

Data Validation Package

August 2013
Groundwater Sampling at the
Grand Junction, Colorado, Disposal Site

November 2013

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Sampling Event Summary

Site: Grand Junction, Colorado, Disposal Site

Sampling Period: August 7, 2013

The 1998 *Interim Long-Term Surveillance Plan for the Cheney Disposal Site Near Grand Junction, Colorado* requires annual monitoring to assess the performance of the disposal cell. Monitoring wells 0731, 0732, and 0733 were sampled as specified in the plan. Sampling and analyses were conducted in accordance with *Sampling and Analysis Plan for the U.S. Department of Energy Office of Legacy Management Sites (LMS/PRO/S04351, continually updated)*.

The water level was measured at each sampled well. The water level in well 0733, located in the disposal cell, is lower than water levels in adjacent wells 0731 and 0732, indicating a hydraulic gradient toward the disposal cell. The attached hydrograph shows stable water levels in well 0733 over the past several years.

Results from this sampling event were generally consistent with results from the past as shown in the attached concentration versus time graphs. There have been no large changes in contaminant concentration observed over the last several years.

- Molybdenum concentrations continue to be significantly below the maximum concentration limit (MCL) of 0.1 milligram per liter (mg/L).
- Nitrate + nitrite as nitrogen concentrations exceed the standard in both wells adjacent to the cell (0731 and 0732). This contaminant is below the MCL of 10.0 mg/L and continues to trend downward in well 0733, which is located in the cell.
- Selenium concentrations continue to exceed the MCL of 0.01 mg/L in wells 0731 and 0732, but remain below the standard in well 0733. This is to be expected as selenium levels are typically elevated in sediments of the Mancos Shale in the area.
- Uranium concentrations remain below the MCL of 0.044 mg/L in wells 0731 and 0732, but exceed the MCL in well 0733 after trending upward since 2003. Higher uranium concentrations are expected in this well, located in the disposal cell.
- No polychlorinated biphenyls (PCBs) were detected in any of the wells.

Wells with sample concentrations that exceeded U.S. Environmental Protection Agency (EPA) groundwater standards (40 CFR 192) are listed in Table 1.

Table 1. Grand Junction Disposal Site Wells Where EPA Standards Were Exceeded in August 2013

Analyte	Standard ^a	Location	Concentration
Nitrate + Nitrite as Nitrogen	10	0731	37
		0732	39
Selenium	0.01	0731	0.56
		0732	0.31
Uranium	0.044	0733	0.14

^a Standards are listed in 40 CFR 192.02 Table 1 to subpart A; units are in mg/L.



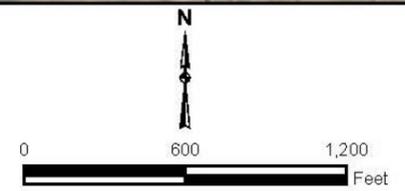
 Gary Baur
 Site Lead, S.M. Stoller Corporation

NOVEMBER 8TH 2013

 Date



LEGEND
 ● WELL TO BE SAMPLED
 - - - SITE BOUNDARY



U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AC05-01OR21400
Planned Sampling Map Grand Junction, CO, Disposal Site August 2013	
DATE PREPARED: June 25, 2013	FILENAME: S1037700

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Grand Junction, Colorado, Disposal Site Sample Location Map

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	<u>Grand Junction, CO, Disposal Site</u>	Date(s) of Water Sampling	<u>August 7, 2013</u>
Date(s) of Verification	<u>October 9, 2013</u>	Name of Verifier	<u>Gretchen Baer</u>

	Response (Yes, No, NA)	Comments
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 July 8, 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>pH pre-trip calibration: spans were below acceptance limits. pH values have been qualified.</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 from location 0732.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	
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 2978 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	Water levels were measured at each sampled monitoring well.

Laboratory Performance Assessment

General Information

Requisition Index No. (RIN): 13075515
Sample Event: August 7, 2013
Site(s): Grand Junction, Colorado, Disposal Site
Laboratory: ALS Laboratory Group
Work Order No.: 1308155
Analysis: Metals, Organics, and Wet Chemistry
Validator: Gretchen Baer
Review Date: October 9, 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 2.

Table 2. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Molybdenum, Selenium, Uranium, Vanadium	LMM-02	SW-846 3005A	SW-846 6020A
Nitrate + Nitrite as N	WCH-A-022	MCAWW 353.2	MCAWW 353.2
Polychlorinated Biphenyls (PCBs)	PEP-A-006	SW-846 3520C, 3665A	SW-846 8082
Sulfate	MIS-A-044	SW-846 9056	SW-846 9056
Total Dissolved Solids	WCH-A-033	MCAWW 160.1	MCAWW 160.1

Data Qualifier Summary

Analytical results were qualified as listed in Table 3. Refer to the 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
1308155-3	0733	Selenium	J	Reporting limit verification > 130%

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received four water samples on August 9, 2013, accompanied by Chain of Custody (COC) forms. The receiving documentation included copies of the air bills. The COC forms were checked to confirm that all of the samples

were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The COC form was complete with no errors or omissions.

Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced cooler at 5.2 °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 and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods. All calibration and laboratory spike standards were prepared from independent sources.

Method MCAWW 160.1

There are no calibration requirements associated with the determination of total dissolved solids.

Method MCAWW 353.2

Calibrations for nitrate + nitrite as N were performed using seven calibration standards on August 14, 2013. 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. All calibration check results were within the acceptance criteria.

Method SW-846 6020A

Calibrations for molybdenum, selenium, uranium, and vanadium were performed on August 13, 2013, using five calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. 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, with one exception. The selenium check result was above the acceptance range. Affected (dilution-factor-corrected) results less than 5 times the PQL and above the MDL are qualified with a “J” flag (estimated). Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries associated with requested analytes were stable and within acceptable ranges.

Method SW-846 8082

The initial calibrations for PCBs were performed using five calibration standards on June 5, 2013. Calibration curves were established using linear regression. Linear regression calibrations had correlation coefficient values greater than 0.99 and intercepts less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. All calibration checks met the acceptance criteria for all analytes on both gas chromatography columns. PCBs were not detected in any field sample.

Method SW-846 9056

Calibrations for sulfate were performed using six calibration standards on July 12, 2013. 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. All calibration check results were within 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.

Metals and Wet Chemistry

All method blank and calibration blank results associated with the samples were below the PQL for all analytes. In cases where a blank concentration exceeds the MDL, the associated sample results are qualified with a “U” flag (not detected) when the sample result is greater than the MDL but less than 5 times the blank concentration.

Organics

The method blank results were below the MDLs for all target compounds.

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. 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 results that are greater than 5 times the PQL should be less than 20 percent (or less than the laboratory-derived control limits for organics). For results that are less than 5 times the PQL, the range should be no greater than the PQL. All replicate results met these criteria, demonstrating acceptable precision.

