

# Verification Monitoring Report for the Slick Rock, Colorado, Processing Sites 2008 and 2009 Update

July 2010



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## Appendixes

Appendix A—Groundwater Quality Data by Parameter
Appendix B—Surface Water Quality Data by Parameter
Appendix C—Hydrographs and Static Water Level Data

## Abbreviations

ACL	alternate concentration limit
BTEX	benzene, toluene, ethylbenzene, and xylenes
CDPHE	Colorado Department of Public Health and Environment
CFR	<i>Code of Federal Regulations</i>
COPC	constituent of potential concern
EPA	U.S. Environmental Protection Agency
ft	feet
GCAP	Groundwater Compliance Action Plan
MCL	maximum concentration limit (listed in 40 CFR 192, Table 1 to Subpart A) <i>or</i> maximum contaminant level (EPA Safe Drinking Water Act)
mg/L	milligrams per liter
n	number of samples
NAPL	nonaqueous phase liquid
pCi/L	picocuries per liter
Ra-226	radium-226
Ra-228	radium-228
SDWA	Safe Drinking Water Act
SOWP	Site Observational Work Plan
SRE	Slick Rock East
SRW	Slick Rock West
UMTRCA	Uranium Mill Tailings Control Act
VMR	Verification Monitoring Report
VSP	Visual Sample Plan

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## 1.0 Introduction

The Slick Rock, Colorado, Processing sites consist of two former uranium-ore processing facilities, referred to as the Slick Rock East (SRE) site (formerly the North Continent site) and the Slick Rock West (SRW) site (formerly the Union Carbide site). The Slick Rock sites are located along the banks of the Dolores River in San Miguel County, Colorado (Figure 1). Steep, juniper-covered hillsides and cliffs of the Dolores River Canyon surround the sites. The SRW site is approximately 1 mile downstream from the SRE site (Figure 2). Surface remediation of the two sites was completed in 1996; mill tailings and other residual radioactive materials were disposed of in a cell located approximately 5 miles east of the processing sites.

### 1.1 Purpose of Report

The purpose of this Verification Monitoring Report (VMR) is to evaluate groundwater and surface water monitoring data collected at the Slick Rock processing sites since 2000 and to assess the status of the compliance strategy for groundwater cleanup.

### 1.2 Compliance Strategy

The proposed compliance strategy for the Slick Rock sites is natural flushing combined with institutional controls and compliance monitoring as stated in the *Draft Final Groundwater Compliance Action Plan for the Slick Rock, Colorado, UMTRA Project Sites* (GCAP) (DOE 2006). Constituents of potential concern (COPCs) at the Slick Rock sites include manganese, molybdenum, nitrate, selenium, and uranium. Selenium and uranium are the only COPCs common to both the SRE and SRW sites. Several other COPCs, including BTEX (benzene, toluene, ethylbenzene, and xylenes), radium-226 (Ra-226), and radium-228 (Ra-228), are limited to a single SRW alluvial well (0319).

To assess the status of compliance, COPC concentrations at the Slick Rock sites are compared to maximum concentration limits (MCLs) codified in Title 40 *Code of Federal Regulations* Part 192 (40 CFR 192), commonly referred to as Uranium Mill Tailings Radiation Control Act (UMTRCA) MCLs. Because an MCL has not been established for manganese, manganese concentrations are instead compared to the maximum background concentration (4.2 milligrams per liter [mg/L]) to assess compliance (DOE 2006). Table 1 lists COPCs for the Slick Rock sites along with 40 CFR 192 MCLs established by the U.S. Environmental Protection Agency (EPA), Safe Drinking Water Act (SDWA) maximum contaminant levels (also established by EPA), and other benchmark values.

Groundwater modeling predicts that natural flushing for all COPCs except selenium will be completed within the 100-year regulatory time frame. Groundwater modeling conducted for the Site Observational Work Plan (SOWP) (DOE 2002b) predicts that selenium concentrations at the SRW site will not decrease below the MCL within 100 years; therefore, a human-health risk-based alternate concentration limit (ACL) of 0.18 mg/L is proposed in the GCAP for selenium. Public health will be protected during the natural flushing process through institutional controls, which will restrict access to contaminated alluvial groundwater. The institutional controls that will be used for the Slick Rock sites are environmental covenants between the State of Colorado, represented by the Colorado Department of Public Health and Environment (CDPHE), and the landowner, Umetco Minerals Corporation; this issue is still pending.

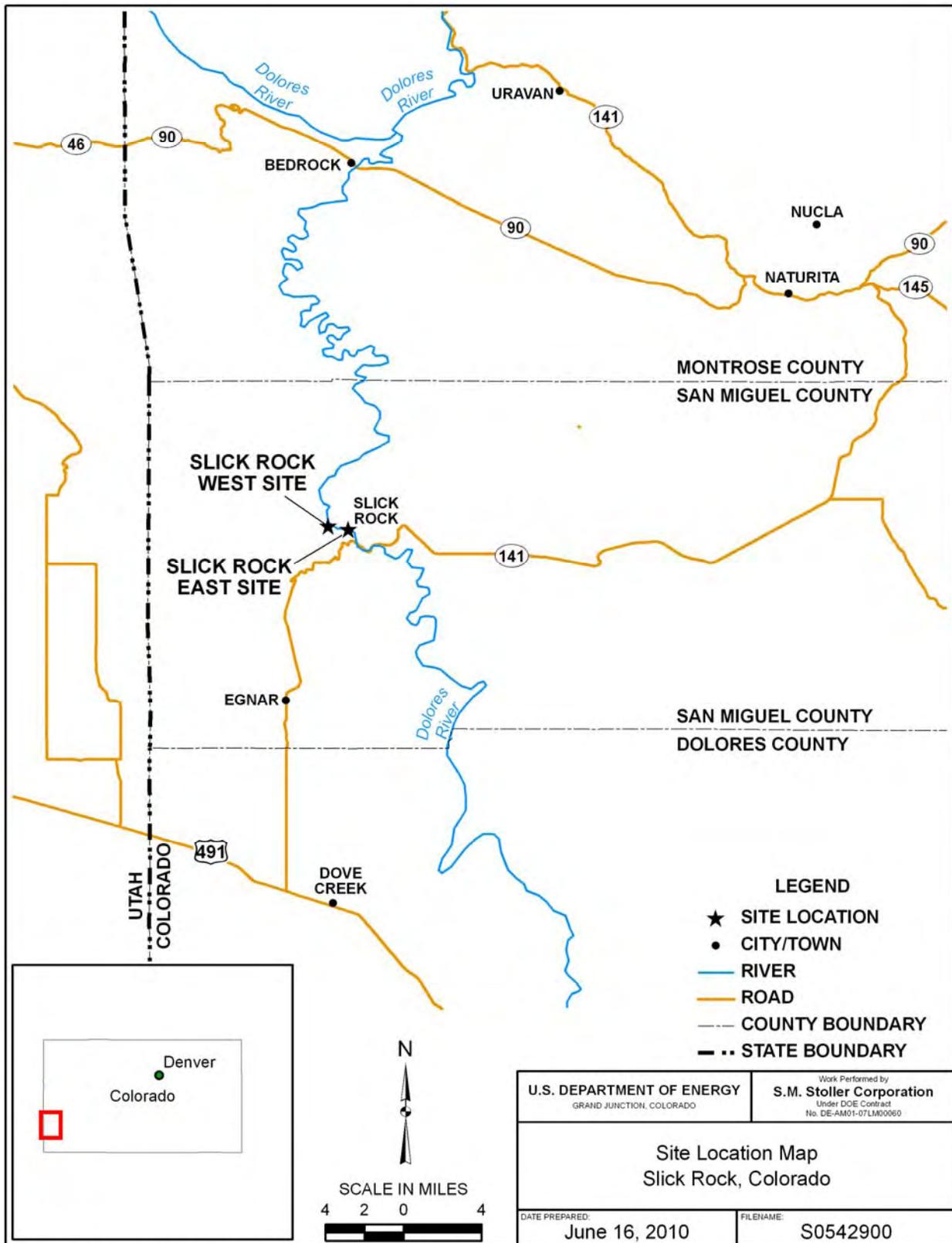


Figure 1. Slick Rock, Colorado, Processing Sites Location Map

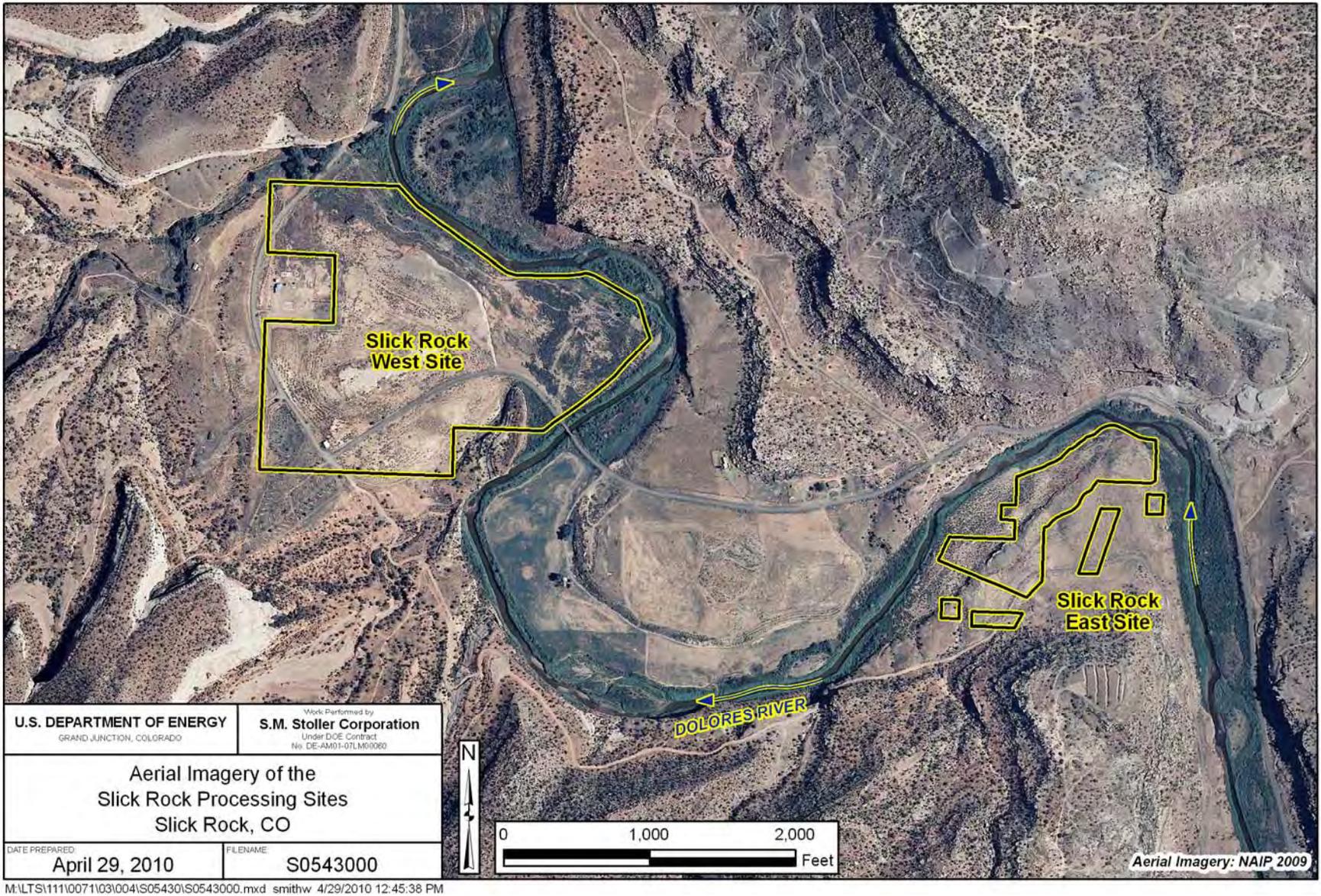


Figure 2. Aerial Photograph of the Slick Rock, Colorado, Processing Sites

Table 1. Groundwater Benchmarks for Slick Rock East and West Site COPCs

COPC <sup>a</sup>	Benchmark	Basis for Benchmark <sup>b</sup>	Applicable Site	Applicable Wells <sup>c</sup>	Comment
Uranium	0.044 mg/L	40 CFR 192	SRE, SRW	All wells except SRW well 0319	
Selenium	SRE: 0.01 mg/L  SRW: 0.18 mg/L (ACL)	SRE: 40 CFR 192 MCL  SRW: Risk-based ACL <sup>d</sup> (DOE 2002b)	SRE, SRW	SRE wells 0305 and 0307  All SRW wells except 0319	Note that the 40 CFR 192 (UMTRCA) standard is less than the 0.05 mg/L SDWA MCL.
Manganese	4.19 mg/L <sup>e</sup>	Maximum background	SRW	All except 0317 and 0319	Maximum concentration measured at formerly sampled upgradient location 0300 (DOE 2002b).
Molybdenum	0.10 mg/L	40 CFR 192	SRW	All wells	
Nitrate as NO <sub>3</sub>	44.3 mg/L	40 CFR 192	SRW	Most wells	
Ra-226 + 228	5 pCi/L	40 CFR 192	SRW	0319	Analysis for radium in other SRW wells was discontinued after 2001 given levels below 5 pCi/L.
Benzene	0.005 mg/L	SDWA MCL	SRW	0319	
Toluene	1 mg/L	SDWA MCL	SRW	0319	
Ethylbenzene	0.7 mg/L	SDWA MCL	SRW	0319	The 0.7 mg/L SDWA MCL has never been exceeded.
Xylenes	10 mg/L	SDWA MCL	SRW	0319	Analysis discontinued in 2004 given historical concentrations below MCL.

<sup>a</sup> Constituents listed in general order of prevalence as COPCs (e.g., uranium is most common to both sites, whereas Ra-226/Ra-228 are limited to the immediate vicinity of well 0319).

<sup>b</sup> 40 CFR 192 = maximum concentration limit in Table 1 to Subpart A. SDWA MCL = Safe Drinking Water Act maximum contaminant level.

<sup>c</sup> Applicable wells refer to only those currently monitored; refer to the SOWP (DOE 2002b) for historical characterization results.

<sup>d</sup> A risk-based value for selenium was established in the SOWP (DOE 2002b) based on the EPA Risk Table ([http://www.epa.gov/reg3hscd/risk/human/rb-concentration\\_table/Generic\\_Tables/index.htm](http://www.epa.gov/reg3hscd/risk/human/rb-concentration_table/Generic_Tables/index.htm)) (see tapwater screening level in Summary Table). As of last access (July 2010), the most recent EPA update was May 17, 2010.

<sup>e</sup> Previous VMRs cited a maximum background value for manganese of 3.5 mg/L—this value was based on the first (September 2000) measurement in background well 0300. However, the most recent measurement in this well (sample collected in August 2001) was 4.19 mg/L.

mg/L = milligrams per liter  
pCi/L = picocuries per liter

## 2.0 Site Conditions

### 2.1 Hydrogeology

The Slick Rock sites overlie Quaternary alluvium deposited by the Dolores River. The alluvial aquifer consists of unconsolidated material ranging in thickness from 15 to 20 feet (ft) and consists primarily of silty sands and silty sandy gravels with an occasional interbedded clay lens.

The Dolores River alluvium is laterally restricted by bedrock that forms the terraces and canyon walls adjacent to the Dolores River. In addition, the Dolores River floodplain is discontinuous and pinches out in areas where the river meets the canyon wall. Depth to groundwater in the unconfined alluvial aquifer ranges from 7 to 15 ft below ground surface.

The Salt Wash Member of the Jurassic Morrison Formation and the Jurassic Summerville Formation underlie the Dolores River alluvium at the SRE site. Because the Morrison Formation and the Summerville Formation have an abundance of fine-grained, low-permeability units, these formations are considered aquitards at the SRE site (DOE 2002b).

The hydrostratigraphic units at the SRW site are, in descending stratigraphic order, the Quaternary Dolores River alluvium (the uppermost aquifer), the Jurassic Entrada Sandstone, and the Jurassic Navajo Sandstone. The Entrada Sandstone ranges from 40 to 60 ft in thickness in the floodplain area, with depths to groundwater ranging from 6 to 8 ft below ground surface. The thickness of the Navajo Sandstone is approximately 180 ft in the Slick Rock area (DOE 2002b). Groundwater in wells completed in the Navajo Sandstone and located on the floodplain at the SRW site has an upward vertical gradient with respect to water in the alluvial aquifer and the Entrada Sandstone; therefore, contamination in the alluvial aquifer will not cross-contaminate the Navajo Sandstone aquifer.

The Dolores River alluvium is the only unit affected by site-related contamination and is therefore the primary subject of this VMR. Groundwater flow direction in the alluvial aquifer generally follows the downstream direction of the Dolores River.

### 2.2 Groundwater Quality

#### 2.2.1 SRE Site

Alluvial groundwater beneath the SRE site was contaminated as a result of former uranium-ore processing activities. COPCs in the uppermost (alluvial) aquifer at the SRE site are selenium and uranium (DOE 2002b). Uranium concentrations in the alluvial aquifer are up to two orders of magnitude greater than the MCL of 0.044 mg/L established at 40 CFR 192. Elevated selenium at the SRE site is confined to one well (0305), and selenium is not considered a major contaminant at the SRE site. While concentrations at this well are about twice the 40 CFR 192 groundwater standard of 0.01 mg/L, they are below the Safe Drinking Water Act (SDWA) primary drinking water standard of 0.05 mg/L.

### **2.2.2 SRW Site**

The former uranium-ore processing activities also contaminated the groundwater beneath the SRW site. COPCs in the uppermost (alluvial) aquifer at the SRW site include manganese, molybdenum, nitrate (as NO<sub>3</sub>), selenium, uranium, Ra-226, Ra-228, benzene, and toluene. All of these COPCs have been detected in concentrations greater than the MCL or background concentrations (in the case of manganese) in the alluvial aquifer. Contaminant plumes in the alluvial aquifer are all contained on site. The Ra-226, Ra-228, benzene, and toluene contamination is isolated to one well (0319); Ra-226 + 228 concentration dropped below the MCL in 2005 but rose slightly higher than the MCL in 2006; concentrations remained near the MCL in 2007. Manganese concentrations tend to be near background levels. The most pervasive contaminants in the alluvial aquifer are molybdenum, nitrate, selenium, and uranium, with concentrations as high as two orders of magnitude greater than their respective MCLs.

Samples from wells completed in the Entrada Sandstone on the floodplain at the SRW site have elevated concentrations of COPCs. Historically, concentrations of molybdenum (well 0317), nitrate (well 0324), and selenium (well 0324) exceeded their respective MCLs. These concentrations are thought to be cross contamination that resulted from drilling and installing monitoring wells through the contaminated alluvial aquifer. This interpretation is supported by hydrologic data indicating that groundwater has a slight upward vertical gradient between the Entrada and the overlying alluvium and the fact that the hydraulic conductivity in the alluvial aquifer is two orders of magnitude greater than that of the Entrada aquifer. These hydrologic conditions should inhibit groundwater from flowing vertically downward into the Entrada aquifer. Sampling of well 0324 was discontinued in 2004 because the nitrate and selenium concentrations were below the MCLs for three consecutive rounds of sampling. Appendix A provides results of the 2008–2009 groundwater monitoring program.

## **2.3 Surface Water Quality**

The Dolores River is the only perennial surface water feature in the vicinity of the Slick Rock sites. Results from surface water sampling have demonstrated minimal impact to the Dolores River from site contamination. Concentrations of COPCs in samples collected from the river have not exceeded their respective CDPHE water quality benchmarks (CDPHE 2006). Appendix B provides results of the 2008–2009 surface water monitoring program.

## **2.4 Remediation Activities**

Surface remediation at the Slick Rock sites began in 1995 and was completed in 1996. Abandoned uranium mill tailings and other residual radioactive material associated with the former milling operations were relocated to the Slick Rock disposal cell (formerly the Burro Canyon disposal cell), approximately 5 miles east of the Slick Rock sites. The sites were regraded with on-site material, and subsequent revegetation efforts have been deemed successful.

## 2.5 Land and Water Use

Umetco Minerals Corporation currently owns the SRE and SRW sites. The SRE site is not fenced and is currently used for livestock grazing. The majority of the SRW site is enclosed with a barbed-wire fence. Land between the two sites is privately owned, and land use includes irrigated alfalfa fields, livestock grazing, and gravel-mining operations. Water used to irrigate the alfalfa is pumped from the Dolores River. There is no current use of alluvial groundwater beneath the former processing sites.<sup>1</sup>

Groundwater use from the Entrada Sandstone in the area near the SRE and SRW sites is limited. As discussed in previous VMRs, water from the Entrada Sandstone is used to water livestock via a “collector system” located northwest and upgradient of the SRW site. The collector system consists of a plastic pipe installed into the cliff face formed by the Entrada Sandstone. Water discharges from the pipe into a stock tank at a rate of approximately 1 liter per minute.

Groundwater for domestic or agricultural use in the Slick Rock area is primarily supplied by the Navajo Sandstone aquifer. Historically, wells completed in the Navajo Sandstone provided water for the milling operations and for the mill community at the SRW site. One of these wells, 0672 (located about 1000 ft north-northwest of SRE well 0312), was monitored periodically between 1986 and 2000 (DOE 2002b). No evidence of site-related contamination was detected in this well (uranium concentrations all <0.003 mg/L).

## 3.0 Monitoring Program

Monitoring at the Slick Rock processing site is to be performed annually for the first 10 years after U.S. Nuclear Regulatory Commission concurrence of the GCAP to ascertain that natural flushing is progressing as predicted by groundwater flow and transport modeling (DOE 2006). After 10 years, the monitoring frequency will decrease to every 5 years.

### 3.1 SRE Site

At the SRE site, the monitoring network consists of seven monitoring wells and three surface water locations (Table 2 and Figure 3). Sampling at two monitoring wells, 0310 and 0312, was resumed in 2005 after a 3-year hiatus to better characterize the extent of uranium contamination detected in well 0311. The farthest downgradient SRE surface water location (0700) was also established at that time.

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<sup>1</sup> According to the Environmental Assessment (DOE 2002a), historically, a hand-dug alluvial well, 0675, was located between the SRE and SRW sites—approximately 0.25 mile south of SRW surface location 0693, east of the river within the alluvial floodplain. This well had reportedly been used as a domestic source (DOE 2002a) but is no longer used. The owner stated that this well has since been filled in.

Table 2. Monitoring Program at the SRE Site

ID	Matrix	Location <sup>a</sup>	Rationale	Analytes
0303	Groundwater	On site	Hot spot for uranium.	Uranium
0305	Groundwater	On site	Hot spot for uranium; selenium above the MCL.	Uranium, selenium
0307	Groundwater	On site	Downgradient of hot spots, monitor plume migration.	Uranium, selenium
0309	Groundwater	On site	Farthest downgradient well on site.	Uranium
0310	Groundwater	Off site, downgradient	Off site, across the Dolores River. Monitor migration of the uranium plume between the SRE and SRW sites.	Uranium
0311	Groundwater	Off site, downgradient	Adjacent to and north of well 0310.	Uranium
0312	Groundwater	Off site, downgradient	Adjacent to and north of well 0312.	Uranium
0696	Surface Water	Upstream	Surface water background <sup>b</sup>	Uranium
0692	Surface Water	Adjacent to site	Predicted location where the centroid of the uranium plume intersects the river.	Uranium
0700	Surface Water	Downstream	Established in 2005; located about 100 ft southwest of well 0309	Uranium

<sup>a</sup> Locations are listed in order of matrix, and then by general flow direction (upgradient-most listed first).

<sup>b</sup> In previous VMRs, the 0696 surface water sampling location was referred to as "Background for SRE site." However, this is not valid for groundwater. To re-establish a technically valid background groundwater monitoring location, DOE may resume sampling at one of the two background wells (0300 or 0301) established during site characterization activities conducted for the SOWP (DOE 2002b).

