

# Data Validation Package

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**June 2010**  
**Groundwater Sampling at the**  
**Shirley Basin South, Wyoming,**  
**Disposal Site**

**October 2010**



**U.S. DEPARTMENT OF**  
**ENERGY**

Legacy  
Management

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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:** June 29–30, 2010

The 2009 *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 wells 5-SC, 5-DC, and 19-DC, and monitoring wells 40-SC, 54-SC, 10-DC, and K.G.S. #3 were sampled as specified in the plan; point-of-compliance well 51-SC was dry at the time of sampling. Also sampled were five newer monitoring wells installed downgradient of the disposal cell in 2008 (100-SC, 102-SC, 110-DC, 112-DC, and 113-DC); new well 101-SC was dry at the time of sampling. The water level was measured at each sampled well. Sampling and analysis were conducted in accordance with *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. 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.

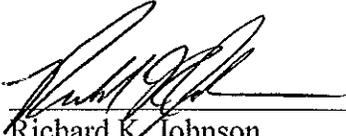
ACLs are approved for cadmium, chromium, lead, nickel, radium-226, radium-228, selenium, thorium-230, and uranium in site groundwater. As shown on Table 1, radium-228 concentrations remain above the ACL in wells 5-DC and 54-SC. The elevated radium-228 concentrations apparently are related to naturally occurring thorium ore. Radium-226 exceeded the ACL in downgradient well 110-DC. The elevated radium-226 concentration in this well was first observed in July 2009 with the concentration confirmed in November 2009. The wells near the disposal cell do not exhibit elevated radium-226 concentrations, so the concentration in well 110-DC is suspected to be due to natural causes. No other ACLs were exceeded.

*Table 1. Wells with Results Exceeding an ACL*

| <b>Analyte</b> | <b>ACL</b> | <b>110-DC</b> | <b>5-DC</b> | <b>54-SC</b> |
|----------------|------------|---------------|-------------|--------------|
| Radium-226     | 91.3 pCi/L | 134 pCi/L     |             |              |
| Radium-228     | 25.7 pCi/L |               | 43.3 pCi/L  | 107 pCi/L    |

Key: ACL = alternate concentration limit; 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 from these aquifers at the site.



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

10/20/10  
Date



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Shirley Basin South, Wyoming, Disposal Site Sample Location Map

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# Data Assessment Summary

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### Water Sampling Field Activities Verification Checklist

|                                |                                     |                                  |                         |
|--------------------------------|-------------------------------------|----------------------------------|-------------------------|
| <b>Project</b>                 | <u>Shirley Basin South, Wyoming</u> | <b>Date(s) of Water Sampling</b> | <u>June 29–30, 2010</u> |
| <b>Date(s) of Verification</b> | <u>September 15, 2010</u>           | <b>Name of Verifier</b>          | <u>Steve Donovan</u>    |

|   | <b>Response<br/>(Yes, No, NA)</b>                                | <b>Comments</b>   |
|---|--|---|
| 1. Is the SAP the primary document directing field procedures?<br>List other documents, SOPs, instructions.   | <u>Yes</u>   | <u>Work Order Letter date May 10, 2010.</u>                 |
| 2. Were the sampling locations specified in the planning documents sampled?   | <u>No</u>  | <u>Wells 101-SC and 51-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 28, 2010.</u> |
| 4. Was an operational check of the field equipment conducted daily?<br>Did the operational checks meet criteria?  | <u>Yes</u><br><u>Yes</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:<br>Was one pump/tubing volume purged prior to sampling?<br>Did the water level stabilize prior to sampling?<br>Did pH, specific conductance, and turbidity measurements stabilize prior to sampling?<br>Was the flow rate less than 500 mL/min?<br>If a portable pump was used, was there a 4-hour delay between pump installation and sampling? | <u>Yes</u><br><u>Yes</u><br><u>No</u><br><u>Yes</u><br><u>NA</u> | <u>The pH in well 54-SC did not stabilize.</u>              |

### Water Sampling Field Activities Verification Checklist (continued)

|   | Response<br>(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 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 (FDCS) 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 (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?  | Yes                       |   |

## Laboratory Performance Assessment

### General Information

Report Number (RIN): 10063127  
Sample Event: June 29–30, 2010  
Site(s): Shirley Basin South, Wyoming  
Laboratory: ALS Laboratory Group, Fort Collins, Colorado  
Work Order No.: 1007019  
Analysis: Metals, Inorganic, and Radiochemistry  
Validator: Steve Donovan  
Review Date: September 15, 2010

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      | 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                                     |
|---------------|-----------------|-------------|------|--|
| All           | All             | Radium-226  | J    | Yield adjusted by laboratory               |
| 1007019-3     | 10-DC           | Thorium-230 | J    | Less than the determination limit          |
| 1007019-5     | 112-DC          | Radium-228  | J    | Yield adjusted by laboratory               |
| 1007019-5     | 112-DC          | Thorium-228 | J    | Less than the determination limit          |
| 1007019-5     | 112-DC          | Thorium-232 | U    | Less than the decision level concentration |
| 1007019-8     | 40-SC Duplicate | Cadmium     | J    | Poor field duplicate precision             |
| 1007019-8     | 40-SC Duplicate | Radium-228  | J    | Less than the determination limit          |
| 1007019-9     | 40-SC           | Cadmium     | J    | Poor field duplicate precision             |
| 1007019-9     | 40-SC           | Radium-228  | J    | Less than the determination limit          |
| 1007019-11    | 5-DC            | Thorium-228 | J    | Spectra interference                       |
| 1007019-12    | 5-SC            | Radium-228  | J    | Yield adjusted by laboratory               |
| 1007019-13    | K.G.S.#3        | Radium-228  | J    | Less than the determination limit          |

### Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 13 water samples on July 1, 2010, 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.

### Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced cooler at 3.4 °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.

### 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 8, 2010, 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). Initial and continuing calibration verification (CCV) checks were made at the required frequency resulting in nine verification checks. All calibration checks met the acceptance criteria.

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

Single point calibrations were performed for chromium and nickel on July 29, 2010. Initial and CCV checks were made at the required frequency resulting in 14 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, selenium, and uranium were performed on July 28, 2010, 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 CCV checks were made at the required frequency resulting in 17 verification checks. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL, the cadmium results were not within the acceptance range. Sample cadmium results that are less than 5 times the PQL are qualified with a “J” flag as estimated values. 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 July 1, 2010, and July 13, 2010, 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 CCV checks were made at the required frequency resulting in 19 verification checks. All calibration checks met the acceptance criteria with the exception of CCV3 for sulfate on July 07, 2010. The samples bracketed by this CCV were re-analyzed with acceptable CCV.

Radiochemical Analysis

Radiochemical results are qualified with a “J” flag (estimated) when the result is greater than the minimum detectable concentration (MDC), but less than Determination Limit (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 Decision Level Concentration estimated as the two sigma total propagated uncertainty.

*Radium-226*

Plateau voltage determinations were performed in November 2009. Efficiency calibrations were performed in March 2010. Daily instrument checks met the acceptance criteria. The chemical recoveries met the acceptance criteria of 40 to 110 percent for all samples. Chemical recoveries

for all 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).

#### *Radium-228*

Plateau voltage determinations and detector efficiency calibrations were performed in June 2010. Daily instrument checks performed on July 27, 2010, 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 August 5, 2009. Instrument background was determined on August 5, 2009. The tracer recoveries met the acceptance criteria of 30 to 110 percent for all samples with the exception of 40-SC. The spectral quality for this sample is adequate for accurate quantification and the result is greater than the MDC. The results are acceptable without further qualification. 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 with the following exception. There is evidence of spectra interference near the thorium-228 peak for sample 5-DC. The thorium-228 result for this sample is qualified with a “J” flag as an estimated value.

#### 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 (CCB) results associated with the samples were below the PQL for all analytes with the exception of CCB2 for nitrate/nitrite as N, CCB1 and CCB15 for sulfate on July 13, 2010, and CCB5 for chromium and nickel. None of the samples associated with this RIN were bracketed by nitrate/nitrite as N blank or metals CCB5. The samples bracketed by the CCBs for sulfate contained more than 10 times the concentration of sulfate detected in the CCB. 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.

#### *Radiochemistry*

All radiochemical method blank results were below the MDC with the exception of thorium-232. Thorium-232 sample results that are greater than the MDC but less than 5 times the blank concentration are qualified with a “J” flag as estimated values.

### 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 are 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 total propagated uncertainty) 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. The required detection limits were met for all metals and wet chemistry analytes.

All radiochemical MDCs were calculated as specified in *Quality Systems for Analytical Services*. All reported MDCs were less than the required MDCs with the exception of three thorium isotope MDCs. The associated sample results 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 August 2, 2010. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

# SAMPLE MANAGEMENT SYSTEM

## General Data Validation Report

RIN: 10063127    Lab Code: PAR    Validator: Steve Donovan    Validation Date: 9/15/2010  
Project: Shirley Basin South    Analysis Type:  Metals     General Chem     Rad     Organics  
# of Samples: 13    Matrix: WATER    Requested Analysis Completed: Yes

### Chain of Custody

Present: OK    Signed: OK    Dated: OK

### Sample

Integrity: OK    Preservation: OK    Temperature: OK

### Select Quality Parameters

- Holding Times
- 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

RIN: 10063127 Lab Code: PAR

Non-Compliance Report: Detection Limits

Project: Shirley Basin South

Validation Date: 9/15/2010

| Ticket  | Location | Lab Sample ID | Method Code | Lab Method | Analyte Name | Result | Qualifier | Reported Detection Limit | Required Detection Limit | Units |
|---------|----------|---------------|-------------|------------|--------------|--------|-----------|--------------------------|--------------------------|-------|
| JHV 360 | 54-SC    | 1007019-10    | ASP-A-008   | 714R12     | Thorium-230  | 5.21   |           | 1.4                      | 1                        | pCi/L |
| JHV 347 | 5-SC     | 1007019-12    | ASP-A-008   | 714R12     | Thorium-230  | 421    |           | 2.8                      | 1                        | pCi/L |
| JHV 347 | 5-SC     | 1007019-12    | ASP-A-008   | 714R12     | Thorium-228  | 47.8   |           | 1.8                      | 1                        | pCi/L |

**SAMPLE MANAGEMENT SYSTEM**  
**Metals Data Validation Worksheet**

RIN: 10063127      Lab Code: PAR      Date Due: 7/29/2010  
 Matrix: Water      Site Code: SBS      Date Completed: 8/3/2010

| Analyte  | Date Analyzed | CALIBRATION |        |     |     |     |     | Method | LCS<br>%R | MS<br>%R | MSD<br>%R | Dup.<br>RPD | ICSAB<br>%R | Serial Dil.<br>%R | CRI<br>%R |
|----------|---------------|-------------|--------|-----|-----|-----|-----|--------|-----------|----------|-----------|-------------|-------------|-------------------|-----------|
|          |               | Int.        | R^2    | ICV | CCV | ICB | CCB |        |           |          |           |             |             |                   |           |
| Cadmium  | 07/28/2010    | 0.0000      | 1.0000 | OK  | OK  | OK  | OK  | OK     | 96.0      | 95.0     | 95.2      | 0.0         | 103.0       |                   | 102.0     |
| Chromium | 07/29/2010    |             |        | OK  | OK  | OK  | OK  | OK     | 96.0      | 88.0     | 89.0      | 1.0         | 88.0        |                   | 99.0      |
| Lead     | 07/28/2010    | 0.0000      | 1.0000 | OK  | OK  | OK  | OK  | OK     | 102.0     | 99.0     | 99.9      | 1.0         | 106.0       |                   | 110.0     |
| Nickel   | 07/29/2010    |             |        | OK  | OK  | OK  | OK  | OK     | 99.0      | 91.0     | 92.0      | 1.0         | 88.0        |                   | 105.0     |
| Selenium | 07/28/2010    | 0.0000      | 1.0000 | OK  | OK  | OK  | OK  | OK     | 93.0      | 105.0    | 105.7     | 1.0         | 104.0       |                   | 110.0     |
| Uranium  | 07/28/2010    | 0.0000      | 1.0000 | OK  | OK  | OK  | OK  | OK     | 95.0      | 100.0    | 99.4      | 0.0         | 105.0       | 1.0               | 120.0     |

**SAMPLE MANAGEMENT SYSTEM**  
**Wet Chemistry Data Validation Worksheet**

**RIN:** 10063127      **Lab Code:** PAR      **Date Due:** 7/29/2010  
**Matrix:** Water      **Site Code:** SBS      **Date Completed:** 8/3/2010

| Analyte                | Date Analyzed | CALIBRATION |        |     |     |     |     | Method<br>Blank | LCS<br>%R | MS<br>%R | MSD<br>%R | DUP<br>RPD | Serial Dil.<br>%R |
|------------------------|---------------|-------------|--------|-----|-----|-----|-----|-----------------|-----------|----------|-----------|------------|-------------------|
|                        |               | Int.        | R^2    | ICV | CCV | ICB | CCB |                 |           |          |           |            |                   |
| CHLORIDE               | 07/07/2010    | 0.000       | 1.0000 | OK  | OK  | OK  | OK  | OK              | 96.00     | 104.0    | 100.0     | 2.00       |                   |
| Nitrate+Nitrite as N   | 07/08/2010    | 0.000       | 1.0000 | OK  | OK  | OK  | OK  | OK              | 94.00     | 103.0    | 108.0     | 4.00       |                   |
| SULFATE                | 07/07/2010    | 0.000       | 1.0000 | OK  | OK  | OK  | OK  | OK              | 95.00     | 102.0    | 97.0      | 1.00       |                   |
| TOTAL DISSOLVED SOLIDS | 07/07/2010    |             |        |     |     |     |     | OK              | 98.00     |          |           | 1.00       |                   |
| TOTAL DISSOLVED SOLIDS | 07/07/2010    |             |        |     |     |     |     |                 |           |          |           | 1.00       |                   |