Laboratory Control Sample

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

Metals Serial Dilution

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

PCB Surrogate Recoveries

Laboratory performance for individual samples is established by monitoring the recovery of surrogate spikes. The PCB surrogate recoveries were within the acceptance ranges for all samples.

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 PCB and sulfate data. All peak integrations were satisfactory.

Electronic Data Deliverable (EDD) File

The EDD file arrived on August 20, 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: 13075515 Lab Code: PAR Validator: Gretchen Baer Validation Date: 10/9/2013

Project: Grand Junction Disp/Proc Sites 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
- Detection Limits
- Field/Trip Blanks
- Field Duplicates

All analyses were completed within the applicable holding times.

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

There was 1 duplicate evaluated.

**SAMPLE MANAGEMENT SYSTEM
Metals Data Validation Worksheet**

RIN: 13075515 **Lab Code:** PAR **Date Due:** 9/6/2013
Matrix: Water **Site Code:** GRJ03 **Date Completed:** 8/26/2013

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								
Molybdenum	ICP/MS	08/13/2013	0.0000	1.0000	OK	OK	OK	96.0	106.0	104.0	2.0	89.0		90.0
Selenium	ICP/MS	08/13/2013	-0.0050	1.0000	OK	OK	OK	106.0	115.0	105.0	1.0	96.0	8.0	163.0
Selenium	ICP/MS	08/13/2013									4.0			
Uranium	ICP/MS	08/13/2013	0.0000	1.0000	OK	OK	OK	107.0	108.0	105.0	1.0	103.0	10.0	100.0
Uranium	ICP/MS	08/13/2013									1.0			
Vanadium	ICP/MS	08/13/2013	-0.0290	1.0000	OK	OK	OK	100.0	110.0	111.0	1.0	97.0	4.0	100.0

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 13075515 **Lab Code:** PAR **Date Due:** 9/6/2013
Matrix: Water **Site Code:** GRJ03 **Date Completed:** 8/26/2013

Analyte	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	CCV	CCB						
Nitrate+Nitrite as N	08/14/2013	0.000	0.9998	OK	OK	OK	104.00	114.0	116.0	1.00	
SULFATE	08/13/2013	0.375	0.9999	OK	OK	OK	98.00	94.0	95.0	0	
TOTAL DISSOLVED SOLIDS	08/14/2013					OK	104.00			1.00	

SAMPLE MANAGEMENT SYSTEM Organics Data Validation Summary

RIN: 13075515

Project: Grand Junction Disp/Proc Site: **Lab Code:** PAR

Validation Date: 10/9/2013

LCS Recovery: All LCS recoveries were within the laboratory acceptance limits.

Method Blank(s): All method blanks results were below the method detection limit.

MS/MSD Recovery: All MS/MSD recoveries were within the laboratory acceptance limits.

Surrogate Recovery: All surrogate recoveries were within the laboratory acceptance limits.

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 well 0731 were further qualified with a “Q” flag in the database, indicating the data are considered qualitative because this well was sampled using Category II criteria.

During the field instrument calibration for pH, two calibration criteria were not met; all pH measurements are qualified with a “J” flag as estimated values.

Equipment Blank Assessment

An equipment blank was not required because samples were collected using dedicated equipment.

Field Duplicate Analysis

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 0732. 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. The duplicate results met the criteria, demonstrating acceptable overall precision.

SAMPLE MANAGEMENT SYSTEM
Validation Report: Field Duplicates

Page 1 of 1

RIN: 13075515 Lab Code: PAR Project: Grand Junction Disp/Proc Sites Validation Date: 10/9/2013

Duplicate: 2978

Sample: 0732

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Aroclor 1016	0.29	U		1	0.28	U		1			UG/L
Aroclor 1221	0.29	U		1	0.28	U		1			UG/L
Aroclor 1232	0.29	U		1	0.28	U		1			UG/L
Aroclor 1242	0.29	U		1	0.28	U		1			UG/L
Aroclor 1248	0.29	U		1	0.28	U		1			UG/L
Aroclor 1254	0.29	U		1	0.28	U		1			UG/L
Aroclor 1260	0.29	U		1	0.28	U		1			UG/L
Molybdenum	2.4			10	2.4			10	0		UG/L
Nitrate+Nitrite as N	39			50	40			50	2.53		MG/L
Selenium	310			10	320			10	3.17		UG/L
SULFATE	4100			100	4100			100	0		MG/L
TOTAL DISSOLVED SOLIDS	7700			1	7200			1	6.71		MG/L
Uranium	22			10	22			10	0		UG/L
Vanadium	0.78			1	0.75			1	3.92		UG/L

Certification

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

Laboratory Coordinator: *Stephen Donovan* 11-4-2013
Stephen Donovan Date

Data Validation Lead: *Gretchen Baer* 11/4/13
Gretchen Baer Date

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Attachment 1
Assessment of Anomalous Data

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Potential Outliers Report

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Potential Outliers Report

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

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

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

1. Identify extreme values that may be potential outliers by generating the Outliers Report using the Sample Management System from data in the 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.

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Data Validation Outliers Report - No Field Parameters

Comparison: All historical Data Beginning 1/1/2003

Laboratory: ALS Laboratory Group

RIN: 13075515

Report Date: 10/25/2013

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	
GRJ03	0733	N001	08/07/2013	Nitrate + Nitrite as Nitrogen	2.3		F	24		FQ	3		JF	11	0	No
GRJ03	0733	N001	08/07/2013	Total Dissolved Solids	11000		F	13000		F	12000		F	13	0	NA
GRJ03	0733	N001	08/07/2013	Uranium	0.14		F	0.13		F	0.0216		FQ	13	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.