As shown in Table 2, background groundwater quality is not currently monitored at the SRE site. Monitoring wells 0300 and 0301 were installed in August 2000 about 0.6 mile upgradient of the SRE site (Figure 3). These wells were sampled five times between 2000 and 2001 to determine background water quality for both the SRE and SRW sites (DOE 2002b). DOE may resume sampling in 2010 at one of these locations.

### 3.2 SRW Site

At the SRW site, the monitoring network consists of seven monitoring wells and four surface water locations. These locations are described in Table 3 and shown on Figure 4.

Table 3. Monitoring Program at the SRW Site

ID	Matrix	Location <sup>a</sup>	Rationale	Analytes
0317	Groundwater	On site	Entrada Sandstone well, exceeds molybdenum MCL.	Molybdenum
0318	Groundwater	On site	Hot spot for several COPCs <sup>b</sup> .	Manganese, molybdenum, nitrate, selenium, and uranium
0508	Groundwater	On site	High selenium, nitrate, molybdenum, and uranium.	Manganese, molybdenum, nitrate, selenium, and uranium
0324	Groundwater	On site	Entrada Sandstone well, previously exceeded nitrate and selenium MCLs.	Removed from sampling network in 2004 because contaminant concentrations dropped below MCLs (time-trend plots provided herein still include this well).
0510	Groundwater	On site	Edge of former tailings pile, high COPC concentrations.	Manganese, molybdenum, nitrate, selenium, and uranium
0317	Groundwater	On site	Entrada Sandstone well, exceeds molybdenum MCL.	Molybdenum
0319	Groundwater	On site	Hot spot for benzene, toluene, and Ra-226/Ra-228.	Benzene, toluene, ethylbenzene <sup>c</sup> ; Ra-226 and Ra-228
0320	Groundwater	On site	Farthest downgradient well on site; monitor plume movement.	Manganese, molybdenum, nitrate, selenium, and uranium
0684	Groundwater	Off site	Farthest downgradient well; purpose is to verify that contaminants are not migrating off site.	Manganese, molybdenum, nitrate, selenium, and uranium
0693	Surface Water	Upstream	Upgradient SRW surface water location (but downgradient of SRE).	Manganese, molybdenum, nitrate, selenium, and uranium
0347	Surface Water	Adjacent to site	Predicted location where the centroid of the selenium plume intersects the river; point of exposure for selenium (DOE 2006).	Manganese, molybdenum, nitrate, selenium, and uranium
0349	Surface Water	Adjacent to site	Predicted location where the centroids of the contaminant plumes intersect the river. Potential point of exposure.	Manganese, molybdenum, nitrate, selenium, and uranium
0694	Surface Water	Downstream	Potential for contaminant plumes to discharge to the river at this location.	Manganese, molybdenum, nitrate, selenium, and uranium

<sup>a</sup> Locations are listed in order of matrix, and then by general flow direction (farthest upgradient listed first).

<sup>b</sup> A portion of the well screen in well 0318 is damaged. As a result, PVC, sand pack, and formation material have filled in the bottom 3 feet of the well, which normally contains about 4–5 ft of water, and sampling equipment cannot be lowered to a depth that allows for collection of a representative groundwater sample. This well is scheduled for replacement in 2010.

<sup>c</sup> Although the full BTEX suite was analyzed during initial characterization efforts (2000–2002, 2004), analysis for xylenes was discontinued in 2005, given levels consistently well below the corresponding 10 mg/L SDWA standard.

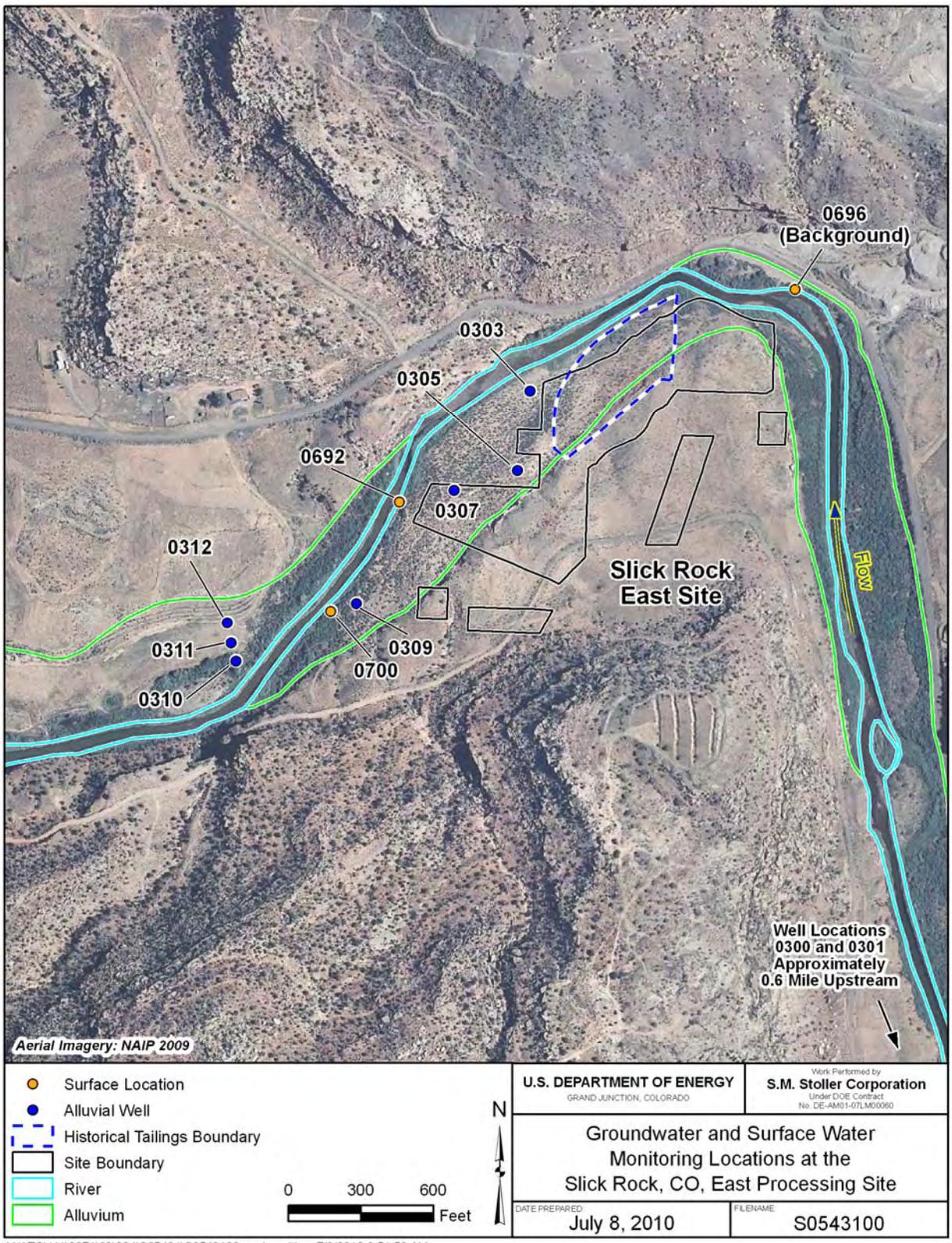


Figure 3. Groundwater and Surface Water Monitoring Locations at the Slick Rock East Site

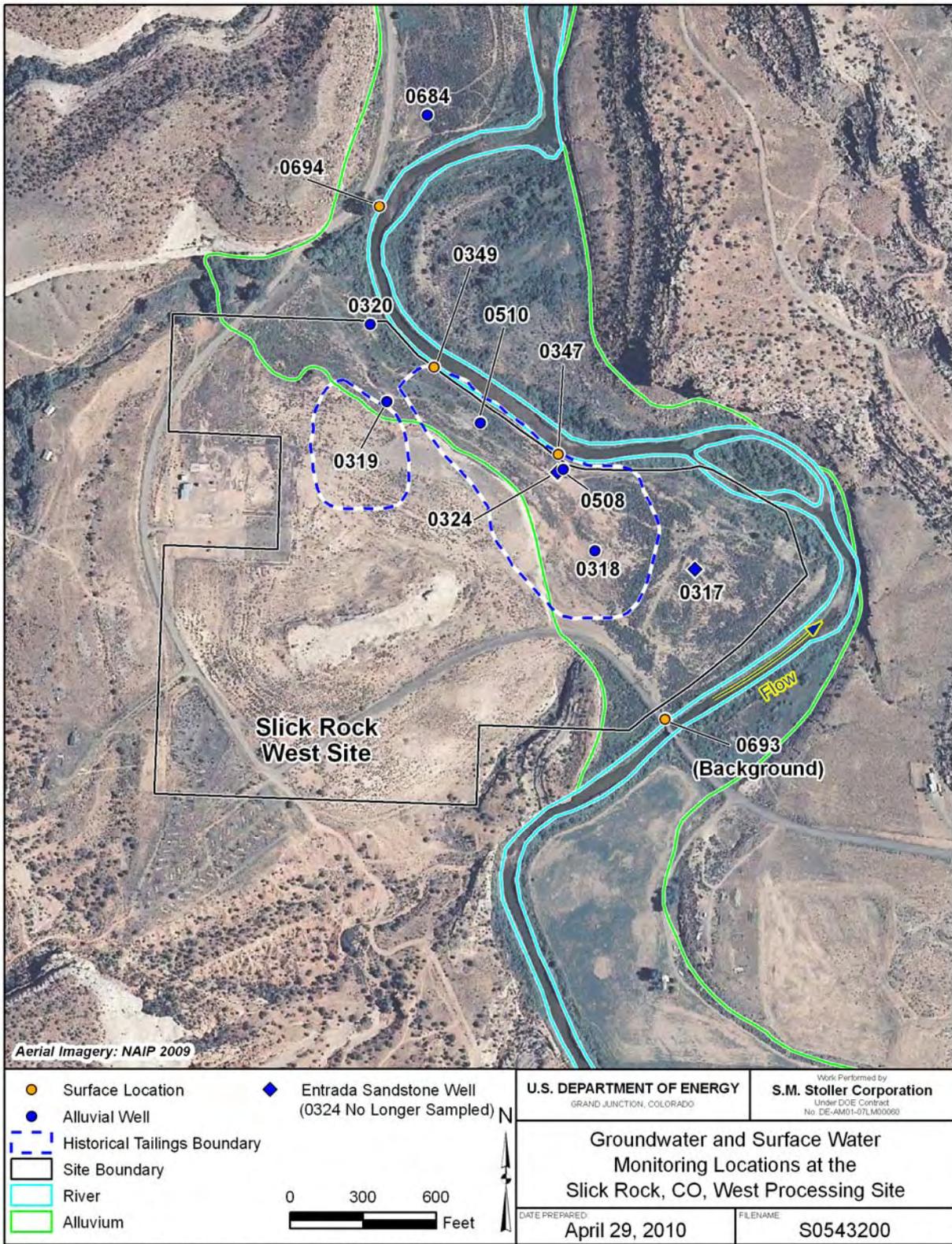


Figure 4. Groundwater and Surface Water Monitoring Locations at the Slick Rock West Site

## 4.0 Results of 2008–2009 Monitoring

This section documents the results of groundwater and surface water monitoring conducted in 2008 and 2009 for both the SRE and SRW sites. Corresponding detailed results are documented in Appendix A and Appendix B. In previous VMRs prepared for this site, this section also compared monitoring results with previous groundwater model predictions. In this report, that evaluation is provided in Section 5, “Natural Flushing Assessment.”

### 4.1 SRE Site Groundwater Monitoring Results

As discussed in Section 3.1, uranium and selenium are the only constituents currently monitored at SRE, as levels of other constituents have been below respective benchmarks. While uranium is monitored at all SRE well locations, selenium is only monitored at two (0305 and 0307). Recent and historical trends observed for each of these constituents are discussed below.

#### Uranium

The box plots in Figure 5 show the historical distribution of uranium in all SRE wells, ordered (from left to right) by direction of groundwater flow (upgradient to downgradient). For comparison, results from previously sampled background locations (0300 and 0301, last sampled in August 2001) are also shown. This figure shows that uranium concentrations are highest—greater than 10 times the 0.044 mg/L MCL—in SRE wells 0303, 0305, 0307, and 0309. As shown in Figure 6, which plots the results of the most recent (September 2009) sampling, these wells are located in the central portion of the SRE site, just downgradient of the historical tailings boundary. Although uranium levels attenuate farther downgradient, with the exception of well 0310, concentrations are still above the MCL.

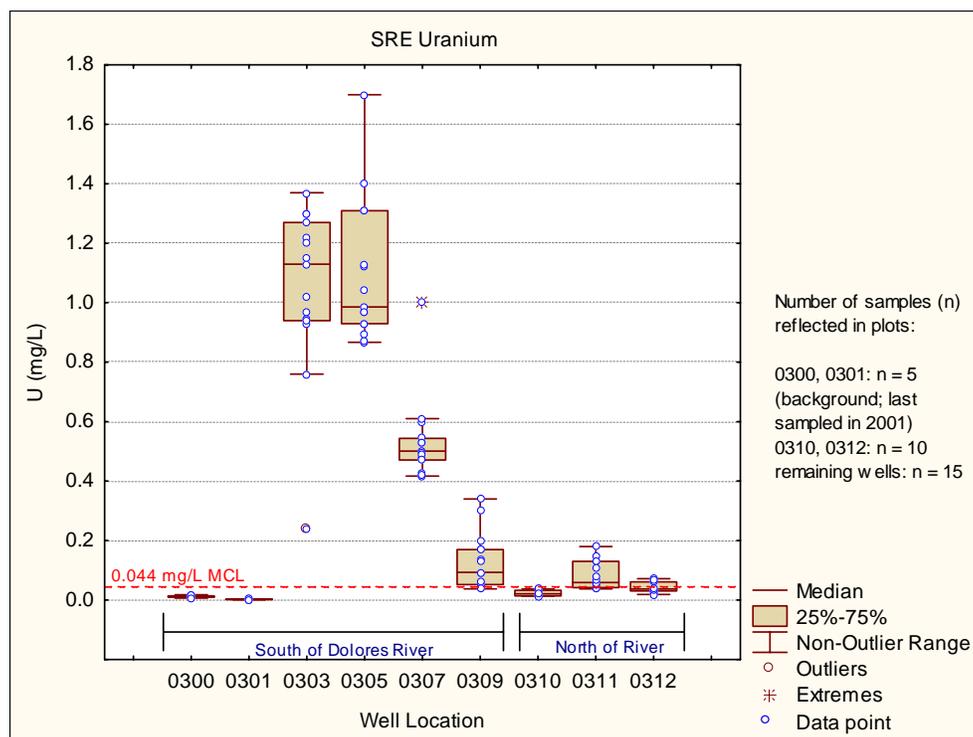


Figure 5. Box Plot and Scatter Plot of Uranium in SRE Wells

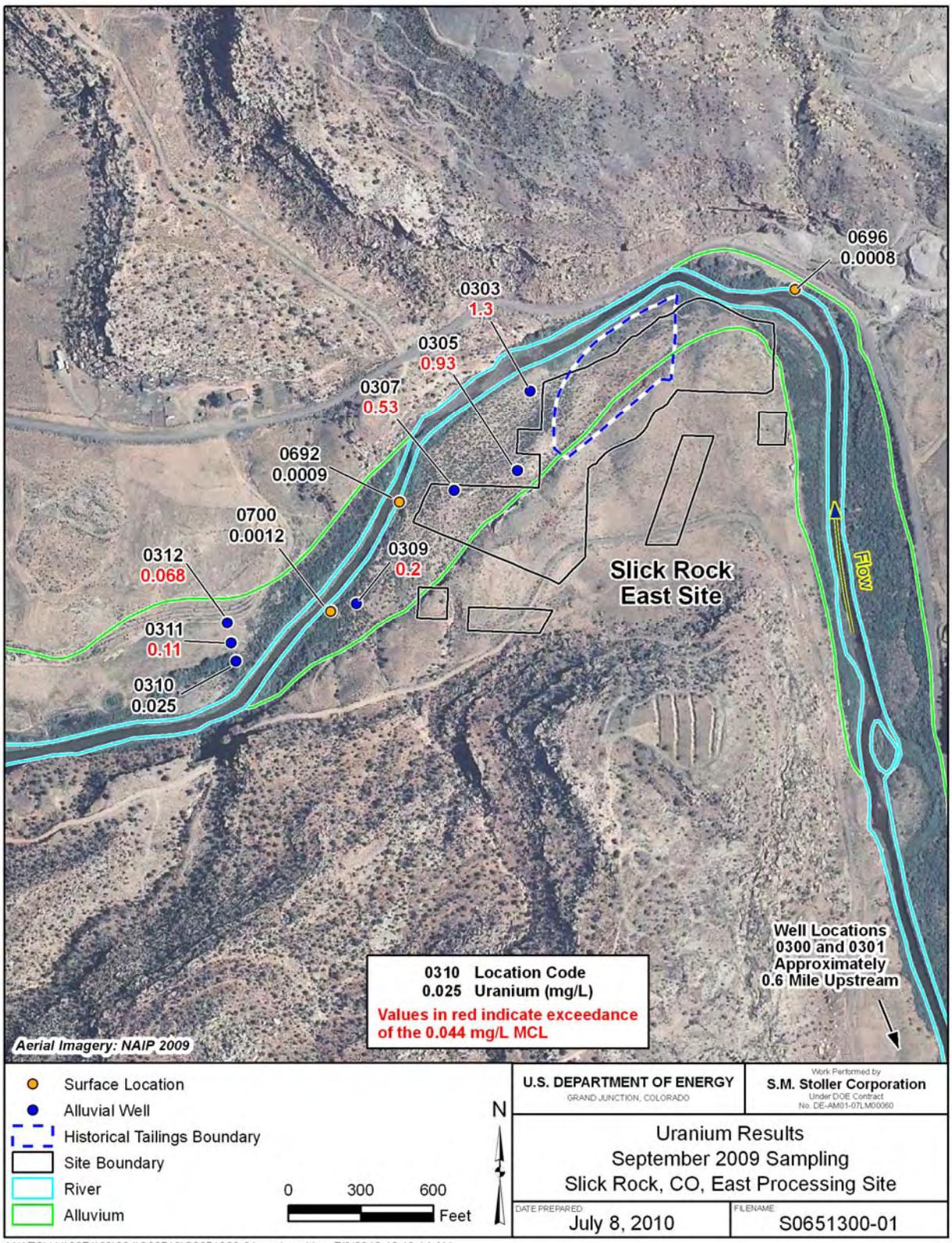


Figure 6. Uranium and Selenium Distribution at SRE Monitoring Locations: September 2009 Sampling

The time-trend plot in Figure 7 shows uranium concentrations over time for the subset of SRE on-site alluvial wells located south of the Dolores River: 0303, 0305, 0307, and 0309. As shown in Figure 5, these wells have historically had the highest uranium concentrations. To examine possible causes of temporal fluctuations in wells 0303, 0305, and 0307, Figure 8 shows the same data plotted along with corresponding water levels.

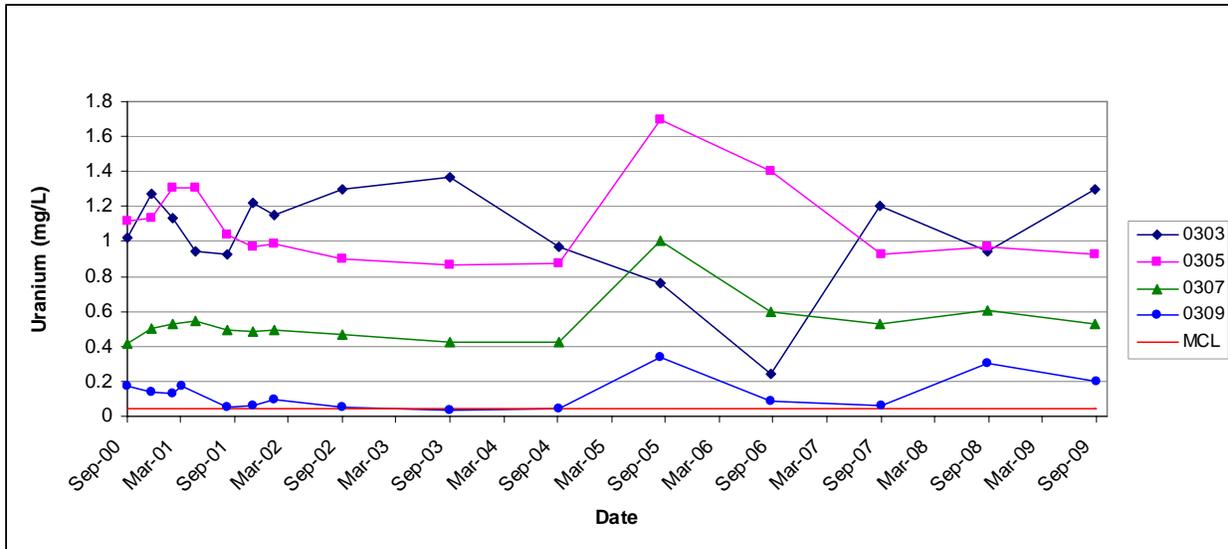


Figure 7. Uranium Concentrations Versus Time in SRE Wells South of Dolores River

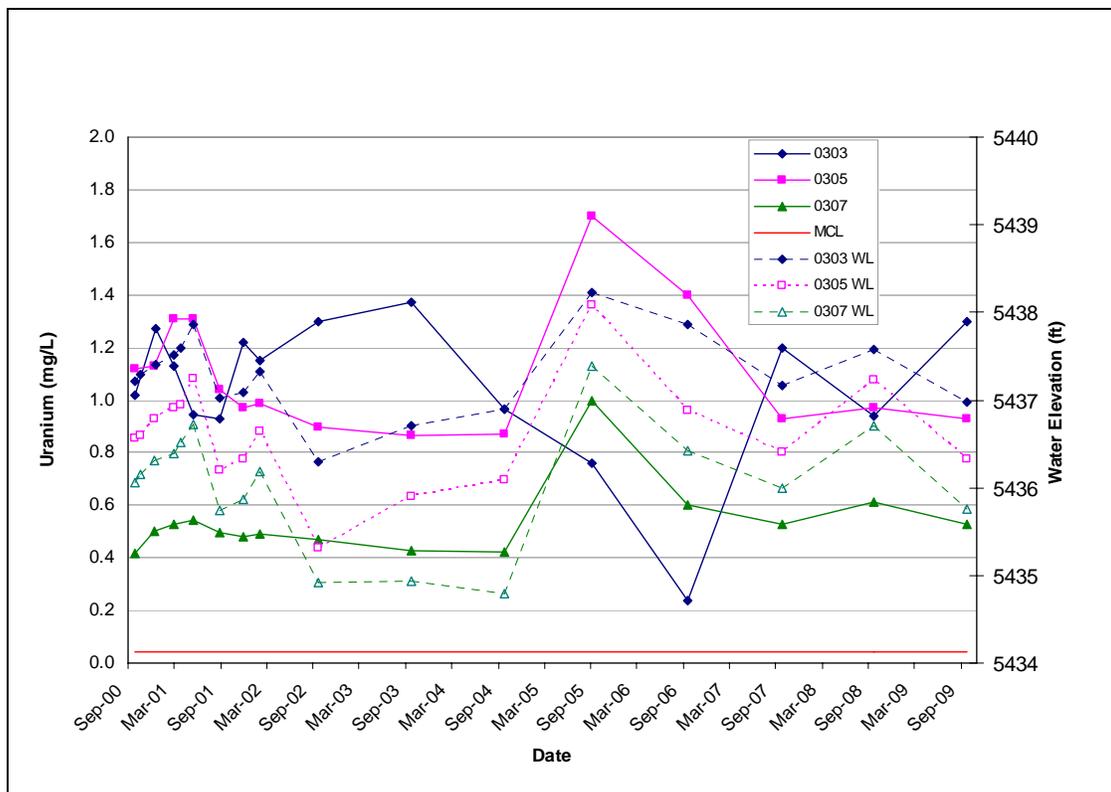


Figure 8. Uranium Versus Water Levels in SRE Wells 0303, 0305, and 0307

Figure 7 shows that uranium concentrations in SRE central wells (0303, 0305, 0307) fluctuated between 2004 and 2007 but have stabilized since then to pre-2005 averages—about 1 mg/L for 0303 and 0305, and 0.5 mg/L for 0307. In well 0309, located farther downgradient but still south of the river, uranium concentrations have remained stable at about 0.2 mg/L. No attenuation over time (e.g., attributable to natural flushing) is apparent in any wells.<sup>2</sup>

Figure 8 demonstrates the correlation between uranium concentrations in wells and corresponding water levels for the well subset exhibiting the widest fluctuations (wells 0303, 0305, and 0307). Appendix C provides supporting static water level data and hydrographs. Two types of correlations are apparent: while uranium in wells 0305 and 0307 varies directly with water levels, the opposite trend (an inverse correlation) is apparent for well 0303. It is not clear what specific factors account for these differing trends.