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

**RIN:** 10063127                      **Lab Code:** PAR                      **Date Due:** 7/29/2010  
**Matrix:** Water                      **Site Code:** SBS                      **Date Completed:** 8/3/2010

| Sample         | Analyte    | Date Analyzed | Result | Flag | Tracer %R | LCS %R | MS %R | Duplicate |
|----------------|------------|---------------|--------|------|-----------|--------|-------|-----------|
| 100-SC         | Radium-226 | 07/23/2010    |        |      | 93.6      |        |       |           |
| 102-SC         | Radium-226 | 07/23/2010    |        |      | 87.8      |        |       |           |
| 10-DC          | Radium-226 | 07/23/2010    |        |      | 95.9      |        |       |           |
| 110-DC         | Radium-226 | 07/23/2010    |        |      | 88.9      |        |       |           |
| 112-DC         | Radium-226 | 07/23/2010    |        |      | 92.0      |        |       |           |
| 113-DC         | Radium-226 | 07/23/2010    |        |      | 93.4      |        |       |           |
| 19-DC          | Radium-226 | 07/23/2010    |        |      | 94.8      |        |       |           |
| 2940           | Radium-226 | 07/23/2010    |        |      | 86.1      |        |       |           |
| 40-SC          | Radium-226 | 07/23/2010    |        |      | 91.3      |        |       |           |
| 54-SC          | Radium-226 | 07/23/2010    |        |      | 90.3      |        |       |           |
| 5-DC           | Radium-226 | 07/23/2010    |        |      | 90.0      |        |       |           |
| 5-SC           | Radium-226 | 07/23/2010    |        |      | 91.2      |        |       |           |
| K.G.S.#3       | Radium-226 | 07/23/2010    |        |      | 90.9      |        |       |           |
| Blank_Spike    | Radium-226 | 07/23/2010    |        |      | 93.7      | 95.80  |       |           |
| Blank_Spike_Du | Radium-226 | 07/23/2010    |        |      | 92.3      | 92.20  |       | 0.20      |
| Blank          | Radium-226 | 07/23/2010    | 0.1600 | U    | 88.6      |        |       |           |
| 100-SC         | Radium-228 | 07/27/2010    |        |      | 79.5      |        |       |           |
| 102-SC         | Radium-228 | 07/27/2010    |        |      | 71.9      |        |       |           |
| 10-DC          | Radium-228 | 07/27/2010    |        |      | 66.5      |        |       |           |
| 110-DC         | Radium-228 | 07/27/2010    |        |      | 70.4      |        |       |           |
| 112-DC         | Radium-228 | 07/27/2010    |        |      | 67.3      |        |       |           |
| 113-DC         | Radium-228 | 07/27/2010    |        |      | 68.3      |        |       |           |
| 19-DC          | Radium-228 | 07/27/2010    |        |      | 76.6      |        |       |           |
| 2940           | Radium-228 | 07/27/2010    |        |      | 76.2      |        |       |           |
| 40-SC          | Radium-228 | 07/27/2010    |        |      | 76.1      |        |       |           |
| 54-SC          | Radium-228 | 07/27/2010    |        |      | 71.2      |        |       |           |
| 5-DC           | Radium-228 | 07/27/2010    |        |      | 70.4      |        |       |           |
| 5-SC           | Radium-228 | 07/27/2010    |        |      | 71.6      |        |       |           |
| K.G.S.#3       | Radium-228 | 07/27/2010    |        |      | 74.0      |        |       |           |
| Blank_Spike    | Radium-228 | 07/27/2010    |        |      | 70.3      | 113.00 |       |           |
| Blank_Spike_Du | Radium-228 | 07/27/2010    |        |      | 74.6      | 100.00 |       | 0.60      |
| Blank          | Radium-228 | 07/27/2010    | 0.3850 | U    | 75.2      |        |       |           |

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

**RIN:** 10063127                      **Lab Code:** PAR                      **Date Due:** 7/29/2010  
**Matrix:** Water                      **Site Code:** SBS                      **Date Completed:** 8/3/2010

| Sample      | Analyte     | Date Analyzed | Result  | Flag | Tracer %R | LCS %R | MS %R | Duplicate |
|-------------|-------------|---------------|---------|------|-----------|--------|-------|-----------|
| 100-SC      | Thorium-228 | 07/21/2010    |         |      | 63.4      |        |       |           |
| 102-SC      | Thorium-228 | 07/21/2010    |         |      | 47.6      |        |       |           |
| 10-DC       | Thorium-228 | 07/21/2010    |         |      | 62.3      |        |       |           |
| 110-DC      | Thorium-228 | 07/21/2010    |         |      | 63.1      |        |       |           |
| 112-DC      | Thorium-228 | 07/21/2010    |         |      | 69.8      |        |       |           |
| 113-DC      | Thorium-228 | 07/21/2010    |         |      | 71.8      |        |       |           |
| 19-DC       | Thorium-228 | 07/21/2010    |         |      | 63.2      |        |       |           |
| 2940        | Thorium-228 | 07/21/2010    |         |      | 62.7      |        |       |           |
| 54-SC       | Thorium-228 | 07/21/2010    |         |      | 77.7      |        |       |           |
| 5-DC        | Thorium-228 | 07/21/2010    |         |      | 60.7      |        |       |           |
| 5-SC        | Thorium-228 | 07/21/2010    |         |      | 77.2      |        |       |           |
| K.G.S.#3    | Thorium-228 | 07/21/2010    |         |      | 51.1      |        |       |           |
| 112-DC      | Thorium-228 | 07/21/2010    |         |      | 61.2      |        |       | 2.75      |
| 40-SC       | Thorium-228 | 07/21/2010    |         |      | 67.4      |        |       | 0.28      |
| Blank       | Thorium-228 | 07/22/2010    | -0.1080 | U    | 49.6      |        |       |           |
| 40-SC       | Thorium-228 | 07/26/2010    |         |      | 26.7      |        |       |           |
| Blank_Spike | Thorium-230 | 07/21/2010    |         |      | 28.4      | 101.00 |       |           |
| 112-DC      | Thorium-230 | 07/21/2010    |         |      |           |        |       | 1.56      |
| 40-SC       | Thorium-230 | 07/21/2010    |         |      |           |        |       | 0.13      |
| Blank       | Thorium-230 | 07/22/2010    | -0.0605 | U    |           |        |       |           |
| 112-DC      | Thorium-232 | 07/21/2010    |         |      |           |        |       | 0.97      |
| 40-SC       | Thorium-232 | 07/21/2010    |         |      |           |        |       | 0.17      |
| Blank       | Thorium-232 | 07/22/2010    | 0       | U    |           |        |       |           |

## Sampling Quality Control Assessment

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

### Sampling Protocol

Sample results for all Category I or II monitoring wells were qualified with an “F” flag in the database, indicating the wells were purged and sampled using the low-flow sampling method. Wells 102-SC and K.G.S.#3 were classified as Category IV. All other 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 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. The relative percent difference for non-radiochemical duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results less than 5 times the PQL, the range should be no greater than the PQL. The radiochemical duplicate results should have a relative error ratio (calculated using the one-sigma total propagated uncertainty) of less than three. One duplicate sample was collected from location 40-SC. With the following exception, the duplicate results met the acceptance criteria. The difference in cadmium results is outside acceptance limits. The sample and duplicate results for cadmium are qualified with a “J” flag as estimated values.

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

RIN: 10063127    Lab Code: PAR    Project: Shirley Basin South    Validation Date: 9/15/2010

Duplicate: 2940

Sample: 40-SC

| Analyte                | Sample   |      |       |          | Duplicate |      |        |          | RPD   | RER | Units |
|------------------------|----------|------|-------|----------|-----------|------|--------|----------|-------|-----|-------|
|                        | Result   | Flag | Error | Dilution | Result    | Flag | Error  | Dilution |       |     |       |
| Cadmium                | 0.075    |      |       | 1        | 0.22      |      |        | 1        | 98.31 |     | UG/L  |
| CHLORIDE               | 42       |      |       | 20       | 41        |      |        | 20       | 2.41  |     | MG/L  |
| Chromium               | 0.51     | U    |       | 1        | 0.51      | U    |        | 1        |       |     | UG/L  |
| Lead                   | 0.068    |      |       | 1        | 0.0068    | U    |        | 1        |       |     | UG/L  |
| Nickel                 | 6.9      |      |       | 1        | 8.2       |      |        | 1        | 17.22 |     | UG/L  |
| Nitrate+Nitrite as N   | 1.5      |      |       | 1        | 1.5       |      |        | 1        | 0     |     | MG/L  |
| Radium-226             | 0.185    |      | 0.136 | 1        | 0.414     |      | 0.217  | 1        |       | 1.8 | pCi/L |
| Radium-228             | 1.03     |      | 0.438 | 1        | 0.959     |      | 0.432  | 1        |       | 0.2 | pCi/L |
| Selenium               | 6.9      |      |       | 1        | 7         |      |        | 1        | 1.44  |     | UG/L  |
| SULFATE                | 1700     |      |       | 20       | 1700      |      |        | 20       | 0     |     | MG/L  |
| Thorium-228            | -0.0526  | U    | 0.451 | 1        | -0.049    | U    | 0.165  | 1        |       | 0   | pCi/L |
| Thorium-230            | 0.0964   | U    | 0.508 | 1        | 0.478     | U    | 0.432  | 1        |       | 1.1 | pCi/L |
| Thorium-232            | -0.00733 | U    | 0.148 | 1        | 0.0268    | U    | 0.0868 | 1        |       | 0.4 | pCi/L |
| TOTAL DISSOLVED SOLIDS | 2600     |      |       | 1        | 2600      |      |        | 1        | 0     |     | MG/L  |
| Uranium                | 0.25     |      |       | 1        | 0.26      |      |        | 1        | 3.92  |     | 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 10-20-2010  
Steve Donovan Date

Data Validation Lead: Steve Donovan 10-20-2010  
Steve Donovan 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 thorium-228 result for location 5-DC was identified as a potential outlier. This result was qualified as an estimated value based on suspected spectral interference. The data for this event are acceptable as qualified.

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

**Comparison: All Historical Data**

Laboratory: ALS Laboratory Group

RIN: 10063127

Report Date: 9/15/2010

| 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     | 10-DC         | N001      | 06/30/2010  | Cadmium                       | 0.000039 |                | F    | 0.05               | U              |      | 0.000044           | U              | FJ   | 48                    | 41             | No                  |
| SBS01     | 10-DC         | N001      | 06/30/2010  | Nickel                        | 0.00093  | U              | F    | 3.83               |                |      | 0.00095            | B              | F    | 48                    | 30             | No                  |
| SBS01     | 19-DC         | N001      | 06/30/2010  | Sulfate                       | 3000     |                | F    | 2900               |                | F    | 1190               |                |      | 25                    | 0              | No                  |
| SBS01     | 19-DC         | N001      | 06/30/2010  | Total Dissolved Solids        | 4600     |                | F    | 4400               |                | F    | 2500               |                | FQ   | 9                     | 0              | No                  |
| SBS01     | 40-SC         | N001      | 06/30/2010  | Cadmium                       | 0.000075 |                | FJ   | 0.06               |                |      | 0.00011            | B              | FJ   | 57                    | 41             | No                  |
| SBS01     | 40-SC         | N002      | 06/30/2010  | Nickel                        | 0.0082   |                | F    | 0.19               |                |      | 0.0099             | B              | F    | 61                    | 30             | No                  |
| SBS01     | 40-SC         | N001      | 06/30/2010  | Nickel                        | 0.0069   |                | F    | 0.19               |                |      | 0.0099             | B              | F    | 61                    | 30             | No                  |
| SBS01     | 40-SC         | N002      | 06/30/2010  | Nitrate + Nitrite as Nitrogen | 1.5      |                | F    | 1.2                |                | F    | 0.28               |                | FJ   | 10                    | 0              | No                  |
| SBS01     | 40-SC         | N001      | 06/30/2010  | Nitrate + Nitrite as Nitrogen | 1.5      |                | F    | 1.2                |                | F    | 0.28               |                | FJ   | 10                    | 0              | No                  |
| SBS01     | 40-SC         | N002      | 06/30/2010  | Total Dissolved Solids        | 2600     |                | F    | 4000               |                | FJ   | 3000               |                | F    | 12                    | 0              | No                  |
| SBS01     | 40-SC         | N001      | 06/30/2010  | Total Dissolved Solids        | 2600     |                | F    | 4000               |                | FJ   | 3000               |                | F    | 12                    | 0              | No                  |
| SBS01     | 40-SC         | N001      | 06/30/2010  | Uranium                       | 0.00025  |                | F    | 0.11               |                |      | 0.0003             | U              |      | 85                    | 25             | No                  |
| SBS01     | 40-SC         | N002      | 06/30/2010  | Uranium                       | 0.00026  |                | F    | 0.11               |                |      | 0.0003             | U              |      | 85                    | 25             | No                  |
| SBS01     | 54-SC         | N001      | 06/29/2010  | Nitrate + Nitrite as Nitrogen | 0.02     |                | FQ   | 20                 | U              | F    | 0.1                | U              | F    | 6                     | 5              | No                  |
| SBS01     | 54-SC         | N001      | 06/29/2010  | Thorium-232                   | 4.45     |                | FQ   | 8.72               |                | F    | 4.83               |                | FQ   | 6                     | 0              | No                  |
| SBS01     | 5-DC          | N001      | 06/30/2010  | Cadmium                       | 0.000058 | U              | F    | 0.1                |                |      | 0.00011            | B              | FJ   | 59                    | 22             | No                  |
| SBS01     | 5-DC          | N001      | 06/30/2010  | Chromium                      | 0.0045   | B              | F    | 0.25               |                |      | 0.01               | U              |      | 59                    | 29             | No                  |
| SBS01     | 5-DC          | N001      | 06/30/2010  | Nitrate + Nitrite as Nitrogen | 0.027    |                | F    | 10                 | U              | F    | 0.1                | U              | F    | 6                     | 5              | No                  |

