Data Validation Package

September 2011
Groundwater and Surface Water Sampling at the Slick Rock, Colorado, Processing Site

December 2011

U.S. DEPARTMENT OF ENERGY | Legacy Management

This page intentionally left blank

Contents

This page intentionally left blank

Sampling Event Summary

Site: Slick Rock, Colorado, Processing Sites

Sampling Period: September 6–7, 2011

The Slick Rock, Colorado, Processing Sites are referred to as the Slick Rock West Processing Site (SRK05) and the Slick Rock East Processing Site (SRK06). This annual event involved sampling a total of 16 monitoring wells and 7 surface water locations at both sites as required by the 2006 *Draft Final Ground Water Compliance Action Plan for the Slick Rock, Colorado, Processing Sites* (GCAP). Water levels were measured at all sampled wells.

The proposed compliance strategy for the Slick Rock sites is natural flushing in conjunction with institutional controls and compliance monitoring. Contaminant concentrations at the Slick Rock sites are compared to their respective maximum contaminant level (MCL) to assess compliance with Title 40, *Code of Federal Regulations*, Part 192 (40 CFR 192), with the exception of manganese and selenium. Manganese concentrations are compared to the maximum background concentration of 3.5 milligrams per liter (mg/L) to assess compliance because manganese does not have an MCL. A human-health risk-based alternate concentration limit of 0.18 mg/L has been proposed to assess compliance for selenium because groundwater modeling predicts that selenium concentrations at the Slick Rock West Processing Site will not be reduced to below the MCL of 0.05 mg/L within 100 years.

As defined in the GCAP, the constituents of potential concern in the groundwater at the West Processing Site are manganese, molybdenum, nitrate, selenium, uranium, radium-226, radium-228, benzene, and toluene. The radium-226, radium-228, benzene, and toluene contamination is isolated to one well (0319). Results from this sampling event demonstrated elevated concentrations for most contaminants at West Processing Site locations. Wells with analyte concentrations that exceeded applicable groundwater standards are listed in Table 1.

Table 2 lists the drinking water MCLs and results for benzene, toluene, ethyl benzene, and xylenes (total) in well 0319. The radium-226 plus radium-228 concentration has decreased in this well since 2006, and remains below the MCL of 5 picocuries per liter.

Selenium and uranium are the constituents of potential concern at the East Processing Site. As shown in the time-concentration graphs included in the Data Presentation section (Attachment 2), uranium concentrations exceed the MCL at most East Processing Site locations. The selenium contamination is isolated to the onsite well 0305.

Table 1. Slick Rock Wells with Samples that Exceeded EPA Standards in September 2011

Analyte	Standard (mg/L)	Site	Location	Concentration (mg/L)
Manganese [a]	4.2	West	0340	5.4
			0510	4.2
Molybdenum	0.1	West	0317	0.18
			0318A	1.7
			0339	1.3
			0340	1.7
			0508	1.2
			0510	0.85
Nitrate + Nitrite as Nitrogen	10	West	0318A	66
			0339	48
			0340	340
			0508	170
			0510	240
Selenium [b]	0.18	West	0318A	3.4
			0339	2.1
			0340	2.9
			0508	0.91
			0510	0.83
Uranium	0.044	West	0340	0.05
			0508	0.074
			0510	0.096
		East	0303	1.0
			0305	0.78
			0307	0.48
			0309	0.085
			0311	0.098

Standards are listed in 40 CFR 192.02 Table 1 to Subpart A; concentrations are in mg/L.
[a] Manganese standard is the maximum background concentration observed in well 0300.
[b] Selenium standard is the proposed Alternate Concentration Limit.

Table 2. BTEX [a] MCLs and Results for Well 0319 in September 2011

Analyte	MCL (mg/L)	Concentration in Well 0319 (mg/L)
Benzene	0.005	4.0
Ethyl benzene	0.7	0.3
Toluene	1	2.6
Xylenes, Total	10	6.6

MCLs are listed in the 2009 *National Primary Drinking Water Regulations* (EPA 816-F-09-0004, May 2009); concentrations are in mg/L.
[a] BTEX = Benzene, Toluene, Ethyl benzene, and Xylenes (total).

Surface water location 0692 at the East Processing Site is monitored for uranium because it is the predicted location where the centroid of the uranium plume intersects the river. The uranium concentration at this location remains well below the benchmark concentration for background location 0696, as shown in Table 3. In this case, the benchmark calculation was performed using 27 values with 18.5 percent of those values non-detects. The benchmark value is equal to the maximum concentration or the highest detection limit because there were more than 15 percent but less than 50 percent non-detects.

Table 3. Comparison of Slick Rock East Processing Site September 2011 Surface Water Concentrations to Historical Upgradient Benchmarks

Analyte	Benchmark Value for 0696 (mg/L)	0692 Concentration (mg/L)	0700 Concentration (mg/L)
Uranium	0.0550	0.0006	0.0006

West Processing Site surface water locations in the Dolores River are monitored to verify that the compliance strategy is protective of the environment. The potential for environmental exposure to site contaminants exists in the Dolores River because it receives groundwater discharge from the contaminated alluvial aquifer. Surface water results are compared to statistical benchmark values derived using historical data from river location 0693, which is located upstream of the West Processing Site, but downstream of the East Processing Site. Selenium concentrations are also compared to the State of Colorado standard of 0.005 mg/L. As shown in Table 4, only manganese at location 0349 exceeded the benchmark value during this event. Location 0349 is the predicted location where the centroid of the contaminant plumes intersect the river.

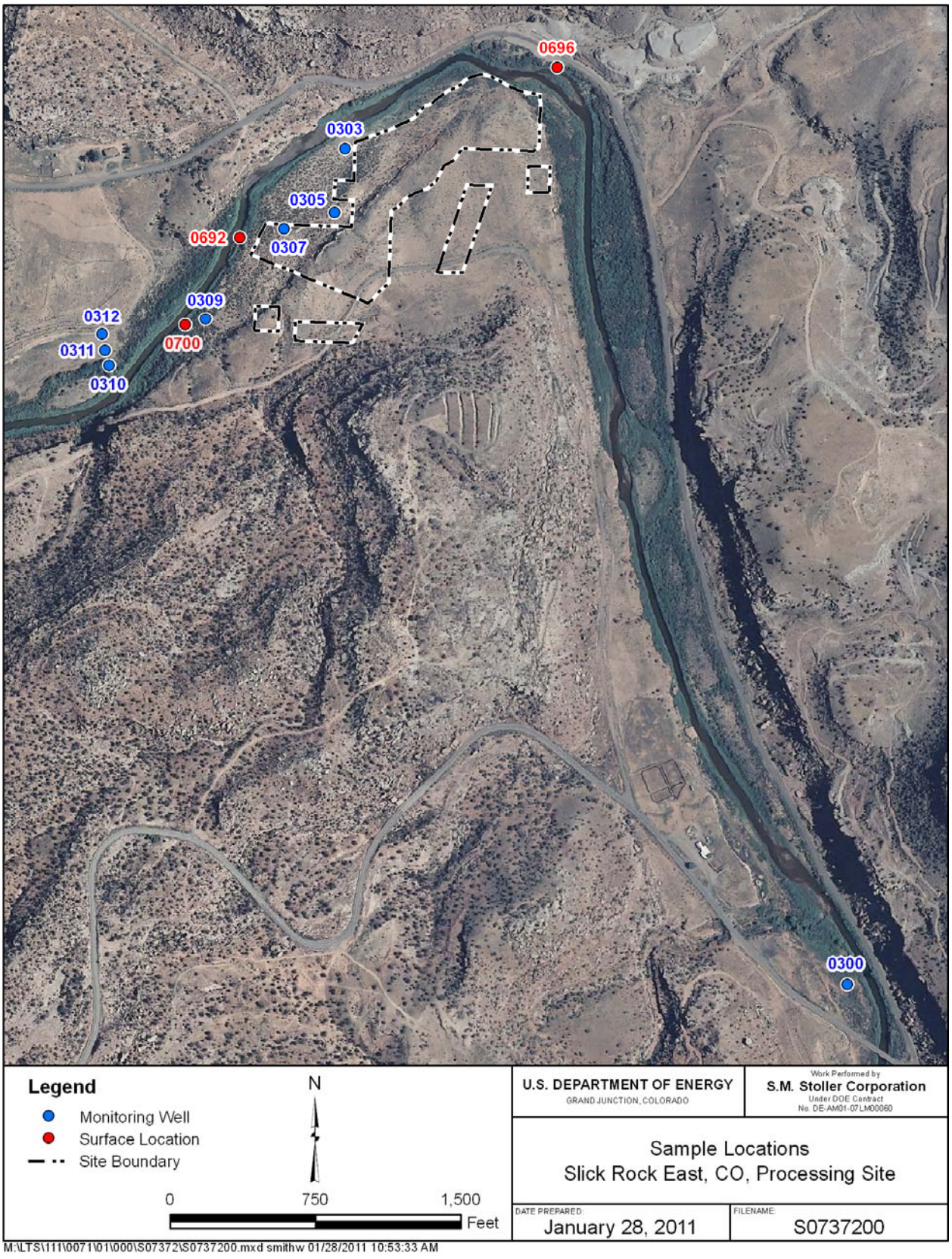
Table 4. Comparison of Slick Rock West Processing Site September 2011 Surface Water Concentrations to Historical Upgradient Benchmarks

Analyte	Benchmark Value for 0693 (mg/L)	0347 Concentration (mg/L)	0349 Concentration (mg/L)	0694 Concentration (mg/L)
Manganese	0.0122	ND [a]	0.020	ND [a]
Molybdenum	0.0048	0.0023	ND [a]	ND [a]
Nitrate + Nitrite as N	0.2400	ND [a]	ND [a]	ND [a]
Selenium	0.0047	0.0003	0.0003	0.0004
Uranium	0.0028	0.0006	0.0006	0.0006

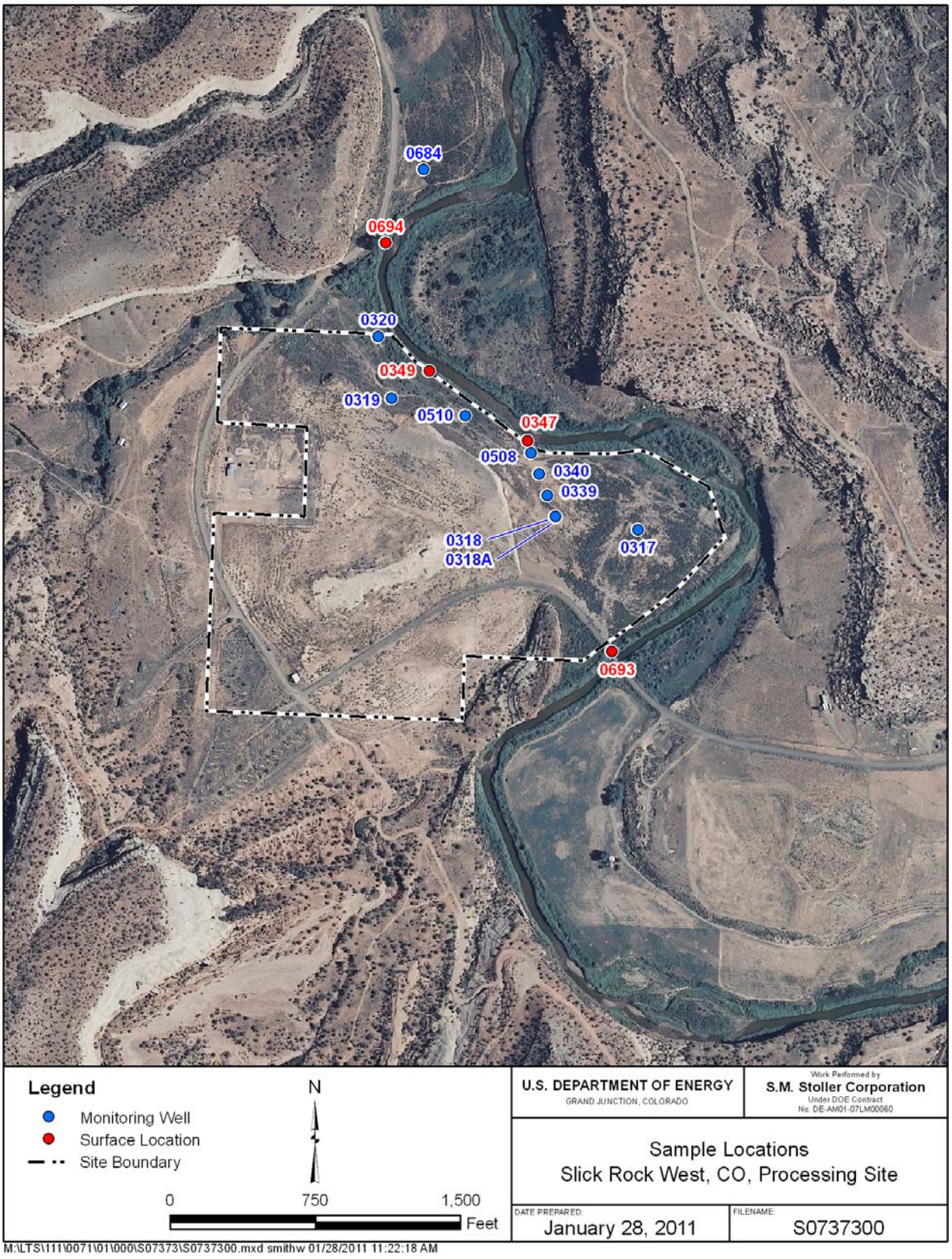
[a] ND = Not detected

_____ _____

David Traub Date
Site Lead, S.M. Stoller Corporation



Slick Rock Processing Site East, Sample Location Map



Slick Rock Processing Site West, Sample Location Map

This page intentionally left blank

Data Assessment Summary

This page intentionally left blank

Water Sampling Field Activities Verification Checklist

Project	Slick Rock, Colorado	**Date(s) of Water Sampling**	September 6–7, 2011
Date(s) of Verification	November 28, 2011	**Name of Verifier**	Steve Donivan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List other documents, SOPs, instructions.		Work Order letter dated August 15, 2011.
2. Were the sampling locations specified in the planning documents sampled?	Yes	
3. Was a pre-trip calibration conducted as specified in the above-named documents?	Yes	Pre-trip calibration was performed on September 2, 2011.
4. Was an operational check of the field equipment conducted daily?	Yes	
Did the operational checks meet criteria?	No	Some turbidity meter readings were slightly low. The instrument could not be field-recalibrated because the turbidity calibration standards are not available in the field.
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	The turbidity in wells 0309 and 0319 remained above 10 NTU, the samples were filtered.
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:	NA	All wells were Category I.
Was the flow rate less than 500 mL/min?		
Was one pump/tubing volume removed prior to sampling?		
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	Duplicate samples were collected from locations 0319 and 0684.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	Yes	One equipment blank was prepared.
11. Were trip blanks prepared and included with each shipment of VOC samples?	Yes	One trip blank was included with the samples.
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	
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):	11084053
Sample Event:	September 6–7, 2011
Site(s):	Slick Rock, Colorado, Processing Sites
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Work Order No.:	1109105
Analysis:	Metals, Organics, Wet Chemistry, and Radiochemistry
Validator:	Steve Donivan
Review Date:	November 15, 2011

This validation was performed according to the *Environmental Procedures Catalog* (LMS/PRO/S04325, continually updated), "Standard Practice for Validation of Laboratory Data." The procedure was applied at Level 3, Data Validation, which consists of determining the data quality and the extent to which the laboratory accurately and completely reported all sample and quality control results, and satisfied all contract requirements. 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 5.

