

# Data Validation Package

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**August 2009**  
**Groundwater Sampling at the**  
**Grand Junction, Colorado, Disposal Site**

**October 2009**



U.S. DEPARTMENT OF  
**ENERGY**

Legacy  
Management

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# Sampling Event Summary

**Site:** Grand Junction, Colorado, Disposal Site

**Sampling Period:** August 6, 2009

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. Monitor 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.

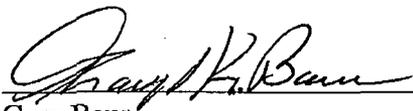
- Molybdenum concentrations continue to be significantly below the maximum contaminant level (MCL) of 0.1 milligram per liter (mg/L).
- Nitrate + nitrite as nitrogen concentrations exceed the standard in both wells adjacent to the cell (0731 and 0732). This contaminant is below the MCL of 10.0 mg/L and 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 2009

Analyte	Standard <sup>a</sup>	Location	Concentration
Nitrate + Nitrite as Nitrogen	10	0731	35
		0732	32
Selenium	0.01	0731	0.63
		0732	0.33
Uranium	0.044	0733	0.076

<sup>a</sup> 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

NOVEMBER 9<sup>TH</sup> 2009  
Date



M:\LTS\111\0029\14\S04886\S0488600.mxd smithw 11/24/2008 11:34:14 AM

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

<b>Project</b>	<u>Grand Junction, Colorado</u>	<b>Date(s) of Water Sampling</b>	<u>August 6, 2009</u>
<b>Date(s) of Verification</b>	<u>October 8, 2009</u>	<b>Name of Verifier</b>	<u>Steve Donovan</u>

	<b>Response (Yes, No, NA)</b>	<b>Comments</b>
1. Is the SAP the primary document directing field procedures? List other documents, SOPs, instructions.	<u>Yes</u>	<u>Work Order Letter dated July 8, 2009.</u>
2. Were the sampling locations specified in the planning documents sampled?	<u>Yes</u>	
3. Was a pre-trip calibration conducted as specified in the above-named documents?	<u>Yes</u>	<u>Pre-trip calibration was performed on August 6, 2009.</u>
4. Was an operational check of the field equipment conducted daily? Did the operational checks meet criteria?	<u>Yes</u> <u>Yes</u>	<u>One operational check was performed on August 6, 2009.</u>
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	<u>Yes</u>	
6. Was the category of the well documented?	<u>Yes</u>	<u>All wells were Category I.</u>
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling?	<u>Yes</u>	
Did the water level stabilize prior to sampling?	<u>Yes</u>	
Did pH, specific conductance, and turbidity measurements stabilize prior to sampling?	<u>Yes</u>	
Was the flow rate less than 500 mL/min?	<u>Yes</u>	
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	<u>NA</u>	

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

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well:		
Was the flow rate less than 500 mL/min?	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 well 0733.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	NA	Dedicated equipment was used.
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	Location ID 2978 was used for the duplicate sample.
Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDCS) report?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Are field data sheets signed and dated by both team members (hardcopies) or are dates present for the "Date Signed" fields (FDCS)?	Yes	
18. Was all other pertinent information documented on the field data sheets?	Yes	
19. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
20. Were water levels measured at the locations specified in the planning documents?	Yes	

## Laboratory Performance Assessment

### General Information

Report Number (RIN): 09072485  
Sample Event: August 6, 2009  
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: October 7, 2009

This validation was performed according to the *Environmental Procedures Catalog* (LMS/PRO/S04325, continually updated), "Standard Practice for Validation of Laboratory Data," GT-9(P). 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
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

None of the sample results required additional qualification.

### Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received four water samples on August 7, 2009, under air waybill number 7968 4059 6620 accompanied by a Chain of Custody (COC) form. The COC form 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 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 4.0 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

## 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.

### *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 12, 2009. 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 three 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 12, 2009, using seven 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. Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the required frequency resulting in nine verification checks. All calibration checks met the acceptance criteria with the exception of one molybdenum and one vanadium calibration check. There were no sample results associated with these calibration checks. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the practical quantitation limit 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 March 9, 2009. 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 15 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 4, 2009. 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 four 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 practical quantitation limits for all analytes with the following exceptions. One molybdenum calibration blank result was above the practical quantitation limit. There were no reported results associated with this blank. The sulfate calibration blank results were above the practical quantitation limit. The samples associated with these blanks had sulfate concentrations greater than 10 times the blank concentrations.

#### *Organics*

The method blank results were below the practical quantitation limits and 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 practical quantitation limit, 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 practical quantitation limit. 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.

### Detection Limits/Dilutions

Samples were diluted in a consistent and acceptable manner when required. The samples were diluted prior to analysis of molybdenum, uranium, and vanadium to reduce interferences. 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 August 24, 2009. 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: 09072485    Lab Code: PAR    Validator: Steve Donovan    Validation Date: 10/7/2009  
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

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

Field/Trip Blanks

Field Duplicates

There was 1 duplicate evaluated.

**SAMPLE MANAGEMENT SYSTEM**  
**Metals Data Validation Worksheet**

RIN: 09072485      Lab Code: PAR      Date Due: 9/4/2009  
 Matrix: Water      Site Code: GRJ03      Date Completed: 8/25/2009

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
		Int.	R <sup>2</sup>	ICV	CCV	ICB	CCB								
MOLYBDENUM	08/12/2009	0.0000	1.0000	OK	OK	OK	OK	OK	100.0	117.0	110.0	5.0	109.0		99.0
SELENIUM	08/12/2009	0.0000	1.0000	OK	OK	OK	OK	OK	84.0			3.0	89.0	0.0	126.0
URANIUM	08/12/2009	0.0000	1.0000	OK	OK	OK	OK	OK	101.0	110.0	97.0	6.0	107.0	3.0	101.0
VANADIUM	08/12/2009	0.0000	1.0000	OK	OK	OK	OK	OK	96.0	117.0	116.0	1.0	94.0		92.0

**SAMPLE MANAGEMENT SYSTEM**  
**Organics Data Validation Summary**

**RIN:** 09072485

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

**Validation Date:** 10/7/2009

**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.

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

RIN: 09072485      Lab Code: PAR      Date Due: 9/4/2009  
 Matrix: Water      Site Code: GRJ03      Date Completed: 8/25/2009

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R <sup>2</sup>	ICV	CCV	ICB	CCB						
NITRATE/NITRITE AS N	08/12/2009	0.000	0.9996	OK	OK	OK	OK	OK	101.00	92.0	91.0	1.00	
SULFATE	08/10/2009	0.000	1.0000	OK	OK	OK	OK	OK	96.00	99.0	100.0	0	
TOTAL DISSOLVED SOLIDS	08/10/2009							OK	100.00			1.00	

## Sampling Quality Control Assessment

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

### Sampling Protocol

Sample results for all monitor 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. Duplicate samples were collected from location 0733 (field duplicate ID 2978). The duplicate results met the EPA recommended laboratory duplicate criteria of less than 20 percent relative difference for results that are greater than 5 times the practical quantitation limit, indicating acceptable overall precision.

