LMS/LKP/S00514

Data Validation Package

May 2014
Groundwater Sampling at the Lakeview, Oregon, Processing Site

August 2014

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Sampling Event Summary

Site: Lakeview, Oregon, Processing Site

Sampling Period: May 21, 2014

This biennial event includes sampling six groundwater locations (five monitoring wells and one domestic well) at the Lakeview, Oregon, Processing Site. For this event, the domestic well (location 0543) could not be sampled because no one lives at the residence and the well pump is not operational. Sampling is conducted to monitor groundwater quality as a best management practice. Sampling and analysis 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). One duplicate sample was collected from location 0540. Water levels were measured at each sampled monitoring well.

The constituents monitored at the Lakeview site are manganese and sulfate. Monitoring locations that exceeded the U.S. Environmental Protection Agency (EPA) Secondary Maximum Contaminant Levels for these constituents are listed in Table 1.

Table 1. Lakeview Locations That Exceed Groundwater Standards

Analyte	EPA SMCL[a] (mg/L)	Location	Concentration (mg/L)
Manganese	0.05	0503	8.2
		0505	3.8
		0509	0.13
		0518	4.2
		0540	6.5
Sulfate	250	0503	2600
		0505	1700
		0518	400
		0540	590

mg/L = milligrams per liter
[a] SMCL = Secondary Maximum Contaminant Level (EPA, Safe Drinking Water Act)

Review of time-concentration graphs included in this report indicate that manganese and sulfate concentrations are consistent with historical measurements.

Sulfur-34 (from sulfate) was also monitored for the first time during this sampling event and the results are included in this report.

Ann Houska — 8/15/14

Ann Houska, Site Lead
The S.M. Stoller Corporation,
a wholly owned subsidiary of
Huntington Ingalls Industries

Date

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Lakeview, Oregon, Processing Site, Sample Location Map

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Lakeview, Oregon	**Date(s) of Water Sampling**	May 21, 2014
Date(s) of Verification	June 24, 2014	**Name of Verifier**	Stephen Donivan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List any Program Directives or other documents, SOPs, instructions.		Work Order letter dated May 12, 2014.
2. Were the sampling locations specified in the planning documents sampled?	No	Private well location 0543 was not sampled per the direction of the site lead.
3. Were calibrations conducted as specified in the above-named documents?	Yes	Calibrations were performed May 16, 2014.
4. Was an operational check of the field equipment conducted daily?	Yes	
Did the operational checks meet criteria?	Yes	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Were wells categorized correctly?	Yes	
7. Were the following conditions met when purging a Category I well:		
Was one pump/tubing volume purged prior to sampling?	Yes	
Did the water level stabilize prior to sampling?	Yes	
Did pH, specific conductance, and turbidity measurements meet criteria prior to sampling?	Yes	
Was the flow rate less than 500 mL/min?	Yes	

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?	NA	All wells were Category I.
Was one pump/tubing volume removed prior to sampling?		
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected at location 0608.
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 the true identities of the QC samples documented?	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. 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):	14056157
Sample Event:	May 20–21, 2014
Site(s):	Lakeview, Oregon, Disposal and Processing Sites
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Work Order No.:	1405511
Analysis:	Metals and Wet Chemistry
Validator:	Stephen Donivan
Review Date:	June 19, 2014

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 2.

Table 2. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Chloride	MIS-A-045	SW-846 9056	SW-846 9056
Metals: As, Cd, U	LMM-02	SW-846 3005A	SW-846 6020A
Metals: Ca, Fe, K, Mg, Mn, Na, SiO_2	LMM-01	SW-846 3005A	SW-846 6010B
Sulfate	MIS-A-045	SW-846 9056	SW-846 9056
Total Dissolved Solids	WCH-A-033	EPA 160.1	EPA 160.1

Data Qualifier Summary

Analytical results were qualified as listed in Table 3. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 3. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1405511-5	0540	Manganese	J	Field duplicate precision
1405511-5	0540	Sulfate	J	Field duplicate precision
1405511-6	0540 Duplicate	Manganese	J	Field duplicate precision
1405511-6	0540 Duplicate	Sulfate	J	Field duplicate precision

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 12 water samples on May 23, 2014, 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 1.8 °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 SW-846 6010B, Metals
Calibrations were performed on May 29, 2014, using three calibration standards. The calibration curve correlation coefficient value was greater than 0.995. The absolute value of the intercept was greater than 3 times the MDL, but was less than 3 times the reporting limit and all results were above the reporting limit. Initial and continuing calibration verification checks were made at the required frequency resulting in four verification checks. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range.

Method SW-846 6020A, Metals
Calibrations were performed on May 29, 2014, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency with all checks meeting the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL, the arsenic and cadmium results were not within the acceptance

range. Associated sample results that are greater than the MDL but less than 5 times the PQL are qualified with a "J" flag as estimated values. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries were stable and within acceptable ranges.

