

# Data Validation Package

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**June 2012**  
**Groundwater Sampling at the**  
**Hallam, Nebraska, Decommissioned**  
**Reactor Site**

**August 2012**



U.S. DEPARTMENT OF  
**ENERGY**

Legacy  
Management

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# Contents

Sampling Event Summary .....	1
Hallam, Nebraska, Sample Location Map .....	3
Data Assessment Summary.....	5
Water Sampling Field Activities Verification Checklist.....	7
Laboratory Performance Assessment .....	9
Sampling Quality Control Assessment .....	16
Certification .....	18

## **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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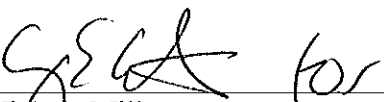
# Sampling Event Summary

**Site:** Hallam, Nebraska, Decommissioned Reactor

**Sampling Period:** June 4–7, 2012

The 2008 *Long-Term Surveillance Plan [LTSP] for the Hallam Nuclear Power Facility, Hallam, Nebraska* requires biennial groundwater monitoring. This event involved sampling 17 monitoring wells at the Hallam, Nebraska, site. Water levels were measured at all sampled wells and two additional wells (6A and 6B) on June 4, 2012, prior to the start of sampling. Additionally, water levels of each sampled well were measured at the beginning of sampling. Sampling and analysis were conducted as specified in *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites (LMS/PLN/S04351, continually updated)* and the *Environmental Procedures Catalog (LMS/PRO/S04325, continually updated)*.

Gross alpha and gross beta are the only parameters that were detected at statistically significant concentrations. Time/concentration graphs of the gross alpha and gross beta data are presented in this report. The gross alpha and gross beta activity concentrations observed are consistent with values previously observed and are attributed to naturally occurring radionuclides (e.g., uranium and uranium decay chain products) in the groundwater.

 for  
\_\_\_\_\_  
Michele Miller  
Site Lead, S.M. Stoller Corporation

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Date 9/10/12

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Hallam, Nebraska, Sample Location Map

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# Data Assessment Summary

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### Water Sampling Field Activities Verification Checklist

<b>Project</b>	<u>Hallam, Nebraska</u>	<b>Date(s) of Water Sampling</b>	<u>June 4–7, 2012</u>
<b>Date(s) of Verification</b>	<u>August 9, 2012</u>	<b>Name of Verifier</b>	<u>Steve Donovan</u>

	<b>Response (Yes, No, NA)</b>	<b>Comments</b>
1. Is the SAP the primary document directing field procedures? List other documents, SOPs, instructions.	<u>Yes</u>	<u>Work Order letter dated May 8, 2012.</u>
2. Were the sampling locations specified in the planning documents sampled?	<u>Yes</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 May 31, 2012.</u>
4. Was an operational check of the field equipment conducted daily? Did the operational checks meet criteria?	<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: Was one pump/tubing volume purged prior to sampling?	<u>Yes</u>	
Did the water level stabilize prior to sampling?	<u>Yes</u>	
Did pH, specific conductance, and turbidity measurements stabilize prior to sampling?	<u>Yes</u>	
Was the flow rate less than 500 mL/min?	<u>Yes</u>	
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	<u>NA</u>	

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

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well: Was the flow rate less than 500 mL/min?	Yes	
Was one pump/tubing volume removed prior to sampling?	Yes	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected from well 1A.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	An equipment blank was not required.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number?	Yes	
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?	NA	Sample cooling was not required.
20. Were water levels measured at the locations specified in the planning documents?	Yes	

## Laboratory Performance Assessment

### General Information

#### Requisition Index

Number (RIN): 12054583  
Sample Event: June 4–5, 2012  
Site(s): Hallam, Nebraska  
Laboratory: ALS Laboratory Group, Fort Collins, Colorado  
Work Order No.: 1206165  
Analysis: Radiochemistry  
Validator: Steve Donovan  
Review Date: August 8, 2012

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

Table 1. Analytes and Methods

Analyte	Line Item Code	Preparation Method	Analytical Method
Gamma Spectrometry	GAM-A-001	SOP713R11	SOP713R11
Gross Alpha/Beta	GPC-A-001	SOP702R19	SOP724R10
Tritium	LSC-A-001	SOP700R10	SOP704R9
Nickel-63	LSC-A-009	SOP774R1	SOP704R9

### Data Qualifier Summary

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

Table 2. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1206165-1	1A	Actinium-228	J	Result less than the determination limit
1206165-1	1A	Gross Alpha	J	Result less than the determination limit
1206165-1	1A	Gross Beta	J	Result less than the determination limit
1206165-1	1A	Uranium-235	J	Result less than the determination limit
1206165-3	1A Duplicate	Gross Alpha	J	Result less than the determination limit
1206165-3	1A Duplicate	Gross Beta	J	Result less than the determination limit
1206165-3	1A Duplicate	Promethium-144	U	Identification criteria not met
1206165-7	2C2	Gross Alpha	J	Result less than the determination limit
1206165-7	2C2	Gross Beta	J	Result less than the determination limit

Table 2 (continued). Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1206165-8	3A	Gross Alpha	J	Result less than the determination limit
1206165-8	3A	Gross Beta	J	Result less than the determination limit
1206165-9	3B	Actinium-228	J	Result less than the determination limit
1206165-9	3B	Gross Alpha	J	Result less than the determination limit
1206165-9	3B	Gross Beta	J	Result less than the determination limit
1206165-10	4A	Gross Alpha	J	Result less than the determination limit
1206165-10	4A	Gross Beta	J	Result less than the determination limit
1206165-12	4C	Yttrium-88	U	Identification criteria not met
1206165-13	5A	Gross Alpha	J	Result less than the determination limit
1206165-13	5A	Gross Beta	J	Result less than the determination limit
1206165-15	7B	Yttrium-88	U	Identification criteria not met
1206165-17	8B	Actinium-228	U	Identification criteria not met

### Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 18 samples on June 12, 2012, accompanied by Chain of Custody (COC) form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents including the COC form and the sample tickets had no errors or omissions.

### Holding Times and Preservation

The sample shipments were received intact at ambient temperature. All samples were received in the correct container types and had been preserved correctly for the requested analyses and all samples were analyzed within the applicable holding times.

### Detection and Quantitation Limits

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

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

defined as 3 times the MDC. Results not previously “U” qualified that are less than the DL are qualified with a “J” flag as estimated values.

The reported MDCs for radiochemical analytes demonstrate compliance with contractual requirements.

### 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.

### Radiochemical Analysis

Radiochemical results are qualified with a “J” flag (estimated) when the result is greater than the MDC, but less than DL (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 DCL estimated as the two sigma total propagated uncertainty.

### Gamma Spectrometry

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

### Method 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. All blank results were below the minimum detectable concentration.

### Matrix Spike Analysis

Matrix spike and matrix spike duplicate samples (MS/MSD) were analyzed for gross alpha, gross beta, and tritium as a measure of method performance in the sample matrix. All spike results were within the acceptance range.

### Laboratory Duplicate Analysis

The laboratory replicate sample results demonstrate acceptable laboratory precision with relative error ratios less than 3 for all duplicate sample results.

### 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. The laboratory control sample results were acceptable for all analytes.

### Completeness

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

### Electronic Data Deliverable (EDD) File

The EDD file arrived on July 12, 2012. The Sample Management System EDD validation module was used to verify that the EDD files were complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.



# SAMPLE MANAGEMENT SYSTEM

## General Data Validation Report

RIN: 12054583 Lab Code: PAR Validator: Steve Donovan Validation Date: 8/8/2012  
Project: Hallam Analysis Type:  Metals  General Chem  Rad  Organics  
# of Samples: 18 Matrix: WATER Requested Analysis Completed: Yes

### Chain of Custody

Present: OK Signed: OK Dated: OK

### Sample

Integrity: OK Preservation: OK Temperature: OK

### Select Quality Parameters

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

All analyses were completed within the applicable holding times.

There are 0 detection limit failures.

There was 1 duplicate evaluated.

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

RIN: 12054583                      Lab Code: PAR                      Date Due: 7/10/2012  
 Matrix: Water                      Site Code: HAL                      Date Completed: 7/6/2012

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
1A	Actinium-228	06/16/2012						1.45
1A	Americium-241	06/16/2012						0.43
Blank_Spike	Americium-241	06/17/2012				95.90		
1A	Antimony-125	06/16/2012						0.31
1A	Cerium-144	06/16/2012						0.28
1A	Cesium-134	06/16/2012						1.02
1A	Cesium-137	06/16/2012						0.72
Blank_Spike	Cesium-137	06/17/2012				99.70		
1A	Cobalt-60	06/16/2012						0.26
Blank_Spike	Cobalt-60	06/17/2012				94.60		
1A	Europium-152	06/16/2012						1.27
1A	Europium-154	06/16/2012						0.72
1A	Europium-155	06/16/2012						0.96
7B	GROSS ALPHA	06/25/2012						1.85
Blank_Spike	GROSS ALPHA	06/25/2012				93.80		
Blank_Spike	GROSS ALPHA	06/25/2012				95.30		
1A	GROSS ALPHA	06/25/2012					79.0	
8C	GROSS ALPHA	06/25/2012					93.9	
Blank	GROSS ALPHA	06/25/2012	0.1430	U				
Blank	GROSS ALPHA	06/26/2012	0.0820	U				
1A	GROSS ALPHA	06/28/2012						1.24
7B	GROSS BETA	06/25/2012						0.72
Blank_Spike	GROSS BETA	06/25/2012				95.70		
Blank_Spike	GROSS BETA	06/25/2012				98.20		
1A	GROSS BETA	06/25/2012					100.0	
8C	GROSS BETA	06/25/2012					96.2	
Blank	GROSS BETA	06/25/2012	1.3200	U				
Blank	GROSS BETA	06/26/2012	1.1500	U				
1A	GROSS BETA	06/28/2012						0.06
1A	H-3	06/21/2012						0.76
Blank_Spike	H-3	06/22/2012				96.60		
Blank_Spike_Du	H-3	06/22/2012				98.80		

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

RIN: 12054583                      Lab Code: PAR                      Date Due: 7/10/2012  
 Matrix: Water                      Site Code: HAL                      Date Completed: 7/6/2012

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
Blank	H-3	06/22/2012	-58.0000	U				
1A	Lead-212	06/16/2012						0.92
1A	Nickel-63	06/27/2012			88.5			
1B	Nickel-63	06/27/2012			91.7			
2628	Nickel-63	06/27/2012			92.9			
2A	Nickel-63	06/27/2012			95.7			
2B	Nickel-63	06/27/2012			92.4			
2B2	Nickel-63	06/27/2012			90.8			
2C2	Nickel-63	06/27/2012			90.8			
3A	Nickel-63	06/27/2012			94.7			
3B	Nickel-63	06/27/2012			94.1			
4A	Nickel-63	06/27/2012			93.4			
4B	Nickel-63	06/27/2012			92.7			
4C	Nickel-63	06/27/2012			94.7			
5A	Nickel-63	06/27/2012			90.9			
5B	Nickel-63	06/27/2012			93.6			
7B	Nickel-63	06/27/2012			94.9			
7C	Nickel-63	06/27/2012			94.8			
8B	Nickel-63	06/27/2012			80.0			
8C	Nickel-63	06/27/2012			81.9			
1A	Nickel-63	06/27/2012			93.1			0.86
4B	Nickel-63	06/27/2012			90.6			0.34
Blank_Spike	Nickel-63	06/27/2012			93.4	97.20		
Blank	Nickel-63	06/27/2012	-1.8000	U	91.0			
1A	Potassium-40	06/16/2012						0.25
1A	Promethium-144	06/16/2012						0.92
1A	Promethium-146	06/16/2012						0.86
1A	Ruthenium-106	06/16/2012						0.52
1A	Thorium-234	06/16/2012						0.16
1A	Uranium-235	06/16/2012						1.88
1A	Yttrium-88	06/16/2012						2.14

## **Sampling Quality Control Assessment**

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

### Sampling Protocol

All monitoring wells were purged and sampled using Category I or II low-flow sampling method with the following exceptions. Wells 2B2, 2C2, 7B, and 7C ran out of water during initial sampling due to the limitations associated with using a peristaltic pump. These wells were allowed to recharge and subsequently sampled until sufficient volume was collected for all analytes. The sample results from all Category I and II wells are qualified with a “F” flag indicating that the wells were sampled using the low-flow technique. With the exception of well 1A, the data were further qualified with a “Q” flag as estimated values because these are Category II wells.