Table 5. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Manganese	LMM-01	SW-846 3005A	SW-846 6010B
Molybdenum, Selenium, Uranium	LMM-02	SW-846 3005A	SW-846 6020A
Nitrite + Nitrate as N	WCH-A-022	MCAWW 353.2	MCAWW 353.2
Radium-226	ASP-A-016	PA SOP783R8	PA SOP783R8
Radium-228	GPC-A-020	SW-846 9320 (m)	PA SOP724R10
Volatile Organics	VOA-A-009	SW-846 5030C	SW-846 8260B

Data Qualifier Summary

Analytical results were qualified as listed in Table 6. Refer to the sections below for an explanation of the data qualifiers applied.

Table 6. Data Qualifier Summary

Sample Number	Location	Analyte	Flag	Reason
1109105-3	0319	Ethylbenzene	J	Duplicate precision
1109105-3	0319	m,p-Xylene	J	Duplicate precision
1109105-3	0319	Radium-228	J	Less than 5 times the method blank
1109105-7	0347	Manganese	U	Less than 5 times the calibration blank
1109105-8	0349	Molybdenum	U	Less than 5 times the method blank
1109105-12	0693	Manganese	U	Less than 5 times the calibration blank
1109105-12	0693	Molybdenum	U	Less than 5 times the method blank

Table 6 (continued). Data Qualifier Summary

Sample Number	Location	Analyte	Flag	Reason
1109105-13	0694	Manganese	U	Less than 5 times the calibration blank
1109105-13	0694	Molybdenum	U	Less than 5 times the method blank
1109105-15	0319 Duplicate	Ethylbenzene	J	Duplicate precision
1109105-15	0319 Duplicate	m,p-Xylene	J	Duplicate precision
1109105-15	0319 Duplicate	Radium-228	J	Less than 5 times the method blank
1109105-17	Equipment Blank	Molybdenum	U	Less than 5 times the method blank

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 27 water samples on September 9, 2011, accompanied by a Chain of Custody (COC) form. Copies of the two air bills were included in the receiving documentation. 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 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. All samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all metal, organic, and wet chemical analytes as required. The MDL, as defined in 40 CFR 136, is the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured, and is defined as five times the MDL.

For radiochemical analytes (those measured by radiometric counting) the MDL and PQL are not applicable, and these results are evaluated using the minimum detectable concentration (MDC), Decision Level Concentration (DLC), and Determination Limit (DL). The MDC is a measure of radiochemical method performance and was calculated and reported as specified in *Quality Systems for Analytical Services*. The DLC is the minimum concentration of a analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero, and is estimated as 3 times the one-sigma total propagated uncertainty. Results that are greater than the MDC, but less than the DLC are qualified with a “U” flag (not detected). The DL for radiochemical results is the lowest concentration that can be reliably measured, and is defined as three times the MDC. Results not previously “U” qualified that are less than the DL are qualified with a “J” flag as estimated values.

The reported MDLs for all metal, organic, and wet chemical analytes; and MDCs for radiochemical analytes demonstrate compliance with contractual requirements.

Laboratory Instrument Calibration

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

Method MCAWW 353.2, Nitrate+Nitrite as N
Calibrations for nitrate + nitrite as N were performed using seven calibration standards on September 21, 2011. 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 eight verification checks. All calibration check results were within the acceptance criteria.

Method SW-846 6010B, Manganese
Calibration for manganese was performed on September 21, 2011, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency resulting in 15 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 6020, Molybdenum, Selenium, Uranium
Calibrations were performed on September 21 and 22, 2011, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency resulting in 15 verification checks. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range. 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 8260B, Volatiles
The initial calibrations for benzene, ethylbenzene, toluene, and xylenes were performed using nine calibration standards on August 15, 2011. Calibration curves are established using linear regression, quadratic regression, or the average response factor approach. Calibrations using average response factors had relative standard deviations of less than 15 percent. Initial and continuing calibration verification checks were made at the required frequency. The verification checks met all acceptance criteria. The mass spectrometer calibration and resolution were checked at the beginning of each analytical run in accordance with the procedure.

Radium-226
Emanation cell plateau voltage determinations and cell efficiency calibrations were performed in March 2011. Daily instrument checks performed on September 27, 2011, met the acceptance criteria. All sample chemical recoveries were within the acceptance range of 40 to 110 percent.

Radium-228
Plateau voltage determinations and detector efficiency calibrations were performed in December 2010. Background determinations were performed on September 12, 2011. The daily instrument checks performed on September 17, 2011, met the acceptance criteria. All sample chemical recoveries were within the acceptance range of 40 to 110 percent.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis.

Metals and Wet Chemistry
All method blank and calibration blank results associated with the samples were below the PQLs for all analytes. Sample results exceeding the MDL that are associated with blanks with concentrations exceeding the MDL are qualified with a "U" flag (not detected) when the sample result is not significantly greater (5 times) the blank concentration. For manganese, some blank results were negative and the absolute values were greater than the MDL but less than the PQL. All associated manganese results were greater than 5 times the MDL, not requiring qualification.

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

Radiochemistry
The radiochemical method blank results were below the DLC with the exception of the radium-228 blank. Sample radium-228 results associated with this blank that are not significantly greater (5 times) the blank concentration are qualified with a "J" flag as estimated values.

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) pairs were analyzed for metals and nitrate + nitrite as N as a measure of 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 non-radiochemical sample replicates, laboratory control sample replicates, and matrix spike replicates were less than 20 percent for results greater than 5 times the PQL, indicating acceptable precision.

The radiochemical relative error ratio (calculated using the one-sigma total propagated uncertainty) for the laboratory control sample replicates was less than three, 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.

Volatile Organics Internal Standard and Surrogate Recovery

Laboratory performance for individual samples is evaluated by means of surrogate spikes. All samples are spiked with surrogate compounds prior to sample preparation. Surrogate recoveries are used to monitor factors such as interference and high concentrations of analytes. Surrogate recoveries may also be influenced by the success in recoveries of the internal standards. Internal standard recoveries were stable and within acceptance ranges. All surrogate recoveries were within the acceptance ranges.

Chromatography Peak Integration

The integration of analyte peaks was reviewed for all volatile organics data. All peak integrations were satisfactory.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers. The analytical report included the MDL (MDC for radiochemistry) and PQL for all analytes and all required supporting documentation.

Electronic Data Deliverable (EDD) File

The EDD file arrived on October 3, 2011. 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: 11084053 **Lab Code:** PAR **Validator:** Steve Donivan **Validation Date:** 11/14/2011

Project: Slick Rock **Analysis Type:** ☑ Metals ☑ General Chem ☑ Rad ☑ Organics

# of Samples: 27 **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 were 2 trip/equipment blanks evaluated.
☑ Field Duplicates	There were 2 duplicates evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 11084053 **Lab Code:** PAR **Date Due:** 10/7/2011

Matrix: Water **Site Code:** SRK **Date Completed:** 10/6/2011

Analyte	Method Type	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	ICV	CCV	ICB	CCB								
Manganese	ICP/ES	09/21/2011	0.0000	1.0000	OK	OK	OK	OK	OK	93.0	93.0	92.0	1.0	96.0	1.0	107.0
Manganese	ICP/ES	09/21/2011							OK	98.0			2.0	93.0	6.0	105.0
Molybdenum	ICP/MS	09/21/2011	0.0000	1.0000	OK	OK	OK	OK	OK	94.0	99.0	98.0	0.0	96.0	2.0	121.0
Molybdenum	ICP/MS	09/21/2011								95.0	101.0	103.0	0.0	102.0		99.0
Selenium	ICP/MS	09/21/2011	0.0000	1.0000	OK	OK	OK	OK	OK	102.0	84.0	94.0	0.0	103.0	1.0	118.0
Selenium	ICP/MS	09/21/2011							OK	101.0				109.0		90.0
Selenium	ICP/MS	09/22/2011	0.0000	1.0000	OK	OK	OK	OK			106.0	103.0	3.0			
Uranium	ICP/MS	09/21/2011	0.0000	1.0000	OK	OK	OK	OK	OK	98.0	106.0	109.0	1.0	103.0	2.0	110.0
Uranium	ICP/MS	09/21/2011								96.0	114.0	103.0	2.0		2.0	95.0

SAMPLE MANAGEMENT SYSTEM
Organics Data Validation Summary

RIN: 11084053 **Project:** Slick Rock **Lab Code:** PAR **Validation Date:** 11/14/2011

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
Radiochemistry Data Validation Worksheet

RIN: 11084053 **Lab Code:** PAR **Date Due:** 10/7/2011

Matrix: Water **Site Code:** SRK **Date Completed:** 10/6/2011

Sample	Analyte	Date Analyzed	Result	Flag	Tracer %R	LCS %R	MS %R	Duplicate
0319	Radium-226	09/27/2011			88.9			
2498	Radium-226	09/27/2011			91.9			
Blank_Spike	Radium-226	09/27/2011			85.7	91.80		
Blank_Spike_Du	Radium-226	09/27/2011			80.9	96.80		0.30
Blank	Radium-226	09/27/2011	0.0380	U	84.4			
0319	Radium-228	09/17/2011			74.2			
2498	Radium-228	09/17/2011			71.5			
Blank_Spike	Radium-228	09/17/2011			80.8	97.30		
Blank_Spike_Du	Radium-228	09/17/2011			82.2	108.00		0.50
Blank	Radium-228	09/17/2011	0.7870		77.5			

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 11084053 **Lab Code:** PAR **Date Due:** 10/7/2011

Matrix: Water **Site Code:** SRK **Date Completed:** 10/6/2011

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	ICV	CCV	ICB	CCB						
Nitrate+Nitrite as N	09/21/2011	0.000	1.0000	OK	OK	OK	OK	OK	99.00				

Sampling Quality Control Assessment

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

Sampling Protocol

Surface water locations were sampled using a peristaltic pump and tubing reel or by container immersion. Monitoring wells were sampled using a peristaltic pump and dedicated tubing. All monitoring 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 location 0696 is located on a side channel of the Dolores River. This side channel was dry for this event, and the sample for this location was taken from the near-by main channel. The Stoller Site Lead determined this location was not accurate;, therefore, results for this sample are not valid. The results for location 0696 are qualified with an "R" flag as rejected and are not included in this report.

During the daily calibration checks, some turbidity meter readings were slightly low. The instrument could not be field-recalibrated because the turbidity calibration standards are not available in the field. The associated sample turbidity results are qualified with a "J" flag as estimated values.

Equipment Blank

Equipment blanks are prepared and analyzed to document contamination attributable to the sample collection process. One equipment blank was submitted with these samples. There were no analytes detected in the equipment blank.

Trip Blank Assessment

A trip blank (field ID 2500) was prepared and analyzed for volatile organics to document contamination attributable to shipping and field handling procedures. There were no target analytes detected in the trip blank.

Field Duplicate Assessment

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results less than 5 times the PQL, the range should be no greater than the PQL. Duplicate samples were collected from locations 0319 and 0684 (field duplicate IDs 2404 and 2498). The duplicate results met these criteria, demonstrating acceptable overall precision, for all analytes except ethylbenzene and m,p-xylene. The sample and duplicate results for these compounds are qualified with a "J" flag as estimated values.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 11084053 **Lab Code:** PAR **Project:** Slick Rock **Validation Date:** 11/14/2011

Duplicate: 2404 **Sample:** 0684

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Manganese	220			1	200			1	9.52		UG/L
Molybdenum	6			1	6.2			10	3.28		UG/L
Nitrate+Nitrite as N	0.01	U		1	0.01	U		1			MG/L
Selenium	0.21			1	0.15			1			UG/L
Uranium	9			10	9			10	0		UG/L

Duplicate: 2498 **Sample:** 0319

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Benzene	4000			100	4500			100	11.76		UG/L
Ethylbenzene	250			100	330			100	27.59		UG/L
m,p-Xylene	5600			100	6900			100	20.80		UG/L
o-Xylene	970			100	1100			100	12.56		UG/L
Radium-226	0.509	U	0.404	1	0.97		0.44	1		1.5	pCi/L
Radium-228	2.88		0.942	1	2.3		0.789	1		0.9	pCi/L
Toluene	2600			100	2800			100	7.41		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 — 12-8-2011

Data Validation Lead: Steve Donivan — 12-8-2011

This page intentionally left blank

Attachment 1
Assessment of Anomalous Data

This page intentionally left blank

Potential Outliers Report

This page intentionally left blank

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.

The m,p-xylene and radium-226 results from location 0319 and the manganese result from location 0508 were identified as potentially anomalous. The results for location 0319 were confirmed and qualified based on the duplicate performance. Manganese is trending downward in well 0508. The data from this sampling event are acceptable as qualified.

Data Validation Outliers Report - No Field Parameters
Comparison: All Historical Data
Laboratory: ALS Laboratory Group
RIN: 11084053
Report Date: 11/28/2011

					Current			Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
						Qualifiers			Qualifiers			Qualifiers				
Site Code	Location Code	Sample ID	Sample Date	Analyte	Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
SRK05	0319	0001	09/07/2011	m,p-Xylene	5600		FJ	4800		F	1900		FJ	12	0	No
SRK05	0319	N002	09/07/2011	m,p-Xylene	6900		FJ	4800		F	1900		FJ	12	0	Yes
SRK05	0319	0001	09/07/2011	Radium-226	0.55	U	F	3.22			0.915		F	25	0	Yes
SRK05	0320	N001	09/07/2011	Uranium	0.011		F	0.03		F	0.014		F	18	0	No
SRK05	0347	0001	09/07/2011	Nitrate + Nitrite as Nitrogen	0.01	U		0.46			0.011			6	0	No
SRK05	0349	0001	09/07/2011	Nitrate + Nitrite as Nitrogen	0.01	U		5			0.052			6	0	No
SRK05	0508	N001	09/07/2011	Manganese	2.7		F	7.49			2.9		F	32	0	Yes
SRK05	0508	N001	09/07/2011	Nitrate + Nitrite as Nitrogen	170		F	1320			220		F	10	0	No
SRK05	0694	0001	09/06/2011	Manganese	0.0016	B	U	1.27			0.0017	B		36	5	No
SRK05	0694	0001	09/06/2011	Nitrate + Nitrite as Nitrogen	0.01	U		1	U	J	0.025			10	1	No
SRK06	0305	N001	09/06/2011	Uranium	0.78		F	1.7		F	0.8		F	16	0	No
SRK06	0700	0001	09/06/2011	Uranium	0.00059			0.0014			0.00063			6	0	No

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

Attachment 2
Data Presentation

This page intentionally left blank

Groundwater Quality Data

This page intentionally left blank

Groundwater Quality Data by Location (USEE100) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0317 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/07/2011	N001	19.46 - 39.52	266		F	#		
Molybdenum	mg/L	09/07/2011	N001	19.46 - 39.52	0.18		F	#	0.00032	
Oxidation Reduction Potential	mV	09/07/2011	N001	19.46 - 39.52	185		F	#		
pH	s.u.	09/07/2011	N001	19.46 - 39.52	7.29		F	#		
Selenium	mg/L	09/07/2011	N001	19.46 - 39.52	0.0052		F	#	0.00032	
Specific Conductance	umhos /cm	09/07/2011	N001	19.46 - 39.52	2439		F	#		
Temperature	C	09/07/2011	N001	19.46 - 39.52	13.02		F	#		
Turbidity	NTU	09/07/2011	N001	19.46 - 39.52	1.88		FJ	#		

Groundwater Quality Data by Location (USEE100) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0318A WELL Replacement well for 0318

