

# Data Validation Package

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July 2013

Groundwater Sampling at the  
Sherwood, Washington, Disposal Site

October 2013



U.S. DEPARTMENT OF  
**ENERGY**

Legacy  
Management

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# Sampling Event Summary

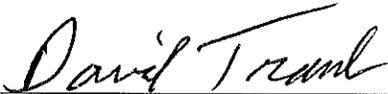
**Site:** Sherwood, Washington, Disposal Site

**Sampling Period:** July 17, 2013

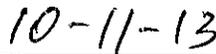
The 2001 *Long-Term Surveillance Plan (LTSP) for the U.S. Department of Energy Sherwood Project (UMTRCA Title II) Reclamation Cell, Wellpinit, Washington*, does not require groundwater compliance monitoring at the Sherwood site. However, the LTSP stipulates limited groundwater monitoring for chloride and sulfate (designated indicator parameters) and total dissolved solids (TDS) as a best management practice.

Samples were collected from the background well, MW-2B, and the two downgradient wells, MW-4 and MW-10, in accordance with the LTSP. Sampling and analyses were conducted as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites (LMS/PRO/S04351, continually updated)*. Water levels were measured in the wells and in four piezometers completed in the tailings dam.

Review of time-concentration graphs included in this report indicate that the chloride, sulfate, and TDS concentrations are consistent with historical measurements. The concentrations in well MW-4, which were high in 2011, have returned to historical levels and remain there. The concentrations of chloride and sulfate are well below the State of Washington water quality criteria value of 250 milligrams per liter for both parameters.



David Traub  
Site Lead, S.M. Stoller Corporation



Date

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<b>Legend</b> ● WELL TO BE SAMPLED ● WATER LEVEL ONLY - - - SITE BOUNDARY		<b>U.S. DEPARTMENT OF ENERGY</b> <small>GRAND JUNCTION, COLORADO</small>	<small>Work Performed by</small> <b>S.M. Stoller Corporation</b> <small>Under DOE Contract No. DE-AM01-07LM00080</small>
		<b>Planned Sampling Map</b> <b>Sherwood, WA, Disposal Site</b> <b>July 2013</b>	
		<small>DATE PREPARED:</small> <b>June 13, 2013</b>	<small>FILENAME:</small> <b>S1035400</b>

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*Sherwood, Washington, 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>Sherwood, Washington</u>	<b>Date(s) of Water Sampling</b>	<u>July 17, 2013</u>
<b>Date(s) of Verification</b>	<u>September 17, 2013</u>	<b>Name of Verifier</b>	<u>Stephen Donovan</u>

	<b>Response (Yes, No, NA)</b>	<b>Comments</b>
1. Is the SAP the primary document directing field procedures? List any Program Directives or other documents, SOPs, instructions.	<u>Yes</u>	<u>Work Order letter dated June 17, 2013.</u>
2. Were the sampling locations specified in the planning documents sampled?	<u>Yes</u>	
3. Were calibrations conducted as specified in the above-named documents?	<u>Yes</u>	<u>Calibration was performed on July 17, 2013.</u>
4. Was an operational check of the field equipment conducted daily? Did the operational checks meet criteria?	<u>Yes</u> <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. Were wells categorized correctly?	<u>Yes</u>	
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling? Did the water level stabilize prior to sampling? Did pH, specific conductance, and turbidity measurements meet criteria prior to sampling? Was the flow rate less than 500 mL/min?	<u>Yes</u> <u>Yes</u> <u>Yes</u> <u>Yes</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 at location MW-4.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated 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 the true identities of the QC samples documented?	Yes	Location ID 2100 was used for the duplicate sample.
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Was all pertinent information documented on the field data sheets?	Yes	
18. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
19. Were water levels measured at the locations specified in the planning documents?	Yes	

## Laboratory Performance Assessment

### General Information

Requisition No. (RIN): 13075481  
Sample Event: July 17, 2013  
Site(s): Sherwood, Washington  
Laboratory: ALS Laboratory Group, Fort Collins, Colorado  
Work Order No.: 1307269  
Analysis: Inorganics  
Validator: Stephen Donivan  
Review Date: September 17, 2013

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

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Chloride, Cl	MIS-A-045	SW-846 9056	SW-846 9056
Sulfate, SO <sub>4</sub>	MIS-A-045	SW-846 9056	SW-846 9056
TDS	WCH-A-033	MCAWW 160.1	MCAWW 160.1

### Data Qualifier Summary

None of the analytical results required qualification.

### Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received four samples on July 18, 2013, accompanied by a Chain of Custody form. The Chain of Custody 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 Chain of Custody was complete with no errors or omissions. A copy of the air bill was included in the receiving documentation.

### Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced cooler at 1.0 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

## Detection and Quantitation Limits

The method detection limit (MDL) was reported for all 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. The reported MDLs for all 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. 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 are no initial or continuing calibration requirements associated with the determination of TDS.

### *Method SW-846 9056, Chloride and Sulfate*

Initial calibrations were performed using five calibration standards on July 12, 2013. The correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration checks were made at the required frequency with all calibration checks meeting the acceptance criteria.

## 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 method blank and calibration blank results were below the MDL for all analytes with the exception of the ninth sulfate calibration blank analyzed on July 24, 2013. The samples associated with this blank were re-analyzed with an acceptable calibration blank.

## Matrix Spike Analysis

Matrix spike samples are used to measure method performance in the sample matrix. The spike recoveries met the acceptance criteria for all analytes evaluated.

## Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for replicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no

greater than the PQL. The replicate results met these criteria, demonstrating acceptable laboratory 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.

#### Completeness

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

#### Chromatography Peak Integration

The integration of analyte peaks was reviewed for all ion chromatography data. There were no manual integrations performed and all peak integrations were satisfactory.

#### Electronic Data Deliverable (EDD) File

The EDD file arrived on August 5, 2013. 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: 13075481    Lab Code: PAR    Validator: Stephen Donovan    Validation Date: 09/17/2013  
Project: Sherwood    Analysis Type:  Metals     General Chem     Rad     Organics  
# of Samples: 4    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

All analyses were completed within the applicable holding times.

Detection Limits

The reported detection limits are equal to or below contract requirements.

Field/Trip Blanks

Field Duplicates

There was 1 duplicate evaluated.

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

**RIN:** 13075481      **Lab Code:** PAR      **Date Due:** 08/15/2013  
**Matrix:** Water      **Site Code:** SHE01      **Date Completed:** 08/06/2013

Analyte	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	CCV	CCB						
CHLORIDE	07/24/2013	0.000	1.0000	OK	OK	OK	95.00				
CHLORIDE	07/25/2013							88.0	88.0	1.00	
SULFATE	07/24/2013	0.000	1.0000	OK	OK	OK	95.00				
SULFATE	07/30/2013			OK	OK			99.0	100.0	1.00	
TOTAL DISSOLVED SOLIDS	07/24/2013					OK	108.00				

## **Sampling Quality Control Assessment**

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

### Sampling Protocol

Sample results for all monitoring wells met the Category I or II low-flow sampling criteria and were qualified with an “F” flag in the database, indicating the wells were purged and sampled using the low-flow sampling method. The groundwater sample results for wells MW-2B and MW-4 were further qualified with a “Q” flag in the database indicating the data are considered qualitative because these are Category II wells.

### Equipment Blank Assessment

An equipment blank was not required because dedicated equipment was used to collect all samples.

### Field Duplicate Assessment

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. A duplicate sample was collected from location MW-4. The duplicate results met the criteria, demonstrating acceptable overall precision.

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

RIN: 13075481    Lab Code: PAR    Project: Sherwood    Validation Date: 09/17/2013

Duplicate: 2100

Sample: MW-4

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
CHLORIDE	1.1			2	1.1			2			MG/L
SULFATE	3.9			2	3.5			2			MG/L
TOTAL DISSOLVED SOLIDS	360			1	290			1	NA		MG/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:

Stephen Donovan  
Stephen Donovan

10-10-2013  
Date

Data Validation Lead:

Stephen Donovan  
Stephen Donovan

10-10-2013  
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 environmental database. The application compares the new data set (in standard environmental database units) 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 review should include an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

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 Beginning 01/01/2003**

Laboratory: ALS Laboratory Group

RIN: 13075481

Report Date: 09/17/2013

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
SHE01	MW-2B	0001	07/17/2013	Chloride	3		FQ	2.6		FQ	0.56		FQ	16	0	No
SHE01	MW-4	N001	07/17/2013	Sulfate	3.9		FQ	220		FQ	7.4		FQ	12	0	NA
SHE01	MW-4	N002	07/17/2013	Total Dissolved Solids	290		FQ	990		FQ	300		FQ	12	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.

NA: Data are not normally or lognormally distributed.

# **Attachment 2**

## **Data Presentation**

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## **Groundwater Quality Data**

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**Groundwater Quality Data by Location (USEE100) FOR SITE SHE01, Sherwood Disposal Site**

REPORT DATE: 09/17/2013

Location: MW-10 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Chloride	mg/L	07/17/2013	N001	224	-	234	2.4		F	#	1	
Oxidation Reduction Potential	mV	07/17/2013	N001	224	-	234	85		F	#		
pH	s.u.	07/17/2013	N001	224	-	234	6.81		F	#		
Specific Conductance	umhos/cm	07/17/2013	N001	224	-	234	1030		F	#		
Sulfate	mg/L	07/17/2013	N001	224	-	234	28		F	#	2.5	
Temperature	C	07/17/2013	N001	224	-	234	18.8		F	#		
Total Dissolved Solids	mg/L	07/17/2013	N001	224	-	234	640		F	#	20	
Turbidity	NTU	07/17/2013	N001	224	-	234	0.52		F	#		

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**Groundwater Quality Data by Location (USEE100) FOR SITE SHE01, Sherwood Disposal Site**

REPORT DATE: 09/17/2013

Location: MW-2B WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Chloride	mg/L	07/17/2013	0001	47.4	-	57.4	3		FQ	#	0.2	
Oxidation Reduction Potential	mV	07/17/2013	N001	47.4	-	57.4	57		FQ	#		
pH	s.u.	07/17/2013	N001	47.4	-	57.4	6.52		FQ	#		
Specific Conductance	umhos/cm	07/17/2013	N001	47.4	-	57.4	329		FQ	#		
Sulfate	mg/L	07/17/2013	0001	47.4	-	57.4	4.2		FQ	#	0.5	
Temperature	C	07/17/2013	N001	47.4	-	57.4	15		FQ	#		
Total Dissolved Solids	mg/L	07/17/2013	0001	47.4	-	57.4	220		FQ	#	20	
Turbidity	NTU	07/17/2013	N001	47.4	-	57.4	12.5		FQ	#		