Method SW-846 9056, Chloride and Sulfate
Initial calibrations were performed using five calibration standards on April 21, 2014. 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 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 associated with the samples were below the MDL for all analytes.

Inductively Coupled Plasma Interference Check Sample Analysis

Interference check samples were analyzed at the required frequency to verify the instrumental interelement and background correction factors. All check sample results met the acceptance criteria.

Matrix Spike Analysis

Matrix spike and matrix spike duplicate (MS/MSD) samples are used to measure method performance in the sample matrix. The MS/MSD data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike concentration (as was the case with the manganese spikes). 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 Samples

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. All control sample results were acceptable.

Metals Serial Dilution

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

Completeness

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

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 File

The electronic data deliverable (EDD) file arrived on June 2, 2014. 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: 14056157 **Lab Code:** PAR **Validator:** Stephen Donivan **Validation Date:** 06/19/2014

Project: Lakeview Disposal and Processing Sites **Analysis Type:** ☑ Metals ☑ General Chem ☐ Rad ☐ Organics

# of Samples: 12 **Matrix:** WATER **Requested Analysis Completed:** Yes

Chain of Custody

Present: OK **Signed:** OK **Dated:** OK

Sample

Integrity: OK **Preservation:** OK **Temperature:** OK

Select Quality Parameters

☑ Holding Times	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 were 2 duplicates evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 14056157 **Lab Code:** PAR **Date Due:** 06/20/2014

Matrix: Water **Site Code:** LKV01 **Date Completed:** 06/03/2014

Analyte	Method Type	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	CCV	CCB								
Arsenic	ICP/MS	05/29/2014	0.0000	1.0000	OK	OK	OK	98.0	105.0	106.0	1.0	100.0	10.0	65.0
Cadmium	ICP/MS	05/29/2014	0.0000	1.0000	OK	OK	OK	107.0	106.0	106.0	0.0	103.0		133.0
Calcium	ICP/ES	05/29/2014	0.0000	1.0000	OK	OK	OK	102.0	103.0	105.0	1.0	107.0	3.0	105.0
Iron	ICP/ES	05/29/2014	0.0000	1.0000	OK	OK	OK	105.0	97.0	88.0	10.0	108.0		100.0
Magnesium	ICP/ES	05/29/2014	0.0000	1.0000	OK	OK	OK	99.0	97.0	98.0	1.0	104.0	0.0	102.0
Manganese	ICP/ES	05/29/2014	0.0000	1.0000	OK	OK	OK	104.0	99.0	101.0	2.0	94.0		106.0
Potassium	ICP/ES	05/29/2014	0.0000	1.0000	OK	OK	OK	103.0	108.0	109.0	1.0			83.0
Silicon	ICP/ES	05/29/2014	0.0000	1.0000	OK	OK	OK	104.0	93.0	89.0	0.0	93.0	0.0	88.0
Sodium	ICP/ES	05/29/2014	0.0000	1.0000	OK	OK	OK	104.0	113.0	114.0	1.0		1.0	85.0
Uranium	ICP/MS	05/29/2014	0.0000	1.0000	OK	OK	OK	104.0	111.0	110.0	1.0	103.0		90.0

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 14056157 **Lab Code:** PAR **Date Due:** 06/20/2014

Matrix: Water **Site Code:** LKV01 **Date Completed:** 06/03/2014

Analyte	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	CCV	CCB						
CHLORIDE	05/28/2014	0.000	0.9999	OK	OK	OK	98.00				
CHLORIDE	05/29/2014							100.0	99.0	0	
SULFATE	05/28/2014	0.000	0.9998	OK	OK	OK	98.00				
SULFATE	05/29/2014							97.0	97.0	0	
TOTAL DISSOLVED SOLIDS	05/28/2014					OK	101.00			3.00	

General Information

Requisition No. (RIN):	14056158
Sample Event:	May 21, 2014
Site(s):	Lakeview, Oregon, Processing Site
Laboratory:	Reston Stable Isotope Laboratory, Reston, Virginia
Analysis:	Stable Isotopes
Validator:	Stephen Donivan
Review Date:	June 19, 2014

This validation was performed according to the *Environmental Procedures Catalog* (LMS/POL/S04325), "Standard Practice for Validation of Environmental Data." The procedure was applied at Level 1, Data Deliverables Examination. 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 4.

Table 4. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
S-34/S-32 Isotope Ratio	LMW-09	NA	Mass Spectrometry

Data Qualifier Summary

None of the analytical results required qualification.

Sample Shipping/Receiving

The Reston Stable Isotope Laboratory in Reston, Virginia, received six water samples on May 23, 2014, submitted for the determination of stable hydrogen, oxygen, and sulfur isotope ratios. The analytical report was checked to confirm that all of the samples scheduled were received and analyzed.

Preservation and Holding Times

The sample shipment was received intact with the sample in the correct container type preserved correctly for the requested analyses. The sample was analyzed within the applicable holding time.