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

RIN: 09072485    Lab Code: PAR    Project: Grand Junction Disp/Proc Sites    Validation Date: 10/7/2009

Duplicate: 2978

Sample: 0733

Analyte	Sample			Duplicate			RPD	RER	Units
	Result	Flag	Error	Result	Flag	Error			
AROCLOR-1016	0.11	U		0.11	U				UG/L
AROCLOR-1221	0.081	U		0.081	U				UG/L
AROCLOR-1232	0.12	U		0.12	U				UG/L
AROCLOR-1242	0.13	U		0.13	U				UG/L
AROCLOR-1248	0.13	U		0.13	U				UG/L
AROCLOR-1254	0.11	U		0.11	U				UG/L
AROCLOR-1260	0.092	U		0.092	U				UG/L
MOLYBDENUM	1.9			1.9			0		UG/L
NITRATE/NITRITE AS N	6.1			6.1			0		MG/L
SELENIUM	2.6			2.8			7.41		UG/L
SULFATE	6300			6200			1.60		MG/L
TOTAL DISSOLVED SOLIDS	12000			12000			0		MG/L
URANIUM	75			76			1.32		UG/L
VANADIUM	1.8			1.6			11.76		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 Donovan 10-21-2009  
Steve Donovan Date

Data Validation Lead: Steve Donovan 10-21-2009  
Steve Donovan 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 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**

Laboratory: PARAGON (Fort Collins, CO)

RIN: 09072485

Comparison: All Historical Data

Report Date: 10/8/2009

Site Code	Location Code	Sample Date	Analyte	Current		Historical Maximum		Historical Minimum		Number of Data Points		Normally Distributed	Statistical Outlier
				Result	Qualifiers Lab Data	Result	Qualifiers Lab Data	Result	Qualifiers Lab Data	N	N Below Detect		
GRJ03	0732	08/06/2009	Sulfate	4400	F	4260		963	L	36	0	No	No
GRJ03	0733	08/06/2009	Nitrate + Nitrite as Nitrogen	6.1	F	24	FQ	7.8	F	5	0	Yes	No
GRJ03	0733	08/06/2009	Uranium	0.076	F	0.065	F	0.0175	F	18	0	No	Yes
GRJ03	0733	08/06/2009	Uranium	0.075	F	0.065	F	0.0175	F	18	0	No	Yes

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.

**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: 10/8/2009

Location: 0731 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft.BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	08/06/2009	N001	17	-	32	160		F	#	
Aroclor - 1016	ug/L	08/06/2009	N001	17	-	32	0.11	U	F	#	0.11
Aroclor - 1221	ug/L	08/06/2009	N001	17	-	32	0.08	U	F	#	0.08
Aroclor - 1232	ug/L	08/06/2009	N001	17	-	32	0.12	U	F	#	0.12
Aroclor - 1242	ug/L	08/06/2009	N001	17	-	32	0.13	U	F	#	0.13
Aroclor - 1248	ug/L	08/06/2009	N001	17	-	32	0.13	U	F	#	0.13
Aroclor - 1254	ug/L	08/06/2009	N001	17	-	32	0.11	U	F	#	0.11
Aroclor - 1260	ug/L	08/06/2009	N001	17	-	32	0.091	U	F	#	0.091
Molybdenum	mg/L	08/06/2009	N001	17	-	32	0.0033		F	#	0.000067
Nitrate + Nitrite as Nitrogen	mg/L	08/06/2009	N001	17	-	32	35		F	#	0.5
Oxidation Reduction Potential	mV	08/06/2009	N001	17	-	32	146.6		F	#	
pH	s.u.	08/06/2009	N001	17	-	32	7.26		F	#	
Selenium	mg/L	08/06/2009	N001	17	-	32	0.63		F	#	0.0016
Specific Conductance	umhos/cm	08/06/2009	N001	17	-	32	7817		F	#	
Sulfate	mg/L	08/06/2009	N001	17	-	32	4400		F	#	50
Temperature	C	08/06/2009	N001	17	-	32	16.24		F	#	
Total Dissolved Solids	mg/L	08/06/2009	N001	17	-	32	8000		F	#	80
Turbidity	NTU	08/06/2009	N001	17	-	32	2.96		F	#	
Uranium	mg/L	08/06/2009	N001	17	-	32	0.035		F	#	0.0000017
Vanadium	mg/L	08/06/2009	N001	17	-	32	0.0006		F	#	0.00005

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

REPORT DATE: 10/8/2009

Location: 0732 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	08/06/2009	N001	17.52	-	33	242		F	#		
Aroclor - 1016	ug/L	08/06/2009	N001	17.52	-	33	0.11	U	F	#	0.11	
Aroclor - 1221	ug/L	08/06/2009	N001	17.52	-	33	0.082	U	F	#	0.082	
Aroclor - 1232	ug/L	08/06/2009	N001	17.52	-	33	0.12	U	F	#	0.12	
Aroclor - 1242	ug/L	08/06/2009	N001	17.52	-	33	0.13	U	F	#	0.13	
Aroclor - 1248	ug/L	08/06/2009	N001	17.52	-	33	0.13	U	F	#	0.13	
Aroclor - 1254	ug/L	08/06/2009	N001	17.52	-	33	0.11	U	F	#	0.11	
Aroclor - 1260	ug/L	08/06/2009	N001	17.52	-	33	0.094	U	F	#	0.094	
Molybdenum	mg/L	08/06/2009	N001	17.52	-	33	0.0026		F	#	0.000067	
Nitrate + Nitrite as Nitrogen	mg/L	08/06/2009	N001	17.52	-	33	32		F	#	0.5	
Oxidation Reduction Potential	mV	08/06/2009	N001	17.52	-	33	146.2		F	#		
pH	s.u.	08/06/2009	N001	17.52	-	33	7.08		F	#		
Selenium	mg/L	08/06/2009	N001	17.52	-	33	0.33		F	#	0.0016	
Specific Conductance	umhos/cm	08/06/2009	N001	17.52	-	33	8945		F	#		
Sulfate	mg/L	08/06/2009	N001	17.52	-	33	4400		F	#	50	
Temperature	C	08/06/2009	N001	17.52	-	33	14.73		F	#		
Total Dissolved Solids	mg/L	08/06/2009	N001	17.52	-	33	8900		F	#	400	
Turbidity	NTU	08/06/2009	N001	17.52	-	33	4.16		F	#		
Uranium	mg/L	08/06/2009	N001	17.52	-	33	0.025		F	#	0.0000017	
Vanadium	mg/L	08/06/2009	N001	17.52	-	33	0.00056		F	#	0.00005	