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**Groundwater Quality Data by Location (USEE100) FOR SITE SHE01, Sherwood Disposal Site**

REPORT DATE: 09/17/2013

Location: MW-4 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data QA		
Chloride	mg/L	07/17/2013	N001	184	-	197.5	1.1	FQ	#	0.4	
Chloride	mg/L	07/17/2013	N002	184	-	197.5	1.1	FQ	#	0.4	
Oxidation Reduction Potential	mV	07/17/2013	N001	184	-	197.5	-90	FQ	#		
pH	s.u.	07/17/2013	N001	184	-	197.5	6.83	FQ	#		
Specific Conductance	umhos/cm	07/17/2013	N001	184	-	197.5	543	FQ	#		
Sulfate	mg/L	07/17/2013	N001	184	-	197.5	3.9	FQ	#	1	
Sulfate	mg/L	07/17/2013	N002	184	-	197.5	3.5	FQ	#	1	
Temperature	C	07/17/2013	N001	184	-	197.5	16.8	FQ	#		
Total Dissolved Solids	mg/L	07/17/2013	N001	184	-	197.5	360	FQ	#	20	
Total Dissolved Solids	mg/L	07/17/2013	N002	184	-	197.5	290	FQ	#	20	
Turbidity	NTU	07/17/2013	N001	184	-	197.5	9.31	FQ	#		

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 SHE01, Sherwood Disposal Site**  
**REPORT DATE: 09/17/2013**

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Time	Date	Depth From Top of Casing (Ft)	Water Elevation (Ft)
MW-10		2008.93	07/17/2013	11:55:29	228.46	1780.47
MW-2B		2116.04	07/17/2013	08:39:11	55.08	2060.96
MW-4		NA	07/17/2013	11:00:24	239.08	NA
P1		NA	07/17/2013	09:46:00	22.25	NA
P2		NA	07/17/2013	09:41:00	60.5	NA
P3		NA	07/17/2013	09:33:00	67.44	NA
P4		NA	07/17/2013	09:29:00	22.28	NA

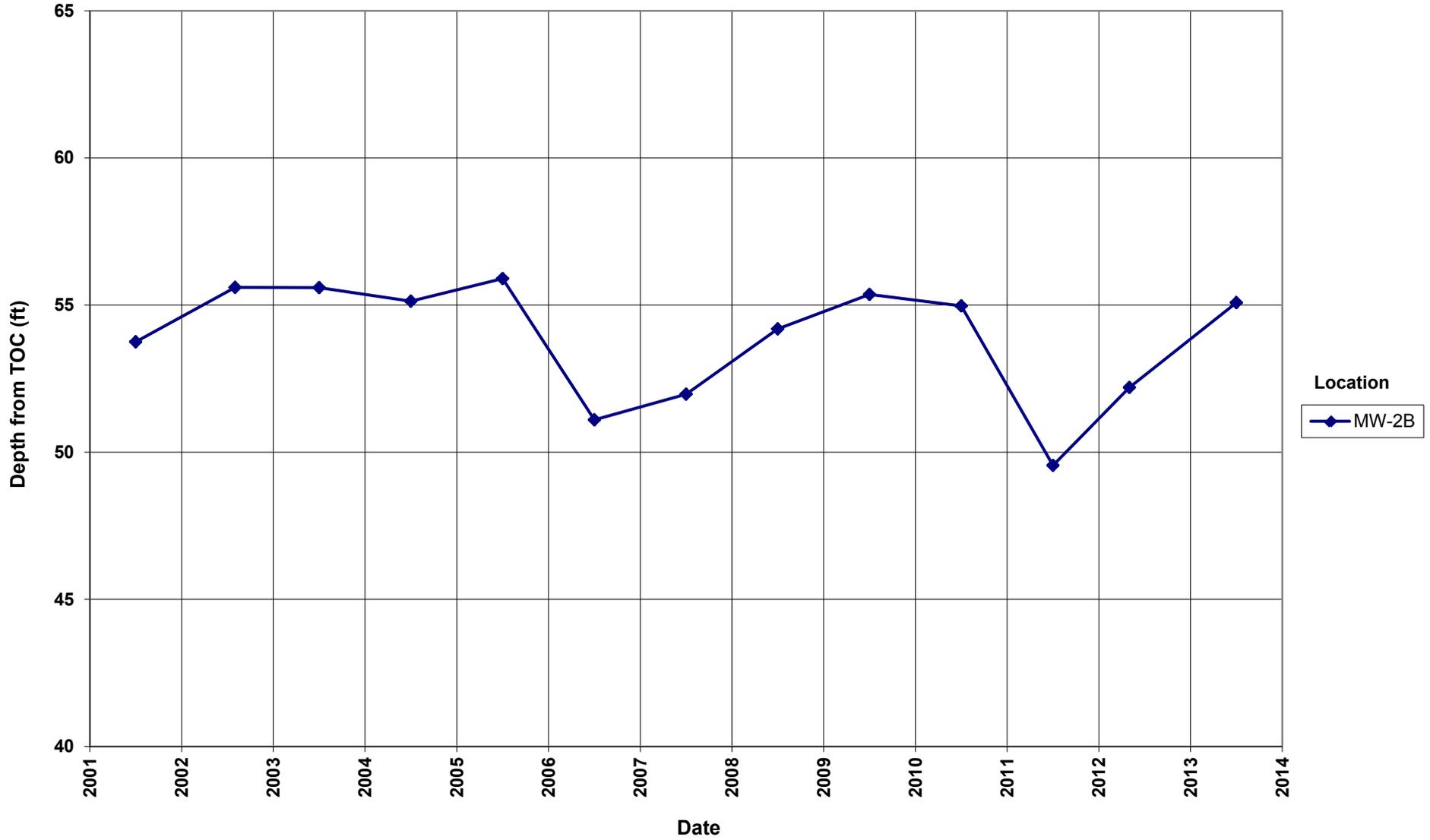
FLOW CODES: B BACKGROUND    C CROSS GRADIENT    D DOWN GRADIENT    F OFF SITE  
                   N UNKNOWN            O ON SITE            U UPGRADIENT