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/07/2011	N001	9.2	-	14.2	282		F	#		
Manganese	mg/L	09/07/2011	N001	9.2	-	14.2	1.2		F	#	0.00011	
Molybdenum	mg/L	09/07/2011	N001	9.2	-	14.2	1.7		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	09/07/2011	N001	9.2	-	14.2	66		F	#	0.5	
Oxidation Reduction Potential	mV	09/07/2011	N001	9.2	-	14.2	193		F	#		
pH	s.u.	09/07/2011	N001	9.2	-	14.2	6.91		F	#		
Selenium	mg/L	09/07/2011	N001	9.2	-	14.2	3.4		F	#	0.00032	
Specific Conductance	umhos /cm	09/07/2011	N001	9.2	-	14.2	2258		F	#		
Temperature	C	09/07/2011	N001	9.2	-	14.2	16.91		F	#		
Turbidity	NTU	09/07/2011	N001	9.2	-	14.2	8.37		FJ	#		
Uranium	mg/L	09/07/2011	N001	9.2	-	14.2	0.028		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0319 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/07/2011	0001	4.55 - 14.58	1020		F	#		
Benzene	ug/L	09/07/2011	0001	4.55 - 14.58	4000		F	#	33	
Benzene	ug/L	09/07/2011	N002	4.55 - 14.58	4500		F	#	33	
Ethylbenzene	ug/L	09/07/2011	0001	4.55 - 14.58	250		FJ	#	33	
Ethylbenzene	ug/L	09/07/2011	N002	4.55 - 14.58	330		FJ	#	33	
m,p-Xylene	ug/L	09/07/2011	0001	4.55 - 14.58	5600		FJ	#	44	
m,p-Xylene	ug/L	09/07/2011	N002	4.55 - 14.58	6900		FJ	#	44	
o-Xylene	ug/L	09/07/2011	0001	4.55 - 14.58	970		F	#	33	
o-Xylene	ug/L	09/07/2011	N002	4.55 - 14.58	1100		F	#	33	
Oxidation Reduction Potential	mV	09/07/2011	N001	4.55 - 14.58	-132		F	#		
pH	s.u.	09/07/2011	N001	4.55 - 14.58	6.91		F	#		
Radium-226	pCi/L	09/07/2011	0001	4.55 - 14.58	0.55	U	F	#	0.55	0.404
Radium-226	pCi/L	09/07/2011	N002	4.55 - 14.58	0.97		F	#	0.29	0.44
Radium-228	pCi/L	09/07/2011	0001	4.55 - 14.58	2.88		FJ	#	0.49	0.942
Radium-228	pCi/L	09/07/2011	N002	4.55 - 14.58	2.3		FJ	#	0.53	0.789
Selenium	mg/L	09/07/2011	0001	4.55 - 14.58	0.001		F	#	0.000032	
Specific Conductance	umhos /cm	09/07/2011	N001	4.55 - 14.58	3823		F	#		

Groundwater Quality Data by Location (USEE100) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0319 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Temperature	C	09/07/2011	N001	4.55	-	14.58	17.13		F	#		
Toluene	ug/L	09/07/2011	0001	4.55	-	14.58	2600		F	#	33	
Toluene	ug/L	09/07/2011	N002	4.55	-	14.58	2800		F	#	33	
Turbidity	NTU	09/07/2011	N001	4.55	-	14.58	13		FJ	#		

Groundwater Quality Data by Location (USEE100) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0320 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/07/2011	N001	4.92 - 9.96	370		F	#		
Manganese	mg/L	09/07/2011	N001	4.92 - 9.96	0.48		F	#	0.00011	
Molybdenum	mg/L	09/07/2011	N001	4.92 - 9.96	0.01		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	09/07/2011	N001	4.92 - 9.96	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	09/07/2011	N001	4.92 - 9.96	-66		F	#		
pH	s.u.	09/07/2011	N001	4.92 - 9.96	7.07		F	#		
Selenium	mg/L	09/07/2011	N001	4.92 - 9.96	0.00013		F	#	0.000032	
Specific Conductance	umhos /cm	09/07/2011	N001	4.92 - 9.96	884		F	#		
Temperature	C	09/07/2011	N001	4.92 - 9.96	16.19		F	#		
Turbidity	NTU	09/07/2011	N001	4.92 - 9.96	6.43		FJ	#		
Uranium	mg/L	09/07/2011	N001	4.92 - 9.96	0.011		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0339 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/07/2011	N001	11	-	14	294		F	#		
Manganese	mg/L	09/07/2011	N001	11	-	14	1.9		F	#	0.00011	
Molybdenum	mg/L	09/07/2011	N001	11	-	14	1.3		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	09/07/2011	N001	11	-	14	48		F	#	0.5	
Oxidation Reduction Potential	mV	09/07/2011	N001	11	-	14	224		F	#		
pH	s.u.	09/07/2011	N001	11	-	14	6.95		F	#		
Selenium	mg/L	09/07/2011	N001	11	-	14	2.1		F	#	0.00032	
Specific Conductance	umhos /cm	09/07/2011	N001	11	-	14	2134		F	#		
Temperature	C	09/07/2011	N001	11	-	14	15.63		F	#		
Turbidity	NTU	09/07/2011	N001	11	-	14	8.7		FJ	#		
Uranium	mg/L	09/07/2011	N001	11	-	14	0.035		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0340 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/07/2011	N001	6.51	-	11.51	290		F	#		
Manganese	mg/L	09/07/2011	N001	6.51	-	11.51	5.4		F	#	0.00011	
Molybdenum	mg/L	09/07/2011	N001	6.51	-	11.51	1.7		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	09/07/2011	N001	6.51	-	11.51	340		F	#	2	
Oxidation Reduction Potential	mV	09/07/2011	N001	6.51	-	11.51	235		F	#		
pH	s.u.	09/07/2011	N001	6.51	-	11.51	6.6		F	#		
Selenium	mg/L	09/07/2011	N001	6.51	-	11.51	2.9		F	#	0.00032	
Specific Conductance	umhos /cm	09/07/2011	N001	6.51	-	11.51	4819		F	#		
Temperature	C	09/07/2011	N001	6.51	-	11.51	18.32		F	#		
Turbidity	NTU	09/07/2011	N001	6.51	-	11.51	8.06		FJ	#		
Uranium	mg/L	09/07/2011	N001	6.51	-	11.51	0.05		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0508 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/07/2011	N001	1.01	-	11.01	308		F	#		
Manganese	mg/L	09/07/2011	N001	1.01	-	11.01	2.7		F	#	0.00011	
Molybdenum	mg/L	09/07/2011	N001	1.01	-	11.01	1.2		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	09/07/2011	N001	1.01	-	11.01	170		F	#	2	
Oxidation Reduction Potential	mV	09/07/2011	N001	1.01	-	11.01	240		F	#		
pH	s.u.	09/07/2011	N001	1.01	-	11.01	6.69		F	#		
Selenium	mg/L	09/07/2011	N001	1.01	-	11.01	0.91		F	#	0.00032	
Specific Conductance	umhos /cm	09/07/2011	N001	1.01	-	11.01	3537		F	#		
Temperature	C	09/07/2011	N001	1.01	-	11.01	18.47		F	#		
Turbidity	NTU	09/07/2011	N001	1.01	-	11.01	2.05		FJ	#		
Uranium	mg/L	09/07/2011	N001	1.01	-	11.01	0.074		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0510 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/07/2011	N001	4.92	-	13.92	303		F	#		
Manganese	mg/L	09/07/2011	N001	4.92	-	13.92	4.2		F	#	0.00011	
Molybdenum	mg/L	09/07/2011	N001	4.92	-	13.92	0.85		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	09/07/2011	N001	4.92	-	13.92	240		F	#	2	
Oxidation Reduction Potential	mV	09/07/2011	N001	4.92	-	13.92	237		F	#		
pH	s.u.	09/07/2011	N001	4.92	-	13.92	6.54		F	#		
Selenium	mg/L	09/07/2011	N001	4.92	-	13.92	0.83		F	#	0.00032	
Specific Conductance	umhos /cm	09/07/2011	N001	4.92	-	13.92	4159		F	#		
Temperature	C	09/07/2011	N001	4.92	-	13.92	17.16		F	#		
Turbidity	NTU	09/07/2011	N001	4.92	-	13.92	1.7		FJ	#		
Uranium	mg/L	09/07/2011	N001	4.92	-	13.92	0.096		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0684 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	N001	11	-	21	197		F	#		
Manganese	mg/L	09/06/2011	N001	11	-	21	0.22		F	#	0.00011	
Manganese	mg/L	09/06/2011	N002	11	-	21	0.2		F	#	0.00011	
Molybdenum	mg/L	09/06/2011	N001	11	-	21	0.006		F	#	0.000032	
Molybdenum	mg/L	09/06/2011	N002	11	-	21	0.0062		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	09/06/2011	N001	11	-	21	0.01	U	F	#	0.01	
Nitrate + Nitrite as Nitrogen	mg/L	09/06/2011	N002	11	-	21	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	09/06/2011	N001	11	-	21	7		F	#		
pH	s.u.	09/06/2011	N001	11	-	21	7.32		F	#		
Selenium	mg/L	09/06/2011	N001	11	-	21	0.00021		F	#	0.000032	
Selenium	mg/L	09/06/2011	N002	11	-	21	0.00015		F	#	0.000032	
Specific Conductance	umhos /cm	09/06/2011	N001	11	-	21	682		F	#		
Temperature	C	09/06/2011	N001	11	-	21	14.03		F	#		
Turbidity	NTU	09/06/2011	N001	11	-	21	5.28		FJ	#		
Uranium	mg/L	09/06/2011	N001	11	-	21	0.009		F	#	0.000029	
Uranium	mg/L	09/06/2011	N002	11	-	21	0.009		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK06, Slick Rock East Processing Site
REPORT DATE: 11/28/2011
Location: 0303 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	N001	4.3	-	14.3	560		F	#		
Oxidation Reduction Potential	mV	09/06/2011	N001	4.3	-	14.3	-100		F	#		
pH	s.u.	09/06/2011	N001	4.3	-	14.3	7.2		F	#		
Specific Conductance	umhos /cm	09/06/2011	N001	4.3	-	14.3	3335		F	#		
Temperature	C	09/06/2011	N001	4.3	-	14.3	17.72		F	#		
Turbidity	NTU	09/06/2011	N001	4.3	-	14.3	7.23		FJ	#		
Uranium	mg/L	09/06/2011	N001	4.3	-	14.3	1		F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK06, Slick Rock East Processing Site
REPORT DATE: 11/28/2011
Location: 0305 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	N001	8.7	-	18.7	448		F	#		
Oxidation Reduction Potential	mV	09/06/2011	N001	8.7	-	18.7	46		F	#		
pH	s.u.	09/06/2011	N001	8.7	-	18.7	7.13		F	#		
Selenium	mg/L	09/06/2011	N001	8.7	-	18.7	0.018		F	#	0.0016	
Specific Conductance	umhos /cm	09/06/2011	N001	8.7	-	18.7	3186		F	#		
Temperature	C	09/06/2011	N001	8.7	-	18.7	15.71		F	#		
Turbidity	NTU	09/06/2011	N001	8.7	-	18.7	7.58		FJ	#		
Uranium	mg/L	09/06/2011	N001	8.7	-	18.7	0.78		F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK06, Slick Rock East Processing Site
REPORT DATE: 11/28/2011
Location: 0307 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	N001	4.4	-	14.4	764		F	#		
Oxidation Reduction Potential	mV	09/06/2011	N001	4.4	-	14.4	-78		F	#		
pH	s.u.	09/06/2011	N001	4.4	-	14.4	7.11		F	#		
Selenium	mg/L	09/06/2011	N001	4.4	-	14.4	0.00022	B	F	#	0.00016	
Specific Conductance	umhos /cm	09/06/2011	N001	4.4	-	14.4	5828		F	#		
Temperature	C	09/06/2011	N001	4.4	-	14.4	14.52		F	#		
Turbidity	NTU	09/06/2011	N001	4.4	-	14.4	8.69		FJ	#		
Uranium	mg/L	09/06/2011	N001	4.4	-	14.4	0.48		F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK06, Slick Rock East Processing Site
REPORT DATE: 11/28/2011
Location: 0309 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	0001	10.2	-	20.2	788		F	#		
Oxidation Reduction Potential	mV	09/06/2011	N001	10.2	-	20.2	-77		F	#		
pH	s.u.	09/06/2011	N001	10.2	-	20.2	7.46		F	#		
Specific Conductance	umhos /cm	09/06/2011	N001	10.2	-	20.2	3637		F	#		
Temperature	C	09/06/2011	N001	10.2	-	20.2	14.23		F	#		
Turbidity	NTU	09/06/2011	N001	10.2	-	20.2	34		FJ	#		
Uranium	mg/L	09/06/2011	0001	10.2	-	20.2	0.085		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK06, Slick Rock East Processing Site
REPORT DATE: 11/28/2011
Location: 0310 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	N001	14.7	-	19.7	194		F	#		
Oxidation Reduction Potential	mV	09/06/2011	N001	14.7	-	19.7	-75		F	#		
pH	s.u.	09/06/2011	N001	14.7	-	19.7	7.33		F	#		
Specific Conductance	umhos /cm	09/06/2011	N001	14.7	-	19.7	823		F	#		
Temperature	C	09/06/2011	N001	14.7	-	19.7	14.88		F	#		
Turbidity	NTU	09/06/2011	N001	14.7	-	19.7	6.09		FJ	#		
Uranium	mg/L	09/06/2011	N001	14.7	-	19.7	0.02		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK06, Slick Rock East Processing Site
REPORT DATE: 11/28/2011
Location: 0311 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	N001	14.1	-	19.1	298		F	#		
Oxidation Reduction Potential	mV	09/06/2011	N001	14.1	-	19.1	146		F	#		
pH	s.u.	09/06/2011	N001	14.1	-	19.1	7.02		F	#		
Specific Conductance	umhos /cm	09/06/2011	N001	14.1	-	19.1	1803		F	#		
Temperature	C	09/06/2011	N001	14.1	-	19.1	15.43		F	#		
Turbidity	NTU	09/06/2011	N001	14.1	-	19.1	1.76		FJ	#		
Uranium	mg/L	09/06/2011	N001	14.1	-	19.1	0.098		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE SRK06, Slick Rock East Processing Site
REPORT DATE: 11/28/2011
Location: 0312 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	N001	14.5	-	19.5	276		F	#		
Oxidation Reduction Potential	mV	09/06/2011	N001	14.5	-	19.5	135		F	#		
pH	s.u.	09/06/2011	N001	14.5	-	19.5	7.33		F	#		
Specific Conductance	umhos /cm	09/06/2011	N001	14.5	-	19.5	2049		F	#		
Temperature	C	09/06/2011	N001	14.5	-	19.5	15.68		F	#		
Turbidity	NTU	09/06/2011	N001	14.5	-	19.5	5.83		FJ	#		
Uranium	mg/L	09/06/2011	N001	14.5	-	19.5	0.032		F	#	0.000029	

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.
- 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.