Figure 9 plots uranium concentrations over time for the remaining SRE wells completed in the alluvium north of the Dolores River: 0310, 0311, and 0312.

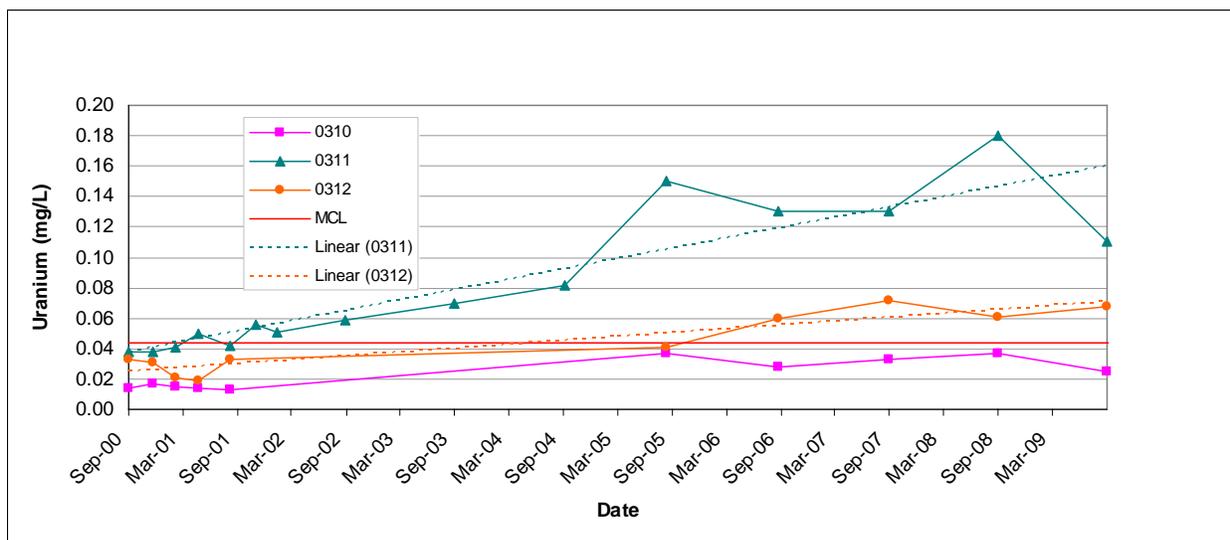


Figure 9. Uranium Concentrations Versus Time in SRE Wells North of the Dolores River

Although uranium concentrations in SRE well 0310 have always been below the 0.044 MCL, levels in wells 0311 and 0312 exceed the MCL and are gradually increasing (see Table 5 in Section 5). These findings indicate that some contaminated groundwater may be flowing under the river, but it may also reflect contamination from the numerous uranium mining operations north of the Dolores River. These wells will continue to be monitored. Evaluation of uranium trends versus corresponding water levels in these northernmost wells indicated no correlations (therefore, no plot is provided here).

<sup>2</sup> Table 5 (in Section 5, “Natural Flushing Assessment”) documents uranium trend analysis results for all SRE wells. Also see Figure 24, which plots uranium concentrations in well 0305 versus prior groundwater model predictions.

## Selenium

Figure 10 shows the historical distribution of selenium in SRE wells (again ordered by direction of groundwater flow, where 0300 and 0301 represent background conditions). As shown in this figure, selenium has only been elevated in well 0305. Therefore, unlike at SRW (discussed in the following section), selenium is not considered a major contaminant at the SRE site, and only wells 0305 and 0307 are currently monitored. Selenium concentrations in 0305 still exceed the 0.01 mg/L 40 CFR 192 MCL (having stabilized at about 0.02 mg/L), but they are below the 0.05 mg/L SDWA primary drinking water standard and appear to be gradually decreasing (Figure 11). Selenium concentrations in well 0307 have been consistently below the 0.01 mg/L 40 CFR 192 MCL. In fact, 9 of 15 measurements were nondetects (<0.0001 mg/L). Given these findings, discontinuation of monitoring for selenium in this well may be justified.

## **4.2 SRW Site Groundwater Monitoring Results**

This section begins with a discussion of historical and recent trends for the two COPCs common to both SRE and SRW: uranium and selenium. Other COPCs monitored in most SRW wells—manganese, molybdenum, nitrate—are then discussed. This section concludes with a discussion of trends observed for the COPCs limited to alluvial well 0319—BTEX (namely, benzene and toluene) and Ra-226/Ra-228.

### Uranium

Figure 12 plots uranium concentrations over time for all SRW wells; Figure 13 maps the most recent (September 2009) results. Historically, uranium has exceeded the 0.044 mg/L MCL in only three wells—alluvial wells 0318, 0508, and 0510, all located within the historical tailings boundary (Figure 13). Since August 2001, uranium in 0318 has been below the standard and is gradually decreasing (last measurement = 0.025 mg/L). The general distributions (range and average) of uranium in wells 0508 and 0510 are very similar: historically ranging from about 0.07 to 0.13 mg/L, with an average of about 0.1 mg/L. These distributions are comparable to those found in the farthest downgradient wells at SRE (0310–0312; see Figure 5).

Figure 14 presents a combination of historical box plot diagrams for all SRW wells. The plots in this figure are similar to those shown for SRE (Figure 5 and Figure 10), except that averages are shown in addition to the nonparametric statistics (median, quartiles, and range).

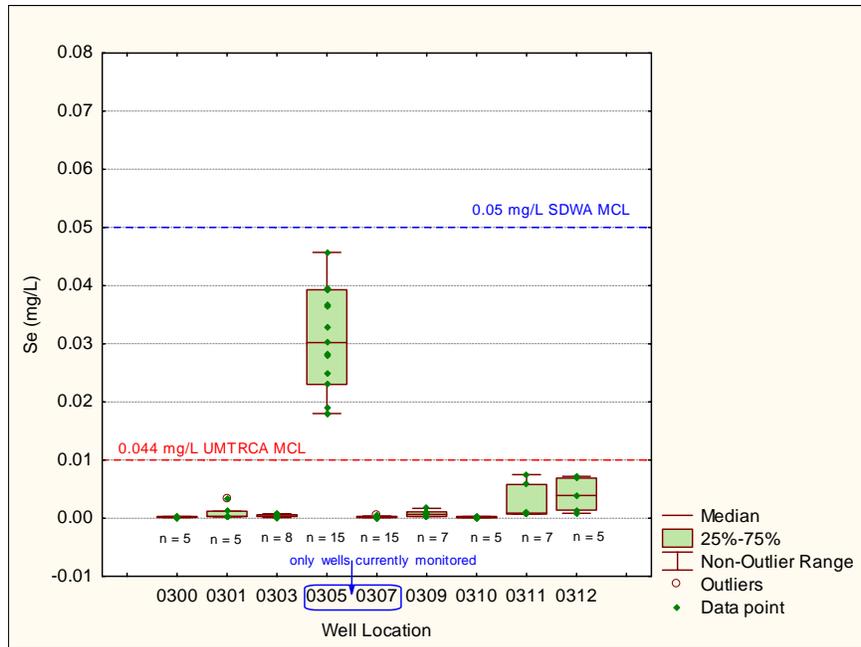


Figure 10. Box Plot and Scatter Plot of Selenium in SRE Wells

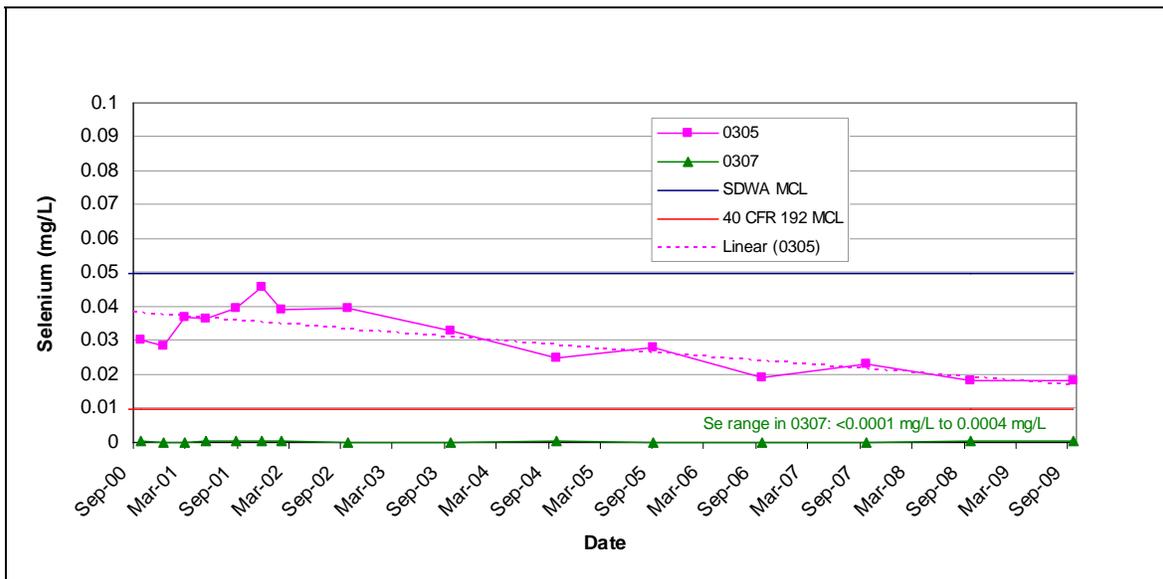


Figure 11. Selenium Concentrations in SRE Wells 0305 and 0307

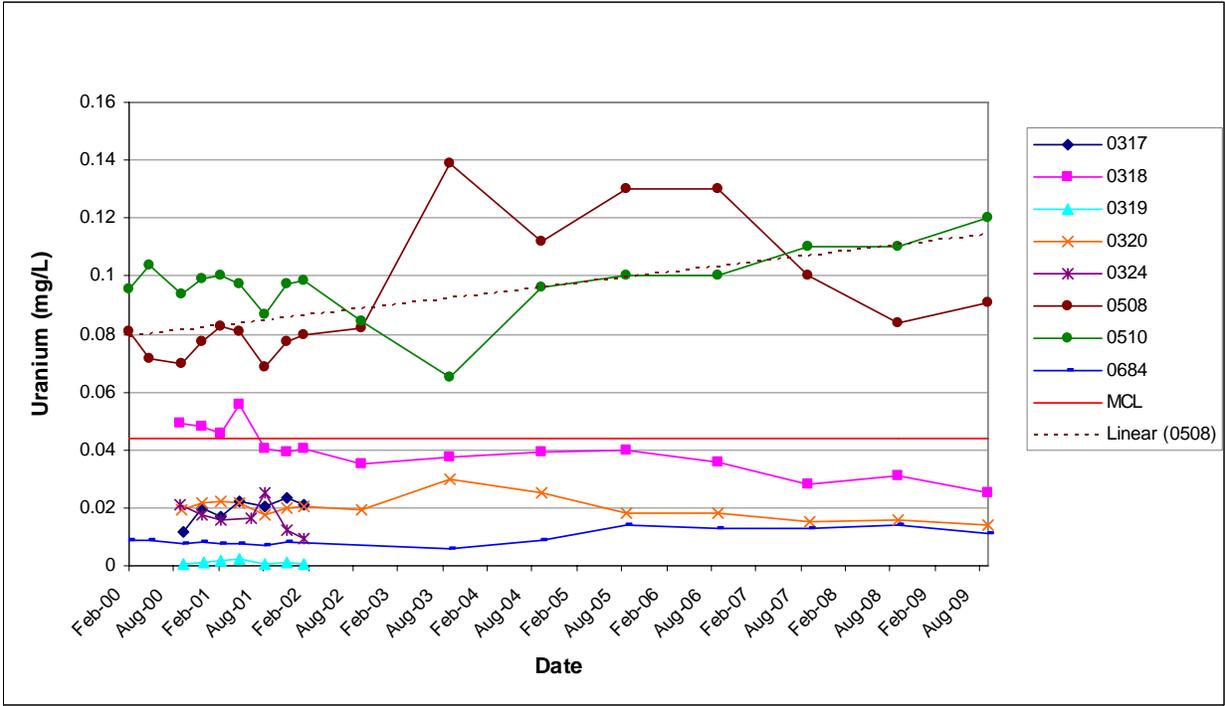


Figure 12. Uranium Concentration Trends at SRW

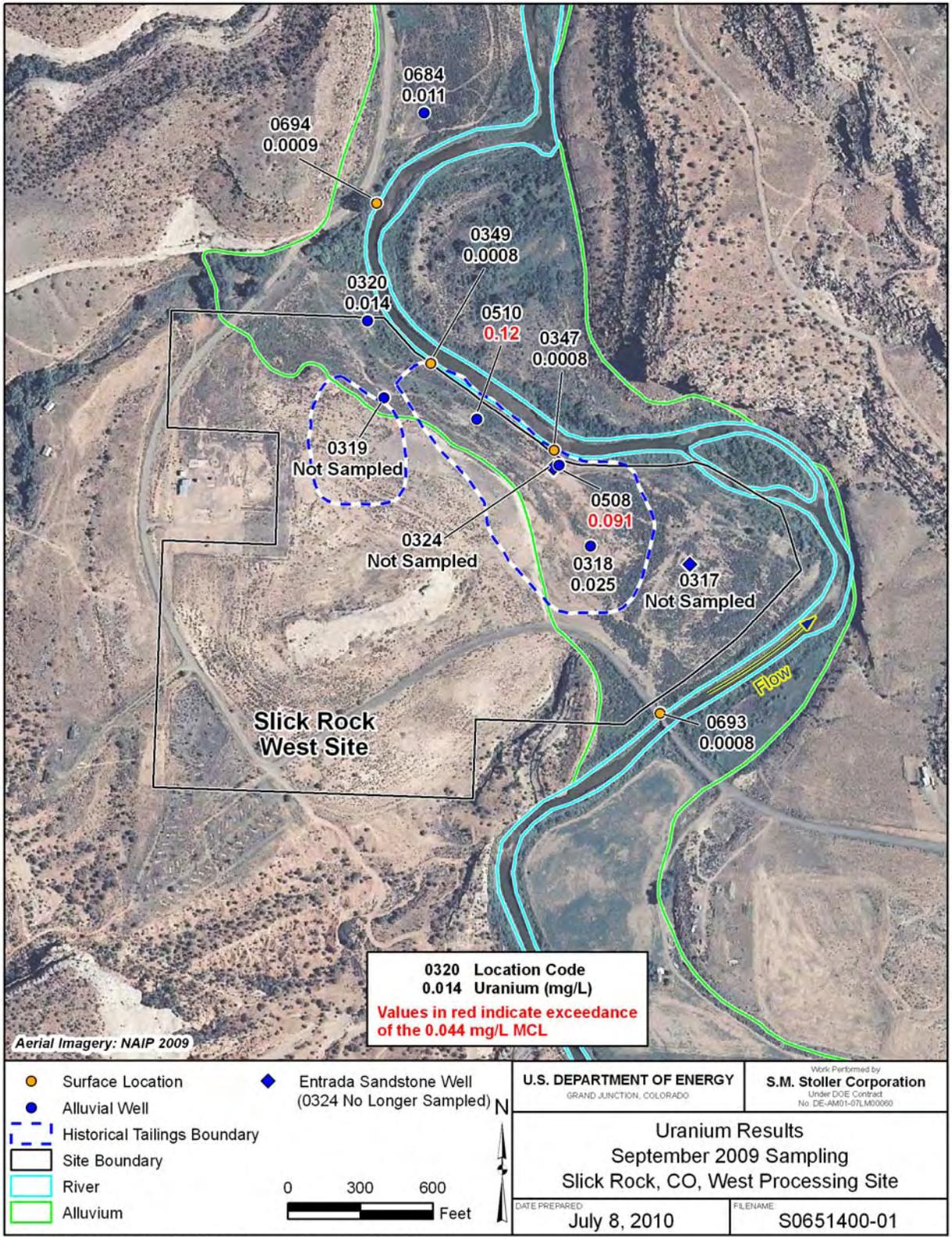


Figure 13. Uranium Distribution at Slick Rock West Site: September 2009

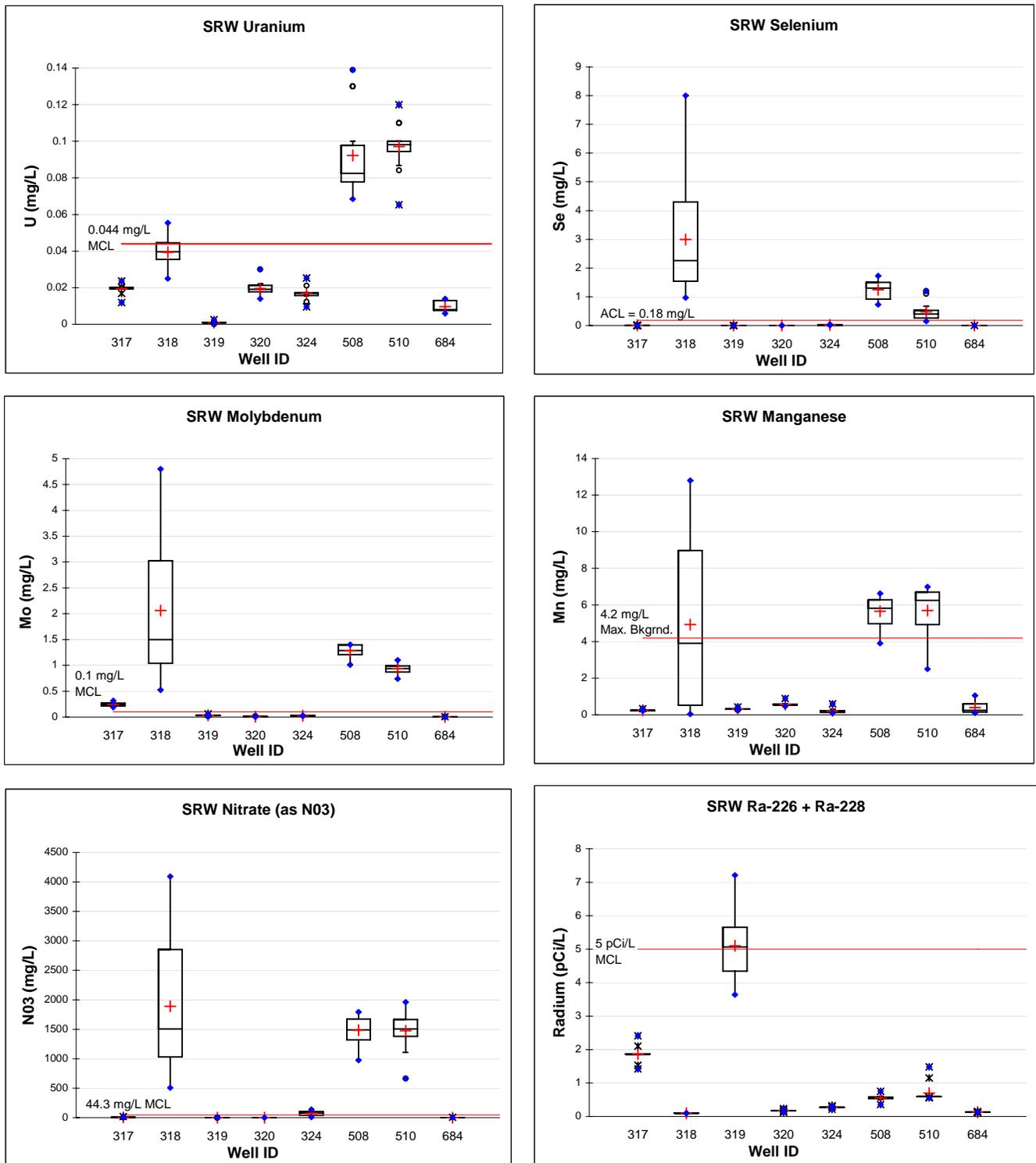


Figure 14. Historical Distributions of SRW COPCs <sup>†</sup>

<sup>†</sup> The box plots shown above are similar to those shown previously for SRE COPCs (see Figures 5 and 10). The box plots depict the median, the lower and upper quartiles, and the non-outlier range; points plotted beyond these limits are outliers. The plots above differ slightly from those previously shown in that the mean is also displayed (denoted by +, vs. the median line, which bisects the box). BTEX data are not plotted above, as these were generally limited to well 0319.

## Selenium

Like uranium, selenium has only exceeded the 0.18 mg/L ACL benchmark in SRW alluvial wells 0318, 0508, and 0510, coinciding with the historical tailings area (Figure 14). Except for Entrada well 0324 (no longer sampled), in which selenium levels ranged up to 0.04 mg/L initially but then later stabilized at about 0.005 mg/L, selenium in remaining wells has been below the 0.01 mg/L UMTRCA MCL. Figure 15 shows that selenium levels in wells 0508 and 0510 have stabilized at about 1 mg/L. However, concentrations in well 0318 have more than doubled since initial measurements in 2000, from 2.5 mg/L to over 5 mg/L, with a peak of 8 mg/L in 2008. The reason for this increase is not clear, although it may be related to the damaged well screen (see footnote b in Table 3). Figure 16 shows these data plotted versus water levels; however, no correlation is apparent. Figure 17 maps the most recent (2009) selenium results.