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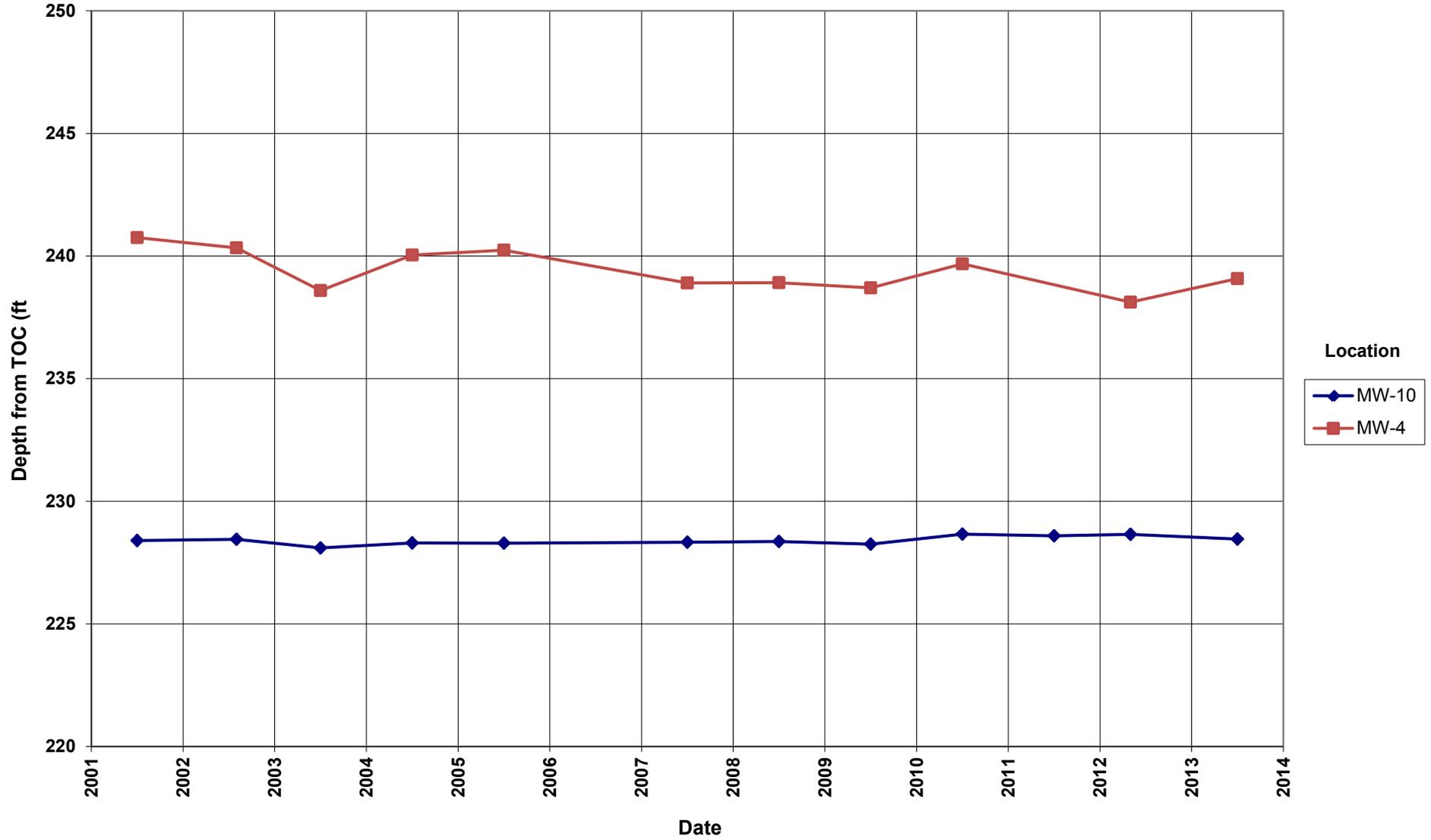
# Hydrographs

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**Sherwood Disposal Site**  
Hydrograph  
Background Well  
(Depth from Top of Casing [TOC])



