LMS/GJO/S00209

Data Validation Package

February 2009
Groundwater and Surface Water Sampling at the Grand Junction, Colorado, Office Site

April 2009

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Sampling Event Summary

Site: Grand Junction, Colorado, Office Site

Sampling Period: February 4−5, 2009

This sampling event consisted of sampling seven monitor wells and six surface water locations at the Grand Junction, Colorado, Office Site (Grand Junction site). Long-term monitoring at the Grand Junction site is prescribed in the *Long-Term Surveillance and Maintenance Plan for the Grand Junction, Colorado, Site*. Groundwater and surface water samples were analyzed for manganese (groundwater only), molybdenum, selenium, sulfate, and uranium. These constituents were selected on the basis of historical data and consideration of groundwater standards (molybdenum, selenium, and uranium), secondary drinking water standards (sulfate and manganese), human health risk (manganese), and Colorado Department of Public Health and the Environment input.

Although groundwater quality at the Grand Junction site has improved, analyte concentrations in the alluvial aquifer still exceed U.S. Environmental Protection Agency (EPA) groundwater standards (40 CFR 192), with the uranium standard exceeded in all seven of the wells in the monitoring network (Table 1).

Table 1. Locations with Samples that Exceeded EPA Groundwater Standards in February 2009

Analyte	Standard[a]	Groundwater		Surface Water	
		Location	Concentration	Location	Concentration
Molybdenum	**0.1**	14-13NA 8-4S GJ01-01	0.15 0.14 0.11	-------	-------
Selenium	**0.01**	6-2N 8-4S GJ01-01	0.043 0.024 0.027	-------	-------
Uranium	**0.044**	10-19N 11-1S 14-13NA 6-2N 8-4S GJ01-01 GJ84-04	0.24 0.061 0.44 0.11 0.52 0.32 0.38	North Pond South Pond Wetland Area	0.075 0.33 0.46

[a]Standards are listed in 40 CFR 192.02 Table 1 to Subpart A; concentrations are in milligrams per liter (mg/L).

Surface water features located at the Grand Junction site, which include the North Pond, the South Pond, and the Wetland Area, receive discharge of contaminated alluvial groundwater; therefore, elevated concentrations of groundwater contaminants are expected in the these ponds. Because these locations are recharged by groundwater, results from these locations were evaluated by comparing them to groundwater standards. Surface water locations with sample concentrations that exceeded groundwater standards are listed in Table 1.

Surface water results from Gunnison River locations adjacent to and downstream of the site were compared to statistical benchmark values derived using historical data from the Upper Gunnison sampling location, which is located upstream of the site on the Gunnison River. As shown in Table 2, no benchmark values were exceeded during this event, which indicates minimal impact to Gunnison River water quality from discharge of contaminated alluvial groundwater.

Table 2. Comparison of Gunnison River Concentrations to Benchmarks

Analyte	Benchmark (mg/L)	2009 Upper Mid Gunnison Concentration (mg/L)	2009 Lower Gunnison Concentration (mg/L)
Molybdenum	0.0500	0.0022	0.0024
Selenium	0.0150	0.0031	0.003
Sulfate	276	240	240
Uranium	0.0110	0.0057	0.0061

Groundwater modeling predicts that natural flushing of the alluvial aquifer at the Grand Junction site will reduce molybdenum, selenium, and uranium concentrations below EPA groundwater standards (40 CFR 192) within 50 to 80 years; approximately 20 years have elapsed in the 50- to 80-year timeframe predicted by the 1989 model. Sampling results indicate that natural flushing is progressing with analyte concentrations generally declining as shown in the time-concentration graphs, included in the Data Presentation section.

To assess the progress of natural flushing and determine if groundwater is flushing according to model predictions, additional data analysis was conducted. Trend analysis using the Mann-Kendall test was performed using data from 1990 through 2009 to assess contaminant concentrations. The Mann-Kendall test determines if an upward trend, downward trend, or no trend exists. As displayed in Table 3, results of the Mann-Kendall testing show that 22 out of 28 tests (7 wells tested for 4 analytes each) show a downward trend, 5 tests show no trend, and 1 test showed an upward trend.

In addition to trend analysis, curve-fitting techniques were used to provide an estimate of flushing time to determine if natural flushing is progressing according to model predictions. If a downward trend was indicated for molybdenum, selenium, sulfate, or uranium (with a minimum of 10 data points from 1990 through 2009), then a best-fit curve was drawn using Excel to approximate the actual data as shown in the trend line graphs included in the Data Presentation section. Though not shown on the figures, the curve was extrapolated to the point where it intercepts the standard. (For sulfate, a background level of 1,004 mg/L was calculated by averaging sulfate results from background wells GJ84-09 and GJ84-10 from 1990 through 2009). The corresponding time when the curve meets the standard provides an estimate of flushing time. Curves described by an exponential equation or a power equation were selected based on their correlation coefficient. If a significant difference in the r values existed, the curve with the highest r value was selected. Estimates of flushing time are displayed in Table 3.

Results of Mann-Kendall testing and curve fitting indicate natural flushing is generally progressing as predicted by the model. Generally, analyte concentrations continue to decline across the aquifer, trends are generally downward, and estimated flushing times are within model predictions. Flushing times generated from curve fitting and data from this sampling event show

that 18 out of 28 observations (7 wells tested for 4 analytes each) are currently or are projected to be within model predictions.

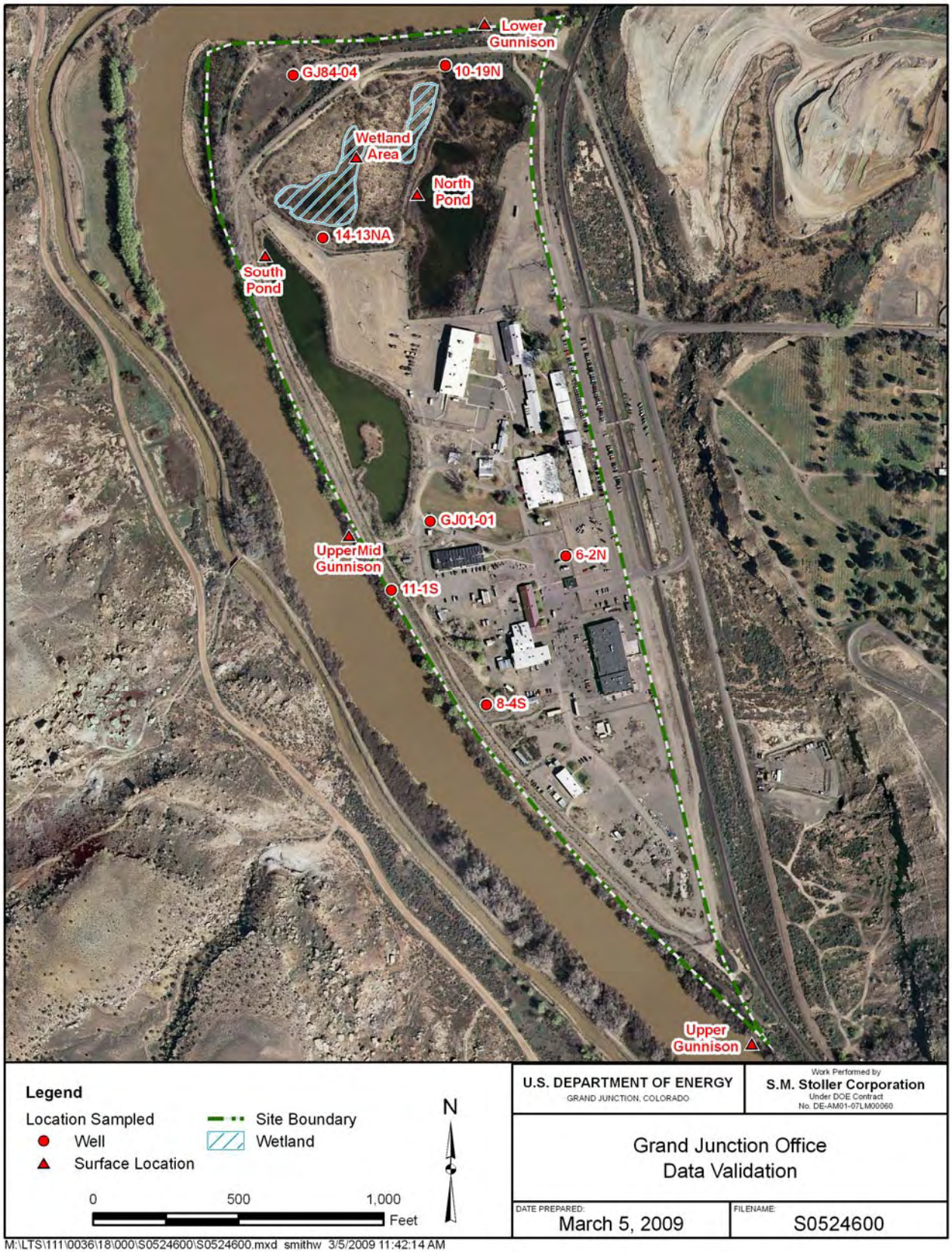
Table 3. Trend Analysis of Wells with Estimates of Flushing Times

Analyte	Well ID	Trend[a]	n[b]	Curve Type	r[c]	Limit[d] (mg/L)	Estimated Completion (Years from 1990)
Molybdenum	10-19N	Down	20	Exponential	0.775	0.1	9
	11-1S	Down	20	Exponential	0.897	0.1	8
	14-13NA	Down	19	Exponential	0.416	0.1	49
	6-2N	None	16	N/A: No trend and results are below the limit		0.1	----
	8-4S	Down	23	Power	0.556	0.1	19
	GJ01-01	Down	8	N/A: Fewer than 10 points		0.1	----
	GJ84-04	Down	20	Exponential	0.967	0.1	15
Selenium	10-19N	Down	20	N/A: Results are below the limit		0.01	----
	11-1S	Down	20	N/A: Results are below the limit		0.01	----
	14-13NA	Down	19	N/A: Results are below the limit		0.01	----
	6-2N	Down	14	Exponential	0.927	0.01	38
	8-4S	Down	20	Exponential	0.628	0.01	17
	GJ01-01	Down	8	N/A: Fewer than 10 points		0.01	----
	GJ84-04	Down	20	N/A: Results are below the limit		0.01	----
Sulfate	10-19N	Down	20	Exponential	0.224	1004	146
	11-1S	Down	20	N/A: Results are below the limit		1004	----
	14-13NA	None	19	N/A: No trend		1004	----
	6-2N	Down	14	Exponential	0.883	1004	15
	8-4S	Down	20	Exponential	0.417	1004	15
	GJ01-01	Down	8	N/A: Results are below the limit		1004	----
	GJ84-04	None	20	N/A: No trend		1004	----
Uranium	10-19N	None	20	N/A: No trend		0.044	----
	11-1S	Down	20	Exponential	0.936	0.044	17
	14-13NA	Up	19	Power		0.044	----
	6-2N	Down	16	Exponential	0.930	0.044	33
	8-4S	None	20	N/A: No trend		0.044	----
	GJ01-01	Down	8	N/A: Fewer than 10 points		0.044	----
	GJ84-04	Down	20	Power	0.710	0.044	298

[a]Data collected from 1990 to 2009.
[b]n=number of observations.
[c]r=Correlation coefficient – a value of 1 represents a perfect correlation.
[d]Limit= Standards listed in 40 CFR 192.02 Table 1 to Subpart A. For sulfate, a background level of 1,004 mg/L was calculated by averaging sulfate results from wells GJ84-09 and GJ84-10 from 1990 through 2009.
N/A=Not applicable.

Sam Campbell
Site Lead, S.M. Stoller

4-29-09
Date



Grand Junction Site, Sample Location Map

Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Grand Junction, CO, Office Site	**Date(s) of Water Sampling**	February 4−5, 2009
Date(s) of Verification	March 4, 2009	**Name of Verifier**	Gretchen Baer

	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 December 30, 2008.
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 performed on February 4, 2009.
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	
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	One duplicate taken @ Lower Gunnison.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	Yes	One equipment blank taken for surface water reel.
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	QC samples are also listed in trip report.
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?	N/A	

Laboratory Performance Assessment

General Information

Report Number (RIN):	09012033
Sample Event:	February 4-5, 2009
Site(s):	Grand Junction Office, Colorado
Laboratory:	Paragon Analytics, Fort Collins, Colorado
Work Order No.:	0902073
Analysis:	Metals and Wet Chemistry
Validator:	Gretchen Baer
Review Date:	March 4, 2009

This validation was performed according to the *Environmental Procedures Catalog*, "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 4.

Table 4. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Manganese	LMM-01	SW-846 3005A	SW-846 6010B
Molybdenum	LMM-02	SW-846 3005A	SW-846 6020A
Selenium	LMM-02	SW-846 3005A	SW-846 6020A
Sulfate	MIS-A-044	SW-846 9056	SW-846 9056
Uranium	LMM-02	SW-846 3005A	SW-846 6020A

Data Qualifier Summary

Analytical results were qualified as listed in Table 5. Refer to the sections below for an explanation of the data qualifiers applied.

Table 5. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
0902073-9	11-1S	Selenium	U	Less than 5 times the method blank
0902073-12	2311 (Equip Blank)	Manganese	U	Less than 5 times the method blank
0902073-12	2311 (Equip Blank)	Molybdenum	U	Less than 5 times the method blank
0902073-12	2311 (Equip Blank)	Selenium	U	Less than 5 times the method blank
0902073-12	2311 (Equip Blank)	Uranium	U	Less than 5 times the method blank

Sample Shipping/Receiving

Paragon Analytics in Fort Collins, Colorado, received 15 water samples on February 10, 2009, under air bill number 7973 2143 3230, 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 sample submittal documents, including the COC form and the sample tickets, had no errors or omissions, with the following exceptions. One page of the COC form did not have a signature for relinquishment. Some sample times differed from the times written on bottle labels by a few minutes.

Preservation and Holding Times

The sample shipment was received cool and intact at a temperature of 1.2 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses and 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 SW-846 6010B, Manganese

Calibrations were performed on February 17, 2009, using four calibration standards. The correlation coefficient value was greater than 0.995. The absolute value of the intercept was only slightly above 3 times the method detection limit (MDL), which is acceptable. Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the required frequency resulting in six 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.