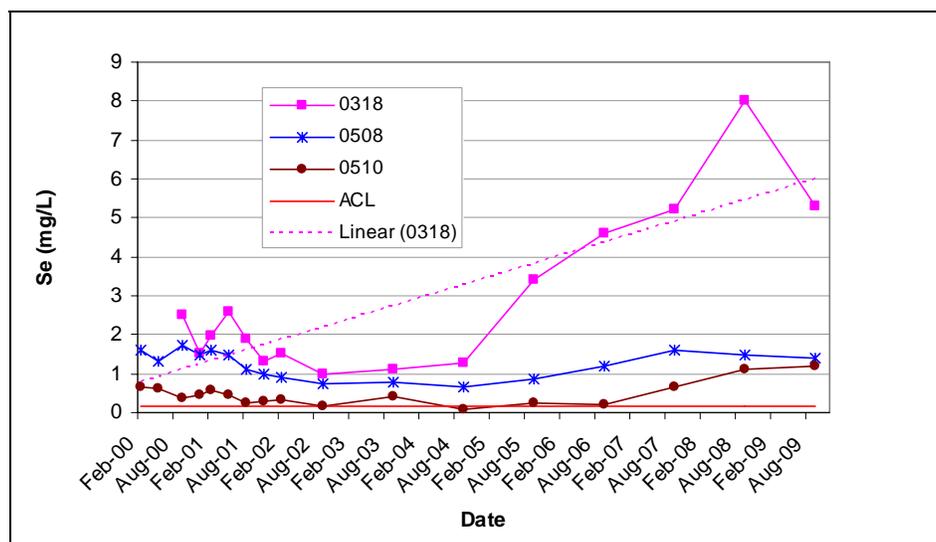


Figure 15. Selenium Concentrations Versus Time in SRW Wells 0318, 0508, and 0510

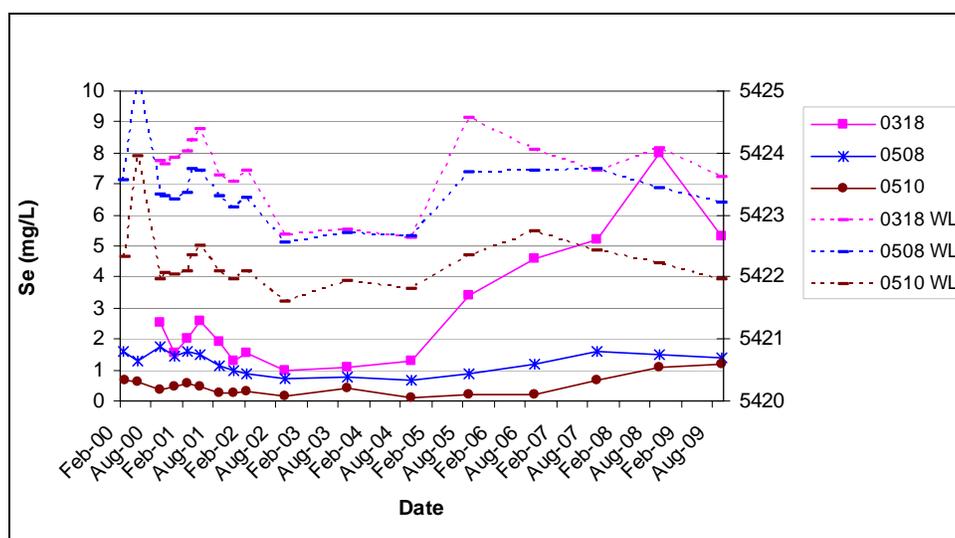


Figure 16. Selenium Versus Water Levels in SRW Wells 0318, 0508, and 0510

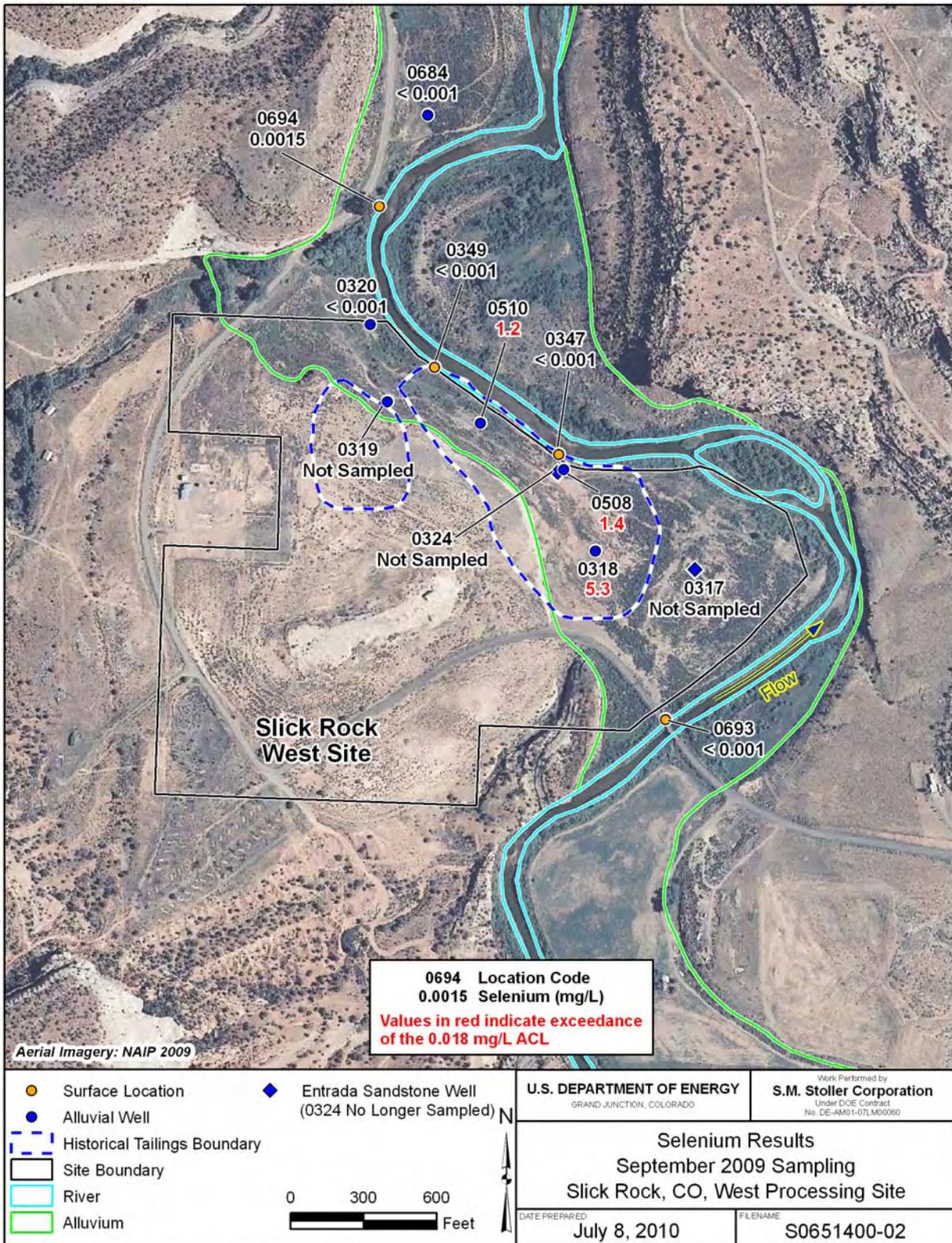


Figure 17. Selenium Distribution at Slick Rock West Site: September 2009

## Manganese

Manganese trends in SRW wells parallel those observed for most of the other SRW COPCs in that elevated concentrations have been limited to alluvial wells coinciding with the former tailings area (0318, 0508, and 0510; see Figure 14). As shown in Figure 18, although historically manganese has been highest in 0318 (the hot spot for selenium, molybdenum, and nitrate), levels have declined significantly (down to 0.04 mg/L), well below the 4.2 mg/L (background) benchmark. Concentrations in 0508 and 0510 have also decreased, but more gradually, stabilizing between about 4 and 6 mg/L, comparable to background.

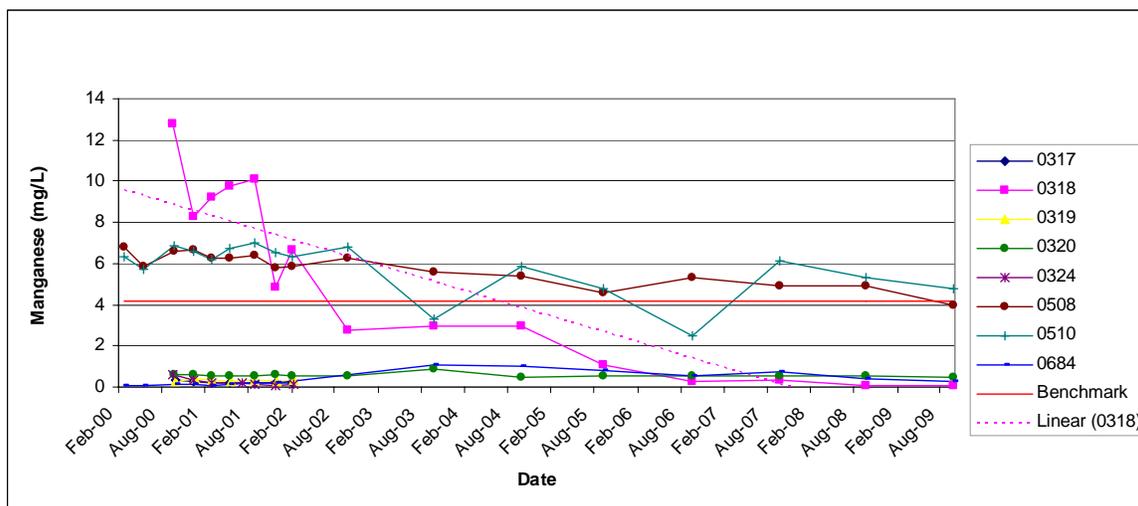


Figure 18. Manganese Concentrations Versus Time at the SRW Site

## Molybdenum

Like other SRW COPCs, molybdenum is most elevated in alluvial wells 0318, 0508, and 0510 (Figure 14; Figure 19). Levels in these wells are over an order of magnitude higher than the 0.1 mg/L MCL and are increasing in 0318 (strongly correlated with selenium increases). Concentrations in Entrada Sandstone well 0317 have also exceeded the MCL, but only slightly.

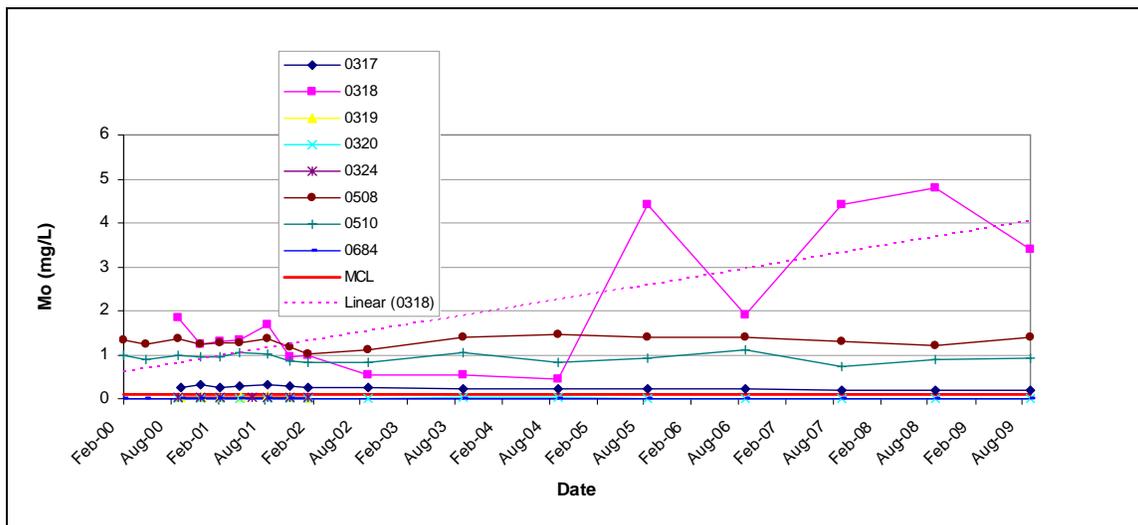


Figure 19. Molybdenum Concentrations Versus Time at the SRW Site

## Nitrate

Due to the great differences in nitrate levels among wells (see Figure 14), Figure 20 plots nitrate concentrations over time for only those wells exhibiting the highest concentrations. Except for Entrada well 0324 (no longer sampled), in which nitrate levels ranged up to 137 mg/L initially but later declined to about 10 mg/L, nitrate in remaining SRW wells has been below the 44.3 mg/L (as NO<sub>3</sub>) UMTRCA MCL. Similar to manganese, nitrate concentrations in 0318 (the historical hot spot) are declining but are still significantly above the MCL. Based on the last (September 2009) measurement, nitrate levels ranged from 620 to nearly 1600 mg/L.

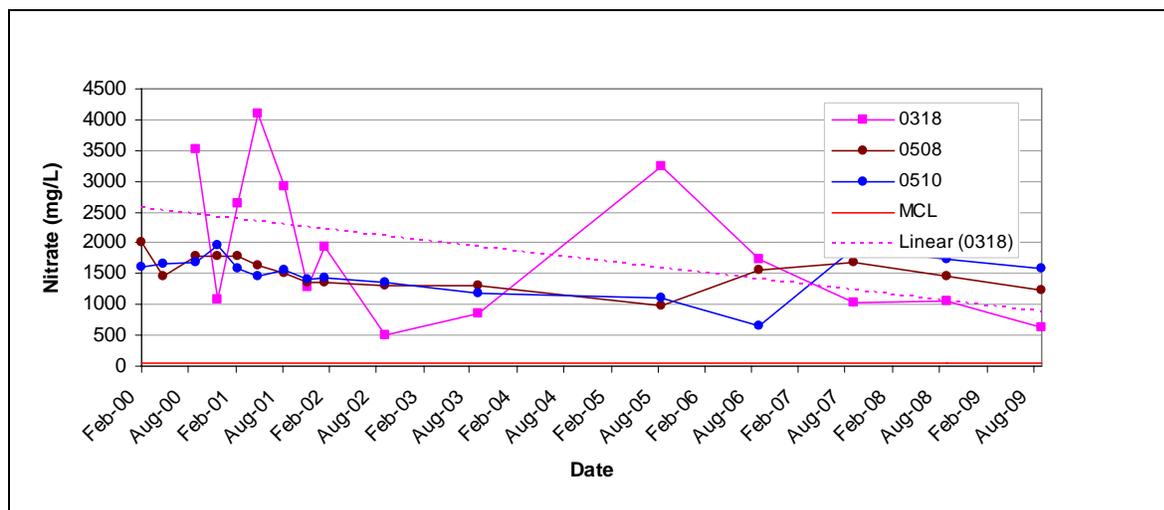


Figure 20. Nitrate (as NO<sub>3</sub>) Concentrations Versus Time in SRW Wells 0318, 0508, and 0510

## BTEX (Well 0319)

During site characterization activities conducted for the SOWP, a localized aromatic hydrocarbon plume was identified in the area of alluvial well 0319 (DOE 2002b; see Figure 5-22), where nonaqueous phase liquid (NAPL) had been identified. This is the only SRW well currently monitored for BTEX<sup>3</sup>; corresponding time-trends are plotted in Figure 21.

As shown in Figure 21, benzene concentrations decreased from the peak in May 2001 (19.8 mg/L) to 3.9 mg/L in September 2009. Levels rebounded in 2005, however (to 13 mg/L), but steadily declined afterwards. Similar fluctuations are apparent for toluene. Both benzene and toluene have consistently exceeded corresponding SDWA MCLs (only one exception for toluene in 2002). However, these benchmarks are drinking water standards and as such are not relevant to the SRW site, where there is no known exposure to alluvial groundwater. Although not readily discernible in Figure 21 given differences in scale, the 0.7 mg/L ethylbenzene SDWA MCL has never been exceeded. As noted in Table 1, analysis for total xylenes was discontinued in 2004, given historical concentrations below the 10 mg/L MCL.

<sup>3</sup> During initial site characterization activities, nine other SRW wells were monitored for BTEX in addition to well 0319: 0320, 0326, and 0332–0338 (0332–0338 have since been decommissioned). Although the maximum benzene concentration was detected in 0319 (nearly 20 mg/L), in 2000–2001 elevated levels were also detected in 0332 and 0333 (located within 100 ft of 0319 to the south and southwest, respectively).

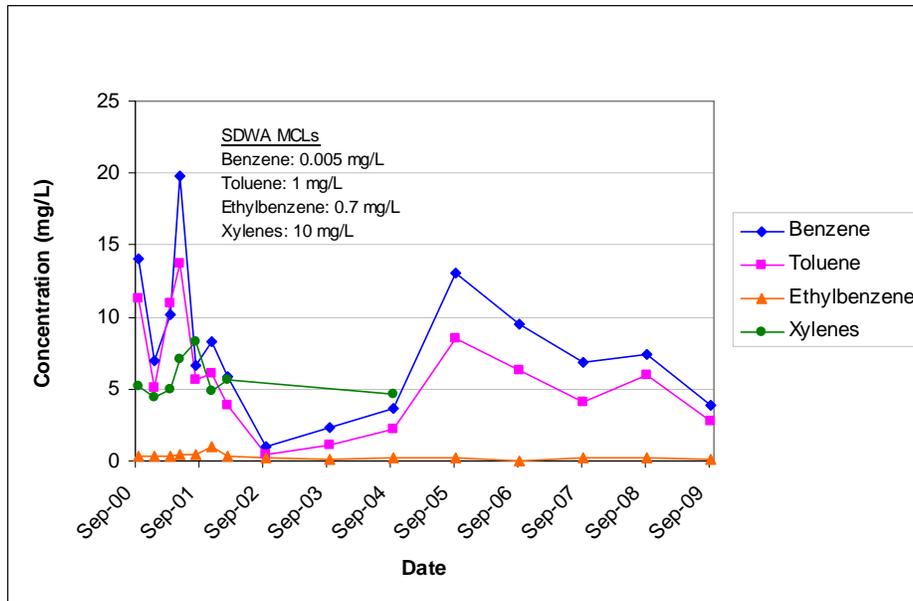


Figure 21. BTEX Concentrations over Time in SRW Well 0319

Ra-226, Ra-228 (Well 0319)

As shown in Figure 14, although radium (Ra-226 + Ra-228) has been detected in other wells, its presence above the 5 picocuries per liter (pCi/L) UMTRCA MCL has historically been limited to well 0319, coinciding with the BTEX hot spot. Figure 22, which plots Ra-226 and Ra-228 concentrations in well 0319 over time, shows that radium levels (Ra-226/228 combined) have been below the 5 pCi/L standard since 2007. Historically, concentrations have ranged from 3.6 to 7.7 pCi/L. However, Figure 14 shows that both the median and the average radium concentrations have been just at 5 pCi/L, suggesting that radium's localized presence is not a major concern at SRW.

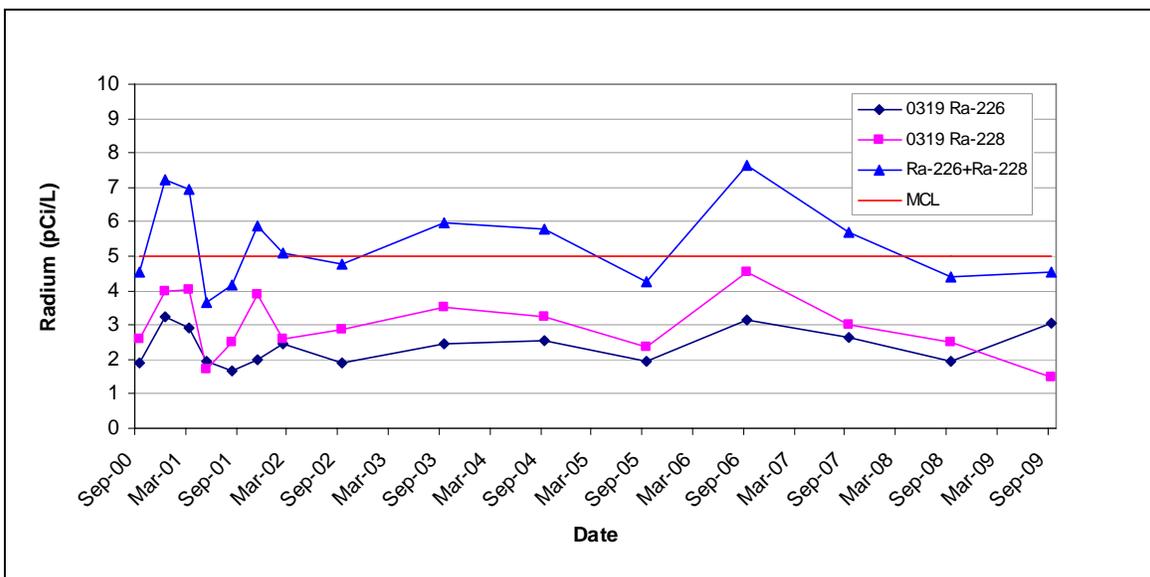


Figure 22. Ra-226 + Ra-228 Concentrations over Time in SRW Well 0319

### 4.3 Surface Water Monitoring Results (Both SRE and SRW Sites)

Surface water sampling results for the 2008–2009 monitoring period demonstrate essentially no impact to the Dolores River from site activities at either the SRE or SRW sites. As shown in Table 4, no CDPHE water quality benchmarks were exceeded in 2008 or 2009 (detailed results are provided in Appendix B). Figure 23 plots the distribution of uranium in historical Dolores River samples for both SRE and SRW sites (uranium is the only surface water COPC common to both). This plot demonstrates that uranium has always been below the CDPHE benchmark, and with the exception of a single outlier in 2006<sup>4</sup>, concentrations have even been below the "hyphenated" standard (0.0168–0.03 mg/L range) proposed by EPA's Region 8 Water Quality Control Division.

Table 4. Comparison of COPC Concentrations in the Dolores River to CDPHE Benchmarks

COPC	CDPHE Benchmark <sup>a</sup> (mg/L)	Dolores River Location						
		SRE Site			SRW Site			
		0696	0692	0700	0693	0347	0349	0694
		2008–2009 Maximum Concentration (mg/L)						
Manganese <sup>b</sup>	0.05	–	–	–	0.0025	0.0035	0.0053	0.0057
Selenium	0.005	–	–	–	0.0009	0.0007	0.0009	0.0015
Uranium <sup>c</sup>	0.059	0.0008	0.0009	0.0012	0.0008	0.0008	0.0008	0.0009

<sup>a</sup> CDPHE surface water benchmark (CDPHE 2006; see <http://epa.gov/waterscience/standards/wqslibrary/co/>).

<sup>b</sup> The standard listed for manganese is for chronic exposure.

<sup>c</sup> The benchmark for uranium (0.059 mg/L) corresponds to 40 pCi/L.

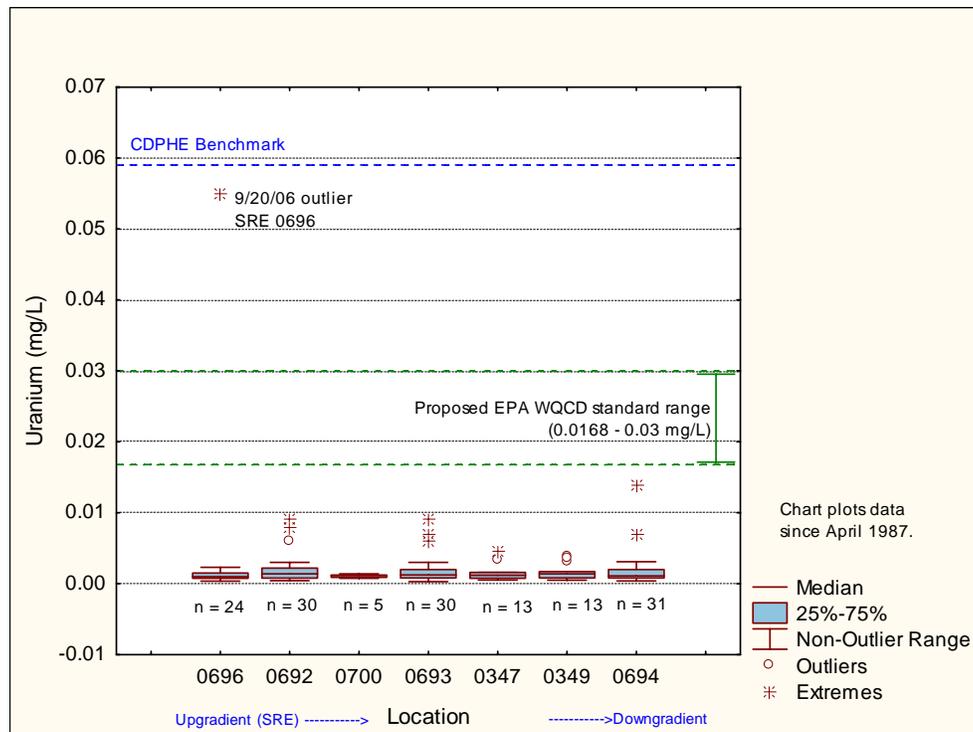


Figure 23. Box Plot of Uranium in Historical Slick Rock Surface Water (Dolores River) Samples

<sup>4</sup> The September 2006 sampling event occurred during a period of heavy rain. The anomalous 0696 value noted above (along with data for other surface water locations) was influenced by storm water runoff.

