LMS/GRJ/S00810

Data Validation Package

August 2010
Groundwater Sampling at the
Grand Junction, Colorado, Disposal Site

October 2010

U.S. DEPARTMENT OF ENERGY | Legacy Management

FSME20

Contents

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Sampling Event Summary

Site: Grand Junction, Colorado, Disposal Site

Sampling Period: August 5, 2010

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 analysis were conducted in accordance with *Sampling and Analyses Plan for the U.S. Department of Energy Office of Legacy Management Sites* (LMS/PLN/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 several years 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 contaminant level (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 0.1 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 2010

Analyte	Standard [a]	Location	Concentration
Nitrate + Nitrite as Nitrogen	10	0731	26
		0732	27
Selenium	0.01	0731	0.54
		0732	0.34
Uranium	0.044	0733	0.11

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

Gary K. Baur

Gary Baur
Site Lead, S.M. Stoller Corporation

10/28/10

Date

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	Grand Junction, Colorado	**Date(s) of Water Sampling**	August 5, 2010
Date(s) of Verification	September 28, 2010	**Name of Verifier**	Steve Donivan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List other documents, SOPs, instructions.		Work Order Letter dated July 9, 2010.
2. Were the sampling locations specified in the planning documents sampled?	Yes	
3. Was a pre-trip calibration conducted as specified in the above-named documents?	Yes	Pre-trip calibration was performed on August 4, 2010.
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. Was the category of the well documented?	Yes	All wells were Category I.
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 stabilize prior to sampling?	Yes	
Was the flow rate less than 500 mL/min?	Yes	
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	NA	

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	
Was one pump/tubing volume removed prior to sampling?	NA	
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 nondedicated equipment?	NA	Dedicated equipment was used to sample all wells.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number?	Yes	
Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDCS) report?	Yes	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. Are field data sheets signed and dated by both team members (hardcopies) or are dates present for the "Date Signed" fields (FDCS)?	Yes	
18. Was all other pertinent information documented on the field data sheets?	Yes	
19. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
20. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Report Number (RIN):	10073245
Sample Event:	August 5, 2010
Site(s):	Grand Junction, Colorado, Disposal Site
Laboratory:	ALS Laboratory Group
Work Order No.:	0908059
Analysis:	Metals, Organics, and Wet Chemistry
Validator:	Steve Donivan
Review Date:	September 28, 2010

This validation was performed according to the *Environmental Procedures Catalog* (LMS/PRO/S04325, continually updated), "Standard Practice for Validation of Laboratory Data." The procedure was applied at Level 3, Data Validation. See attached Data Validation Worksheets for supporting documentation on the data review and validation. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 2.

Table 2. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Metals: Molybdenum, Selenium, Uranium, and 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 sections below for an explanation of the data qualifiers applied.

Table 3. Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
1008070-1	0731	Selenium	J	Serial dilution failure

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received four water samples on August 6, 2010, accompanied by Chain of Custody (COC) forms. The air waybill numbers were listed in the receiving documentation. 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 with the following exception. There were no relinquishment signatures on the COC forms.

Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced coolers at 1.4 °C and 2.4 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods. All calibration and laboratory spike standards were prepared from independent sources.

Method MCAWW 160.1
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 6 and August 9, 2010. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the method detection limit (MDL). Initial and continuing calibration verification checks were made at the required frequency resulting in nine verification checks. All calibration check results were within the acceptance criteria.

Method SW-846 6020A
Calibrations for molybdenum selenium, uranium, and vanadium were performed on August 26, 2010, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency resulting in nine verification checks. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the practical quantitation limit (PQL) and all results were within the acceptance range. 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 August 19, 2010. 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 resulting in two verification checks. All calibration checks met the acceptance criteria for all analytes on both gas chromatography columns, with three exceptions. Quantitation for surrogate and spike compounds was performed from the column that passed the initial and continuing calibration criteria. PCBs were not detected in any field sample.

Method SW-846 9056
Calibrations for sulfate were performed using six calibration standards on August 3, 2010. 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 resulting in 10 verification checks. 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 PQLs for all analytes.

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

Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Analysis

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

Matrix Spike Analysis

Matrix spike and matrix spike duplicate (MS/MSD) samples are used to measure method performance in the sample matrix. The MS/MSD data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike concentration. The spikes met the recovery and precision criteria for all analytes evaluated.

Laboratory Replicate Analysis

Laboratory replicate sample results demonstrate acceptable laboratory precision. The relative percent difference values for the sample replicates, laboratory control sample replicates, and matrix spike replicates were less than 20 percent for results that are greater than 5 times the PQL, indicating acceptable precision.

Laboratory Control Sample

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

Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. ICP-MS serial dilution data are evaluated when the concentration of the undiluted sample is greater than 100 times the PQL. All evaluated serial dilution data were acceptable with the exception of selenium. The associated sample selenium result is qualified with a "J" flag as an estimated value.

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.

Detection Limits/Dilutions

Samples were diluted in a consistent and acceptable manner when required. The required detection limits were met for all analytes.

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 manual integrations that were performed were acceptable and all peak integrations were satisfactory.

Electronic Data Deliverable (EDD) File

The EDD file arrived on September 1, 2010. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

SAMPLE MANAGEMENT SYSTEM

General Data Validation Report

RIN: 10073245 Lab Code: PAR Validator: Steve Donivan Validation Date: 9/28/2010

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	All analyses were completed within the applicable holding times.
☑ Detection Limits	There are 0 detection limit failures.
☐ Field/Trip Blanks	
☑ Field Duplicates	There was 1 duplicate evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 10073245 Lab Code: PAR Date Due: 9/3/2010

Matrix: Water Site Code: GRJ03 Date Completed: 9/2/2010

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
		Int.	R^2	ICV	CCV	ICB	CCB								
Molybdenum	08/26/2010	0.0000	1.0000	OK	OK	OK	OK	OK	97.0	106.0	104.0	2.0	110.0	1.0	101.0
Selenium	08/26/2010	0.0000	1.0000	OK	OK	OK	OK	OK	102.0	149.0	130.0	3.0	107.0	15.0	92.0
Uranium	08/26/2010	0.0000	1.0000	OK	OK	OK	OK	OK	98.0	104.0	97.0	2.0	108.0	3.0	90.0
Vanadium	08/26/2010	0.0000	1.0000	OK	OK	OK	OK	OK	96.0	114.0	111.0	2.0	105.0		126.0

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 10073245 **Lab Code:** PAR **Date Due:** 9/3/2010

Matrix: Water **Site Code:** GRJ03 **Date Completed:** 9/2/2010

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	ICV	CCV	ICB	CCB						
Nitrate+Nitrite as N	08/06/2010	0.000	0.9996	OK	OK	OK	OK	OK	97.00				
SULFATE	08/10/2010	0.000	0.9999	OK	OK	OK	OK	OK	96.00				
TOTAL DISSOLVED SOLIDS	08/11/2010							OK	105.00			1.00	

SAMPLE MANAGEMENT SYSTEM

Organics Data Validation Summary

RIN: 10073245 **Project:** Grand Junction Disp/Proc Site **Lab Code:** PAR **Validation Date:** 9/28/2010

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 were qualified with an "F" flag in the database, indicating the wells were purged and sampled using the low-flow sampling method. All wells met the Category I criteria.