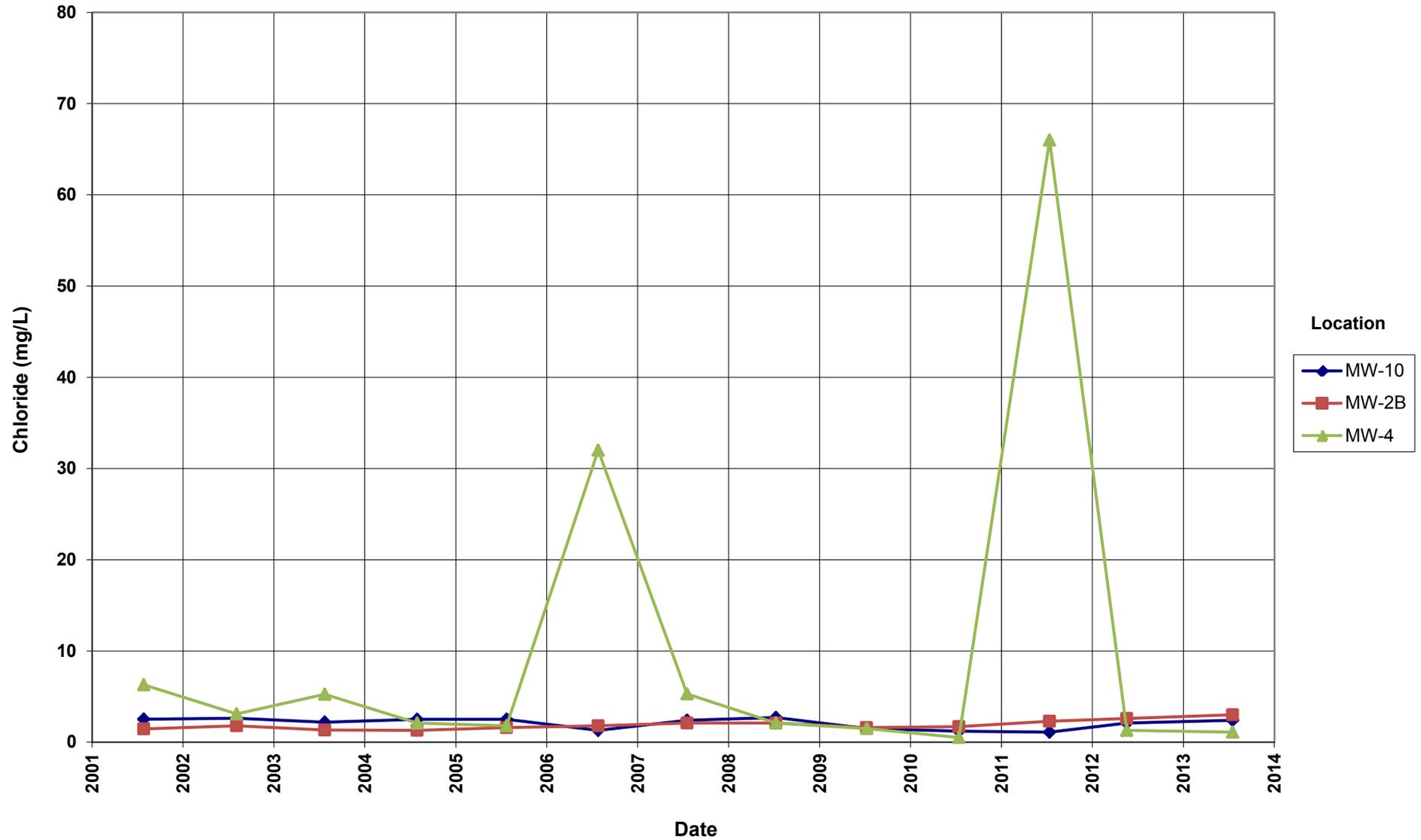
**Sherwood Disposal Site**  
Hydrograph  
(Depth from Top of Casing [TOC])