Method SW-846 6020A, Molybdenum, Selenium, and Uranium

Calibrations for selenium were performed on February 17, 2009, and for molybdenum and uranium on February 13, 2009, using eight calibration standards. The calibration curve correlation coefficient values were greater than 0.995. The absolute values of the calibration curve intercepts were less than 3 times the MDL, with the exception of selenium. The selenium intercept was only slightly above the limit and is acceptable for this project. Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing

calibration verification checks were made at the required frequency resulting in 11 verification checks. All calibration checks associated with the samples 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. 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 9056, Sulfate

Calibrations were performed on January 27, 2009, 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. Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the required frequency resulting in six verification checks. All calibration checks met the acceptance criteria.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. All blank results associated with the samples were below the PQLs 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.

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 spike recoveries 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 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. Serial dilution data are evaluated when the concentration of the undiluted sample is greater than 100 times the PQL for ICP-MS or greater than 50 times the PQL for ICP. All evaluated serial dilution data were acceptable.

Detection Limits/Dilutions

Samples were diluted in a consistent and acceptable manner when required. The samples were diluted prior to analysis of molybdenum and uranium 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 sulfate data. There were no manual integrations performed for sulfate and all peak integrations were satisfactory.

Electronic Data Deliverable (EDD) File

The EDD file with the complete data arrived on February 23, 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: 09012033 **Lab Code:** PAR **Validator:** Gretchen Baer **Validation Date:** 3/4/2009

Project: Grand Junction Office(GJO) **Analysis Type:** ☑ Metals ☑ General Chem ☐ Rad ☐ Organics

# of Samples: 15 **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	There was 1 trip/equipment blank evaluated.
☑ Field Duplicates	There was 1 duplicate evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 09012033 **Lab Code:** PAR **Date Due:** 3/10/2009

Matrix: Water **Site Code:** GJO **Date Completed:** 2/24/2009

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								
MANGANESE	02/17/2009	0.8860	1.0000	OK	OK	OK	OK	OK	102.0			4.0	90.0		104.0
MANGANESE	02/17/2009											0.0	93.0		104.0
MOLYBDENUM	02/13/2009	-0.0030	1.0000	OK	OK	OK	OK		101.0	124.0	122.0	0.0	119.0	3.0	113.0
MOLYBDENUM	02/13/2009											3.0			
SELENIUM	02/17/2009	-0.0550	0.9999	OK	OK	OK	OK		90.0	81.0	84.0	3.0	96.0		100.0
URANIUM	02/13/2009	0.0010	1.0000	OK	OK	OK	OK		102.0			12.0	105.0	3.0	86.0
URANIUM	02/13/2009											2.0			

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 09012033 **Lab Code:** PAR **Date Due:** 3/10/2009

Matrix: Water **Site Code:** GJO **Date Completed:** 2/24/2009

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	ICV	CCV	ICB	CCB						
SULFATE	01/27/2009	0.220	1.0000	OK		OK							
SULFATE	02/11/2009				OK		OK	OK	100.00	100.0	102.0	1.00	
SULFATE	02/11/2009									106.0			

Sampling Quality Control Assessment

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

Sampling Protocol

All monitor wells met the Category I low-flow sampling criteria. Sample results for these wells were qualified with an “F” flag in the database, indicating the wells were purged and sampled using the low-flow sampling method. Surface water locations were sampled using a peristaltic pump and tubing reel or by container immersion.

Equipment Blank

An equipment blank (field ID 2311) was collected after decontamination of the hose reel used to collect the surface water samples. Manganese, molybdenum, selenium, and uranium were detected in the blank by the laboratory, but these analytes were qualified during data validation with a “U” flag as not detected. The equipment blank results indicate adequate decontamination of the sampling 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. Duplicate samples were collected from location Lower Gunnison (field duplicate ID 2310). 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 PQL, indicating acceptable overall precision.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Equipment/Trip Blanks

RIN: 09012033 **Lab Code:** PAR **Project:** Grand Junction Office(GJO) **Validation Date:** 3/4/2009

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	0902073-12	SW6010	MANGANESE	2	B	0.097	UG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	0902073-12	SW6020	MOLYBDENUM	0.059	B	0.052	UG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
0902073-2	HCV 518	Lower Gunnison	2.4	10		
0902073-3	HCV 517	North Pond	2.2	10		
0902073-4	HCV 515	South Pond	51	50		
0902073-5	HCV 514	Upper Gunnison	2.3	10		
0902073-6	HCV 516	Upper Mid Gunnison	2.2	10		
0902073-7	HCV 519	Wetland Area	66	100		

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	0902073-12	SW6020	URANIUM	0.033	B	0.0031	UG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
0902073-2	HCV 518	Lower Gunnison	6.1	10		
0902073-3	HCV 517	North Pond	75	20		
0902073-4	HCV 515	South Pond	330	50		
0902073-5	HCV 514	Upper Gunnison	6	10		
0902073-6	HCV 516	Upper Mid Gunnison	5.7	10		
0902073-7	HCV 519	Wetland Area	460	100		

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	0902073-12	SW6020	SELENIUM	0.031	B	0.017	UG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
0902073-2	HCV 518	Lower Gunnison	3	1		

SAMPLE MANAGEMENT SYSTEM

Validation Report: Equipment/Trip Blanks

RIN: 09012033 **Lab Code:** PAR **Project:** Grand Junction Office(GJO) **Validation Date:** 3/4/2009

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	0902073-12		SELENIUM				

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
0902073-3	HCV 517	North Pond	0.35	1		
0902073-4	HCV 515	South Pond	0.32	1		
0902073-5	HCV 514	Upper Gunnison	3.3	1		
0902073-6	HCV 516	Upper Mid Gunnison	3.1	1		
0902073-7	HCV 519	Wetland Area	0.21	1		

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 09012033 **Lab Code:** PAR **Project:** Grand Junction Office(GJO) **Validation Date:** 3/4/2009

Duplicate: 2310 **Sample:** Lower Gunnison

	Sample			Duplicate					
Analyte	Result	Flag	Error	Result	Flag	Error	RPD	RER	Units
MANGANESE				37					UG/L
MOLYBDENUM	2.4			2.3			4.26		UG/L
SELENIUM	3			3.1			3.28		UG/L
SULFATE	240			240			0		MG/L
URANIUM	6.1			6			1.65		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: 4-27-2009

Data Validation Lead: Gretchen Baer — Date: 4/27/09

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.

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Data Validation Outliers Report - No Field Parameters
Laboratory: PARAGON (Fort Collins, CO)
RIN: 09012033
Comparison: All Historical Data
Report Date: 4/15/2009

				Current			Historical Maximum			Historical Minimum			Number of Data Points		Normally Distributed	Statistical Outlier
					Qualifiers			Qualifiers			Qualifiers					
Site Code	Location Code	Sample Date	Analyte	Result	*Lab*	*Data*	Result	*Lab*	*Data*	Result	*Lab*	*Data*	N	N Below Detect		
GJO01	14-13NA	02/04/2009	Selenium	0.0002		F	0.0572			0.00022		UF	44	29	No	No
GJO01	6-2N	02/04/2009	Uranium	0.11		F	1.1			0.16		F	29	0	Yes	No
GJO01	8-4S	02/04/2009	Sulfate	640		F	2200			710			46	0	Yes (log)	No
GJO01	GJ01-01	02/04/2009	Selenium	0.027		F	0.0634		F	0.033		F	8	0	Yes	No
GJO01	GJ01-01	02/04/2009	Uranium	0.32		F	0.507		F	0.38		F	8	0	Yes	No
GJO01	North Pond	02/05/2009	Selenium	0.00035			0.015	UN		0.0006			62	41	No	No
GJO01	Wetland Area	02/05/2009	Selenium	0.00021			0.0231			0.00087			18	7	No	No
GJO01	Wetland Area	02/05/2009	Sulfate	2000			45200			2880			18	0	Yes (log)	No

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.		

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 GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: 10-19N WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	02/04/2009	N001	-	3.9		F	#	0.000097	
Molybdenum	mg/L	02/04/2009	N001	-	0.041		F	#	0.000052	
Oxidation Reduction Potential	mV	02/04/2009	N001	-	8.7		F	#		
pH	s.u.	02/04/2009	N001	-	7.15		F	#		
Selenium	mg/L	02/04/2009	N001	-	0.00048		F	#	0.000017	
Specific Conductance	umhos /cm	02/04/2009	N001	-	6474		F	#		
Sulfate	mg/L	02/04/2009	N001	-	3300		F	#	50	
Temperature	C	02/04/2009	N001	-	12.32		F	#		
Turbidity	NTU	02/04/2009	N001	-	9.4		F	#		
Uranium	mg/L	02/04/2009	N001	-	0.24		F	#	0.000015	

Groundwater Quality Data by Location (USEE100) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: 11-1S WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	02/04/2009	N001	-	0.68		F	#	0.000097	
Molybdenum	mg/L	02/04/2009	N001	-	0.022		F	#	0.0001	
Oxidation Reduction Potential	mV	02/04/2009	N001	-	33.2		F	#		
pH	s.u.	02/04/2009	N001	-	7.38		F	#		
Selenium	mg/L	02/04/2009	N001	-	0.0001		UF	#	0.000017	
Specific Conductance	umhos /cm	02/04/2009	N001	-	963		F	#		
Sulfate	mg/L	02/04/2009	N001	-	350		F	#	5	
Temperature	C	02/04/2009	N001	-	12.98		F	#		
Turbidity	NTU	02/04/2009	N001	-	0.93		F	#		
Uranium	mg/L	02/04/2009	N001	-	0.061		F	#	0.0000062	

Groundwater Quality Data by Location (USEE100) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: 14-13NA WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	02/04/2009	N001	-	4		F	#	0.000097	
Molybdenum	mg/L	02/04/2009	N001	-	0.15		F	#	0.00052	
Oxidation Reduction Potential	mV	02/04/2009	N001	-	85.6		F	#		
pH	s.u.	02/04/2009	N001	-	7.12		F	#		
Selenium	mg/L	02/04/2009	N001	-	0.0002		F	#	0.000017	
Specific Conductance	umhos /cm	02/04/2009	N001	-	3356		F	#		
Sulfate	mg/L	02/04/2009	N001	-	1500		F	#	25	
Temperature	C	02/04/2009	N001	-	13.43		F	#		
Turbidity	NTU	02/04/2009	N001	-	1.37		F	#		
Uranium	mg/L	02/04/2009	N001	-	0.44		F	#	0.000031	

Groundwater Quality Data by Location (USEE100) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: 6-2N WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	02/04/2009	N001	-	0.72		F	#	0.000097	
Molybdenum	mg/L	02/04/2009	N001	-	0.046		F	#	0.0001	
Oxidation Reduction Potential	mV	02/04/2009	N001	-	74.6		F	#		
pH	s.u.	02/04/2009	N001	-	7.72		F	#		
Selenium	mg/L	02/04/2009	N001	-	0.043		F	#	0.000084	
Specific Conductance	umhos /cm	02/04/2009	N001	-	2155		F	#		
Sulfate	mg/L	02/04/2009	N001	-	880		F	#	10	
Temperature	C	02/04/2009	N001	-	17.77		F	#		
Turbidity	NTU	02/04/2009	N001	-	0.92		F	#		
Uranium	mg/L	02/04/2009	N001	-	0.11		F	#	0.0000062	

Groundwater Quality Data by Location (USEE100) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: 8-4S WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	02/04/2009	N001	-	1		F	#	0.000097	
Molybdenum	mg/L	02/04/2009	N001	-	0.14		F	#	0.00052	
Oxidation Reduction Potential	mV	02/04/2009	N001	-	62.7		F	#		
pH	s.u.	02/04/2009	N001	-	7.32		F	#		
Selenium	mg/L	02/04/2009	N001	-	0.024		F	#	0.000084	
Specific Conductance	umhos /cm	02/04/2009	N001	-	1788		F	#		
Sulfate	mg/L	02/04/2009	N001	-	640		F	#	10	
Temperature	C	02/04/2009	N001	-	13.89		F	#		
Turbidity	NTU	02/04/2009	N001	-	0.96		F	#		
Uranium	mg/L	02/04/2009	N001	-	0.52		F	#	0.000031	

Groundwater Quality Data by Location (USEE100) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: GJ01-01 WELL South of Building 20

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	02/04/2009	N001	15.5	-	25.5	0.39		F	#	0.000097	
Molybdenum	mg/L	02/04/2009	N001	15.5	-	25.5	0.11		F	#	0.00026	
Oxidation Reduction Potential	mV	02/04/2009	N001	15.5	-	25.5	70		F	#		
pH	s.u.	02/04/2009	N001	15.5	-	25.5	7.35		F	#		
Selenium	mg/L	02/04/2009	N001	15.5	-	25.5	0.027		F	#	0.000084	
Specific Conductance	umhos /cm	02/04/2009	N001	15.5	-	25.5	1679		F	#		
Sulfate	mg/L	02/04/2009	N001	15.5	-	25.5	590		F	#	10	
Temperature	C	02/04/2009	N001	15.5	-	25.5	14.75		F	#		
Turbidity	NTU	02/04/2009	N001	15.5	-	25.5	1.76		F	#		
Uranium	mg/L	02/04/2009	N001	15.5	-	25.5	0.32		F	#	0.000015	

Groundwater Quality Data by Location (USEE100) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: GJ84-04 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	02/04/2009	N001	-	4.1		F	#	0.000097	
Molybdenum	mg/L	02/04/2009	N001	-	0.094		F	#	0.00052	
Oxidation Reduction Potential	mV	02/04/2009	N001	-	-9.2		F	#		
pH	s.u.	02/04/2009	N001	-	7.16		F	#		
Selenium	mg/L	02/04/2009	N001	-	0.00017		F	#	0.000017	
Specific Conductance	umhos /cm	02/04/2009	N001	-	3437		F	#		
Sulfate	mg/L	02/04/2009	N001	-	1600		F	#	25	
Temperature	C	02/04/2009	N001	-	12.91		F	#		
Turbidity	NTU	02/04/2009	N001	-	6.03		F	#		
Uranium	mg/L	02/04/2009	N001	-	0.38		F	#	0.000031	

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.