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

**Comparison: All Historical Data**

Laboratory: ALS Laboratory Group

RIN: 10063127

Report Date: 9/15/2010

| Site Code | Location Code | Sample ID | Sample Date | Analyte                       | Current |                        | Historical Maximum |                        |        | Historical Minimum     |   |                | Number of Data Points |  | Statistical Outlier |
|-----------|---------------|-----------|-------------|-------------------------------|---------|------------------------|--------------------|------------------------|--------|------------------------|---|----------------|-----------------------|--|---------------------|
|           |               |           |             |                               | Result  | Qualifiers<br>Lab Data | Result             | Qualifiers<br>Lab Data | Result | Qualifiers<br>Lab Data | N | N Below Detect |                       |  |                     |
| SBS01     | 5-DC          | N001      | 06/30/2010  | Thorium-228                   | 5.83    | FJ                     | 2.92               | F                      | 1.97   | F                      | 6 | 0              | Yes                   |  |                     |
| SBS01     | 5-DC          | N001      | 06/30/2010  | Total Dissolved Solids        | 9400    | F                      | 9200               | F                      | 6620   |                        | 8 | 0              | No                    |  |                     |
| SBS01     | 5-SC          | N001      | 06/30/2010  | Thorium-228                   | 47.8    | F                      | 58.1               | F                      | 49.6   | F                      | 7 | 0              | No                    |  |                     |
| SBS01     | K.G.S.#3      | N001      | 06/30/2010  | Nitrate + Nitrite as Nitrogen | 0.15    |                        | 0.025              | F                      | 0.01   | U F                    | 5 | 4              | No                    |  |                     |

**Data Validation Outliers Report - Field Parameters Only**

**Comparison: All Historical Data**

Laboratory: Field Measurements

RIN: 10063127

Report Date: 9/15/2010

| Site Code | Location Code | Sample ID | Sample Date | Analyte              | Current |                        | Historical Maximum |                        |        | Historical Minimum     |    |                | Number of Data Points |  | Statistical Outlier |
|-----------|---------------|-----------|-------------|----------------------|---------|------------------------|--------------------|------------------------|--------|------------------------|----|----------------|-----------------------|--|---------------------|
|           |               |           |             |                      | Result  | Qualifiers<br>Lab Data | Result             | Qualifiers<br>Lab Data | Result | Qualifiers<br>Lab Data | N  | N Below Detect |                       |  |                     |
| SBS01     | 19-DC         | N001      | 06/30/2010  | Specific Conductance | 4503    | F                      | 4320               |                        | 2500   |                        | 17 | 0              | No                    |  |                     |
| SBS01     | 19-DC         | N001      | 06/30/2010  | Temperature          | 12.9    | F                      | 12.45              | F                      | 9.59   |                        | 6  | 0              | No                    |  |                     |
| SBS01     | 5-DC          | N001      | 06/30/2010  | Turbidity            | 9.6     | F                      | 9.56               | F                      | 0.64   | F                      | 7  | 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.

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# **Attachment 2**

## **Data Presentation**

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## **Groundwater Quality Data**

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

REPORT DATE: 9/15/2010

Location: 10-DC WELL

| Parameter                     | Units    | Sample Date | ID   | Depth Range (Ft BLS) | Result   | Lab | Qualifiers Data | QA | Detection Limit | Uncertainty |
|-------------------------------|----------|-------------|------|----------------------|----------|-----|-----------------|----|-----------------|-------------|
| Cadmium                       | mg/L     | 06/30/2010  | N001 | 180.8 - 220.8        | 0.000039 |     | F               | #  | 0.000012        |             |
| Chloride                      | mg/L     | 06/30/2010  | N001 | 180.8 - 220.8        | 55       |     | F               | #  | 4               |             |
| Chromium                      | mg/L     | 06/30/2010  | N001 | 180.8 - 220.8        | 0.00051  | U   | F               | #  | 0.00051         |             |
| Lead                          | mg/L     | 06/30/2010  | N001 | 180.8 - 220.8        | 0.00039  |     | F               | #  | 0.0000068       |             |
| Nickel                        | mg/L     | 06/30/2010  | N001 | 180.8 - 220.8        | 0.00093  | U   | F               | #  | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L     | 06/30/2010  | N001 | 180.8 - 220.8        | 0.01     | U   | F               | #  | 0.01            |             |
| Oxidation Reduction Potential | mV       | 06/30/2010  | N001 | 180.8 - 220.8        | -19.2    |     | F               | #  |                 |             |
| pH                            | s.u.     | 06/30/2010  | N001 | 180.8 - 220.8        | 6.69     |     | F               | #  |                 |             |
| Radium-226                    | pCi/L    | 06/30/2010  | N001 | 180.8 - 220.8        | 13.5     |     | FJ              | #  | 0.14            | 3.51        |
| Radium-228                    | pCi/L    | 06/30/2010  | N001 | 180.8 - 220.8        | 4.19     |     | F               | #  | 0.53            | 1.33        |
| Selenium                      | mg/L     | 06/30/2010  | N001 | 180.8 - 220.8        | 0.000032 | U   | F               | #  | 0.000032        |             |
| Specific Conductance          | umhos/cm | 06/30/2010  | N001 | 180.8 - 220.8        | 2114     |     | F               | #  |                 |             |
| Sulfate                       | mg/L     | 06/30/2010  | N001 | 180.8 - 220.8        | 1100     |     | F               | #  | 10              |             |
| Temperature                   | C        | 06/30/2010  | N001 | 180.8 - 220.8        | 11.56    |     | F               | #  |                 |             |
| Thorium-228                   | pCi/L    | 06/30/2010  | N001 | 180.8 - 220.8        | 0.54     | U   | F               | #  | 0.54            | 0.306       |
| Thorium-230                   | pCi/L    | 06/30/2010  | N001 | 180.8 - 220.8        | 0.707    |     | FJ              | #  | 0.68            | 0.468       |
| Thorium-232                   | pCi/L    | 06/30/2010  | N001 | 180.8 - 220.8        | 0.21     | U   | F               | #  | 0.21            | 0.107       |
| Total Dissolved Solids        | mg/L     | 06/30/2010  | N001 | 180.8 - 220.8        | 1800     |     | F               | #  | 40              |             |
| Turbidity                     | NTU      | 06/30/2010  | N001 | 180.8 - 220.8        | 4.9      |     | F               | #  |                 |             |
| Uranium                       | mg/L     | 06/30/2010  | N001 | 180.8 - 220.8        | 0.013    |     | F               | #  | 0.0000029       |             |

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

REPORT DATE: 9/15/2010

Location: 100-SC WELL

| Parameter                     | Units     | Sample Date | ID   | Depth Range (Ft BLS) |       | Result  | Lab | Qualifiers Data | QA | Detection Limit | Uncertainty |
|-------------------------------|-----------|-------------|------|----------------------|-------|---------|-----|-----------------|----|-----------------|-------------|
| Cadmium                       | mg/L      | 06/29/2010  | N001 | 210                  | - 225 | 0.00013 |     | FQ              | #  | 0.000012        |             |
| Chloride                      | mg/L      | 06/29/2010  | N001 | 210                  | - 225 | 120     |     | FQ              | #  | 4               |             |
| Chromium                      | mg/L      | 06/29/2010  | N001 | 210                  | - 225 | 0.00051 | U   | FQ              | #  | 0.00051         |             |
| Lead                          | mg/L      | 06/29/2010  | N001 | 210                  | - 225 | 0.00012 |     | FQ              | #  | 0.0000068       |             |
| Nickel                        | mg/L      | 06/29/2010  | N001 | 210                  | - 225 | 0.0038  | B   | FQ              | #  | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L      | 06/29/2010  | N001 | 210                  | - 225 | 0.01    | U   | FQ              | #  | 0.01            |             |
| pH                            | s.u.      | 06/29/2010  | N001 | 210                  | - 225 | 7.13    |     | FQ              | #  |                 |             |
| Radium-226                    | pCi/L     | 06/29/2010  | N001 | 210                  | - 225 | 3.37    |     | FQJ             | #  | 0.14            | 0.978       |
| Radium-228                    | pCi/L     | 06/29/2010  | N001 | 210                  | - 225 | 4.25    |     | FQ              | #  | 0.42            | 1.32        |
| Selenium                      | mg/L      | 06/29/2010  | N001 | 210                  | - 225 | 0.00015 |     | FQ              | #  | 0.000032        |             |
| Specific Conductance          | umhos /cm | 06/29/2010  | N001 | 210                  | - 225 | 2334    |     | FQ              | #  |                 |             |
| Sulfate                       | mg/L      | 06/29/2010  | N001 | 210                  | - 225 | 1000    |     | FQ              | #  | 10              |             |
| Temperature                   | C         | 06/29/2010  | N001 | 210                  | - 225 | 14.79   |     | FQ              | #  |                 |             |
| Thorium-228                   | pCi/L     | 06/29/2010  | N001 | 210                  | - 225 | 0.54    | U   | FQ              | #  | 0.54            | 0.293       |
| Thorium-230                   | pCi/L     | 06/29/2010  | N001 | 210                  | - 225 | 0.69    | U   | FQ              | #  | 0.69            | 0.416       |
| Thorium-232                   | pCi/L     | 06/29/2010  | N001 | 210                  | - 225 | 0.23    | U   | FQ              | #  | 0.23            | 0.0878      |
| Total Dissolved Solids        | mg/L      | 06/29/2010  | N001 | 210                  | - 225 | 1800    |     | FQ              | #  | 40              |             |
| Turbidity                     | NTU       | 06/29/2010  | N001 | 210                  | - 225 | 3.46    |     | FQ              | #  |                 |             |
| Uranium                       | mg/L      | 06/29/2010  | N001 | 210                  | - 225 | 0.0038  |     | FQ              | #  | 0.0000029       |             |

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

REPORT DATE: 9/15/2010

Location: 102-SC WELL

| Parameter                     | Units     | Sample Date | Sample ID | Depth Range (Ft BLS) | Result   | Qualifiers |      |    | Detection Limit | Uncertainty |
|-------------------------------|-----------|-------------|-----------|----------------------|----------|------------|------|----|-----------------|-------------|
|                               |           |             |           |                      |          | Lab        | Data | QA |                 |             |
| Cadmium                       | mg/L      | 06/30/2010  | 0001      | 168.5 - 183.5        | 0.00034  |            |      | #  | 0.000012        |             |
| Chloride                      | mg/L      | 06/30/2010  | 0001      | 168.5 - 183.5        | 260      |            |      | #  | 4               |             |
| Chromium                      | mg/L      | 06/30/2010  | 0001      | 168.5 - 183.5        | 0.00051  | U          |      | #  | 0.00051         |             |
| Lead                          | mg/L      | 06/30/2010  | 0001      | 168.5 - 183.5        | 0.000053 |            |      | #  | 0.0000068       |             |
| Nickel                        | mg/L      | 06/30/2010  | 0001      | 168.5 - 183.5        | 0.00093  | U          |      | #  | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L      | 06/30/2010  | 0001      | 168.5 - 183.5        | 1.2      |            |      | #  | 0.01            |             |
| Oxidation Reduction Potential | mV        | 06/30/2010  | N001      | 168.5 - 183.5        | 51.6     |            |      | #  |                 |             |
| pH                            | s.u.      | 06/30/2010  | N001      | 168.5 - 183.5        | 7.86     |            |      | #  |                 |             |
| Radium-226                    | pCi/L     | 06/30/2010  | 0001      | 168.5 - 183.5        | 3.87     |            | J    | #  | 0.15            | 1.11        |
| Radium-228                    | pCi/L     | 06/30/2010  | 0001      | 168.5 - 183.5        | 3.32     |            |      | #  | 0.49            | 1.07        |
| Selenium                      | mg/L      | 06/30/2010  | 0001      | 168.5 - 183.5        | 0.0007   |            |      | #  | 0.000032        |             |
| Specific Conductance          | umhos /cm | 06/30/2010  | N001      | 168.5 - 183.5        | 2006     |            |      | #  |                 |             |
| Sulfate                       | mg/L      | 06/30/2010  | 0001      | 168.5 - 183.5        | 520      |            |      | #  | 10              |             |
| Temperature                   | C         | 06/30/2010  | N001      | 168.5 - 183.5        | 11.68    |            |      | #  |                 |             |
| Thorium-228                   | pCi/L     | 06/30/2010  | 0001      | 168.5 - 183.5        | 0.67     | U          |      | #  | 0.67            | 0.356       |
| Thorium-230                   | pCi/L     | 06/30/2010  | 0001      | 168.5 - 183.5        | 0.78     | U          |      | #  | 0.78            | 0.377       |
| Thorium-232                   | pCi/L     | 06/30/2010  | 0001      | 168.5 - 183.5        | 0.34     | U          |      | #  | 0.34            | 0.155       |
| Total Dissolved Solids        | mg/L      | 06/30/2010  | 0001      | 168.5 - 183.5        | 1300     |            |      | #  | 40              |             |
| Turbidity                     | NTU       | 06/30/2010  | N001      | 168.5 - 183.5        | 112      |            |      | #  |                 |             |
| Uranium                       | mg/L      | 06/30/2010  | 0001      | 168.5 - 183.5        | 0.0054   |            |      | #  | 0.0000029       |             |