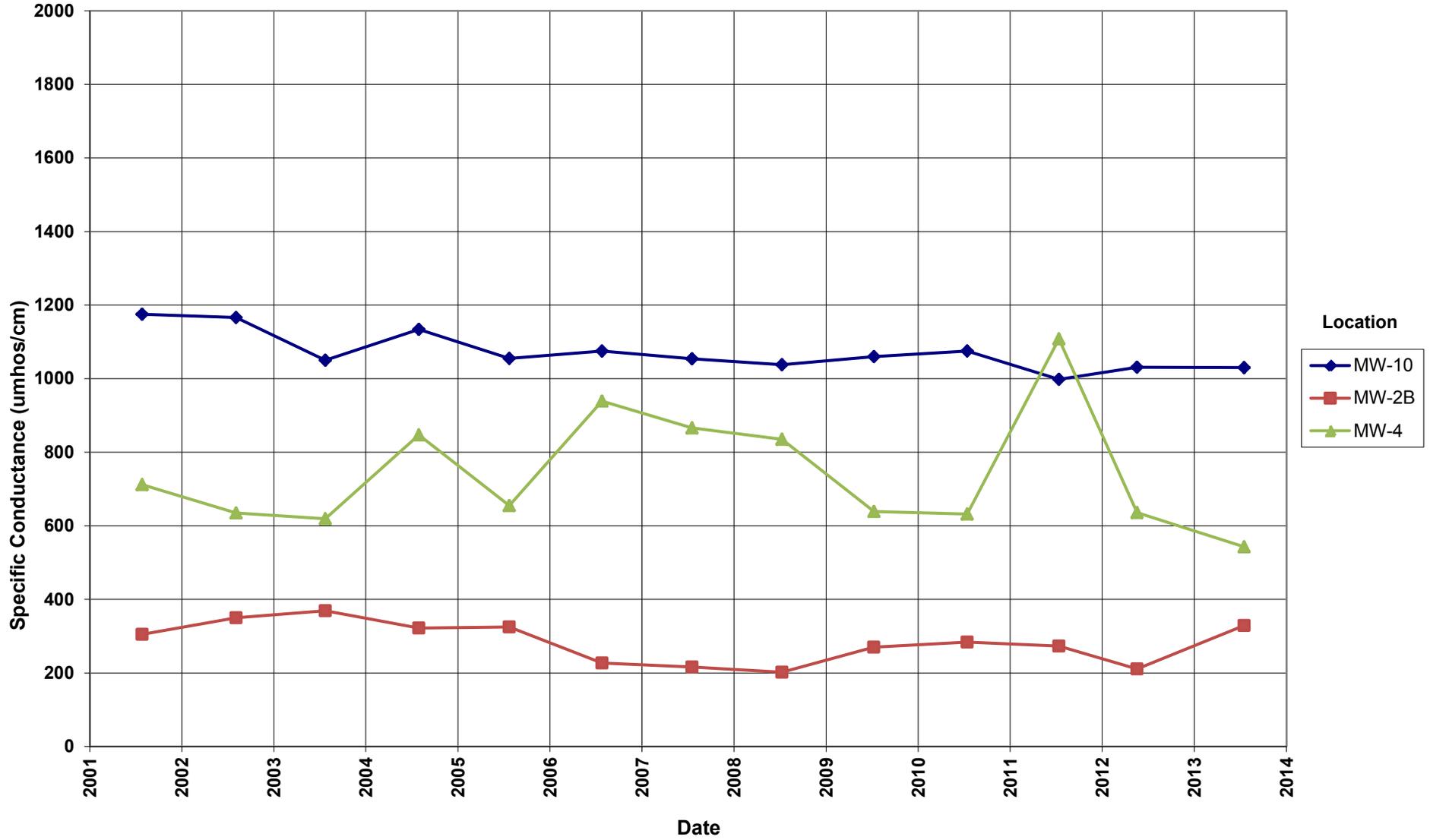
## **Time-Concentration Graphs**

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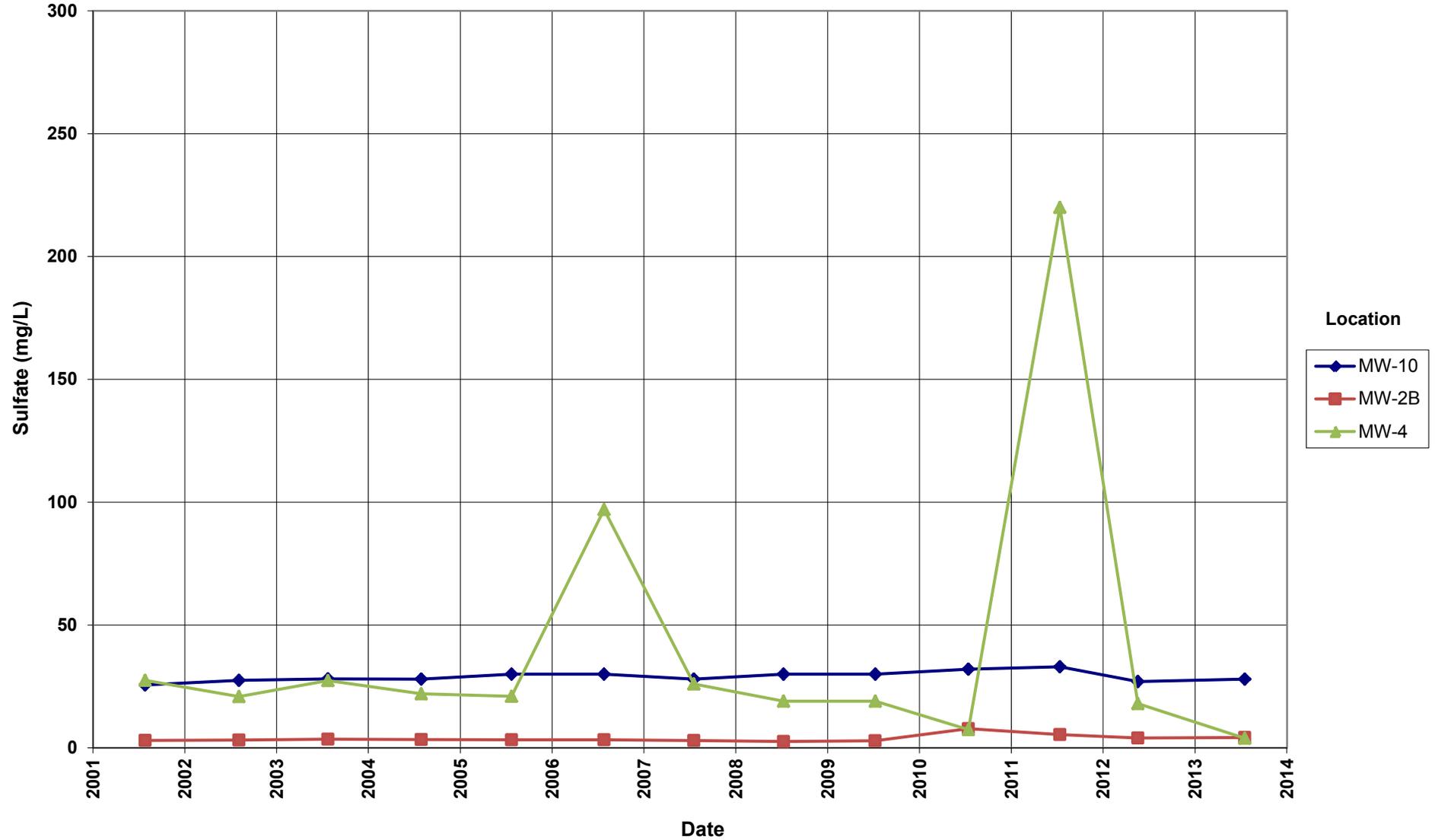
# Sherwood Disposal Site Chloride Concentration