Surface Water Quality Data

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Surface Water Quality Data by Location (USEE102) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: Lower Gunnison SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	02/05/2009	N002	0.037			#	0.000097	
Molybdenum	mg/L	02/05/2009	N001	0.0024			#	0.000052	
Molybdenum	mg/L	02/05/2009	N002	0.0023			#	0.000052	
Oxidation Reduction Potential	mV	02/05/2009	N001	198.2			#		
pH	s.u.	02/05/2009	N001	8.17			#		
Selenium	mg/L	02/05/2009	N001	0.003			#	0.000017	
Selenium	mg/L	02/05/2009	N002	0.0031			#	0.000017	
Specific Conductance	umhos/cm	02/05/2009	N001	737			#		
Sulfate	mg/L	02/05/2009	N001	240			#	5	
Sulfate	mg/L	02/05/2009	N002	240			#	5	
Temperature	C	02/05/2009	N001	3.72			#		
Turbidity	NTU	02/05/2009	N001	5.92			#		
Uranium	mg/L	02/05/2009	N001	0.0061			#	0.0000031	
Uranium	mg/L	02/05/2009	N002	0.006			#	0.0000031	

Surface Water Quality Data by Location (USEE102) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: North Pond SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Molybdenum	mg/L	02/05/2009	N001	0.0022			#	0.000052	
Oxidation Reduction Potential	mV	02/05/2009	N001	-78.2			#		
pH	s.u.	02/05/2009	N001	7.45			#		
Selenium	mg/L	02/05/2009	N001	0.00035			#	0.000017	
Specific Conductance	umhos/cm	02/05/2009	N001	2995			#		
Sulfate	mg/L	02/05/2009	N001	1300			#	25	
Temperature	C	02/05/2009	N001	2.87			#		
Turbidity	NTU	02/05/2009	N001	6.23			#		
Uranium	mg/L	02/05/2009	N001	0.075			#	0.0000062	

Surface Water Quality Data by Location (USEE102) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: South Pond SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Molybdenum	mg/L	02/05/2009	N001	0.051			#	0.00026	
Oxidation Reduction Potential	mV	02/05/2009	N001	123.9			#		
pH	s.u.	02/05/2009	N001	8.16			#		
Selenium	mg/L	02/05/2009	N001	0.00032			#	0.000017	
Specific Conductance	umhos/cm	02/05/2009	N001	2762			#		
Sulfate	mg/L	02/05/2009	N001	1300			#	25	
Temperature	C	02/05/2009	N001	4.27			#		
Turbidity	NTU	02/05/2009	N001	7.03			#		
Uranium	mg/L	02/05/2009	N001	0.33			#	0.000015	

Surface Water Quality Data by Location (USEE102) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: Upper Gunnison SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Molybdenum	mg/L	02/05/2009	N001	0.0023			#	0.000052	
Oxidation Reduction Potential	mV	02/05/2009	N001	101.3			#		
pH	s.u.	02/05/2009	N001	8.38			#		
Selenium	mg/L	02/05/2009	N001	0.0033			#	0.000017	
Specific Conductance	umhos/cm	02/05/2009	N001	804			#		
Sulfate	mg/L	02/05/2009	N001	250			#	5	
Temperature	C	02/05/2009	N001	4.98			#		
Turbidity	NTU	02/05/2009	N001	6.84			#		
Uranium	mg/L	02/05/2009	N001	0.006			#	0.0000031	

Surface Water Quality Data by Location (USEE102) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: Upper Mid Gunnison SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Molybdenum	mg/L	02/05/2009	N001	0.0022			#	0.000052	
Oxidation Reduction Potential	mV	02/05/2009	N001	29.8			#		
pH	s.u.	02/05/2009	N001	8.28			#		
Selenium	mg/L	02/05/2009	N001	0.0031			#	0.000017	
Specific Conductance	umhos/cm	02/05/2009	N001	710			#		
Sulfate	mg/L	02/05/2009	N001	240			#	5	
Temperature	C	02/05/2009	N001	4.2			#		
Turbidity	NTU	02/05/2009	N001	5.37			#		
Uranium	mg/L	02/05/2009	N001	0.0057			#	0.0000031	

Surface Water Quality Data by Location (USEE102) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009
Location: Wetland Area SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Molybdenum	mg/L	02/05/2009	N001	0.066			#	0.00052	
Oxidation Reduction Potential	mV	02/05/2009	N001	-8.5			#		
pH	s.u.	02/05/2009	N001	7.95			#		
Selenium	mg/L	02/05/2009	N001	0.00021			#	0.000017	
Specific Conductance	umhos/cm	02/05/2009	N001	4208			#		
Sulfate	mg/L	02/05/2009	N001	2000			#	25	
Temperature	C	02/05/2009	N001	3.95			#		
Turbidity	NTU	02/05/2009	N001	1.67			#		
Uranium	mg/L	02/05/2009	N001	0.46			#	0.000031	

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.

Equipment Blank Data

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BLANKS REPORT
LAB: PARAGON (Fort Collins, CO)
RIN: 09012033
Report Date: 4/15/2009

Parameter	Site Code	Location ID	Sample Date	ID	Units	Result	Qualifiers Lab	Data	Detection Limit	Uncertainty	Sample Type
Manganese	GJO01	0999	02/05/2009	N001	mg/L	0.002	B	U	0.000097		E
Molybdenum	GJO01	0999	02/05/2009	N001	mg/L	0.000059	B	U	0.000052		E
Selenium	GJO01	0999	02/05/2009	N001	mg/L	0.000031	B	U	0.000017		E
Sulfate	GJO01	0999	02/05/2009	N001	mg/L	0.5	U		0.5		E
Uranium	GJO01	0999	02/05/2009	N001	mg/L	0.000033	B	U	0.0000031		E

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.

SAMPLE TYPES:
- E Equipment Blank.

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Static Water Level Data

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STATIC WATER LEVELS (USEE700) FOR SITE GJO01, Grand Junction Site
REPORT DATE: 4/15/2009

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
10-19N	O	4566.62	02/04/2009	11:21:58	12.63	4553.99	
11-1S	O	4572.83	02/04/2009	15:43:01	16.09	4556.74	
14-13NA	O	4560.58	02/04/2009	15:10:30	5.63	4554.95	
6-2N	O	4569.89	02/04/2009	14:23:03	13.78	4556.11	
8-4S	O	4568.59	02/04/2009	13:13:19	11.36	4557.23	
GJ01-01		4568.37	02/04/2009	13:37:04	12.12	4556.25	
GJ84-04	D	4563.24	02/04/2009	11:45:25	8.72	4554.52	

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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Time-Concentration Graphs
Groundwater Locations

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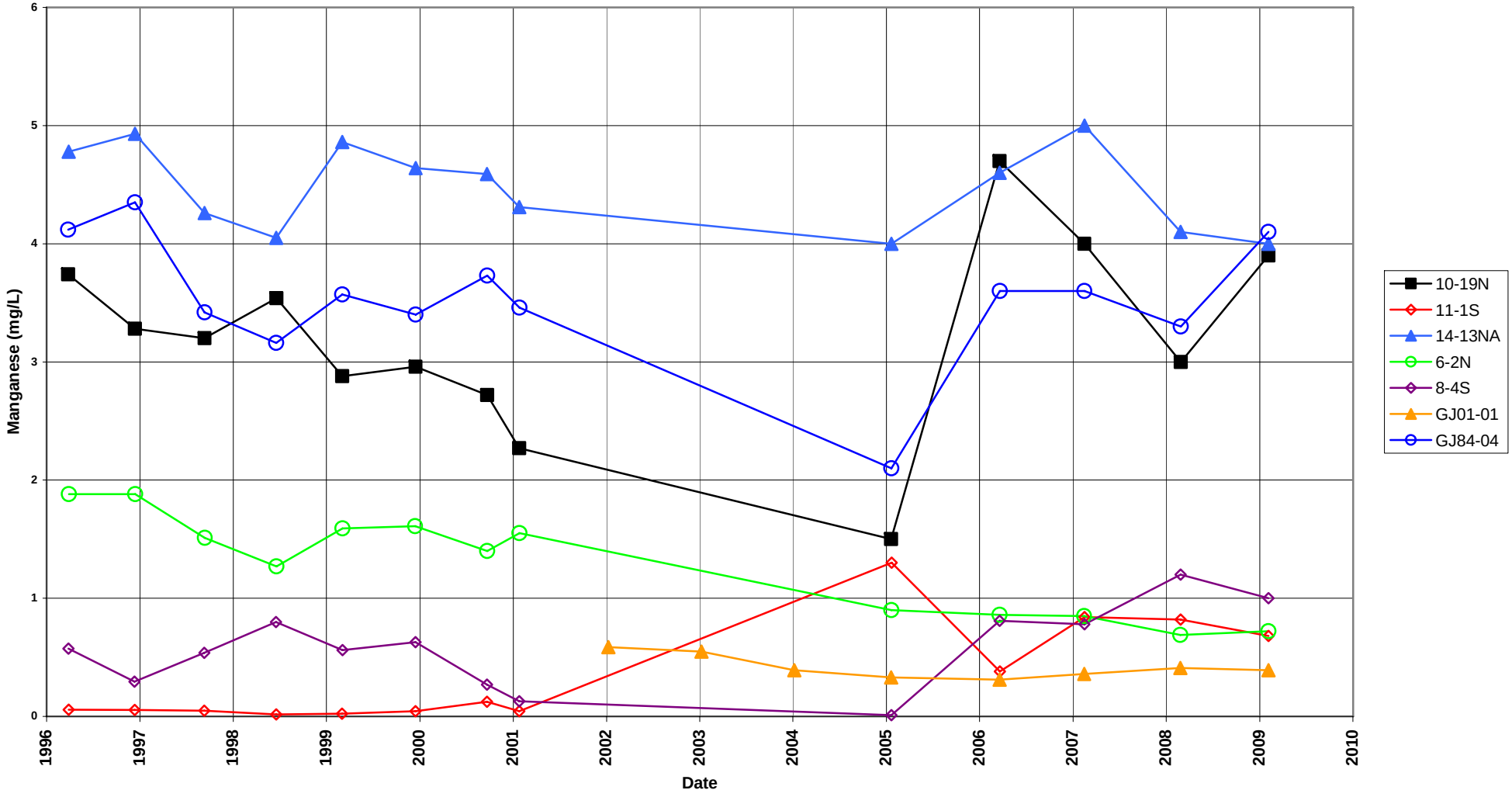
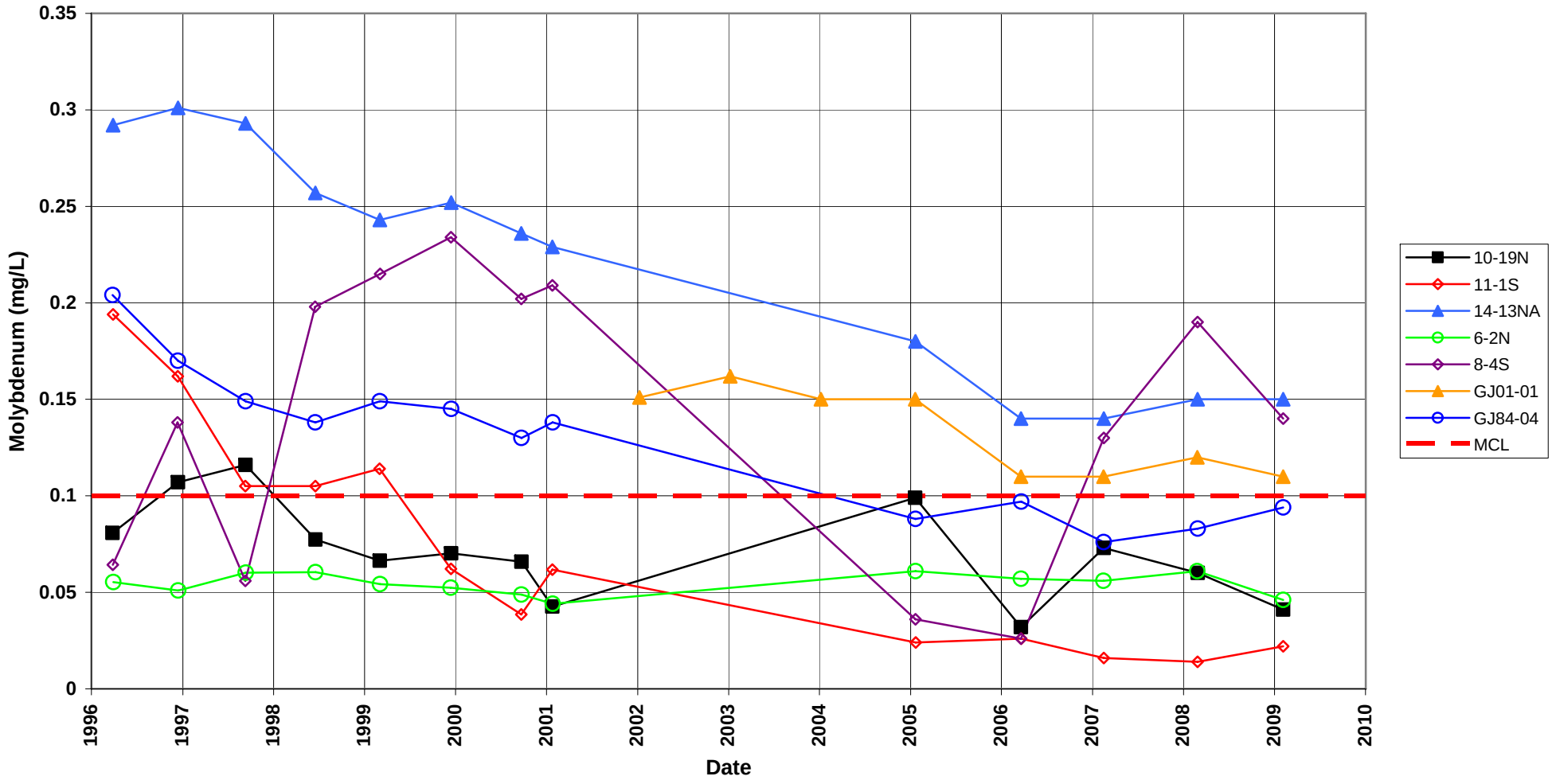
Grand Junction Site
Manganese Concentration