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

REPORT DATE: 9/15/2010

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     | 06/29/2010  | N001      | 255                  | - 305 | 0.000012 | U          | F    | #  | 0.000012        |             |
| Chloride                      | mg/L     | 06/29/2010  | N001      | 255                  | - 305 | 220      |            | F    | #  | 4               |             |
| Chromium                      | mg/L     | 06/29/2010  | N001      | 255                  | - 305 | 0.00051  | U          | F    | #  | 0.00051         |             |
| Lead                          | mg/L     | 06/29/2010  | N001      | 255                  | - 305 | 0.0033   |            | F    | #  | 0.0000068       |             |
| Nickel                        | mg/L     | 06/29/2010  | N001      | 255                  | - 305 | 0.00093  | U          | F    | #  | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L     | 06/29/2010  | N001      | 255                  | - 305 | 0.01     | U          | F    | #  | 0.01            |             |
| Oxidation Reduction Potential | mV       | 06/29/2010  | N001      | 255                  | - 305 | -24.3    |            | F    | #  |                 |             |
| pH                            | s.u.     | 06/29/2010  | N001      | 255                  | - 305 | 6.52     |            | F    | #  |                 |             |
| Radium-226                    | pCi/L    | 06/29/2010  | N001      | 255                  | - 305 | 134      |            | FJ   | #  | 0.14            | 33.8        |
| Radium-228                    | pCi/L    | 06/29/2010  | N001      | 255                  | - 305 | 6.4      |            | F    | #  | 0.5             | 1.96        |
| Selenium                      | mg/L     | 06/29/2010  | N001      | 255                  | - 305 | 0.000032 | U          | F    | #  | 0.000032        |             |
| Specific Conductance          | umhos/cm | 06/29/2010  | N001      | 255                  | - 305 | 3841     |            | F    | #  |                 |             |
| Sulfate                       | mg/L     | 06/29/2010  | N001      | 255                  | - 305 | 1900     |            | F    | #  | 25              |             |
| Temperature                   | C        | 06/29/2010  | N001      | 255                  | - 305 | 17.2     |            | F    | #  |                 |             |
| Thorium-228                   | pCi/L    | 06/29/2010  | N001      | 255                  | - 305 | 0.74     | U          | F    | #  | 0.74            | 0.443       |
| Thorium-230                   | pCi/L    | 06/29/2010  | N001      | 255                  | - 305 | 0.9      | U          | F    | #  | 0.9             | 0.535       |
| Thorium-232                   | pCi/L    | 06/29/2010  | N001      | 255                  | - 305 | 0.19     | U          | F    | #  | 0.19            | 0.113       |
| Total Dissolved Solids        | mg/L     | 06/29/2010  | N001      | 255                  | - 305 | 3600     |            | F    | #  | 80              |             |
| Turbidity                     | NTU      | 06/29/2010  | N001      | 255                  | - 305 | 5.35     |            | F    | #  |                 |             |
| Uranium                       | mg/L     | 06/29/2010  | N001      | 255                  | - 305 | 0.0087   |            | F    | #  | 0.0000029       |             |

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

REPORT DATE: 9/15/2010

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      | 06/30/2010  | N001      | 203                  | - 253 | 0.000034 |            | F    | #  | 0.000012        |             |
| Chloride                      | mg/L      | 06/30/2010  | N001      | 203                  | - 253 | 53       |            | F    | #  | 4               |             |
| Chromium                      | mg/L      | 06/30/2010  | N001      | 203                  | - 253 | 0.00051  | U          | F    | #  | 0.00051         |             |
| Lead                          | mg/L      | 06/30/2010  | N001      | 203                  | - 253 | 0.00028  |            | F    | #  | 0.0000068       |             |
| Nickel                        | mg/L      | 06/30/2010  | N001      | 203                  | - 253 | 0.00093  | U          | F    | #  | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L      | 06/30/2010  | N001      | 203                  | - 253 | 0.01     | U          | F    | #  | 0.01            |             |
| Oxidation Reduction Potential | mV        | 06/30/2010  | N001      | 203                  | - 253 | 26.3     |            | F    | #  |                 |             |
| pH                            | s.u.      | 06/30/2010  | N001      | 203                  | - 253 | 7.13     |            | F    | #  |                 |             |
| Radium-226                    | pCi/L     | 06/30/2010  | N001      | 203                  | - 253 | 14.9     |            | FJ   | #  | 0.14            | 3.87        |
| Radium-228                    | pCi/L     | 06/30/2010  | N001      | 203                  | - 253 | 4.43     |            | UF   | #  | 0.55            | 1.4         |
| Selenium                      | mg/L      | 06/30/2010  | N001      | 203                  | - 253 | 0.000032 | U          | F    | #  | 0.000032        |             |
| Specific Conductance          | umhos /cm | 06/30/2010  | N001      | 203                  | - 253 | 2347     |            | F    | #  |                 |             |
| Sulfate                       | mg/L      | 06/30/2010  | N001      | 203                  | - 253 | 1200     |            | F    | #  | 10              |             |
| Temperature                   | C         | 06/30/2010  | N001      | 203                  | - 253 | 12.23    |            | F    | #  |                 |             |
| Thorium-228                   | pCi/L     | 06/30/2010  | N001      | 203                  | - 253 | 0.584    |            | FJ   | #  | 0.5             | 0.361       |
| Thorium-230                   | pCi/L     | 06/30/2010  | N001      | 203                  | - 253 | 0.64     | U          | F    | #  | 0.64            | 0.317       |
| Thorium-232                   | pCi/L     | 06/30/2010  | N001      | 203                  | - 253 | 0.0872   |            | UF   | #  | 0.059           | 0.0883      |
| Total Dissolved Solids        | mg/L      | 06/30/2010  | N001      | 203                  | - 253 | 2000     |            | F    | #  | 40              |             |
| Turbidity                     | NTU       | 06/30/2010  | N001      | 203                  | - 253 | 2.35     |            | F    | #  |                 |             |
| Uranium                       | mg/L      | 06/30/2010  | N001      | 203                  | - 253 | 0.043    |            | F    | #  | 0.0000029       |             |

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

REPORT DATE: 9/15/2010

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     | 06/30/2010  | 0001      | 235                  | - 285 | 0.000012 | U          | F    | #  | 0.000012        |             |
| Chloride                      | mg/L     | 06/30/2010  | 0001      | 235                  | - 285 | 8        |            | F    | #  | 2               |             |
| Chromium                      | mg/L     | 06/30/2010  | 0001      | 235                  | - 285 | 0.00051  | U          | F    | #  | 0.00051         |             |
| Lead                          | mg/L     | 06/30/2010  | 0001      | 235                  | - 285 | 0.000092 |            | F    | #  | 0.0000068       |             |
| Nickel                        | mg/L     | 06/30/2010  | 0001      | 235                  | - 285 | 0.00093  | U          | F    | #  | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L     | 06/30/2010  | 0001      | 235                  | - 285 | 0.063    |            | F    | #  | 0.01            |             |
| Oxidation Reduction Potential | mV       | 06/30/2010  | N001      | 235                  | - 285 | 20.2     |            | F    | #  |                 |             |
| pH                            | s.u.     | 06/30/2010  | N001      | 235                  | - 285 | 7.48     |            | F    | #  |                 |             |
| Radium-226                    | pCi/L    | 06/30/2010  | 0001      | 235                  | - 285 | 2.65     |            | FJ   | #  | 0.14            | 0.792       |
| Radium-228                    | pCi/L    | 06/30/2010  | 0001      | 235                  | - 285 | 2.98     |            | F    | #  | 0.54            | 0.985       |
| Selenium                      | mg/L     | 06/30/2010  | 0001      | 235                  | - 285 | 0.000032 | U          | F    | #  | 0.000032        |             |
| Specific Conductance          | umhos/cm | 06/30/2010  | N001      | 235                  | - 285 | 1514     |            | F    | #  |                 |             |
| Sulfate                       | mg/L     | 06/30/2010  | 0001      | 235                  | - 285 | 640      |            | F    | #  | 5               |             |
| Temperature                   | C        | 06/30/2010  | N001      | 235                  | - 285 | 12.36    |            | F    | #  |                 |             |
| Thorium-228                   | pCi/L    | 06/30/2010  | 0001      | 235                  | - 285 | 0.52     | U          | F    | #  | 0.52            | 0.258       |
| Thorium-230                   | pCi/L    | 06/30/2010  | 0001      | 235                  | - 285 | 0.63     | U          | F    | #  | 0.63            | 0.321       |
| Thorium-232                   | pCi/L    | 06/30/2010  | 0001      | 235                  | - 285 | 0.16     | U          | F    | #  | 0.16            | 0.0764      |
| Total Dissolved Solids        | mg/L     | 06/30/2010  | 0001      | 235                  | - 285 | 1100     |            | F    | #  | 20              |             |
| Turbidity                     | NTU      | 06/30/2010  | N001      | 235                  | - 285 | 13.7     |            | F    | #  |                 |             |
| Uranium                       | mg/L     | 06/30/2010  | 0001      | 235                  | - 285 | 0.0012   |            | F    | #  | 0.0000029       |             |

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

REPORT DATE: 9/15/2010

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      | 06/30/2010  | N001      | 177                  | - 237 | 0.00063   |            | F    | #  | 0.000012        |             |
| Chloride                      | mg/L      | 06/30/2010  | N001      | 177                  | - 237 | 82        |            | F    | #  | 10              |             |
| Chromium                      | mg/L      | 06/30/2010  | N001      | 177                  | - 237 | 0.00051   | U          | F    | #  | 0.00051         |             |
| Lead                          | mg/L      | 06/30/2010  | N001      | 177                  | - 237 | 0.0000068 | U          | F    | #  | 0.0000068       |             |
| Nickel                        | mg/L      | 06/30/2010  | N001      | 177                  | - 237 | 0.11      |            | F    | #  | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L      | 06/30/2010  | N001      | 177                  | - 237 | 0.01      | U          | F    | #  | 0.01            |             |
| Oxidation Reduction Potential | mV        | 06/30/2010  | N001      | 177                  | - 237 | -83.3     |            | F    | #  |                 |             |
| pH                            | s.u.      | 06/30/2010  | N001      | 177                  | - 237 | 6.55      |            | F    | #  |                 |             |
| Radium-226                    | pCi/L     | 06/30/2010  | N001      | 177                  | - 237 | 6.51      |            | FJ   | #  | 0.13            | 1.77        |
| Radium-228                    | pCi/L     | 06/30/2010  | N001      | 177                  | - 237 | 6.34      |            | F    | #  | 0.47            | 1.94        |
| Selenium                      | mg/L      | 06/30/2010  | N001      | 177                  | - 237 | 0.00016   |            | F    | #  | 0.000032        |             |
| Specific Conductance          | umhos /cm | 06/30/2010  | N001      | 177                  | - 237 | 4503      |            | F    | #  |                 |             |
| Sulfate                       | mg/L      | 06/30/2010  | N001      | 177                  | - 237 | 3000      |            | F    | #  | 25              |             |
| Temperature                   | C         | 06/30/2010  | N001      | 177                  | - 237 | 12.9      |            | F    | #  |                 |             |
| Thorium-228                   | pCi/L     | 06/30/2010  | N001      | 177                  | - 237 | 0.61      | U          | F    | #  | 0.61            | 0.34        |
| Thorium-230                   | pCi/L     | 06/30/2010  | N001      | 177                  | - 237 | 0.67      | U          | F    | #  | 0.67            | 0.34        |
| Thorium-232                   | pCi/L     | 06/30/2010  | N001      | 177                  | - 237 | 0.16      | U          | F    | #  | 0.16            | 0.0858      |
| Total Dissolved Solids        | mg/L      | 06/30/2010  | N001      | 177                  | - 237 | 4600      |            | F    | #  | 80              |             |
| Turbidity                     | NTU       | 06/30/2010  | N001      | 177                  | - 237 | 2.89      |            | F    | #  |                 |             |
| Uranium                       | mg/L      | 06/30/2010  | N001      | 177                  | - 237 | 0.00018   |            | F    | #  | 0.0000029       |             |

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

REPORT DATE: 9/15/2010

Location: 40-SC WELL

| Parameter                     | Units | Sample Date | Sample ID | Depth Range (Ft BLS) | Result   | Qualifiers |         | Detection Limit | Uncertainty |
|-------------------------------|-------|-------------|-----------|----------------------|----------|------------|---------|-----------------|-------------|
|                               |       |             |           |                      |          | Lab        | Data QA |                 |             |
| Cadmium                       | mg/L  | 06/30/2010  | N001      | -                    | 0.000075 |            | FJ #    | 0.000012        |             |
| Cadmium                       | mg/L  | 06/30/2010  | N002      | -                    | 0.00022  |            | FJ #    | 0.000012        |             |
| Chloride                      | mg/L  | 06/30/2010  | N001      | -                    | 42       |            | F #     | 4               |             |
| Chloride                      | mg/L  | 06/30/2010  | N002      | -                    | 41       |            | F #     | 4               |             |
| Chromium                      | mg/L  | 06/30/2010  | N001      | -                    | 0.00051  | U          | F #     | 0.00051         |             |
| Chromium                      | mg/L  | 06/30/2010  | N002      | -                    | 0.00051  | U          | F #     | 0.00051         |             |
| Lead                          | mg/L  | 06/30/2010  | N001      | -                    | 0.000068 |            | F #     | 0.000068        |             |
| Lead                          | mg/L  | 06/30/2010  | N002      | -                    | 0.000068 | U          | F #     | 0.000068        |             |
| Nickel                        | mg/L  | 06/30/2010  | N001      | -                    | 0.0069   |            | F #     | 0.00093         |             |
| Nickel                        | mg/L  | 06/30/2010  | N002      | -                    | 0.0082   |            | F #     | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L  | 06/30/2010  | N001      | -                    | 1.5      |            | F #     | 0.01            |             |
| Nitrate + Nitrite as Nitrogen | mg/L  | 06/30/2010  | N002      | -                    | 1.5      |            | F #     | 0.01            |             |
| Oxidation Reduction Potential | mV    | 06/30/2010  | N001      | -                    | 65.2     |            | F #     |                 |             |
| pH                            | s.u.  | 06/30/2010  | N001      | -                    | 6.42     |            | F #     |                 |             |
| Radium-226                    | pCi/L | 06/30/2010  | N001      | -                    | 0.185    |            | FJ #    | 0.13            | 0.136       |
| Radium-226                    | pCi/L | 06/30/2010  | N002      | -                    | 0.414    |            | FJ #    | 0.16            | 0.217       |
| Radium-228                    | pCi/L | 06/30/2010  | N001      | -                    | 1.03     |            | UF #    | 0.46            | 0.438       |
| Radium-228                    | pCi/L | 06/30/2010  | N002      | -                    | 0.959    |            | UF #    | 0.49            | 0.432       |
| Selenium                      | mg/L  | 06/30/2010  | N001      | -                    | 0.0069   |            | F #     | 0.000032        |             |
| Selenium                      | mg/L  | 06/30/2010  | N002      | -                    | 0.007    |            | F #     | 0.000032        |             |