Equipment Blank Assessment

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

Field Duplicate Assessment

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results less than 5 times the PQL, the range should be no greater than the PQL. A duplicate sample was collected from location 0732. The duplicate results met these criteria, demonstrating acceptable overall precision.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 10073245 Lab Code: PAR Project: Grand Junction Disp/Proc Sites Validation Date: 9/28/2010

Duplicate: 2978 Sample: 0732

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Aroclor 1016	0.087	U		1	0.087	U		1			UG/L
Aroclor 1221	1.9	U		1	1.9	U		1			UG/L
Aroclor 1232	0.96	U		1	0.96	U		1			UG/L
Aroclor 1242	0.96	U		1	0.96	U		1			UG/L
Aroclor 1248	0.96	U		1	0.96	U		1			UG/L
Aroclor 1254	0.96	U		1	0.96	U		1			UG/L
Aroclor 1260	0.11	U		1	0.11	U		1			UG/L
Molybdenum	2.3			1	2.3			1	0		UG/L
Nitrate+Nitrite as N	27			50	25			20	3.77		MG/L
Selenium	340			1	340			1	0		UG/L
SULFATE	4100			50	4100			50	0		MG/L
TOTAL DISSOLVED SOLIDS	7300			1	7300			1	0		MG/L
Uranium	19			1	19			1	0		UG/L
Vanadium	0.92			1	0.83			1	10.29		UG/L

Certification

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

Laboratory Coordinator: Steve Donivan — Date: 10-27-2010

Data Validation Lead: Steve Donivan — Date: 10-27-2010

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Attachment 1
Assessment of Anomalous Data

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Potential Outliers Report

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Potential Outliers Report

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

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

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

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

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

Data Validation Outliers Report - No Field Parameters
Comparison: All Historical Data
Laboratory: ALS Laboratory Group
RIN: 10073245
Report Date: 9/28/2010

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current Result	Current Qualifiers Lab	Current Qualifiers Data	Historical Maximum Result	Historical Maximum Qualifiers Lab	Historical Maximum Qualifiers Data	Historical Minimum Result	Historical Minimum Qualifiers Lab	Historical Minimum Qualifiers Data	Number of Data Points N.	Number of Data Points N Below Detect	Statistical Outlier
GRJ03	0732	N001	08/05/2010	Nitrate + Nitrite as Nitrogen	27		F	36		F	28		F	9	0	No
GRJ03	0732	N002	08/05/2010	Nitrate + Nitrite as Nitrogen	26		F	36		F	28		F	9	0	No
GRJ03	0733	N001	08/05/2010	Nitrate + Nitrite as Nitrogen	4.6		F	24		FQ	6.1		F	7	0	No
GRJ03	0733	N001	08/05/2010	Uranium	0.11		F	0.076		F	0.0175		F	20	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.