This page intentionally left blank

Surface Water Quality Data

This page intentionally left blank

Surface Water Quality Data by Location (USEE102) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0347 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/07/2011	0001	101			#		
Manganese	mg/L	09/07/2011	0001	0.0041	B	U	#	0.00011	
Molybdenum	mg/L	09/07/2011	0001	0.0023			#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	09/07/2011	0001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	09/07/2011	N001	205			#		
pH	s.u.	09/07/2011	N001	8.27			#		
Selenium	mg/L	09/07/2011	0001	0.00032			#	0.000032	
Specific Conductance	umhos/cm	09/07/2011	N001	402			#		
Temperature	C	09/07/2011	N001	20.53			#		
Turbidity	NTU	09/07/2011	N001	918		J	#		
Uranium	mg/L	09/07/2011	0001	0.0006			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0349 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/07/2011	0001	103			#		
Manganese	mg/L	09/07/2011	0001	0.02			#	0.00011	
Molybdenum	mg/L	09/07/2011	0001	0.0019		U	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	09/07/2011	0001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	09/07/2011	N001	113			#		
pH	s.u.	09/07/2011	N001	8.27			#		
Selenium	mg/L	09/07/2011	0001	0.00032			#	0.000032	
Specific Conductance	umhos/cm	09/07/2011	N001	328			#		
Temperature	C	09/07/2011	N001	21			#		
Turbidity	NTU	09/07/2011	N001	999		J	#		
Uranium	mg/L	09/07/2011	0001	0.00061			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE SRK06, Slick Rock East Processing Site
REPORT DATE: 11/28/2011
Location: 0692 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	0001	106			#		
Oxidation Reduction Potential	mV	09/06/2011	N001	67.5			#		
pH	s.u.	09/06/2011	N001	8.34			#		
Specific Conductance	umhos/cm	09/06/2011	N001	319			#		
Temperature	C	09/06/2011	N001	19.62			#		
Turbidity	NTU	09/06/2011	N001	395		J	#		
Uranium	mg/L	09/06/2011	0001	0.0006			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0693 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	0001	88			#		
Manganese	mg/L	09/06/2011	0001	0.0032	B	U	#	0.00011	
Molybdenum	mg/L	09/06/2011	0001	0.0016		U	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	09/06/2011	0001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	09/06/2011	N001	58.8			#		
pH	s.u.	09/06/2011	N001	8.32			#		
Selenium	mg/L	09/06/2011	0001	0.0003			#	0.000032	
Specific Conductance	umhos/cm	09/06/2011	N001	319			#		
Temperature	C	09/06/2011	N001	20.37			#		
Turbidity	NTU	09/06/2011	N001	200		J	#		
Uranium	mg/L	09/06/2011	0001	0.00053			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/28/2011
Location: 0694 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	0001	110			#		
Manganese	mg/L	09/06/2011	0001	0.0016	B	U	#	0.00011	
Molybdenum	mg/L	09/06/2011	0001	0.0016		U	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	09/06/2011	0001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	09/06/2011	N001	126			#		
pH	s.u.	09/06/2011	N001	8.35			#		
Selenium	mg/L	09/06/2011	0001	0.00038			#	0.000032	
Specific Conductance	umhos/cm	09/06/2011	N001	318			#		
Temperature	C	09/06/2011	N001	20.4			#		
Turbidity	NTU	09/06/2011	N001	261		J	#		
Uranium	mg/L	09/06/2011	0001	0.00057			#	0.000029	

Surface Water Quality Data by Location (USEE102) FOR SITE SRK06, Slick Rock East Processing Site
REPORT DATE: 11/28/2011
Location: 0700 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	09/06/2011	0001	100			#		
Oxidation Reduction Potential	mV	09/06/2011	N001	5.2			#		
pH	s.u.	09/06/2011	N001	8.37			#		
Specific Conductance	umhos/cm	09/06/2011	N001	317			#		
Temperature	C	09/06/2011	N001	19.72			#		
Turbidity	NTU	09/06/2011	N001	218		J	#		
Uranium	mg/L	09/06/2011	0001	0.00059			#	0.000029	

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.
- 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.

Equipment Blank and Trip Blank Data

This page intentionally left blank

BLANKS REPORT
LAB: PARAGON/ALS LABORATORY GROUP (Fort Collins, CO)
RIN: 11084053
Report Date: 11/28/2011

Parameter	Site Code	Location ID	Sample Date	Sample ID	Units	Result	Qualifiers Lab	Qualifiers Data	Detection Limit	Uncertainty	Sample Type
Benzene	SRK05	0999	09/06/2011	N001	ug/L	0.33	U		0.33		TB
Ethylbenzene	SRK05	0999	09/06/2011	N001	ug/L	0.33	U		0.33		TB
m,p-Xylene	SRK05	0999	09/06/2011	N001	ug/L	0.44	U		0.44		TB
Manganese	SRK05	0999	09/07/2011	N001	mg/L	0.00011	U		0.00011		E
Molybdenum	SRK05	0999	09/07/2011	N001	mg/L	0.00041	B	U	0.00032		E
Nitrate + Nitrite as Nitrogen	SRK05	0999	09/07/2011	N001	mg/L	0.01	U		0.01		E
o-Xylene	SRK05	0999	09/06/2011	N001	ug/L	0.33	U		0.33		TB
Selenium	SRK05	0999	09/07/2011	N001	mg/L	0.000032	U		0.000032		E
Toluene	SRK05	0999	09/06/2011	N001	ug/L	0.33	U		0.33		TB
Uranium	SRK05	0999	09/07/2011	N001	mg/L	0.000029	U		0.000029		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.
- 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.

SAMPLE TYPES:
- E Equipment Blank.

This page intentionally left blank

Static Water Level Data

This page intentionally left blank

STATIC WATER LEVELS (USEE700) FOR SITE SRK05, Slick Rock West Processing Site
REPORT DATE: 11/29/2011

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
0317		5435.18	09/07/2011	09:00:36	11.14	5424.04
0318A		NA	09/07/2011	09:35:41	12.05	NA
0319	O	5430.66	09/07/2011	12:25:12	8.9	5421.76
0320	O	5427.4	09/07/2011	11:30:22	5.84	5421.56
0339		NA	09/07/2011	09:50:12	10.95	NA
0340		NA	09/07/2011	10:20:40	9.58	NA
0508	O	5430.2	09/07/2011	10:35:45	6.84	5423.36
0510	O	5427.87	09/07/2011	11:05:50	5.69	5422.18
0684	D	5432.68	09/06/2011	16:30:11	16.04	5416.64

STATIC WATER LEVELS (USEE700) FOR SITE SRK06, Slick Rock East Processing Site
REPORT DATE: 11/29/2011

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
0303	O	5446.91	09/06/2011	13:05:11	9.94	5436.97
0305	O	5448.75	09/06/2011	12:30:52	12.5	5436.25
0307	O	5447.1	09/06/2011	12:15:27	11.34	5435.76
0309	O	5450.18	09/06/2011	11:30:52	15.37	5434.81
0310	D	5450.56	09/06/2011	15:20:20	17.55	5433.01
0311	D	5450.7	09/06/2011	14:40:39	17.91	5432.79
0312	D	5451.06	09/06/2011	14:15:10	17.6	5433.46

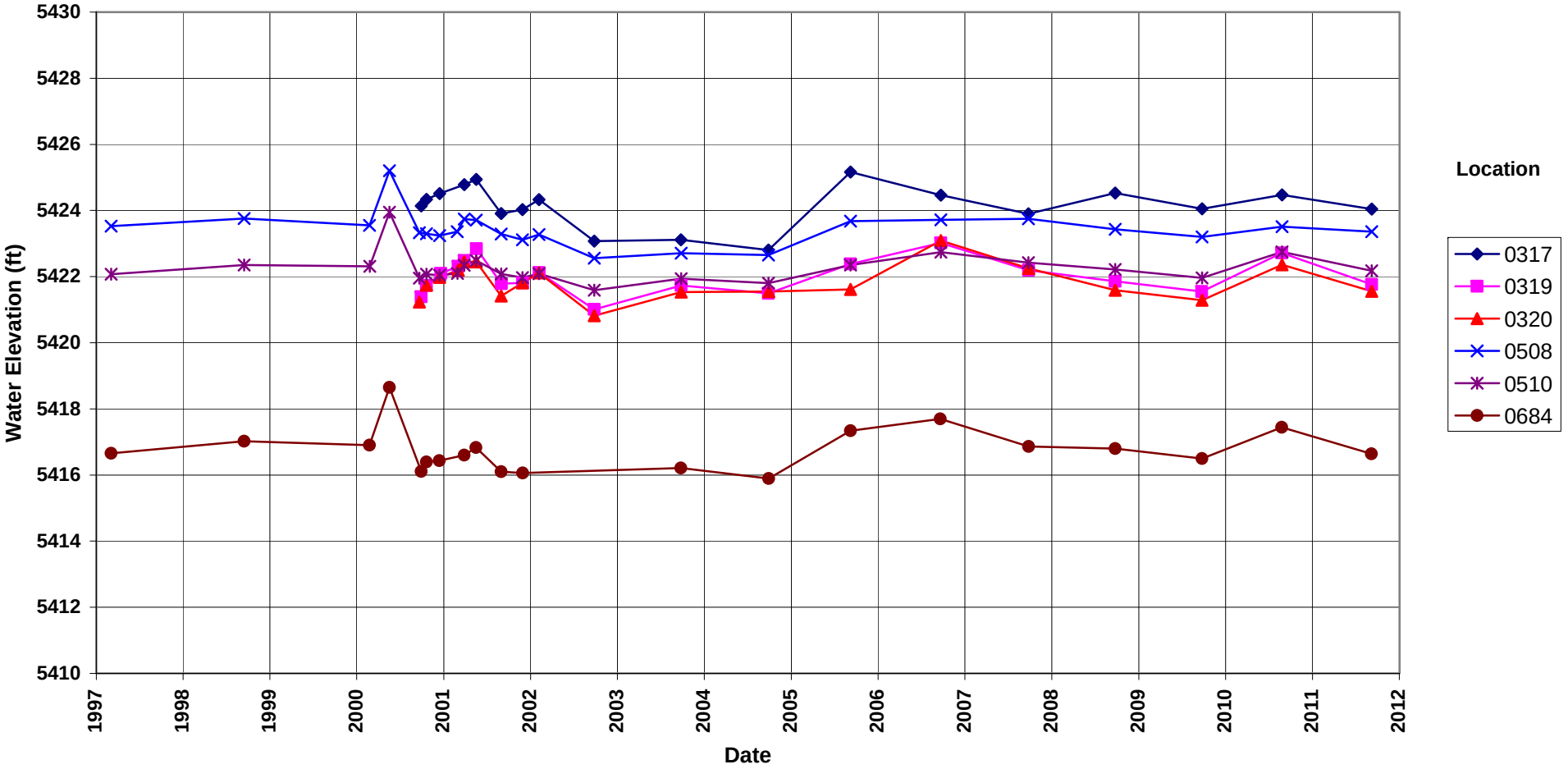
FLOW CODES: B BACKGROUND C CROSS GRADIENT D DOWN GRADIENT F OFF SITE
N UNKNOWN O ON SITE U UPGRADIENT

This page intentionally left blank

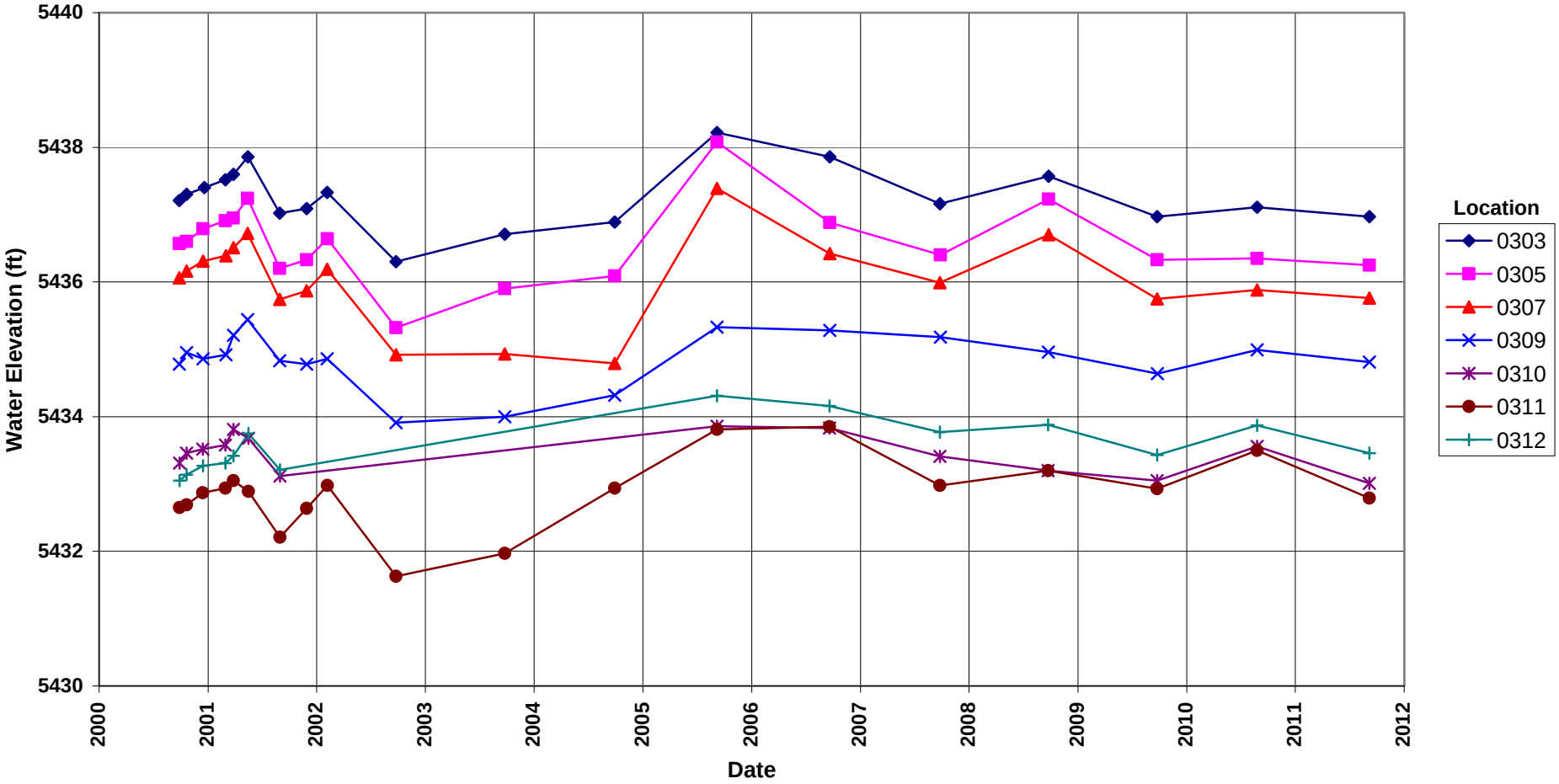
Hydrographs

This page intentionally left blank

Slick Rock West Processing Site
Hydrograph



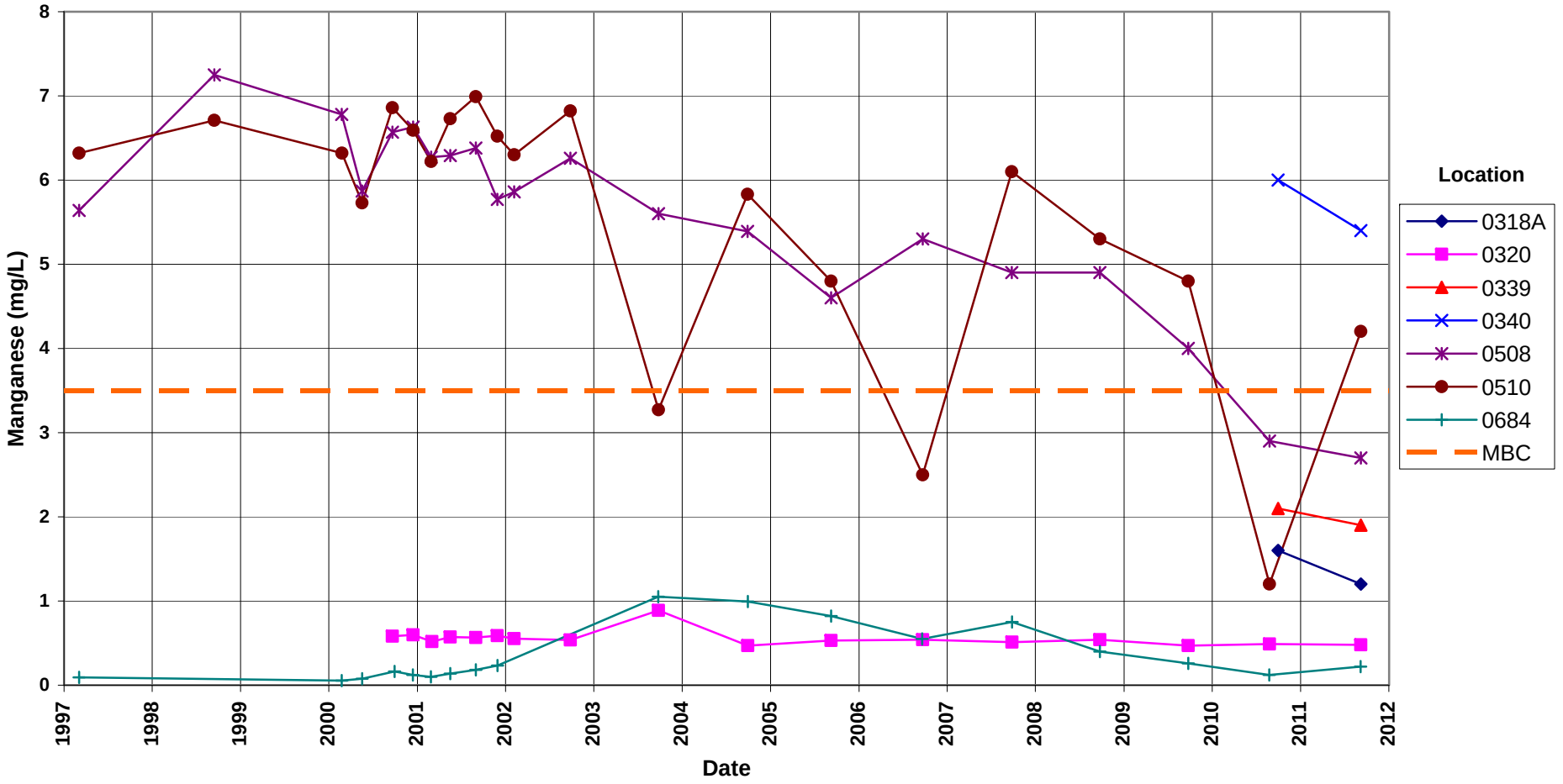
Slick Rock East Processing Site
Hydrograph