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

REPORT DATE: 9/15/2010

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 | 06/30/2010  | N001      | -                    | 2836    |            | F #     |                 |             |
| Sulfate                | mg/L      | 06/30/2010  | N001      | -                    | 1700    |            | F #     | 10              |             |
| Sulfate                | mg/L      | 06/30/2010  | N002      | -                    | 1700    |            | F #     | 10              |             |
| Temperature            | C         | 06/30/2010  | N001      | -                    | 6.94    |            | F #     |                 |             |
| Thorium-228            | pCi/L     | 06/30/2010  | N001      | -                    | 0.86    | U          | F #     | 0.86            | 0.451       |
| Thorium-228            | pCi/L     | 06/30/2010  | N002      | -                    | 0.36    | U          | F #     | 0.36            | 0.165       |
| Thorium-230            | pCi/L     | 06/30/2010  | N001      | -                    | 0.91    | U          | F #     | 0.91            | 0.508       |
| Thorium-230            | pCi/L     | 06/30/2010  | N002      | -                    | 0.67    | U          | F #     | 0.67            | 0.432       |
| Thorium-232            | pCi/L     | 06/30/2010  | N001      | -                    | 0.27    | U          | F #     | 0.27            | 0.148       |
| Thorium-232            | pCi/L     | 06/30/2010  | N002      | -                    | 0.14    | U          | F #     | 0.14            | 0.0868      |
| Total Dissolved Solids | mg/L      | 06/30/2010  | N001      | -                    | 2600    |            | F #     | 40              |             |
| Total Dissolved Solids | mg/L      | 06/30/2010  | N002      | -                    | 2600    |            | F #     | 40              |             |
| Turbidity              | NTU       | 06/30/2010  | N001      | -                    | 1.45    |            | F #     |                 |             |
| Uranium                | mg/L      | 06/30/2010  | N001      | -                    | 0.00025 |            | F #     | 0.000029        |             |
| Uranium                | mg/L      | 06/30/2010  | N002      | -                    | 0.00026 |            | F #     | 0.000029        |             |

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

REPORT DATE: 9/15/2010

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      | 06/30/2010  | N001      | -                    | 0.000058 | U          | F    | #  | 0.000058        |             |
| Chloride                      | mg/L      | 06/30/2010  | N001      | -                    | 170      |            | F    | #  | 10              |             |
| Chromium                      | mg/L      | 06/30/2010  | N001      | -                    | 0.0045   | B          | F    | #  | 0.00051         |             |
| Lead                          | mg/L      | 06/30/2010  | N001      | -                    | 0.00028  |            | F    | #  | 0.000034        |             |
| Nickel                        | mg/L      | 06/30/2010  | N001      | -                    | 0.9      |            | F    | #  | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L      | 06/30/2010  | N001      | -                    | 0.027    |            | F    | #  | 0.01            |             |
| Oxidation Reduction Potential | mV        | 06/30/2010  | N001      | -                    | 187.4    |            | F    | #  |                 |             |
| pH                            | s.u.      | 06/30/2010  | N001      | -                    | 4.27     |            | F    | #  |                 |             |
| Radium-226                    | pCi/L     | 06/30/2010  | N001      | -                    | 9.68     |            | FJ   | #  | 0.14            | 2.57        |
| Radium-228                    | pCi/L     | 06/30/2010  | N001      | -                    | 43.3     |            | F    | #  | 0.52            | 12.9        |
| Selenium                      | mg/L      | 06/30/2010  | N001      | -                    | 0.02     |            | F    | #  | 0.00016         |             |
| Specific Conductance          | umhos /cm | 06/30/2010  | N001      | -                    | 7790     |            | F    | #  |                 |             |
| Sulfate                       | mg/L      | 06/30/2010  | N001      | -                    | 6300     |            | F    | #  | 50              |             |
| Temperature                   | C         | 06/30/2010  | N001      | -                    | 13.04    |            | F    | #  |                 |             |
| Thorium-228                   | pCi/L     | 06/30/2010  | N001      | -                    | 5.83     |            | FJ   | #  | 0.53            | 1.24        |
| Thorium-230                   | pCi/L     | 06/30/2010  | N001      | -                    | 0.74     | U          | F    | #  | 0.74            | 0.478       |
| Thorium-232                   | pCi/L     | 06/30/2010  | N001      | -                    | 0.625    |            | F    | #  | 0.2             | 0.283       |
| Total Dissolved Solids        | mg/L      | 06/30/2010  | N001      | -                    | 9400     |            | F    | #  | 200             |             |
| Turbidity                     | NTU       | 06/30/2010  | N001      | -                    | 9.6      |            | F    | #  |                 |             |
| Uranium                       | mg/L      | 06/30/2010  | N001      | -                    | 0.045    |            | F    | #  | 0.000015        |             |

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

REPORT DATE: 9/15/2010

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     | 06/30/2010  | N001      | 49.3                 | - 57.7 | 0.039    |            | F    | #  | 0.000058        |             |
| Chloride                      | mg/L     | 06/30/2010  | N001      | 49.3                 | - 57.7 | 300      |            | F    | #  | 10              |             |
| Chromium                      | mg/L     | 06/30/2010  | N001      | 49.3                 | - 57.7 | 0.26     |            | F    | #  | 0.00051         |             |
| Lead                          | mg/L     | 06/30/2010  | N001      | 49.3                 | - 57.7 | 0.000034 | U          | F    | #  | 0.000034        |             |
| Nickel                        | mg/L     | 06/30/2010  | N001      | 49.3                 | - 57.7 | 2.5      |            | F    | #  | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L     | 06/30/2010  | N001      | 49.3                 | - 57.7 | 0.01     | U          | F    | #  | 0.01            |             |
| Oxidation Reduction Potential | mV       | 06/30/2010  | N001      | 49.3                 | - 57.7 | 289.3    |            | F    | #  |                 |             |
| pH                            | s.u.     | 06/30/2010  | N001      | 49.3                 | - 57.7 | 3.39     |            | F    | #  |                 |             |
| Radium-226                    | pCi/L    | 06/30/2010  | N001      | 49.3                 | - 57.7 | 5.09     |            | FJ   | #  | 0.15            | 1.41        |
| Radium-228                    | pCi/L    | 06/30/2010  | N001      | 49.3                 | - 57.7 | 3.4      |            | UF   | #  | 0.52            | 1.09        |
| Selenium                      | mg/L     | 06/30/2010  | N001      | 49.3                 | - 57.7 | 0.073    |            | F    | #  | 0.00016         |             |
| Specific Conductance          | umhos/cm | 06/30/2010  | N001      | 49.3                 | - 57.7 | 12176    |            | F    | #  |                 |             |
| Sulfate                       | mg/L     | 06/30/2010  | N001      | 49.3                 | - 57.7 | 14000    |            | F    | #  | 100             |             |
| Temperature                   | C        | 06/30/2010  | N001      | 49.3                 | - 57.7 | 11.01    |            | F    | #  |                 |             |
| Thorium-228                   | pCi/L    | 06/30/2010  | N001      | 49.3                 | - 57.7 | 47.8     |            | F    | #  | 1.8             | 7.95        |
| Thorium-230                   | pCi/L    | 06/30/2010  | N001      | 49.3                 | - 57.7 | 421      |            | F    | #  | 2.8             | 64.4        |
| Thorium-232                   | pCi/L    | 06/30/2010  | N001      | 49.3                 | - 57.7 | 11.5     |            | F    | #  | 0.14            | 2.32        |
| Total Dissolved Solids        | mg/L     | 06/30/2010  | N001      | 49.3                 | - 57.7 | 18000    |            | F    | #  | 200             |             |
| Turbidity                     | NTU      | 06/30/2010  | N001      | 49.3                 | - 57.7 | 4.86     |            | F    | #  |                 |             |
| Uranium                       | mg/L     | 06/30/2010  | N001      | 49.3                 | - 57.7 | 3.4      |            | F    | #  | 0.000015        |             |

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

REPORT DATE: 9/15/2010

Location: 54-SC WELL

| Parameter                     | Units    | Sample Date | Sample ID | Depth Range (Ft BLS) | Result  | Qualifiers |       | Detection Limit | Uncertainty |
|-------------------------------|----------|-------------|-----------|----------------------|---------|------------|-------|-----------------|-------------|
|                               |          |             |           |                      |         | Lab        | QA    |                 |             |
| Cadmium                       | mg/L     | 06/29/2010  | N001      | -                    | 0.0017  |            | FQ #  | 0.000058        |             |
| Chloride                      | mg/L     | 06/29/2010  | N001      | -                    | 340     |            | FQ #  | 10              |             |
| Chromium                      | mg/L     | 06/29/2010  | N001      | -                    | 0.19    |            | FQ #  | 0.00051         |             |
| Lead                          | mg/L     | 06/29/2010  | N001      | -                    | 0.00062 |            | FQ #  | 0.000034        |             |
| Nickel                        | mg/L     | 06/29/2010  | N001      | -                    | 2.5     |            | FQ #  | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L     | 06/29/2010  | N001      | -                    | 0.02    |            | FQ #  | 0.01            |             |
| Oxidation Reduction Potential | mV       | 06/29/2010  | N001      | -                    | 305.2   |            | FQ #  |                 |             |
| pH                            | s.u.     | 06/29/2010  | N001      | -                    | 3.84    |            | FQ #  |                 |             |
| Radium-226                    | pCi/L    | 06/29/2010  | N001      | -                    | 16.7    |            | FQJ # | 0.13            | 4.33        |
| Radium-228                    | pCi/L    | 06/29/2010  | N001      | -                    | 107     |            | FQ #  | 0.49            | 31.8        |
| Selenium                      | mg/L     | 06/29/2010  | N001      | -                    | 0.047   |            | FQ #  | 0.00016         |             |
| Specific Conductance          | umhos/cm | 06/29/2010  | N001      | -                    | 9210    |            | FQ #  |                 |             |
| Sulfate                       | mg/L     | 06/29/2010  | N001      | -                    | 8400    |            | FQ #  | 50              |             |
| Temperature                   | C        | 06/29/2010  | N001      | -                    | 17.97   |            | FQ #  |                 |             |
| Thorium-228                   | pCi/L    | 06/29/2010  | N001      | -                    | 8.97    |            | FQ #  | 0.73            | 1.71        |
| Thorium-230                   | pCi/L    | 06/29/2010  | N001      | -                    | 5.21    |            | FQ #  | 1.4             | 1.35        |
| Thorium-232                   | pCi/L    | 06/29/2010  | N001      | -                    | 4.45    |            | FQ #  | 0.35            | 0.964       |
| Total Dissolved Solids        | mg/L     | 06/29/2010  | N001      | -                    | 12000   |            | FQ #  | 200             |             |
| Turbidity                     | NTU      | 06/29/2010  | N001      | -                    | 7.65    |            | FQ #  |                 |             |
| Uranium                       | mg/L     | 06/29/2010  | N001      | -                    | 0.045   |            | FQ #  | 0.000015        |             |

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

REPORT DATE: 9/15/2010

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      | 06/30/2010  | N001      | 420                  | - 450 | 0.00027  |            |      | #  | 0.000012        |             |
| Chloride                      | mg/L      | 06/30/2010  | N001      | 420                  | - 450 | 24       |            |      | #  | 1               |             |
| Chromium                      | mg/L      | 06/30/2010  | N001      | 420                  | - 450 | 0.00051  | U          |      | #  | 0.00051         |             |
| Lead                          | mg/L      | 06/30/2010  | N001      | 420                  | - 450 | 0.00059  |            |      | #  | 0.0000068       |             |
| Nickel                        | mg/L      | 06/30/2010  | N001      | 420                  | - 450 | 0.011    |            |      | #  | 0.00093         |             |
| Nitrate + Nitrite as Nitrogen | mg/L      | 06/30/2010  | N001      | 420                  | - 450 | 0.15     |            |      | #  | 0.01            |             |
| Oxidation Reduction Potential | mV        | 06/30/2010  | N001      | 420                  | - 450 | -72.9    |            |      | #  |                 |             |
| pH                            | s.u.      | 06/30/2010  | N001      | 420                  | - 450 | 7.62     |            |      | #  |                 |             |
| Radium-226                    | pCi/L     | 06/30/2010  | N001      | 420                  | - 450 | 0.31     |            | J    | #  | 0.14            | 0.182       |
| Radium-228                    | pCi/L     | 06/30/2010  | N001      | 420                  | - 450 | 0.673    |            | U    | #  | 0.5             | 0.38        |
| Selenium                      | mg/L      | 06/30/2010  | N001      | 420                  | - 450 | 0.000032 | U          |      | #  | 0.000032        |             |
| Specific Conductance          | umhos /cm | 06/30/2010  | N001      | 420                  | - 450 | 770      |            |      | #  |                 |             |
| Sulfate                       | mg/L      | 06/30/2010  | N001      | 420                  | - 450 | 270      |            |      | #  | 2.5             |             |
| Temperature                   | C         | 06/30/2010  | N001      | 420                  | - 450 | 17.92    |            |      | #  |                 |             |
| Thorium-228                   | pCi/L     | 06/30/2010  | N001      | 420                  | - 450 | 0.67     | U          |      | #  | 0.67            | 0.363       |
| Thorium-230                   | pCi/L     | 06/30/2010  | N001      | 420                  | - 450 | 0.78     | U          |      | #  | 0.78            | 0.406       |
| Thorium-232                   | pCi/L     | 06/30/2010  | N001      | 420                  | - 450 | 0.29     | U          |      | #  | 0.29            | 0.121       |
| Total Dissolved Solids        | mg/L      | 06/30/2010  | N001      | 420                  | - 450 | 450      |            |      | #  | 20              |             |
| Turbidity                     | NTU       | 06/30/2010  | N001      | 420                  | - 450 | 7.84     |            |      | #  |                 |             |
| Uranium                       | mg/L      | 06/30/2010  | N001      | 420                  | - 450 | 0.000033 |            |      | #  | 0.0000029       |             |

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

LAB QUALIFIERS:

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

DATA QUALIFIERS:

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

QA QUALIFIER:

- # Validated according to quality assurance guidelines.