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

REPORT DATE: 10/8/2009

Location: 0733 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	08/06/2009	N001	63.8 - 73.8	383		F	#		
Aroclor - 1016	ug/L	08/06/2009	N001	63.8 - 73.8	0.11	U	F	#	0.11	
Aroclor - 1016	ug/L	08/06/2009	N002	63.8 - 73.8	0.11	U	F	#	0.11	
Aroclor - 1221	ug/L	08/06/2009	N001	63.8 - 73.8	0.081	U	F	#	0.081	
Aroclor - 1221	ug/L	08/06/2009	N002	63.8 - 73.8	0.081	U	F	#	0.081	
Aroclor - 1232	ug/L	08/06/2009	N001	63.8 - 73.8	0.12	U	F	#	0.12	
Aroclor - 1232	ug/L	08/06/2009	N002	63.8 - 73.8	0.12	U	F	#	0.12	
Aroclor - 1242	ug/L	08/06/2009	N001	63.8 - 73.8	0.13	U	F	#	0.13	
Aroclor - 1242	ug/L	08/06/2009	N002	63.8 - 73.8	0.13	U	F	#	0.13	
Aroclor - 1248	ug/L	08/06/2009	N001	63.8 - 73.8	0.13	U	F	#	0.13	
Aroclor - 1248	ug/L	08/06/2009	N002	63.8 - 73.8	0.13	U	F	#	0.13	
Aroclor - 1254	ug/L	08/06/2009	N001	63.8 - 73.8	0.11	U	F	#	0.11	
Aroclor - 1254	ug/L	08/06/2009	N002	63.8 - 73.8	0.11	U	F	#	0.11	
Aroclor - 1260	ug/L	08/06/2009	N001	63.8 - 73.8	0.092	U	F	#	0.092	
Aroclor - 1260	ug/L	08/06/2009	N002	63.8 - 73.8	0.092	U	F	#	0.092	
Molybdenum	mg/L	08/06/2009	N001	63.8 - 73.8	0.0019		F	#	0.000067	
Molybdenum	mg/L	08/06/2009	N002	63.8 - 73.8	0.0019		F	#	0.000067	
Nitrate + Nitrite as Nitrogen	mg/L	08/06/2009	N001	63.8 - 73.8	6.1		F	#	0.1	
Nitrate + Nitrite as Nitrogen	mg/L	08/06/2009	N002	63.8 - 73.8	6.1		F	#	0.1	

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

REPORT DATE: 10/8/2009

Location: 0733 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Oxidation Reduction Potential	mV	08/06/2009	N001	63.8 - 73.8	163.8		F	#		
pH	s.u.	08/06/2009	N001	63.8 - 73.8	7.01		F	#		
Selenium	mg/L	08/06/2009	N001	63.8 - 73.8	0.0026		F	#	0.000032	
Selenium	mg/L	08/06/2009	N002	63.8 - 73.8	0.0028		F	#	0.000032	
Specific Conductance	umhos/cm	08/06/2009	N001	63.8 - 73.8	12101		F	#		
Sulfate	mg/L	08/06/2009	N001	63.8 - 73.8	6300		F	#	50	
Sulfate	mg/L	08/06/2009	N002	63.8 - 73.8	6200		F	#	50	
Temperature	C	08/06/2009	N001	63.8 - 73.8	16.93		F	#		
Total Dissolved Solids	mg/L	08/06/2009	N001	63.8 - 73.8	12000		F	#	200	
Total Dissolved Solids	mg/L	08/06/2009	N002	63.8 - 73.8	12000		F	#	200	
Turbidity	NTU	08/06/2009	N001	63.8 - 73.8	3.2		F	#		
Uranium	mg/L	08/06/2009	N001	63.8 - 73.8	0.075		F	#	0.0000017	
Uranium	mg/L	08/06/2009	N002	63.8 - 73.8	0.076		F	#	0.0000017	
Vanadium	mg/L	08/06/2009	N001	63.8 - 73.8	0.0018		F	#	0.00005	
Vanadium	mg/L	08/06/2009	N002	63.8 - 73.8	0.0016		F	#	0.00005	

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: 10/8/2009

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0731	D	5218.52	08/06/2009	12:25:05	23.2	5195.32	
0732	C	5202.5	08/06/2009	11:45:56	27.02	5175.48	
0733	N	5232.84	08/06/2009	10:50:14	68.7	5164.14	