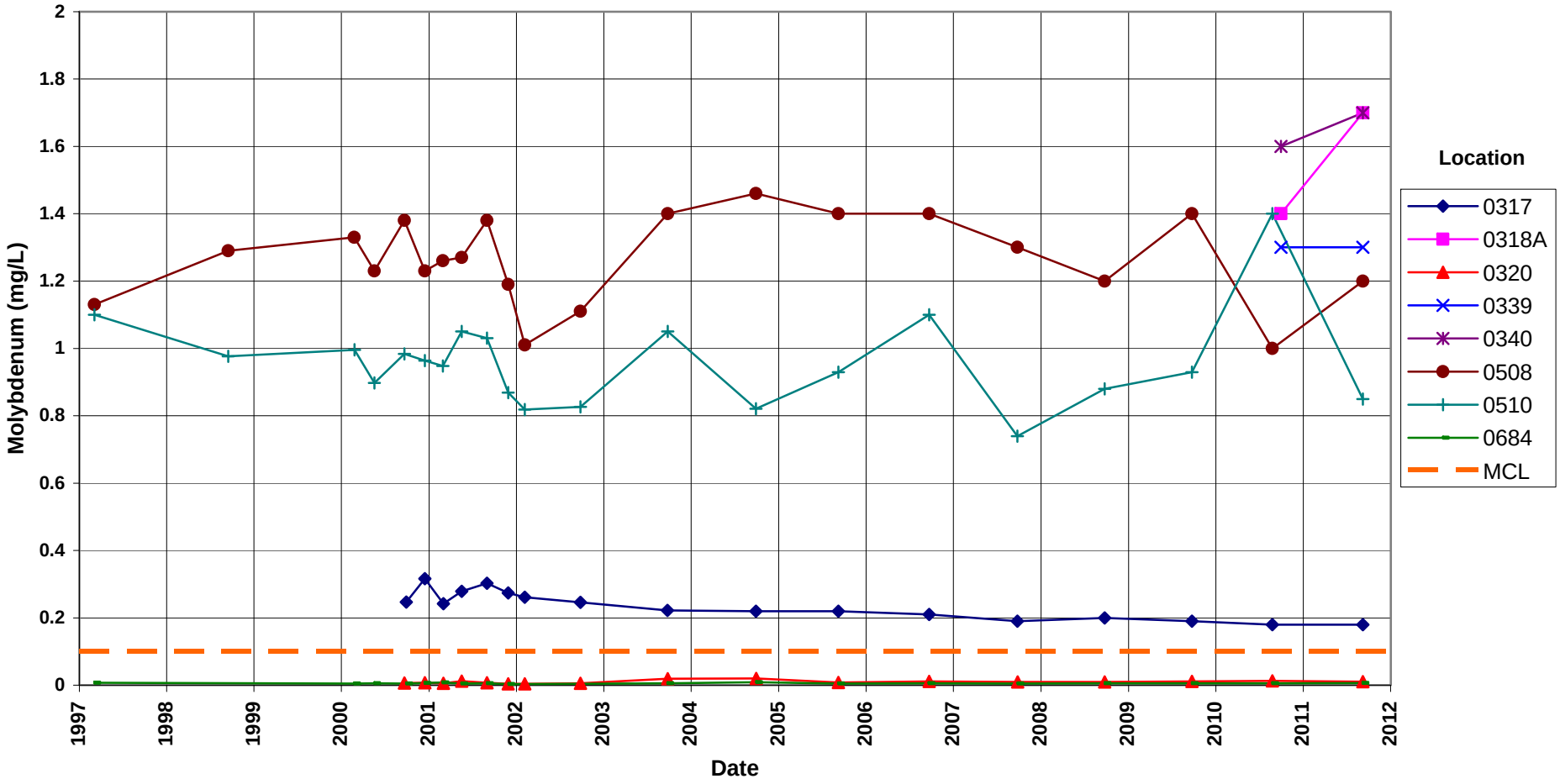
Groundwater
Time-Concentration Graphs

This page intentionally left blank

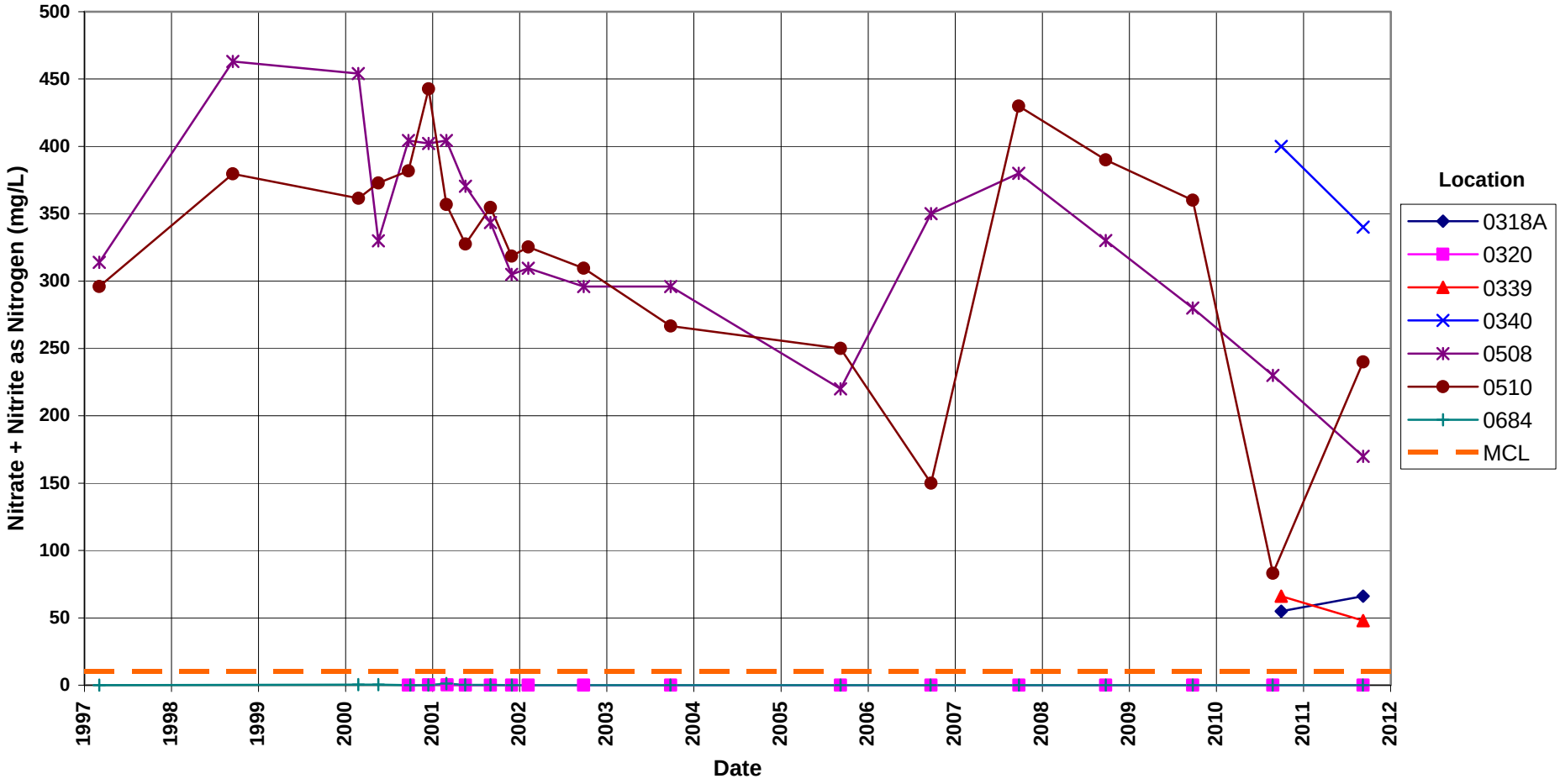
Slick Rock West Processing Site
Manganese Concentration
Maximum Background Concentration (MBC) = 3.5 mg/L



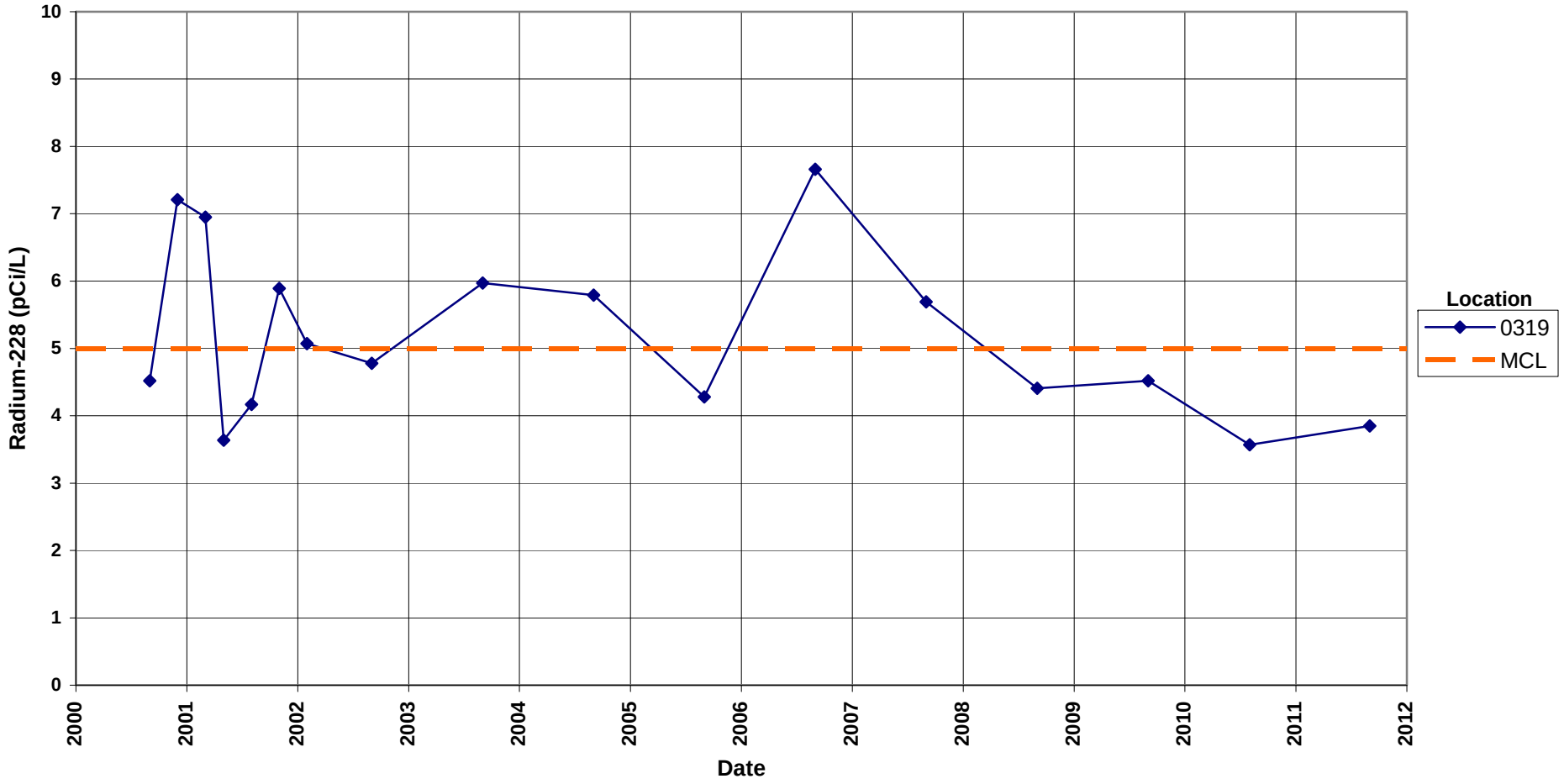
Slick Rock West Processing Site
Molybdenum Concentration
Maximum Contaminant Level (MCL) = 0.1 mg/L



