

SUBJECT: Trip Report

**Site:** Shirley Basin WY, Disposal Site

**Dates of Sampling Event:** October 27-31, 2008

**Team Members:** Dan Sellers, Jeff Price, Kent Moe and Joe Trevino

**Number of Locations Sampled:** Ten wells were sampled for metals (Cd, Cr, Pb, Ni, Se, U), Th-230, Ra-226/228, TDS, nitrites/nitrates, and anions (Cl, SO4). In addition, 1 duplicate sample was collected for QA/QC purposes. No equipment blank was required due to dedicated tubing and equipment used at each well.

**Locations Not Sampled/Reason:** Wells 51-SC, 101-SC, and 102-SC were not sampled because they were considered dry due to water being below the screen and only in the sumps. Well 51-SC was pumped dry and after 24 hours did not recover.

### Well Location Specific Information:

Ticket Number	Location	Sample Date	Description	Comments
GLV 281	5-SC	10/28/2008	Cat. I	Developed Well
GLV 285	5-DC	10/29/2008	Cat. I	Developed Well
GLV 283	54-SC	10/28/2008	Cat. I	Developed Well
GLV 280	40-SC	10/29/2008	Cat. I	Developed Well
GLV 286	19-DC	10/29/2008	Cat. I	Developed Well
GLV 284	10-DC	10/30/2008	Cat. I	Developed Well
GLV 287	110-DC	10/30/2008	Cat. I	Developed Well (bleach odor). Installed pump.
GLV 289	112-DC	10/30/2008	Cat. I	Developed Well (bleach odor) Installed pump.
GLV 290	113-DC	10/30/2008	Cat. I	Developed Well - Installed pump.
GLV 291	100-SC	10/30/2008	Cat. II	Developed Well (bleach odor) Installed pump.
	51-SC		Dry	Water only in sump. Well purged dry. No recovery.
	101-SC		Dry	Water only in sump. No pump installed.
	102-SC		Dry	Water only in sump. No pump installed.

**Field Variance:** ORP was very high (>700 m/V) in the following three new wells; 100-SC, 110-DC, 112-DC. The following wells had very low pH levels between 3.0-5.0 s.u.; 54-SC, 5-SC, and 5-DC.

**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
2940	40-SC	Duplicate	Groundwater	GLV 288

**Requisition Numbers Assigned:** All samples were assigned to RIN 08101885.

**Sample Shipment:** Samples were delivered directly to Paragon Analytics on October 29, 2008.

**Water Level Measurements:** Water levels were collected at all wells:

**Well Inspection Summary:** All wells were in good condition and properly labeled.

**Equipment:** All wells were equipped with dedicated bladder pumps, except for well 40-SC which was sampled using a peristaltic pump with dedicated tubing.

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

**Fences, Gates, Locks:** OK

**Signs:** No missing or vandalized signs were observed.

**Trespassing/Site Disturbances:** N/A

#### Site Issues

**Disposal Cell/Drainage Structure Integrity:** OK

**Vegetation/Noxious Weed Concerns:** N/A

**Maintenance Requirements:** None observed

**Corrective Action Taken:** None.

DLS/lcg

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