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: 9/28/2010
Location: 0731 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	08/05/2010	N001	17	-	32	205		F	#		
Aroclor - 1016	ug/L	08/05/2010	N001	17	-	32	0.085	U	F	#	0.085	
Aroclor - 1221	ug/L	08/05/2010	N001	17	-	32	1.9	U	F	#	1.9	
Aroclor - 1232	ug/L	08/05/2010	N001	17	-	32	0.94	U	F	#	0.94	
Aroclor - 1242	ug/L	08/05/2010	N001	17	-	32	0.94	U	F	#	0.94	
Aroclor - 1248	ug/L	08/05/2010	N001	17	-	32	0.94	U	F	#	0.94	
Aroclor - 1254	ug/L	08/05/2010	N001	17	-	32	0.94	U	F	#	0.94	
Aroclor - 1260	ug/L	08/05/2010	N001	17	-	32	0.1	U	F	#	0.1	
Molybdenum	mg/L	08/05/2010	N001	17	-	32	0.0036		F	#	0.000032	
Nitrate + Nitrite as Nitrogen	mg/L	08/05/2010	N001	17	-	32	26		F	#	0.5	
Oxidation Reduction Potential	mV	08/05/2010	N001	17	-	32	208.5		F	#		
pH	s.u.	08/05/2010	N001	17	-	32	7.27		F	#		
Selenium	mg/L	08/05/2010	N001	17	-	32	0.54	E	FJ	#	0.000032	
Specific Conductance	umhos /cm	08/05/2010	N001	17	-	32	7857		F	#		
Sulfate	mg/L	08/05/2010	N001	17	-	32	4300		F	#	25	
Temperature	C	08/05/2010	N001	17	-	32	14.72		F	#		
Total Dissolved Solids	mg/L	08/05/2010	N001	17	-	32	7300		F	#	80	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site
REPORT DATE: 9/28/2010
Location: 0731 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Turbidity	NTU	08/05/2010	N001	17	-	32	1.49		F	#		
Uranium	mg/L	08/05/2010	N001	17	-	32	0.028		F	#	0.0000029	
Vanadium	mg/L	08/05/2010	N001	17	-	32	0.0013	E	F	#	0.000015	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site
REPORT DATE: 9/28/2010
Location: 0732 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	08/05/2010	N001	17.52	-	33	188		F	#		
Aroclor - 1016	ug/L	08/05/2010	N001	17.52	-	33	0.087	U	F	#	0.087	
Aroclor - 1016	ug/L	08/05/2010	N002	17.52	-	33	0.087	U	F	#	0.087	
Aroclor - 1221	ug/L	08/05/2010	N001	17.52	-	33	1.9	U	F	#	1.9	
Aroclor - 1221	ug/L	08/05/2010	N002	17.52	-	33	1.9	U	F	#	1.9	
Aroclor - 1232	ug/L	08/05/2010	N001	17.52	-	33	0.96	U	F	#	0.96	
Aroclor - 1232	ug/L	08/05/2010	N002	17.52	-	33	0.96	U	F	#	0.96	
Aroclor - 1242	ug/L	08/05/2010	N001	17.52	-	33	0.96	U	F	#	0.96	
Aroclor - 1242	ug/L	08/05/2010	N002	17.52	-	33	0.96	U	F	#	0.96	
Aroclor - 1248	ug/L	08/05/2010	N001	17.52	-	33	0.96	U	F	#	0.96	
Aroclor - 1248	ug/L	08/05/2010	N002	17.52	-	33	0.96	U	F	#	0.96	
Aroclor - 1254	ug/L	08/05/2010	N001	17.52	-	33	0.96	U	F	#	0.96	
Aroclor - 1254	ug/L	08/05/2010	N002	17.52	-	33	0.96	U	F	#	0.96	
Aroclor - 1260	ug/L	08/05/2010	N001	17.52	-	33	0.11	U	F	#	0.11	
Aroclor - 1260	ug/L	08/05/2010	N002	17.52	-	33	0.11	U	F	#	0.11	
Molybdenum	mg/L	08/05/2010	N001	17.52	-	33	0.0023		F	#	0.000032	
Molybdenum	mg/L	08/05/2010	N002	17.52	-	33	0.0023		F	#	0.000032	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site
REPORT DATE: 9/28/2010
Location: 0732 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Nitrate + Nitrite as Nitrogen	mg/L	08/05/2010	N001	17.52	-	33	27		F	#	0.5	
Nitrate + Nitrite as Nitrogen	mg/L	08/05/2010	N002	17.52	-	33	26		F	#	0.2	
Oxidation Reduction Potential	mV	08/05/2010	N001	17.52	-	33	218.3		F	#		
pH	s.u.	08/05/2010	N001	17.52	-	33	7.12		F	#		
Selenium	mg/L	08/05/2010	N001	17.52	-	33	0.34		F	#	0.000032	
Selenium	mg/L	08/05/2010	N002	17.52	-	33	0.34		F	#	0.000032	
Specific Conductance	umhos /cm	08/05/2010	N001	17.52	-	33	8143		F	#		
Sulfate	mg/L	08/05/2010	N001	17.52	-	33	4100		F	#	25	
Sulfate	mg/L	08/05/2010	N002	17.52	-	33	4100		F	#	25	
Temperature	C	08/05/2010	N001	17.52	-	33	13.98		F	#		
Total Dissolved Solids	mg/L	08/05/2010	N001	17.52	-	33	7300		F	#	80	
Total Dissolved Solids	mg/L	08/05/2010	N002	17.52	-	33	7300		F	#	80	
Turbidity	NTU	08/05/2010	N001	17.52	-	33	2.14		F	#		
Uranium	mg/L	08/05/2010	N001	17.52	-	33	0.019		F	#	0.0000029	
Uranium	mg/L	08/05/2010	N002	17.52	-	33	0.019		F	#	0.0000029	
Vanadium	mg/L	08/05/2010	N001	17.52	-	33	0.00092		F	#	0.000015	
Vanadium	mg/L	08/05/2010	N002	17.52	-	33	0.00083		F	#	0.000015	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site
REPORT DATE: 9/28/2010
Location: 0733 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	08/05/2010	N001	63.8	-	73.8	470		F	#		
Aroclor - 1016	ug/L	08/05/2010	N001	63.8	-	73.8	0.088	U	F	#	0.088	
Aroclor - 1221	ug/L	08/05/2010	N001	63.8	-	73.8	2	U	F	#	2	
Aroclor - 1232	ug/L	08/05/2010	N001	63.8	-	73.8	0.98	U	F	#	0.98	
Aroclor - 1242	ug/L	08/05/2010	N001	63.8	-	73.8	0.98	U	F	#	0.98	
Aroclor - 1248	ug/L	08/05/2010	N001	63.8	-	73.8	0.98	U	F	#	0.98	
Aroclor - 1254	ug/L	08/05/2010	N001	63.8	-	73.8	0.98	U	F	#	0.98	
Aroclor - 1260	ug/L	08/05/2010	N001	63.8	-	73.8	0.11	U	F	#	0.11	
Molybdenum	mg/L	08/05/2010	N001	63.8	-	73.8	0.0016		F	#	0.000032	
Nitrate + Nitrite as Nitrogen	mg/L	08/05/2010	N001	63.8	-	73.8	4.6		F	#	0.05	
Oxidation Reduction Potential	mV	08/05/2010	N001	63.8	-	73.8	226.2		F	#		
pH	s.u.	08/05/2010	N001	63.8	-	73.8	6.78		F	#		
Selenium	mg/L	08/05/2010	N001	63.8	-	73.8	0.0045		F	#	0.000032	
Specific Conductance	umhos /cm	08/05/2010	N001	63.8	-	73.8	13131		F	#		
Sulfate	mg/L	08/05/2010	N001	63.8	-	73.8	6700		F	#	50	
Temperature	C	08/05/2010	N001	63.8	-	73.8	16.36		F	#		
Total Dissolved Solids	mg/L	08/05/2010	N001	63.8	-	73.8	12000		F	#	200	
Turbidity	NTU	08/05/2010	N001	63.8	-	73.8	2.03		F	#		

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site
REPORT DATE: 9/28/2010
Location: 0733 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Uranium	mg/L	08/05/2010	N001	63.8	-	73.8	0.11		F	#	0.0000029	
Vanadium	mg/L	08/05/2010	N001	63.8	-	73.8	0.00072		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.
- L Less than 3 bore volumes purged prior to sampling.
- U Parameter analyzed for but was not detected.
- G Possible grout contamination, pH > 9.
- Q Qualitative result due to sampling technique.
- X Location is undefined.
- J Estimated value.
- R Unusable result.

QA QUALIFIER:
- # Validated according to quality assurance guidelines.

Static Water Level Data

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STATIC WATER LEVELS (USEE700) FOR SITE GRJ03, Grand Junction Disposal Site
REPORT DATE: 9/28/2010

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	08/05/2010	11:15:32	20.15	5198.37
0732	C	5202.5	08/05/2010	10:35:01	22.1	5180.4
0733	N	5232.84	08/05/2010	09:40:21	68.8	5164.04