### Equipment Blank Assessment

An equipment blank was not collected because dedicated tubing was used to sample all wells.

### Field Duplicate Assessment

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. A duplicate sample was collected from location 1A. For non-radiochemical measurements, the relative percent difference for 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. For radiochemical measurements, the relative error ratio calculated from the 1-sigma uncertainties should be less than three. All duplicate results met these criteria demonstrating acceptable precision.

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

RIN: 12054583    Lab Code: PAR    Project: Hallam    Validation Date: 8/8/2012

Duplicate: 2628

Sample: 1A

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Actinium-228	16.9		9.42	1	15	U	11.4	1		0.3	pCi/L
Americium-241	-0.509	U	14.5	1	6.3	U	27.8	1		0.4	pCi/L
Antimony-125	4.76	U	5.22	1	-3.48	U	8.51	1		1.6	pCi/L
Cerium-144	-3.95	U	10.4	1	18.6	U	17.2	1		2.2	pCi/L
Cesium-134	-1.82	U	2.44	1	2.7	U	5.13	1		1.6	pCi/L
Cesium-137	-2.25	U	2.18	1	1.19	U	3.38	1		1.7	pCi/L
Cobalt-60	-0.824	U	2.57	1	2.84	U	3.95	1		1.5	pCi/L
Europium-152	3.92	U	11.5	1	1.1	U	18.5	1		0.3	pCi/L
Europium-154	-3.64	U	12.9	1	5.04	U	18.8	1		0.7	pCi/L
Europium-155	1.66	U	5.98	1	-2.01	U	8.67	1		0.7	pCi/L
GROSS ALPHA	3.7		1.27	1	3.34		1.51	1		0.4	pCi/L
GROSS BETA	3.35		1.64	1	3.91		1.81	1		0.4	pCi/L
H-3	22.3	U	202	1	-74.2	U	199	1		0.7	pCi/L
Lead-212	-3.76	U	7.49	1	1.66	U	8.3	1		1.0	pCi/L
Nickel-63	-1.63	U	3.58	1	1.46	U	3.47	1		1.2	pCi/L
Potassium-40	40.5	U	66.8	1	-23.2	U	80.3	1		1.2	pCi/L
Promethium-144	-0.954	U	2.73	1	6.84		3.97	1		3.2	pCi/L
Promethium-146	-0.643	U	2.53	1	-2.67	U	4.13	1		0.8	pCi/L
Ruthenium-106	1.3	U	20.7	1	-7.84	U	32.3	1		0.5	pCi/L
Thorium-234	12.7	U	74.2	1	27.7	U	92.5	1		0.2	pCi/L
Uranium-235	16.6		10.1	1	15.3	U	26.5	1		0.1	pCi/L
Yttrium-88	-3.01	U	5.85	1	-0.316	U	4.04	1		0.7	pCi/L

## Certification

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

Laboratory Coordinator:



Digitally signed by Stephen E. Donivan  
DN: c=us, o=u.s. government,  
ou=department of energy, ou=headquarters,  
ou=people, cn=Stephen E. Donivan  
Date: 2012.09.04 14:56:52 -06'00'

\_\_\_\_\_  
Steve Donivan

\_\_\_\_\_  
Date

Data Validation Lead:



Digitally signed by Stephen E. Donivan  
DN: c=us, o=u.s. government, ou=department  
of energy, ou=headquarters, ou=people,  
cn=Stephen E. Donivan  
Date: 2012.09.04 14:57:14 -06'00'

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Steve Donivan

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Date

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

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# Potential Outliers Report

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## Potential Outliers Report

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

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

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

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

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

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

**Comparison: All Historical Data**

Laboratory: ALS Laboratory Group

RIN: 12054583

Report Date: 8/8/2012

Site Code	Location Code	Sample ID	Sample Date	Analyte	Result	Current Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
						Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
HAL01	1A	N001	06/05/2012	Actinium-228	16.9		FJ	119	U		18.8	U	F	12	12	No
HAL01	1A	N001	06/05/2012	Gross Beta	3.35		FJ	12.4	U		3.47		FJ	22	16	No
HAL01	3A	N001	06/05/2012	Gross Beta	15.4		FQJ	12.22	U	L	4.24	U	FQ	13	10	No
HAL01	3B	N001	06/05/2012	Actinium-228	17.9		FQJ	87.2	U		20.3	U	FQ	7	7	No
HAL01	8C	N001	06/05/2012	Gross Alpha	6.2		FQ	16.4		FQ	7.43		FQ	14	2	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.

# **Attachment 2 Data Presentation**

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## **Groundwater Quality Data**

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**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 1A WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/05/2012	N001	16	- 23.5	16.9		FJ	#	14	9.42
Actinium-228	pCi/L	06/05/2012	N002	16	- 23.5	22	U	F	#	22	11.4
Americium-241	pCi/L	06/05/2012	N001	16	- 23.5	24	U	F	#	24	14.5
Americium-241	pCi/L	06/05/2012	N002	16	- 23.5	46	U	F	#	46	27.8
Antimony-125	pCi/L	06/05/2012	N001	16	- 23.5	9.5	U	F	#	9.5	5.22
Antimony-125	pCi/L	06/05/2012	N002	16	- 23.5	15	U	F	#	15	8.51
Cerium-144	pCi/L	06/05/2012	N001	16	- 23.5	18	U	F	#	18	10.4
Cerium-144	pCi/L	06/05/2012	N002	16	- 23.5	28	U	F	#	28	17.2
Cesium-134	pCi/L	06/05/2012	N001	16	- 23.5	4.2	U	F	#	4.2	2.44
Cesium-134	pCi/L	06/05/2012	N002	16	- 23.5	8.4	U	F	#	8.4	5.13
Cesium-137	pCi/L	06/05/2012	N001	16	- 23.5	3.9	U	F	#	3.9	2.18
Cesium-137	pCi/L	06/05/2012	N002	16	- 23.5	5.7	U	F	#	5.7	3.38
Cobalt-60	pCi/L	06/05/2012	N001	16	- 23.5	4.5	U	F	#	4.5	2.57
Cobalt-60	pCi/L	06/05/2012	N002	16	- 23.5	6.5	U	F	#	6.5	3.95
Dissolved Oxygen	mg/L	06/05/2012	N001	16	- 23.5	2.9		F	#		
Europium-152	pCi/L	06/05/2012	N001	16	- 23.5	19	U	F	#	19	11.5
Europium-152	pCi/L	06/05/2012	N002	16	- 23.5	32	U	F	#	32	18.5

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 1A WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Europium-154	pCi/L	06/05/2012	N001	16	- 23.5	22	U	F	#	22	12.9
Europium-154	pCi/L	06/05/2012	N002	16	- 23.5	32	U	F	#	32	18.8
Europium-155	pCi/L	06/05/2012	N001	16	- 23.5	10	U	F	#	10	5.98
Europium-155	pCi/L	06/05/2012	N002	16	- 23.5	15	U	F	#	15	8.67
Gross Alpha	pCi/L	06/05/2012	N001	16	- 23.5	3.7		FJ	#	1.5	1.27
Gross Alpha	pCi/L	06/05/2012	N002	16	- 23.5	3.34		FJ	#	2.1	1.51
Gross Beta	pCi/L	06/05/2012	N001	16	- 23.5	3.35		FJ	#	2.5	1.64
Gross Beta	pCi/L	06/05/2012	N002	16	- 23.5	3.91		FJ	#	2.7	1.81
Lead-212	pCi/L	06/05/2012	N001	16	- 23.5	12	U	F	#	12	7.49
Lead-212	pCi/L	06/05/2012	N002	16	- 23.5	14	U	F	#	14	8.3
Nickel-63	pCi/L	06/05/2012	N001	16	- 23.5	12	U	F	#	12	3.58
Nickel-63	pCi/L	06/05/2012	N002	16	- 23.5	12	U	F	#	12	3.47
Oxidation Reduction Potential	mV	06/05/2012	N001	16	- 23.5	118.1		F	#		
pH	s.u.	06/05/2012	N001	16	- 23.5	6.64		F	#		
Potassium-40	pCi/L	06/05/2012	N001	16	- 23.5	110	U	F	#	110	66.8
Potassium-40	pCi/L	06/05/2012	N002	16	- 23.5	140	U	F	#	140	80.3
Promethium-144	pCi/L	06/05/2012	N001	16	- 23.5	4.7	U	F	#	4.7	2.73

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 1A WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Promethium-144	pCi/L	06/05/2012	N002	16	- 23.5	6.84		UF	#	6.2	3.97
Promethium-146	pCi/L	06/05/2012	N001	16	- 23.5	4.3	U	F	#	4.3	2.53
Promethium-146	pCi/L	06/05/2012	N002	16	- 23.5	7.2	U	F	#	7.2	4.13
Ruthenium-106	pCi/L	06/05/2012	N001	16	- 23.5	35	U	F	#	35	20.7
Ruthenium-106	pCi/L	06/05/2012	N002	16	- 23.5	56	U	F	#	56	32.3
Specific Conductance	umhos/cm	06/05/2012	N001	16	- 23.5	1727		F	#		
Temperature	C	06/05/2012	N001	16	- 23.5	18.57		F	#		
Thorium-234	pCi/L	06/05/2012	N001	16	- 23.5	120	U	F	#	120	74.2
Thorium-234	pCi/L	06/05/2012	N002	16	- 23.5	150	U	F	#	150	92.5
Tritium	pCi/L	06/05/2012	N001	16	- 23.5	340	U	F	#	340	202
Tritium	pCi/L	06/05/2012	N002	16	- 23.5	340	U	F	#	340	199
Turbidity	NTU	06/05/2012	N001	16	- 23.5	2.11		F	#		
Uranium-235	pCi/L	06/05/2012	N001	16	- 23.5	16.6		FJ	#	16	10.1
Uranium-235	pCi/L	06/05/2012	N002	16	- 23.5	44	U	F	#	44	26.5
Yttrium-88	pCi/L	06/05/2012	N001	16	- 23.5	9.9	U	F	#	9.9	5.85
Yttrium-88	pCi/L	06/05/2012	N002	16	- 23.5	7	U	F	#	7	4.04

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 1B WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/05/2012	0001	39	- 49	26	U	FQ	#	26	16
Americium-241	pCi/L	06/05/2012	0001	39	- 49	32	U	FQ	#	32	18.2
Antimony-125	pCi/L	06/05/2012	0001	39	- 49	15	U	FQ	#	15	8.92
Cerium-144	pCi/L	06/05/2012	0001	39	- 49	27	U	FQ	#	27	16.4
Cesium-134	pCi/L	06/05/2012	0001	39	- 49	7.5	U	FQ	#	7.5	4.3
Cesium-137	pCi/L	06/05/2012	0001	39	- 49	7.3	U	FQ	#	7.3	4.05
Cobalt-60	pCi/L	06/05/2012	0001	39	- 49	7.3	U	FQ	#	7.3	4.37
Dissolved Oxygen	mg/L	06/05/2012	N001	39	- 49	5.14		FQ	#		
Europium-152	pCi/L	06/05/2012	0001	39	- 49	38	U	FQ	#	38	22.5
Europium-154	pCi/L	06/05/2012	0001	39	- 49	38	U	FQ	#	38	22
Europium-155	pCi/L	06/05/2012	0001	39	- 49	16	U	FQ	#	16	9.54
Gross Alpha	pCi/L	06/05/2012	0001	39	- 49	7.57		FQ	#	1.3	1.69
Gross Beta	pCi/L	06/05/2012	0001	39	- 49	8.54		FQ	#	1.9	1.89
Lead-212	pCi/L	06/05/2012	0001	39	- 49	15	U	FQ	#	15	8.99
Nickel-63	pCi/L	06/05/2012	0001	39	- 49	12	U	FQ	#	12	3.54
Oxidation Reduction Potential	mV	06/05/2012	N001	39	- 49	141.4		FQ	#		
pH	s.u.	06/05/2012	N001	39	- 49	6.59		FQ	#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 1B WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/05/2012	0001	39	- 49	160	U	FQ	#	160	93.8
Promethium-144	pCi/L	06/05/2012	0001	39	- 49	7	U	FQ	#	7	4.13
Promethium-146	pCi/L	06/05/2012	0001	39	- 49	7.8	U	FQ	#	7.8	4.42
Ruthenium-106	pCi/L	06/05/2012	0001	39	- 49	63	U	FQ	#	63	35.9
Specific Conductance	umhos /cm	06/05/2012	N001	39	- 49	1129		FQ	#		
Temperature	C	06/05/2012	N001	39	- 49	18.13		FQ	#		
Thorium-234	pCi/L	06/05/2012	0001	39	- 49	150	U	FQ	#	150	88.1
Tritium	pCi/L	06/05/2012	N001	39	- 49	340	U	FQ	#	340	196
Turbidity	NTU	06/05/2012	N001	39	- 49	18.3		FQ	#		
Uranium-235	pCi/L	06/05/2012	0001	39	- 49	26	U	FQ	#	26	16.5
Yttrium-88	pCi/L	06/05/2012	0001	39	- 49	7.8	U	FQ	#	7.8	4.72