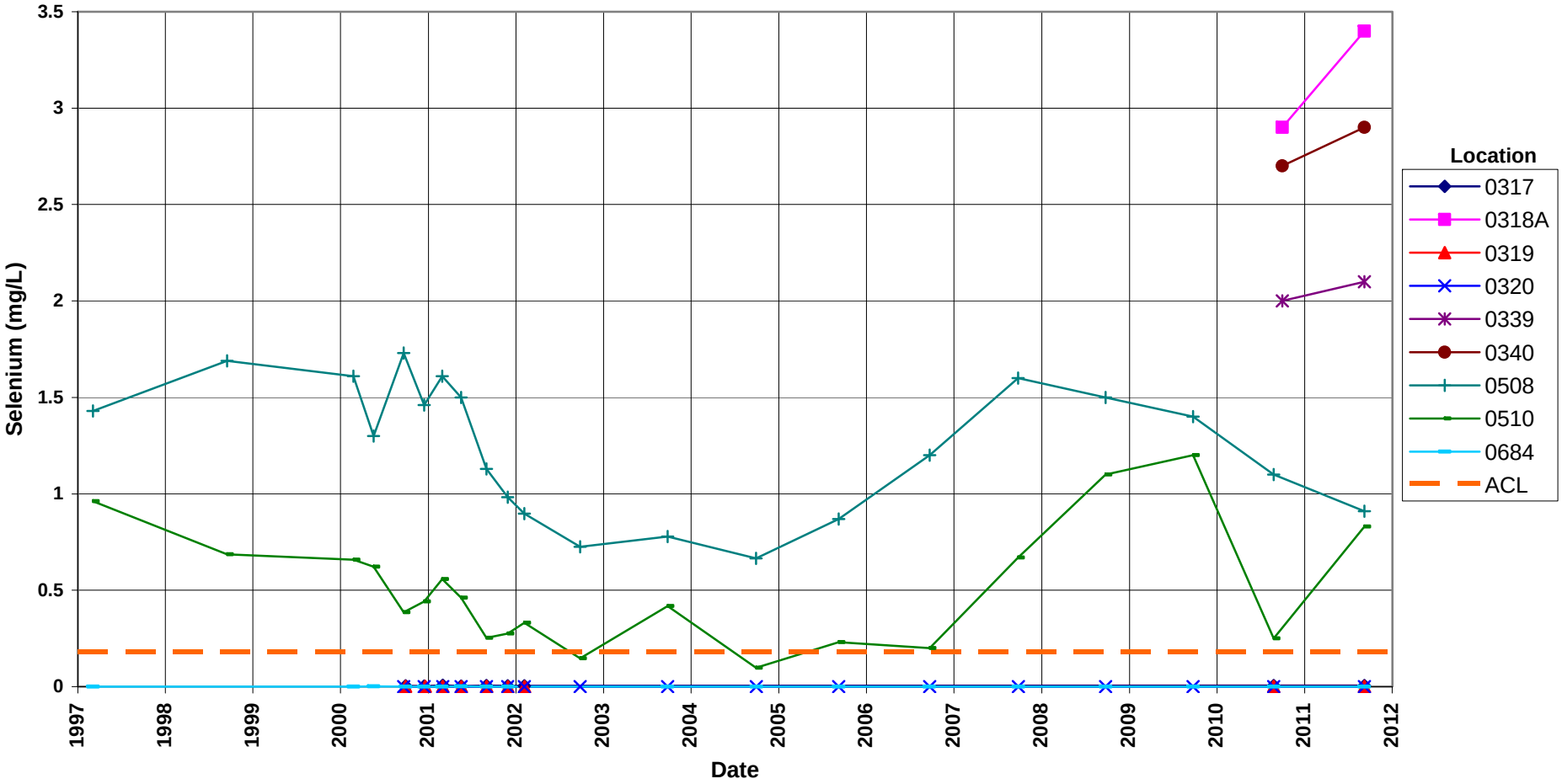
Slick Rock West Processing Site
Nitrate + Nitrite as Nitrogen Concentration
Maximum Contaminant Level (MCL) = 10.0 mg/L



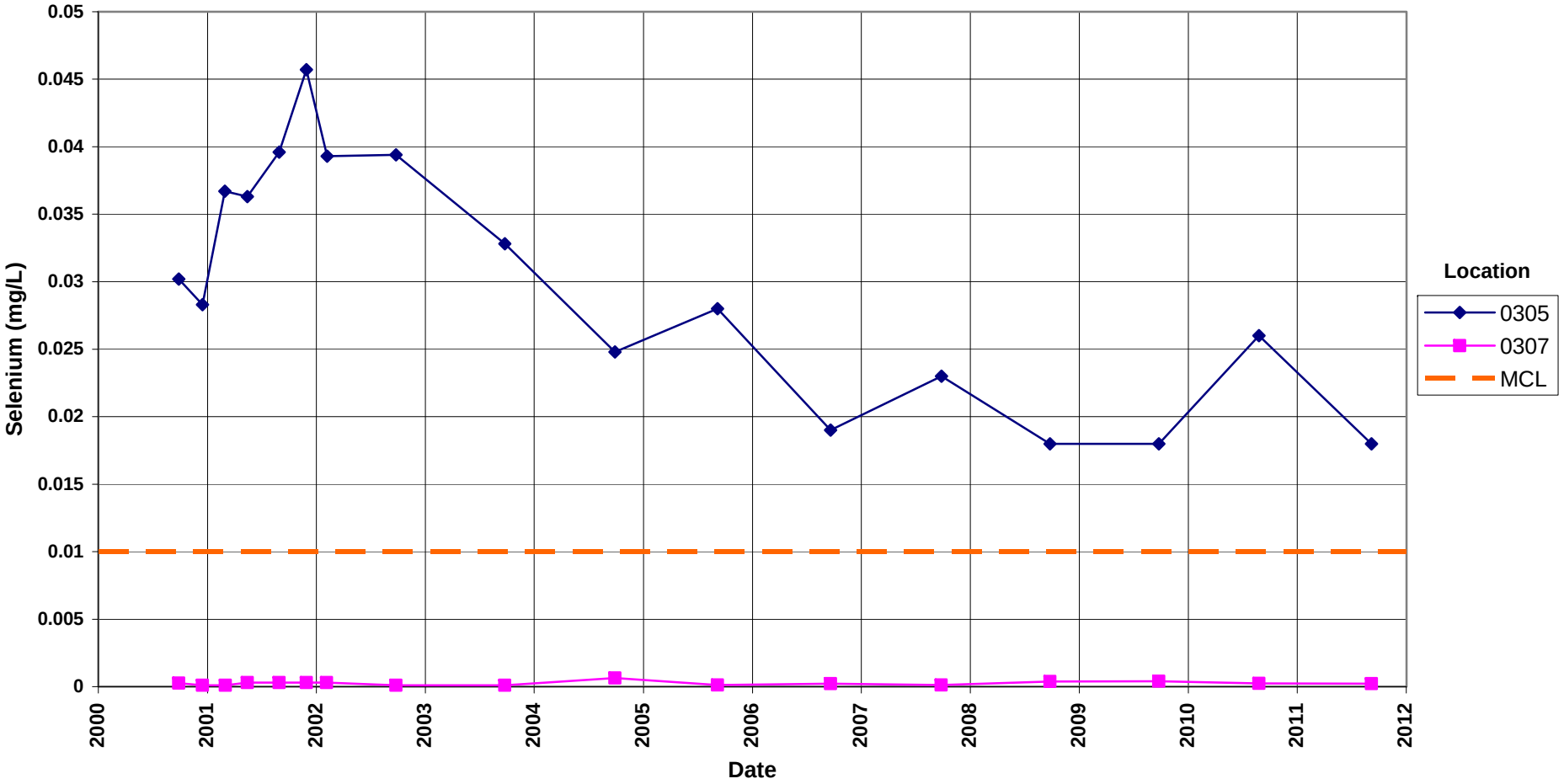
Slick Rock West Processing Site
Radium-226+228 Concentration
Maximum Contaminant Level (MCL) = 5.0 pCi/L



Slick Rock West Processing Site
Selenium Concentration
Alternate Concentration Limit (ACL) = 0.18 mg/L

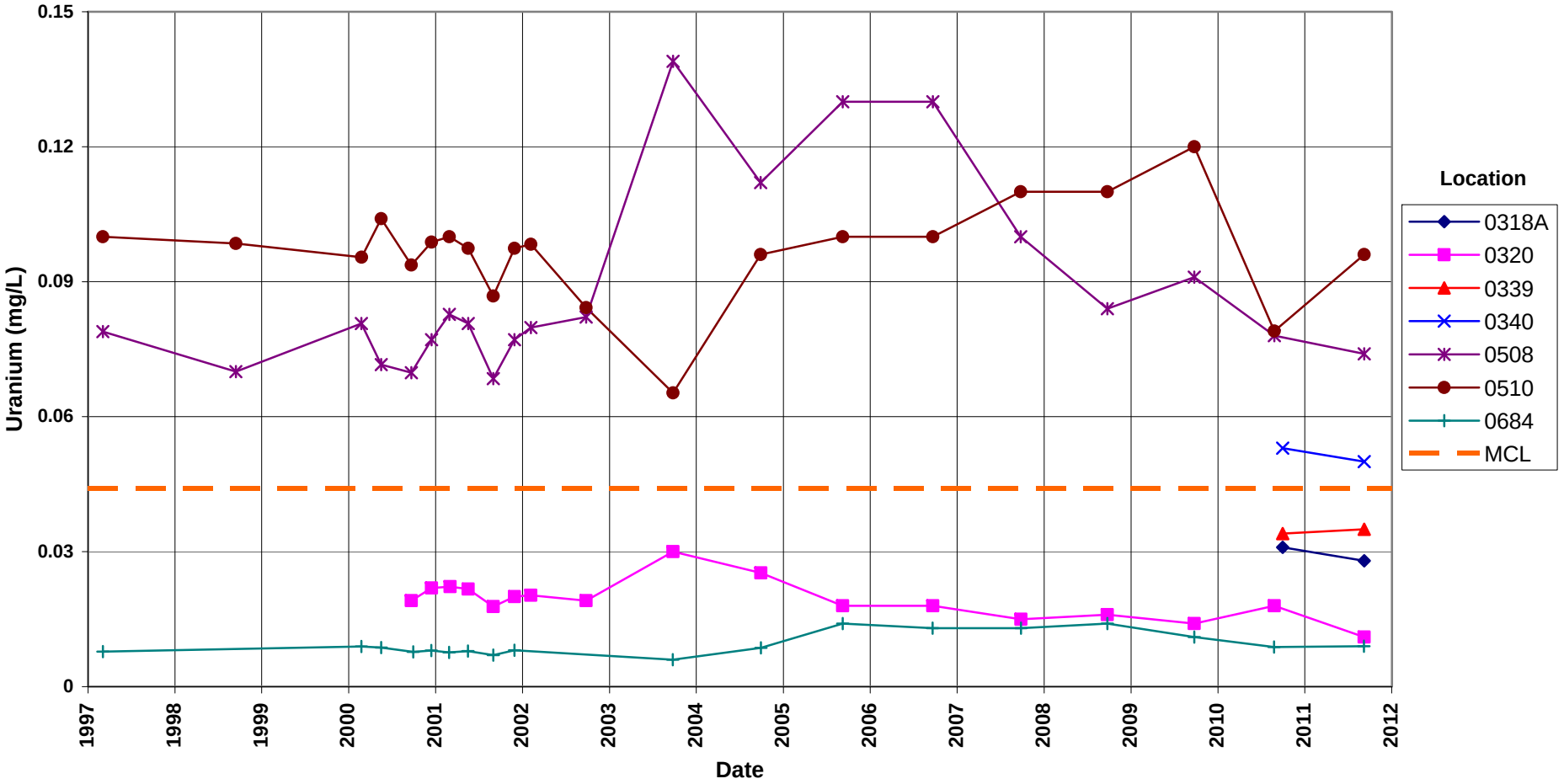


Slick Rock East Processing Site
Selenium Concentration
Maximum Contaminant Level (MCL) = 0.01 mg/L