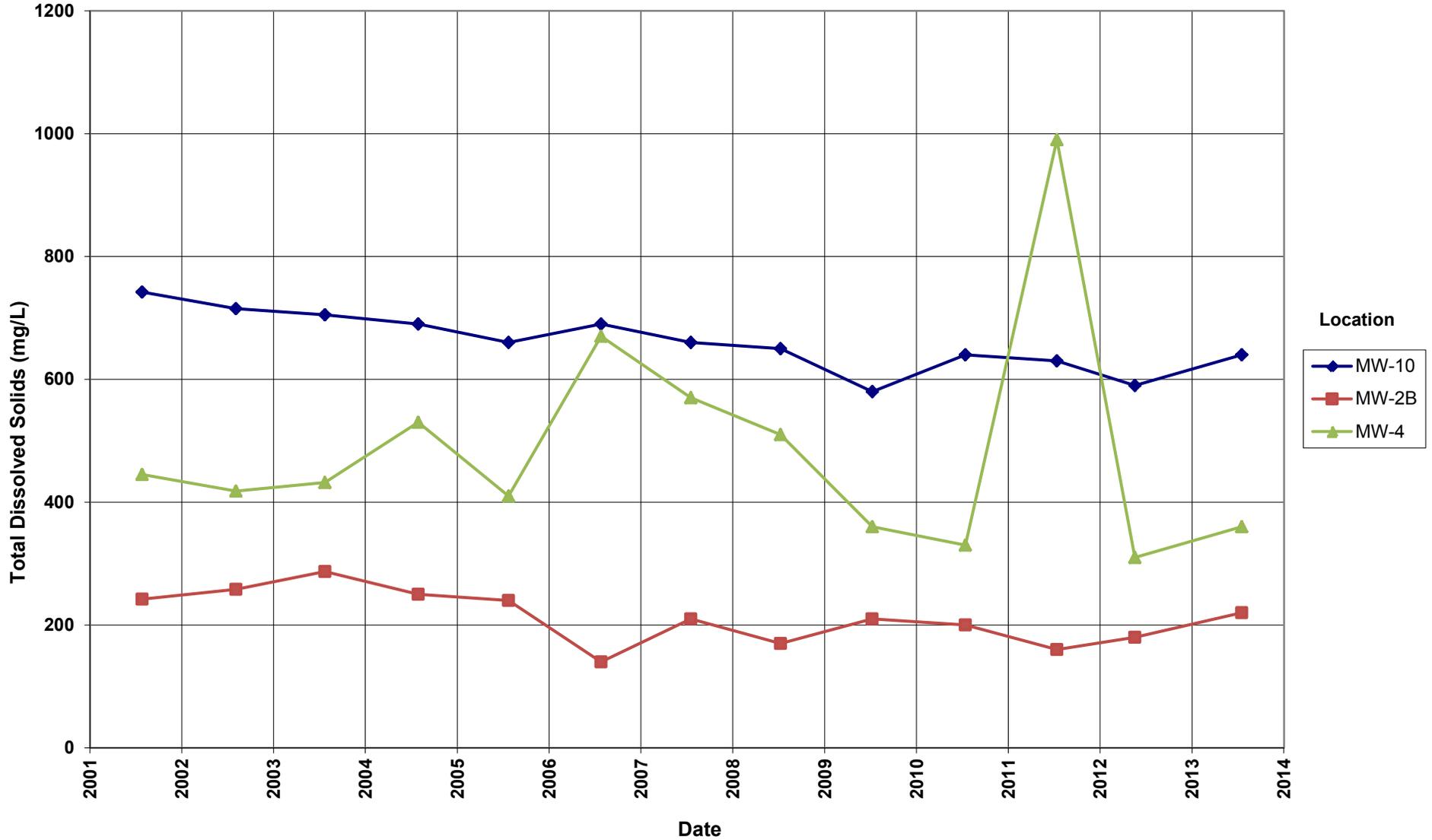
## Sherwood Disposal Site Specific Conductance Concentration



# Sherwood Disposal Site Sulfate Concentration



# Sherwood Disposal Site Total Dissolved Solids Concentration



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

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established 1959

Task Order LM-501  
Control Number 13-0646

June 17, 2013

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

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)  
July 2013 Environmental Sampling at the Sherwood, Washington, Disposal Site

REFERENCE: Task Order LM00-501-03-221-402, Sherwood, Washington, Disposal Site

Dear Mr. Bush:

The purpose of this letter is to inform you of the upcoming sampling event at Sherwood, Washington. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Sherwood Disposal Site. Water quality data will be collected at this site as part of the routine environmental sampling currently scheduled to begin the week of July 15, 2013.

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

**Monitoring Wells**

MW-2B      MW-4      MW-10

Water levels will be obtained from piezometers P1, P2, P3, and P4.

All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. Access agreements are being reviewed and are expected to be complete by the beginning of fieldwork.

Please contact me at (970) 248-6557 if you have any questions.