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 2A WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/04/2012	N001	20	- 25	19	U	FQ	#	19	12.1
Americium-241	pCi/L	06/04/2012	N001	20	- 25	9.8	U	FQ	#	9.8	5.87
Antimony-125	pCi/L	06/04/2012	N001	20	- 25	11	U	FQ	#	11	5.98
Cerium-144	pCi/L	06/04/2012	N001	20	- 25	20	U	FQ	#	20	12
Cesium-134	pCi/L	06/04/2012	N001	20	- 25	4.6	U	FQ	#	4.6	2.68
Cesium-137	pCi/L	06/04/2012	N001	20	- 25	4.7	U	FQ	#	4.7	2.7
Cobalt-60	pCi/L	06/04/2012	N001	20	- 25	5.7	U	FQ	#	5.7	3.2
Dissolved Oxygen	mg/L	06/04/2012	N001	20	- 25	2.97		FQ	#		
Europium-152	pCi/L	06/04/2012	N001	20	- 25	27	U	FQ	#	27	15.3
Europium-154	pCi/L	06/04/2012	N001	20	- 25	28	U	FQ	#	28	15.7
Europium-155	pCi/L	06/04/2012	N001	20	- 25	8.2	U	FQ	#	8.2	4.99
Gross Alpha	pCi/L	06/04/2012	N001	20	- 25	8.96		FQ	#	1.8	2.09
Gross Beta	pCi/L	06/04/2012	N001	20	- 25	8.3		FQ	#	2.4	2.05
Lead-212	pCi/L	06/04/2012	N001	20	- 25	12	U	FQ	#	12	7.35
Nickel-63	pCi/L	06/04/2012	N001	20	- 25	11	U	FQ	#	11	3.39
Oxidation Reduction Potential	mV	06/04/2012	N001	20	- 25	91.6		FQ	#		
pH	s.u.	06/04/2012	N001	20	- 25	7.94		FQ	#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 2A WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/04/2012	N001	20	- 25	120	U	FQ	#	120	75.2
Promethium-144	pCi/L	06/04/2012	N001	20	- 25	5.2	U	FQ	#	5.2	3.01
Promethium-146	pCi/L	06/04/2012	N001	20	- 25	5.5	U	FQ	#	5.5	3.17
Ruthenium-106	pCi/L	06/04/2012	N001	20	- 25	43	U	FQ	#	43	26.2
Specific Conductance	umhos/cm	06/04/2012	N001	20	- 25	1259		FQ	#		
Temperature	C	06/04/2012	N001	20	- 25	18.46		FQ	#		
Thorium-234	pCi/L	06/04/2012	N001	20	- 25	87	U	FQ	#	87	52.4
Tritium	pCi/L	06/04/2012	N001	20	- 25	340	U	FQ	#	340	204
Turbidity	NTU	06/04/2012	N001	20	- 25	3.17		FQ	#		
Uranium-235	pCi/L	06/04/2012	N001	20	- 25	35	U	FQ	#	35	16.8
Yttrium-88	pCi/L	06/04/2012	N001	20	- 25	15	U	FQ	#	15	8.96

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 2B WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/04/2012	N001	43	- 53	17	U	FQ	#	17	10.8
Americium-241	pCi/L	06/04/2012	N001	43	- 53	5.2	U	FQ	#	5.2	3.06
Antimony-125	pCi/L	06/04/2012	N001	43	- 53	10	U	FQ	#	10	6.51
Cerium-144	pCi/L	06/04/2012	N001	43	- 53	12	U	FQ	#	12	7.35
Cesium-134	pCi/L	06/04/2012	N001	43	- 53	4.9	U	FQ	#	4.9	2.77
Cesium-137	pCi/L	06/04/2012	N001	43	- 53	5	U	FQ	#	5	2.83
Cobalt-60	pCi/L	06/04/2012	N001	43	- 53	5.9	U	FQ	#	5.9	3.26
Dissolved Oxygen	mg/L	06/04/2012	N001	43	- 53	2.91		FQ	#		
Europium-152	pCi/L	06/04/2012	N001	43	- 53	26	U	FQ	#	26	15.3
Europium-154	pCi/L	06/04/2012	N001	43	- 53	27	U	FQ	#	27	15.8
Europium-155	pCi/L	06/04/2012	N001	43	- 53	8.6	U	FQ	#	8.6	5.07
Gross Alpha	pCi/L	06/04/2012	N001	43	- 53	17.1		FQ	#	2.2	3.45
Gross Beta	pCi/L	06/04/2012	N001	43	- 53	15.4		FQ	#	3.2	3.26
Lead-212	pCi/L	06/04/2012	N001	43	- 53	11	U	FQ	#	11	6.69
Nickel-63	pCi/L	06/04/2012	N001	43	- 53	12	U	FQ	#	12	3.46
Oxidation Reduction Potential	mV	06/04/2012	N001	43	- 53	-95.5		FQ	#		
pH	s.u.	06/04/2012	N001	43	- 53	7.87		FQ	#		



**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 2B WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/04/2012	N001	43	- 53	120	U	FQ	#	120	68.1
Promethium-144	pCi/L	06/04/2012	N001	43	- 53	6.7	U	FQ	#	6.7	3.96
Promethium-146	pCi/L	06/04/2012	N001	43	- 53	5.4	U	FQ	#	5.4	3.09
Ruthenium-106	pCi/L	06/04/2012	N001	43	- 53	44	U	FQ	#	44	24.8
Specific Conductance	umhos /cm	06/04/2012	N001	43	- 53	1392		FQ	#		
Temperature	C	06/04/2012	N001	43	- 53	17.17		FQ	#		
Thorium-234	pCi/L	06/04/2012	N001	43	- 53	77	U	FQ	#	77	46.6
Tritium	pCi/L	06/04/2012	N001	43	- 53	340	U	FQ	#	340	202
Turbidity	NTU	06/04/2012	N001	43	- 53	3.09		FQ	#		
Uranium-235	pCi/L	06/04/2012	N001	43	- 53	17	U	FQ	#	17	10.5
Yttrium-88	pCi/L	06/04/2012	N001	43	- 53	5.2	U	FQ	#	5.2	3.04

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 2B2 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/04/2012	N001	-	15	U		#	15	9.08
Americium-241	pCi/L	06/04/2012	N001	-	98	U		#	98	58.1
Antimony-125	pCi/L	06/04/2012	N001	-	9.5	U		#	9.5	5.76
Cerium-144	pCi/L	06/04/2012	N001	-	22	U		#	22	13
Cesium-134	pCi/L	06/04/2012	N001	-	4.1	U		#	4.1	2.36
Cesium-137	pCi/L	06/04/2012	N001	-	3.8	U		#	3.8	2.23
Cobalt-60	pCi/L	06/04/2012	N001	-	7.5	U		#	7.5	4.42
Dissolved Oxygen	mg/L	06/04/2012	N001	-	5.23			#		
Europium-152	pCi/L	06/04/2012	N001	-	19	U		#	19	11.5
Europium-154	pCi/L	06/04/2012	N001	-	22	U		#	22	12.7
Europium-155	pCi/L	06/04/2012	N001	-	15	U		#	15	8.73
Gross Alpha	pCi/L	06/04/2012	N001	-	8.1			#	1.6	1.9
Gross Beta	pCi/L	06/04/2012	N001	-	10.5			#	2.4	2.32
Lead-212	pCi/L	06/04/2012	N001	-	14	U		#	14	8.28
Nickel-63	pCi/L	06/04/2012	N001	-	12	U		#	12	3.53
Oxidation Reduction Potential	mV	06/04/2012	N001	-	-6.9			#		
pH	s.u.	06/04/2012	N001	-	7.56			#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 2B2 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/04/2012	N001	-	110	U		#	110	64.7
Promethium-144	pCi/L	06/04/2012	N001	-	4	U		#	4	2.32
Promethium-146	pCi/L	06/04/2012	N001	-	4.3	U		#	4.3	2.53
Ruthenium-106	pCi/L	06/04/2012	N001	-	34	U		#	34	20.5
Specific Conductance	umhos/cm	06/04/2012	N001	-	1191			#		
Temperature	C	06/04/2012	N001	-	18.25			#		
Thorium-234	pCi/L	06/04/2012	N001	-	200	U		#	200	120
Tritium	pCi/L	06/04/2012	N001	-	350	U		#	350	205
Turbidity	NTU	06/04/2012	N001	-	8.98			#		
Uranium-235	pCi/L	06/04/2012	N001	-	38	U		#	38	23.2
Yttrium-88	pCi/L	06/04/2012	N001	-	4	U		#	4	2.47

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 2C2 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/04/2012	N001	-	35	U		#	35	20.8
Americium-241	pCi/L	06/04/2012	N001	-	23	U		#	23	13.8
Antimony-125	pCi/L	06/04/2012	N001	-	12	U		#	12	6.96
Cerium-144	pCi/L	06/04/2012	N001	-	20	U		#	20	12.2
Cesium-134	pCi/L	06/04/2012	N001	-	5.2	U		#	5.2	3.14
Cesium-137	pCi/L	06/04/2012	N001	-	5.2	U		#	5.2	3.05
Cobalt-60	pCi/L	06/04/2012	N001	-	6.8	U		#	6.8	3.74
Dissolved Oxygen	mg/L	06/04/2012	N001	-	5.74			#		
Europium-152	pCi/L	06/04/2012	N001	-	29	U		#	29	16.8
Europium-154	pCi/L	06/04/2012	N001	-	30	U		#	30	17.5
Europium-155	pCi/L	06/04/2012	N001	-	12	U		#	12	7.2
Gross Alpha	pCi/L	06/04/2012	N001	-	5.36		J	#	2	1.67
Gross Beta	pCi/L	06/04/2012	N001	-	7.39		J	#	2.6	2.06
Lead-212	pCi/L	06/04/2012	N001	-	14	U		#	14	8.3
Nickel-63	pCi/L	06/04/2012	N001	-	12	U		#	12	3.48
Oxidation Reduction Potential	mV	06/04/2012	N001	-	138.8			#		
pH	s.u.	06/04/2012	N001	-	7.89			#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 2C2 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/04/2012	N001	-	140	U		#	140	86.7
Promethium-144	pCi/L	06/04/2012	N001	-	5.6	U		#	5.6	3.28
Promethium-146	pCi/L	06/04/2012	N001	-	6	U		#	6	3.62
Ruthenium-106	pCi/L	06/04/2012	N001	-	49	U		#	49	27.9
Specific Conductance	umhos /cm	06/04/2012	N001	-	1151			#		
Temperature	C	06/04/2012	N001	-	17.98			#		
Thorium-234	pCi/L	06/04/2012	N001	-	140	U		#	140	85
Tritium	pCi/L	06/04/2012	N001	-	340	U		#	340	204
Turbidity	NTU	06/04/2012	N001	-	1.7			#		
Uranium-235	pCi/L	06/04/2012	N001	-	20	U		#	20	12.5
Yttrium-88	pCi/L	06/04/2012	N001	-	6	U		#	6	3.56