Laboratory Analysis

For sulfur isotope ratio measurements, dissolved sulfate is converted to $BaSO_4$, which is analyzed by conversion to sulfur dioxide with an elemental analyzer and subsequent analysis with a continuous flow isotope ratio mass spectrometer. Samples are analyzed simultaneously with $BaSO_4$ isotopic reference materials. No correction for oxygen isotopic composition was made to reported data.

Sulfur isotope ratios are reported in parts per thousand (per mill) relative to VCDT, defined by assigning a value of -0.3 per mill exactly to IAEA-S-1 silver sulfide.

Completeness

The electronic data deliverable was the only deliverable received for this RIN.

Electronic Data Deliverable File

The EDD files arrived on June 13, 2014.

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 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.

Equipment Blank Assessment

Dedicated equipment was used for all sampling and an equipment blank was not required.

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 0540. The duplicate manganese and sulfate results from location 0540 did not meet the criteria. The sample and duplicate manganese and sulfate results are qualified with a "J" flag as estimated values.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 14056157 Lab Code: PAR Project: Lakeview Disposal and Processing Sites Validation Date: 06/24/2014

Duplicate: 2628 Sample: 0540

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Manganese	6500			1	4700			1	32.14		UG/L
SULFATE	590			10	460			10	24.76		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 Donivan — Date: 8-15-2014

Data Validation Lead: Stephen Donivan — Date: 8-15-2014

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 01/01/2004
Laboratory: ALS Laboratory Group
RIN: 14056157
Report Date: 06/24/2014

					Current	Qualifiers		Historical Maximum	Qualifiers		Historical Minimum	Qualifiers		Number of Data Points		Statistical Outlier
Site Code	Location Code	Sample ID	Sample Date	Analyte	Result	*Lab*	*Data*	Result	*Lab*	*Data*	Result	*Lab*	*Data*	N	N Below Detect	
LKV01	0503	0001	05/21/2014	Sulfate	2600		F	2500		F	2300		FQ	7	0	No
LKV01	0505	N001	05/21/2014	Manganese	3.80		F	3.60		F	2.20		F	5	0	No
LKV01	0505	N001	05/21/2014	Sulfate	1700		F	1600		F	1600		F	5	0	NA
LKV01	0540	0002	05/21/2014	Manganese	4.70		FJ	26.0		F	5.50		F	7	0	No

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

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 LKV01, Lakeview Processing Site
REPORT DATE: 06/25/2014
Location: 0503 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	05/21/2014	N001	18.16 - 23.16	404		F	#		
Manganese	mg/L	05/21/2014	0001	18.16 - 23.16	8.2		F	#	0.00057	
Oxidation Reduction Potential	mV	05/21/2014	N001	18.16 - 23.16	27.5		F	#		
pH	s.u.	05/21/2014	N001	18.16 - 23.16	6.8		F	#		
Specific Conductance	umhos /cm	05/21/2014	N001	18.16 - 23.16	7917		F	#		
S-34/S-32	‰	05/21/2014	0002	18.16 - 23.16	12.1			#		
Sulfate	mg/L	05/21/2014	0001	18.16 - 23.16	2600		F	#	50	
Temperature	C	05/21/2014	N001	18.16 - 23.16	11.43		F	#		
Turbidity	NTU	05/21/2014	N001	18.16 - 23.16	15		F	#		

Groundwater Quality Data by Location (USEE100) FOR SITE LKV01, Lakeview Processing Site
REPORT DATE: 06/25/2014
Location: 0505 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	05/21/2014	0001	21.1 - 26.1	584		F	#		
Manganese	mg/L	05/21/2014	N001	21.1 - 26.1	3.8		F	#	0.00057	
Oxidation Reduction Potential	mV	05/21/2014	N001	21.1 - 26.1	102.9		F	#		
pH	s.u.	05/21/2014	N001	21.1 - 26.1	7.12		F	#		
Specific Conductance	umhos /cm	05/21/2014	N001	21.1 - 26.1	5646		F	#		
S-34/S-32	‰	05/21/2014	0002	21.1 - 26.1	11.66			#		
Sulfate	mg/L	05/21/2014	N001	21.1 - 26.1	1700		F	#	25	
Temperature	C	05/21/2014	N001	21.1 - 26.1	11.05		F	#		
Turbidity	NTU	05/21/2014	N001	21.1 - 26.1	0.7		F	#		

Groundwater Quality Data by Location (USEE100) FOR SITE LKV01, Lakeview Processing Site
REPORT DATE: 06/25/2014
Location: 0509 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	05/21/2014	N001	26.92 - 31.92	198		F	#		
Manganese	mg/L	05/21/2014	N001	26.92 - 31.92	0.13		F	#	0.00011	
Oxidation Reduction Potential	mV	05/21/2014	N001	26.92 - 31.92	92.2		F	#		
pH	s.u.	05/21/2014	N001	26.92 - 31.92	7.37		F	#		
Specific Conductance	umhos /cm	05/21/2014	N001	26.92 - 31.92	522		F	#		
S-34/S-32	‰	05/21/2014	0001	26.92 - 31.92	7.93			#		
Sulfate	mg/L	05/21/2014	N001	26.92 - 31.92	50		F	#	2.5	
Temperature	C	05/21/2014	N001	26.92 - 31.92	13.83		F	#		
Turbidity	NTU	05/21/2014	N001	26.92 - 31.92	0.85		F	#		