## 5.0 Natural Flushing Assessment

In support of the SOWP for the Slick Rock site, a groundwater flow and transport model was developed to evaluate whether natural flushing would reduce site COPCs to levels below respective MCLs or alternative benchmarks in the alluvial aquifer within 100 years (DOE 2002b, Section 5.3 and Appendix H). Because this modeling predicted that site COPCs would be below benchmarks within 50 years, natural flushing was selected as a viable compliance strategy (DOE 2006).

This section evaluates the status of natural flushing for both the SRE and SRW sites, plotting predicted versus actual concentrations for the modeled constituents in the target wells (SRE well 0305 and SRW well 0508). To buttress the analysis, trends are evaluated for all COPCs and all wells. Trend analysis was performed using the Mann-Kendall test (see Gilbert 1987); this test determines if an upward trend, a downward trend, or no trend exists. To facilitate review and interpretation of these findings, it is recommended that the reader refer back to the time-trend plots provided in the previous section.

### 5.1 SRE Site

Figure 24 plots uranium concentrations in SRE well 0305 versus groundwater model predictions. This figure shows that uranium concentrations are not attenuating as rapidly as predicted; in fact, actual concentrations are about an order of magnitude above predicted values. (A corresponding plot for selenium, the only other SRE COPC, is not provided because levels in well 0305 have stabilized at about 0.02 mg/L, close to the 0.01 mg/L UMTRCA standard and below the 0.05 mg/L SDWA MCL (Figure 11).

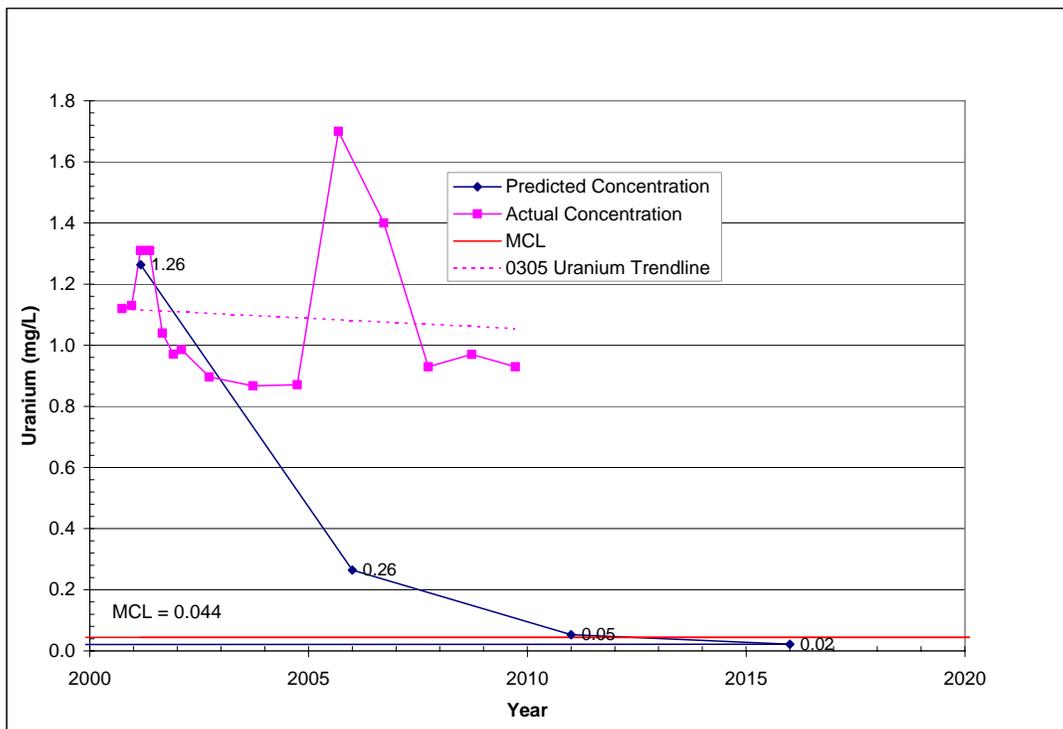


Figure 24. Predicted Versus Actual Uranium Concentrations in SRE Well 0305

Table 5 and Table 6, respectively, shows results of the trend analyses for uranium and selenium in SRE monitoring wells.

*Table 5. Assessment of Uranium Trends in SRE Site Monitoring Wells*

Location	No. of Samples	Trend <sup>a</sup>	2009 Result (mg/L) <sup>b</sup>	Standard Exceeded in 2008 or 2009?
0303	15	No trend	1.3	Yes
0305	15	No trend	0.93	Yes
0307	15	No trend	0.53	Yes
0309	15	No trend	0.2	Yes
0310	10	No trend	0.025	No
0311	15	Upward <sup>c</sup>	0.11	Yes
0312	10	Upward <sup>c</sup>	0.068	Yes

<sup>a</sup> Data from 1997 to 2009. Only wells with more than five data points are included. Trend analysis was based on the Mann-Kendall test (see Gilbert 1987). These tests were performed using the Visual Sampling Plan (VSP) software developed by DOE (<http://vsp.pnl.gov/>).

<sup>b</sup> Results listed in red exceed the 0.044 mg/L (40 CFR 192) uranium standard for SRE.

<sup>c</sup> See trendlines in Figure 9.

*Table 6. Assessment of Selenium Trends in SRE Site Monitoring Wells*

Location	No. of Samples	Trend <sup>a</sup>	2009 Result (mg/L) <sup>b</sup>	Standard Exceeded in 2008 or 2009?
0305	15	Downward	0.018	Yes
0307	15	No Trend	0.00039	No

<sup>a</sup> Data from 1997 to 2009. Refer to notes from Table 6.

<sup>b</sup> Results listed in red exceed the 0.01 mg/L (40 CFR 192) selenium standard for SRE; note that this differs from the 0.18 mg/L ACL benchmark established for SRW.

Table 5 indicates that uranium is not demonstrably attenuating in any SRE well, and in fact is increasing in the two farthest downgradient SRE wells, 0311 and 0312, installed north of the Dolores River (refer to Figure 9 in Section 4.1). As noted previously, selenium is not considered a major contaminant at the SRE site, and only wells 0305 and 0307 are currently monitored. Table 6 indicates a slight downward trend in well 0305; the most recent measurement in this well just slightly exceeds the 0.01 mg/L 40 CFR 192 MCL but is below the 0.05 mg/L SDWA standard.

## 5.2 SRW Site

Figures 25 through 28 plot concentrations of manganese, molybdenum, nitrate, and selenium in SRW well 0508 versus model predictions. Table 7 summarizes the results of the trend analyses for manganese, molybdenum, nitrate, selenium, and uranium.

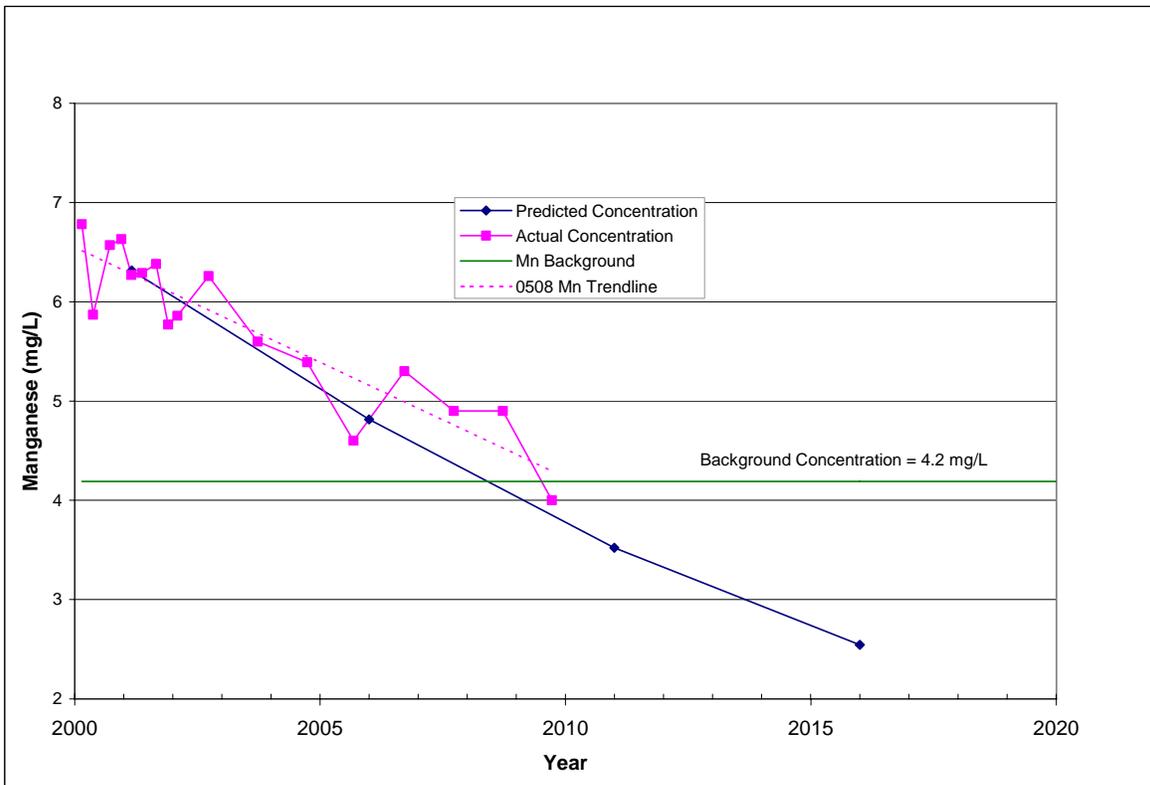


Figure 25. Manganese Concentrations in SRW Well 0508 Versus Groundwater Model Predictions

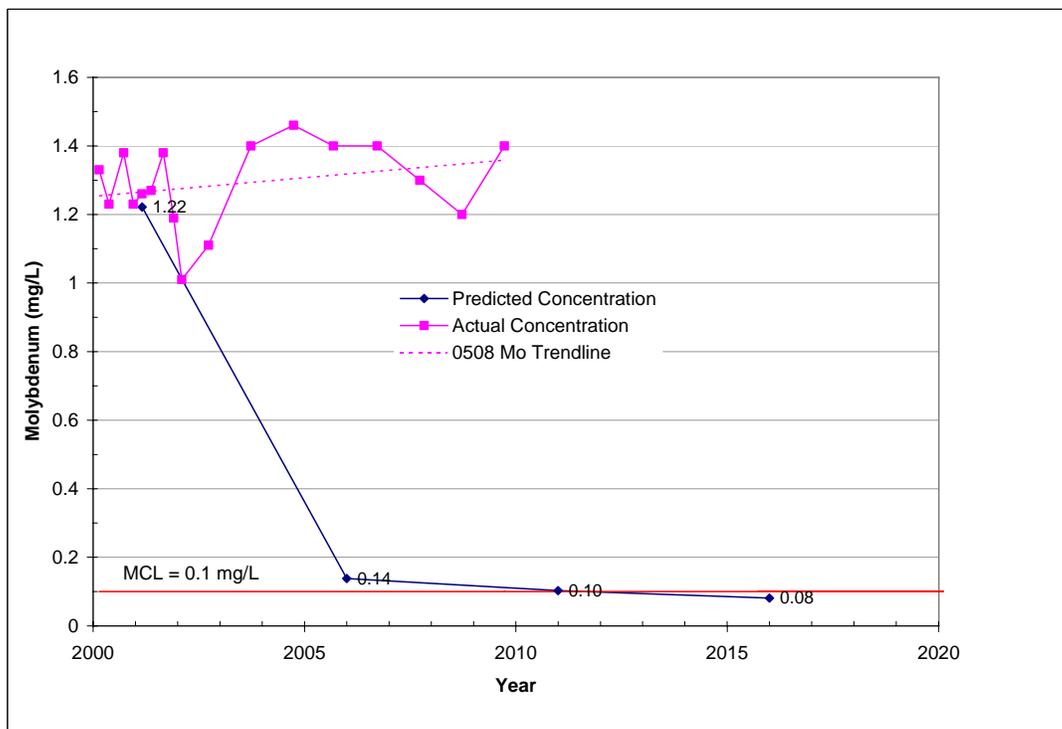


Figure 26. Predicted Molybdenum Concentrations in Well 0508 Versus Groundwater Model Predictions at the SRW Site

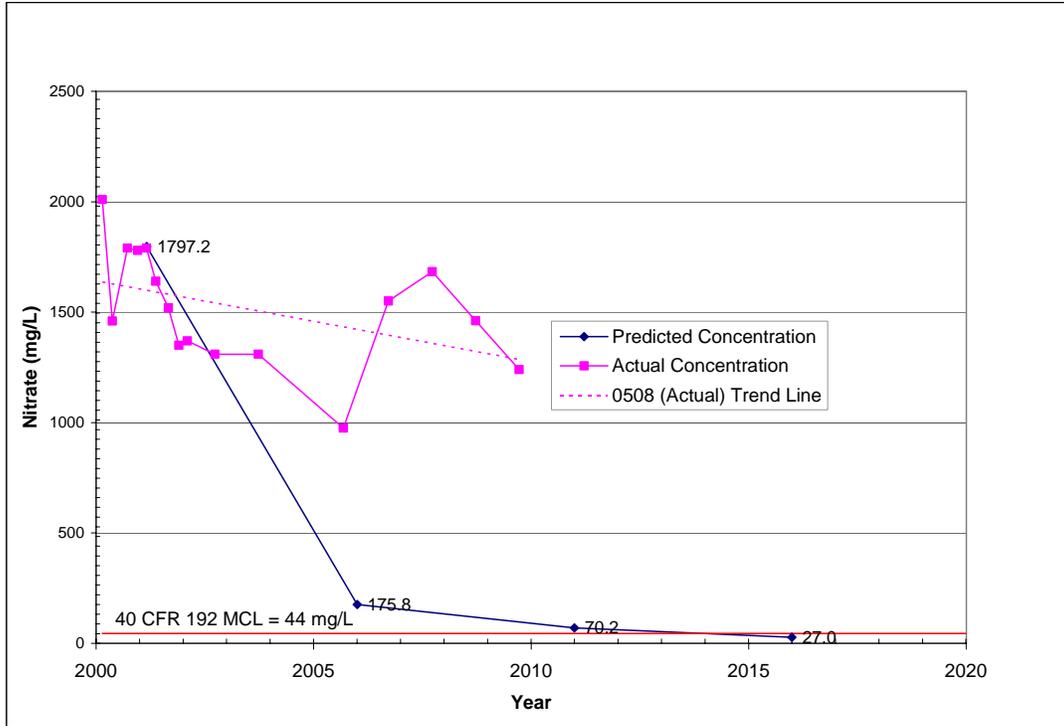


Figure 27. Predicted Nitrate (as  $\text{NO}_3$ ) Concentrations in Well 0508 Versus Groundwater Model Predictions at the SRW Site

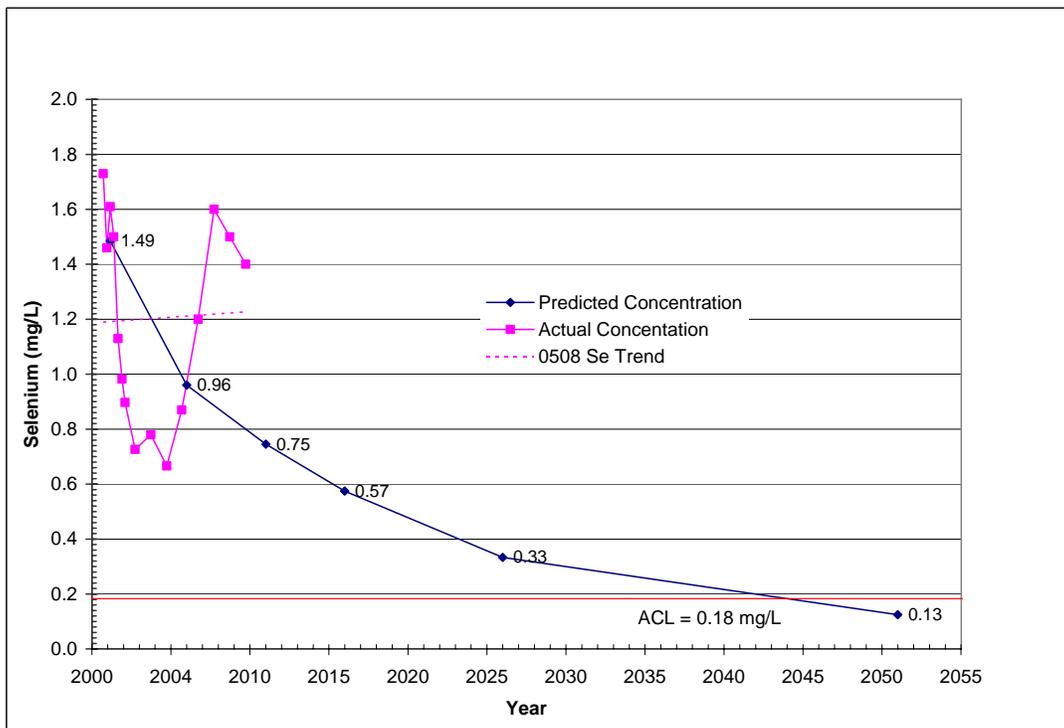


Figure 28. Selenium Concentrations in SRW Well 0508 Versus Groundwater Model Predictions

Table 7. COPC Trend Matrix for SRW Site Monitoring Wells

Location <sup>a</sup>	Manganese	Molybdenum	Nitrate (as NO <sub>3</sub> )	Selenium	Uranium
<b>Benchmark (mg/L)</b>	<b>4.2</b>	<b>0.10</b>	<b>44.3</b>	<b>0.18</b>	<b>0.044</b>
<b>0317</b> (Entrada well)	No trend	<b>Downward</b>	No trend	No trend	<b>Upward</b>
N	7	15	7	7	7
Most recent result:	0.2 (Feb-02)	<b>0.19</b>	5.5 (Feb-02)	0.004 (Feb-02)	0.02 (Feb-02)
<b>0318</b>	<b>Downward</b>	No trend	<b>Downward</b>	<b>Upward</b>	<b>Downward</b>
N	15	15	14	14	15
Most recent result:	0.039	<b>3.4</b>	<b>620</b>	<b>5.3</b>	0.025
<b>0319<sup>a</sup></b> (BTEX hot spot)	No trend	No trend	No trend	No trend	No trend
N	7	7	7	7	7
Most recent result:	0.3 (Feb-02)	0.014 (Feb-02)	0.45 (Feb-02)	0.0006	0.0003 (Feb-02)
<b>0320</b>	<b>Downward</b>	No trend	No trend	<b>Downward</b>	<b>Downward</b>
N	15	15	14	15	15
Most recent result:	0.47	0.011	0.38	0.0001	0.014
<b>0324<sup>b</sup></b> (Entrada well)	<b>Downward</b>	<b>Downward</b>	<b>Downward</b>	<b>Downward</b>	No trend
N	7	7	9	9	7
Most recent result:	0.1 (Feb-02)	0.019 (Feb-02)	10.6 (Sep-03)	0.004 (Sep-03)	0.0096 (Feb-02)
<b>0508</b>	<b>Downward</b>	No trend	<b>Downward</b>	No trend	<b>Upward</b>
N	17	17	16	17	17
Most recent result:	4.0	<b>1.4</b>	<b>1240</b>	<b>1.4</b>	<b>0.091</b>
<b>0510</b>	<b>Downward</b>	No trend	<b>Downward</b>	No trend	<b>Upward</b>
N	17	17	16	17	17
Most recent result:	<b>4.8</b>	<b>0.93</b>	<b>1595</b>	<b>1.2</b>	<b>0.12</b>
<b>0684</b>	<b>Upward</b>	No trend	<b>Downward</b>	No trend	No trend
N	15	15	14	15	15
Most recent result:	0.26	0.006	0.07	0.0003	0.011

**General Notes**

Trend analysis was performed using the Mann-Kendall test and DOE's VSP software (<http://vsp.pnl.gov/>).

All results listed above are reported in milligrams per liter; results listed in **red** exceed the corresponding standard. N = number of data points. Differing N values for some analytes/wells reflect the fact that analysis for some constituents was discontinued.

Data are from 2000 to 2009; only wells with more than 5 data points are included. Wells are listed in general order of groundwater flow direction. Most recent results are from the September 2009 sampling unless noted otherwise. Some wells are only monitored for one constituent (e.g., molybdenum in Entrada well 0317); in these cases the last monitoring result for other constituents may not be recent.

**Specific Notes**

<sup>a</sup> BTEX and radium (Ra-226 + Ra-228) are not addressed in this table because they apply only to well 0319. Trend analysis for these constituents yielded no significant trend except a downward trend for ethylbenzene.

<sup>b</sup> Entrada well 0324 was removed from the monitoring network. The trend analysis results listed above (downward for most constituents) support this decision.

As shown on Figures 25 through 28, manganese is the only SRW constituent for which the actual trend agrees with the groundwater model prediction. Manganese concentrations in well 0508 are decreasing significantly (Table 7). As shown in Figure 25, the most recent measured value is close to the predicted value. Results for the other constituents, however, are not in close agreement with values predicted from the model (Figures 26 through 28). However, these figures only plot results for a single SRW well, 0508, which was considered most representative of assessing natural flushing progress. Uranium is not plotted in this final set of SRW figures because the model originally developed for the site did not evaluate this analyte (see Table 1 of the GCAP; DOE 2006).

The trend analysis matrix in Table 7 reveals mixed results. In general, no trend predominates. The only well with a consistent downward trend is Entrada well 0324, where monitoring was discontinued several years ago. As discussed previously, selenium is increasing significantly in well 0318, and the most recent result (3.8 mg/L) is over 20 times the 0.18 mg/L ACL. (As noted in footnote b of Table 3, the well screen in 0318 is damaged, and this well is scheduled for replacement.) Uranium is increasing significantly in three wells—Entrada well 0317 (although uranium is still below the 0.044 mg/L standard), 0508, and 0510 (most recent results 0.09 and 0.12 mg/L, respectively).

## **6.0 Conclusions**

### **6.1 Status of Site Compliance**

Although previous VMRs for the Slick Rock sites have suggested that deviations from model predications were potentially attributable to drought conditions, evaluation of trends documented in the previous section suggest that certain constituents may not attenuate as initially predicted based on groundwater modeling conducted for the SOWP (DOE 2002b). Although still early in the 100-year time frame established in 40 CFR 192, time trend analysis for most constituents/wells indicate a stable (flat) or even increasing trend.

### **6.2 Recommendations**

It is recommended that annual verification monitoring of groundwater from designated monitoring wells and surface water locations continue as specified in the draft final GCAP (DOE 2006). In accordance with the GCAP, a reevaluation of monitoring requirements will be conducted after 10 years of monitoring. It had been anticipated that monitoring could eventually be decreased to once every 5 years. However, if recently observed fluctuations in contaminant concentrations continue, or if contamination persists north of the Dolores River, it may be advisable to continue monitoring annually until contaminant concentrations decline.