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 3A WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/05/2012	N001	19	- 24	15	U	FQ	#	15	9.29
Americium-241	pCi/L	06/05/2012	N001	19	- 24	25	U	FQ	#	25	14.6
Antimony-125	pCi/L	06/05/2012	N001	19	- 24	9.6	U	FQ	#	9.6	5.41
Cerium-144	pCi/L	06/05/2012	N001	19	- 24	17	U	FQ	#	17	10.1
Cesium-134	pCi/L	06/05/2012	N001	19	- 24	4.1	U	FQ	#	4.1	2.34
Cesium-137	pCi/L	06/05/2012	N001	19	- 24	3.9	U	FQ	#	3.9	2.27
Cobalt-60	pCi/L	06/05/2012	N001	19	- 24	4.4	U	FQ	#	4.4	2.51
Dissolved Oxygen	mg/L	06/05/2012	N001	19	- 24	5.14		FQ	#		
Europium-152	pCi/L	06/05/2012	N001	19	- 24	22	U	FQ	#	22	12.1
Europium-154	pCi/L	06/05/2012	N001	19	- 24	22	U	FQ	#	22	12.6
Europium-155	pCi/L	06/05/2012	N001	19	- 24	9.9	U	FQ	#	9.9	5.92
Gross Alpha	pCi/L	06/05/2012	N001	19	- 24	10.6		FQJ	#	3.7	3.22
Gross Beta	pCi/L	06/05/2012	N001	19	- 24	15.4		FQJ	#	5.5	4.32
Lead-212	pCi/L	06/05/2012	N001	19	- 24	12	U	FQ	#	12	6.72
Nickel-63	pCi/L	06/05/2012	N001	19	- 24	12	U	FQ	#	12	3.41
Oxidation Reduction Potential	mV	06/05/2012	N001	19	- 24	108.6		FQ	#		
pH	s.u.	06/05/2012	N001	19	- 24	6.84		FQ	#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 3A WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/05/2012	N001	19	-	24	120	U	FQ	#	120	68.3
Promethium-144	pCi/L	06/05/2012	N001	19	-	24	4.1	U	FQ	#	4.1	2.58
Promethium-146	pCi/L	06/05/2012	N001	19	-	24	4	U	FQ	#	4	2.44
Ruthenium-106	pCi/L	06/05/2012	N001	19	-	24	35	U	FQ	#	35	20.3
Specific Conductance	umhos/cm	06/05/2012	N001	19	-	24	3315		FQ	#		
Temperature	C	06/05/2012	N001	19	-	24	18.03		FQ	#		
Thorium-234	pCi/L	06/05/2012	N001	19	-	24	140	U	FQ	#	140	82.1
Tritium	pCi/L	06/05/2012	N001	19	-	24	350	U	FQ	#	350	206
Turbidity	NTU	06/05/2012	N001	19	-	24	0.67		FQ	#		
Uranium-235	pCi/L	06/05/2012	N001	19	-	24	16	U	FQ	#	16	10.1
Yttrium-88	pCi/L	06/05/2012	N001	19	-	24	4.3	U	FQ	#	4.3	2.61

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 3B WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/05/2012	N001	43	- 53	17.9		FQJ	#	12	6.9
Americium-241	pCi/L	06/05/2012	N001	43	- 53	4.1	U	FQ	#	4.1	2.37
Antimony-125	pCi/L	06/05/2012	N001	43	- 53	8.7	U	FQ	#	8.7	4.75
Cerium-144	pCi/L	06/05/2012	N001	43	- 53	14	U	FQ	#	14	7.93
Cesium-134	pCi/L	06/05/2012	N001	43	- 53	3.5	U	FQ	#	3.5	2.09
Cesium-137	pCi/L	06/05/2012	N001	43	- 53	3.6	U	FQ	#	3.6	2.12
Cobalt-60	pCi/L	06/05/2012	N001	43	- 53	4.4	U	FQ	#	4.4	2.49
Dissolved Oxygen	mg/L	06/05/2012	N001	43	- 53	3.14		FQ	#		
Europium-152	pCi/L	06/05/2012	N001	43	- 53	21	U	FQ	#	21	11.9
Europium-154	pCi/L	06/05/2012	N001	43	- 53	22	U	FQ	#	22	13
Europium-155	pCi/L	06/05/2012	N001	43	- 53	6.6	U	FQ	#	6.6	3.97
Gross Alpha	pCi/L	06/05/2012	N001	43	- 53	6.47		FQJ	#	2.9	2.33
Gross Beta	pCi/L	06/05/2012	N001	43	- 53	8.93		FQJ	#	4	2.92
Lead-212	pCi/L	06/05/2012	N001	43	- 53	10	U	FQ	#	10	6.01
Nickel-63	pCi/L	06/05/2012	N001	43	- 53	12	U	FQ	#	12	3.35
Oxidation Reduction Potential	mV	06/05/2012	N001	43	- 53	109.4		FQ	#		
pH	s.u.	06/05/2012	N001	43	- 53	6.98		FQ	#		



**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 3B WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/05/2012	N001	43	- 53	110	U	FQ	#	110	63.9
Promethium-144	pCi/L	06/05/2012	N001	43	- 53	2.9	U	FQ	#	2.9	1.58
Promethium-146	pCi/L	06/05/2012	N001	43	- 53	4	U	FQ	#	4	2.42
Ruthenium-106	pCi/L	06/05/2012	N001	43	- 53	33	U	FQ	#	33	18.8
Specific Conductance	umhos /cm	06/05/2012	N001	43	- 53	2310		FQ	#		
Temperature	C	06/05/2012	N001	43	- 53	16.83		FQ	#		
Thorium-234	pCi/L	06/05/2012	N001	43	- 53	72	U	FQ	#	72	43.1
Tritium	pCi/L	06/05/2012	N001	43	- 53	340	U	FQ	#	340	198
Turbidity	NTU	06/05/2012	N001	43	- 53	1.23		FQ	#		
Uranium-235	pCi/L	06/05/2012	N001	43	- 53	23	U	FQ	#	23	10.3
Yttrium-88	pCi/L	06/05/2012	N001	43	- 53	3.9	U	FQ	#	3.9	2.43

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 4A WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/04/2012	N001	19	- 24	17	U	FQ	#	17	10.6
Americium-241	pCi/L	06/04/2012	N001	19	- 24	5.7	U	FQ	#	5.7	3.5
Antimony-125	pCi/L	06/04/2012	N001	19	- 24	9.8	U	FQ	#	9.8	5.86
Cerium-144	pCi/L	06/04/2012	N001	19	- 24	19	U	FQ	#	19	11.4
Cesium-134	pCi/L	06/04/2012	N001	19	- 24	4.4	U	FQ	#	4.4	2.53
Cesium-137	pCi/L	06/04/2012	N001	19	- 24	4.6	U	FQ	#	4.6	2.71
Cobalt-60	pCi/L	06/04/2012	N001	19	- 24	5.4	U	FQ	#	5.4	3.18
Dissolved Oxygen	mg/L	06/04/2012	N001	19	- 24	5.38		FQ	#		
Europium-152	pCi/L	06/04/2012	N001	19	- 24	27	U	FQ	#	27	15.3
Europium-154	pCi/L	06/04/2012	N001	19	- 24	26	U	FQ	#	26	15.1
Europium-155	pCi/L	06/04/2012	N001	19	- 24	8.1	U	FQ	#	8.1	4.95
Gross Alpha	pCi/L	06/04/2012	N001	19	- 24	6.95		FQJ	#	2.7	2.23
Gross Beta	pCi/L	06/04/2012	N001	19	- 24	7.36		FQJ	#	3.5	2.54
Lead-212	pCi/L	06/04/2012	N001	19	- 24	14	U	FQ	#	14	8.21
Nickel-63	pCi/L	06/04/2012	N001	19	- 24	12	U	FQ	#	12	3.52
Oxidation Reduction Potential	mV	06/04/2012	N001	19	- 24	65.5		FQ	#		
pH	s.u.	06/04/2012	N001	19	- 24	7.47		FQ	#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 4A WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/04/2012	N001	19	-	24	140	U	FQ	#	140	80.9
Promethium-144	pCi/L	06/04/2012	N001	19	-	24	4.7	U	FQ	#	4.7	2.92
Promethium-146	pCi/L	06/04/2012	N001	19	-	24	5.3	U	FQ	#	5.3	3.09
Ruthenium-106	pCi/L	06/04/2012	N001	19	-	24	44	U	FQ	#	44	25.4
Specific Conductance	umhos/cm	06/04/2012	N001	19	-	24	2064		FQ	#		
Temperature	C	06/04/2012	N001	19	-	24	18.69		FQ	#		
Thorium-234	pCi/L	06/04/2012	N001	19	-	24	78	U	FQ	#	78	47.4
Tritium	pCi/L	06/04/2012	N001	19	-	24	330	U	FQ	#	330	195
Turbidity	NTU	06/04/2012	N001	19	-	24	1.21		FQ	#		
Uranium-235	pCi/L	06/04/2012	N001	19	-	24	19	U	FQ	#	19	11.8
Yttrium-88	pCi/L	06/04/2012	N001	19	-	24	10	U	FQ	#	10	5.93

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 4B WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/04/2012	N001	44	- 54	16	U	FQ	#	16	7.23
Americium-241	pCi/L	06/04/2012	N001	44	- 54	33	U	FQ	#	33	19.7
Antimony-125	pCi/L	06/04/2012	N001	44	- 54	10	U	FQ	#	10	5.68
Cerium-144	pCi/L	06/04/2012	N001	44	- 54	31	U	FQ	#	31	18.7
Cesium-134	pCi/L	06/04/2012	N001	44	- 54	4.3	U	FQ	#	4.3	2.49
Cesium-137	pCi/L	06/04/2012	N001	44	- 54	4.1	U	FQ	#	4.1	2.44
Cobalt-60	pCi/L	06/04/2012	N001	44	- 54	4.6	U	FQ	#	4.6	2.6
Dissolved Oxygen	mg/L	06/04/2012	N001	44	- 54	3.37		FQ	#		
Europium-152	pCi/L	06/04/2012	N001	44	- 54	20	U	FQ	#	20	11.3
Europium-154	pCi/L	06/04/2012	N001	44	- 54	22	U	FQ	#	22	12.4
Europium-155	pCi/L	06/04/2012	N001	44	- 54	20	U	FQ	#	20	12.2
Gross Alpha	pCi/L	06/04/2012	N001	44	- 54	12.6		FQ	#	2.1	2.71
Gross Beta	pCi/L	06/04/2012	N001	44	- 54	11.2		FQ	#	2.7	2.52
Lead-212	pCi/L	06/04/2012	N001	44	- 54	11	U	FQ	#	11	6.67
Nickel-63	pCi/L	06/04/2012	N001	44	- 54	12	U	FQ	#	12	3.49
Oxidation Reduction Potential	mV	06/04/2012	N001	44	- 54	-35		FQ	#		
pH	s.u.	06/04/2012	N001	44	- 54	7.59		FQ	#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 4B WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/04/2012	N001	44	- 54	100	U	FQ	#	100	63.7
Promethium-144	pCi/L	06/04/2012	N001	44	- 54	4.1	U	FQ	#	4.1	2.49
Promethium-146	pCi/L	06/04/2012	N001	44	- 54	4.8	U	FQ	#	4.8	2.8
Ruthenium-106	pCi/L	06/04/2012	N001	44	- 54	37	U	FQ	#	37	21.1
Specific Conductance	umhos/cm	06/04/2012	N001	44	- 54	1516		FQ	#		
Temperature	C	06/04/2012	N001	44	- 54	16.81		FQ	#		
Thorium-234	pCi/L	06/04/2012	N001	44	- 54	110	U	FQ	#	110	67.3
Tritium	pCi/L	06/04/2012	N001	44	- 54	340	U	FQ	#	340	202
Turbidity	NTU	06/04/2012	N001	44	- 54	1.88		FQ	#		
Uranium-235	pCi/L	06/04/2012	N001	44	- 54	17	U	FQ	#	17	10.3
Yttrium-88	pCi/L	06/04/2012	N001	44	- 54	4.5	U	FQ	#	4.5	2.78