Groundwater Quality Data by Location (USEE100) FOR SITE LKV01, Lakeview Processing Site
REPORT DATE: 06/25/2014
Location: 0518 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	05/20/2014	N001	21.76 - 26.76	161		F	#		
Manganese	mg/L	05/20/2014	N001	21.76 - 26.76	4.2		F	#	0.00011	
Oxidation Reduction Potential	mV	05/20/2014	N001	21.76 - 26.76	32.9		F	#		
pH	s.u.	05/20/2014	N001	21.76 - 26.76	7.2		F	#		
Specific Conductance	umhos /cm	05/20/2014	N001	21.76 - 26.76	2472		F	#		
S-34/S-32	‰	05/21/2014	0001	21.76 - 26.76	13.5			#		
Sulfate	mg/L	05/20/2014	N001	21.76 - 26.76	400		F	#	12	
Temperature	C	05/20/2014	N001	21.76 - 26.76	10.84		F	#		
Turbidity	NTU	05/20/2014	N001	21.76 - 26.76	9.71		F	#		

Groundwater Quality Data by Location (USEE100) FOR SITE LKV01, Lakeview Processing Site
REPORT DATE: 06/25/2014
Location: 0540 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	05/21/2014	0001	25.04 - 30.04	68		F	#		
Manganese	mg/L	05/21/2014	0001	25.04 - 30.04	6.5		FJ	#	0.00011	
Manganese	mg/L	05/21/2014	0002	25.04 - 30.04	4.7		FJ	#	0.00011	
Oxidation Reduction Potential	mV	05/21/2014	N001	25.04 - 30.04	81		F	#		
pH	s.u.	05/21/2014	N001	25.04 - 30.04	6		F	#		
Specific Conductance	umhos /cm	05/21/2014	N001	25.04 - 30.04	982		F	#		
S-34/S-32	‰	05/21/2014	0003	25.04 - 30.04	1.45			#		
S-34/S-32	‰	05/21/2014	0004	25.04 - 30.04	1.17			#		
Sulfate	mg/L	05/21/2014	0001	25.04 - 30.04	590		FJ	#	5	
Sulfate	mg/L	05/21/2014	0002	25.04 - 30.04	460		FJ	#	5	
Temperature	C	05/21/2014	N001	25.04 - 30.04	12.76		F	#		
Turbidity	NTU	05/21/2014	N001	25.04 - 30.04	18.1		F	#		

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 LKV01, Lakeview Processing Site
REPORT DATE: 06/24/2014

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Time	Date	Depth From Top of Casing (Ft)	Water Elevation (Ft)
0503	D	4747.73	05/21/2014	09:35:21	11.65	4736.08
0505	D	4744.64	05/21/2014	10:30:01	9	4735.64
0509	D	4742.14	05/21/2014	12:45:57	7.82	4734.32
0518	D	4739.79	05/20/2014	17:15:09	6.98	4732.81
0540	D	4747.89	05/21/2014	11:40:35	9.17	4738.72