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

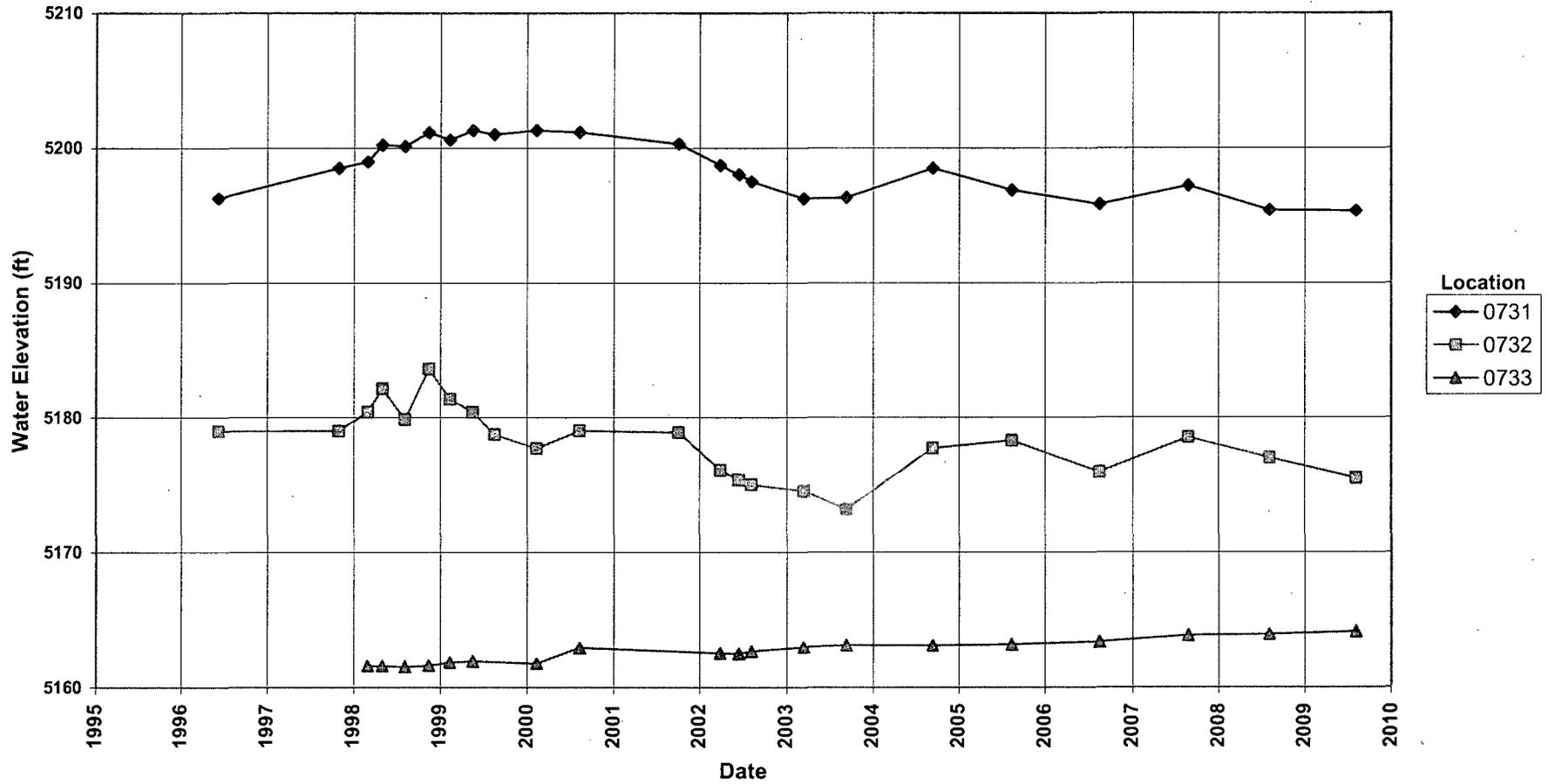
WATER LEVEL FLAGS: D Dry      F FLOWING

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# Hydrograph

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### Grand Junction Disposal Site Hydrograph