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 4C WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/04/2012	N001	64	- 74	16	U	FQ	#	16	9.67
Americium-241	pCi/L	06/04/2012	N001	64	- 74	99	U	FQ	#	99	59.7
Antimony-125	pCi/L	06/04/2012	N001	64	- 74	10	U	FQ	#	10	5.88
Cerium-144	pCi/L	06/04/2012	N001	64	- 74	36	U	FQ	#	36	21.5
Cesium-134	pCi/L	06/04/2012	N001	64	- 74	4.3	U	FQ	#	4.3	2.5
Cesium-137	pCi/L	06/04/2012	N001	64	- 74	4	U	FQ	#	4	2.32
Cobalt-60	pCi/L	06/04/2012	N001	64	- 74	7.5	U	FQ	#	7.5	4.45
Dissolved Oxygen	mg/L	06/04/2012	N001	64	- 74	3.15		FQ	#		
Europium-152	pCi/L	06/04/2012	N001	64	- 74	21	U	FQ	#	21	11.9
Europium-154	pCi/L	06/04/2012	N001	64	- 74	23	U	FQ	#	23	10.7
Europium-155	pCi/L	06/04/2012	N001	64	- 74	15	U	FQ	#	15	9.1
Gross Alpha	pCi/L	06/04/2012	N001	64	- 74	15		FQ	#	1.5	2.95
Gross Beta	pCi/L	06/04/2012	N001	64	- 74	17.1		FQ	#	3	3.42
Lead-212	pCi/L	06/04/2012	N001	64	- 74	14	U	FQ	#	14	8.15
Nickel-63	pCi/L	06/04/2012	N001	64	- 74	11	U	FQ	#	11	3.34
Oxidation Reduction Potential	mV	06/04/2012	N001	64	- 74	-81.9		FQ	#		
pH	s.u.	06/04/2012	N001	64	- 74	7.57		FQ	#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 4C WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/04/2012	N001	64	- 74	110	U	FQ	#	110	65.4
Promethium-144	pCi/L	06/04/2012	N001	64	- 74	4.1	U	FQ	#	4.1	2.5
Promethium-146	pCi/L	06/04/2012	N001	64	- 74	4.5	U	FQ	#	4.5	2.65
Ruthenium-106	pCi/L	06/04/2012	N001	64	- 74	37	U	FQ	#	37	21.7
Specific Conductance	umhos /cm	06/04/2012	N001	64	- 74	1413		FQ	#		
Temperature	C	06/04/2012	N001	64	- 74	16.96		FQ	#		
Thorium-234	pCi/L	06/04/2012	N001	64	- 74	200	U	FQ	#	200	119
Tritium	pCi/L	06/04/2012	N001	64	- 74	340	U	FQ	#	340	201
Turbidity	NTU	06/04/2012	N001	64	- 74	0.46		FQ	#		
Uranium-235	pCi/L	06/04/2012	N001	64	- 74	39	U	FQ	#	39	23.5
Yttrium-88	pCi/L	06/04/2012	N001	64	- 74	4.72		UFQ	#	3.9	2.57

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 5A WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/05/2012	N001	19	- 24	40	U	FQ	#	40	23.7
Americium-241	pCi/L	06/05/2012	N001	19	- 24	46	U	FQ	#	46	27.9
Antimony-125	pCi/L	06/05/2012	N001	19	- 24	15	U	FQ	#	15	8.67
Cerium-144	pCi/L	06/05/2012	N001	19	- 24	29	U	FQ	#	29	17
Cesium-134	pCi/L	06/05/2012	N001	19	- 24	8.4	U	FQ	#	8.4	5.08
Cesium-137	pCi/L	06/05/2012	N001	19	- 24	5.8	U	FQ	#	5.8	3.4
Cobalt-60	pCi/L	06/05/2012	N001	19	- 24	6.8	U	FQ	#	6.8	3.91
Dissolved Oxygen	mg/L	06/05/2012	N001	19	- 24	6.28		FQ	#		
Europium-152	pCi/L	06/05/2012	N001	19	- 24	32	U	FQ	#	32	18.3
Europium-154	pCi/L	06/05/2012	N001	19	- 24	34	U	FQ	#	34	19
Europium-155	pCi/L	06/05/2012	N001	19	- 24	14	U	FQ	#	14	8.56
Gross Alpha	pCi/L	06/05/2012	N001	19	- 24	3.94		FQJ	#	1.5	1.29
Gross Beta	pCi/L	06/05/2012	N001	19	- 24	5.14		FQJ	#	2.2	1.64
Lead-212	pCi/L	06/05/2012	N001	19	- 24	14	U	FQ	#	14	8.59
Nickel-63	pCi/L	06/05/2012	N001	19	- 24	12	U	FQ	#	12	3.58
Oxidation Reduction Potential	mV	06/05/2012	N001	19	- 24	99.8		FQ	#		
pH	s.u.	06/05/2012	N001	19	- 24	7.26		FQ	#		



**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 5A WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/05/2012	N001	19	-	24	140	U	FQ	#	140	81.7
Promethium-144	pCi/L	06/05/2012	N001	19	-	24	6.4	U	FQ	#	6.4	3.89
Promethium-146	pCi/L	06/05/2012	N001	19	-	24	7.2	U	FQ	#	7.2	4.19
Ruthenium-106	pCi/L	06/05/2012	N001	19	-	24	53	U	FQ	#	53	31.6
Specific Conductance	umhos/cm	06/05/2012	N001	19	-	24	1206		FQ	#		
Temperature	C	06/05/2012	N001	19	-	24	19.14		FQ	#		
Thorium-234	pCi/L	06/05/2012	N001	19	-	24	150	U	FQ	#	150	92.8
Tritium	pCi/L	06/05/2012	N001	19	-	24	340	U	FQ	#	340	203
Turbidity	NTU	06/05/2012	N001	19	-	24	6.4		FQ	#		
Uranium-235	pCi/L	06/05/2012	N001	19	-	24	44	U	FQ	#	44	26.1
Yttrium-88	pCi/L	06/05/2012	N001	19	-	24	6.6	U	FQ	#	6.6	4.01

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 5B WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/05/2012	N001	39	- 49	39	U	FQ	#	39	23
Americium-241	pCi/L	06/05/2012	N001	39	- 49	32	U	FQ	#	32	19.1
Antimony-125	pCi/L	06/05/2012	N001	39	- 49	12	U	FQ	#	12	6.59
Cerium-144	pCi/L	06/05/2012	N001	39	- 49	22	U	FQ	#	22	12.6
Cesium-134	pCi/L	06/05/2012	N001	39	- 49	5.5	U	FQ	#	5.5	3.15
Cesium-137	pCi/L	06/05/2012	N001	39	- 49	4.7	U	FQ	#	4.7	2.88
Cobalt-60	pCi/L	06/05/2012	N001	39	- 49	5.5	U	FQ	#	5.5	3.07
Dissolved Oxygen	mg/L	06/05/2012	N001	39	- 49	4.1		FQ	#		
Europium-152	pCi/L	06/05/2012	N001	39	- 49	27	U	FQ	#	27	14.7
Europium-154	pCi/L	06/05/2012	N001	39	- 49	29	U	FQ	#	29	16.3
Europium-155	pCi/L	06/05/2012	N001	39	- 49	12	U	FQ	#	12	7.83
Gross Alpha	pCi/L	06/05/2012	N001	39	- 49	11.9		FQ	#	1	2.2
Gross Beta	pCi/L	06/05/2012	N001	39	- 49	11.5		FQ	#	1.4	2.1
Lead-212	pCi/L	06/05/2012	N001	39	- 49	12	U	FQ	#	12	7.41
Nickel-63	pCi/L	06/05/2012	N001	39	- 49	12	U	FQ	#	12	3.36
Oxidation Reduction Potential	mV	06/05/2012	N001	39	- 49	89.3		FQ	#		
pH	s.u.	06/05/2012	N001	39	- 49	7.45		FQ	#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 5B WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/05/2012	N001	39	- 49	120	U	FQ	#	120	72
Promethium-144	pCi/L	06/05/2012	N001	39	- 49	5.7	U	FQ	#	5.7	3.41
Promethium-146	pCi/L	06/05/2012	N001	39	- 49	5.4	U	FQ	#	5.4	3.16
Ruthenium-106	pCi/L	06/05/2012	N001	39	- 49	46	U	FQ	#	46	26.8
Specific Conductance	umhos /cm	06/05/2012	N001	39	- 49	723		FQ	#		
Temperature	C	06/05/2012	N001	39	- 49	17.76		FQ	#		
Thorium-234	pCi/L	06/05/2012	N001	39	- 49	140	U	FQ	#	140	82.4
Tritium	pCi/L	06/05/2012	N001	39	- 49	340	U	FQ	#	340	201
Turbidity	NTU	06/05/2012	N001	39	- 49	0.85		FQ	#		
Uranium-235	pCi/L	06/05/2012	N001	39	- 49	33	U	FQ	#	33	19.8
Yttrium-88	pCi/L	06/05/2012	N001	39	- 49	5.6	U	FQ	#	5.6	3.43

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 7B WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/04/2012	N001	-	18	U		#	18	8.86
Americium-241	pCi/L	06/04/2012	N001	-	5.2	U		#	5.2	3.05
Antimony-125	pCi/L	06/04/2012	N001	-	12	U		#	12	6.68
Cerium-144	pCi/L	06/04/2012	N001	-	18	U		#	18	10.6
Cesium-134	pCi/L	06/04/2012	N001	-	4.7	U		#	4.7	2.8
Cesium-137	pCi/L	06/04/2012	N001	-	4.7	U		#	4.7	2.83
Cobalt-60	pCi/L	06/04/2012	N001	-	5.6	U		#	5.6	3.13
Dissolved Oxygen	mg/L	06/04/2012	N001	-	3.15			#		
Europium-152	pCi/L	06/04/2012	N001	-	26	U		#	26	15.1
Europium-154	pCi/L	06/04/2012	N001	-	29	U		#	29	16.7
Europium-155	pCi/L	06/04/2012	N001	-	8.9	U		#	8.9	5.12
Gross Alpha	pCi/L	06/04/2012	N001	-	5.37			#	0.91	1.19
Gross Beta	pCi/L	06/04/2012	N001	-	6.07			#	1.5	1.42
Lead-212	pCi/L	06/04/2012	N001	-	11	U		#	11	6.51
Nickel-63	pCi/L	06/04/2012	N001	-	11	U		#	11	3.38
Oxidation Reduction Potential	mV	06/04/2012	N001	-	148.8			#		
pH	s.u.	06/04/2012	N001	-	7.67			#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 7B WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/04/2012	N001	-	120	U		#	120	68.7
Promethium-144	pCi/L	06/04/2012	N001	-	7.4	U		#	7.4	4.39
Promethium-146	pCi/L	06/04/2012	N001	-	5.2	U		#	5.2	3.11
Ruthenium-106	pCi/L	06/04/2012	N001	-	45	U		#	45	26.2
Specific Conductance	umhos/cm	06/04/2012	N001	-	696			#		
Temperature	C	06/04/2012	N001	-	17.29			#		
Thorium-234	pCi/L	06/04/2012	N001	-	77	U		#	77	46
Tritium	pCi/L	06/04/2012	N001	-	350	U		#	350	205
Turbidity	NTU	06/04/2012	N001	-	0.46			#		
Uranium-235	pCi/L	06/04/2012	N001	-	26	U		#	26	15.5
Yttrium-88	pCi/L	06/04/2012	N001	-	5.54		U	#	5	3.28

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 7C WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/04/2012	N001	-	24	U		#	24	15.1
Americium-241	pCi/L	06/04/2012	N001	-	7.7	U		#	7.7	4.64
Antimony-125	pCi/L	06/04/2012	N001	-	13	U		#	13	7.48
Cerium-144	pCi/L	06/04/2012	N001	-	26	U		#	26	14.9
Cesium-134	pCi/L	06/04/2012	N001	-	6.1	U		#	6.1	3.51
Cesium-137	pCi/L	06/04/2012	N001	-	6.2	U		#	6.2	3.7
Cobalt-60	pCi/L	06/04/2012	N001	-	7.4	U		#	7.4	4.43
Dissolved Oxygen	mg/L	06/04/2012	N001	-	4.8			#		
Europium-152	pCi/L	06/04/2012	N001	-	37	U		#	37	21.3
Europium-154	pCi/L	06/04/2012	N001	-	34	U		#	34	19.5
Europium-155	pCi/L	06/04/2012	N001	-	11	U		#	11	6.44
Gross Alpha	pCi/L	06/04/2012	N001	-	7.94			#	0.64	1.5
Gross Beta	pCi/L	06/04/2012	N001	-	6.08			#	1.5	1.4
Lead-212	pCi/L	06/04/2012	N001	-	15	U		#	15	8.9
Nickel-63	pCi/L	06/04/2012	N001	-	11	U		#	11	3.46
Oxidation Reduction Potential	mV	06/04/2012	N001	-	115.4			#		
pH	s.u.	06/04/2012	N001	-	7.1			#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 7C WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/04/2012	N001	-	140	U		#	140	80.4
Promethium-144	pCi/L	06/04/2012	N001	-	6.5	U		#	6.5	3.8
Promethium-146	pCi/L	06/04/2012	N001	-	7.1	U		#	7.1	4.13
Ruthenium-106	pCi/L	06/04/2012	N001	-	59	U		#	59	32.8
Specific Conductance	umhos/cm	06/04/2012	N001	-	765			#		
Temperature	C	06/04/2012	N001	-	18.31			#		
Thorium-234	pCi/L	06/04/2012	N001	-	88	U		#	88	45.5
Tritium	pCi/L	06/04/2012	N001	-	340	U		#	340	204
Turbidity	NTU	06/04/2012	N001	-	0.6			#		
Uranium-235	pCi/L	06/04/2012	N001	-	25	U		#	25	15.4
Yttrium-88	pCi/L	06/04/2012	N001	-	11	U		#	11	6.49