FLOW CODES: B BACKGROUND C CROSS GRADIENT D DOWN GRADIENT F OFFSITE
N UNKNOWN O ONSITE U UPGRADIENT

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Hydrograph

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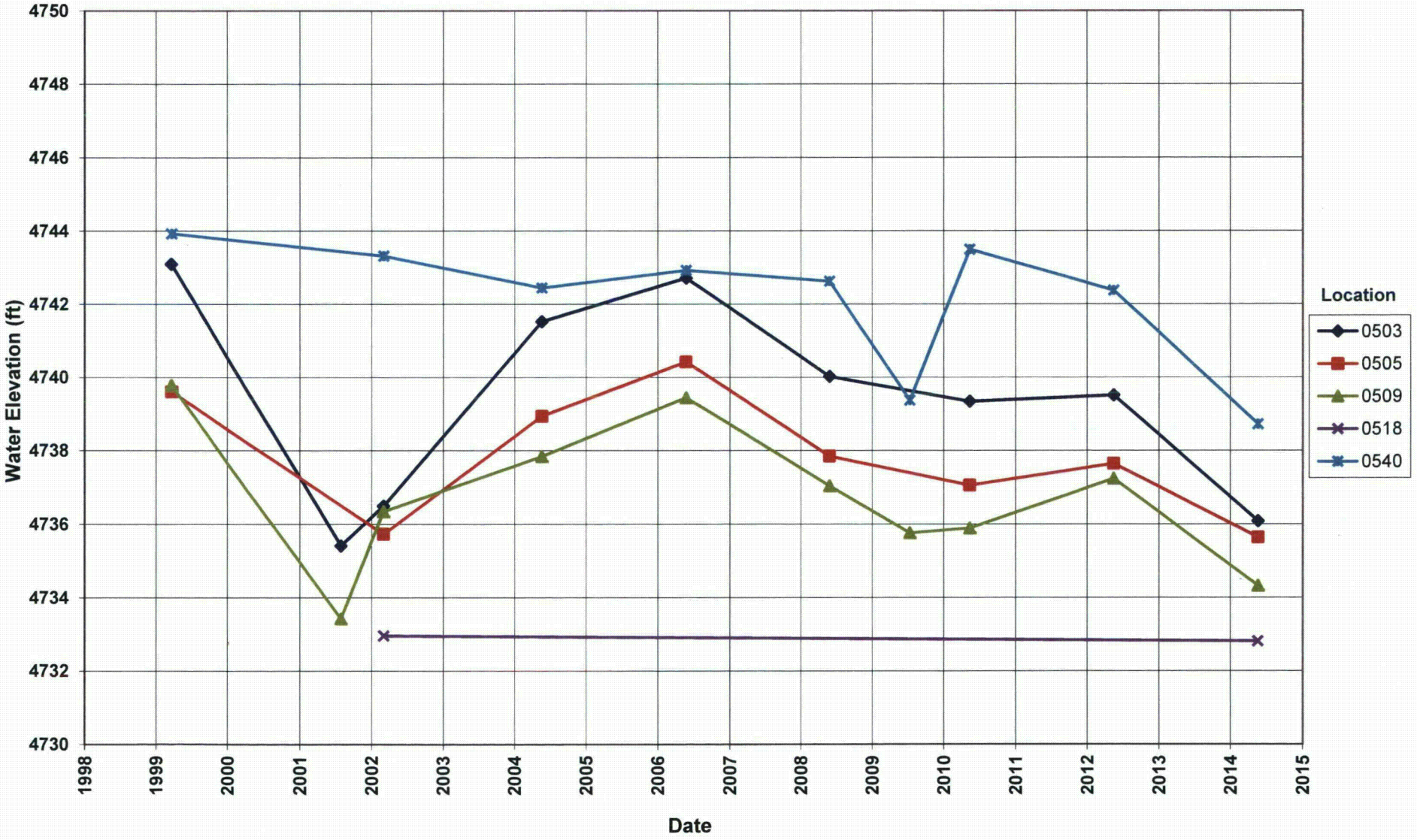
Lakeview Processing Site
Hydrograph