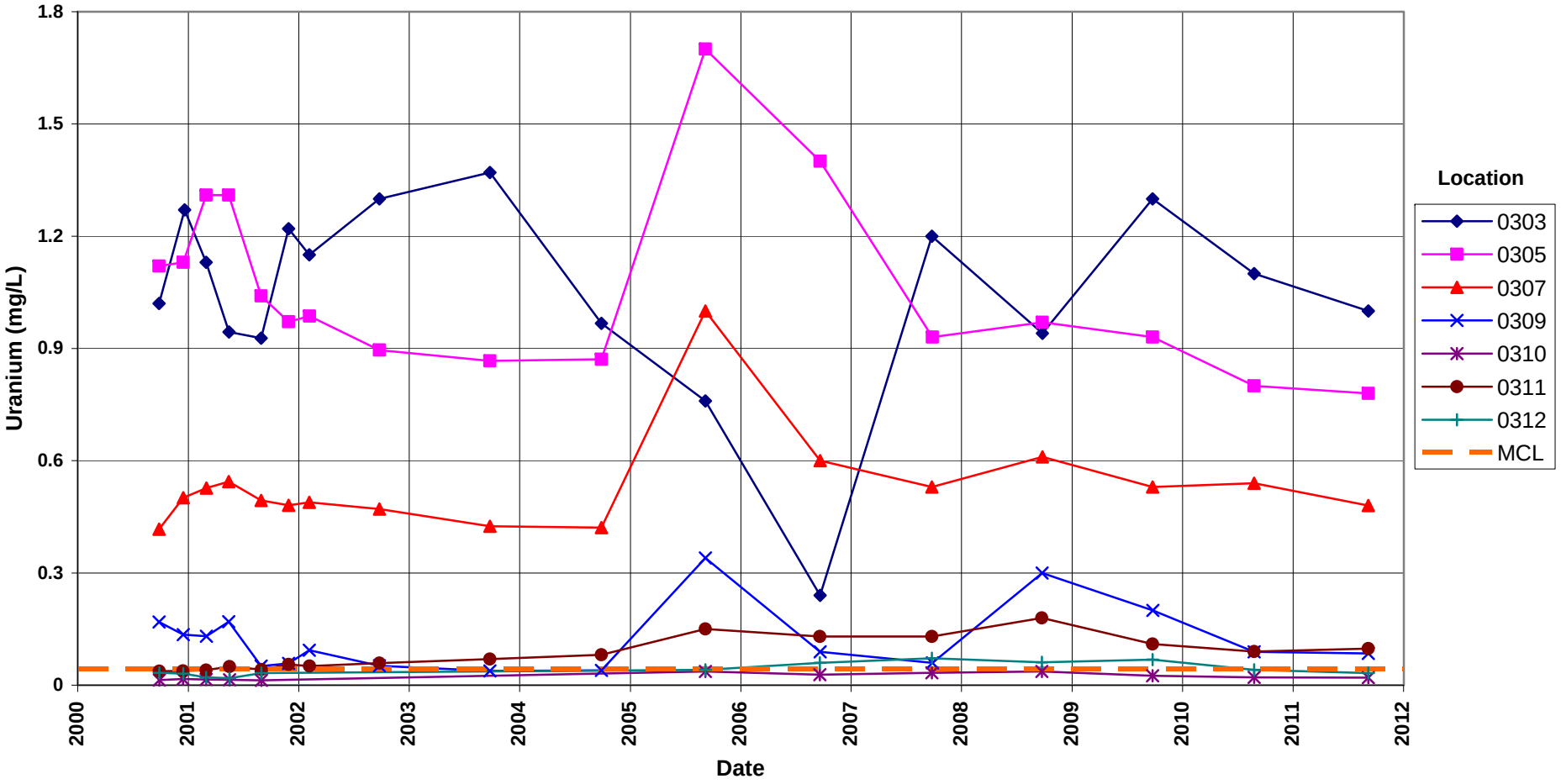


Slick Rock West Processing Site
Uranium Concentration

Maximum Contaminant Level (MCL) = 0.044 mg/L



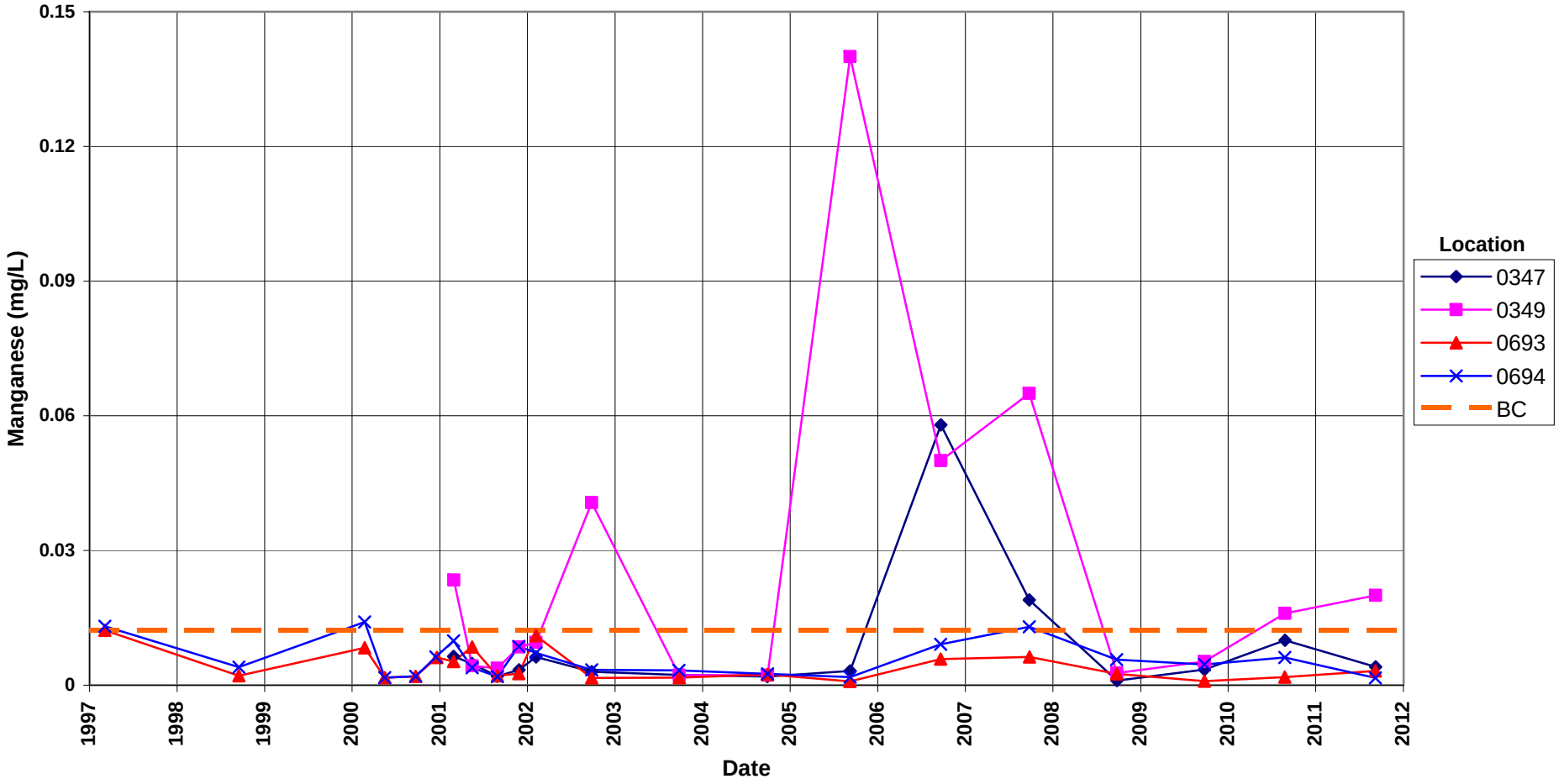
Slick Rock East Processing Site
Uranium Concentration
Maximum Contaminant Level (MCL) = 0.044 mg/L



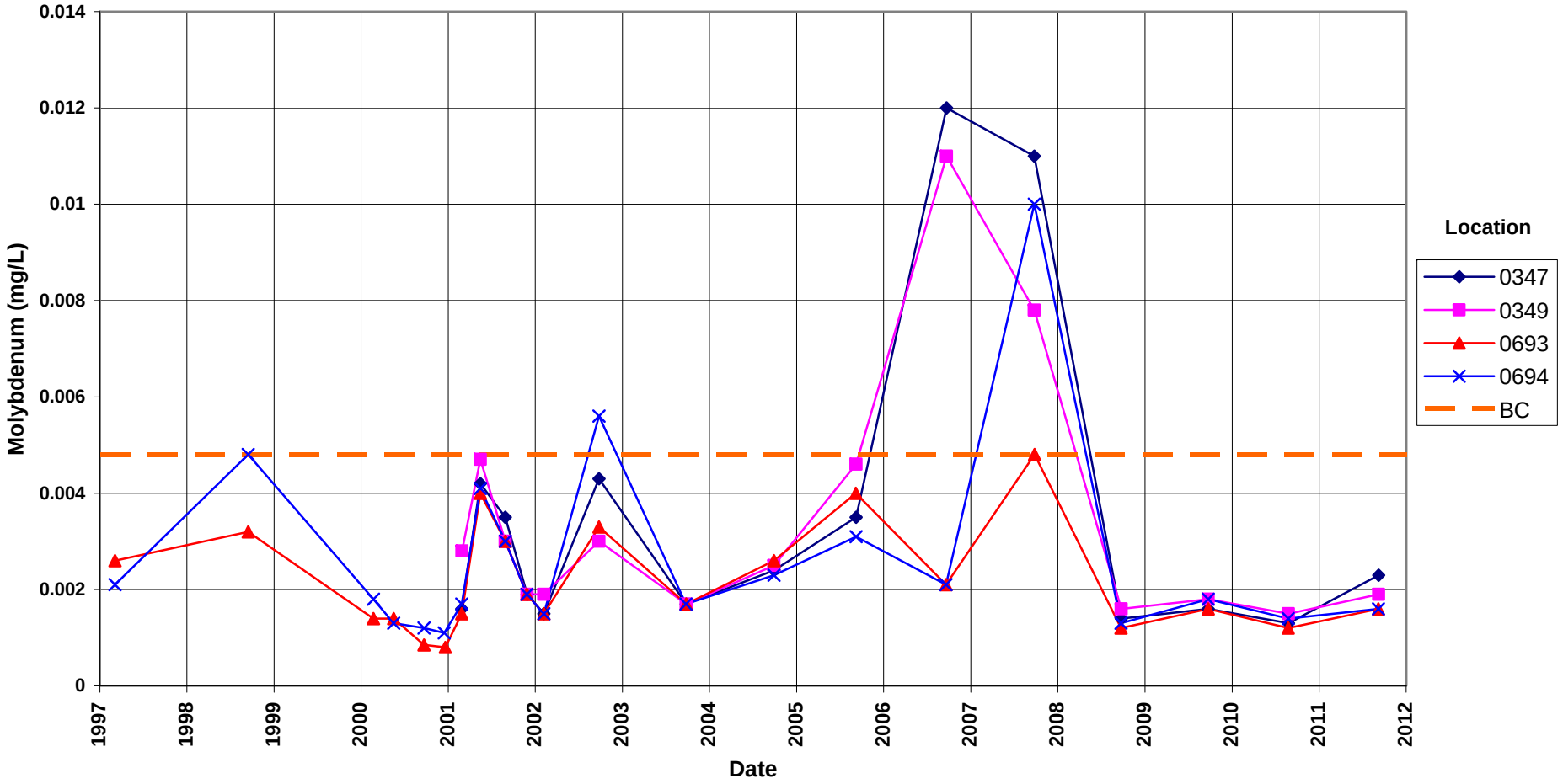
Surface Water
Time-Concentration Graphs

This page intentionally left blank

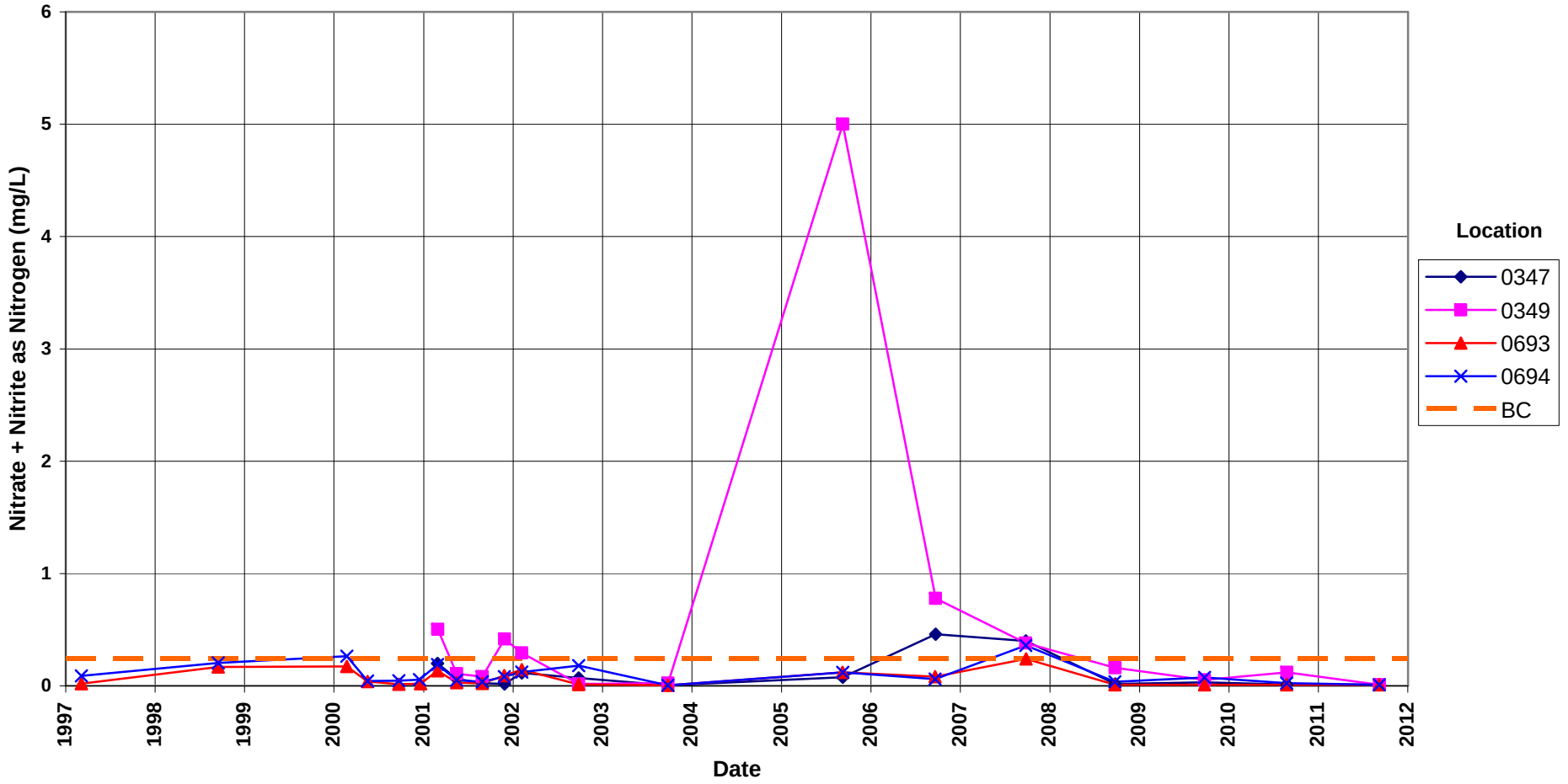
Slick Rock West Processing Site
Manganese Concentration
Benchmark Concentration (BC) = 0.0122 mg/L



Slick Rock West Processing Site
Molybdenum Concentration
Benchmark Concentration (BC) = 0.0048 mg/L

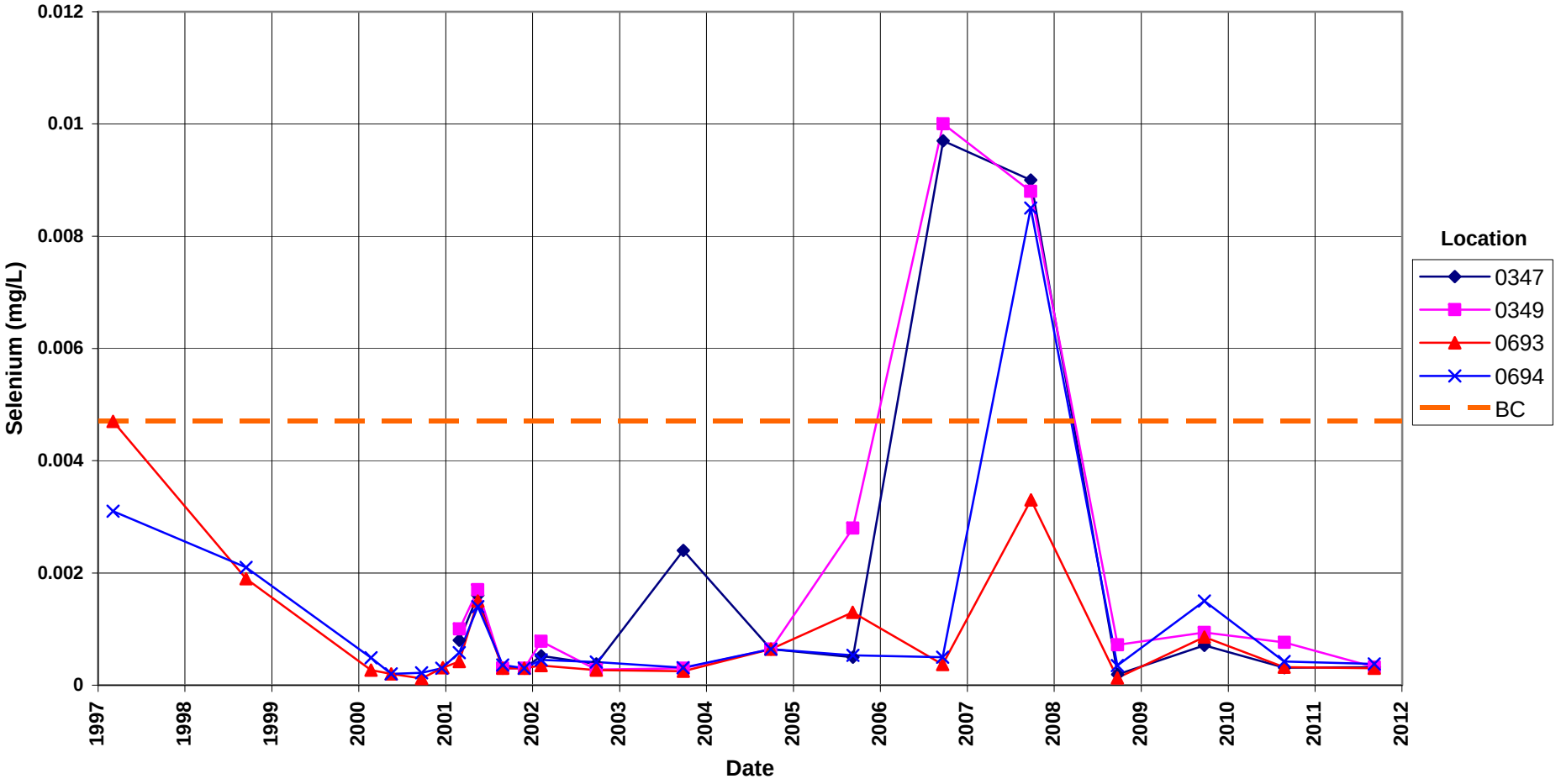


Slick Rock West Processing Site
Nitrate + Nitrite as Nitrogen Concentration
Benchmark Concentration (BC) = 0.24 mg/L