## **Static Water Level Data**

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**STATIC WATER LEVELS (USEE700) FOR SITE SBS01, Shirley Basin South Disposal Site**  
**REPORT DATE: 9/15/2010**

| Location Code | Flow Code | Top of Casing Elevation (Ft) | Measurement Date | Measurement Time | Depth From Top of Casing (Ft) | Water Elevation (Ft) |
|---------------|-----------|------------------------------|------------------|------------------|-------------------------------|----------------------|
| 10-DC         |           | 7113.1                       | 06/30/2010       | 17:35:51         | 170.43                        | 6942.67              |
| 100-SC        |           | 7153.56                      | 06/29/2010       | 11:45:40         | 216.9                         | 6936.66              |
| 102-SC        |           | 7126.74                      | 06/30/2010       | 12:15:38         | 183.8                         | 6942.94              |
| 110-DC        |           | 7153.92                      | 06/29/2010       | 11:30:11         | 211.47                        | 6942.45              |
| 112-DC        |           | 7125.62                      | 06/30/2010       | 12:00:36         | 182.83                        | 6942.79              |
| 113-DC        |           | 7135.93                      | 06/30/2010       | 13:30:06         | 191.14                        | 6944.79              |
| 19-DC         |           | 7112.1                       | 06/30/2010       | 15:25:46         | 169.48                        | 6942.62              |
| 40-SC         |           | 7058.3                       | 06/30/2010       | 18:35:44         | 8.72                          | 7049.58              |
| 5-DC          |           | 7119.94                      | 06/30/2010       | 10:40:13         | 177.56                        | 6942.38              |
| 5-SC          |           | 7053.31                      | 06/30/2010       | 16:25:38         | 56.96                         | 6996.35              |
| 54-SC         |           | 7158.74                      | 06/29/2010       | 15:55:22         | 208.54                        | 6950.2               |
| K.G.S.#3      |           | 7171.3                       | 06/30/2010       | 14:00:26         | 123.4                         | 7047.9               |

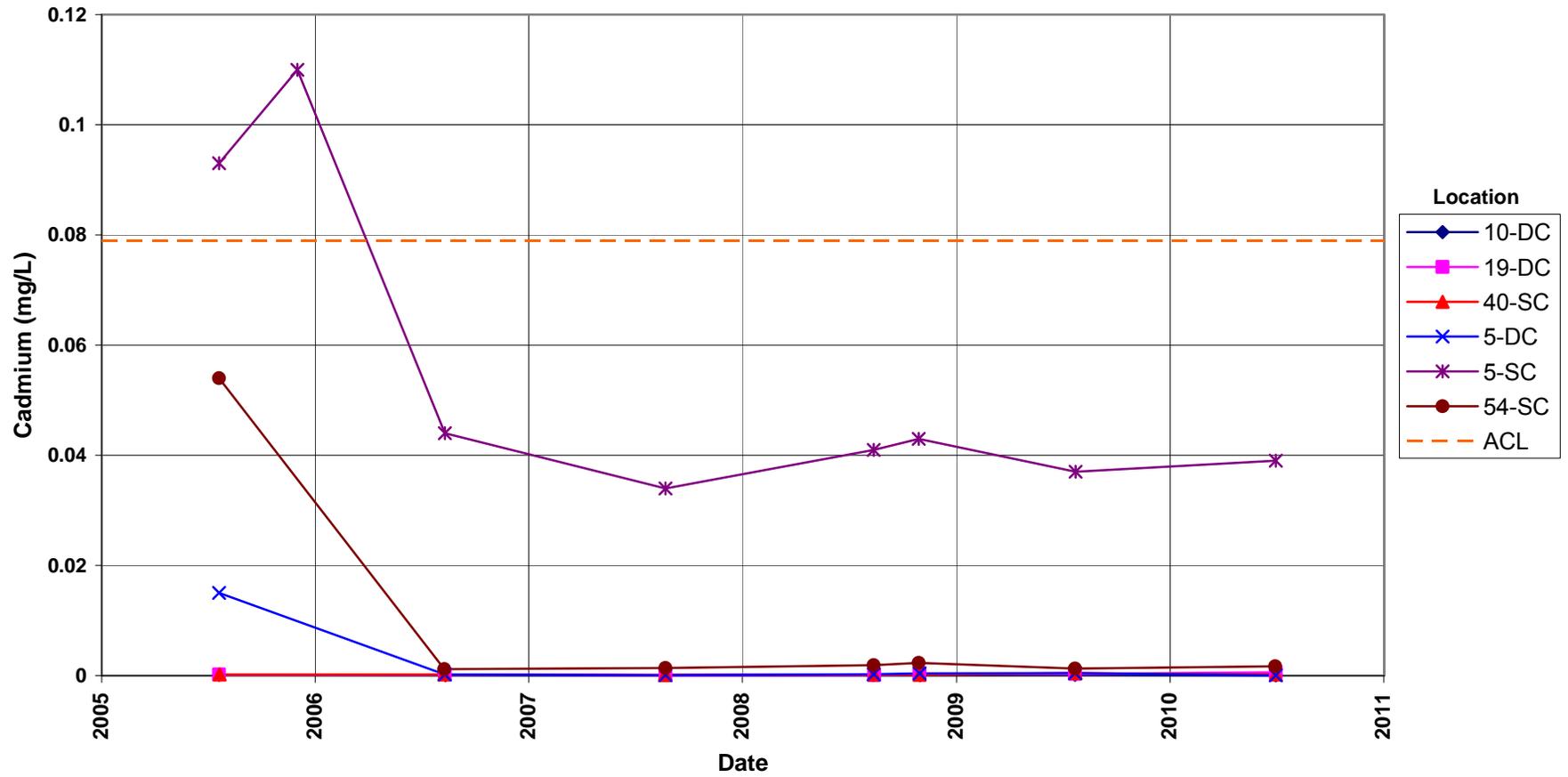
FLOW CODES: B BACKGROUND      C CROSS GRADIENT      D DOWN GRADIENT      F OFF SITE  
                   N UNKNOWN            O ON SITE                U UPGRADIENT

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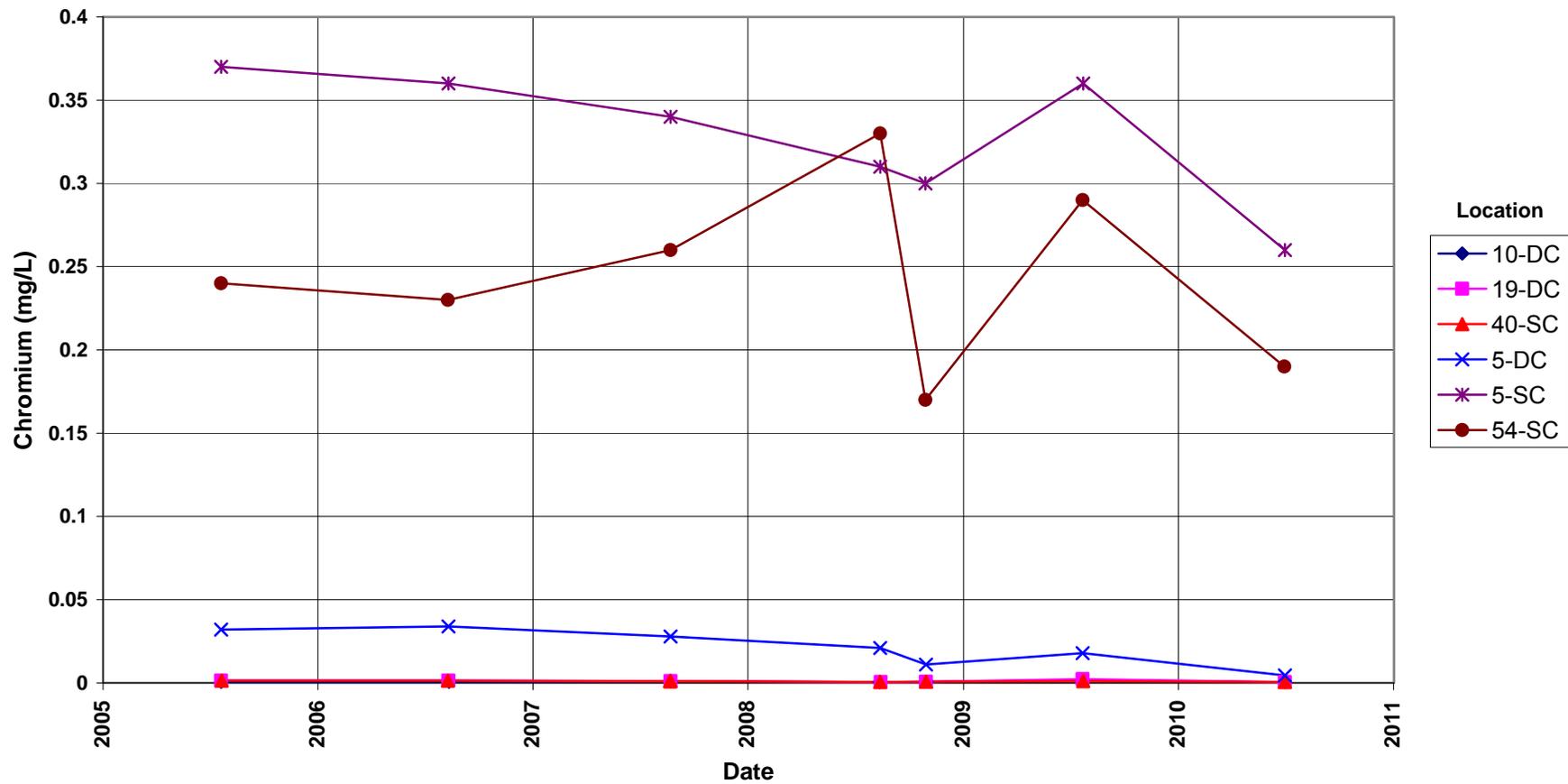
## **Time-Concentration Graphs**

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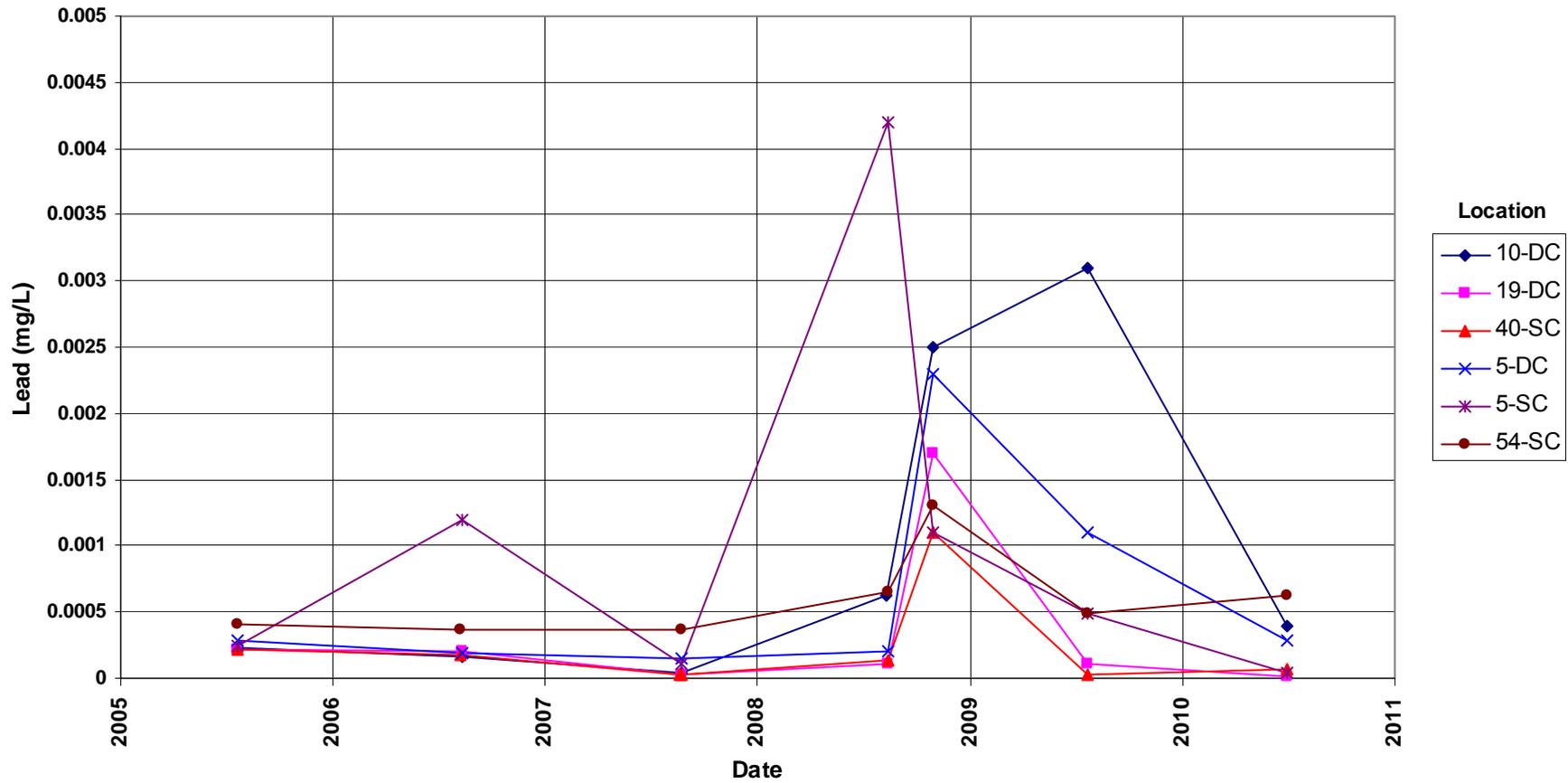
**Shirley Basin South Disposal Site**  
**Cadmium Concentration**  
Alternate Concentration Limit (ACL) = 0.079 mg/L