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Time-Concentration Graphs

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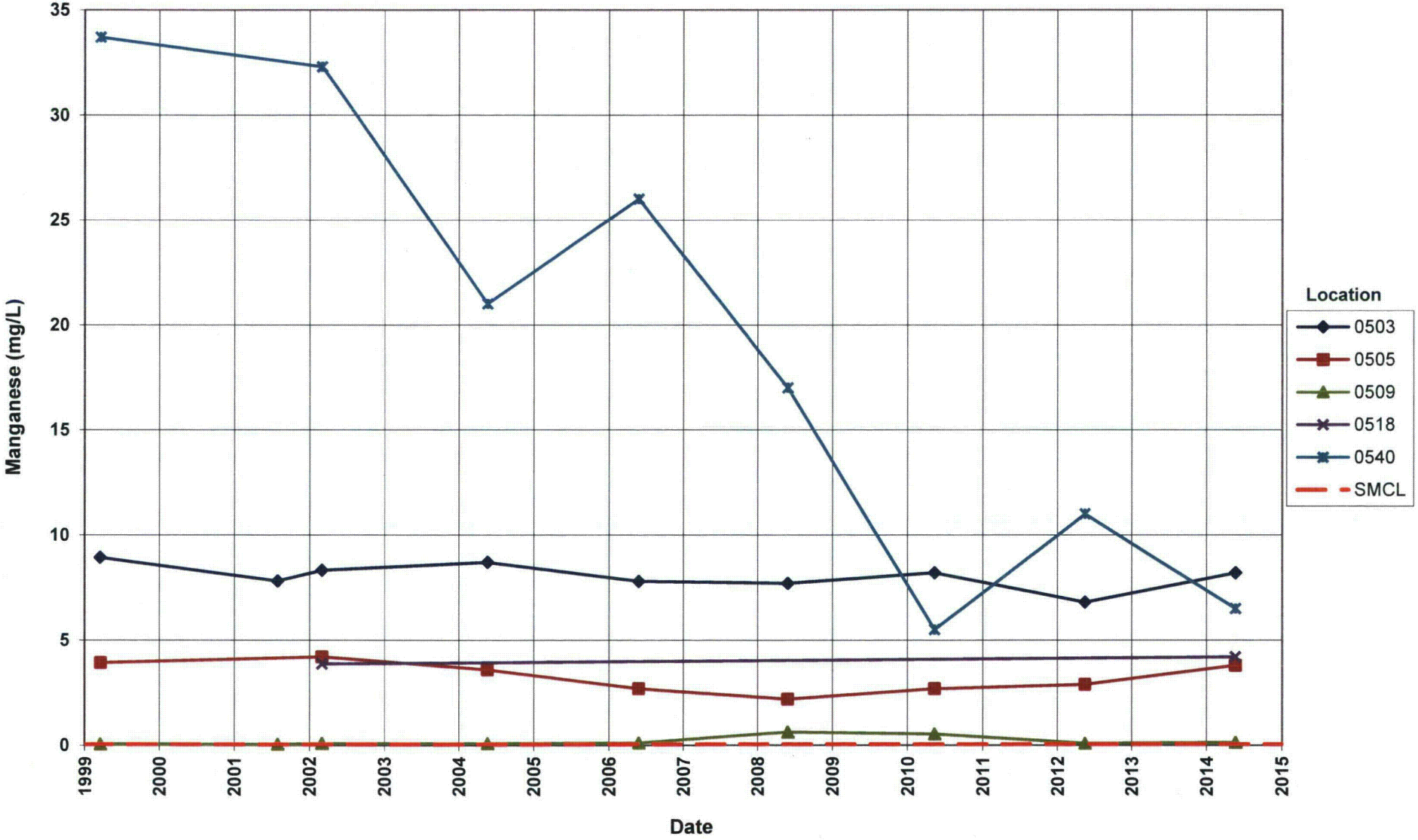
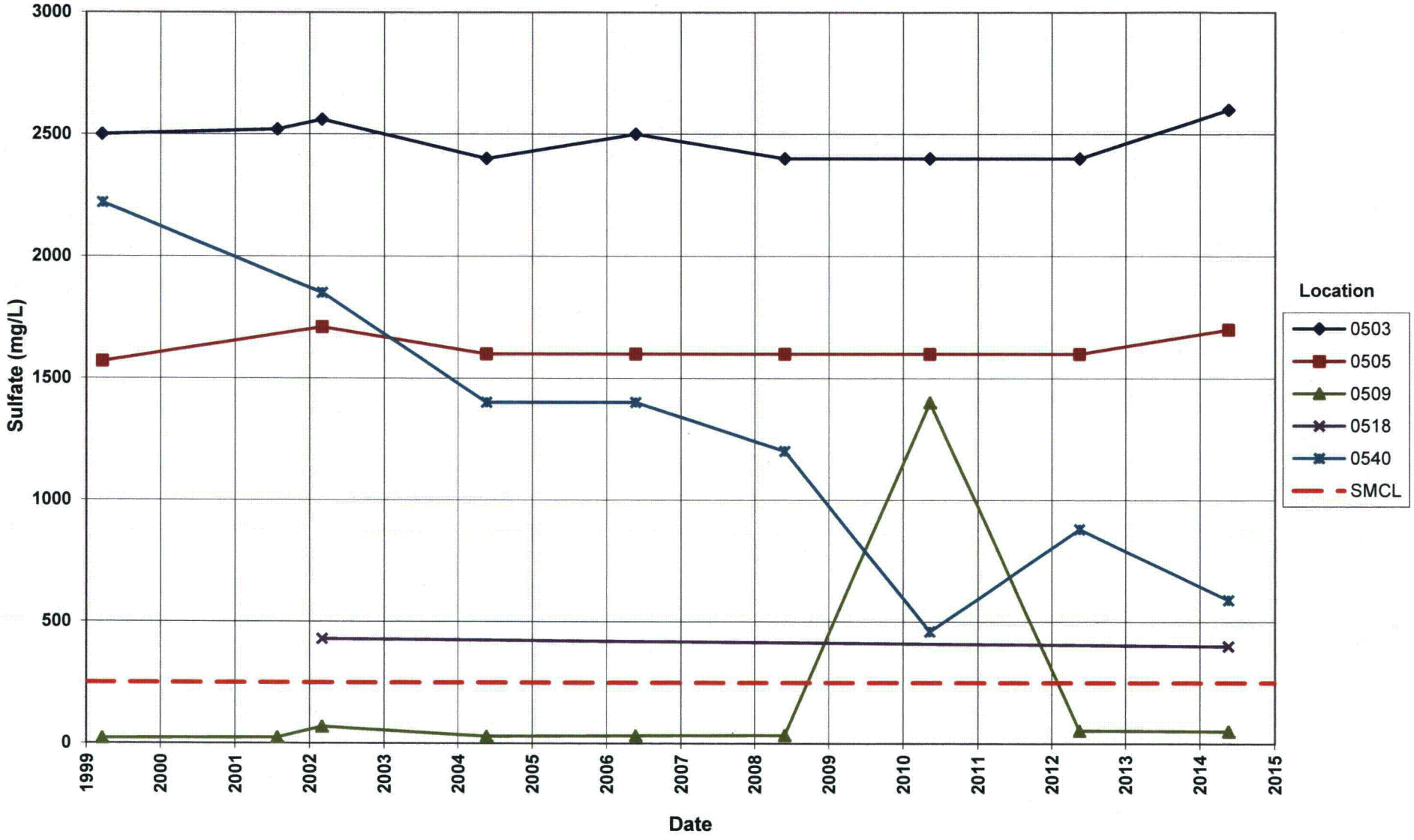
Lakeview Processing Site
Manganese Concentration