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 8B WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/05/2012	N001	-	25.9		UFQ	#	18	12.2
Americium-241	pCi/L	06/05/2012	N001	-	38	U	FQ	#	38	22.5
Antimony-125	pCi/L	06/05/2012	N001	-	14	U	FQ	#	14	7.21
Cerium-144	pCi/L	06/05/2012	N001	-	35	U	FQ	#	35	20.7
Cesium-134	pCi/L	06/05/2012	N001	-	5.8	U	FQ	#	5.8	3.45
Cesium-137	pCi/L	06/05/2012	N001	-	5.6	U	FQ	#	5.6	3.18
Cobalt-60	pCi/L	06/05/2012	N001	-	5.6	U	FQ	#	5.6	3.36
Dissolved Oxygen	mg/L	06/05/2012	N001	-	3.76		FQ	#		
Europium-152	pCi/L	06/05/2012	N001	-	27	U	FQ	#	27	16
Europium-154	pCi/L	06/05/2012	N001	-	28	U	FQ	#	28	15.8
Europium-155	pCi/L	06/05/2012	N001	-	22	U	FQ	#	22	13.1
Gross Alpha	pCi/L	06/05/2012	N001	-	6.89		FQ	#	1	1.45
Gross Beta	pCi/L	06/05/2012	N001	-	6.79		FQ	#	1.8	1.62
Lead-212	pCi/L	06/05/2012	N001	-	12	U	FQ	#	12	7.03
Nickel-63	pCi/L	06/05/2012	N001	-	14	U	FQ	#	14	3.93
Oxidation Reduction Potential	mV	06/05/2012	N001	-	21.6		FQ	#		
pH	s.u.	06/05/2012	N001	-	7.5		FQ	#		



**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 8B WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/05/2012	N001	-	120	U	FQ	#	120	71.7
Promethium-144	pCi/L	06/05/2012	N001	-	5.4	U	FQ	#	5.4	3.22
Promethium-146	pCi/L	06/05/2012	N001	-	6.2	U	FQ	#	6.2	3.62
Ruthenium-106	pCi/L	06/05/2012	N001	-	52	U	FQ	#	52	29.6
Specific Conductance	umhos /cm	06/05/2012	N001	-	874		FQ	#		
Temperature	C	06/05/2012	N001	-	17.32		FQ	#		
Thorium-234	pCi/L	06/05/2012	N001	-	130	U	FQ	#	130	76.4
Tritium	pCi/L	06/05/2012	N001	-	340	U	FQ	#	340	203
Turbidity	NTU	06/05/2012	N001	-	3.35		FQ	#		
Uranium-235	pCi/L	06/05/2012	N001	-	35	U	FQ	#	35	20.5
Yttrium-88	pCi/L	06/05/2012	N001	-	6.2	U	FQ	#	6.2	3.74

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 8C WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Actinium-228	pCi/L	06/05/2012	N001	-	36	U	FQ	#	36	21.2
Americium-241	pCi/L	06/05/2012	N001	-	31	U	FQ	#	31	18.6
Antimony-125	pCi/L	06/05/2012	N001	-	15	U	FQ	#	15	8.98
Cerium-144	pCi/L	06/05/2012	N001	-	27	U	FQ	#	27	16.2
Cesium-134	pCi/L	06/05/2012	N001	-	7.1	U	FQ	#	7.1	4.05
Cesium-137	pCi/L	06/05/2012	N001	-	7	U	FQ	#	7	4.05
Cobalt-60	pCi/L	06/05/2012	N001	-	7.9	U	FQ	#	7.9	4.65
Dissolved Oxygen	mg/L	06/05/2012	N001	-	1.58		FQ	#		
Europium-152	pCi/L	06/05/2012	N001	-	41	U	FQ	#	41	24.3
Europium-154	pCi/L	06/05/2012	N001	-	40	U	FQ	#	40	22.2
Europium-155	pCi/L	06/05/2012	N001	-	16	U	FQ	#	16	9.47
Gross Alpha	pCi/L	06/05/2012	N001	-	6.2		FQ	#	1	1.36
Gross Beta	pCi/L	06/05/2012	N001	-	6.91		FQ	#	1.8	1.63
Lead-212	pCi/L	06/05/2012	N001	-	15	U	FQ	#	15	8.66
Nickel-63	pCi/L	06/05/2012	N001	-	13	U	FQ	#	13	3.85
Oxidation Reduction Potential	mV	06/05/2012	N001	-	-98		FQ	#		
pH	s.u.	06/05/2012	N001	-	7.4		FQ	#		

**Groundwater Quality Data by Location (USEE100) FOR SITE HAL01, Hallam Decommissioned Reactor Site**

REPORT DATE: 8/8/2012

Location: 8C WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Potassium-40	pCi/L	06/05/2012	N001	-	170	U	FQ	#	170	103
Promethium-144	pCi/L	06/05/2012	N001	-	7.4	U	FQ	#	7.4	4.43
Promethium-146	pCi/L	06/05/2012	N001	-	7.8	U	FQ	#	7.8	4.48
Ruthenium-106	pCi/L	06/05/2012	N001	-	62	U	FQ	#	62	35.9
Specific Conductance	umhos /cm	06/05/2012	N001	-	760		FQ	#		
Temperature	C	06/05/2012	N001	-	16.43		FQ	#		
Thorium-234	pCi/L	06/05/2012	N001	-	150	U	FQ	#	150	90.5
Tritium	pCi/L	06/05/2012	N001	-	340	U	FQ	#	340	208
Turbidity	NTU	06/05/2012	N001	-	4.95		FQ	#		
Uranium-235	pCi/L	06/05/2012	N001	-	26	U	FQ	#	26	16.3
Yttrium-88	pCi/L	06/05/2012	N001	-	7.9	U	FQ	#	7.9	4.79

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 HAL01, Hallam Decommissioned Reactor Site**  
**REPORT DATE: 8/8/2012**

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
1A	N	1440.35	06/04/2012	09:55:00	4.96	1435.39
1A	N	1440.35	06/05/2012	09:22:05	5	1435.35
1B	N	1440.5	06/04/2012	10:09:00	7.25	1433.25
1B	N	1440.5	06/05/2012	08:23:38	6.6	1433.9
2A	N	1441.02	06/04/2012	09:37:00	7.37	1433.65
2A	N	1441.02	06/04/2012	14:03:15	7.37	1433.65
2B	N	1441.29	06/04/2012	09:49:00	7.59	1433.7
2B	N	1441.29	06/04/2012	14:17:54	7.75	1433.54
2B2	N	1442.62	06/04/2012	09:53:00	8.91	1433.71
2B2	N	1442.62	06/04/2012	13:23:02	9.05	1433.57
2C2	N	1442.61	06/04/2012	09:50:00	12.46	1430.15
2C2	N	1442.61	06/04/2012	13:10:35	12.32	1430.29
3A	N	1439.03	06/04/2012	09:13:00	8.81	1430.22
3A	N	1439.03	06/05/2012	10:41:57	8.85	1430.18
3B	N	1439.39	06/04/2012	09:31:00	7.82	1431.57
3B	N	1439.39	06/05/2012	10:19:41	7.52	1431.87
4A	N	1438.5	06/04/2012	08:46:00	6.5	1432
4A	N	1438.5	06/04/2012	15:06:18	6.38	1432.12
4B	N	1438.61	06/04/2012	08:58:00	6.31	1432.3
4B	N	1438.61	06/04/2012	15:22:15	6.3	1432.31
4C	N	1439.77	06/04/2012	08:58:00	22.04	1417.73
4C	N	1439.77	06/04/2012	15:46:37	22.16	1417.61
5A	N	1437.63	06/04/2012	08:44:00	10.58	1427.05
5A	N	1437.63	06/05/2012	11:55:37	10.6	1427.03
5B	N	1437.95	06/04/2012	08:45:00	11.07	1426.88
5B	N	1437.95	06/05/2012	11:20:06	11.28	1426.67
6A	N	1438.13	06/04/2012	10:20:00	5.97	1432.16
6B	N	1438.15	06/04/2012	10:22:00	6.79	1431.36

**STATIC WATER LEVELS (USEE700) FOR SITE HAL01, Hallam Decommissioned Reactor Site**  
**REPORT DATE: 8/8/2012**

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
7B	N	1443.11	06/04/2012	11:00:00	9.44	1433.67
7B	N	1443.11	06/04/2012	11:32:51	9.44	1433.67
7C	N	1443.23	06/04/2012	11:09:00	9.9	1433.33
7C	N	1443.23	06/04/2012	11:42:59	9.9	1433.33
8B	N	1440.97	06/04/2012	09:10:00	8.62	1432.35
8B	N	1440.97	06/05/2012	13:28:03	10.47	1430.5
8C	N	1441.03	06/04/2012	09:11:00	9.56	1431.47
8C	N	1441.03	06/05/2012	13:05:26	8.7	1432.33

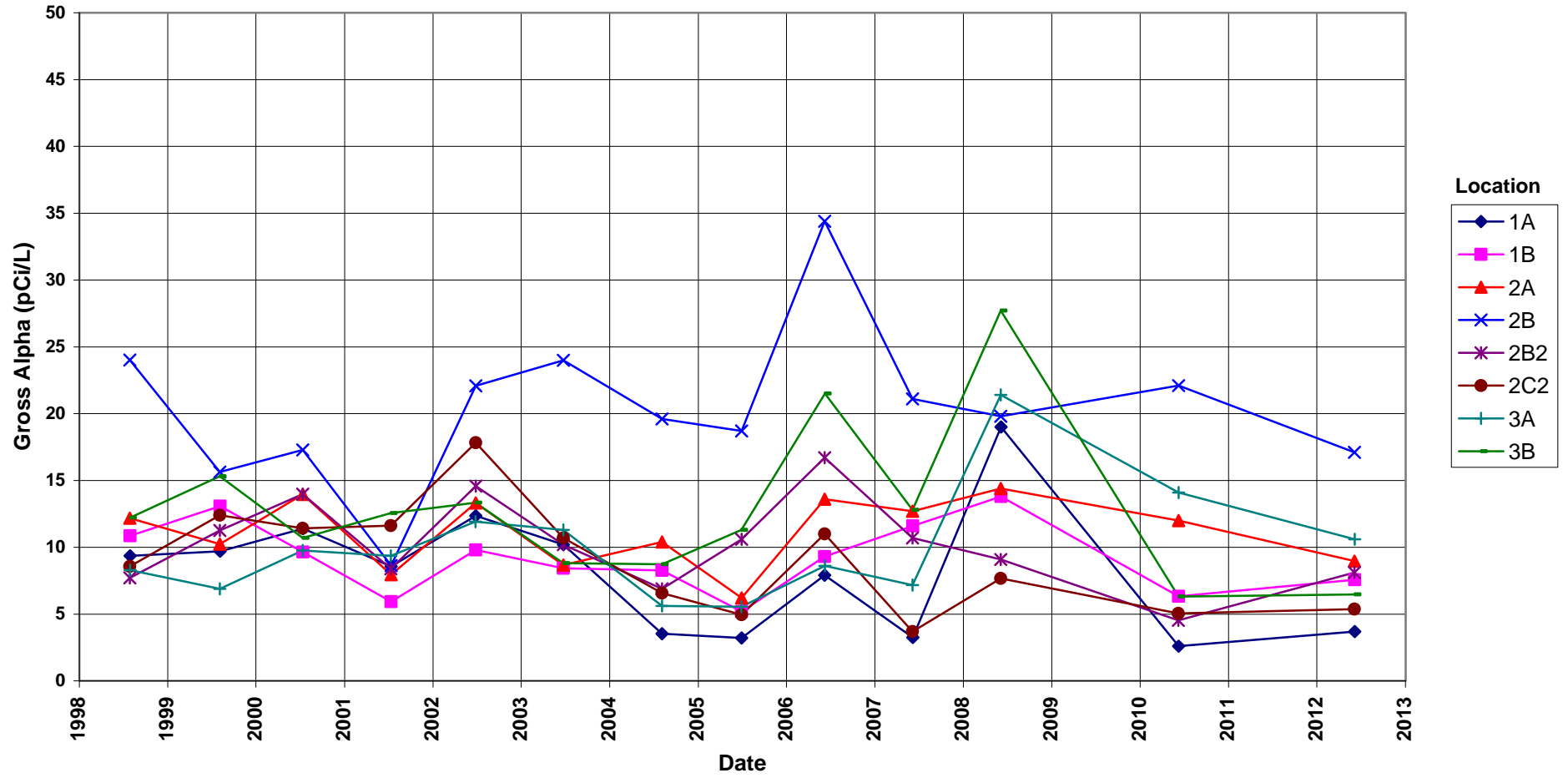
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                   N UNKNOWN            O ON SITE                U UPGRADIENT