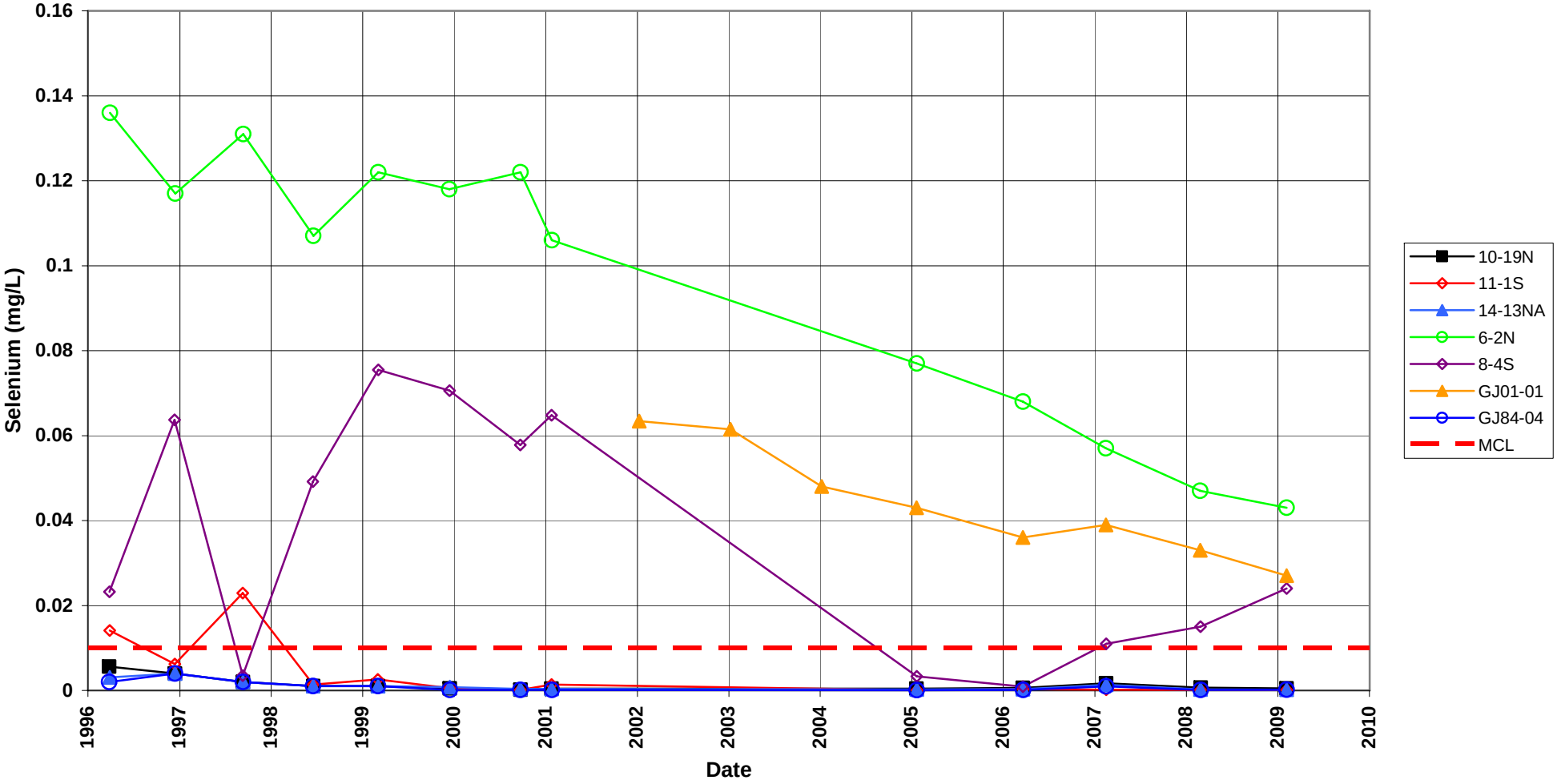
-

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



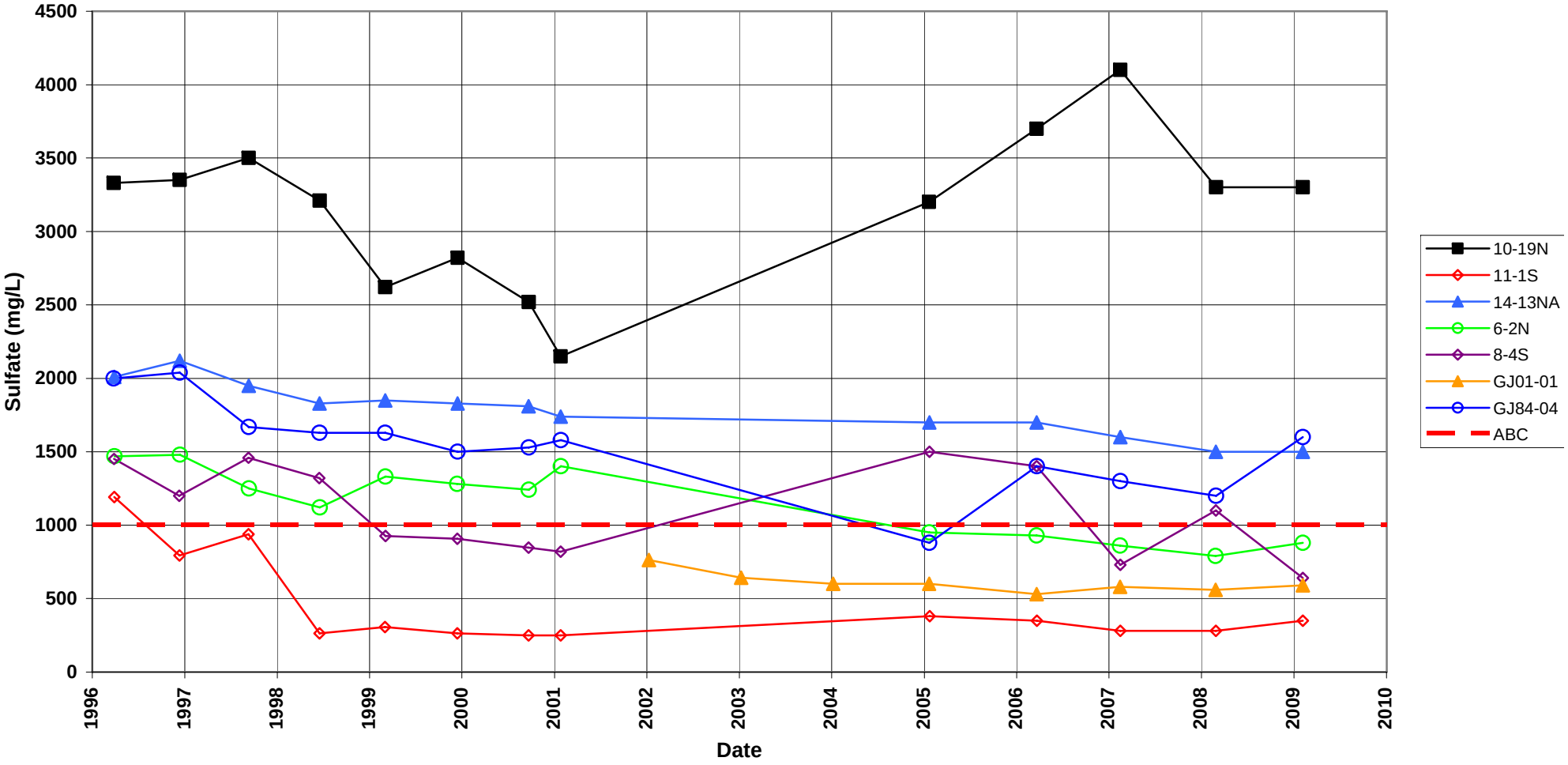
-

Grand Junction Site
Selenium Concentration
Maximum Contaminant Level (MCL) = 0.01 mg/L



-

Grand Junction Site
Sulfate Concentration
Average Background Concentration (ABC) in Background Wells = 1004 mg/L



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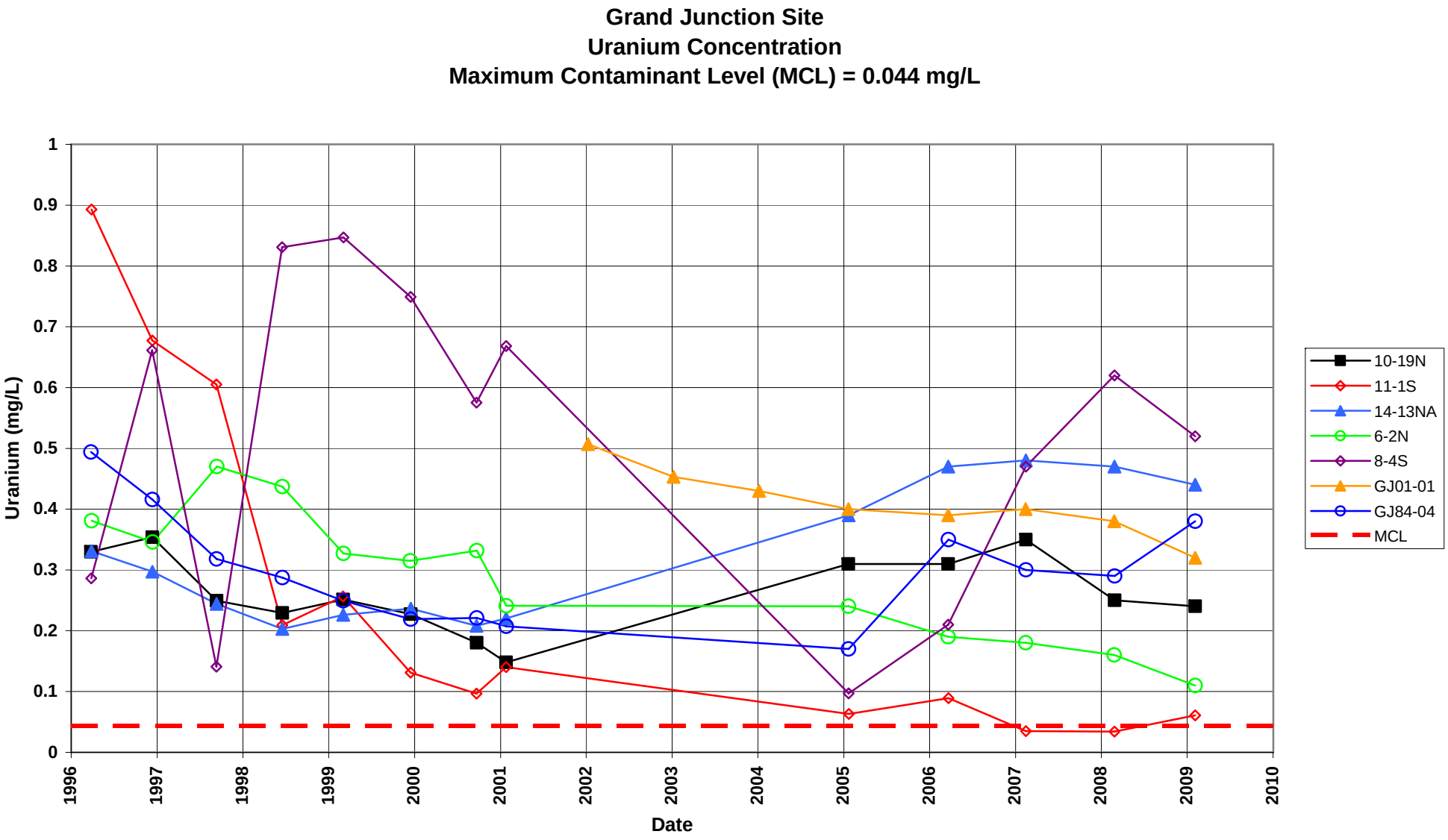
Grand Junction Site
Uranium Concentration
Maximum Contaminant Level (MCL) = 0.044 mg/L
Uranium (mg/L)
Date
10-19N
11-1S
14-13NA
6-2N
8-4S
GJ01-01
GJ84-04
MCL

-

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Time-Concentration Graphs
Surface Water Locations

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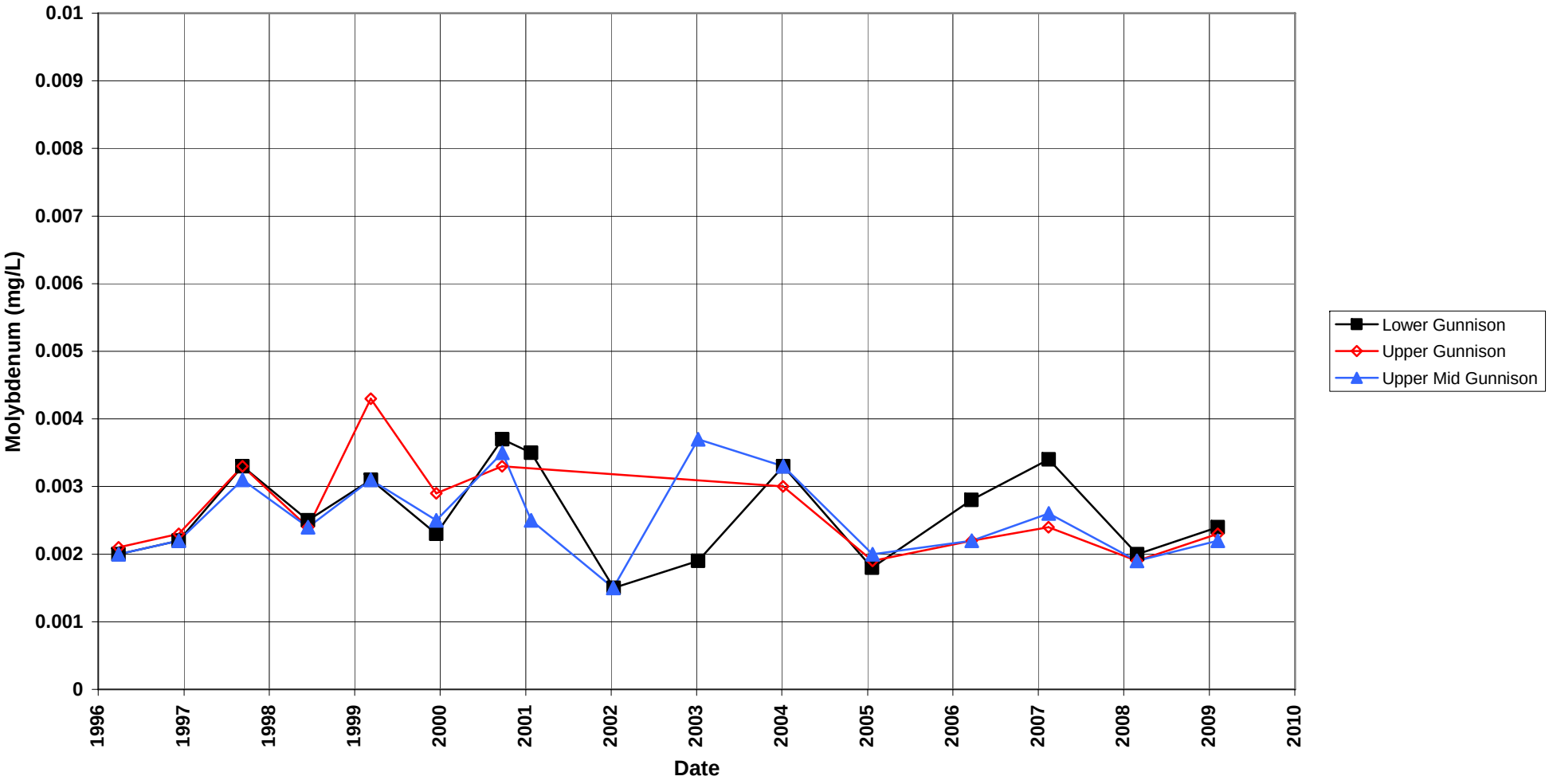
Grand Junction Site
Molybdenum Concentration
River Locations