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Attachment 2

Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site

REPORT DATE: 10/25/2013

Location: 0731 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	08/07/2013	N001	17	-	32	249		FQ	#		
Aroclor - 1016	ug/L	08/07/2013	N001	17	-	32	0.3	U	FQ	#	0.3	
Aroclor - 1221	ug/L	08/07/2013	N001	17	-	32	0.3	U	FQ	#	0.3	
Aroclor - 1232	ug/L	08/07/2013	N001	17	-	32	0.3	U	FQ	#	0.3	
Aroclor - 1242	ug/L	08/07/2013	N001	17	-	32	0.3	U	FQ	#	0.3	
Aroclor - 1248	ug/L	08/07/2013	N001	17	-	32	0.3	U	FQ	#	0.3	
Aroclor - 1254	ug/L	08/07/2013	N001	17	-	32	0.3	U	FQ	#	0.3	
Aroclor - 1260	ug/L	08/07/2013	N001	17	-	32	0.3	U	FQ	#	0.3	
Molybdenum	mg/L	08/07/2013	N001	17	-	32	0.0031		FQ	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	08/07/2013	N001	17	-	32	37		FQ	#	1	
Oxidation Reduction Potential	mV	08/07/2013	N001	17	-	32	103		FQ	#		
pH	s.u.	08/07/2013	N001	17	-	32	7.67		JFQ	#		
Selenium	mg/L	08/07/2013	N001	17	-	32	0.56		FQ	#	0.00032	
Specific Conductance	umhos/cm	08/07/2013	N001	17	-	32	6989		FQ	#		
Sulfate	mg/L	08/07/2013	N001	17	-	32	3900		FQ	#	50	
Temperature	C	08/07/2013	N001	17	-	32	16.79		FQ	#		
Total Dissolved Solids	mg/L	08/07/2013	N001	17	-	32	6700		FQ	#	200	
Turbidity	NTU	08/07/2013	N001	17	-	32	2.41		FQ	#		
Uranium	mg/L	08/07/2013	N001	17	-	32	0.036		FQ	#	0.000029	
Vanadium	mg/L	08/07/2013	N001	17	-	32	0.001		FQ	#	0.000015	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site

REPORT DATE: 10/25/2013

Location: 0732 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	08/07/2013	N001	17.52	-	33	179		F	#		
Aroclor - 1016	ug/L	08/07/2013	N001	17.52	-	33	0.29	U	F	#	0.29	
Aroclor - 1016	ug/L	08/07/2013	N002	17.52	-	33	0.28	U	F	#	0.28	
Aroclor - 1221	ug/L	08/07/2013	N001	17.52	-	33	0.29	U	F	#	0.29	
Aroclor - 1221	ug/L	08/07/2013	N002	17.52	-	33	0.28	U	F	#	0.28	
Aroclor - 1232	ug/L	08/07/2013	N001	17.52	-	33	0.29	U	F	#	0.29	
Aroclor - 1232	ug/L	08/07/2013	N002	17.52	-	33	0.28	U	F	#	0.28	
Aroclor - 1242	ug/L	08/07/2013	N001	17.52	-	33	0.29	U	F	#	0.29	
Aroclor - 1242	ug/L	08/07/2013	N002	17.52	-	33	0.28	U	F	#	0.28	
Aroclor - 1248	ug/L	08/07/2013	N001	17.52	-	33	0.29	U	F	#	0.29	
Aroclor - 1248	ug/L	08/07/2013	N002	17.52	-	33	0.28	U	F	#	0.28	
Aroclor - 1254	ug/L	08/07/2013	N001	17.52	-	33	0.29	U	F	#	0.29	
Aroclor - 1254	ug/L	08/07/2013	N002	17.52	-	33	0.28	U	F	#	0.28	
Aroclor - 1260	ug/L	08/07/2013	N001	17.52	-	33	0.29	U	F	#	0.29	
Aroclor - 1260	ug/L	08/07/2013	N002	17.52	-	33	0.28	U	F	#	0.28	
Molybdenum	mg/L	08/07/2013	N001	17.52	-	33	0.0024		F	#	0.00032	
Molybdenum	mg/L	08/07/2013	N002	17.52	-	33	0.0024		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	08/07/2013	N001	17.52	-	33	39		F	#	0.5	
Nitrate + Nitrite as Nitrogen	mg/L	08/07/2013	N002	17.52	-	33	40		F	#	0.5	
Oxidation Reduction Potential	mV	08/07/2013	N001	17.52	-	33	115.3		F	#		
pH	s.u.	08/07/2013	N001	17.52	-	33	7.59		JF	#		
Selenium	mg/L	08/07/2013	N001	17.52	-	33	0.31		F	#	0.00032	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site

REPORT DATE: 10/25/2013

Location: 0732 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Selenium	mg/L	08/07/2013	N002	17.52	-	33	0.32		F	#	0.00032	
Specific Conductance	umhos/cm	08/07/2013	N001	17.52	-	33	7710		F	#		
Sulfate	mg/L	08/07/2013	N001	17.52	-	33	4100		F	#	50	
Sulfate	mg/L	08/07/2013	N002	17.52	-	33	4100		F	#	50	
Temperature	C	08/07/2013	N001	17.52	-	33	15.19		F	#		
Total Dissolved Solids	mg/L	08/07/2013	N001	17.52	-	33	7700		F	#	200	
Total Dissolved Solids	mg/L	08/07/2013	N002	17.52	-	33	7200		F	#	200	
Turbidity	NTU	08/07/2013	N001	17.52	-	33	2.95		F	#		
Uranium	mg/L	08/07/2013	N001	17.52	-	33	0.022		F	#	0.000029	
Uranium	mg/L	08/07/2013	N002	17.52	-	33	0.022		F	#	0.000029	
Vanadium	mg/L	08/07/2013	N001	17.52	-	33	0.00078		F	#	0.000015	
Vanadium	mg/L	08/07/2013	N002	17.52	-	33	0.00075		F	#	0.000015	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site

REPORT DATE: 10/25/2013

Location: 0733 WELL

Parameter	Units	Sample		Depth Range		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)	Lab		Data	QA			
Alkalinity, Total (as CaCO ₃)	mg/L	08/07/2013	N001	63.8	- 73.8	498		F	#		
Aroclor - 1016	ug/L	08/07/2013	N001	63.8	- 73.8	0.28	U	F	#	0.28	
Aroclor - 1221	ug/L	08/07/2013	N001	63.8	- 73.8	0.28	U	F	#	0.28	
Aroclor - 1232	ug/L	08/07/2013	N001	63.8	- 73.8	0.28	U	F	#	0.28	
Aroclor - 1242	ug/L	08/07/2013	N001	63.8	- 73.8	0.28	U	F	#	0.28	
Aroclor - 1248	ug/L	08/07/2013	N001	63.8	- 73.8	0.28	U	F	#	0.28	
Aroclor - 1254	ug/L	08/07/2013	N001	63.8	- 73.8	0.28	U	F	#	0.28	
Aroclor - 1260	ug/L	08/07/2013	N001	63.8	- 73.8	0.28	U	F	#	0.28	
Molybdenum	mg/L	08/07/2013	N001	63.8	- 73.8	0.0015		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	08/07/2013	N001	63.8	- 73.8	2.3		F	#	0.05	
Oxidation Reduction Potential	mV	08/07/2013	N001	63.8	- 73.8	110.5		F	#		
pH	s.u.	08/07/2013	N001	63.8	- 73.8	6.94		JF	#		
Selenium	mg/L	08/07/2013	N001	63.8	- 73.8	0.0043		JF	#	0.00032	
Specific Conductance	umhos/cm	08/07/2013	N001	63.8	- 73.8	11403		F	#		
Sulfate	mg/L	08/07/2013	N001	63.8	- 73.8	6100		F	#	100	
Temperature	C	08/07/2013	N001	63.8	- 73.8	15.63		F	#		
Total Dissolved Solids	mg/L	08/07/2013	N001	63.8	- 73.8	11000		F	#	400	
Turbidity	NTU	08/07/2013	N001	63.8	- 73.8	2.01		F	#		
Uranium	mg/L	08/07/2013	N001	63.8	- 73.8	0.14		F	#	0.000029	
Vanadium	mg/L	08/07/2013	N001	63.8	- 73.8	0.0015		F	#	0.000015	

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.