Sincerely,

David Traub  
Site lead

Richard Bush  
Control Number 13-0646  
Page 2

DT/lcg/lb

Enclosures (3)

cc: (electronic)

Christina Pennal, DOE  
Steve Donovan, Stoller  
Bev Gallagher, Stoller  
Lauren Goodknight, Stoller  
David Traub, Stoller  
EDD Delivery  
rc-grand.junction  
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### Sampling Frequencies for Locations at Sherwood, Washington

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
<b>Monitoring Wells</b>						
MW-2B			X			
MW-4			X			
MW-10			X			
P1					X	Water level only
P2					X	Water level only
P3					X	Water level only
P4					X	Water level only

Sampling conducted in July

### Constituent Sampling Breakdown

Site	Sherwood		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water			
<b>Approx. No. Samples/yr</b>	3	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 (NH <sub>3</sub> -N)					
Calcium					
Chloride	X		0.5	SW-846 9056	MIS-A-039
Chromium					
Gross Alpha					
Gross Beta					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO <sub>3</sub> +NO <sub>2</sub> )-N					
Potassium					
Radium-226					
Radium-228					
Selenium					
Silica					
Sodium					
Strontium					
Sulfate	X		0.5	SW-846 9056	MIS-A-044
Sulfide					
Total Dissolved Solids	X		10	SM2540 C	WCH-A-033
Total Organic Carbon					
Uranium					
Vanadium					
Zinc					
<b>Total No. of Analytes</b>	3	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*

DATE: July 31, 2013  
 TO: David Traub  
 FROM: Gretchen Baer  
 SUBJECT: Trip Report

**Site:** Sherwood, WA

**Date of Sampling Event:** July 17, 2013

**Team Members:** Gretchen Baer and Lauren Goodknight. M. Kautsky, D. Traub, and L. Sheader were also at the site on July 17, 2013.

**Number of Locations Sampled:** Three monitoring wells were sampled for total dissolved solids, chloride, and sulfate. Water levels at the four piezometers on top of the tailings dam were also collected.

**Locations Not Sampled/Reason:** All scheduled locations were sampled.

**Location Specific Information:**

Location IDs	Comments
MW-10	Cat I for this event but close to Cat II based on water level drawdown.
MW-2B	Cat II based on water level drawdown. A full equipment volume was purged before sampling. A lab QC volume (250 mL) was collected for TDS.
MW-4	Cat II based on water level drawdown. A full equipment volume was purged before sampling.

**Quality Control Sample Cross Reference:** The following are the false identifications assigned to the quality control samples.

False ID	Ticket Number	True ID	Sample Type	Associated Matrix
2100	LIQ 717	MW-4	Duplicate	Groundwater

Duplicates were collected by filling all bottles labeled with the location number first, then filling all bottles labeled with the false ID second.

**Report Identification Number (RIN) Assigned:** Samples were assigned to RIN 13075481. Field data sheets can be found in Crow\sms\13075481 in the FieldData folder.

**Sample Shipment:** Samples were shipped overnight by FedEx to ALS Laboratory Group from Copy Junction, 13015 W 14th Ave., Airway Heights, WA, on July 17, 2013.

**Water Level Measurements:** Water levels were collected in all three sampled wells and in the four piezometers on the tailings dam. A water level data report for these 4 piezometers (SHE01\_7232013.pdf) can be found in Crow\sms\FDCS\WATER LEVELS.

The water levels at the 4 piezometers are also summarized here:

P1: 22.25' 07/17/2013 09:46  
P2: 60.50' 07/17/2013 09:41  
P3: 67.44' 07/17/2013 09:33  
P4: 22.28' 07/17/2013 09:29

**Well Inspection Summary:** Wells were in good condition. Piezometer lid hinges are rusted and hard to open. A hammer or similar tool is necessary to open and close the lids.

**Field Variance:** None. Samples were collected according to the *Sampling and Analysis Plan for U. S. Department of Energy Office of Legacy Management Sites*.

**Equipment:** All equipment functioned properly. All wells were sampled using the low-flow procedure. Wells were sampled with dedicated bladder pumps. The Field Data Collection System was used to collect data. The times collected are in the PDT time zone.

**Regulatory:** Nothing to note.

**Institutional Controls:**

**Fences, Gates, and Locks:**

- The gate on Elijah Road (aka Sherwood Mine Road), used to access wells MW-4 and MW-10, was unlocked and open. The gate was left as-is by the samplers.
- The well at MW-4 is covered and protected from the elements, but it is not locked. The casing lid design does not allow for a lock.

**Signs:** A site boundary sign was installed at P6 on an existing pole; tamper-proof nuts were used. The site boundary sign at P2 was still there. An attempt was made to remove the nuts. Only one could be removed and it was replaced with a tamper-proof nut.

**Trespassing/Site Disturbances:** None.

**Site Issues:** Cell phone service (Verizon) was weak but available at the site.

**Disposal Cell/Drainage Structure Integrity:** Appeared to be acceptable.

**Vegetation/Noxious Weed Concerns:** There is a significant amount of vegetation growing on the riprap-covered tailings dam face. Many small pine trees are growing around well MW-4.

**Maintenance Requirements:** Some small pine trees may need to be removed in future events to maintain truck access to well MW-4.

**Safety Issues:** None.

**Access Issues:** The road leading to well MW-2B is becoming eroded by water runoff, but is still in fair condition.

**Corrective Action Required/Taken:** None.

(GB/lcg)

cc: (electronic)

Richard Bush, DOE  
Gretchen Baer, Stoller  
Steve Donovan, Stoller  
David Traub, Stoller  
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