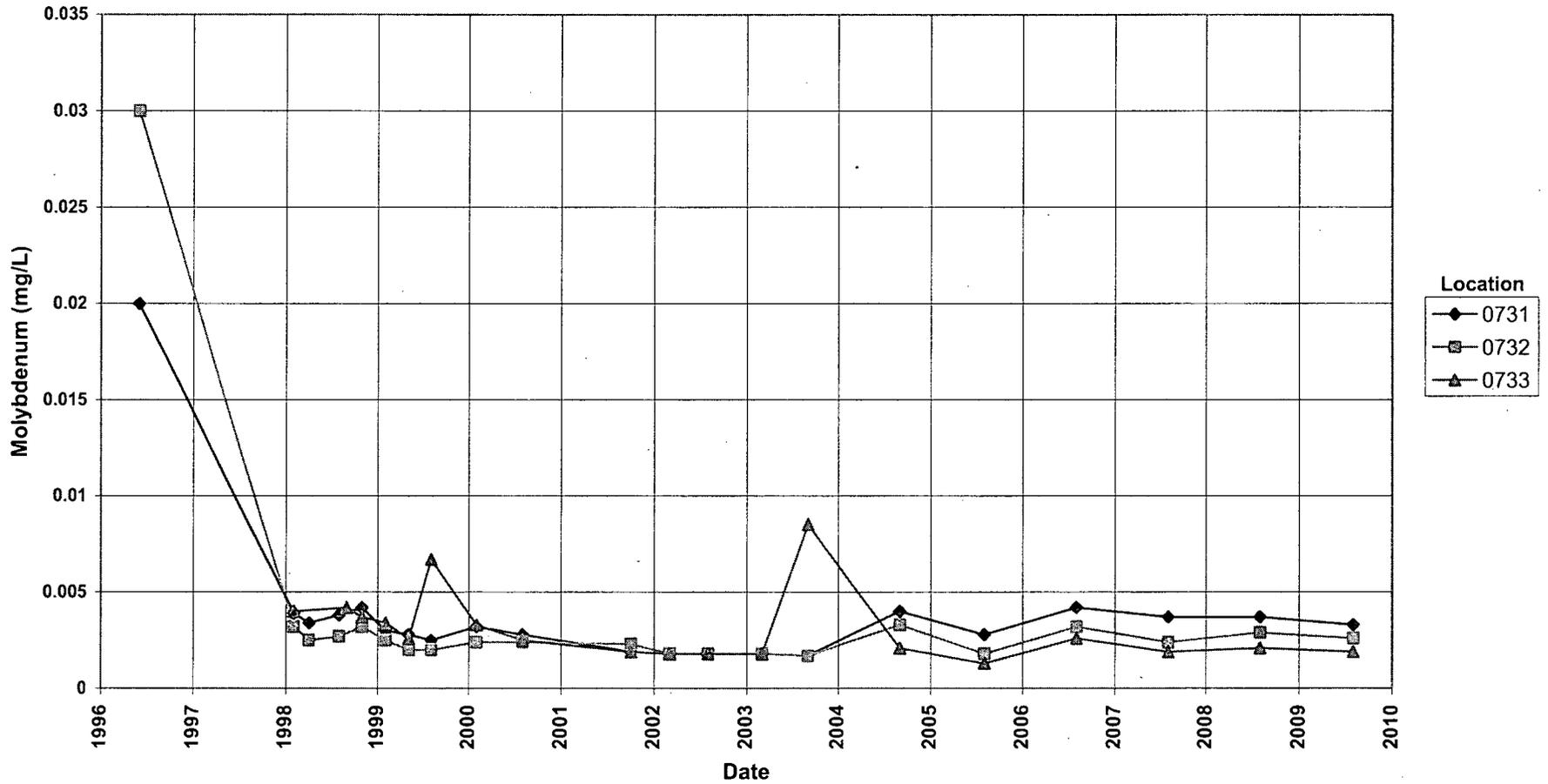


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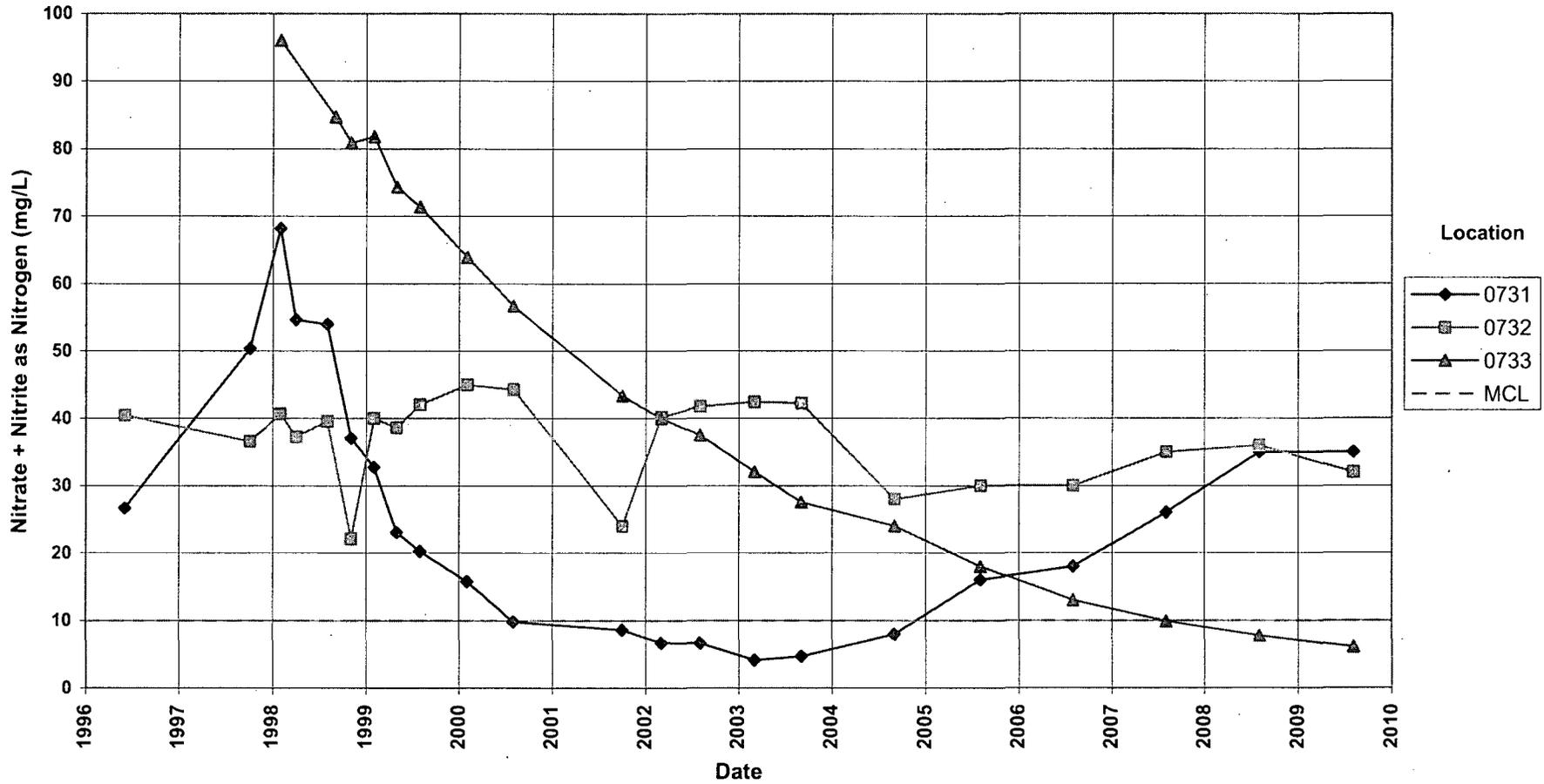
## **Time-Concentration Graphs**

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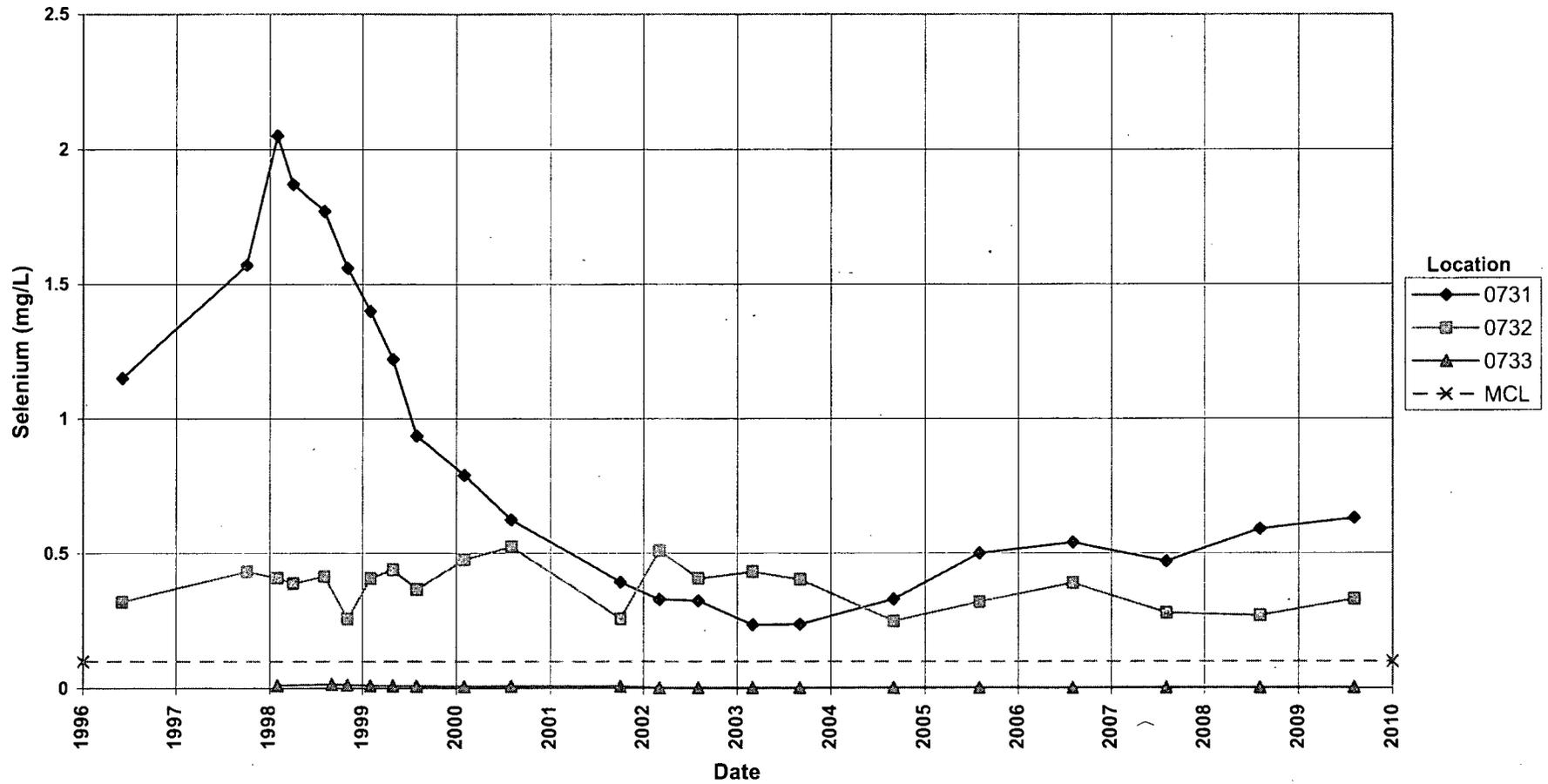
**Grand Junction Disposal Site**  
**Molybdenum Concentration**  
Maximum Contaminant Limit (MCL) = 0.1 mg/L