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

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Hydrograph

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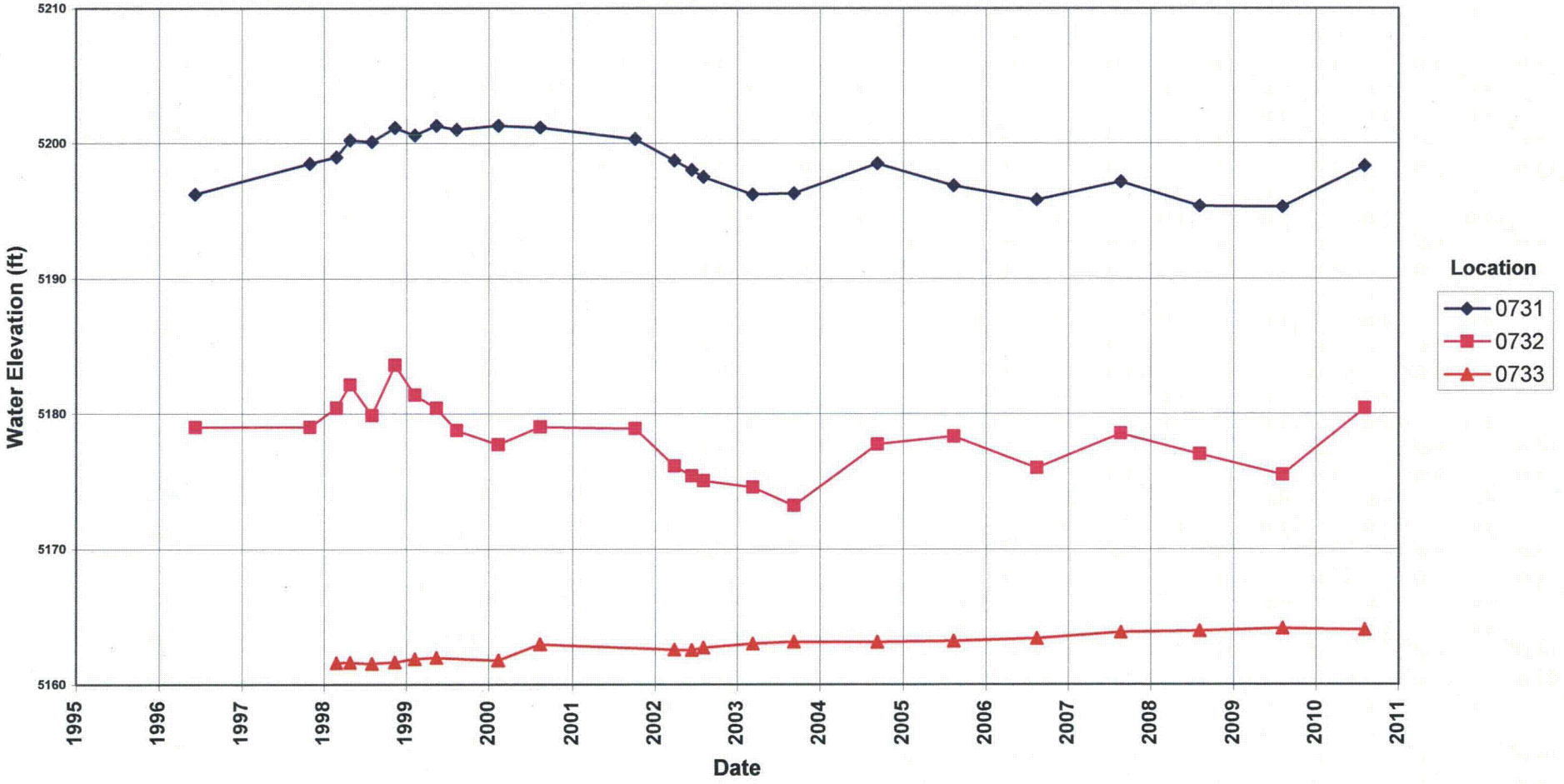
Grand Junction Disposal Site
Hydrograph



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Time-Concentration Graphs

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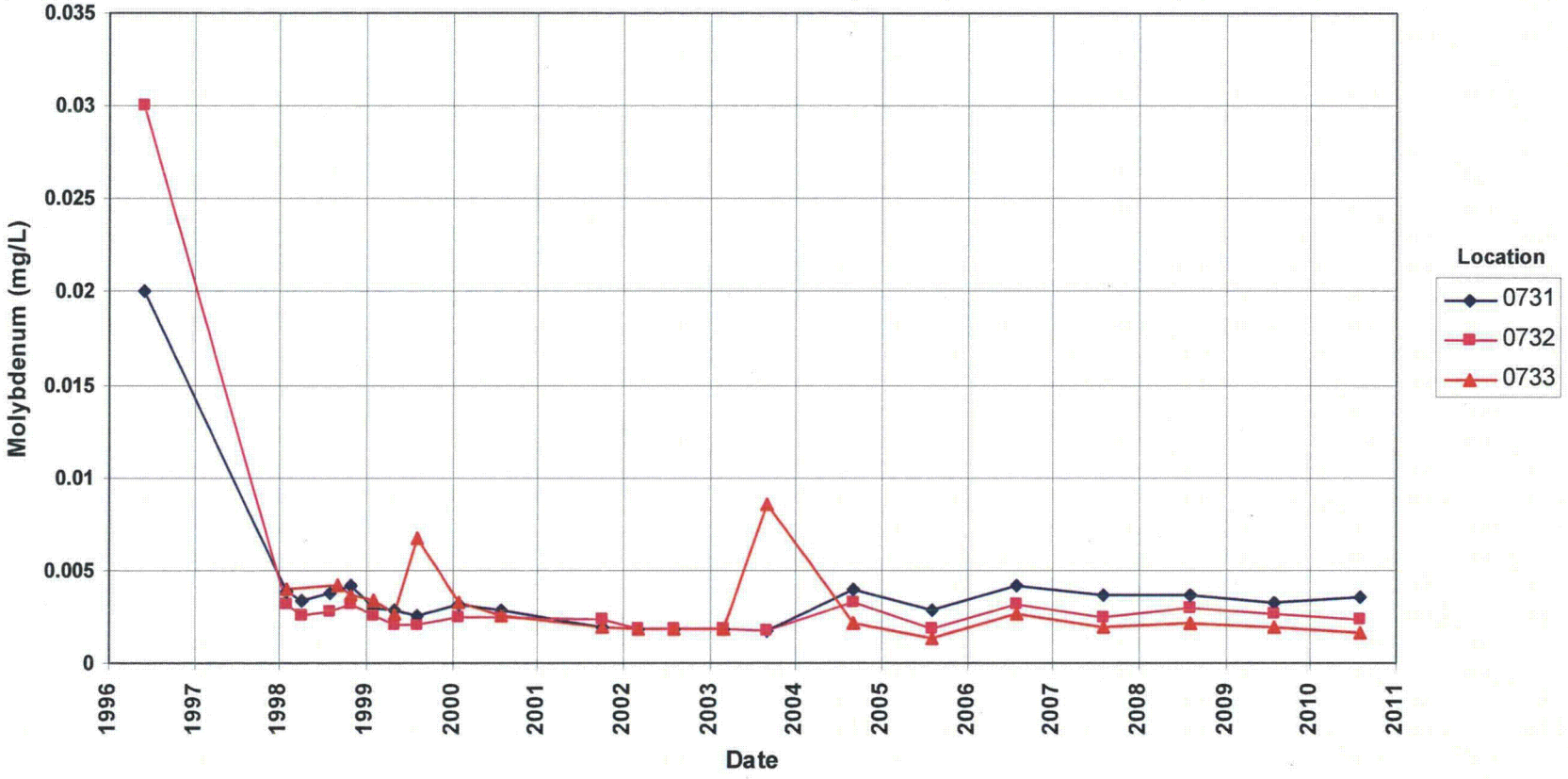
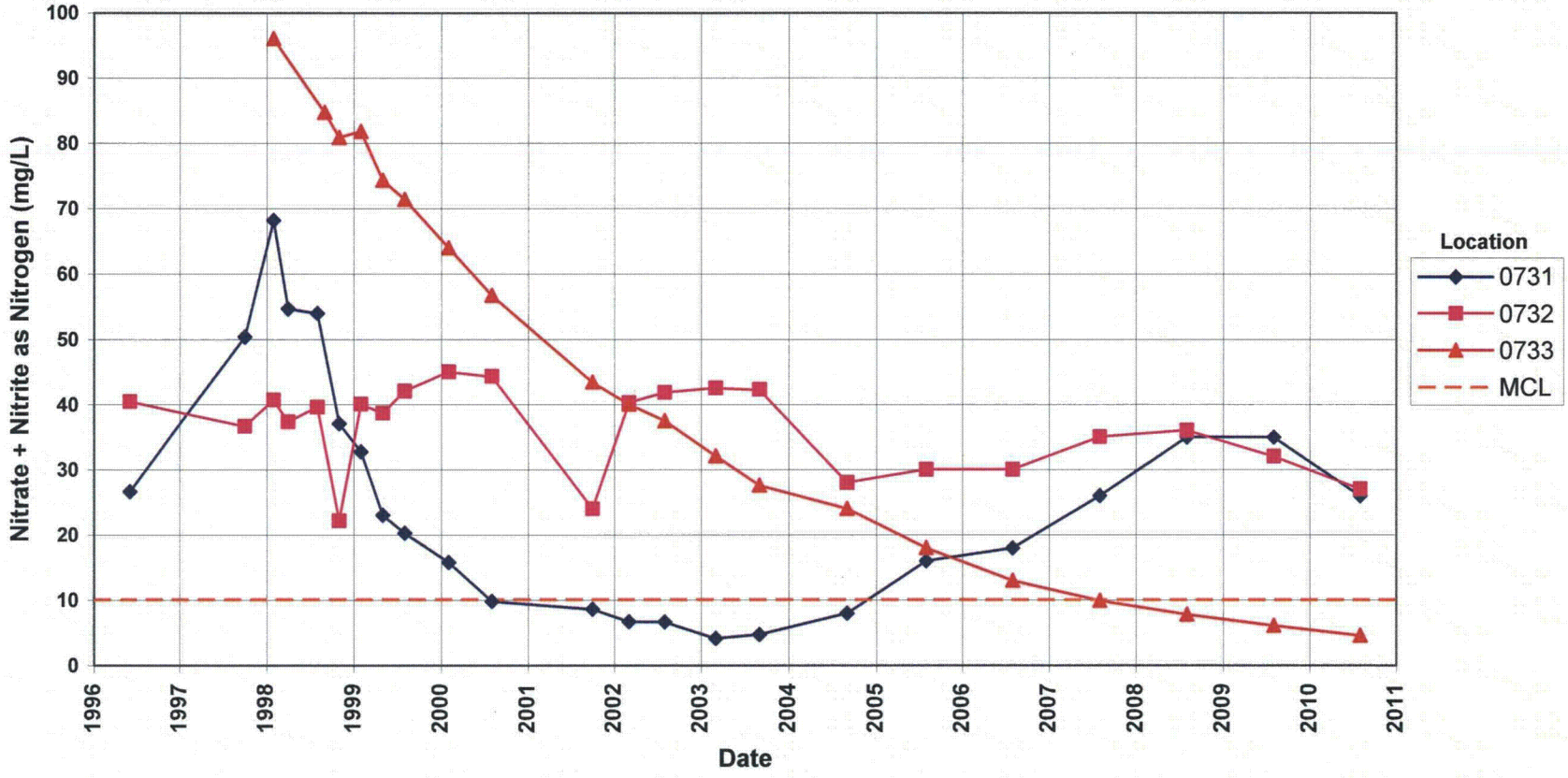
Grand Junction Disposal Site
Molybdenum Concentration