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Static Water Level Data

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STATIC WATER LEVELS (USEE700) FOR SITE GRJ03, Grand Junction Disposal Site
REPORT DATE: 10/25/2013

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
0731	D	5218.52	08/07/2013	10:55:44	24.31	5194.21
0732	C	5202.50	08/07/2013	11:35:13	27.26	5175.24
0733	N	5232.84	08/07/2013	09:50:25	68.01	5164.83

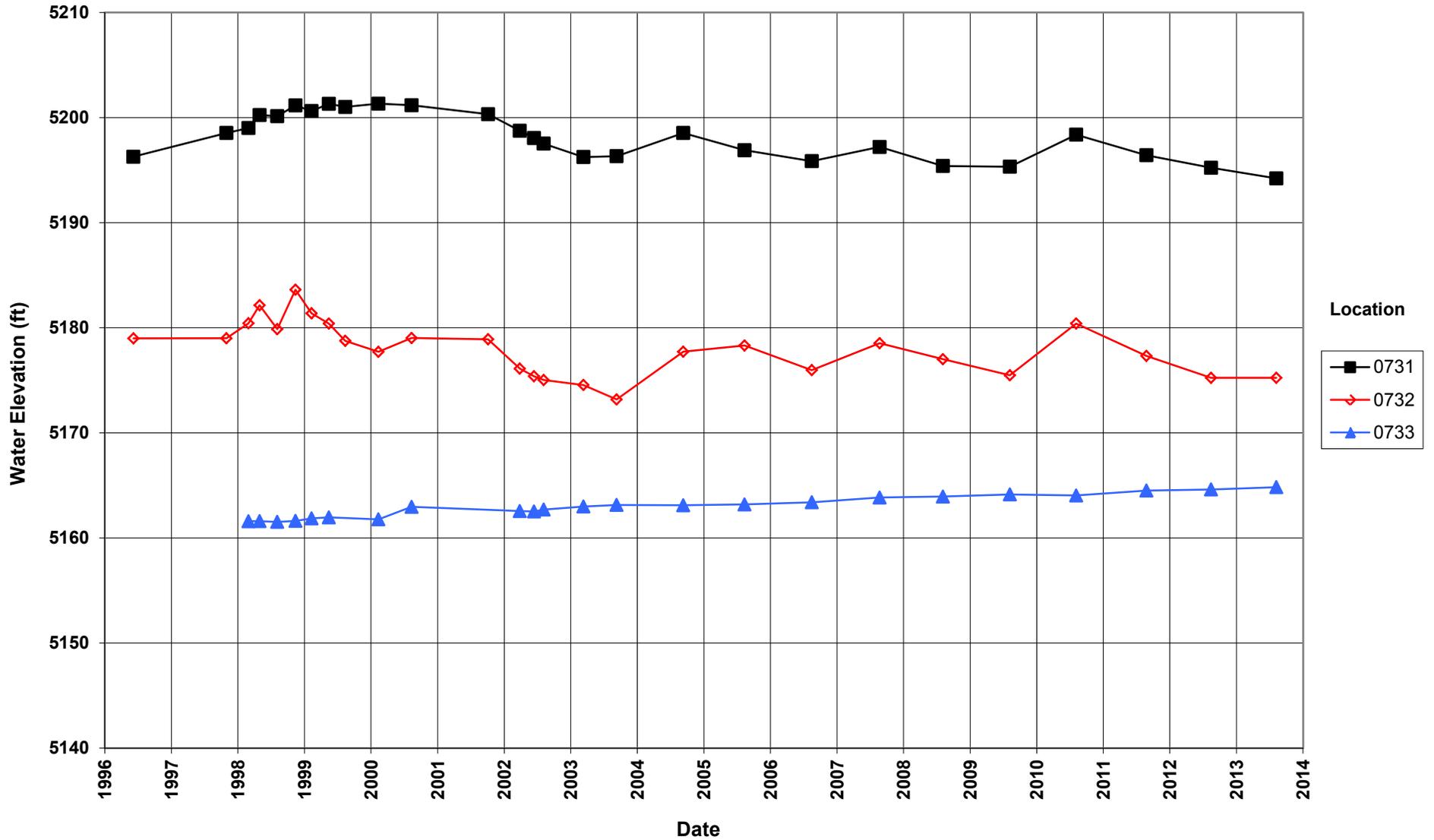
FLOW CODES: C CROSS GRADIENT D DOWN GRADIENT N UNKNOWN

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Hydrograph

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Grand Junction Disposal Site Hydrograph