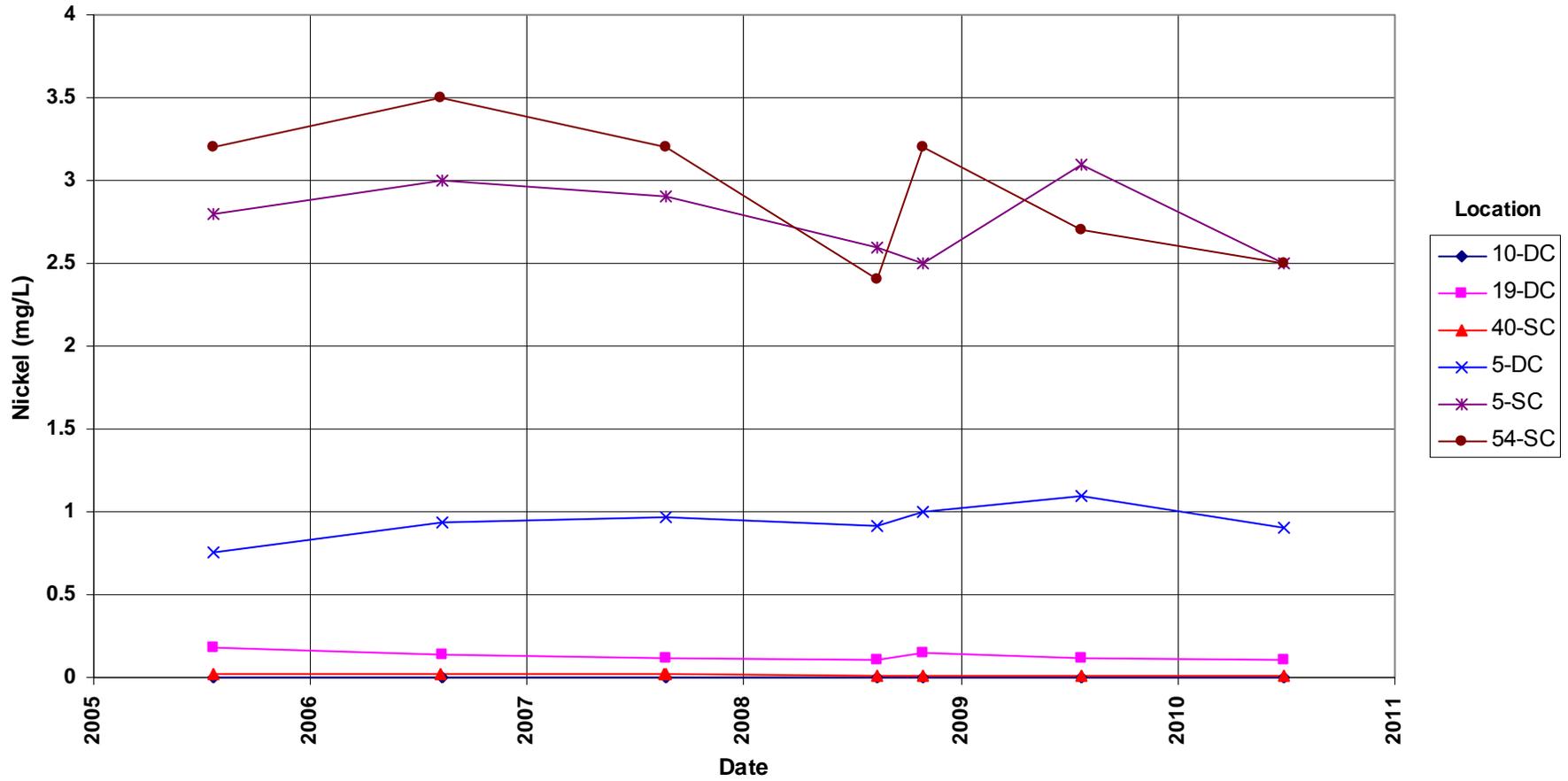
**Shirley Basin South Disposal Site**  
**Chromium Concentration**  
Alternate Concentration Limit (ACL) = 1.83 mg/L



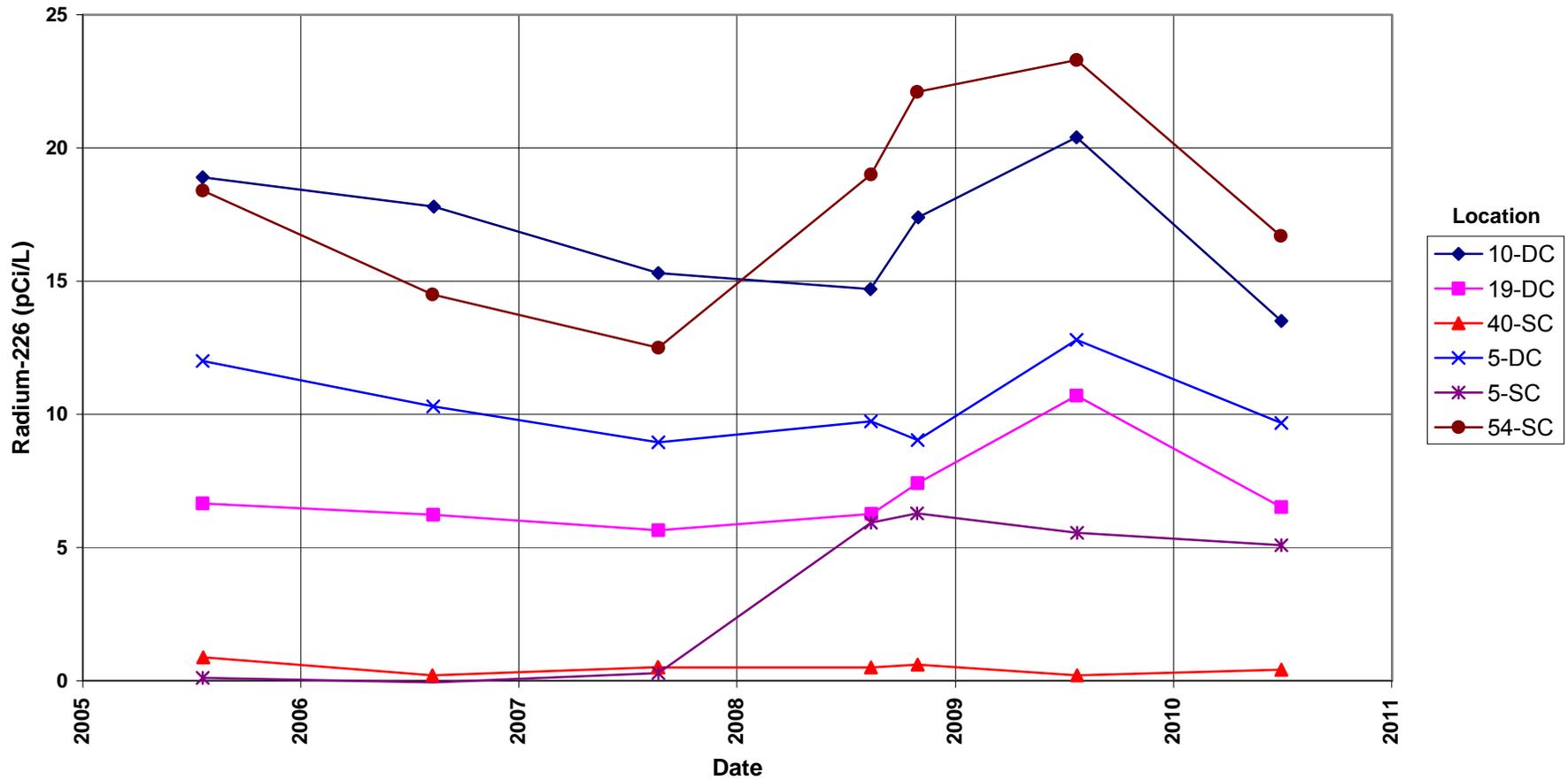
**Shirley Basin South Disposal Site**  
**Lead Concentration**  
Alternate Concentration Limit (ACL) = 0.05 mg/L



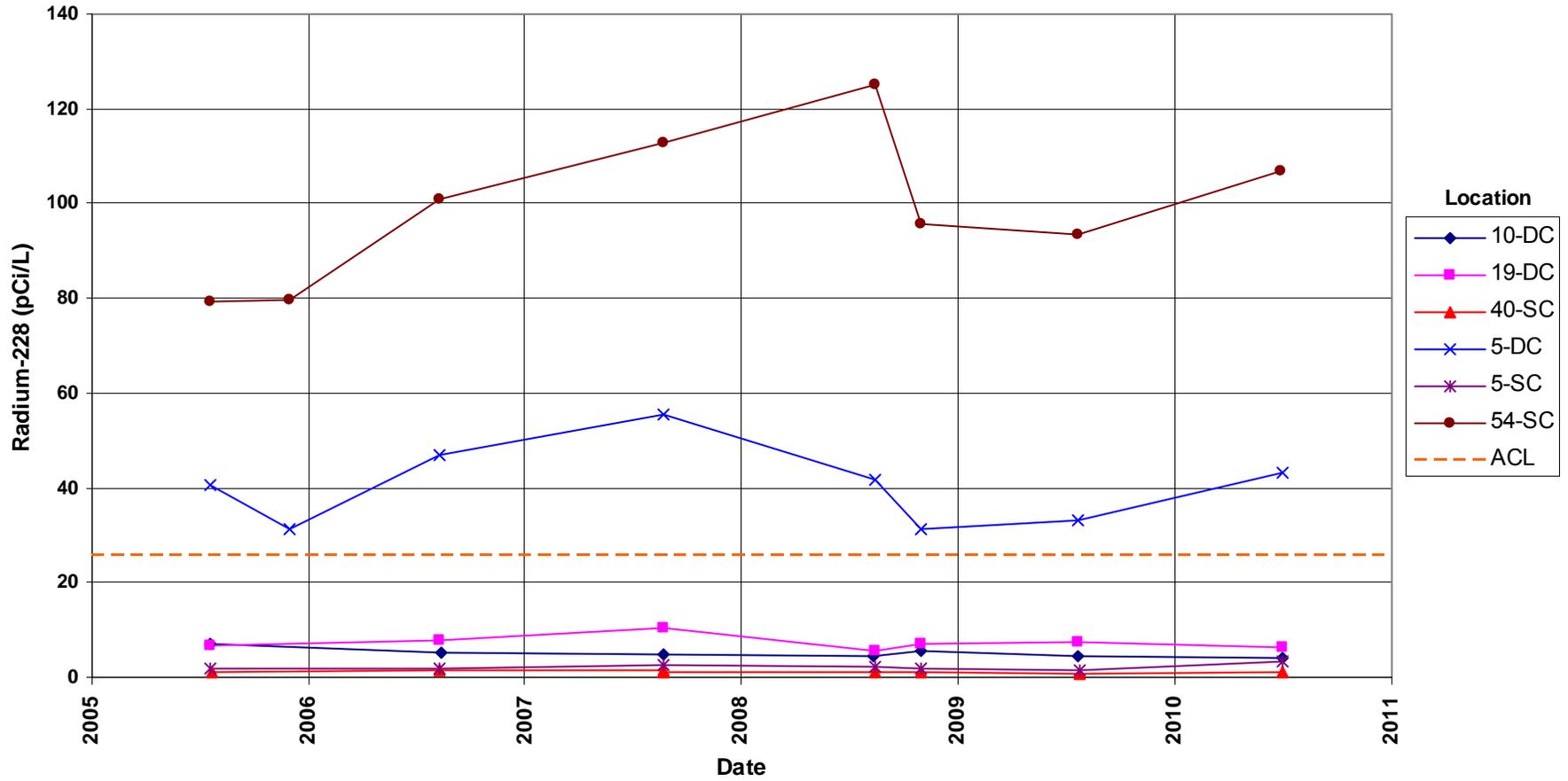
**Shirley Basin South Disposal Site**  
**Nickel Concentration**  
Alternate Concentration Limit (ACL) = 6.15 mg/L



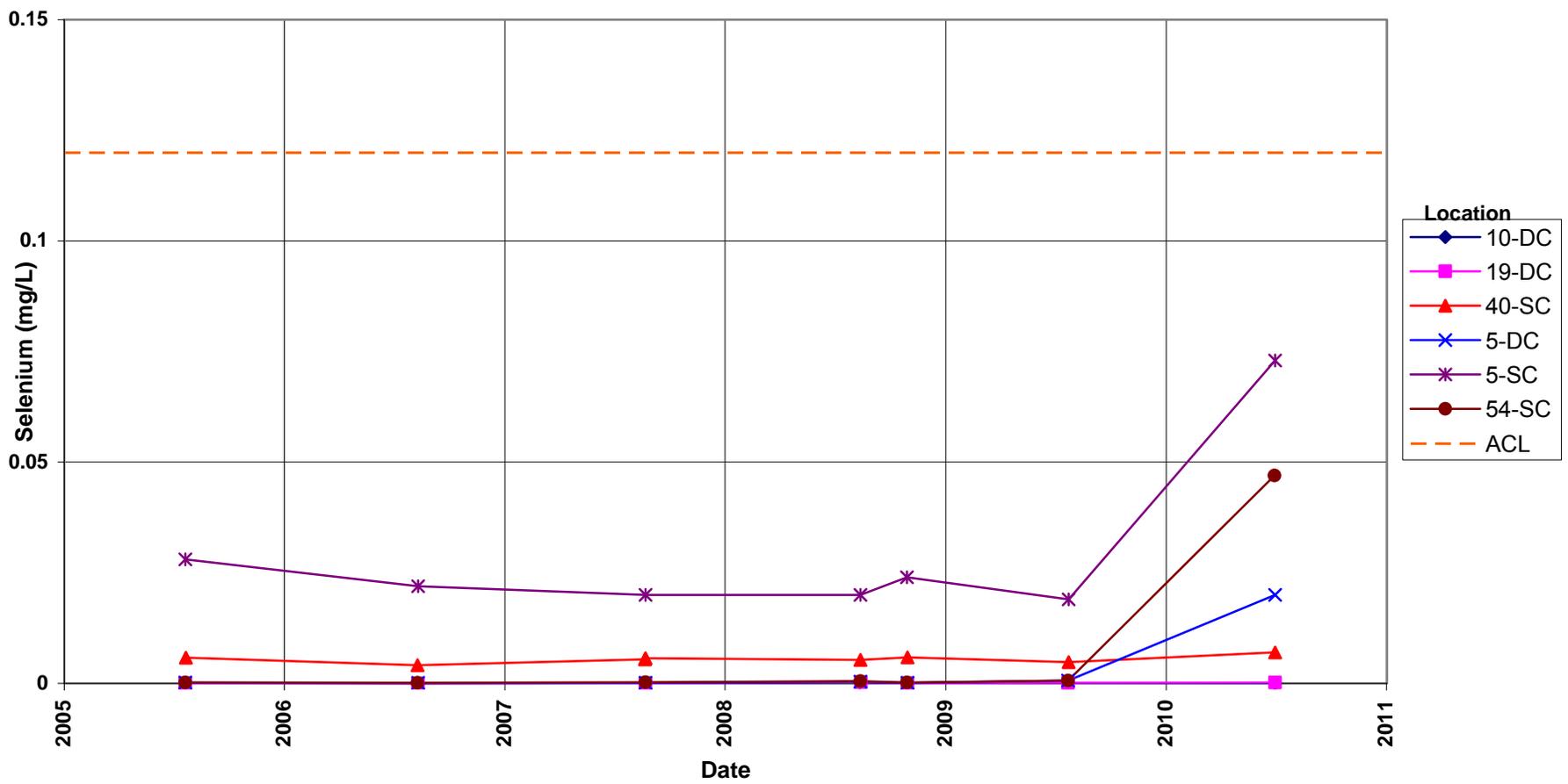
**Shirley Basin South Disposal Site**  
**Radium-226 Concentration**  
Alternate Concentration Limit (ACL) = 91.3 pCi/L