## 7.0 References

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## **Appendix A**

### **Groundwater Quality Data by Parameter**

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GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK06, Slick Rock East Processing Site  
 REPORT DATE: 4/30/2010 3:54 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Alkalinity, Total (As CaCO3)	mg/L	0303	WL	09/23/2009	N001	4.30 - 14.30	587	F #	-	-
	mg/L	0305	WL	09/23/2009	N001	8.70 - 18.70	406	F #	-	-
	mg/L	0307	WL	09/23/2009	N001	4.40 - 14.40	720	F #	-	-
	mg/L	0309	WL	09/24/2009	N001	10.20 - 20.20	695	F #	-	-
	mg/L	0310	WL	09/23/2009	N001	14.70 - 19.70	217	F #	-	-
	mg/L	0311	WL	09/23/2009	N001	14.10 - 19.10	339	QF #	-	-
	mg/L	0312	WL	09/23/2009	N001	14.50 - 19.50	420	F #	-	-
Oxidation Reduction Potential	mV	0303	WL	09/24/2008	N001	4.30 - 14.30	-110	F #	-	-
	mV	0303	WL	09/23/2009	N001	4.30 - 14.30	-93.3	JF #	-	-
	mV	0305	WL	09/24/2008	N001	8.70 - 18.70	47	F #	-	-
	mV	0305	WL	09/23/2009	N001	8.70 - 18.70	37.3	JF #	-	-
	mV	0307	WL	09/24/2008	N001	4.40 - 14.40	-51	F #	-	-
	mV	0307	WL	09/23/2009	N001	4.40 - 14.40	-83.6	JF #	-	-
	mV	0309	WL	09/23/2008	N001	10.20 - 20.20	22	F #	-	-
	mV	0309	WL	09/24/2009	N001	10.20 - 20.20	28.8	F #	-	-
	mV	0310	WL	09/22/2008	N001	14.70 - 19.70	-64	F #	-	-
	mV	0310	WL	09/23/2009	N001	14.70 - 19.70	-86.4	JF #	-	-
	mV	0311	WL	09/22/2008	N001	14.10 - 19.10	56	F #	-	-
	mV	0311	WL	09/23/2009	N001	14.10 - 19.10	77.9	JQF #	-	-
	mV	0312	WL	09/22/2008	N001	14.50 - 19.50	74	F #	-	-
mV	0312	WL	09/23/2009	N001	14.50 - 19.50	-10.5	JF #	-	-	
pH	s.u.	0303	WL	09/24/2008	N001	4.30 - 14.30	7.08	F #	-	-
	s.u.	0303	WL	09/23/2009	N001	4.30 - 14.30	7.28	F #	-	-
	s.u.	0305	WL	09/24/2008	N001	8.70 - 18.70	7.09	F #	-	-
	s.u.	0305	WL	09/23/2009	N001	8.70 - 18.70	7.23	F #	-	-

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK06, Slick Rock East Processing Site  
 REPORT DATE: 4/30/2010 3:54 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
pH	s.u.	0307	WL	09/24/2008	N001	4.40 - 14.40	7.05	F #	-	-
	s.u.	0307	WL	09/23/2009	N001	4.40 - 14.40	7.25	F #	-	-
	s.u.	0309	WL	09/23/2008	N001	10.20 - 20.20	7.29	F #	-	-
	s.u.	0309	WL	09/24/2009	N001	10.20 - 20.20	7.48	F #	-	-
	s.u.	0310	WL	09/22/2008	N001	14.70 - 19.70	6.74	F #	-	-
	s.u.	0310	WL	09/23/2009	N001	14.70 - 19.70	7.39	F #	-	-
	s.u.	0311	WL	09/22/2008	N001	14.10 - 19.10	6.57	F #	-	-
	s.u.	0311	WL	09/23/2009	N001	14.10 - 19.10	7.08	QF #	-	-
	s.u.	0312	WL	09/22/2008	N001	14.50 - 19.50	7.07	F #	-	-
	s.u.	0312	WL	09/23/2009	N001	14.50 - 19.50	7.42	F #	-	-
Selenium	mg/L	0305	WL	09/24/2008	N001	8.70 - 18.70	0.018	F #	4.7E-05	-
	mg/L	0305	WL	09/23/2009	N001	8.70 - 18.70	0.018	F #	6.4E-05	-
	mg/L	0307	WL	09/24/2008	N001	4.40 - 14.40	0.00038	F #	2.4E-05	-
	mg/L	0307	WL	09/23/2009	N001	4.40 - 14.40	0.00039	JF #	3.2E-05	-
Specific Conductance	umhos/cm	0303	WL	09/24/2008	N001	4.30 - 14.30	3100	F #	-	-
	umhos/cm	0303	WL	09/23/2009	N001	4.30 - 14.30	3514	F #	-	-
	umhos/cm	0305	WL	09/24/2008	N001	8.70 - 18.70	3662	F #	-	-
	umhos/cm	0305	WL	09/23/2009	N001	8.70 - 18.70	3606	F #	-	-
	umhos/cm	0307	WL	09/24/2008	N001	4.40 - 14.40	5717	F #	-	-
	umhos/cm	0307	WL	09/23/2009	N001	4.40 - 14.40	6013	F #	-	-
	umhos/cm	0309	WL	09/23/2008	N001	10.20 - 20.20	5077	F #	-	-
	umhos/cm	0309	WL	09/24/2009	N001	10.20 - 20.20	5616	F #	-	-
	umhos/cm	0310	WL	09/22/2008	N001	14.70 - 19.70	1108	F #	-	-
	umhos/cm	0310	WL	09/23/2009	N001	14.70 - 19.70	913	F #	-	-
	umhos/cm	0311	WL	09/22/2008	N001	14.10 - 19.10	3966	F #	-	-
	umhos/cm	0311	WL	09/23/2009	N001	14.10 - 19.10	2329	QF #	-	-

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK06, Slick Rock East Processing Site  
 REPORT DATE: 4/30/2010 3:54 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Specific Conductance	umhos/cm	0312	WL	09/22/2008	N001	14.50 - 19.50	3083	F #	-	-
	umhos/cm	0312	WL	09/23/2009	N001	14.50 - 19.50	3145	F #	-	-
Temperature	C	0303	WL	09/24/2008	N001	4.30 - 14.30	17.93	F #	-	-
	C	0303	WL	09/23/2009	N001	4.30 - 14.30	18.21	F #	-	-
	C	0305	WL	09/24/2008	N001	8.70 - 18.70	15.86	F #	-	-
	C	0305	WL	09/23/2009	N001	8.70 - 18.70	16.48	F #	-	-
	C	0307	WL	09/24/2008	N001	4.40 - 14.40	14.24	F #	-	-
	C	0307	WL	09/23/2009	N001	4.40 - 14.40	15.39	F #	-	-
	C	0309	WL	09/23/2008	N001	10.20 - 20.20	14.95	F #	-	-
	C	0309	WL	09/24/2009	N001	10.20 - 20.20	13.35	F #	-	-
	C	0310	WL	09/22/2008	N001	14.70 - 19.70	14.24	F #	-	-
	C	0310	WL	09/23/2009	N001	14.70 - 19.70	14.43	F #	-	-
	C	0311	WL	09/22/2008	N001	14.10 - 19.10	16.98	F #	-	-
	C	0311	WL	09/23/2009	N001	14.10 - 19.10	16.79	QF #	-	-
	C	0312	WL	09/22/2008	N001	14.50 - 19.50	17.79	F #	-	-
C	0312	WL	09/23/2009	N001	14.50 - 19.50	17.33	F #	-	-	
Turbidity	NTU	0303	WL	09/24/2008	N001	4.30 - 14.30	8.4	F #	-	-
	NTU	0303	WL	09/23/2009	N001	4.30 - 14.30	3.77	F #	-	-
	NTU	0305	WL	09/24/2008	N001	8.70 - 18.70	5.8	F #	-	-
	NTU	0305	WL	09/23/2009	N001	8.70 - 18.70	6.21	F #	-	-
	NTU	0307	WL	09/24/2008	N001	4.40 - 14.40	6.90	F #	-	-
	NTU	0307	WL	09/23/2009	N001	4.40 - 14.40	7.90	F #	-	-
	NTU	0309	WL	09/23/2008	N001	10.20 - 20.20	5.2	F #	-	-
	NTU	0309	WL	09/24/2009	N001	10.20 - 20.20	5.24	F #	-	-
	NTU	0310	WL	09/22/2008	N001	14.70 - 19.70	2.35	F #	-	-
	NTU	0310	WL	09/23/2009	N001	14.70 - 19.70	9.81	F #	-	-

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK06, Slick Rock East Processing Site  
 REPORT DATE: 4/30/2010 3:54 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Turbidity	NTU	0311	WL	09/22/2008	N001	14.10 - 19.10	1.07	F #	-	-
	NTU	0311	WL	09/23/2009	N001	14.10 - 19.10	3.16	QF #	-	-
	NTU	0312	WL	09/22/2008	N001	14.50 - 19.50	1.52	F #	-	-
	NTU	0312	WL	09/23/2009	N001	14.50 - 19.50	1.66	F #	-	-
Uranium	mg/L	0303	WL	09/24/2008	N001	4.30 - 14.30	0.940	F #	0.00009	-
	mg/L	0303	WL	09/23/2009	N001	4.30 - 14.30	1.300	F #	8.7E-05	-
	mg/L	0305	WL	09/24/2008	N001	8.70 - 18.70	0.970	F #	0.00009	-
	mg/L	0305	WL	09/23/2009	N001	8.70 - 18.70	0.930	F #	4.4E-05	-
	mg/L	0307	WL	09/24/2008	N001	4.40 - 14.40	0.610	F #	0.00009	-
	mg/L	0307	WL	09/23/2009	N001	4.40 - 14.40	0.530	F #	4.4E-05	-
	mg/L	0309	WL	09/23/2008	N001	10.20 - 20.20	0.300	F #	4.5E-05	-
	mg/L	0309	WL	09/24/2009	N001	10.20 - 20.20	0.200	F #	8.7E-06	-
	mg/L	0310	WL	09/22/2008	N001	14.70 - 19.70	0.037	F #	4.5E-06	-
	mg/L	0310	WL	09/23/2009	N001	14.70 - 19.70	0.025	F #	1.7E-06	-
	mg/L	0311	WL	09/22/2008	N001	14.10 - 19.10	0.180	F #	2.2E-05	-
	mg/L	0311	WL	09/23/2009	N001	14.10 - 19.10	0.110	QF #	8.7E-06	-
	mg/L	0312	WL	09/22/2008	N001	14.50 - 19.50	0.061	F #	4.5E-06	-
	mg/L	0312	WL	09/23/2009	N001	14.50 - 19.50	0.068	F #	1.7E-06	-

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK06, Slick Rock East Processing Site  
 REPORT DATE: 4/30/2010 3:54 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
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RECORDS: SELECTED FROM USEE200 WHERE site\_code='SRK06' AND location\_code in('0303','0305','0307','0309','0310','0311','0312') AND (data\_validation\_qualifiers IS NULL OR data\_validation\_qualifiers NOT LIKE '%R%' AND data\_validation\_qualifiers NOT LIKE '%X%') AND DATE\_SAMPLED between #1/1/2008# and #1/1/2010#

SAMPLE ID CODES: 000X = Filtered sample. N00X = Unfiltered sample. X = replicate number.

LOCATION TYPES: WL WELL

LAB QUALIFIERS:

- \* Replicate analysis not within control limits.
- + Correlation coefficient for MSA < 0.995.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: 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
- M GFAA duplicate injection precision not met.
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
- S Result determined by method of standard addition (MSA).
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Z Laboratory defined (USEPA CLP organic) 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.
- N Presumptive evidence that analyte is present. The analyte is "tentatively identified".
- Q Qualitative result due to sampling technique
- R Unusable result.
- U Parameter analyzed for but was not detected.
- X Location is undefined.

QA QUALIFIER: # = validated according to Quality Assurance guidelines.

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GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:01 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Alkalinity, Total (As CaCO3)	mg/L	0317	WL	09/23/2009	N001	19.46 - 39.52	287	F #	-	-
	mg/L	0318	WL	09/23/2009	N001	4.99 - 15.02	272	F #	-	-
	mg/L	0319	WL	09/22/2009	N001	4.55 - 14.58	327	F #	-	-
	mg/L	0320	WL	09/23/2009	N001	4.92 - 9.96	415	F #	-	-
	mg/L	0508	WL	09/23/2009	N001	1.01 - 11.01	298	F #	-	-
	mg/L	0510	WL	09/23/2009	N001	4.92 - 13.92	257	F #	-	-
	mg/L	0684	WL	09/23/2009	N001	11.00 - 21.00	218	F #	-	-
Benzene	ug/L	0319	WL	09/23/2008	N001	4.55 - 14.58	7400	F #	83	-
	ug/L	0319	WL	09/23/2008	N002	4.55 - 14.58	7200	F #	83	-
	ug/L	0319	WL	09/22/2009	N001	4.55 - 14.58	3900	JF #	33	-
	ug/L	0319	WL	09/22/2009	N002	4.55 - 14.58	3500	JF #	33	-
Ethylbenzene	ug/L	0319	WL	09/23/2008	N001	4.55 - 14.58	240	J F #	83	-
	ug/L	0319	WL	09/23/2008	N002	4.55 - 14.58	260	F #	83	-
	ug/L	0319	WL	09/22/2009	N001	4.55 - 14.58	100	JF #	8.3	-
	ug/L	0319	WL	09/22/2009	N002	4.55 - 14.58	130	JF #	8.3	-
m,p-Xylene	ug/L	0319	WL	09/23/2008	N001	4.55 - 14.58	3800	F #	83	-
	ug/L	0319	WL	09/23/2008	N002	4.55 - 14.58	3900	F #	83	-
	ug/L	0319	WL	09/22/2009	N001	4.55 - 14.58	3700	JF #	8.3	-
	ug/L	0319	WL	09/22/2009	N002	4.55 - 14.58	3600	JF #	8.3	-
Manganese	mg/L	0318	WL	09/23/2008	N001	4.99 - 15.02	0.100	F #	0.0002	-
	mg/L	0318	WL	09/23/2009	N001	4.99 - 15.02	0.039	F #	0.0001	-
	mg/L	0320	WL	09/23/2008	N001	4.92 - 9.96	0.540	F #	0.0002	-
	mg/L	0320	WL	09/23/2009	N001	4.92 - 9.96	0.470	F #	0.0001	-
	mg/L	0508	WL	09/23/2008	N001	1.01 - 11.01	4.900	F #	0.0002	-
	mg/L	0508	WL	09/23/2009	N001	1.01 - 11.01	3.900	F #	0.0001	-

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:01 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Manganese	mg/L	0508	WL	09/23/2009	N002	1.01 - 11.01	4.000	F #	0.0001	-
	mg/L	0510	WL	09/23/2008	N001	4.92 - 13.92	5.300	F #	0.0002	-
	mg/L	0510	WL	09/23/2009	N001	4.92 - 13.92	4.800	F #	0.0001	-
	mg/L	0684	WL	09/23/2008	N001	11.00 - 21.00	0.400	F #	0.0002	-
	mg/L	0684	WL	09/23/2008	N002	11.00 - 21.00	0.350	F #	0.0002	-
	mg/L	0684	WL	09/23/2009	N001	11.00 - 21.00	0.260	F #	0.0001	-
	mg/L	0684	WL	09/23/2009	N002	11.00 - 21.00	0.250	F #	0.0001	-
Molybdenum	mg/L	0317	WL	09/23/2008	N001	19.46 - 39.52	0.200	F #	0.0005	-
	mg/L	0317	WL	09/23/2009	N001	19.46 - 39.52	0.190	F #	0.00034	-
	mg/L	0318	WL	09/23/2008	N001	4.99 - 15.02	4.800	F #	0.01	-
	mg/L	0318	WL	09/23/2009	N001	4.99 - 15.02	3.400	F #	0.0034	-
	mg/L	0320	WL	09/23/2008	N001	4.92 - 9.96	0.0099	F #	0.0001	-
	mg/L	0320	WL	09/23/2009	N001	4.92 - 9.96	0.011	F #	6.7E-05	-
	mg/L	0508	WL	09/23/2008	N001	1.01 - 11.01	1.200	F #	0.002	-
	mg/L	0508	WL	09/23/2009	N001	1.01 - 11.01	1.400	F #	0.0013	-
	mg/L	0508	WL	09/23/2009	N002	1.01 - 11.01	1.300	F #	0.0013	-
	mg/L	0510	WL	09/23/2008	N001	4.92 - 13.92	0.880	F #	0.002	-
	mg/L	0510	WL	09/23/2009	N001	4.92 - 13.92	0.930	F #	0.00067	-
	mg/L	0684	WL	09/23/2008	N001	11.00 - 21.00	0.0053	F #	0.0001	-
	mg/L	0684	WL	09/23/2008	N002	11.00 - 21.00	0.0049	F #	0.0001	-
	mg/L	0684	WL	09/23/2009	N001	11.00 - 21.00	0.0055	F #	6.7E-05	-
	mg/L	0684	WL	09/23/2009	N002	11.00 - 21.00	0.0056	F #	6.7E-05	-
Nitrate + Nitrite as Nitrogen	mg/L	0318	WL	09/23/2008	N001	4.99 - 15.02	240	F #	2	-
	mg/L	0318	WL	09/23/2009	N001	4.99 - 15.02	140	F #	5	-
	mg/L	0320	WL	09/23/2008	N001	4.92 - 9.96	0.014	F #	0.01	-
	mg/L	0320	WL	09/23/2009	N001	4.92 - 9.96	0.086	F #	0.01	-

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:01 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Nitrate + Nitrite as Nitrogen	mg/L	0508	WL	09/23/2008	N001	1.01 - 11.01	330	F #	5	-
	mg/L	0508	WL	09/23/2009	N001	1.01 - 11.01	280	F #	5	-
	mg/L	0508	WL	09/23/2009	N002	1.01 - 11.01	280	F #	5	-
	mg/L	0510	WL	09/23/2008	N001	4.92 - 13.92	390	F #	5	-
	mg/L	0510	WL	09/23/2009	N001	4.92 - 13.92	360	F #	5	-
	mg/L	0684	WL	09/23/2008	N001	11.00 - 21.00	0.033	F #	0.01	-
	mg/L	0684	WL	09/23/2008	N002	11.00 - 21.00	0.035	F #	0.01	-
	mg/L	0684	WL	09/23/2009	N001	11.00 - 21.00	0.016	F #	0.01	-
Oxidation Reduction Potential	mV	0317	WL	09/23/2008	N001	19.46 - 39.52	58	F #	-	-
	mV	0317	WL	09/23/2009	N001	19.46 - 39.52	32.8	JF #	-	-
	mV	0318	WL	09/23/2008	N001	4.99 - 15.02	177	F #	-	-
	mV	0318	WL	09/23/2009	N001	4.99 - 15.02	44.1	JF #	-	-
	mV	0319	WL	09/23/2008	N001	4.55 - 14.58	-131	F #	-	-
	mV	0319	WL	09/22/2009	N001	4.55 - 14.58	-133.8	F #	-	-
	mV	0320	WL	09/23/2008	N001	4.92 - 9.96	-43	F #	-	-
	mV	0320	WL	09/23/2009	N001	4.92 - 9.96	-51.1	JF #	-	-
	mV	0508	WL	09/23/2008	N001	1.01 - 11.01	81	F #	-	-
	mV	0508	WL	09/23/2009	N001	1.01 - 11.01	59.6	JF #	-	-
	mV	0510	WL	09/23/2008	N001	4.92 - 13.92	68	F #	-	-
	mV	0510	WL	09/23/2009	N001	4.92 - 13.92	52.1	JF #	-	-
	mV	0684	WL	09/23/2008	N001	11.00 - 21.00	85	F #	-	-
	mV	0684	WL	09/23/2009	N001	11.00 - 21.00	32.2	JF #	-	-
o-Xylene	ug/L	0319	WL	09/23/2008	N001	4.55 - 14.58	750	F #	83	-
	ug/L	0319	WL	09/23/2008	N002	4.55 - 14.58	770	F #	83	-

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:01 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
o-Xylene	ug/L	0319	WL	09/22/2009	N001	4.55 - 14.58	760	JF #	8.3	-
	ug/L	0319	WL	09/22/2009	N002	4.55 - 14.58	750	JF #	8.3	-
pH	s.u.	0317	WL	09/23/2008	N001	19.46 - 39.52	7.12	F #	-	-
	s.u.	0317	WL	09/23/2009	N001	19.46 - 39.52	7.41	F #	-	-
	s.u.	0318	WL	09/23/2008	N001	4.99 - 15.02	6.51	F #	-	-
	s.u.	0318	WL	09/23/2009	N001	4.99 - 15.02	6.96	F #	-	-
	s.u.	0319	WL	09/23/2008	N001	4.55 - 14.58	6.64	F #	-	-
	s.u.	0319	WL	09/22/2009	N001	4.55 - 14.58	7.04	F #	-	-
	s.u.	0320	WL	09/23/2008	N001	4.92 - 9.96	6.88	F #	-	-
	s.u.	0320	WL	09/23/2009	N001	4.92 - 9.96	7.19	F #	-	-
	s.u.	0508	WL	09/23/2008	N001	1.01 - 11.01	6.31	F #	-	-
	s.u.	0508	WL	09/23/2009	N001	1.01 - 11.01	6.78	F #	-	-
	s.u.	0510	WL	09/23/2008	N001	4.92 - 13.92	6.41	F #	-	-
	s.u.	0510	WL	09/23/2009	N001	4.92 - 13.92	6.60	F #	-	-
	s.u.	0684	WL	09/23/2008	N001	11.00 - 21.00	6.88	F #	-	-
	s.u.	0684	WL	09/23/2009	N001	11.00 - 21.00	7.44	F #	-	-
Radium-226	pCi/L	0319	WL	09/23/2008	N001	4.55 - 14.58	1.83	F #	0.51	± 0.68
	pCi/L	0319	WL	09/23/2008	N002	4.55 - 14.58	1.93	F #	0.31	± 0.64
	pCi/L	0319	WL	09/22/2009	N001	4.55 - 14.58	3.05	F #	1.1	± 1.26
	pCi/L	0319	WL	09/22/2009	N002	4.55 - 14.58	1.26	F #	0.71	± 0.66
Radium-228	pCi/L	0319	WL	09/23/2008	N001	4.55 - 14.58	2.04	F #	0.61	± 0.71
	pCi/L	0319	WL	09/23/2008	N002	4.55 - 14.58	2.48	F #	0.66	± 0.84
	pCi/L	0319	WL	09/22/2009	N001	4.55 - 14.58	1.47	F #	0.55	± 0.58
	pCi/L	0319	WL	09/22/2009	N002	4.55 - 14.58	1.4	F #	0.57	± 0.57
Selenium	mg/L	0318	WL	09/23/2008	N001	4.99 - 15.02	8.000	F #	0.024	-

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:01 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Selenium	mg/L	0318	WL	09/23/2009	N001	4.99 - 15.02	5.300	F #	0.032	-
	mg/L	0320	WL	09/23/2008	N001	4.92 - 9.96	0.00004	B F #	2.4E-05	-
	mg/L	0320	WL	09/23/2009	N001	4.92 - 9.96	0.00009	B UJF #	3.2E-05	-
	mg/L	0508	WL	09/23/2008	N001	1.01 - 11.01	1.500	F #	0.0059	-
	mg/L	0508	WL	09/23/2009	N001	1.01 - 11.01	1.400	F #	0.0064	-
	mg/L	0508	WL	09/23/2009	N002	1.01 - 11.01	1.300	F #	0.0064	-
	mg/L	0510	WL	09/23/2008	N001	4.92 - 13.92	1.100	F #	0.0059	-
	mg/L	0510	WL	09/23/2009	N001	4.92 - 13.92	1.200	F #	0.0064	-
	mg/L	0684	WL	09/23/2008	N001	11.00 - 21.00	0.00035	F #	2.4E-05	-
	mg/L	0684	WL	09/23/2008	N002	11.00 - 21.00	0.00033	F #	2.4E-05	-
	mg/L	0684	WL	09/23/2009	N001	11.00 - 21.00	0.0003	UJF #	3.2E-05	-
	mg/L	0684	WL	09/23/2009	N002	11.00 - 21.00	0.00029	UJF #	3.2E-05	-
Specific Conductance	umhos/cm	0317	WL	09/23/2008	N001	19.46 - 39.52	2725	F #	-	-
	umhos/cm	0317	WL	09/23/2009	N001	19.46 - 39.52	2283	F #	-	-
	umhos/cm	0318	WL	09/23/2008	N001	4.99 - 15.02	3541	F #	-	-
	umhos/cm	0318	WL	09/23/2009	N001	4.99 - 15.02	2787	F #	-	-
	umhos/cm	0319	WL	09/23/2008	N001	4.55 - 14.58	6289	F #	-	-
	umhos/cm	0319	WL	09/22/2009	N001	4.55 - 14.58	6386	F #	-	-
	umhos/cm	0320	WL	09/23/2008	N001	4.92 - 9.96	1056	F #	-	-
	umhos/cm	0320	WL	09/23/2009	N001	4.92 - 9.96	931	F #	-	-
	umhos/cm	0508	WL	09/23/2008	N001	1.01 - 11.01	4395	F #	-	-
	umhos/cm	0508	WL	09/23/2009	N001	1.01 - 11.01	4129	F #	-	-
	umhos/cm	0510	WL	09/23/2008	N001	4.92 - 13.92	5292	F #	-	-
	umhos/cm	0510	WL	09/23/2009	N001	4.92 - 13.92	4817	F #	-	-
	umhos/cm	0684	WL	09/23/2008	N001	11.00 - 21.00	853	F #	-	-
	umhos/cm	0684	WL	09/23/2009	N001	11.00 - 21.00	772	F #	-	-