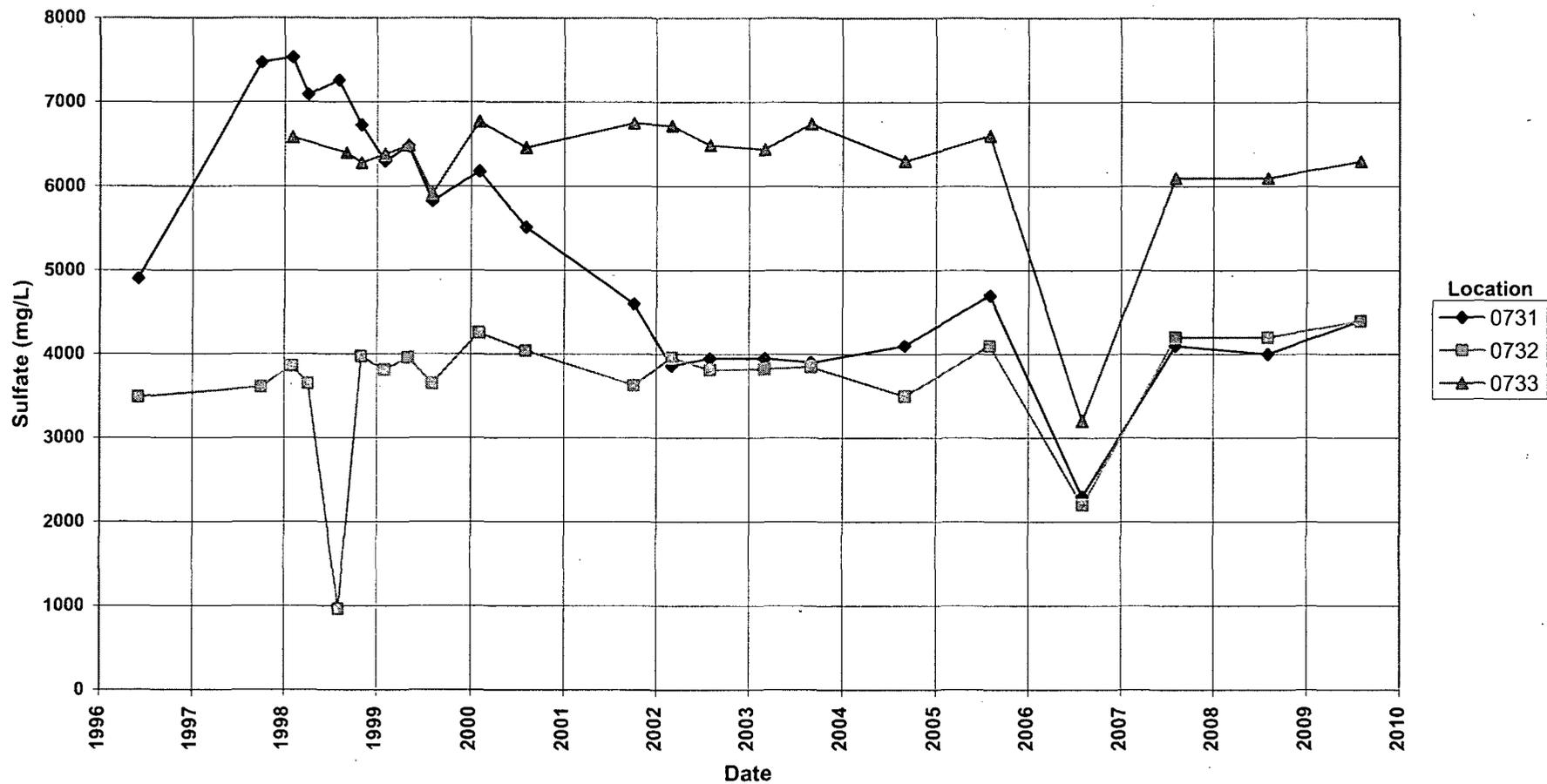
**Grand Junction Disposal Site**  
**Nitrate + Nitrite as Nitrogen Concentration**  
 Maximum Contaminant Limit (MCL) = 10.0 mg/L