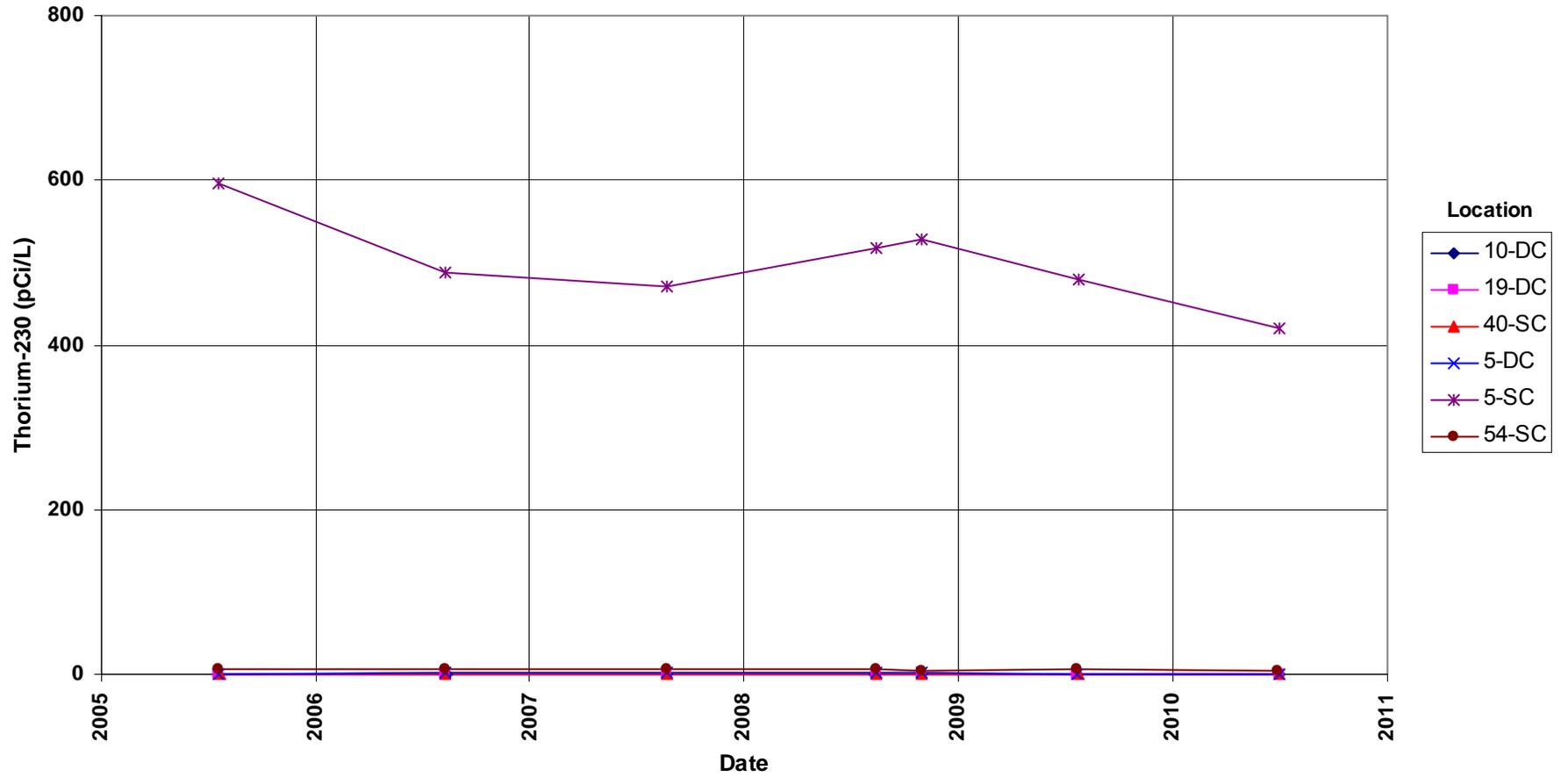
**Shirley Basin South Disposal Site**  
**Radium-228 Concentration**  
Alternate Concentration Limit (ACL) = 25.7 pCi/L



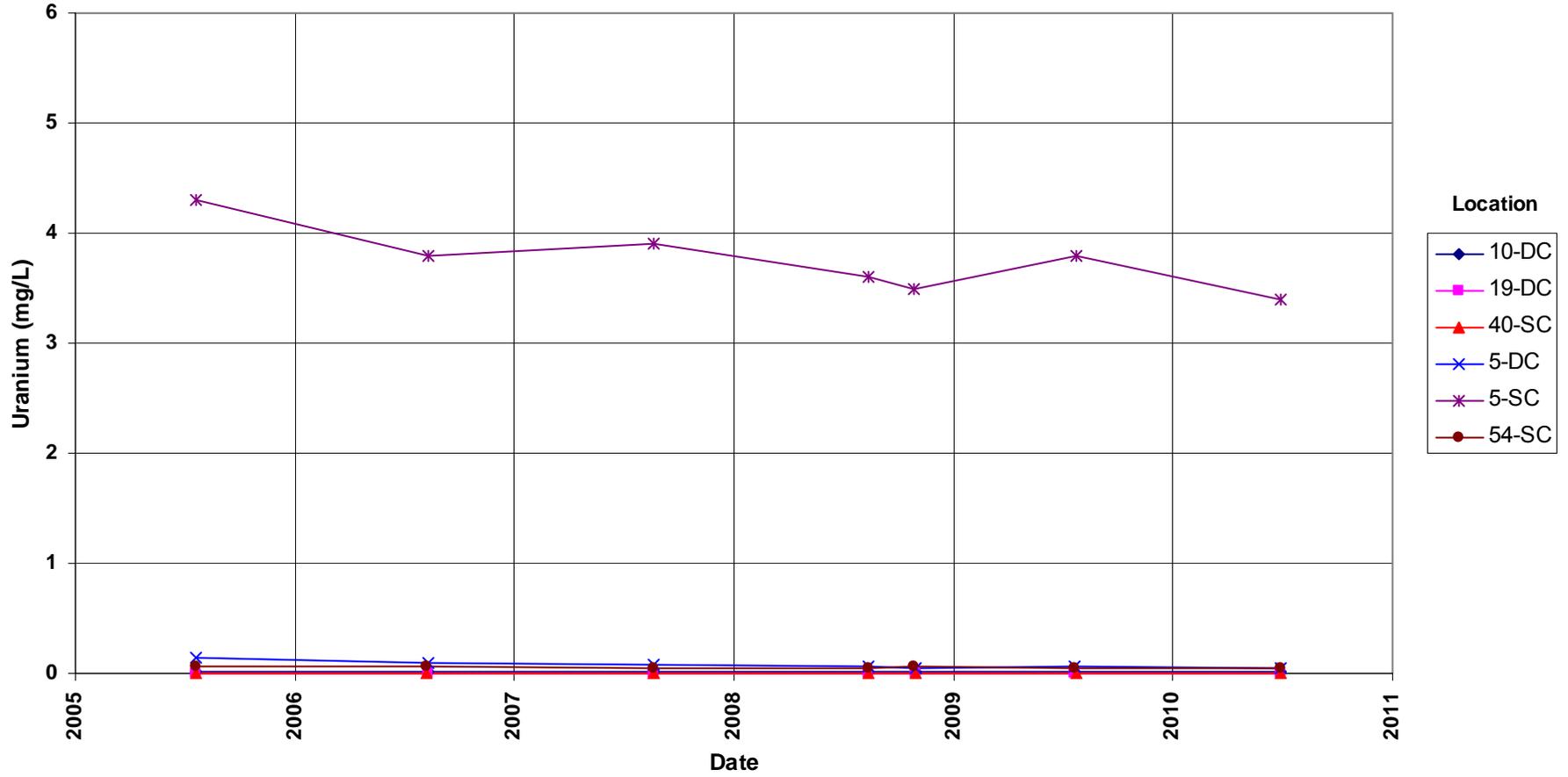
**Shirley Basin South Disposal Site**  
**Selenium Concentration**  
Alternate Concentration Limit (ACL) = 0.12 mg/L



**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



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

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established 1959

Task Order LM00-501  
Control Number 10-0598

May 10, 2010

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

SUBJECT: Contract No. DE-AM01-07LM00060, Stoller  
June 2010 Environmental Sampling at Shirley Basin South, Wyoming

REFERENCE: Task Order LM00-501-03-223-402, Shirley Basin South, WY, 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 disposal 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 14, 2010.

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 |

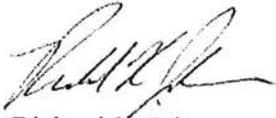
\*NOTE: SC wells are completed in the upper sand aquifer of the Wind River Formation; DC wells are completed in the main sand aquifer of the Wind River Formation. Well 54-SC is completed in both aquifers.

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 R. Surovchak  
Control Number 10-0598  
Page 2

Please contact me at (970) 248-6022 if you have any questions or concerns.

Sincerely,



Richard K. Johnson  
Site Lead

RKJ/lcg/lb

Enclosures (3)

cc: (electronic)

Cheri Bahrke, Stoller  
Steve Donivan, Stoller  
Bev Gallagher, Stoller  
Lauren Goodknight, Stoller  
Richard Johnson, Stoller  
EDD Delivery  
rc-grand.junction

**Sampling Frequencies for Locations at Shirley Basin South, Wyoming**

| Location ID             | Quarterly | Semiannually | Annually | Biennially | Not Sampled | Notes |
|-------------------------|-----------|--------------|----------|------------|-------------|-------|
| <b>Monitoring Wells</b> |           |              |          |            |             |       |
| 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<br>Detection<br>Limit (mg/L) | Analytical<br>Method        | Line Item<br>Code |
|------------------------------------|---------------------|------------------|---------------------------------------|-----------------------------|-------------------|
| Analyte                            | Groundwater         | Surface<br>Water |                                       |                             |                   |
| <b>Approx. No. Samples/yr</b>      | 14                  | 0                |                                       |                             |                   |
| <i>Field Measurements</i>          |                     |                  |                                       |                             |                   |
| Alkalinity                         |                     |                  |                                       |                             |                   |
| Dissolved Oxygen                   |                     |                  |                                       |                             |                   |
| Redox Potential                    | X                   |                  |                                       |                             |                   |
| pH                                 | X                   |                  |                                       |                             |                   |
| Specific Conductance               | X                   |                  |                                       |                             |                   |
| Turbidity                          | X                   |                  |                                       |                             |                   |
| Temperature                        | X                   |                  |                                       |                             |                   |
| <i>Laboratory Measurements</i>     |                     |                  |                                       |                             |                   |
| 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<br>Counter | GPC-A-018         |
| Radium-228                         | X                   |                  | 1 pCi/L                               | Gas Proportional<br>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.

# **Attachment 4**

## **Trip Report**

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*Memorandum*

Control Number N/A

DATE: July 14, 2010

TO: Dick Johnson

FROM: Dan Sellers

SUBJECT: Trip Report

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

**Dates of Sampling Event:** June 28 thru July 1, 2010.

**Team Members:** David Atkinson and Dan Sellers.

**Number of Locations Sampled:** 12 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, one duplicate sample was collected for QA/QC purposes.

**Locations Not Sampled/Reason:** Well 101-SC was dry and well 51-SC had insufficient water.

**Well Development Information:** N/A

**Field Variance:** Could not reach turbidity of <10 NTUs at well 113-DC. Turbidity was within 10 percent over three readings and samples were filtered. Wells K.G.S. #3 and 102-SC were sampled using a bailer. Samples collected from 102-SC were filtered but no filter was required for K.G.S. #3. Bladder pump in K.G.S. #3 was unable to pump water to the surface. Replaced with two different pumps and had no success.

**Location Specific Information:** There were black specks and the water smelled of sulfur in well K.G.S. #3.

**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       | IHV 353       |

**Requisition Numbers Assigned:** All samples were assigned to RIN 10063127.

**Sample Shipment:** Samples were delivered to ALS Laboratory Group on July 1, 2010.

**Water Level Measurements:** Water levels were measured at all wells.

**Well Inspection Summary:** All wells were in good condition and properly labeled. The total depth (TD) of well 51-SC was measured and needs to be changed in the database. The measured TD is 102.2 feet from top of casing (TOC). Development of this well last year was not successful and has not produced sufficient amount of water for many years.

**Equipment:** 10 wells were sampled using the low-flow procedure; 9 wells were sampled through the use of a dedicated bladder pump and dedicated tubing and, 1 well was sampled using a peristaltic pump and dedicated tubing. Two wells were sampled using a bailer (K.G.S. #3 and 102-SC).

All equipment functioned properly except for the bladder pump in well K.G.S. #3. Well 102-SC has no bladder pump or tubing and is considered a Category IV well and will be bailed in the future. Samples were filtered for 102-SC but not required for K.G.S. #3.

**Institutional Controls:** All gates were 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:** No problems observed.

**Vegetation/Noxious Weed Concerns:** The revegetation work on the access roads and the disturbed areas around the newer well pads appears to be a success.

**Maintenance Requirements:** None observed.

**Safety Issues:** None.

**Corrective Action Taken:** Replace tubing and pump at K.G.S. #3 at next sampling event.

DLS/lcg

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