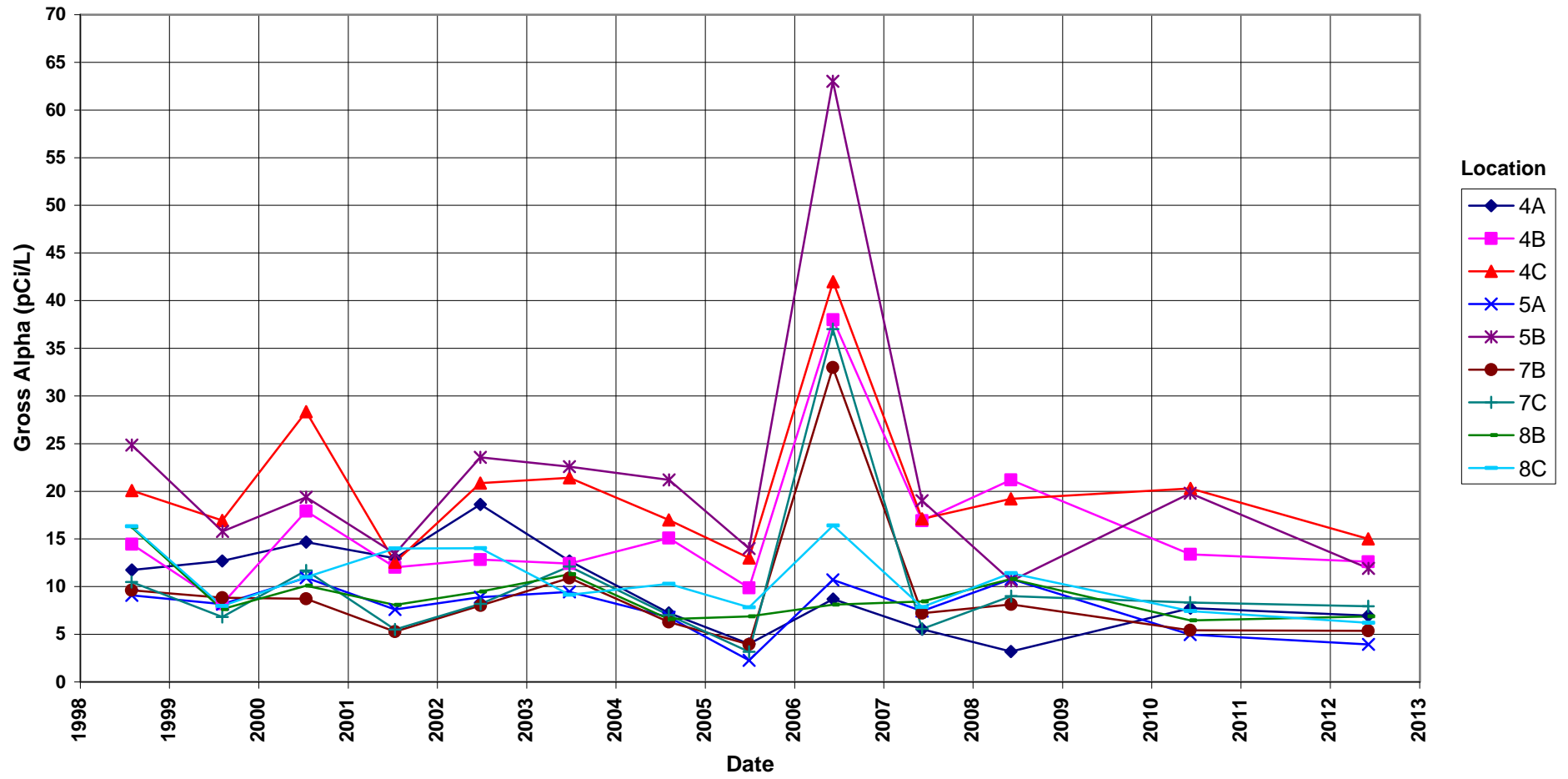
## **Time-Concentration Graphs**

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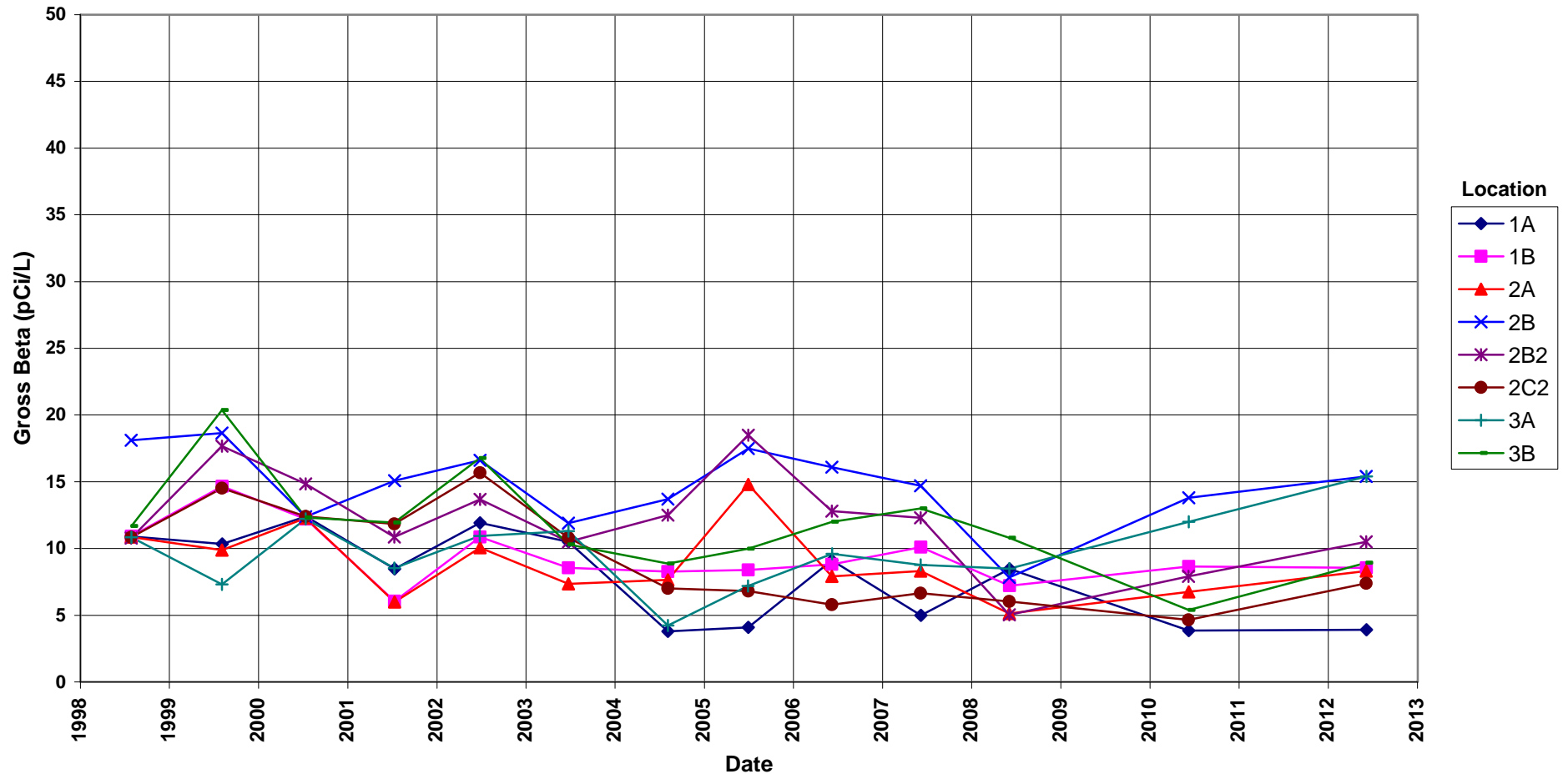
### Hallam Decommissioned Reactor Site Gross Alpha Concentration



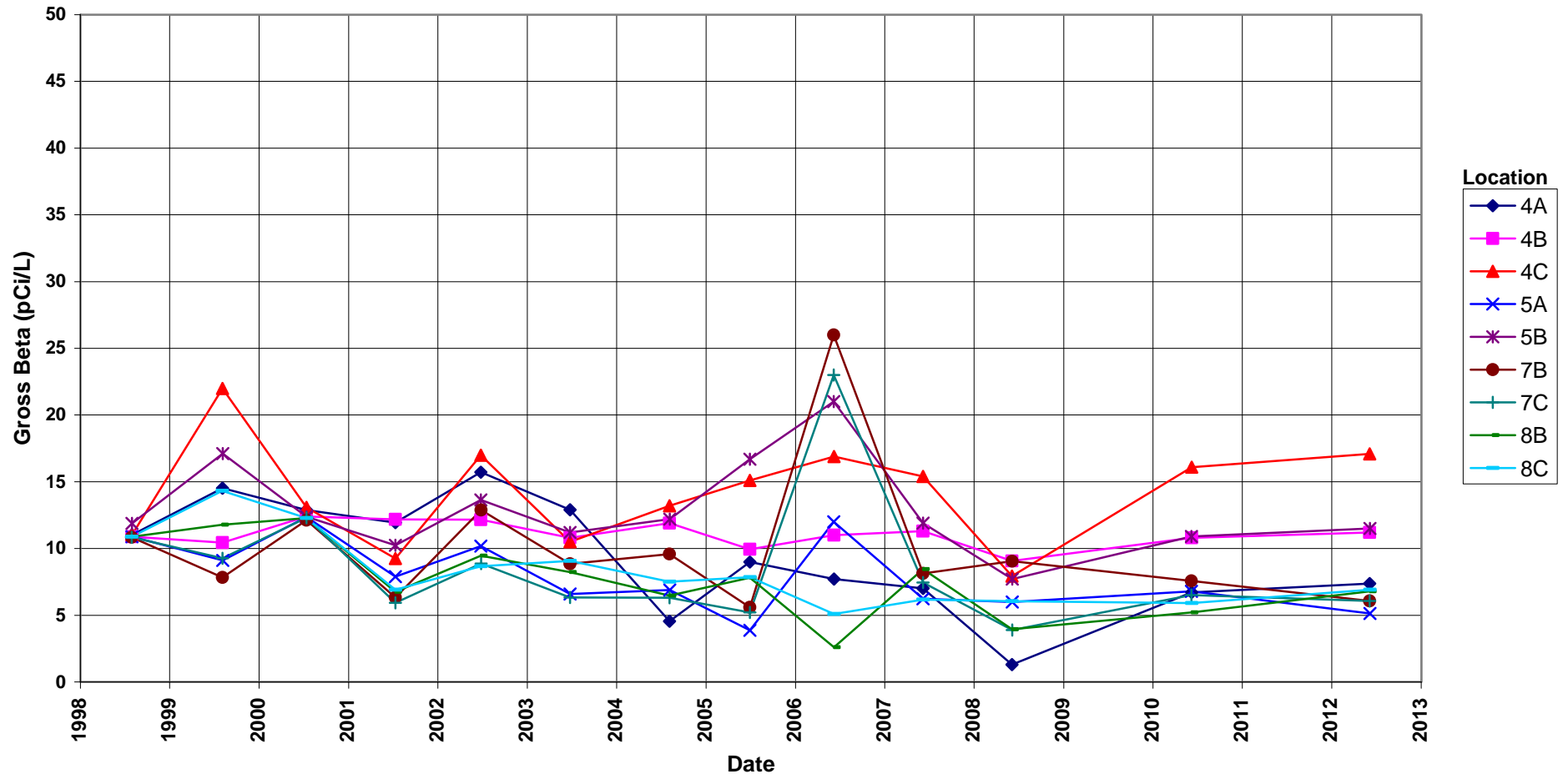
# Hallam Decommissioned Reactor Site Gross Alpha Concentration



# Hallam Decommissioned Reactor Site Gross Beta Concentration



### Hallam Decommissioned Reactor Site Gross Beta Concentration



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

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established 1959

Task Order LM00-501  
Control Number 12-0588

May 8, 2012

U.S. Department of Energy  
Office of Legacy Management  
ATTN: Christopher Clayton  
Site Manager  
Forrestal Building  
1000 Independence Ave., SW  
Washington, DC 20585

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)  
June 2012 Environmental Sampling at the Hallam, Nebraska, Decommissioned  
Reactor Site

REFERENCE: Task Order LM-501-04-303-402, Hallam, Nebraska, Site

Dear Mr. Clayton:

The purpose of this letter is to inform you of the upcoming sampling event at the Hallam, Nebraska, Decommissioned Reactor Site. Enclosed are the map and tables specifying sample locations and analytes for groundwater monitoring at the Hallam site. Water quality data will be collected at the site as part of the routine environmental sampling currently scheduled to begin the week of June 4, 2012.