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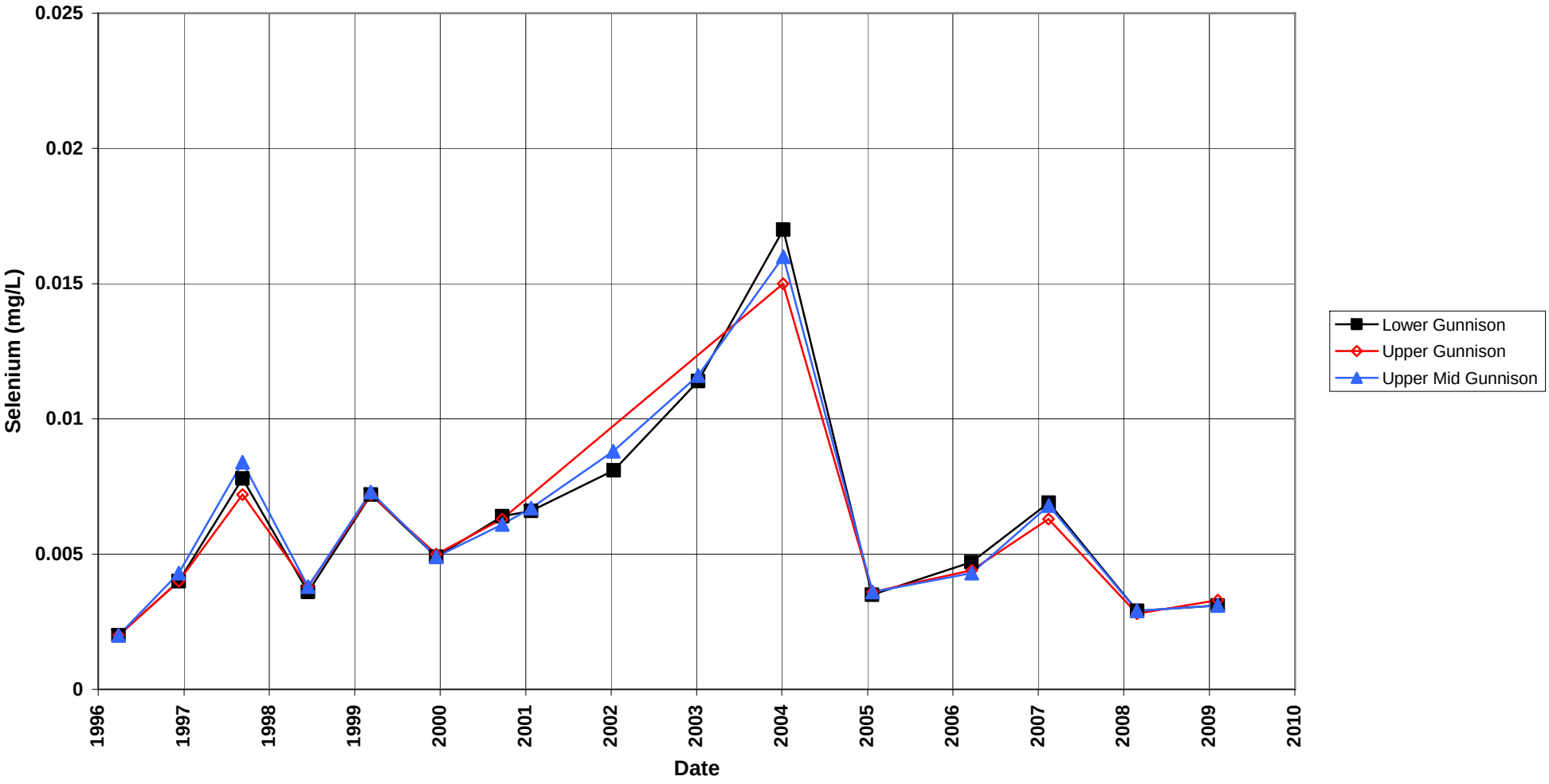
Grand Junction Site
Selenium Concentration
River Locations



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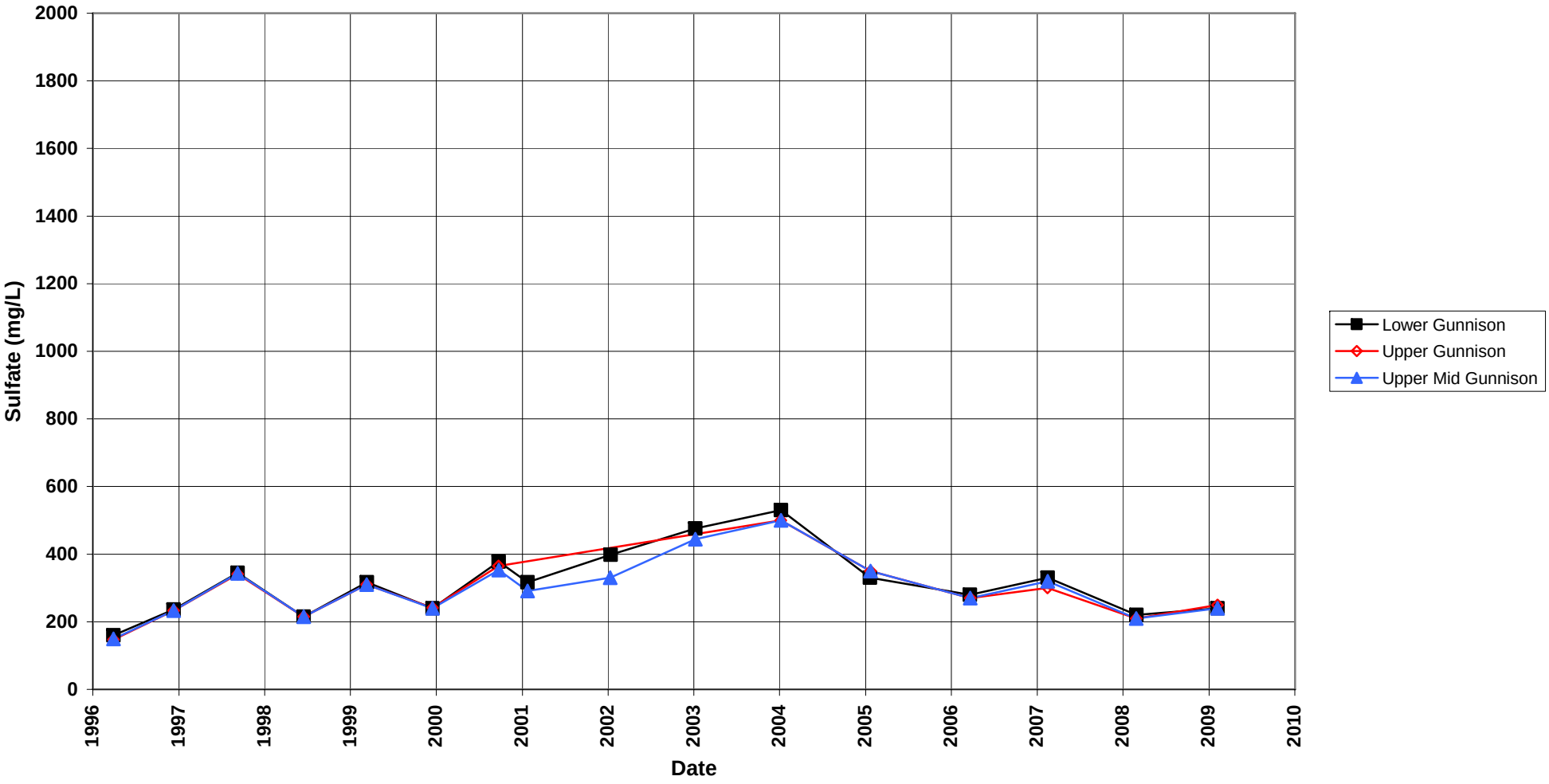
Grand Junction Site
Sulfate Concentration
River Locations



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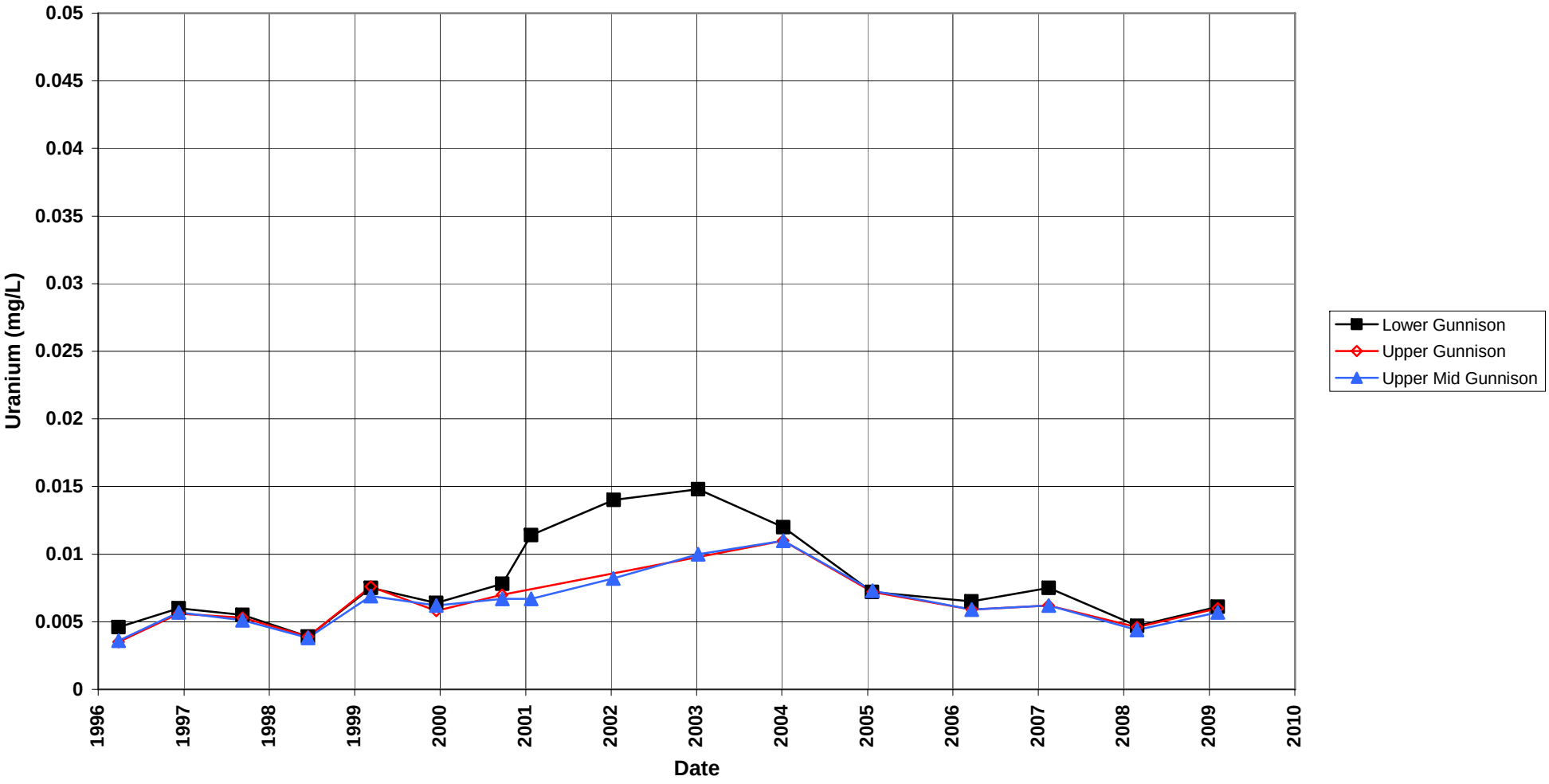
Grand Junction Site
Uranium Concentration
River Locations