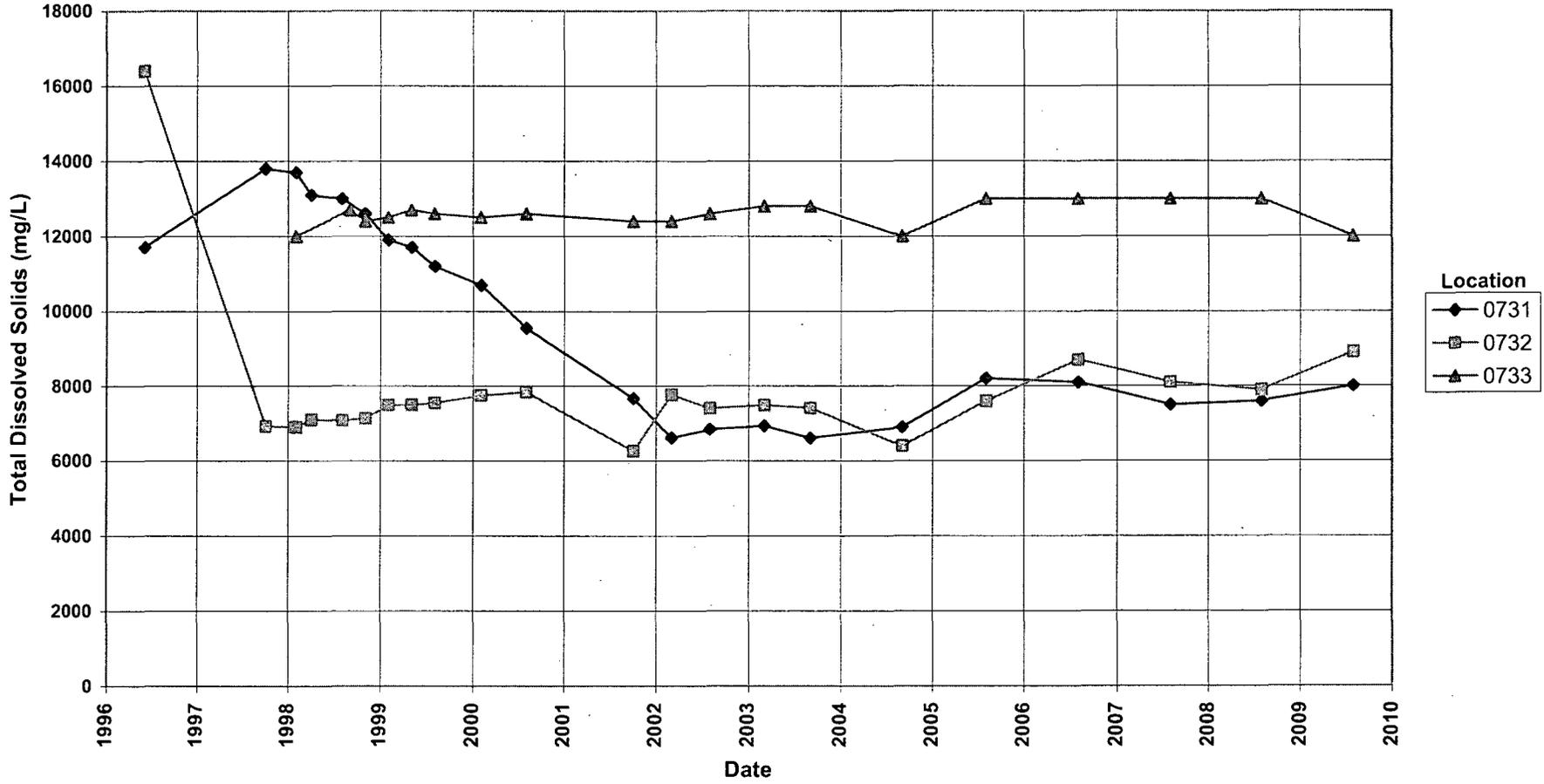
**Grand Junction Disposal Site  
Selenium Concentration**  
Maximum Contaminant Limit (MCL) = 0.1 mg/L



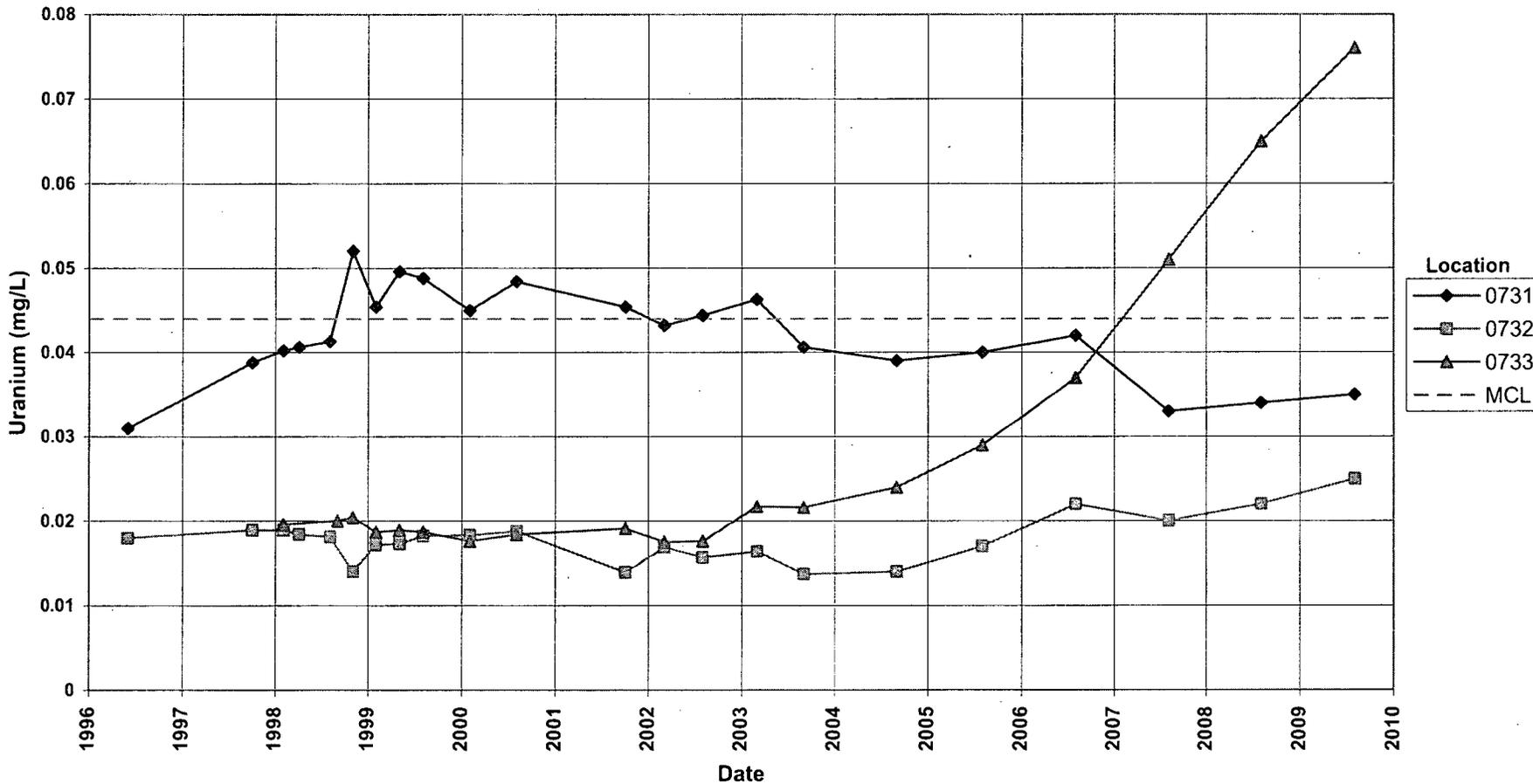
### Grand Junction Disposal Site Sulfate Concentration