Secondary Maximum Contaminant Level (SMCL) = 0.05 mg/L



Lakeview Processing Site
Sulfate Concentration
Secondary Maximum Contaminant Level = 250 mg/L



Attachment 3
Sampling and Analysis Work Order

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Stoller

May 12, 2014

Task Order LM00-501
Control Number 14-0513

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

SUBJECT: Contract No. DE-AM01-07LM00060, The S.M. Stoller Corporation, a wholly owned subsidiary of Huntington Ingalls Industries (Stoller)
May 2014 Environmental Sampling at the Lakeview, Oregon, Disposal and Processing Sites

REFERENCE: Task Order LM00-501-02-109, Lakeview, Oregon, Disposal and Processing Sites

Dear Ms. Dayvault:

The purpose of this letter is to inform you of the upcoming sampling event at Lakeview, Oregon. Enclosed are the map and tables specifying sample locations and analytes for groundwater monitoring at the Lakeview disposal and processing sites. Water quality data will be collected at the disposal and processing site as part of the routine environmental sampling currently scheduled to occur between May 19 and May 23, 2014. The processing site sampling is consistent with Appendix A of the *Groundwater Compliance Action Plan for the Lakeview, Oregon, Processing Site,* June 2010, which adds sampling of monitoring well 518 and the inclusion of a sulfur isotope analysis at all sampled processing site wells to the routine sampling.

The following lists show the monitoring wells (with zone of completion) and domestic well that are scheduled to be sampled during this event.

MONITORING WELLS

Processing Site

503 Sp 505 Sp 509 Sp 540 Al 518 Sp

Disposal Site

515 Sp 603 Al 604 Al 605 Al 606 Cl 607 Al 608 Al 609 Cl
602 Al

*NOTE: Al = alluvium; Cl = Lean Clays, Sandy Clays, or Gravelly Clays; Sp = Sand or Gravelly Sand, Poorly Graded

A SUBSIDIARY OF HUNTINGTON INGALLS INDUSTRIES
2597 Legacy Way • Grand Junction, CO 81503-1789 • Telephone (970) 248-6000 • Fax (970) 248-6040

Domestic Well
543

All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. Additionally, all monitoring wells will be developed during this sampling event prior to commencing sampling.

Private property pre-access notifications will be completed before the beginning of fieldwork.

Please contact me at (970) 248-6579 if you have any questions.

Sincerely,

Ann M. Houska

Ann Houska
Site Lead

AH/lcg/lb

Enclosures (4)

cc: (electronic)
Christina Pennal, DOE
Steve Donivan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
Ann Houska, Stoller
EDD Delivery
rc-grand.junction
File: LKV 410.02(A)

Sampling Frequencies for Locations at Lakeview, Oregon

Location ID	Quarterly	Semiannually	Annually	Biennially	Every 5 years	Notes
Monitoring Wells						
LKV01 - Processing Site						
503				Even year		Next sampling in 5/2014
505				Even year		Next sampling in 5/2014
509				Even year		Next sampling in 5/2014
518				Even year		Next sampling in 5/2014
540				Even year		Next sampling in 5/2014
LKV02 - Disposal Site						
515					X	Every 5 years; next in 5/2014
602					X	Every 5 years; next in 5/2014
603					X	Every 5 years; next in 5/2014
604					X	Every 5 years; next in 5/2014
605					X	Every 5 years; next in 5/2014
606					X	Every 5 years; next in 5/2014
607					X	Every 5 years; next in 5/2014
608					X	Every 5 years; next in 5/2014
609					X	Every 5 years; next in 5/2014
Private Wells						
LKV01 - Processing Site						
543				Even year		Next sampling in 5/2014

Sampling conducted in May.

Constituent Sampling Breakdown

Site	Lakeview				
Analyte	**Groundwater**		**Required Detection Limit (mg/L)**	**Analytical Method**	**Line Item Code**
Approx. No. Samples/yr	9 every 5 yrs.; 6 every 2 yrs.				
Field Measurements					
Alkalinity	X				
Dissolved Oxygen					
Redox Potential	X				
pH	X				
Specific Conductance	X				
Turbidity	X				
Temperature	X				
Laboratory Measurements	***Disposal***	***Processing***			
Aluminum					
Ammonia as N (NH_3-N)					
Arsenic	X		0.0001	SW-846 6020	LMM-02
Cadmium	X		0.001	SW-846 6020	LMM-02
Calcium	X		5	SW-846 6010	LMM-01
Chloride	X		0.5	SW-846 9056	WCH-A-039
Gross Alpha					
Gross Beta					
Iron	X		0.05	SW-846 6020	LMM-02
Lead					
Magnesium	X		5	SW-846 6010	LMM-01
Manganese	X	X	0.005	SW-846 6010	LMM-01
Molybdenum					
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO_3+NO_2)-N					
Potassium	X		1	SW-846 6010	LMM-01
Radium-226					
Radium-228					
Selenium					
Silica	X		0.1	SW-846 6010	LMM-01
Sodium	X		1	SW-846 6010	LMM-01
Strontium					
Sulfate	X	X	0.5	SW-846 9056	MIS-A-044
Sulfide					
Sulfur-34 (from Sulfate SO_4)		X	n/a	Mass Spectrometry	LMW-09
Total Dissolved Solids	X		10	SM2540 C	WCH-A-033
Total Organic Carbon					
Uranium	X		0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
Total No. of Analytes	13	3			

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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Stoller

Memorandum

DATE: June 16, 2014

TO: Ann Houska

FROM: David Atkinson

SUBJECT: Sampling trip report

Site: Lakeview, OR, Processing and Disposal Sites.

Dates of Sampling Event: 5/20/2014 – 5/21/2014

Team Members: David Atkinson, Alison Kuhlman.

Number of Locations Sampled: Samples were collected from 5 monitoring well locations at the processing site, and 5 monitoring well locations at the disposal site. In addition, 1 duplicate sample was collected at the processing site, and 1 duplicate sample at the disposal site.

Locations Not Sampled/Reason: Locations 0602, 0603, 0604, and 0605 at the disposal site were dry and could not be sampled. Private well location 0543 at the processing site was not sampled per the direction of the site lead.

Location Specific Information: At processing site location 0518, the casing was slanted and drop tubing had to be installed (to approximately 3 ft. above the bottom of the well) prior to sampling. Turbidity less than 10 NTUs could not be reached at two of the processing site wells (see Field Variance section), the samplers recommend well redevelopment be conducted on the processing site wells prior to the next round of sampling.

Quality Control Sample Cross Reference: The following table summarizes the QC samples taken during the sampling event.

Sample Date/Time	Sample Type	False ID	True ID	Ticket #
5-21-14/1200	Duplicate	2628	0540	MGR 433
5-21-14/1200	Duplicate	2604	0540	MGR 454
5-21-14/1900	Duplicate	2793	0608	MGR 419

RIN Number Assigned: All disposal site samples were assigned to RIN 14056157. Sulfur isotope samples collected at the processing site and duplicate sample 2604 were assigned to RIN 14056158. All other processing site samples were assigned to RIN 14056157.

Sample Shipment: Samples assigned to RIN 14056157 were shipped to ALS Laboratory Group in Fort Collins, CO, and samples assigned to RIN 14056158 were shipped to Reston Stable Isotope Lab in Reston, VA. All samples were shipped priority overnight via FedEx from Pendleton, OR, on May 22, 2014.

Water Level Measurements: Water levels were measured at all wells prior to the start of sampling.

Well Inspection Summary: All wells were in good condition except for processing site location 0509. The ground has eroded away from the concrete pad, and the protective casing is now loose and could cause damage to the inner casing if livestock were to push hard against the outer casing.

Field Variance: Turbidity less than 10 NTUs could not be reached at processing site wells 0503, and 0540. After turbidity had stabilized above 10 NTUs, the samplers collected samples through 0.45 micron filters.

Equipment: All equipment functioned properly.

Institutional Controls:

Fences, Gates, Locks: No issues identified.
Trespassing/Site Disturbances: None observed.

Site Issues:

Disposal Cell/Drainage Structure Integrity: Disposal cell appeared to be in good condition.
Vegetation/Noxious Weed Concerns: None.
Maintenance Requirements: None
Access Issues: None

Corrective Action Required: Replace concrete pad around processing site well 0509, redevelop processing site wells.

cc: (electronic)
Jalena Dayvault, DOE
Steve Donivan, Stoller
Ann Houska, Stoller
EDD Delivery

Data Validation Package
for the Lakeview, Oregon, Processing Site,
May 2014

The U.S. Department of Energy (DOE) has prepared a Data Validation Package containing the groundwater sampling monitoring data generated from the May 2014 sampling event at the Lakeview, Oregon, Processing Site. This package includes worksheets and reports that document the sampling activities and validation procedures conducted. **At your request, you are receiving a hard copy of the report.**

The report is also available for your review on the Internet at the DOE Office of Legacy Management (LM) website – http://energy.gov/lm. From the LM website home page, select the LM SITES MAP. Then select Lakeview Sites from the LM SITES list in the right column. The report will be available on the Lakeview Processing Site page of the LM website under Site Documents and Links.

U.S. DEPARTMENT OF ENERGY | Legacy Management