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:01 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Temperature	C	0317	WL	09/23/2008	N001	19.46 - 39.52	14.64	F #	-	-
	C	0317	WL	09/23/2009	N001	19.46 - 39.52	13.65	F #	-	-
	C	0318	WL	09/23/2008	N001	4.99 - 15.02	18.76	F #	-	-
	C	0318	WL	09/23/2009	N001	4.99 - 15.02	17.73	F #	-	-
	C	0319	WL	09/23/2008	N001	4.55 - 14.58	17.13	F #	-	-
	C	0319	WL	09/22/2009	N001	4.55 - 14.58	17.33	F #	-	-
	C	0320	WL	09/23/2008	N001	4.92 - 9.96	16.11	F #	-	-
	C	0320	WL	09/23/2009	N001	4.92 - 9.96	16.54	F #	-	-
	C	0508	WL	09/23/2008	N001	1.01 - 11.01	18.58	F #	-	-
	C	0508	WL	09/23/2009	N001	1.01 - 11.01	18.50	F #	-	-
	C	0510	WL	09/23/2008	N001	4.92 - 13.92	15.67	F #	-	-
	C	0510	WL	09/23/2009	N001	4.92 - 13.92	15.92	F #	-	-
	C	0684	WL	09/23/2008	N001	11.00 - 21.00	13.92	F #	-	-
	C	0684	WL	09/23/2009	N001	11.00 - 21.00	14.89	F #	-	-
Toluene	ug/L	0319	WL	09/23/2008	N001	4.55 - 14.58	6000	F #	83	-
	ug/L	0319	WL	09/23/2008	N002	4.55 - 14.58	5800	F #	83	-
	ug/L	0319	WL	09/22/2009	N001	4.55 - 14.58	2800	JF #	33	-
	ug/L	0319	WL	09/22/2009	N002	4.55 - 14.58	2500	JF #	33	-
Turbidity	NTU	0317	WL	09/23/2008	N001	19.46 - 39.52	9.4	F #	-	-
	NTU	0317	WL	09/23/2009	N001	19.46 - 39.52	3.14	F #	-	-
	NTU	0318	WL	09/23/2008	N001	4.99 - 15.02	5.9	F #	-	-
	NTU	0319	WL	09/23/2008	N001	4.55 - 14.58	4.72	F #	-	-
	NTU	0319	WL	09/22/2009	N001	4.55 - 14.58	6.70	F #	-	-
	NTU	0320	WL	09/23/2008	N001	4.92 - 9.96	2.81	F #	-	-
	NTU	0320	WL	09/23/2009	N001	4.92 - 9.96	9.04	F #	-	-
	NTU	0508	WL	09/23/2008	N001	1.01 - 11.01	2.06	F #	-	-

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:01 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Turbidity	NTU	0508	WL	09/23/2009	N001	1.01 - 11.01	1.53	F #	-	-
	NTU	0510	WL	09/23/2008	N001	4.92 - 13.92	1.88	F #	-	-
	NTU	0510	WL	09/23/2009	N001	4.92 - 13.92	1.25	F #	-	-
	NTU	0684	WL	09/23/2008	N001	11.00 - 21.00	5.26	F #	-	-
	NTU	0684	WL	09/23/2009	N001	11.00 - 21.00	5.57	F #	-	-
Uranium	mg/L	0318	WL	09/23/2008	N001	4.99 - 15.02	0.031	F #	4.5E-06	-
	mg/L	0318	WL	09/23/2009	N001	4.99 - 15.02	0.025	F #	8.7E-05	-
	mg/L	0320	WL	09/23/2008	N001	4.92 - 9.96	0.016	F #	4.5E-06	-
	mg/L	0320	WL	09/23/2009	N001	4.92 - 9.96	0.014	F #	1.7E-06	-
	mg/L	0508	WL	09/23/2008	N001	1.01 - 11.01	0.084	F #	0.00009	-
	mg/L	0508	WL	09/23/2009	N001	1.01 - 11.01	0.091	F #	3.5E-05	-
	mg/L	0508	WL	09/23/2009	N002	1.01 - 11.01	0.078	F #	3.5E-05	-
	mg/L	0510	WL	09/23/2008	N001	4.92 - 13.92	0.110	F #	0.00009	-
	mg/L	0510	WL	09/23/2009	N001	4.92 - 13.92	0.120	F #	1.7E-05	-
	mg/L	0684	WL	09/23/2008	N001	11.00 - 21.00	0.014	F #	4.5E-06	-
	mg/L	0684	WL	09/23/2008	N002	11.00 - 21.00	0.014	F #	4.5E-06	-
	mg/L	0684	WL	09/23/2009	N001	11.00 - 21.00	0.011	F #	1.7E-06	-
	mg/L	0684	WL	09/23/2009	N002	11.00 - 21.00	0.011	F #	1.7E-06	-

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:01 pm

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
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RECORDS: SELECTED FROM USEE200 WHERE site\_code='SRK05' AND location\_code in('0317','0318','0319','0320','0324','0508','0510','0684') AND (data\_validation\_qualifiers IS NULL OR data\_validation\_qualifiers NOT LIKE '%R%' AND data\_validation\_qualifiers NOT LIKE '%X%') AND DATE\_SAMPLED between #1/1/2008# and #1/1/2010#

SAMPLE ID CODES: 000X = Filtered sample. N00X = Unfiltered sample. X = replicate number.

LOCATION TYPES: WL WELL

LAB QUALIFIERS:

- \* Replicate analysis not within control limits.
- + Correlation coefficient for MSA < 0.995.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: 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
- M GFAA duplicate injection precision not met.
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
- S Result determined by method of standard addition (MSA).
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Z Laboratory defined (USEPA CLP organic) 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.
- N Presumptive evidence that analyte is present. The analyte is "tentatively identified".
- 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.

## **Appendix B**

### **Surface Water Quality Data by Parameter**

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SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE SRK06, Slick Rock East Processing Site  
 REPORT DATE: 4/30/2010 4:04 pm

PARAMETER	UNITS	LOCATION CODE	SAMPLE:		RESULT	QUALIFIERS: DETECTION UN-		
			DATE	ID		LAB DATA QA	LIMIT	CERTAINTY
Alkalinity, Total (As CaCO3)	mg/L	0692	09/24/2009	0001	126	#	-	-
	mg/L	0696	09/24/2009	0001	115	#	-	-
	mg/L	0700	09/24/2009	0001	134	#	-	-
Oxidation Reduction Potential	mV	0692	09/24/2008	N001	17	#	-	-
	mV	0692	09/24/2009	N001	15.7	#	-	-
	mV	0696	09/22/2008	N001	79	#	-	-
	mV	0696	09/24/2009	N001	51.8	#	-	-
	mV	0700	09/23/2008	N001	64	#	-	-
	mV	0700	09/24/2009	N001	-19.5	#	-	-
pH	s.u.	0692	09/24/2008	N001	8.39	#	-	-
	s.u.	0692	09/24/2009	N001	8.16	#	-	-
	s.u.	0696	09/22/2008	N001	8.23	#	-	-
	s.u.	0696	09/24/2009	N001	8.12	#	-	-
	s.u.	0700	09/23/2008	N001	8.55	#	-	-
	s.u.	0700	09/24/2009	N001	8.23	#	-	-
Specific Conductance	umhos/cm	0692	09/24/2008	N001	385	#	-	-
	umhos/cm	0692	09/24/2009	N001	463	#	-	-
	umhos/cm	0696	09/22/2008	N001	392	#	-	-
	umhos/cm	0696	09/24/2009	N001	459	#	-	-
	umhos/cm	0700	09/23/2008	N001	394	#	-	-
	umhos/cm	0700	09/24/2009	N001	541	#	-	-
Temperature	C	0692	09/24/2008	N001	14.61	#	-	-
	C	0692	09/24/2009	N001	12.71	#	-	-
	C	0696	09/22/2008	N001	18.68	#	-	-
	C	0696	09/24/2009	N001	13.11	#	-	-
	C	0700	09/23/2008	N001	23.34	#	-	-
	C	0700	09/24/2009	N001	12.14	#	-	-
Turbidity	NTU	0692	09/24/2008	N001	17.3	#	-	-
	NTU	0692	09/24/2009	N001	183	#	-	-
	NTU	0696	09/22/2008	N001	21.1	#	-	-
	NTU	0696	09/24/2009	N001	149	#	-	-
	NTU	0700	09/23/2008	N001	11.6	#	-	-
	NTU	0700	09/24/2009	N001	199	#	-	-
Uranium	mg/L	0692	09/24/2008	0001	0.0007	#	4.5E-06	-
	mg/L	0692	09/24/2009	0001	0.0008	#	1.7E-06	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE SRK06, Slick Rock East Processing Site  
 REPORT DATE: 4/30/2010 4:04 pm

PARAMETER	UNITS	LOCATION CODE	SAMPLE:		RESULT	QUALIFIERS:		DETECTION LIMIT	UN-CERTAINTY
			DATE	ID		LAB DATA	QA		
Uranium	mg/L	0696	09/22/2008	0001	0.0006		#	4.5E-06	-
	mg/L	0696	09/24/2009	0001	0.0007		#	1.7E-06	-
	mg/L	0700	09/23/2008	0001	0.0009		#	4.5E-06	-
	mg/L	0700	09/24/2009	0001	0.0012		#	1.7E-06	-

RECORDS: SELECTED FROM USEE800 WHERE site\_code='SRK06' AND (data\_validation\_qualifiers IS NULL OR data\_validation\_qualifiers NOT LIKE '%R%' AND data\_validation\_qualifiers NOT LIKE '%X%' ) AND DATE\_SAMPLED between #1/1/2008# and #1/1/2010#

SAMPLE ID CODES: 000X = Filtered sample. N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- \* Replicate analysis not within control limits.
- + Correlation coefficient for MSA < 0.995.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: 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
- M GFAA duplicate injection precision not met.
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
- S Result determined by method of standard addition (MSA).
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Z Laboratory defined (USEPA CLP organic) qualifier, see case narrative.

DATA QUALIFIERS:

- F Low flow sampling method used.
- J Estimated value.
- N Presumptive evidence that analyte is present. The analyte is "tentatively identified".
- R Unusable result.
- X Location is undefined.
- G Possible grout contamination, pH > 9.
- L Less than 3 bore volumes purged prior to sampling.
- Q Qualitative result due to sampling technique
- U Parameter analyzed for but was not detected.

QA QUALIFIER: # = validated according to Quality Assurance guidelines.

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:06 pm

PARAMETER	UNITS	LOCATION CODE	SAMPLE:		RESULT	QUALIFIERS:			DETECTION LIMIT	UN-CERTAINTY	
			DATE	ID		LAB	DATA	QA			
Alkalinity, Total (As CaCO3)	mg/L	0347	09/23/2009	0001	149				#	-	-
	mg/L	0349	09/23/2009	0001	132				#	-	-
	mg/L	0693	09/23/2009	0001	139				#	-	-
	mg/L	0694	09/23/2009	0001	145				#	-	-
Manganese	mg/L	0347	09/23/2008	0001	0.001	B	J		#	0.0002	-
	mg/L	0347	09/23/2009	0001	0.0035	B			#	0.0001	-
	mg/L	0349	09/23/2008	0001	0.0027	B	J		#	0.0002	-
	mg/L	0349	09/23/2009	0001	0.0053				#	0.0001	-
	mg/L	0693	09/22/2008	0001	0.0025	B	J		#	0.0002	-
	mg/L	0693	09/23/2009	0001	0.0009	B	J		#	0.0001	-
	mg/L	0694	09/22/2008	0001	0.0057				#	0.0002	-
	mg/L	0694	09/23/2009	0001	0.0046	B			#	0.0001	-
Molybdenum	mg/L	0347	09/23/2008	0001	0.0014			U	#	0.0001	-
	mg/L	0347	09/23/2009	0001	0.0016				#	6.7E-05	-
	mg/L	0349	09/23/2008	0001	0.0016				#	0.0001	-
	mg/L	0349	09/23/2009	0001	0.0018				#	6.7E-05	-
	mg/L	0693	09/22/2008	0001	0.0012			U	#	0.0001	-
	mg/L	0693	09/23/2009	0001	0.0016				#	6.7E-05	-
	mg/L	0694	09/22/2008	0001	0.0013			U	#	0.0001	-
	mg/L	0694	09/23/2009	0001	0.0018				#	6.7E-05	-
Nitrate + Nitrite as Nitrogen	mg/L	0347	09/23/2008	0001	0.017				#	0.01	-
	mg/L	0347	09/23/2009	0001	0.032				#	0.01	-
	mg/L	0349	09/23/2008	0001	0.16				#	0.01	-
	mg/L	0349	09/23/2009	0001	0.052				#	0.01	-
	mg/L	0693	09/22/2008	0001	0.01			U	#	0.01	-
	mg/L	0693	09/23/2009	0001	0.01			U	#	0.01	-
	mg/L	0694	09/22/2008	0001	0.036				#	0.01	-
	mg/L	0694	09/23/2009	0001	0.074				#	0.01	-
Oxidation Reduction Potential	mV	0347	09/23/2008	N001	64				#	-	-
	mV	0347	09/23/2009	N001	16.3		J		#	-	-
	mV	0349	09/23/2008	N001	-0.6				#	-	-
	mV	0349	09/23/2009	N001	38.5		J		#	-	-
	mV	0693	09/22/2008	N001	79				#	-	-
	mV	0693	09/23/2009	N001	27.4		J		#	-	-
	mV	0694	09/22/2008	N001	84				#	-	-
	mV	0694	09/23/2009	N001	-9.0		J		#	-	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:06 pm

PARAMETER	UNITS	LOCATION CODE	SAMPLE:		RESULT	QUALIFIERS: DETECTION UN-		
			DATE	ID		LAB DATA QA	LIMIT	CERTAINTY
pH	s.u.	0347	09/23/2008	N001	8.00	#	-	-
	s.u.	0347	09/23/2009	N001	8.26	#	-	-
	s.u.	0349	09/23/2008	N001	8.52	#	-	-
	s.u.	0349	09/23/2009	N001	8.41	#	-	-
	s.u.	0693	09/22/2008	N001	8.15	#	-	-
	s.u.	0693	09/23/2009	N001	8.33	#	-	-
	s.u.	0694	09/22/2008	N001	8.22	#	-	-
	s.u.	0694	09/23/2009	N001	8.31	#	-	-
Selenium	mg/L	0347	09/23/2008	0001	0.0001	#	2.4E-05	-
	mg/L	0347	09/23/2009	0001	0.0007	#	3.2E-05	-
	mg/L	0349	09/23/2008	0001	0.0007	#	2.4E-05	-
	mg/L	0349	09/23/2009	0001	0.0009	#	3.2E-05	-
	mg/L	0693	09/22/2008	0001	0.0001	#	2.4E-05	-
	mg/L	0693	09/23/2009	0001	0.0008	#	3.2E-05	-
	mg/L	0694	09/22/2008	0001	0.0003	#	2.4E-05	-
	mg/L	0694	09/23/2009	0001	0.0015	#	3.2E-05	-
Specific Conductance	umhos/cm	0347	09/23/2008	N001	408	#	-	-
	umhos/cm	0347	09/23/2009	N001	529	#	-	-
	umhos/cm	0349	09/23/2008	N001	430	#	-	-
	umhos/cm	0349	09/23/2009	N001	444	#	-	-
	umhos/cm	0693	09/22/2008	N001	411	#	-	-
	umhos/cm	0693	09/23/2009	N001	455	#	-	-
	umhos/cm	0694	09/22/2008	N001	432	#	-	-
	umhos/cm	0694	09/23/2009	N001	442	#	-	-
Temperature	C	0347	09/23/2008	N001	17.90	#	-	-
	C	0347	09/23/2009	N001	13.25	#	-	-
	C	0349	09/23/2008	N001	16.54	#	-	-
	C	0349	09/23/2009	N001	14.79	#	-	-
	C	0693	09/22/2008	N001	24.30	#	-	-
	C	0693	09/23/2009	N001	19.94	#	-	-
	C	0694	09/22/2008	N001	18.65	#	-	-
	C	0694	09/23/2009	N001	14.18	#	-	-
Turbidity	NTU	0347	09/23/2008	N001	16.2	#	-	-
	NTU	0347	09/23/2009	N001	251	#	-	-
	NTU	0349	09/23/2008	N001	18.2	#	-	-
	NTU	0349	09/23/2009	N001	246	#	-	-
	NTU	0693	09/22/2008	N001	77.4	#	-	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:06 pm

PARAMETER	UNITS	LOCATION CODE	SAMPLE:		RESULT	QUALIFIERS:		DETECTION LIMIT	UN-CERTAINTY
			DATE	ID		LAB DATA	QA		
Turbidity	NTU	0693	09/23/2009	N001	145	#		-	-
	NTU	0694	09/22/2008	N001	18.5	#		-	-
	NTU	0694	09/23/2009	N001	186	#		-	-
Uranium	mg/L	0347	09/23/2008	0001	0.0007	#		4.5E-06	-
	mg/L	0347	09/23/2009	0001	0.0007	#		1.7E-06	-
	mg/L	0349	09/23/2008	0001	0.0008	#		4.5E-06	-
	mg/L	0349	09/23/2009	0001	0.0007	#		1.7E-06	-
	mg/L	0693	09/22/2008	0001	0.0007	#		4.5E-06	-
	mg/L	0693	09/23/2009	0001	0.0008	#		1.7E-06	-
	mg/L	0694	09/22/2008	0001	0.0007	#		4.5E-06	-
	mg/L	0694	09/23/2009	0001	0.0008	#		1.7E-06	-

RECORDS: SELECTED FROM USEE800 WHERE site\_code='SRK05' AND location\_code in('0347','0349','0693','0694') AND (data\_validation\_qualifiers IS NULL OR data\_validation\_qualifiers NOT LIKE '%R%' AND data\_validation\_qualifiers NOT LIKE '%X%') AND DATE\_SAMPLED between #1/1/2008# and #1/1/2010#

SAMPLE ID CODES: 000X = Filtered sample. N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- \* Replicate analysis not within control limits.
- + Correlation coefficient for MSA < 0.995.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: 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
- M GFAA duplicate injection precision not met.
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
- S Result determined by method of standard addition (MSA).
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Z Laboratory defined (USEPA CLP organic) qualifier, see case narrative.

DATA QUALIFIERS:

- F Low flow sampling method used.
- J Estimated value.
- N Presumptive evidence that analyte is present. The analyte is "tentatively identified".
- R Unusable result.
- X Location is undefined.
- G Possible grout contamination, pH > 9.
- L Less than 3 bore volumes purged prior to sampling.
- Q Qualitative result due to sampling technique
- U Parameter analyzed for but was not detected.

QA QUALIFIER: # = validated according to Quality Assurance guidelines.

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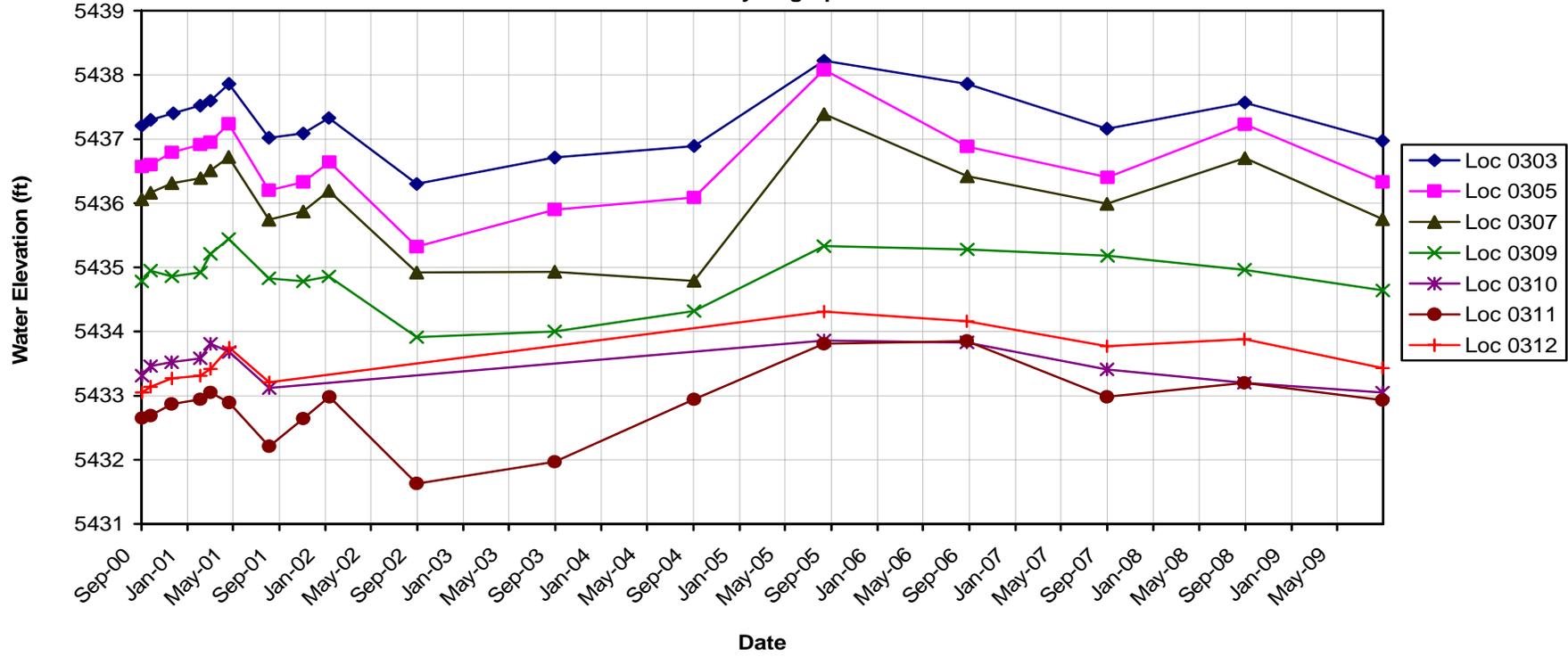
## **Appendix C**

### **Hydrographs and Static Water Level Data**

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# Slick Rock East Processing Site (SRK06)

## Hydrograph



STATIC WATER LEVELS (USEE700) FOR SITE SRK06, Slick Rock East Processing Site  
 REPORT DATE: 4/30/2010 4:16 pm