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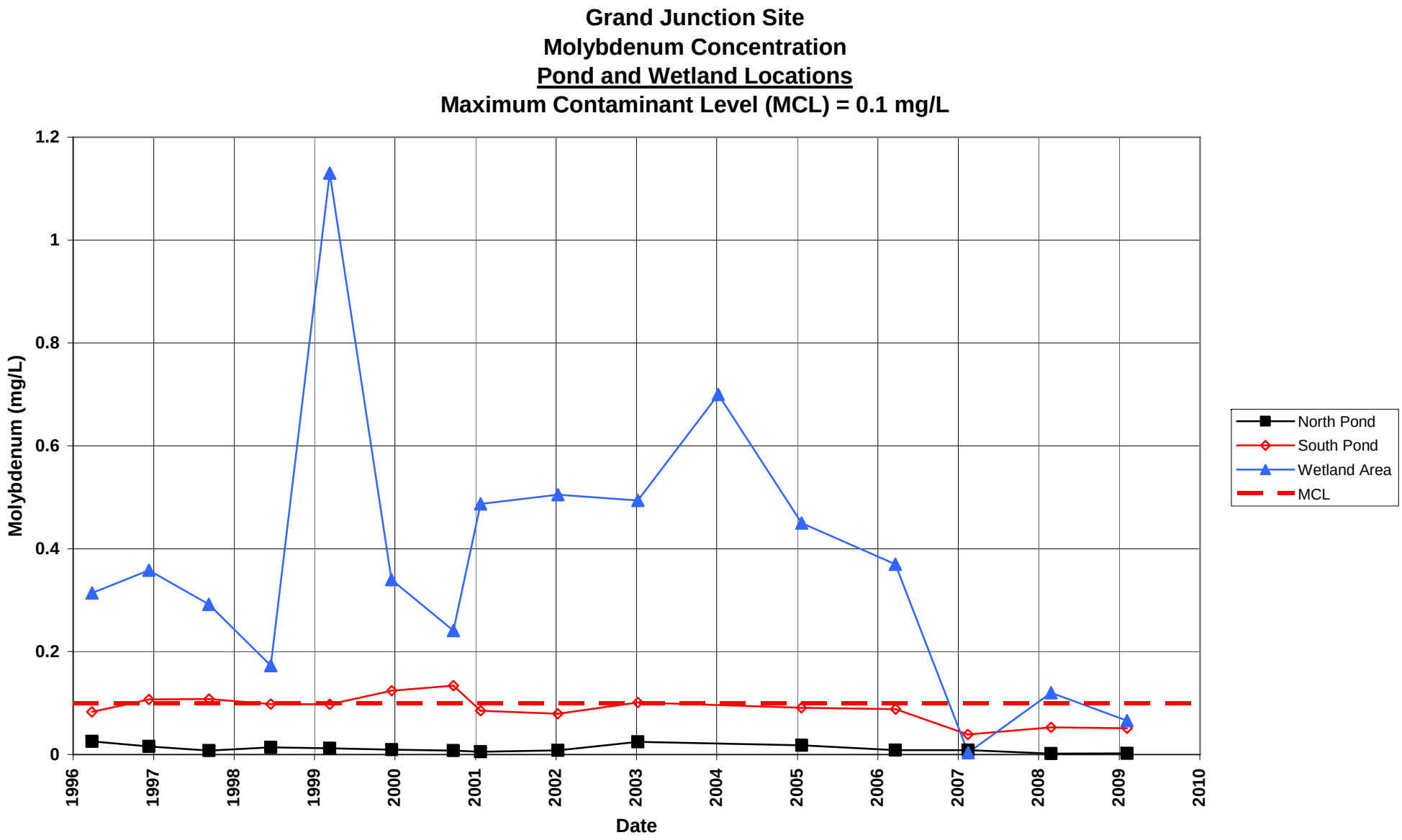
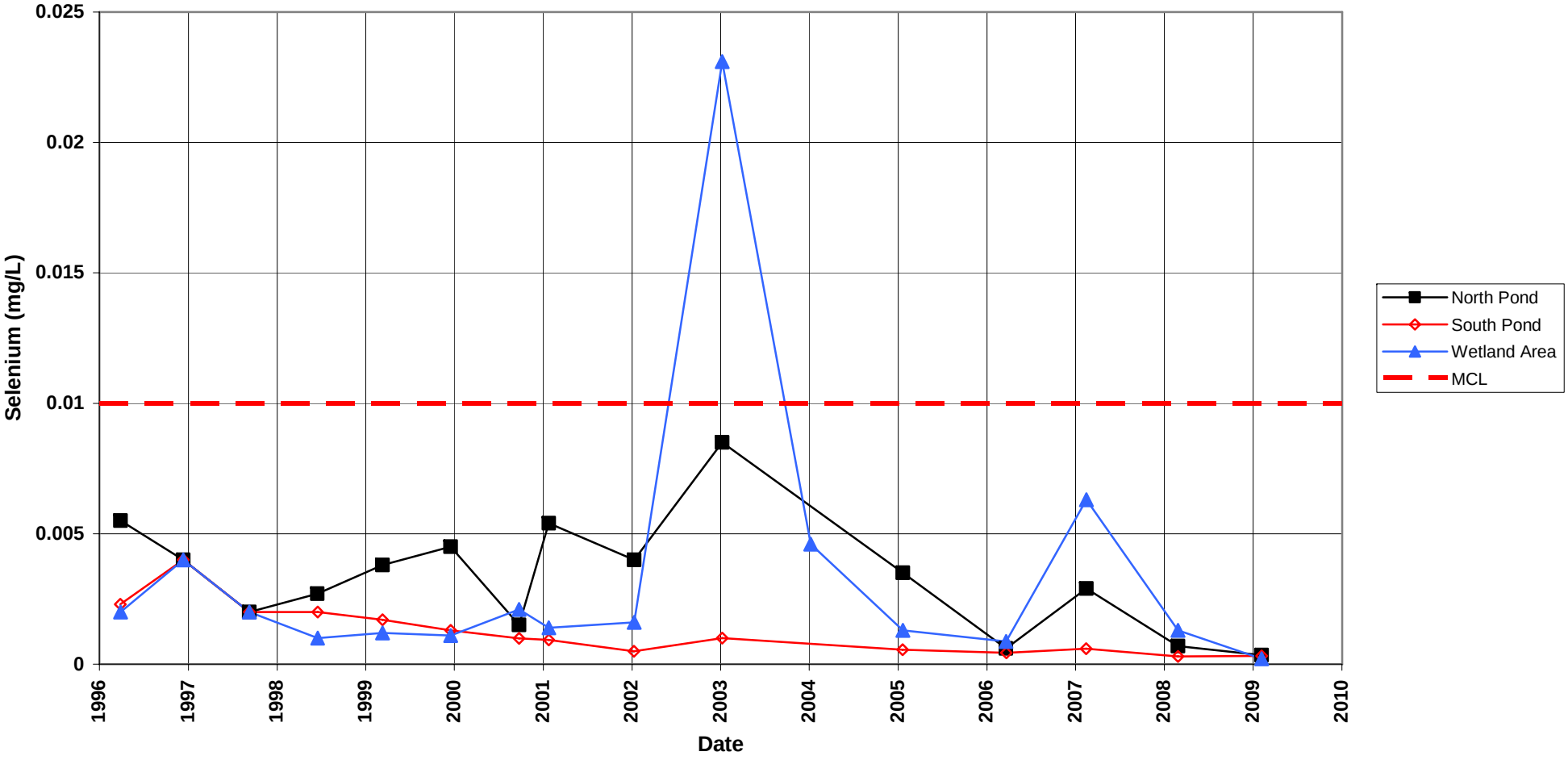

Grand Junction Site
Molybdenum Concentration
Pond and Wetland Locations
Maximum Contaminant Level (MCL) = 0.1 mg/L
Molybdenum (mg/L)
1.2
1
0.8
0.6
0.4
0.2
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Date
North Pond
South Pond
Wetland Area
MCL

-

Grand Junction Site
Selenium Concentration
Pond and Wetland Locations
Maximum Contaminant Level (MCL) = 0.01 mg/L



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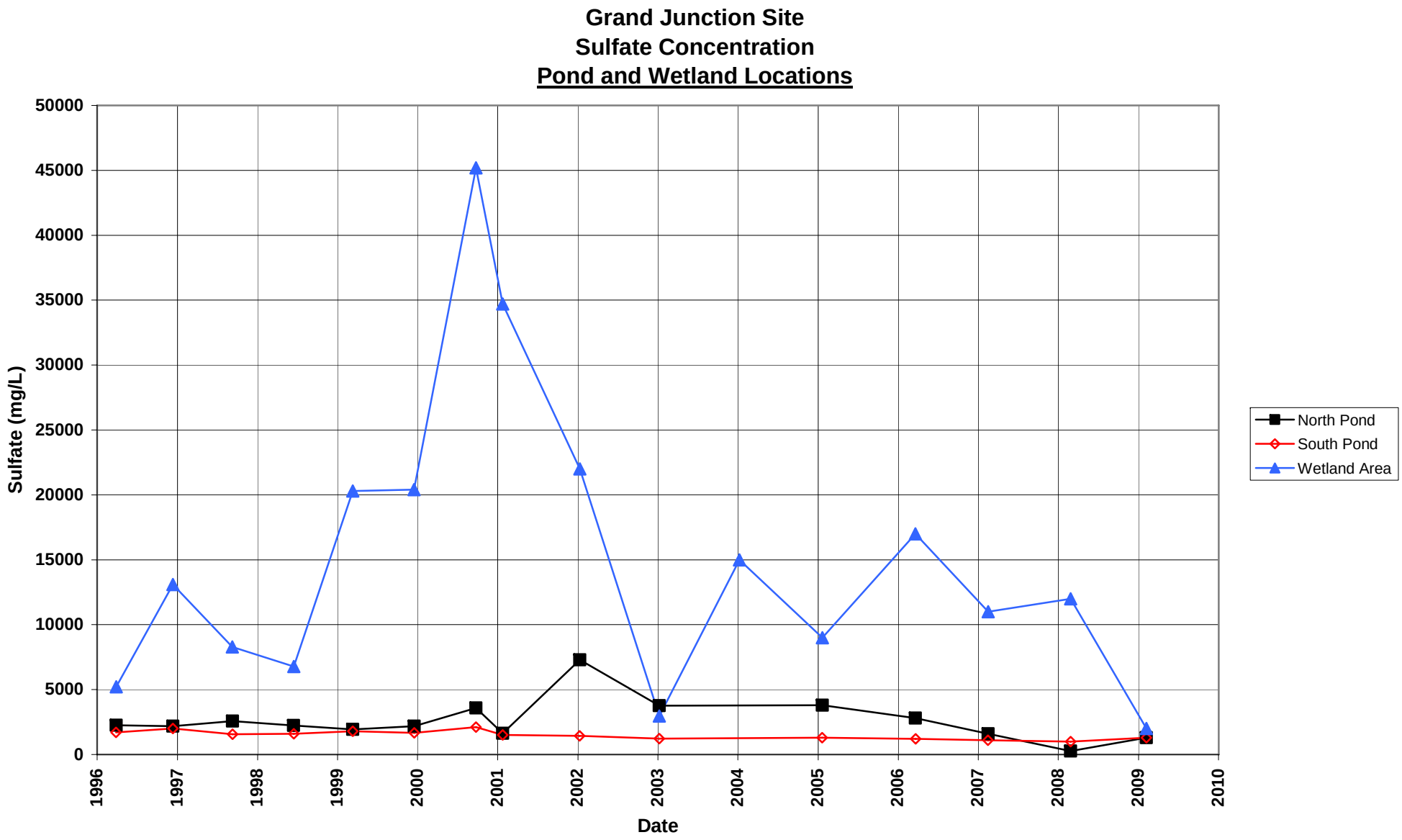
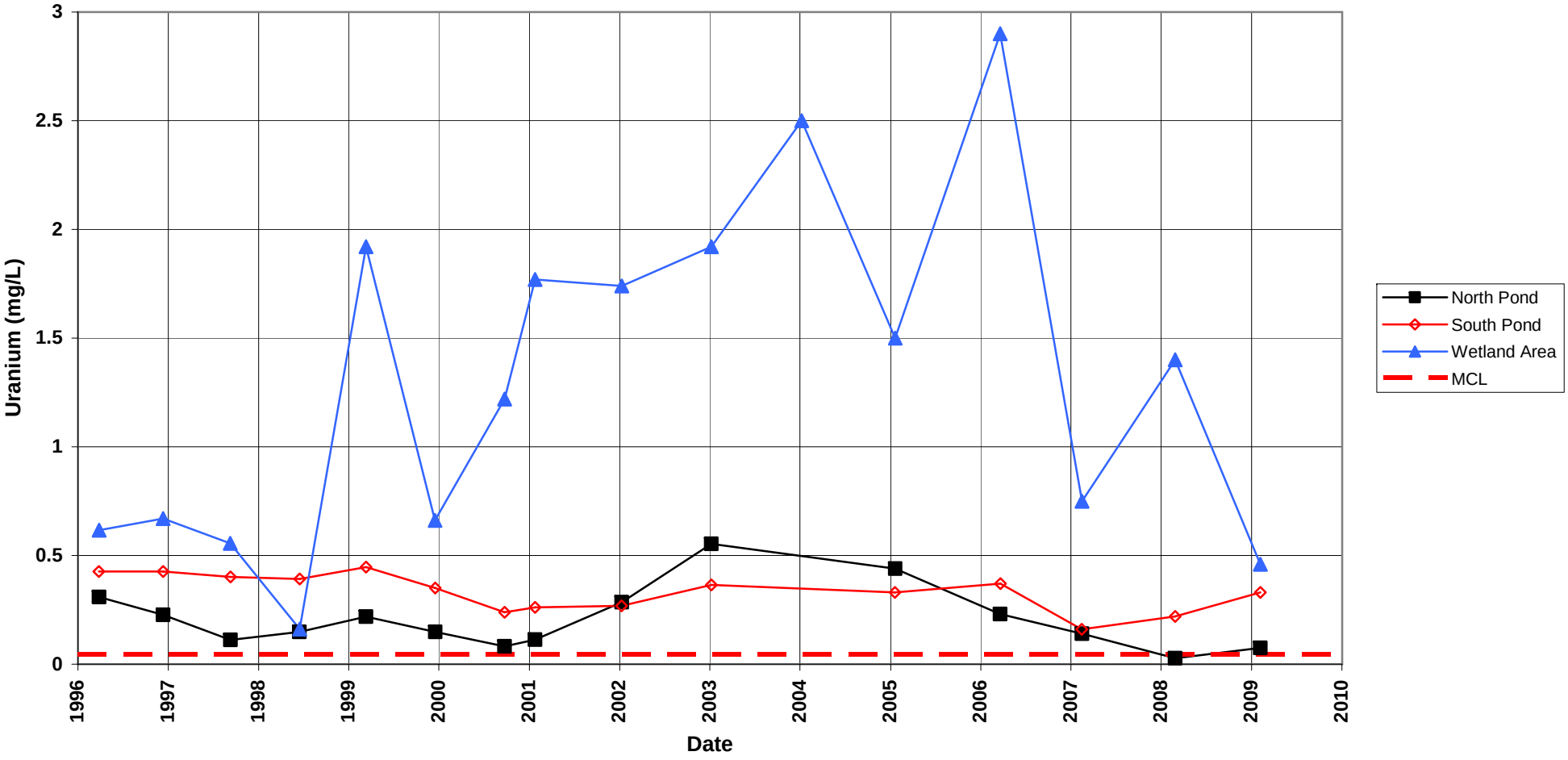

Grand Junction Site
Sulfate Concentration
Pond and Wetland Locations
Sulfate (mg/L)
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Date
North Pond
South Pond
Wetland Area

-

Grand Junction Site
Uranium Concentration
Pond and Wetland Locations
Maximum Contaminant Level (MCL) = 0.044 mg/L



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Trend Line Graphs

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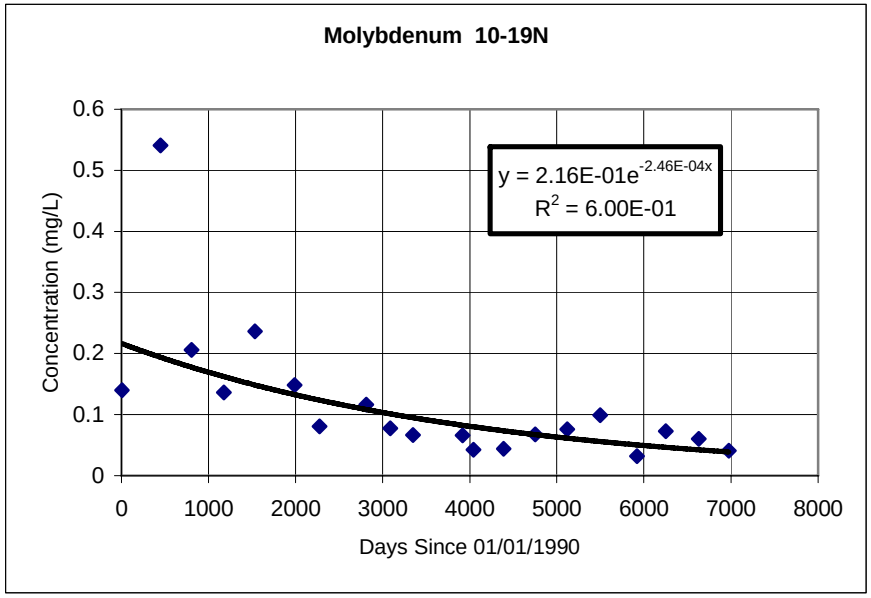
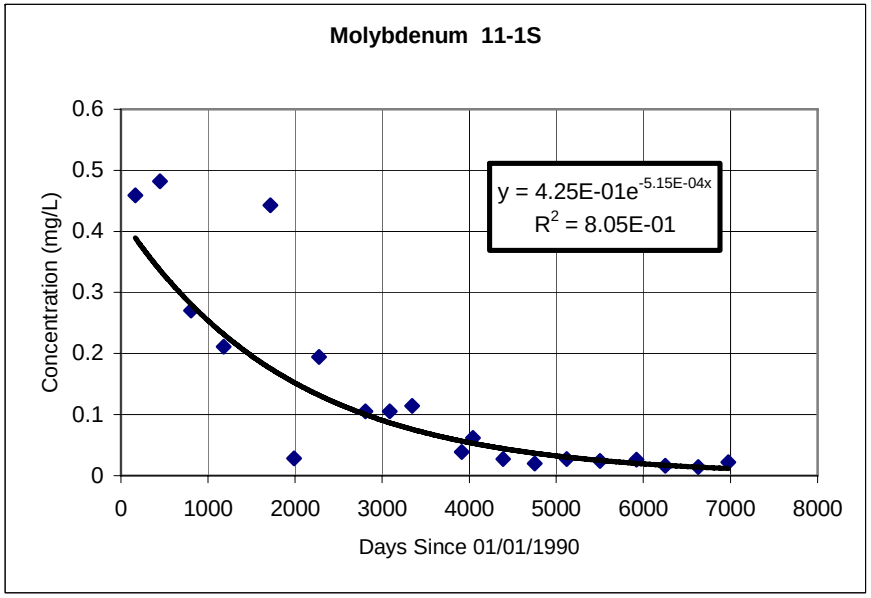
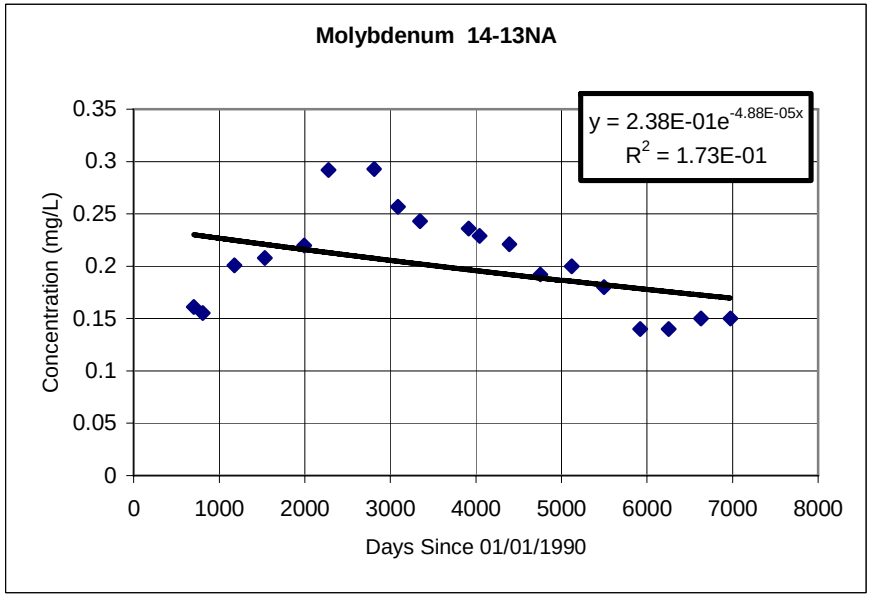
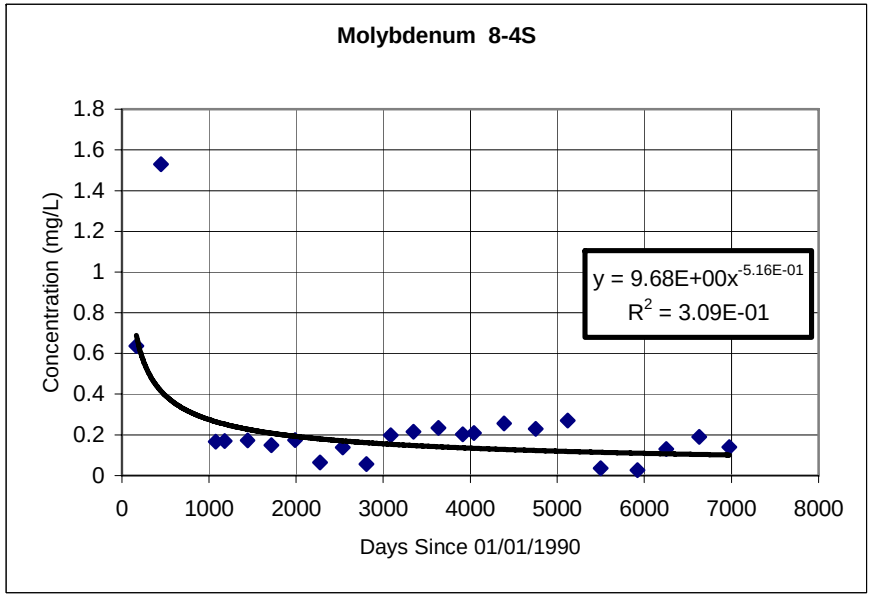
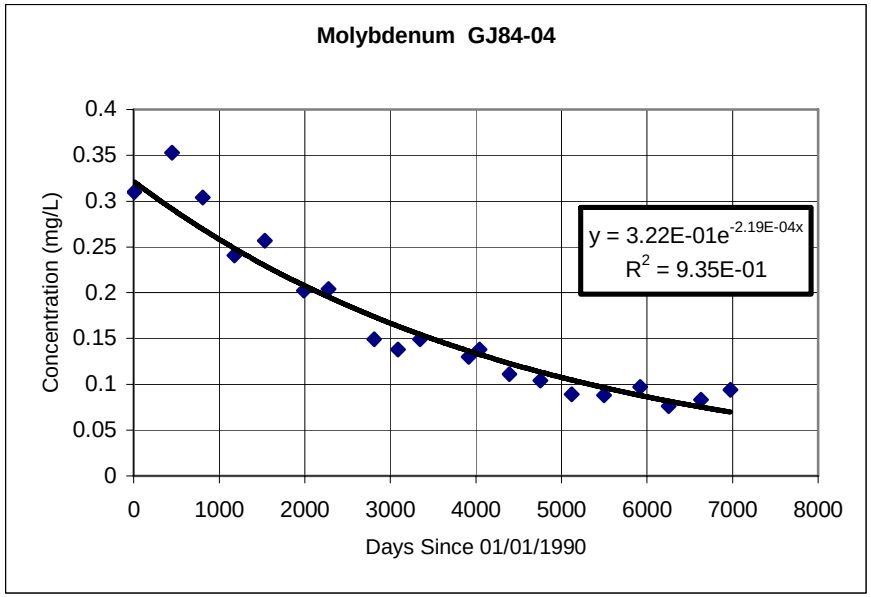
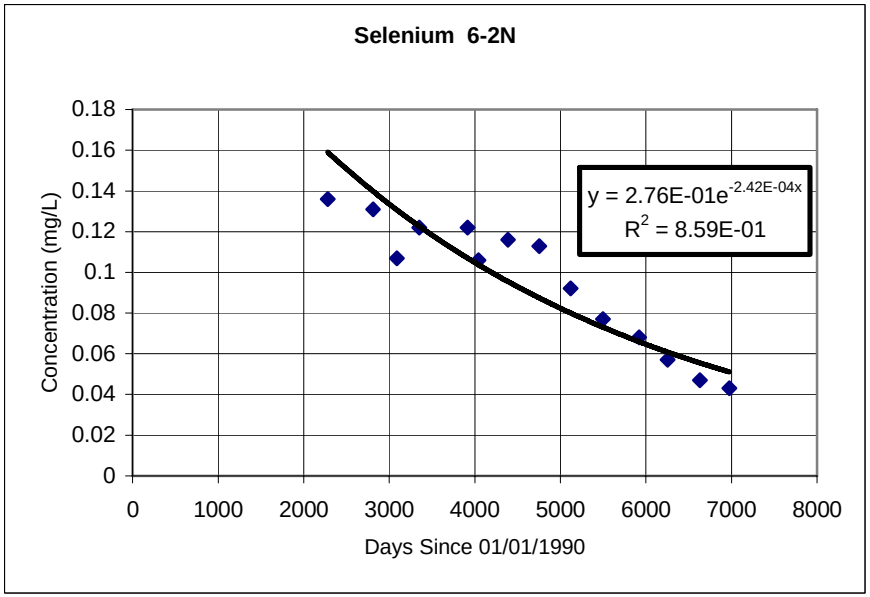

Molybdenum 10-19N
y = 2.16E-01e^-2.46E-04x
R^2 = 6.00E-01
Concentration (mg/L)
Days Since 01/01/1990

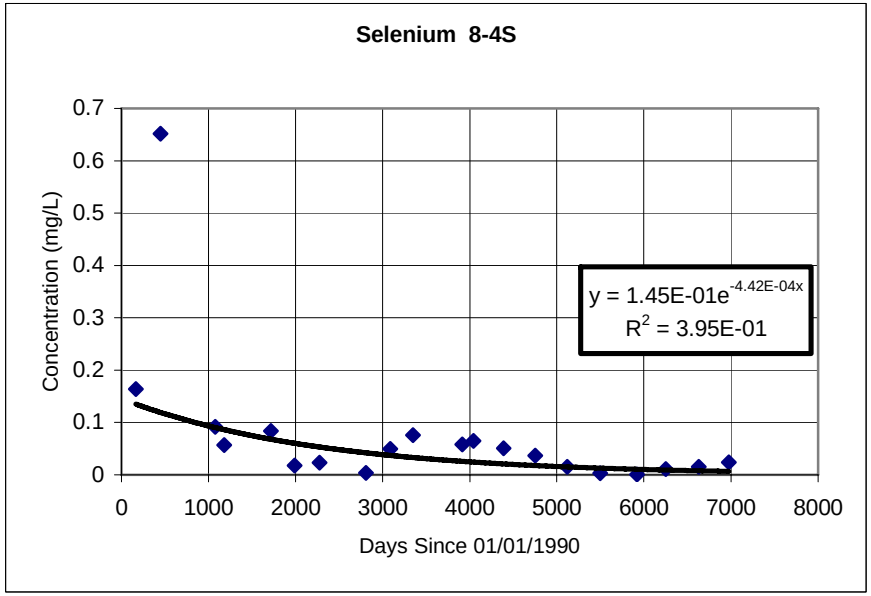

Molybdenum 11-1S
y = 4.25E-01e^-5.15E-04x
R^2 = 8.05E-01
Concentration (mg/L)
Days Since 01/01/1990

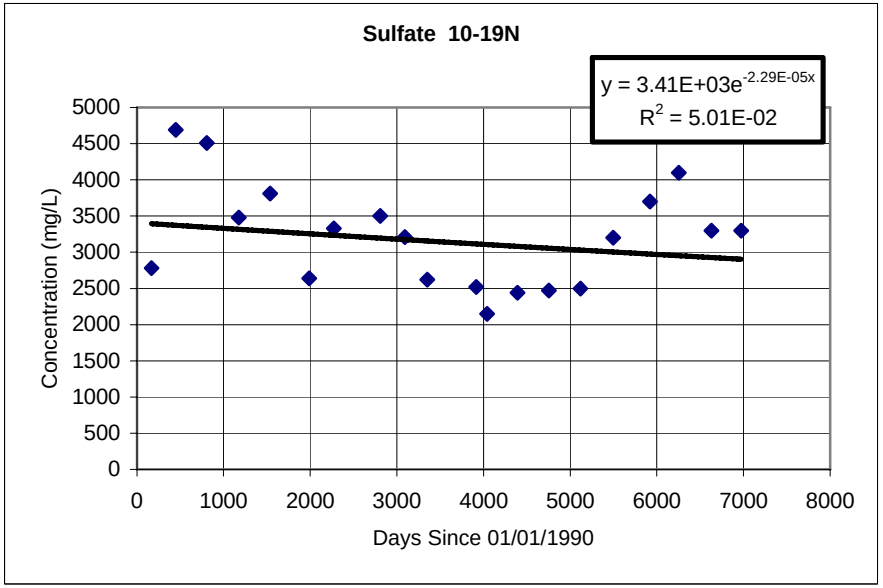

Molybdenum 14-13NA
y = 2.38E-01e^-4.88E-05x
R^2 = 1.73E-01
Concentration (mg/L)
Days Since 01/01/1990

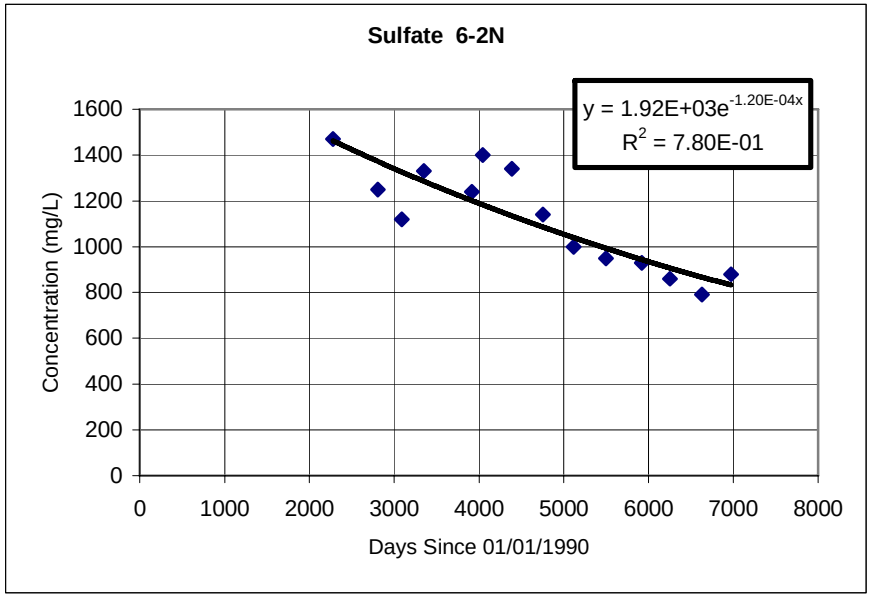

Molybdenum 8-4S
y = 9.68E+00x^-5.16E-01
R^2 = 3.09E-01
Concentration (mg/L)
Days Since 01/01/1990

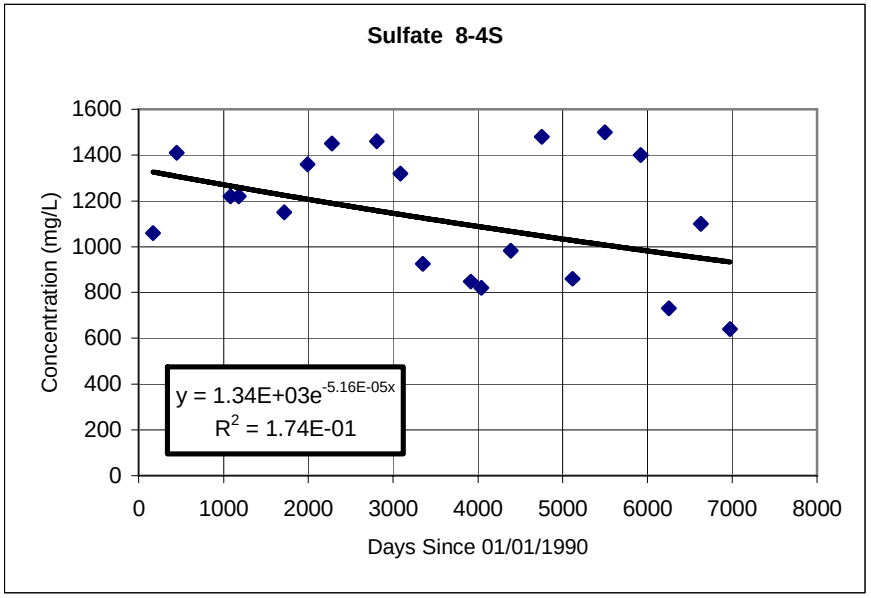

Molybdenum GJ84-04
y = 3.22E-01e^-2.19E-04x
R^2 = 9.35E-01
Concentration (mg/L)
Days Since 01/01/1990

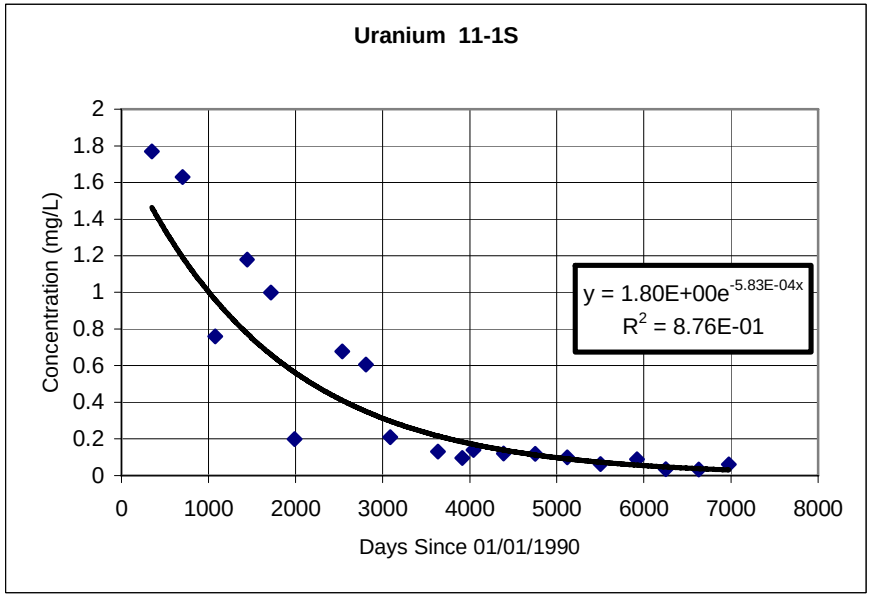

Selenium 6-2N
y = 2.76E-01e^-2.42E-04x
R^2 = 8.59E-01
Concentration (mg/L)
Days Since 01/01/1990

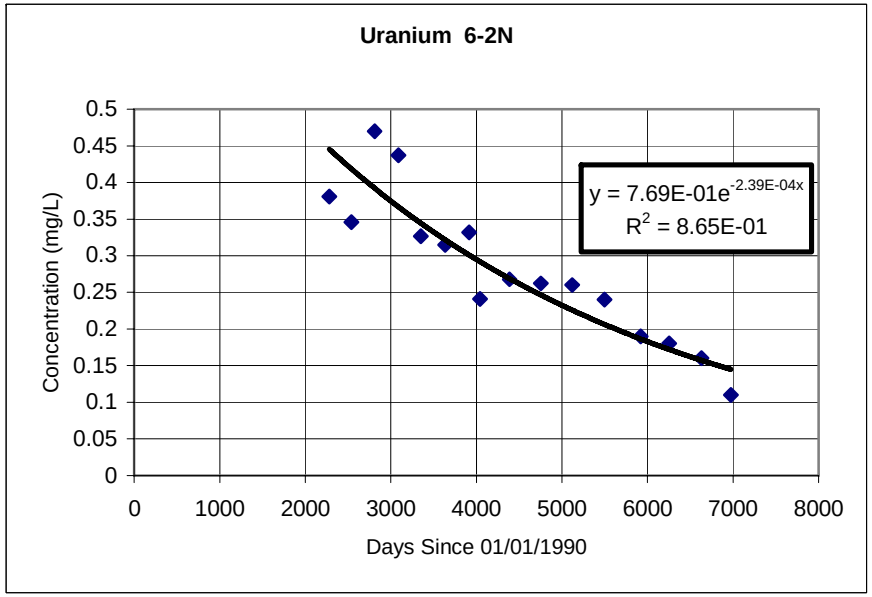

Selenium 8-4S
y = 1.45E-01e^-4.42E-04x
R^2 = 3.95E-01
Concentration (mg/L)
Days Since 01/01/1990

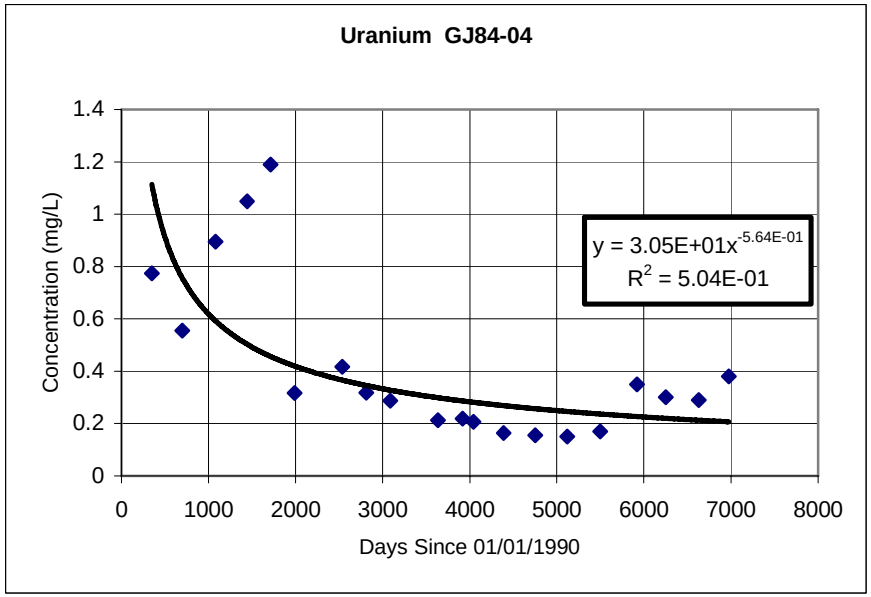

Sulfate 10-19N
y = 3.41E+03e^-2.29E-05x
R^2 = 5.01E-02
Concentration (mg/L)
Days Since 01/01/1990


Sulfate 6-2N
y = 1.92E+03e^-1.20E-04x
R^2 = 7.80E-01
Concentration (mg/L)
Days Since 01/01/1990


Sulfate 8-4S
y = 1.34E+03e^-5.16E-05x
R^2 = 1.74E-01
Concentration (mg/L)
Days Since 01/01/1990


Uranium 11-1S
y = 1.80E+00e^-5.83E-04x
R^2 = 8.76E-01
Concentration (mg/L)
Days Since 01/01/1990


Uranium 6-2N
y = 7.69E-01e^-2.39E-04x
R^2 = 8.65E-01
Concentration (mg/L)
Days Since 01/01/1990


Uranium GJ84-04
Concentration (mg/L)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
1000
2000
3000
4000
5000
6000
7000
8000
Days Since 01/01/1990
y = 3.05E+01x^-5.64E-01
R^2 = 5.04E-01

Attachment 3
Sampling and Analysis Work Order

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Stoller

established 1959

Task Order LM00-501
Control Number 09-0323

December 30, 2008

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

SUBJECT: Contract No. DE-AM01-07LM00060, Stoller
January 2009 Environmental Sampling at the Grand Junction, Colorado, Site

REFERENCE: Task Order LM00-501-04-302-402, Grand Junction, CO

Dear Mr. Desormeau:

The purpose of this letter is to inform you of the upcoming sampling event at the Grand Junction, Colorado, site. Enclosed are the map and tables specifying sample locations and analytes for routine monitoring. Water quality data will be collected from this site as part of the environmental sampling currently scheduled to begin the week of January 12, 2009.

The following lists show the wells (with zone of completion) and surface locations scheduled to be sampled during this event.

Monitor Wells*

8-4S Nr	11-1S Nr	6-2N Nr	14-13NA Nr	GJ84-04 Nr	GJ01-01 Al	10-19N Nr

*NOTE: Al = Alluvium; Nr = No recovery of data for classifying

Surface locations

Upper Gunnison	Upper Middle Gunnison	Lower Gunnison	Wetland Area
South Pond	North Pond		

All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. The Access Agreement for the site is in place, which will allow access to all monitoring locations.

If you have any questions, please call me at 970-248-6654.

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

Sincerely,

Sam Campbell

Sam Campbell
Site Lead

SC/lcg/lb

Enclosures (3)

cc: (electronic)
Cheri Bahrke, Stoller
Sam Campbell, Stoller
Steve Donivan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
Michele Miller, Stoller
EDD Delivery
rc-grand.junction

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

Constituent Sampling Breakdown

Site	Grand Junction Office				
Analyte	Groundwater	Surface Water	Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Approx. No. Samples/yr	7	6			
Field Measurements					
Alkalinity					
Dissolved Oxygen					
Redox Potential	X	X			
pH	X	X			
Specific Conductance	X	X			
Turbidity	X	X			
Temperature	X	X			
Laboratory Measurements					
Aluminum					
Ammonia as N (NH3-N)					
Calcium					
Chloride					
Chromium					
Gross Alpha					
Gross Beta					
Iron					
Lead					
Magnesium					
Manganese	X		0.005	SW-846 6010	LMM-01
Molybdenum	X	X	0.003	SW-846 6020	LMM-02
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO3+NO2)-N					
Potassium					
Radium-226					
Radium-228					
Selenium	X	X	0.0001	SW-846 6020	LMM-02
Silica					
Sodium					
Strontium					
Sulfate	X	X	0.5	SW-846 9056	MIS-A-044
Sulfide					
Total Dissolved Solids					
Total Organic Carbon					
Uranium	X	X	0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
Total No. of Analytes	5	4			

number of analytes does not include field parameters.

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Attachment 4
Trip Report

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Stoller
Grand Junction Office
established 1959

Memorandum

Control Number N/A

DATE: February 19, 2009

TO: Sam Campbell

FROM: Kent L. Moe

SUBJECT: Trip Report

Site: Grand Junction Office Site

Date of Sampling Event: February 4–5, 2009

Team Members: Jeff Price and Kent Moe

Number of Locations Sampled: 7 monitor wells and 6 surface water locations.

Locations Not Sampled/Reason: None; all planned locations were sampled.

Location Specific Information: All monitor wells were purged and sampled using Category I criteria. No filtration was required.

Field Variance: None.

Quality Control Sample Cross Reference:

False ID	True ID	Sample Type	Ticket Number
2310	Lower Gunnison	Duplicate	HCV-520
2311	N/A	Equipment blank	HCV-521

Requisition Numbers Assigned: All samples were assigned to report identification number (RIN) 09012033.

Water Level Measurements: Water levels were measured at all sampled monitor wells.

Well Inspection Summary: All wells were in good shape.

Equipment: All equipment functioned properly.

Regulatory: Onsite personnel observed sampling procedures at well 6-2N

Institutional Controls

Fences, Gates, Locks: No issues identified.
Signs: Signs around the ponds were not inspected; they will be examined as a part of the site inspection.
Trespassing/Site Disturbances: None

Site Issues:

Disposal Cell/Drainage Structure Integrity: Not applicable.
Vegetation/Noxious Weed Concerns: Not applicable.
Maintenance Requirements: None.

Access Issues: None.

Corrective Action Required/Taken: None.

(KLM/lcg)

cc: (electronic)
Joe Desormeau, DOE
Cheri Bahrke, Stoller
Steve Donivan, Stoller
Michele Miller, Stoller
EDD Delivery

V:\09012033\RIN 09012033 DVP.doc