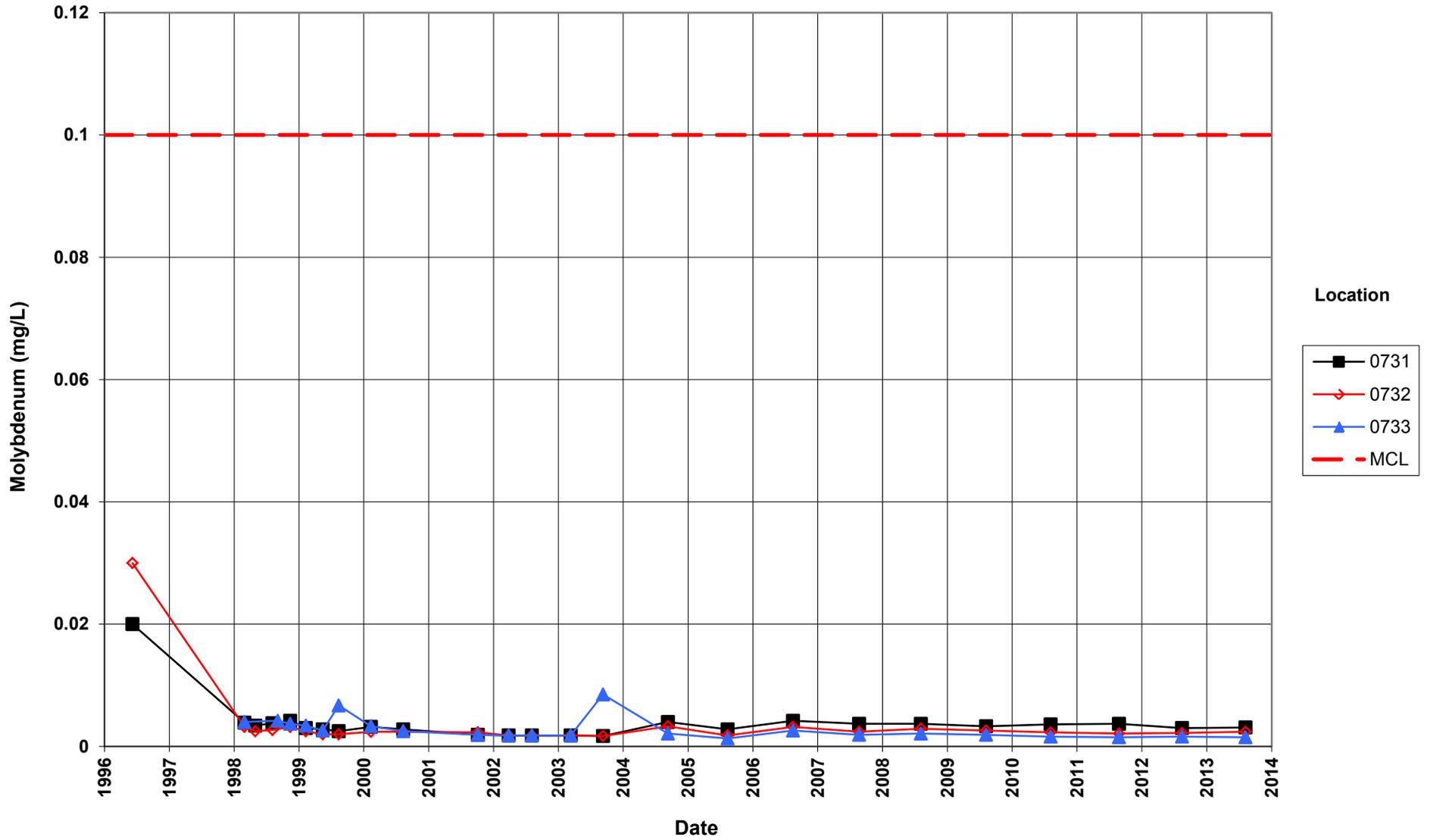


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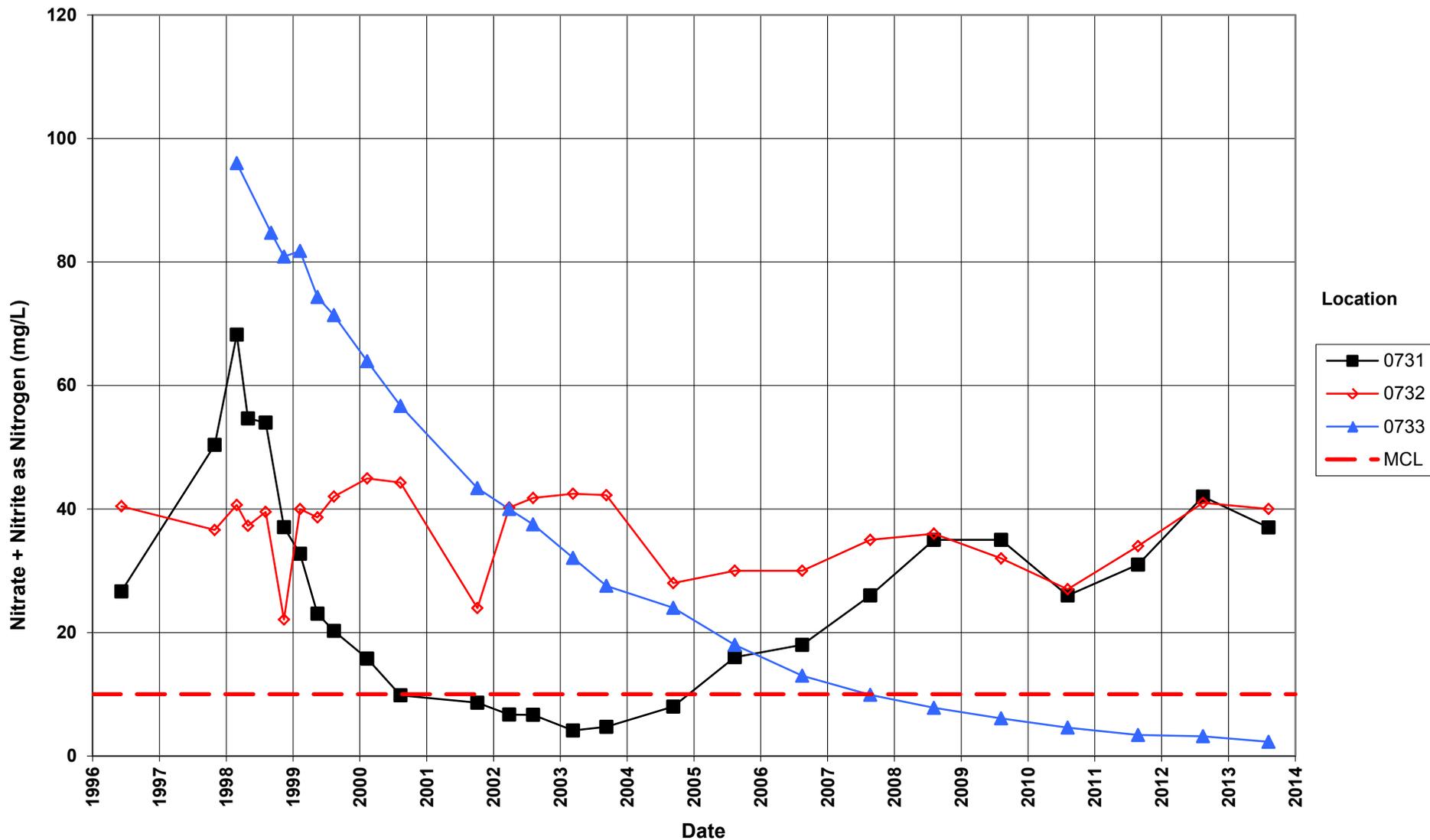
Time-Concentration Graphs