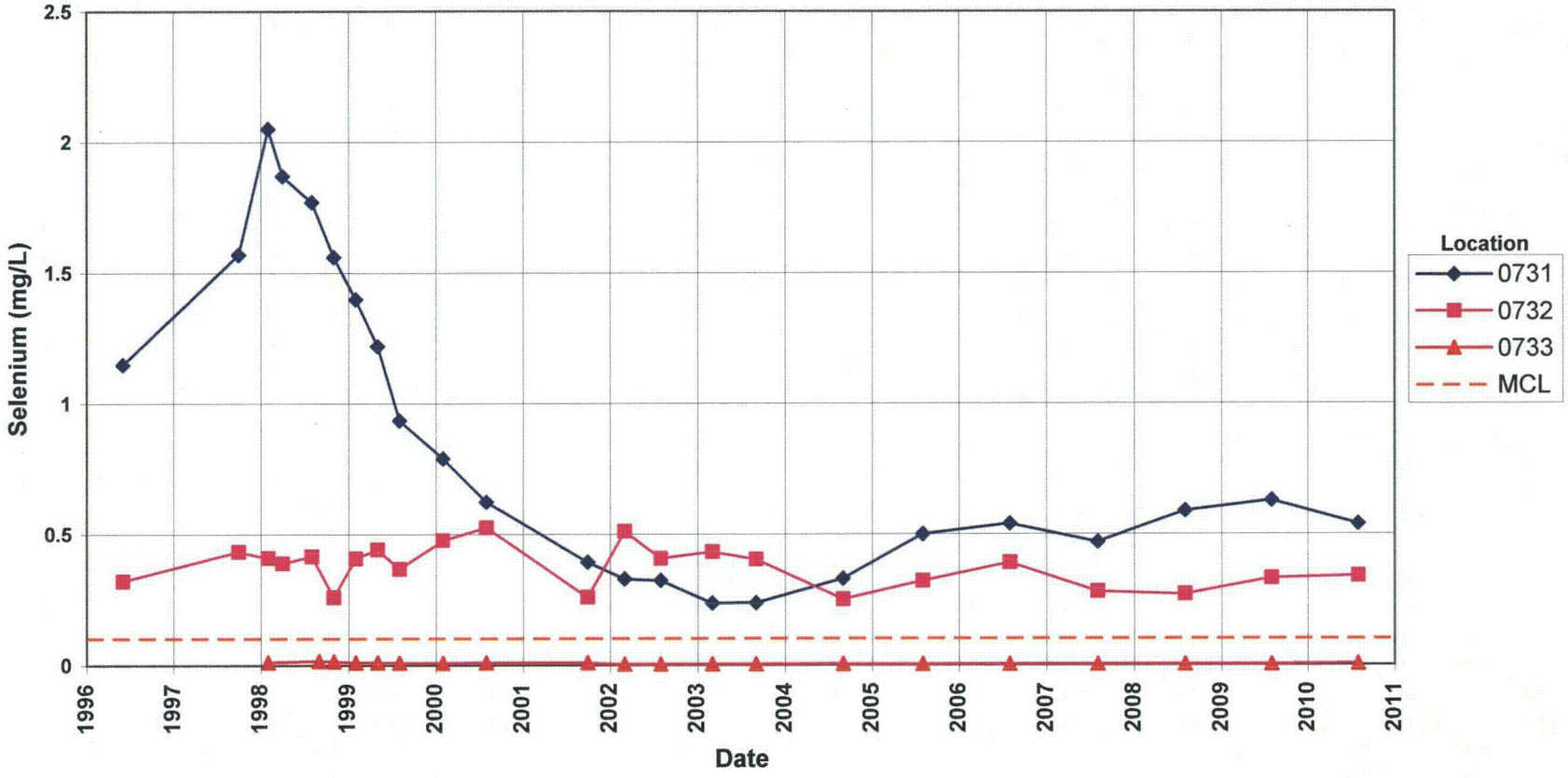
Maximum Contaminant Level (MCL) = 0.1 mg/L