The following list shows the wells (with zone of completion) scheduled to be sampled during this event.

**Monitor Wells (filtered)\***

OBS1A Gt	OBS2B Gt	OBS3A Gt	OBS4B Gt	OBS5A Gt	OBS7B Gt	OBS8B Gt
OBS1B Gt	OBS2B2 Gt	OBS3B Gt	OBS4C Gt	OBS5B Gt	OBS7C Gt	OBS8C
Gt						
OBS2A Gt	OBS2C2 Gt	OBS4A Gt				

\*NOTE: Gt = Glacial till

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.

Christopher Clayton  
Control Number 12-0588  
Page 2

Please contact me at (418) 818-7015 if you have any questions.

Sincerely,



Michele L. Miller  
2012.05.07 18:24:48 -04'00'

Michele Miller  
Project Manager

MM/lcg/lb

Enclosures (3)

cc: (electronic)  
Karl Stoeckle, DOE  
Steve Donovan, Stoller  
Bev Gallagher, Stoller  
Lauren Goodknight, Stoller  
Michelle Miller, Stoller  
EDD Delivery  
rc-grand.junction  
File: HAL 410.02(A)

## Sampling Frequencies for Locations at Hallam, Nebraska

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
<b>Monitoring Wells</b>						
1A				X		Next in 6/2012
1B				X		Next in 6/2012
2A				X		Next in 6/2012
2B				X		Next in 6/2012
2B2				X		Next in 6/2012
2C2				X		Next in 6/2012
3A				X		Next in 6/2012
3B				X		Next in 6/2012
4A				X		Next in 6/2012
4B				X		Next in 6/2012
4C				X		Next in 6/2012
5A				X		Next in 6/2012
5B				X		Next in 6/2012
6A					X	Water level; micropurge if possible
6B					X	Water level; micropurge if possible
7B				X		Next in 6/2012
7C				X		Next in 6/2012
8B				X		Next in 6/2012
8C				X		Next in 6/2012

Sampling conducted in June  
Based on LTSP dated June 2008

## Constituent Sampling Breakdown

Site	Hallam		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
	Groundwater	Surface Water			
<b>Approx. No. Samples/yr</b>	17	0			
<b>Field Measurements</b>					
Alkalinity	X				
Dissolved Oxygen					
Redox Potential	X				
pH	X				
Specific Conductance	X				
Turbidity	X				
Temperature	X				
<b>Laboratory Measurements</b>					
Aluminum					
Ammonia as N (NH <sub>3</sub> -N)					
Calcium					
Chloride					
Chromium					
Gamma Spec	X		10 pCi/L	Gamma Spectrometry	GAM-A-001
Gross Alpha	X		2 pCi/L	EPA 900.0	GPC-A-001
Gross Beta	X		4 pCi/L	EPA 900.0	GPC-A-001
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Nickel-63	X		700 pCi/L	Liquid Scintillation	LSC-A-009
Nitrate + Nitrite as N (NO <sub>3</sub> +NO <sub>2</sub> )-N					
Potassium					
Radium-226					
Radium-228					
Selenium					
Silica					
Sodium					
Strontium					
Sulfate					
Sulfide					
Total Dissolved Solids					
Total Organic Carbon					
Tritium	X		400 pCi/L	Liquid Scintillation	GPC-A-001
Uranium					
Vanadium					
Zinc					
<b>Total No. of Analytes</b>	5	0			

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

# **Attachment 4 Trip Report**

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## Memorandum

Control Number: N/A

DATE: June 26, 2012  
TO: Michele Miller  
FROM: Tom Welton  
SUBJECT: Trip Report

**Site:** Hallam, Nebraska.

**Dates of Sampling Event:** June 4–7, 2012.

**Team Members:** Tom Welton and Tim Zirbes

**Number of Locations Sampled:** 17 groundwater monitoring wells. A summary table of samples collected accompanies this report.

**Locations Not Sampled/Reason:** Wells 6A and 6B are not required to be sampled, but static water levels are measured.

**Location-Specific Information:** All monitoring wells were purged and sampled using Category II criteria, with the exception of monitoring well 1A, which was purged and sampled using Category I criteria.

**Field Variance:** Wells 2B2, 2C2, 7B, and 7C ran out of water during initial sampling due to the limitations associated with using a peristaltic pump. These wells were allowed to recharge and subsequently sampled until sufficient volume was collected for all analytes. The subsequent samples were not micropurged, and the recorded sample time and date are the time and date of the first sample collection. See field sheet comments for further information.

**Filtered Samples:** Location 1B had turbidity of 18.3 NTUs and, in accordance with the Sampling and Analysis Plan, was filtered with a 0.45  $\mu$  filter. The tritium samples were not filtered, as required by the plan. No other sample locations were filtered.

**Quality Control Samples:** The following table shows the false identifications assigned to the quality control sample:

False ID	True ID	Sample Type	Ticket Number
2628	1A	Field Duplicate	KGU 348

**Requisition Numbers Assigned:** Samples were assigned to requisition number 12054583.

**Water Level Measurements:** Water levels were measured at all monitoring wells on June 4, 2012, before the sampling event began. Water levels also were measured at the start of each sampling event. The following table shows the results of these measurements:

Location	SWL 6/4/2012	SWL at Sample Time
1A	4.96	5.00
1B	7.25	6.60
2A	7.37	7.37
2B	7.59	7.75
2B2	8.91	9.05
2C2	12.46	12.32
3A	8.81	8.85
3B	7.82	7.52
4A	6.50	6.38
4B	6.31	6.30
4C	22.04	22.16
5A	10.58	10.60
5B	11.07	11.28
6A	5.97	-
6B	6.79	-
7B	9.44	9.44
7C	9.90	9.90
8B	8.62	10.47
8C	9.56	8.70

**Well Inspection Summary:** An inspection was conducted by others just prior to the sampling event. The findings were transmitted by e-mail to the sampling team and are reflected in the “Corrective Actions Required/Taken” section

**Equipment:** All equipment functioned properly.

**Institutional Controls:**

**Fences, Gates, Locks:** The locks on the wells were very difficult to open. The locks on wells 2C2 and 3B had to be cut off. Todd Chinn of the Nebraska Public Power District (NPPD) stated that he would put NPPD’s locks on the wells. All of the locks should be replaced, preferably with short-shanked locks. The coal dust from the plant clogs the locks and causes them to corrode internally. Fences and gates are the property of NPPD and were in good repair.

**Signs:** Not applicable.

**Trespassing/Site Disturbances:** None noted. Hallam is a fenced, occupied site that is staffed 24 hours a day.



**Site Issues:** None.

**Disposal Cell/Drainage Structure Integrity:** Not applicable.

**Vegetation/Noxious Weed Concerns:** Not applicable.

**Maintenance Requirements:** None.

**Safety Issues:** None.

**Access Issues:** None.

**Corrective Actions Required/Taken:**

Location	Corrective Action
1A	Wire-brushed concrete pad around flush mount, painted pad with florescent paint, cleaned mating surfaces of lid, installed rubber washers on hold-down bolts, placed 2-inch PVC cap on well casing, and stenciled location code in four places on concrete. Brass location marker was missing but not replaced.
1B	Same as 1A. In addition, re-glued brass location marker to concrete.
2A	Installed new hasp opposite hinge that was replaced during previous sampling event. Touched up paint on protective casing.
2B	Installed new hasp opposite hinge that was replaced during previous sampling event. Touched up paint on protective casing.
2B2	Touched up paint on protective casing.
2C2	Touched up paint on protective casing. Cut off lock, which Todd Chinn, NPPD, will replace.
3A	Touched up paint on protective casing.
3B	Replaced protective casing cap with new cap provided by Todd Chinn, NPPD. Installed cap with new hinge and hasp. Painted and relabeled protective casing. Cut off lock, which Todd Chinn, NPPD, will replace.
4A	Touched up paint on protective casing.
4B	Installed new hasp opposite hinge that was replaced during previous sampling event. Touched up paint on protective casing.
4C	Touched up paint on protective casing. Placed new 2-inch PVC cap on protective casing.
5A	Touched up paint on protective casing.
5B	Touched up paint on protective casing.
6A	Wire-brushed concrete pad around flush mount, painted pad with florescent paint, cleaned mating surfaces of lid, installed rubber washers on hold-down bolts, stenciled location code in four places on concrete, and installed brass location marker on concrete pad.
6B	Same as 6A.
7B	Shoveled ash from base of well, scraped and wire-brushed bottom 2 feet (approximate) of protective casing (which was heavily corroded), and applied rust-inhibiting primer and a top coat. Capped well casing with new 2-inch PVC cap.
7C	Shoveled ash from base of well, scraped and wire-brushed bottom 2 feet (approximate) of protective casing (which was heavily corroded), and applied rust-inhibiting primer and top coat.
8B	Placed new 2-inch PVC cap on well casing.
8C	Placed new 2-inch PVC cap on well casing. Removed approximately 5 feet of Teflon tubing from well to remove coupling that was believed to be preventing the water level sonde from going down the well.
All	Lubricated all locks. Oiled all hinges on protective casing caps. Stenciled well locations on wells where numbers were faint or covered over with new paint.

**SUMMARY OF SAMPLING AT HALLAM**  
**June 7–10, 2012**

Location	Date Sampled	Parameters	QC Taken	COMMENTS
7B	6/4/2012 1132	Ni-63, H-3, G Spec, GAB		
7C	6/4/2012 1142	Ni-63, H-3, G Spec, GAB		
2C2	6/4/2012 1310	Ni-63, H-3, G Spec, GAB		
2B2	6/4/2012 1323	Ni-63, H-3, G Spec, GAB		
2A	6/4/2012 1403	Ni-63, H-3, G Spec, GAB		
2B	6/4/2012 1417	Ni-63, H-3, G Spec, GAB		
4A	6/4/2012 1506	Ni-63, H-3, G Spec, GAB		
4B	6/4/2012 1522	Ni-63, H-3, G Spec, GAB		
4C	6/4/2012 1546	Ni-63, H-3, G Spec, GAB		
1B*	6/5/2012 0823	Ni-63, H-3, G Spec, GAB		Turbidity = 18.3 NTU
1A	6/5/2012 0922	Ni-63, H-3, G Spec, GAB	QC/FD	2628 (FD) - 0915
3B	6/5/2012 1019	Ni-63, H-3, G Spec, GAB		
3A	6/5/2012 1041	Ni-63, H-3, G Spec, GAB		
5B	6/5/2012 1120	Ni-63, H-3, G Spec, GAB		
5A	6/5/2012 1155	Ni-63, H-3, G Spec, GAB		
8C	6/5/2012 1305	Ni-63, H-3, G Spec, GAB		
8B	6/5/2012 1328	Ni-63, H-3, G Spec, GAB		

\* Samples filtered with 0.45µ filter; H-3 was not filtered.

(TW/ems)

cc: (electronic)  
 Art Kleinrath, DOE  
 Ken Broberg, Stoller  
 Steve Donovan, Stoller  
 EDD Delivery