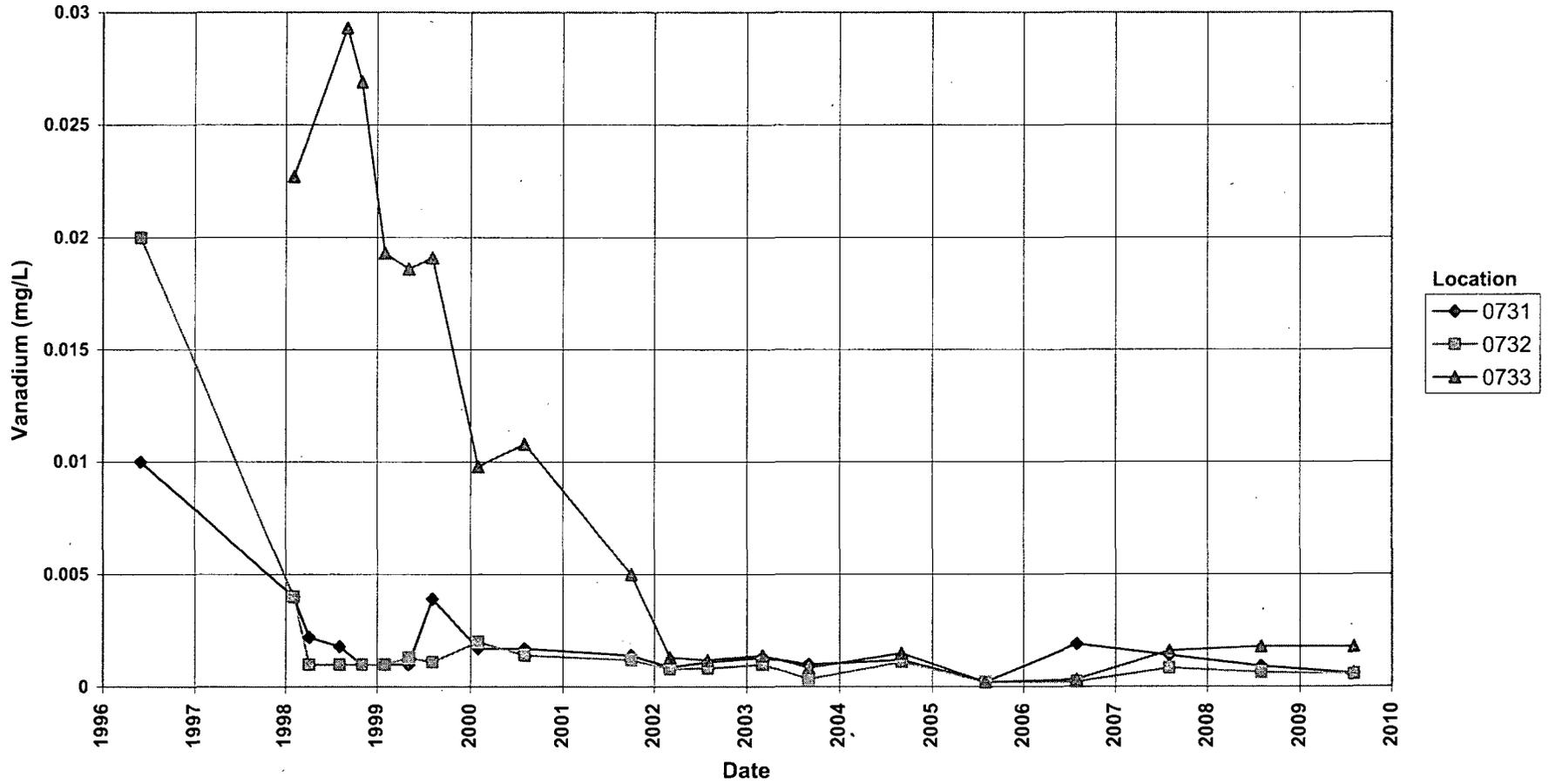
### Grand Junction Disposal Site Total Dissolved Solids Concentration



**Grand Junction Disposal Site**  
**Uranium Concentration**  
 Maximum Contaminant Limit (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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established 1959

Task Order LM00-501  
Control Number 09-0880

July 8, 2009

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, Stoller  
August 2009 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 at this site as part of the routine environmental sampling currently scheduled to begin the week of August 10, 2009.

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

**Monitor Wells\***

0731 A1      0732 A1      0733 T1

\*NOTE: A1 = Alluvium; T1 = 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 call me at (970) 248-6391 if you have any questions.

Sincerely,

Gary K. Baur

Site Lead

GB/lcg/lb

Enclosures (3)

cc: (electronic)

Cheri Bahrke, Stoller

Gary Baur, Stoller

Steve Donovan, Stoller

Bev Gallagher, Stoller

Lauren Goodknight, Stoller

EDD Delivery

rc-grand.junction

### Constituent Sampling Breakdown

Site	Grand Junction Disposal Site		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
	Analyte	Groundwater			
<b>Approx. No. Samples/yr</b>	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					
<b>Total No. of Analytes</b>	<b>8</b>	<b>0</b>			

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.

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**Attachment 4**  
**Trip Report**

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*Memorandum*

Control Number N/A

DATE: August 17, 2009

TO: Gary Baur

FROM: Daniel Sellers

SUBJECT: Trip Report

Site: Grand Junction Disposal Site, Colorado

Date of Sampling Event: August 6, 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: 3 monitor wells.

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
HIY 432	0731	8/6/09	Category I	Data logger was downloaded
HIY 433	0732	8/6/09	Category I	PCBs collected in triplicate for lab QC Data logger was downloaded.
HIY 434	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	0733	Duplicate	Groundwater	HIY 435

**Requisition Numbers Assigned:** All samples were assigned to requisition identification number (RIN) 09072485.

**Sample Shipment:** Samples were shipped overnight by FedEx to ALS Laboratory Group, Fort Collins, CO, from Grand Junction, CO, on August 6, 2009.

**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.

**Equipment:** All wells were equipped with dedicated bladder pumps.

**Institutional Controls:**

**Fences, Gates, Locks:** No gates or locks were opened. Fences appeared to be adequate.

**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:** Roots should be cleaned out of well 0732.

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