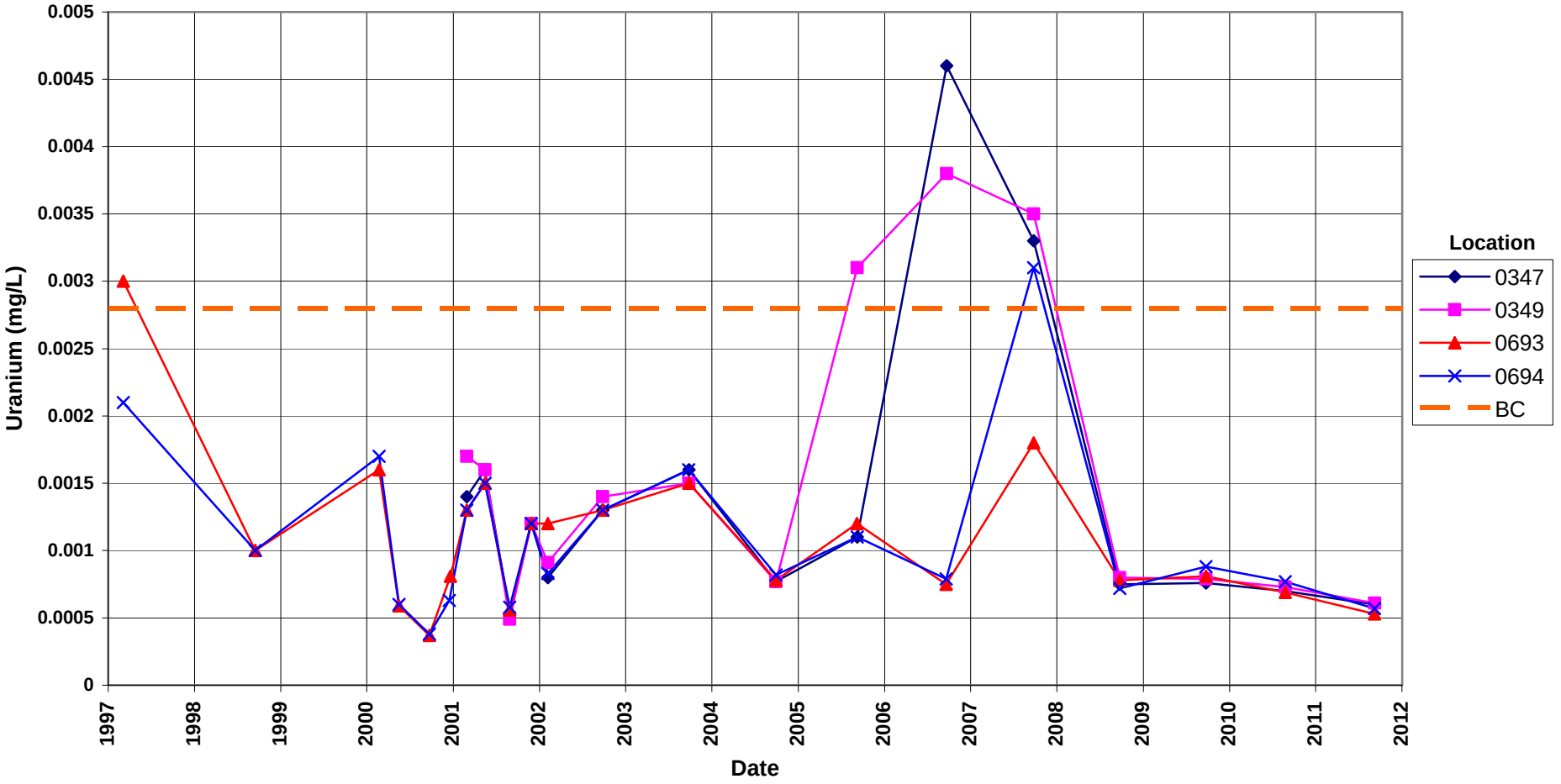


Slick Rock West Processing Site
Selenium Concentration

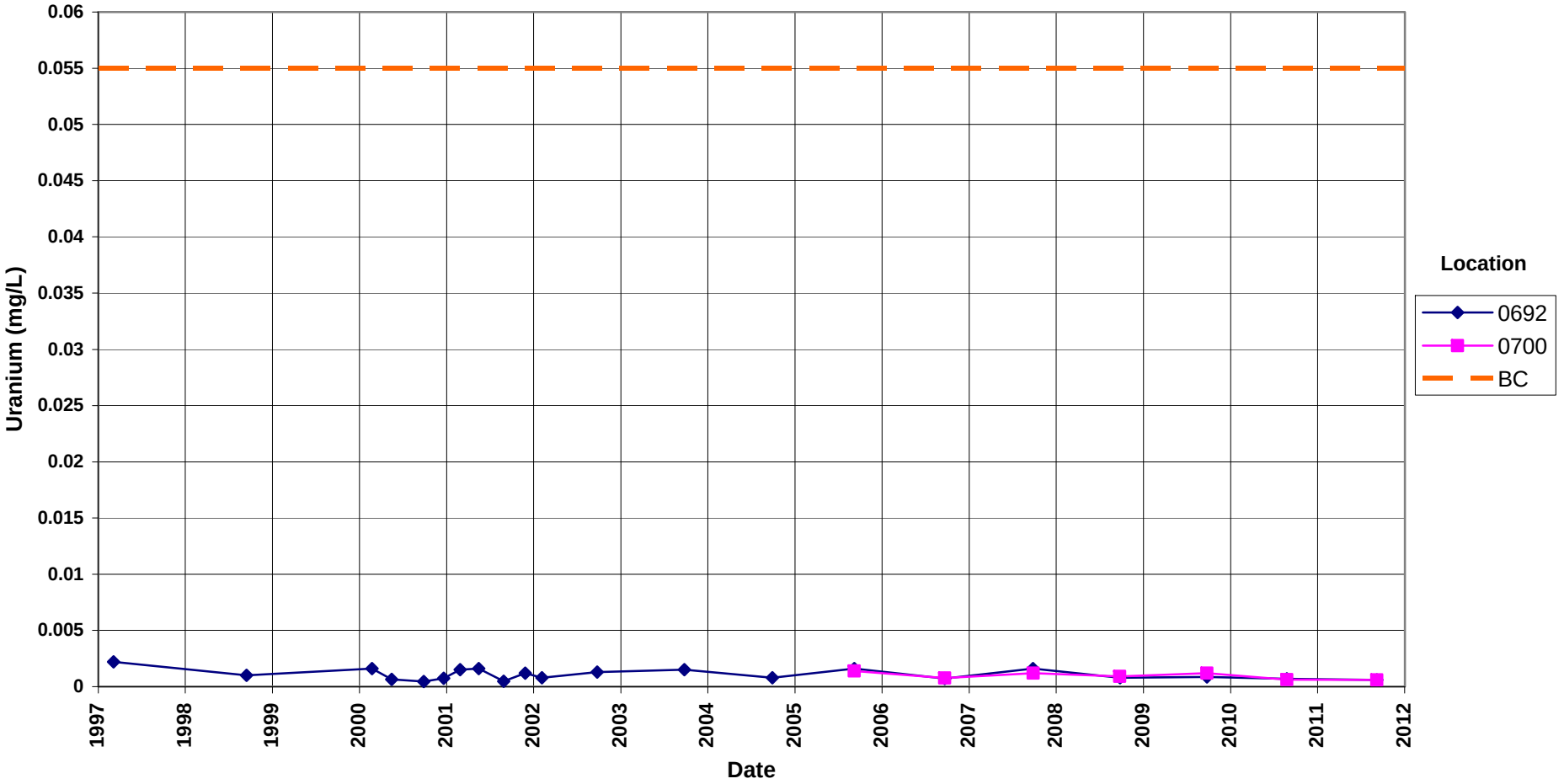
Benchmark Concentration (BC) = 0.0047 mg/L



Slick Rock West Processing Site
Uranium Concentration
Benchmark Concentration (BC) = 0.0028 mg/L



Slick Rock East Processing Site
Uranium Concentration
Benchmark Concentration (BC) = 0.055 mg/L



Attachment 3
Sampling and Analysis Work Order

This page intentionally left blank

Stoller

established 1959

Task Order LM00-501
Control Number 11-0924

August 15, 2011

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

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller) September 2011 Environmental Sampling at the Slick Rock, Colorado, Processing Sites

REFERENCE: Task Order LM00-501-02-120-402, Slick Rock, CO, Processing Sites

Dear Mr. Nguyen:

The purpose of this letter is to inform you of the upcoming sampling event at Slick Rock, CO. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Slick Rock, CO, processing sites. Water quality data will be collected from monitoring wells and surface locations at this site as part of the routine environmental sampling currently scheduled to begin the week of September 6, 2011.

The following lists show the locations scheduled to be sampled during this event.

Monitoring Wells*

West Site

317 Je	319 Al	339 Al	340 Al	508 Al	510 Al	684 Al
318A Al	320 Al					

East Site

303 Al	305 Al	307 Al	309 Al	310 Al	311 Al	312 Al

*NOTE: Al = Alluvium; Je = Jurassic Entrada Sandstone

Surface Water

West Site

347	349	693	694

East Site

692	696	700

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

All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. Access agreements are being reviewed and are expected to be complete by the beginning of fieldwork.

Please contact me at (970) 248-6557 if you have any questions.

Sincerely,

David Traub

David Traub
Site Lead

DT/lcg/lb

Enclosures (3)

cc: (electronic)
Steve Donivan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
David Traub, Stoller
EDD Delivery
rc-grand.junction
File: SRE 410.02 (A)
File: SRW 410.02 (A)

Sampling Frequencies for Locations at Slick Rock, Colorado

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
WEST						
317			X			
318A			X			
319			X			
320			X			
339			X			
340			X			
508			X			
510			X			
684			X			
EAST						
303			X			
305			X			
307			X			
309			X			
310			X			
311			X			
312			X			
Surface Locations						
WEST						
347			X			
349			X			
693			X			
694			X			
EAST						
692			X			
696			X			
700			X			

Sampling conducted in September

Constituent Sampling Breakdown

Site	Slick Rock				
Analyte	**Groundwater**	**Surface Water**	**Required Detection Limit (mg/L)**	**Analytical Method**	**Line Item Code**
Approx. No. Samples/yr	14	7			
Field Measurements					
Alkalinity	X	X			
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)					
Iron					
Lead					
Magnesium					
Manganese	0318, 0320, 0508, 0510, 0684	0347, 0349, 0693, 0694	0.005	SW-846 6010	LMM-01
Molybdenum	0317, 0318, 0320, 0508, 0510, 0684	0347, 0349, 0693, 0694	0.003	SW-846 6020	LMM-02
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO_3+NO_2)-N	0318, 0320, 0508, 0510, 0684	0347, 0349, 0693, 0694	0.05	EPA 353.1	WCH-A-022
Potassium					
Radium-226	0319		1 pCi/L	Gas Proportional Counter	GPC-A-018
Radium-228	0319		1 pCi/L	Gas Proportional Counter	GPC-A-020
Selenium	0305, 0307, 0317, 0318, 0319, 0320, 0508, 0510, 0684	0347, 0349, 0693, 0694	0.0001	SW-846 6020	LMM-02
Silica					
Sodium					
Strontium					
Sulfate					
Sulfide					
Total Dissolved Solids					
Total Organic Carbon					
Uranium	0303, 0305, 0307, 0309, 0310, 0311, 0312, 0318, 0320, 0508, 0510, 0684	X	0.0001	SW-846 6020	LMM-02
Vanadium					
VOCs (BETX)	0319 only		0.005	SW-846 8260	VOA-A-009
Zinc					
Total No. of Analytes	8	5			

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

Attachment 4
Trip Report

This page intentionally left blank

Stoller

established 1959

Memorandum

DATE: October 11, 2011

TO: David Traub

FROM: Gretchen Baer

SUBJECT: Trip Report

Site: Slick Rock, Colorado, East and West Processing Sites

Dates of Sampling Event: September 6 and 7, 2011

Team Members: Gretchen Baer and Jeff Price

Number of Locations Sampled: Samples were collected from the 23 locations identified on the sampling notification letter as follows:

SRK05 (West Site)–9 monitoring wells and 4 surface locations
SRK06 (East Site)–7 monitoring wells and 3 surface locations

Locations Not Sampled/Reason: All scheduled locations were sampled.

Location Specific Information:

Location IDs	Comments
0307, 0309, 0310, 0312, 0318A, 0319, 0340	May need to be re-developed. The turbidity requirement either was not met, or was difficult to meet. Total depth measured for 0340: 14.4 ft.
0307, 0309, 0320	Fe bacteria in purge water.
0312	Small black particles in sample water.
0318A	The broken well pad pieces at nearby abandoned well 0318 were buried. Total depth measured: 16.8 ft.
0319	• Bailed a small volume of water to look for a floating organic layer; none was observed. • Sample aliquots were filtered (high turbidity) with the exception of volatiles. • VOCs were collected by reverse flow as follows: *After purging is complete and after all non-VOC samples have been collected, turn off the pump and leave the pump head tubing clamped so that a volume of water is retained in the tubing. Remove the drop tubing from the well and fill the vials by reversing the flow on the pump to deliver the sample into the vials at a steady rate of ≤100 mL/min.* Collected all 3 vials for 0319 and 1 vial for 2498 (field dup). The tubing was nearly empty so it was re-installed to the same depth and re-filled to collect the final 2 vials for 2498 by reverse flow. • The VOC samples were added to a small volume of HCl in the vials. There was a very slight reaction: some tiny bubbles were observed in the capped vials.
0339	Total depth measured: 16.9 ft.
0510	Total depth measured: 9.8 ft.
0696	According to map, this location is on a side channel of the river. This side channel was dry for this event, so the sample was taken from the main channel. Site lead indicates that results for this sample may not be useful. See copy of email and location photo in Condor\sms\11084053.

Quality Control Sample Cross Reference: The following are the false identifications assigned to the quality control samples.

False ID	True ID	Sample Type	Ticket Number	Associated Matrix
2404	0684	Duplicate (Metals and Nitrate only)	JJT 994	Water
2498	0319	Duplicate (VOCs and Radium only)	JJT 989	Water
2500	----------	Trip Blank (Created 9/6/11 a.m. in Bldg 32 using Milli-Q water + HCl)	JJT 993	Water
2676	Associated with 0347, 0349, 0693, 0694, 0696	Equipment Blank (Metals and Nitrate only)	JJT 995	Water

Report Identification Number (RIN) Assigned: 11084053. Field data sheets can be found in Condor\sms\11084053 in the FieldData folder.

Sample Shipment: Samples were shipped from Grand Junction to ALS Laboratory Group on September 8, 2011.

Water Level Measurements: Water levels were measured in all sampled wells. Total depths were measured on September 7, 2011, at the following wells per site lead request:

0318A: 16.8 feet

0339: 16.9 feet

0340: 14.4 feet

An additional total depth was measured on September 7, 2011, at the following well:

0510: 9.8 feet

Well Inspection Summary: No issues were identified.

Field Variance:

- See the note for location 0319 in the "Location Specific Information" table, above, for details on the collection of volatile samples.
- Turbidity requirements could not be met for Category I wells at SRK05 0319 and SRK06 0309.
- During the daily calibration checks, some turbidimeter readings were slightly low (see "Equipment" section, below). The instrument could not be field-recalibrated because the turbidity calibration standards are not available in the field.

Equipment: All equipment functioned properly, with the exception of the turbidimeter. The daily calibration checks for the turbidimeter indicated that the readings may be biased slightly low. Note that all turbidity readings for non-filtered locations were ≤ 8.7 NTU.

Wells were sampled with a peristaltic pump and dedicated tubing. Surface waters were sampled using a peristaltic pump and tubing reel or by container immersion. An equipment blank was

collected after decontamination of the tubing reel. All other equipment was dedicated or disposable.

Stakeholder/Regulatory: Nothing to note.

Institutional Controls:

Fences, Gates, and Locks: All gates were locked and in good condition.
Signs: OK.
Trespassing/Site Disturbances: None noted.

Site Issues: Cell phone service (Verizon) is NOT available at the site, even with the cell phone signal booster.

Disposal Cell/Drainage Structure Integrity: N/A
Vegetation/Noxious Weed Concerns: Heavy brush creates access difficulties.
Maintenance Requirements: None noted.
Safety Issues: None.
Access Issues:

- Most locations south of the river at the East Site may only be reached on foot or by ATVs. Water runoff is creating deep, steep-sided ditches that may be impossible to cross by truck.
- The road leading to wells 0310, 0311, and 0312 (past non-sampled well 0690) is becoming heavily eroded by water runoff.
- There is heavy brush impeding access to many locations, most notably well 0317 (West Site) and surface water locations 0700 and 0692 (East Site).

Corrective Action Required/Taken: The broken well pad pieces at well 0318 (which was abandoned in an earlier event) were buried at the request of the site lead.

cc: (electronic)
Jason Nguyen, DOE
Bev Gallagher, Stoller
Steve Donivan, Stoller
EDD Delivery

This page intentionally left blank