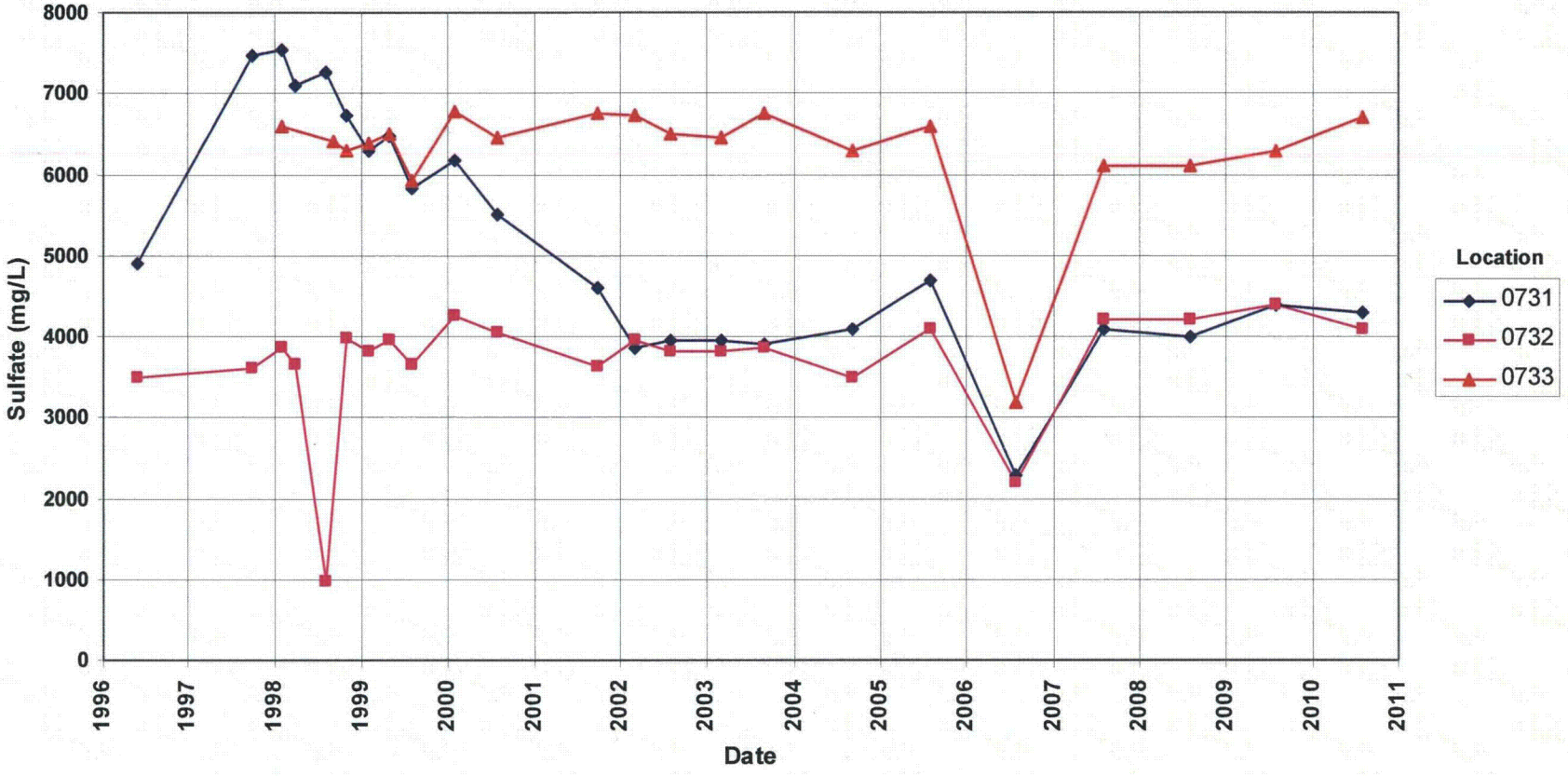
Grand Junction Disposal Site
Nitrate + Nitrite as Nitrogen Concentration
Maximum Contaminant Level (MCL) = 10.0 mg/L



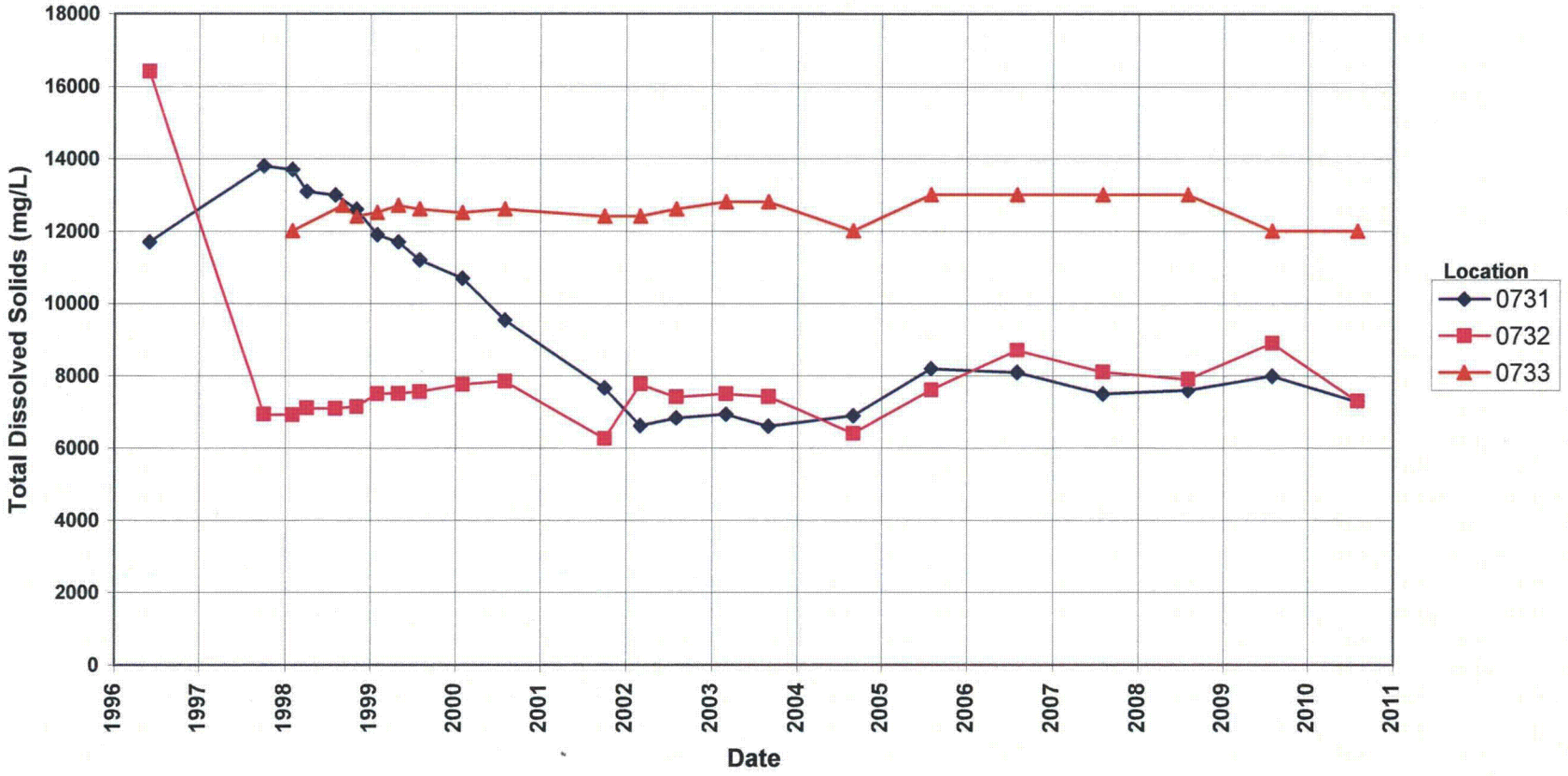
Grand Junction Disposal Site
Selenium Concentration
Maximum Contaminant Level (MCL) = 0.1 mg/L



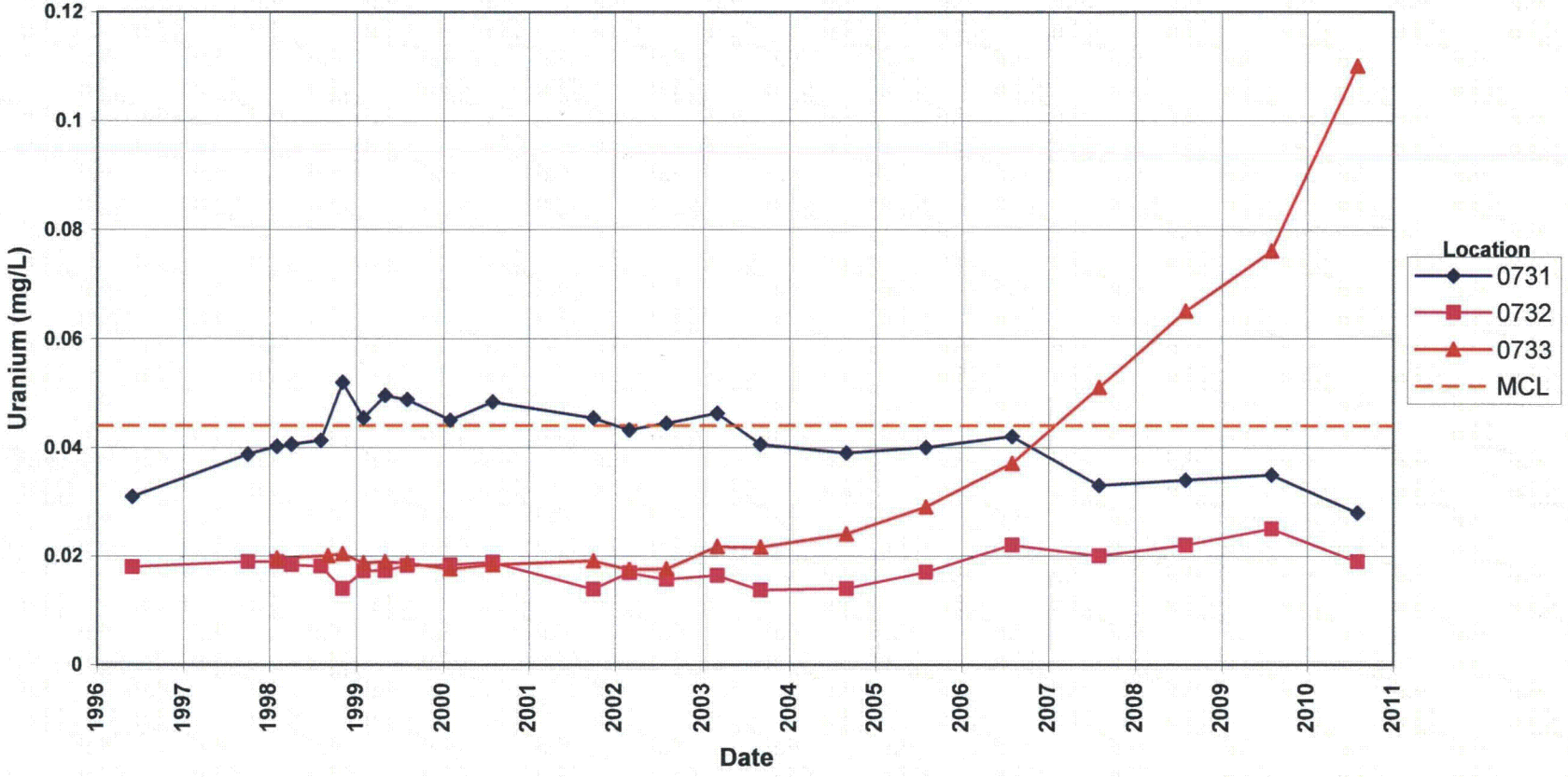
Grand Junction Disposal Site
Sulfate Concentration



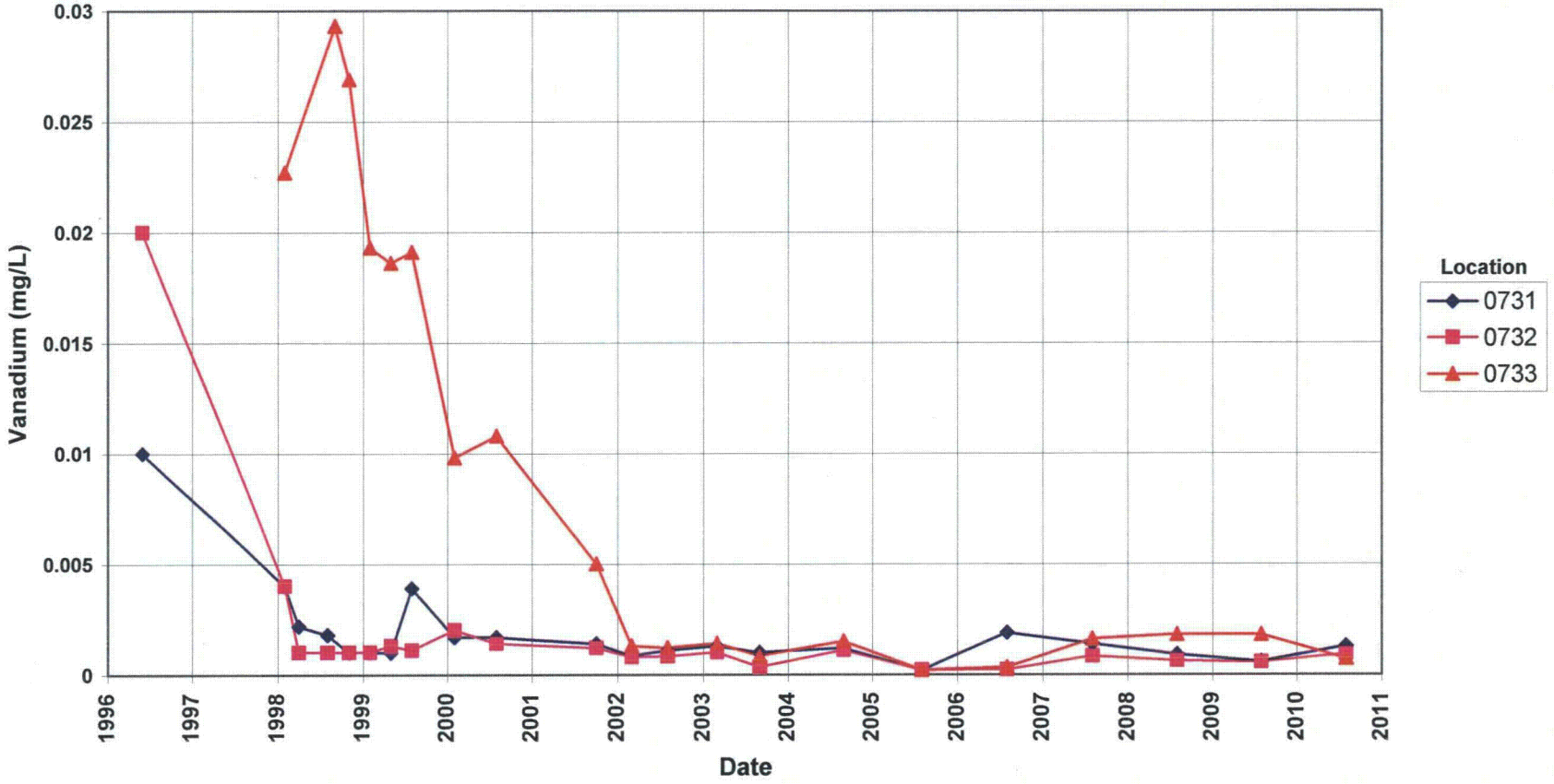
Grand Junction Disposal Site
Total Dissolved Solids Concentration



Grand Junction Disposal Site
Uranium Concentration
Maximum Contaminant Level (MCL) = 0.044 mg/L



Grand Junction Disposal Site
Vanadium Concentration



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Attachment 3
Sampling and Analysis Work Order

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Stoller established 1959

Task Order LM00-501
Control Number 10-0759

July 9, 2010

U.S. Department of Energy
Office of Legacy Management
ATTN: Joseph Desormeau
Site Manager
2597 B ¾ Road
Grand Junction, CO 81503

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)
August 2010 Environmental Sampling at Grand Junction, Colorado

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

Dear Mr. Desormeau:

The purpose of this letter is to inform you of the upcoming sampling event at Grand Junction, Colorado. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Grand Junction disposal site. Water quality data will be collected from monitoring wells at this site as part of the routine environmental sampling currently scheduled to begin the week of August 2, 2010.

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

Monitoring Wells*
0731 Al 0732 Al 0733 Tl

*NOTE: Al = Alluvium; Tl = 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 or concerns.

Sincerely,

Gary K. Baur
Site Lead

The S.M. Stoller Corporation 2597 B ¾ Road Grand Junction, CO 81503 (970) 248-6000 Fax: (970) 248-6040

GKB/lcg/lb

Enclosures (3)

cc: (electronic)
Cheri Bahrke, Stoller
Gary Baur, Stoller
Steve Donivan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
EDD Delivery
rc-grand.junction

Sampling Frequencies for Locations at Grand Junction Disposal Site Disposal Cell

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

Constituent Sampling Breakdown

Site	Grand Junction Disposal Site				
Analyte	**Groundwater**	**Surface Water**	**Required Detection Limit (mg/L)**	**Analytical Method**	**Line Item Code**
Approx. No. Samples/yr	3	0			
Field Measurements					
Alkalinity	X				
Dissolved Oxygen					
Redox Potential	X				
pH	X				
Specific Conductance	X				
Turbidity	X				
Temperature	X				
Laboratory Measurements					
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 analyte samples are considered unfiltered unless stated otherwise. All private well samples are to be unfiltered. The total number of analytes does not include field parameters.

Attachment 4
Trip Report

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Stoller
Grand Junction Office

established 1959

Memorandum

Control Number N/A

DATE: August 16, 2010

TO: Gary Baur

FROM: Daniel Sellers

SUBJECT: Trip Report

Site: Grand Junction Disposal Site, Colorado

Date of Sampling Event: August 5, 2009

Team Members: Dave Atkinson and Dan Sellers. Sampling at GRJ03-0733 well was monitored by Anthony Martinez, radiation control technician (RCT).

Number of Locations Sampled: Three monitoring wells were sampled and 1 duplicate sample was collected.

Locations Not Sampled/Reason: None.

Location Specific Information: Well 0733 is in a contamination area. All equipment, bottles, and supplies were checked by the RCT. All were clean except the water level indicator, which was left on site for any radon activity to dissipate. It will be checked again in the near future and brought back to office when clean.

Ticket Number	Location	Sample Date	Description	Notes
IIR 042	0731	8/6/09	Category I	PCBs collected in triplicate for lab QC. Data logger was downloaded
IIR 043	0732	8/6/09	Category I	PCBs collected in triplicate for lab QC Data logger was downloaded, test stopped and restarted. Roots were found in well and datalogger did not connect to computer initially. Well was developed and datalogger was reinstalled. Data was recovered successfully.
IIR 044	0733	8/6/09	Category I	RCT Monitored sampling Data logger was downloaded

Field Variance: None.

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

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2978	0732	Duplicate	Groundwater	IIR 045

Requisition Numbers Assigned: All samples were assigned to requisition identification number (RIN) 10073245.

Sample Shipment: Samples were shipped overnight by FedEx to ALS Laboratory Group, Fort Collins, CO, from Grand Junction, CO, on August 5, 2010.

Water Level Measurements: Water level measurements were collected in all wells.

Well Inspection Summary: Well inspections were conducted at all sampled wells. All wells were in good condition. Roots were observed in well 0732. This well was developed and roots were removed on August 11, 2010. The datalogger was re-installed and a new test was started.

Equipment: All wells were equipped with dedicated bladder pumps.

Institutional Controls:

Fences, Gates, Locks: Gates were opened and locked after sampling event and well development. Fences and locks were in good condition.
Signs: No missing/damaged signs were noted.
Trespassing/Site Disturbances: None

Site Issues

Disposal Cell/Drainage Structure Integrity: No issues identified.
Vegetation/Noxious Weed Concerns: No issues identified.
Maintenance Requirements: None observed.
Safety Issues: None observed.

Corrective Action Taken/Required:

cc: (electronic)
Joseph Desormeau, DOE
Steve Donivan, Stoller
EDD Delivery