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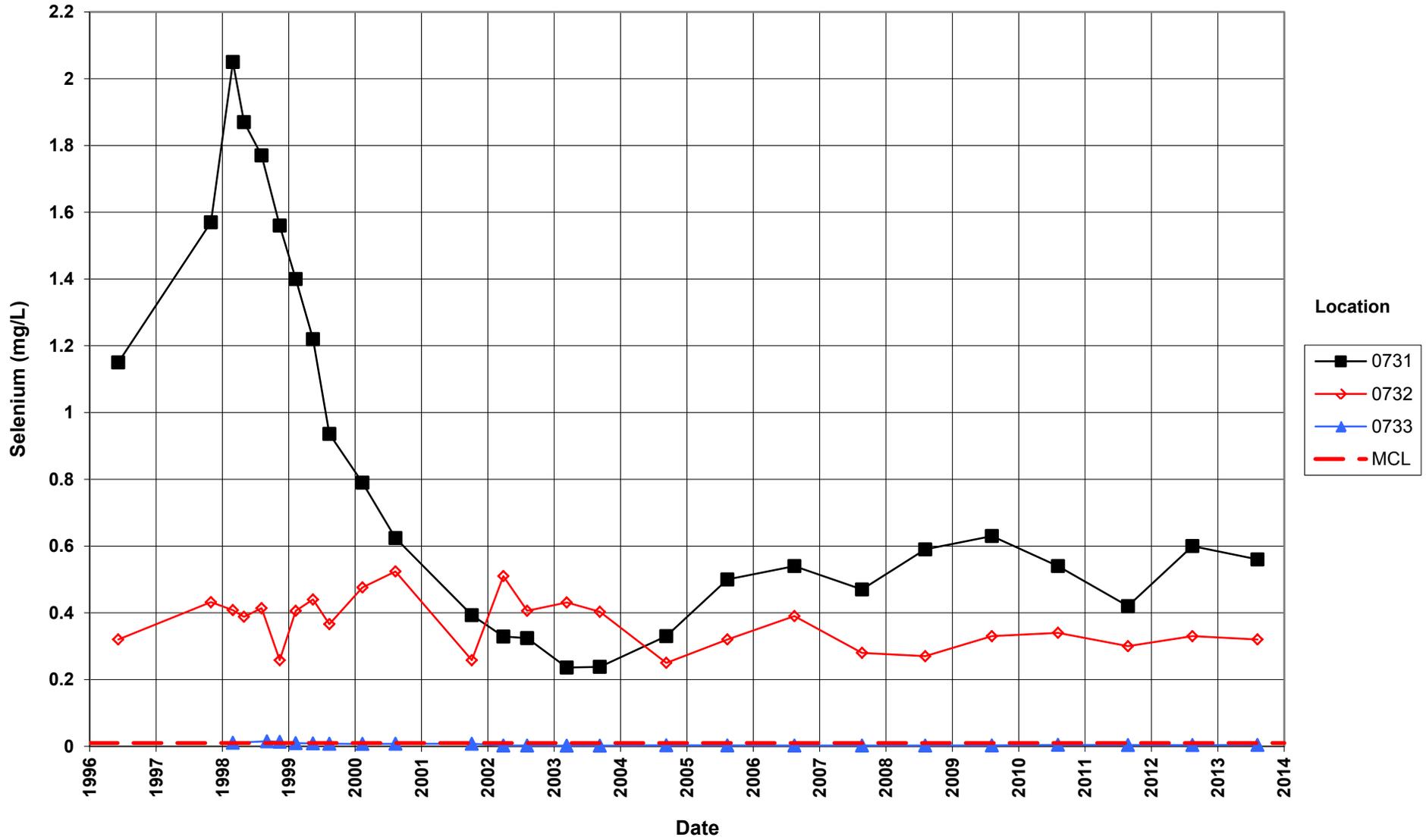
**Grand Junction Disposal Site
Molybdenum Concentration**
Maximum Concentration Limit (MCL) = 0.1 mg/L



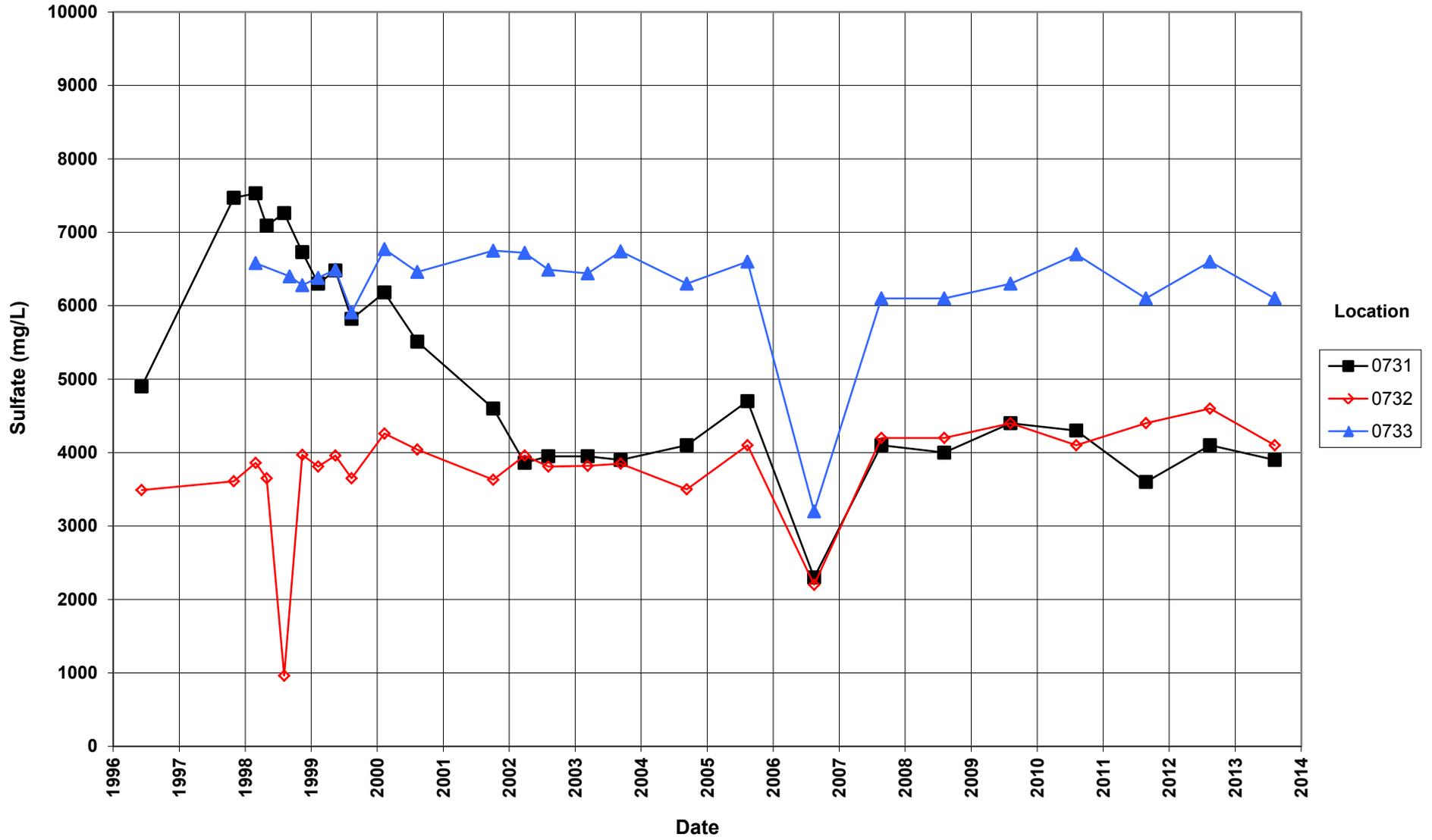
Grand Junction Disposal Site
Nitrate + Nitrite as Nitrogen Concentration
Maximum Concentration Limit (MCL) = 10.0 mg/L



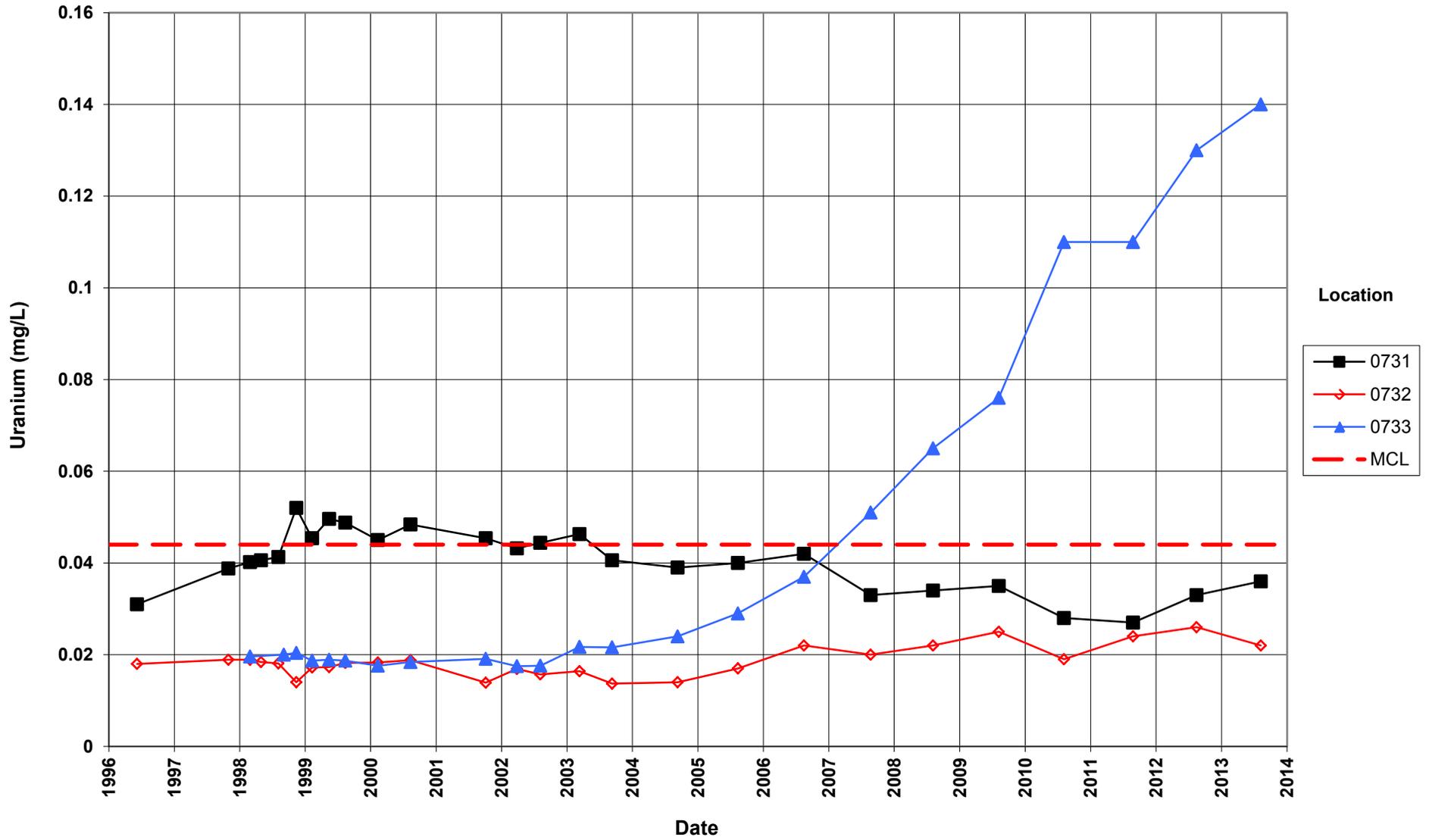
**Grand Junction Disposal Site
Selenium Concentration**
Maximum Concentration Limit (MCL) = 0.01 mg/L



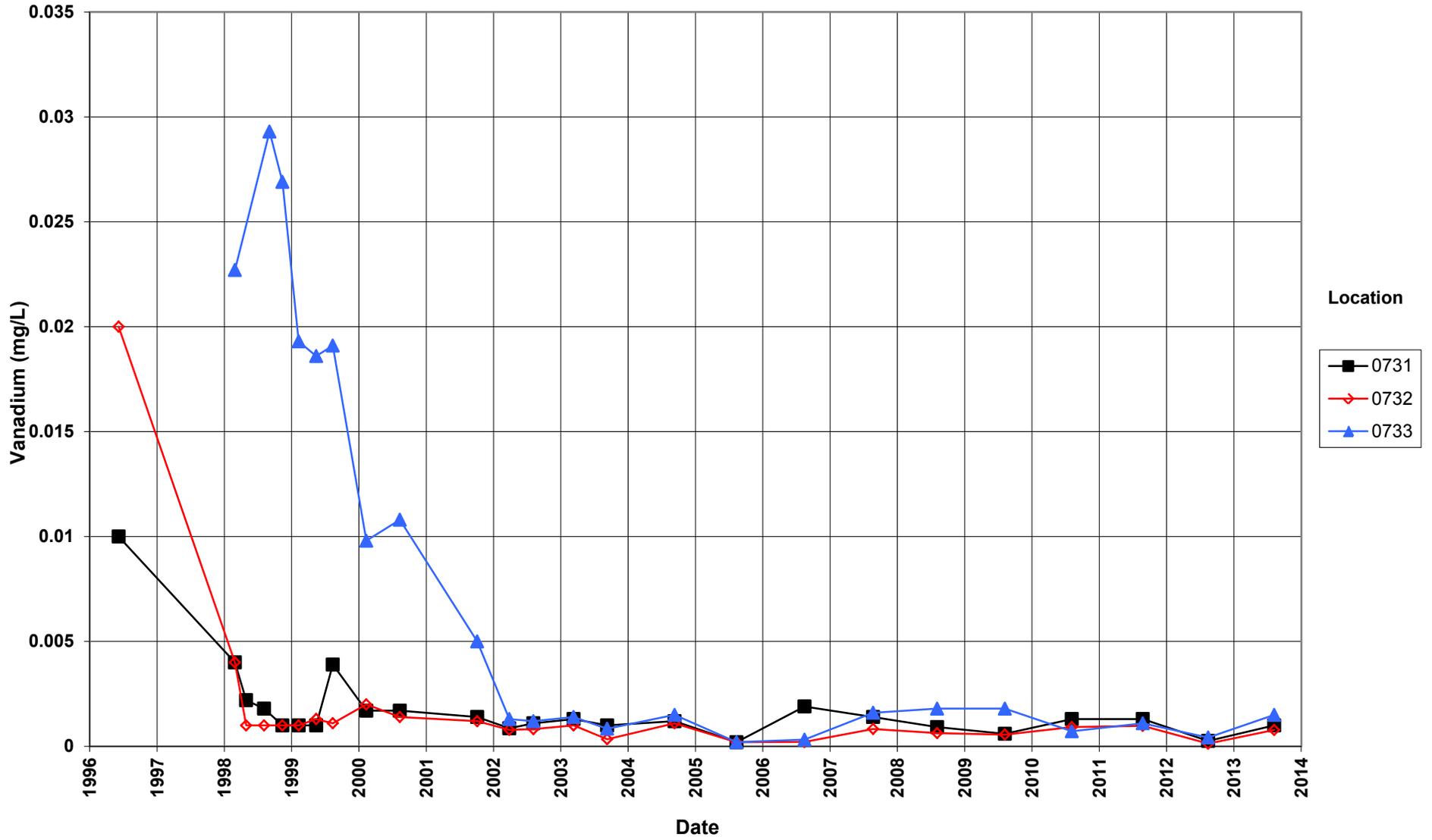
Grand Junction Disposal Site Sulfate Concentration



**Grand Junction Disposal Site
Uranium Concentration**
Maximum Concentration Limit = 0.044 mg/L



Grand Junction Disposal Site Vanadium Concentration



Attachment 3
Sampling and Analysis Work Order

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established 1959

Task Order LM-501
Control Number 13-0690

July 8, 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)
August 2013 Environmental Sampling at Grand Junction, Colorado, Disposal Site

REFERENCE: Task Order LM00-501-02-106-402, Grand Junction, Colorado, Disposal Site

Dear Mr. Bush:

The purpose of this letter is to inform you of the upcoming sampling event at Grand Junction, Colorado. Enclosed are the maps and tables specifying sample locations and analytes for monitoring at the Grand Junction site. Water quality data will be collected from monitoring wells at this site as part of the routine environmental sampling currently scheduled to begin the week of August 5, 2013.

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

Monitoring Wells*

0731 AI 0732 AI 0733 TI

*NOTE: AI = Alluvium; TI = Tailings

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) 248-6391 if you have any questions.

Sincerely,

Gary K. Baur
Site Lead

The S.M. Stoller Corporation 2597 Legacy Way Grand Junction, CO 81503 (970) 248-6000 Fax (970) 248-6040

Richard Bush
Control Number 13-0690
Page 2

GKB/lcg/lb

Enclosures (3)

cc: (electronic)
Christina Pennal, DOE
Gary Baur, Stoller
Steve Donovan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
EDD Delivery
rc-grand.junction
File: GRJ 410.02 (A)

Constituent Sampling Breakdown

Site	Grand Junction Disposal Site		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
	Groundwater	Surface Water			
Approx. No. Samples/yr	3	0			
<i>Field Measurements</i>					
Alkalinity	X				
Dissolved Oxygen					
Redox Potential	X				
pH	X				
Specific Conductance	X				
Turbidity	X				
Temperature	X				
<i>Laboratory Measurements</i>					
Aluminum					
Ammonia as N (NH3-N)					
Calcium					
Chloride					
Chromium					
Gross Alpha					
Gross Beta					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum	X		0.003	SW-846 6020	LMM-02
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO3+NO2)-N	X		0.05	EPA 353.1	WCH-A-022
PCBs	X		0.0005	SW-846 8082	PEP-A-006
Potassium					
Radium-226					
Radium-228					
Selenium	X		0.0001	SW-846 6020	LMM-02
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	X		0.0001	SW-846 6020	LMM-02
Vanadium	X		0.0003	SW-846 6020	LMM-02
Zinc					
Total No. of Analytes	8	0			

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

**Sampling Frequencies for Locations at
Grand Junction, Colorado, Disposal Site**

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
731			X			Download data logger
732			X			Download data logger
733			X			Download data logger

Sampling conducted in August

Attachment 4 Trip Report

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Memorandum

DATE: August 27, 2013

TO: Gary Baur

FROM: David Atkinson

SUBJECT: Trip Report

Site: Grand Junction Disposal Site

Dates of Sampling Event: August 7, 2013

Team Members: David Atkinson, Rob Rice, Scott Ficklin

Number of Locations Sampled: 3 monitoring well locations were sampled, and one duplicate sample was collected.

Locations Not Sampled/Reason: None.

Location Specific Information: Sampling at well 0733 was monitored by Scott Ficklin, Radiation Control Technician. The PCB sample was collected in triplicate at location 0731 for lab QC. The water level in well 0731 did not stabilize while being pumped at a rate less than 100 ml/minute for several minutes. Therefore the samplers determined the well to fall under category II criteria, according to the *Sampling and Analysis Plan for the U. S. Department of Energy Office of Legacy Management Sites*. The samplers collected a final set of field measurements, and then collected the sample. This well has been sampled under category I criteria in the past, and will likely return to category I condition if it is redeveloped.

Quality Control Sample Cross Reference: The following is the false identification assigned to the quality control sample:

False ID	True ID	Ticket Number	Sample Type	Associated Matrix
2978	0732	LIS 154	Duplicate	Groundwater

RIN Number Assigned: All samples were assigned to RIN 13075515

Sample Shipment: Samples were shipped overnight via FedEx to ALS Laboratory Group, Fort Collins, CO, from Grand Junction, CO, on 8/8/2013

Gary Baur
August 27, 2013
Page 2

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

Well Inspection Summary: All wells appeared to be in good condition. Monitoring well 0731 should be redeveloped to return it to category I condition

Field Variance: None

Equipment: All equipment functioned properly. The water level meter used at well 0733 was scanned and kept on site by Scott Ficklin until the radon level on it decays.

Institutional Controls:

Fences, Gates, Locks: No issues identified.

Trespassing/Site Disturbances: None observed.

Site Issues:

Disposal Cell/Drainage Structure Integrity: None

Vegetation/Noxious Weed Concerns: None

Maintenance Requirements: None

Access Issues: None

Corrective Action Required: Redevelopment of monitoring well 0731 should be conducted before the well is sampled again.

cc: (electronic)
Rich Bush, DOE
Gary Baur, Stoller
Steve Donovan, Stoller
Jody Waugh, Stoller
EDD Delivery