LOCATION CODE	FLOW CODE	TOP OF CASING ELEVATION (FT)	MEASUREMENT		DEPTH FROM TOP OF CASING (FT)	WATER ELEVATION (FT)	WATER LEVEL FLAG
			DATE	TIME			
0303	O	5446.91	09/26/2000	17:12	9.70	5437.21	
		5446.91	10/20/2000	11:22	9.61	5437.30	
		5446.91	12/19/2000	10:03	9.51	5437.40	
		5446.91	02/28/2001	15:18	9.39	5437.52	
		5446.91	03/27/2001	11:45	9.31	5437.60	
		5446.91	05/15/2001	09:44	9.05	5437.86	
		5446.91	08/29/2001	11:31	9.89	5437.02	
		5446.91	11/28/2001	14:39	9.82	5437.09	
		5446.91	02/04/2002	16:49	9.58	5437.33	
		5446.91	09/24/2002	14:45	10.61	5436.30	
		5446.91	09/24/2003	14:12	10.20	5436.71	
		5446.91	09/27/2004	12:47	10.02	5436.89	
		5446.91	09/06/2005	14:46	8.69	5438.22	
		5446.91	09/20/2006	15:35	9.05	5437.86	
		5446.91	09/25/2007		9.75	5437.16	
		5446.91	09/24/2008		9.34	5437.57	
		5446.91	09/23/2009		9.94	5436.97	
0305	O	5448.75	09/26/2000	12:27	12.18	5436.57	
		5448.75	10/20/2000	11:26	12.15	5436.60	
		5448.75	12/15/2000	11:08	11.96	5436.79	
		5448.75	02/28/2001	16:42	11.84	5436.91	
		5448.75	03/27/2001	11:42	11.80	5436.95	
		5448.75	05/14/2001	15:51	11.51	5437.24	
		5448.75	08/29/2001	12:50	12.55	5436.20	
		5448.75	11/28/2001	13:22	12.42	5436.33	
		5448.75	02/05/2002	09:33	12.11	5436.64	
		5448.75	09/24/2002	14:20	13.43	5435.32	
		5448.75	09/24/2003	13:41	12.85	5435.90	
		5448.75	09/27/2004	12:21	12.66	5436.09	
		5448.75	09/06/2005	15:14	10.67	5438.08	
		5448.75	09/20/2006	14:32	11.87	5436.88	
		5448.75	09/26/2007		12.35	5436.40	
		5448.75	09/24/2008		11.52	5437.23	
		5448.75	09/23/2009		12.42	5436.33	
0307	O	5447.10	09/26/2000	15:29	11.04	5436.06	
		5447.10	10/20/2000	11:30	10.94	5436.16	
		5447.10	12/15/2000	10:17	10.79	5436.31	

STATIC WATER LEVELS (USEE700) FOR SITE SRK06, Slick Rock East Processing Site  
 REPORT DATE: 4/30/2010 4:16 pm

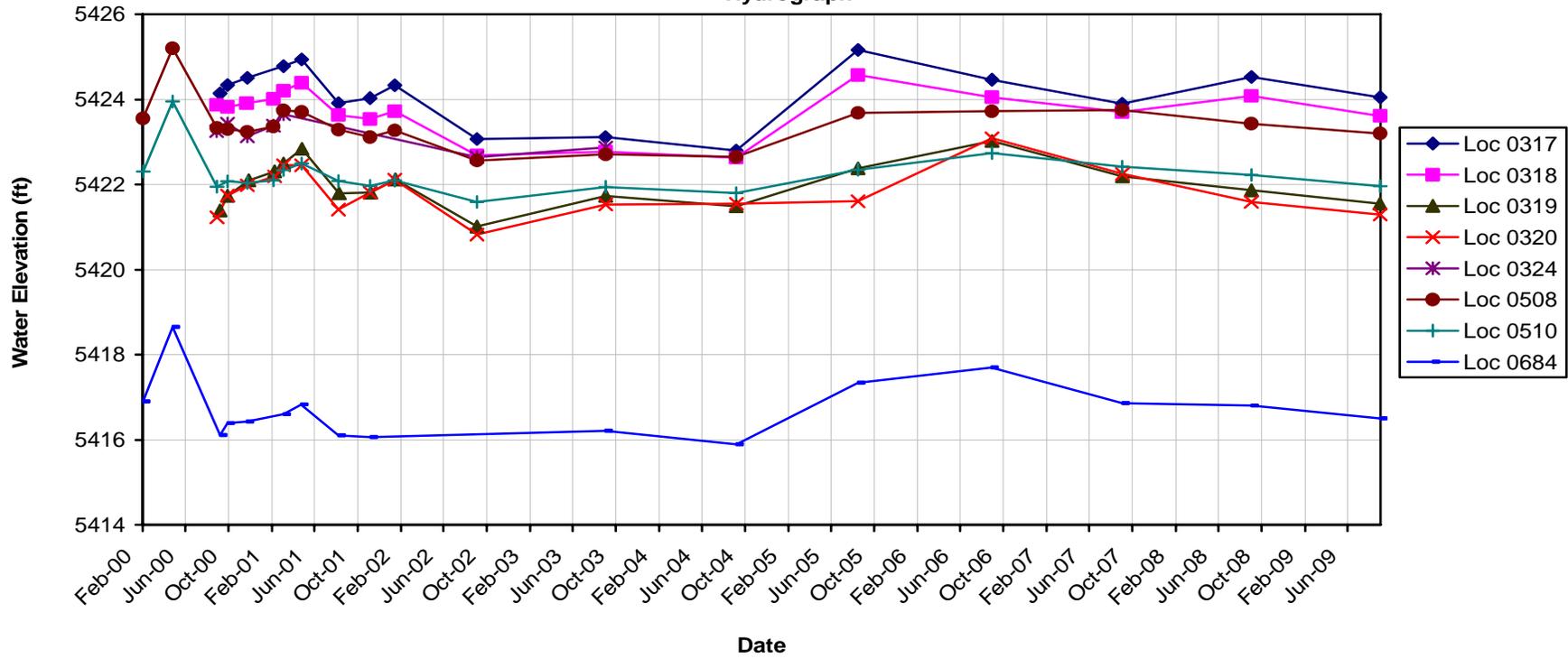
LOCATION CODE	FLOW CODE	TOP OF CASING ELEVATION (FT)	MEASUREMENT		DEPTH FROM TOP OF CASING (FT)	WATER ELEVATION (FT)	WATER LEVEL FLAG
			DATE	TIME			
0307	O	5447.10	03/01/2001	08:53	10.71	5436.39	
		5447.10	03/27/2001	11:36	10.59	5436.51	
		5447.10	05/14/2001	14:49	10.38	5436.72	
		5447.10	08/29/2001	10:27	11.36	5435.74	
		5447.10	11/28/2001	12:33	11.23	5435.87	
		5447.10	02/04/2002	15:57	10.91	5436.19	
		5447.10	09/24/2002	13:52	12.18	5434.92	
		5447.10	09/24/2003	13:08	12.17	5434.93	
		5447.10	09/27/2004	11:56	12.31	5434.79	
		5447.10	09/06/2005	14:10	9.71	5437.39	
		5447.10	09/20/2006	13:51	10.68	5436.42	
		5447.10	09/25/2007		11.11	5435.99	
		5447.10	09/24/2008		10.40	5436.70	
		5447.10	09/23/2009		11.35	5435.75	
		0309	O	5450.18	09/26/2000	09:29	15.40
5450.18	10/20/2000			11:35	15.23	5434.95	
5450.18	12/15/2000			09:43	15.32	5434.86	
5450.18	03/01/2001			09:26	15.26	5434.92	
5450.18	03/27/2001			11:30	14.97	5435.21	
5450.18	05/14/2001			14:04	14.74	5435.44	
5450.18	08/29/2001			09:43	15.35	5434.83	
5450.18	11/28/2001			11:53	15.40	5434.78	
5450.18	02/04/2002			13:30	15.32	5434.86	
5450.18	09/24/2002			12:38	16.27	5433.91	
5450.18	09/24/2003			12:42	16.18	5434.00	
5450.18	09/27/2004			10:44	15.86	5434.32	
5450.18	09/06/2005			13:22	14.85	5435.33	
5450.18	09/20/2006			12:34	14.90	5435.28	
5450.18	09/26/2007				15.00	5435.18	
5450.18	09/23/2008		15.22	5434.96			
5450.18	09/24/2009		15.54	5434.64			
0310	D	5450.56	09/27/2000	13:34	17.25	5433.31	
		5450.56	10/20/2000	12:52	17.10	5433.46	
		5450.56	12/14/2000	16:34	17.04	5433.52	
		5450.56	02/28/2001	10:28	16.98	5433.58	
		5450.56	03/27/2001	12:45	16.75	5433.81	
		5450.56	05/16/2001	14:35	16.88	5433.68	

STATIC WATER LEVELS (USEE700) FOR SITE SRK06, Slick Rock East Processing Site  
 REPORT DATE: 4/30/2010 4:16 pm

LOCATION CODE	FLOW CODE	TOP OF CASING ELEVATION (FT)	MEASUREMENT		DEPTH FROM TOP OF CASING (FT)	WATER ELEVATION (FT)	WATER LEVEL FLAG
			DATE	TIME			
0310	D	5450.56	08/30/2001	09:28	17.44	5433.12	
		5450.56	09/06/2005	17:14	16.70	5433.86	
		5450.56	09/19/2006	17:34	16.73	5433.83	
		5450.56	09/25/2007		17.15	5433.41	
		5450.56	09/22/2008		17.36	5433.20	
		5450.56	09/23/2009		17.51	5433.05	
0311	D	5450.70	09/27/2000	14:00	18.05	5432.65	
		5450.70	10/20/2000	12:49	18.01	5432.69	
		5450.70	12/14/2000	17:00	17.83	5432.87	
		5450.70	02/28/2001	11:03	17.76	5432.94	
		5450.70	03/27/2001	12:41	17.65	5433.05	
		5450.70	05/16/2001	13:46	17.81	5432.89	
		5450.70	08/30/2001	08:50	18.49	5432.21	
		5450.70	11/28/2001	15:59	18.06	5432.64	
		5450.70	02/05/2002	10:48	17.72	5432.98	
		5450.70	09/24/2002	16:10	19.07	5431.63	
		5450.70	09/24/2003	15:14	18.73	5431.97	
		5450.70	09/27/2004	14:07	17.76	5432.94	
		5450.70	09/06/2005	16:46	16.89	5433.81	
		5450.70	09/19/2006	17:11	16.85	5433.85	
		5450.70	09/25/2007		17.72	5432.98	
		5450.70	09/22/2008		17.50	5433.20	
5450.70	09/23/2009		17.77	5432.93			
0312	D	5451.06	09/27/2000	14:56	18.01	5433.05	
		5451.06	10/20/2000	12:47	17.92	5433.14	
		5451.06	12/15/2000	09:04	17.79	5433.27	
		5451.06	02/28/2001	11:38	17.75	5433.31	
		5451.06	03/27/2001	12:44	17.64	5433.42	
		5451.06	05/16/2001	13:06	17.31	5433.75	
		5451.06	08/30/2001	08:07	17.85	5433.21	
		5451.06	09/06/2005	16:22	16.75	5434.31	
		5451.06	09/19/2006	16:42	16.90	5434.16	
		5451.06	09/25/2007		17.29	5433.77	
		5451.06	09/22/2008		17.18	5433.88	
		5451.06	09/23/2009		17.63	5433.43	

# Slick Rock West Processing Site (SRK05)

## Hydrograph



STATIC WATER LEVELS (USEE700) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:18 pm

LOCATION CODE	FLOW CODE	TOP OF CASING ELEVATION (FT)	MEASUREMENT		DEPTH FROM TOP OF CASING (FT)	WATER ELEVATION (FT)	WATER LEVEL FLAG
			DATE	TIME			
0317		5435.18	09/28/2000	16:00	11.04	5424.14	
		5435.18	10/20/2000	14:59	10.84	5424.34	
		5435.18	12/14/2000	09:52	10.67	5424.51	
		5435.18	03/27/2001	14:19	10.40	5424.78	
		5435.18	05/17/2001	08:47	10.24	5424.94	
		5435.18	08/30/2001	12:55	11.27	5423.91	
		5435.18	11/27/2001	11:31	11.15	5424.03	
		5435.18	02/05/2002	13:50	10.85	5424.33	
		5435.18	09/25/2002	11:35	12.11	5423.07	
		5435.18	09/24/2003	16:34	12.07	5423.11	
		5435.18	09/27/2004	16:04	12.38	5422.80	
		5435.18	09/07/2005	11:57	10.02	5425.16	
		5435.18	09/21/2006	12:09	10.72	5424.46	
		5435.18	09/24/2007		11.28	5423.90	
		5435.18	09/23/2008		10.65	5424.53	
		5435.18	09/23/2009	11:00	11.13	5424.05	
0318	O	5435.22	09/19/2000	13:27	11.35	5423.87	
		5435.22	10/20/2000	14:47	11.40	5423.82	
		5435.22	12/13/2000	16:40	11.31	5423.91	
		5435.22	02/27/2001	10:49	11.21	5424.01	
		5435.22	03/27/2001	14:05	11.02	5424.20	
		5435.22	05/17/2001	09:47	10.83	5424.39	
		5435.22	08/30/2001	14:34	11.59	5423.63	
		5435.22	11/27/2001	12:36	11.68	5423.54	
		5435.22	02/05/2002	14:33	11.50	5423.72	
		5435.22	09/25/2002	10:52	12.54	5422.68	
		5435.22	09/25/2003	09:00	12.45	5422.77	
		5435.22	09/27/2004	15:28	12.59	5422.63	
		5435.22	09/07/2005	12:24	10.65	5424.57	
		5435.22	09/21/2006	12:42	11.17	5424.05	
		5435.22	09/24/2007		11.52	5423.70	
		5435.22	09/23/2008		11.14	5424.08	
5435.22	09/23/2009	11:30	11.61	5423.61			
0319	O	5430.66	09/28/2000	15:28	9.27	5421.39	
		5430.66	10/20/2000	14:25	8.93	5421.73	
		5430.66	12/19/2000	13:40	8.56	5422.10	
		5430.66	03/02/2001	09:00	8.35	5422.31	

STATIC WATER LEVELS (USEE700) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:18 pm

LOCATION CODE	FLOW CODE	TOP OF CASING ELEVATION (FT)	MEASUREMENT		DEPTH FROM TOP OF CASING (FT)	WATER ELEVATION (FT)	WATER LEVEL FLAG
			DATE	TIME			
0319	O	5430.66	03/27/2001	13:49	8.17	5422.49	
		5430.66	05/18/2001	08:32	7.82	5422.84	
		5430.66	08/31/2001	08:53	8.87	5421.79	
		5430.66	11/28/2001	08:45	8.85	5421.81	
		5430.66	02/06/2002	09:34	8.54	5422.12	
		5430.66	09/25/2002	14:58	9.65	5421.01	
		5430.66	09/25/2003	10:56	8.93	5421.73	
		5430.66	09/27/2004	17:00	9.17	5421.49	
		5430.66	09/07/2005	13:13	8.28	5422.38	
		5430.66	09/21/2006	09:49	7.64	5423.02	
		5430.66	09/25/2007		8.47	5422.19	
		5430.66	09/23/2008		8.80	5421.86	
		5430.66	09/22/2009	15:55	9.11	5421.55	
0320	O	5427.40	09/20/2000	16:28	6.17	5421.23	
		5427.40	10/20/2000	14:11	5.66	5421.74	
		5427.40	12/14/2000	12:51	5.42	5421.98	
		5427.40	03/02/2001	11:30	5.21	5422.19	
		5427.40	03/27/2001	13:39	4.95	5422.45	
		5427.40	05/17/2001	12:49	4.95	5422.45	
		5427.40	08/30/2001	16:17	5.99	5421.41	
		5427.40	11/27/2001	15:38	5.59	5421.81	
		5427.40	02/05/2002	16:36	5.29	5422.11	
		5427.40	09/25/2002	13:57	6.58	5420.82	
		5427.40	09/25/2003	12:37	5.87	5421.53	
		5427.40	09/28/2004	08:45	5.85	5421.55	
		5427.40	09/07/2005	14:10	5.79	5421.61	
		5427.40	09/21/2006	16:15	4.31	5423.09	
		5427.40	09/25/2007		5.15	5422.25	
5427.40	09/23/2008		5.81	5421.59			
5427.40	09/23/2009	12:50	6.11	5421.29			
0324		5431.19	09/19/2000	14:26	7.94	5423.25	
		5431.19	10/20/2000	14:40	7.76	5423.43	
		5431.19	12/14/2000	11:07	8.06	5423.13	
		5431.19	02/27/2001	10:25	7.81	5423.38	
		5431.19	03/27/2001	13:55	7.54	5423.65	
		5431.19	09/25/2002	12:35	8.55	5422.64	
		5431.19	09/25/2003	09:29	8.32	5422.87	

STATIC WATER LEVELS (USEE700) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:18 pm

LOCATION CODE	FLOW CODE	TOP OF CASING ELEVATION (FT)	MEASUREMENT		DEPTH FROM TOP OF CASING (FT)	WATER ELEVATION (FT)	WATER LEVEL FLAG
			DATE	TIME			
0508	O	5439.77	02/18/1986	14:22	14.32	5425.45	
		5439.77	03/31/1986	12:55	13.24	5426.53	
		5439.77	06/29/1986	13:50	13.65	5426.12	
		5439.77	10/09/1987	10:00	14.25	5425.52	
		5439.77	02/18/1988	14:00	14.12	5425.65	
		5439.77	12/02/1990	15:18	14.64	5425.13	
		5439.77	03/27/1991	16:00	14.50	5425.27	
		5439.77	08/28/1991	11:00	14.64	5425.13	
		5439.77	12/05/1991	13:52	16.00	5423.77	
		5439.77	10/10/1992	15:55	15.87	5423.90	
		5439.77	02/16/1994	14:18	16.21	5423.56	
		5439.77	02/17/1995	14:09	15.52	5424.25	
		5430.20	03/04/1997		6.67	5423.53	
		5430.20	09/14/1998	14:05	6.44	5423.76	
		5430.20	02/23/2000	15:01	6.65	5423.55	
		5430.20	05/17/2000	14:38	5.00	5425.20	
		5430.20	09/20/2000	09:30	6.87	5423.33	
		5430.20	10/20/2000	14:44	6.90	5423.30	
		5430.20	12/14/2000	10:30	6.96	5423.24	
		5430.20	02/26/2001	11:26	6.84	5423.36	
		5430.20	03/27/2001	13:57	6.46	5423.74	
		5430.20	05/17/2001	10:45	6.49	5423.71	
		5430.20	08/30/2001	15:14	6.91	5423.29	
		5430.20	11/27/2001	13:08	7.09	5423.11	
		5430.20	02/05/2002	15:00	6.93	5423.27	
		5430.20	09/25/2002	13:00	7.64	5422.56	
		5430.20	09/25/2003	09:41	7.49	5422.71	
		5430.20	09/27/2004	14:45	7.55	5422.65	
		5430.20	09/07/2005	11:01	6.52	5423.68	
		5430.20	09/21/2006	14:14	6.48	5423.72	
5430.20	09/24/2007		6.45	5423.75			
5430.20	09/23/2008		6.77	5423.43			
5430.20	09/23/2009	09:45	7.00	5423.20			
0510	O	5438.59	02/18/1986	13:00	15.93	5422.66	
		5438.59	03/31/1986	13:05	15.09	5423.50	
		5438.59	06/28/1986	13:50	14.84	5423.75	
		5438.59	10/09/1987	13:30	15.87	5422.72	
		5438.59	02/20/1988	09:10	15.82	5422.77	

STATIC WATER LEVELS (USEE700) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:18 pm

LOCATION CODE	FLOW CODE	TOP OF CASING ELEVATION (FT)	MEASUREMENT		DEPTH FROM TOP OF CASING (FT)	WATER ELEVATION (FT)	WATER LEVEL FLAG
			DATE	TIME			
0510	O	5438.59	05/14/1990	13:49	16.21	5422.38	
		5438.59	12/02/1990	15:22	16.21	5422.38	
		5438.59	03/28/1991	09:45	16.10	5422.49	
		5438.59	08/28/1991	12:15	16.22	5422.37	
		5438.59	12/05/1991	15:12	16.13	5422.46	
		5438.59	10/08/1992	16:47	15.90	5422.69	
		5438.59	02/16/1994	14:21	16.25	5422.34	
		5438.59	02/17/1995	10:47	16.20	5422.39	
		5427.87	03/04/1997		5.80	5422.07	
		5427.87	09/14/1998	12:51	5.52	5422.35	
		5427.87	02/24/2000	08:38	5.56	5422.31	
		5427.87	05/17/2000	15:56	3.92	5423.95	
		5427.87	09/20/2000	11:04	5.92	5421.95	
		5427.87	10/20/2000	14:38	5.80	5422.07	
		5427.87	12/14/2000	12:02	5.83	5422.04	
		5427.87	02/27/2001	12:05	5.77	5422.10	
		5427.87	03/27/2001	13:51	5.53	5422.34	
		5427.87	05/17/2001	11:23	5.38	5422.49	
		5427.87	08/30/2001	15:46	5.79	5422.08	
		5427.87	11/27/2001	14:58	5.90	5421.97	
		5427.87	02/05/2002	15:41	5.78	5422.09	
		5427.87	09/25/2002	13:24	6.28	5421.59	
		5427.87	09/25/2003	10:17	5.93	5421.94	
		5427.87	09/27/2004	16:34	6.07	5421.80	
		5427.87	09/07/2005	10:13	5.52	5422.35	
		5427.87	09/21/2006	15:17	5.13	5422.74	
		5427.87	09/24/2007		5.45	5422.42	
		5427.87	09/23/2008		5.65	5422.22	
		5427.87	09/23/2009	09:15	5.91	5421.96	
		0684	D	5432.68	06/20/1986	15:20	12.94
5432.68	06/29/1986			12:25	13.73	5418.78	
5432.68	04/06/1987			15:30	13.83	5418.68	
5432.68	10/13/1987			08:50	15.21	5417.30	
5432.68	02/19/1988			14:50	15.08	5417.43	
5432.68	12/02/1990			15:51	16.11	5416.40	
5432.68	03/28/1991			15:30	5.90	5426.61	
5432.68	08/06/1991			14:05	16.30	5416.21	
5432.68	11/19/1991			14:12	16.28	5416.23	

STATIC WATER LEVELS (USEE700) FOR SITE SRK05, Slick Rock West Processing Site  
 REPORT DATE: 4/30/2010 4:18 pm

LOCATION CODE	FLOW CODE	TOP OF CASING ELEVATION (FT)	MEASUREMENT		DEPTH FROM TOP OF CASING (FT)	WATER ELEVATION (FT)	WATER LEVEL FLAG
			DATE	TIME			
0684	D	5432.68	10/15/1992	10:50	16.20	5416.31	
		5432.68	02/16/1994	11:36	15.93	5416.58	
		5432.68	02/19/1995	16:50	16.03	5416.48	
		5432.68	03/04/1997		16.02	5416.66	
		5432.68	09/14/1998	16:00	15.66	5417.02	
		5432.68	02/23/2000	12:31	15.78	5416.90	
		5432.68	05/17/2000	12:36	14.03	5418.65	
		5432.68	09/28/2000	13:49	16.57	5416.11	
		5432.68	10/20/2000	14:00	16.29	5416.39	
		5432.68	12/13/2000	14:06	16.25	5416.43	
		5432.68	03/27/2001	13:27	16.08	5416.60	
		5432.68	05/16/2001	16:37	15.85	5416.83	
		5432.68	08/30/2001	10:56	16.58	5416.10	
		5432.68	11/28/2001	10:15	16.62	5416.06	
		5432.68	09/24/2003	15:45	16.47	5416.21	
		5432.68	09/28/2004	10:10	16.79	5415.89	
		5432.68	09/07/2005	09:09	15.34	5417.34	
		5432.68	09/19/2006	15:08	14.98	5417.70	
		5432.68	09/25/2007		15.82	5416.86	
		5432.68	09/23/2008		15.88	5416.80	
5432.68	09/23/2009	13:55	16.18	5416.50			

RECORDS: SELECTED FROM USEE700 WHERE site\_code='SRK05' AND location\_code in('0317','0318','0319','0320','0324','0508','0510','0684')

FLOW CODES: D DOWN GRADIENT O ON-SITE

WATER LEVEL FLAGS: