

**Verification Monitoring Report
for the
Slick Rock, Colorado,
Processing Sites:
September 2014 Sampling**

June 2015



U.S. DEPARTMENT OF
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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
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ft	feet
GCAP	Groundwater Compliance Action Plan
MCL	maximum contaminant level (Safe Drinking Water Act); maximum concentration limit (UMTRCA)
mg/L	milligrams per liter
μS/cm	microsiemens per centimeter
NRC	U.S. Nuclear Regulatory Commission
pCi/L	picocuries per liter
Ra-226	radium-226
Ra-228	radium-228
SC	specific conductance
SDWA	Safe Drinking Water Act
SOWP	Site Observational Work Plan
SRE	Slick Rock East
SRW	Slick Rock West
UMTRCA	Uranium Mill Tailings Radiation Control Act
VMR	Verification Monitoring Report

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Executive Summary

The Slick Rock, Colorado, Processing Sites consist of two former uranium-ore processing facilities, the Slick Rock East (SRE) site and the Slick Rock West (SRW) site. The sites, managed by the U.S. Department of Energy, are located along the Dolores River in San Miguel County. Surface remediation of the two sites was completed in 1996. The purpose of this Verification Monitoring Report is to evaluate groundwater and surface water monitoring data collected since 2000 and to assess the status of the compliance strategy for groundwater cleanup. The proposed compliance strategy for the Slick Rock sites is natural flushing combined with institutional controls and compliance monitoring, as documented in the *Draft Final Groundwater Compliance Action Plan for the Slick Rock, Colorado, UMTRA Project Sites* (GCAP) for the sites (DOE 2006). The U.S. Nuclear Regulatory Commission (NRC) has not yet concurred with this plan.

Uranium and selenium are the only constituents of potential concern (COPCs) at the SRE site. While uranium is monitored at all SRE wells, selenium is only monitored at background well 0300 and SRE wells 0305 and 0307, the only wells where it has been elevated. The contaminant suite at the SRW site is larger: COPCs at this site are manganese, molybdenum, nitrate, selenium, and uranium. One well at SRW, alluvial well 0319, has a unique contaminant signature, including benzene, toluene, ethylbenzene, and xylenes (collectively referred to as BTEX), radium-226 (Ra-226), and radium-228 (Ra-228), all of which are elevated only in the vicinity of this well. To assess the status of compliance, COPC concentrations are compared to maximum concentration limits (MCLs) established under the Uranium Mill Tailings Radiation Control Act (UMTRCA) or, for constituents without UMTRCA MCLs, alternative benchmark values (Safe Drinking Water Act maximum contaminant levels, maximum background concentrations, or alternate concentration limits proposed in the GCAP).

At the SRE site, the current monitoring network consists of eight monitoring wells and three surface water locations. Uranium is monitored at all SRE wells; concentrations are highest in the central portion of the SRE site, just downgradient of the historical tailings boundary. Uranium trends have been fairly stable at most SRE onsite and downgradient wells. Because selenium has been elevated only at well 0305, this parameter is monitored at only three SRE wells: background location 0300, well 0305, and downgradient well 0307. Selenium concentrations in well 0305 have been stable at about 0.02–0.025 mg/L since 2006. As was the case in 2013, well 0312 was dry in 2014 and could not be sampled.

Nine wells and four surface water locations are currently monitored at the SRW site. Uranium, selenium, manganese, molybdenum, and nitrate levels are elevated within the site's historical tailings boundary. Decreases are apparent for manganese and nitrate in SRW wells, and molybdenum may also be trending slightly downward. Concentrations of selenium and uranium remain elevated in wells in this area, and no downward trending is apparent. BTEX, Ra-226, and Ra-228 are slowly attenuating at SRW well 0319; only benzene and toluene are currently elevated above benchmark values.

Since monitoring began in 2000, surface water sampling results have demonstrated minimal impact to the Dolores River from historical milling activities at either the SRE or SRW sites. At most Dolores River monitoring locations, no CDPHE water quality benchmarks were exceeded in 2014, consistent with historical results. However, at SRW location 0349, 2014 results for

manganese and selenium did exceed these benchmarks. These exceedances are attributed to surface runoff at this location, which is close to the former tailings piles, as heavy rain coincided with the sampling event. During the next sampling event, this area will be inspected to determine if there are surface drainage discharge points in the area around location 0349 that may have contributed to the elevated results.

Although the 100-year time frame established in Title 40 *Code of Federal Regulations* Part 192 does not commence until NRC approves the GCAP, data collected to date indicate that most site constituents are not attenuating as initially predicted in groundwater modeling. It is recommended that annual verification monitoring of groundwater from designated monitoring wells and surface water locations continue until groundwater contaminant concentrations in all site wells stabilize or decline.

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, approximately 1 mile downstream from SRE, the Slick Rock West (SRW) site (formerly the Union Carbide site). The Slick Rock processing sites are located along the Dolores River in San Miguel County (Figure 1 and Figure 2). Surface remediation of the two sites was completed in 1996.

1.1 Purpose

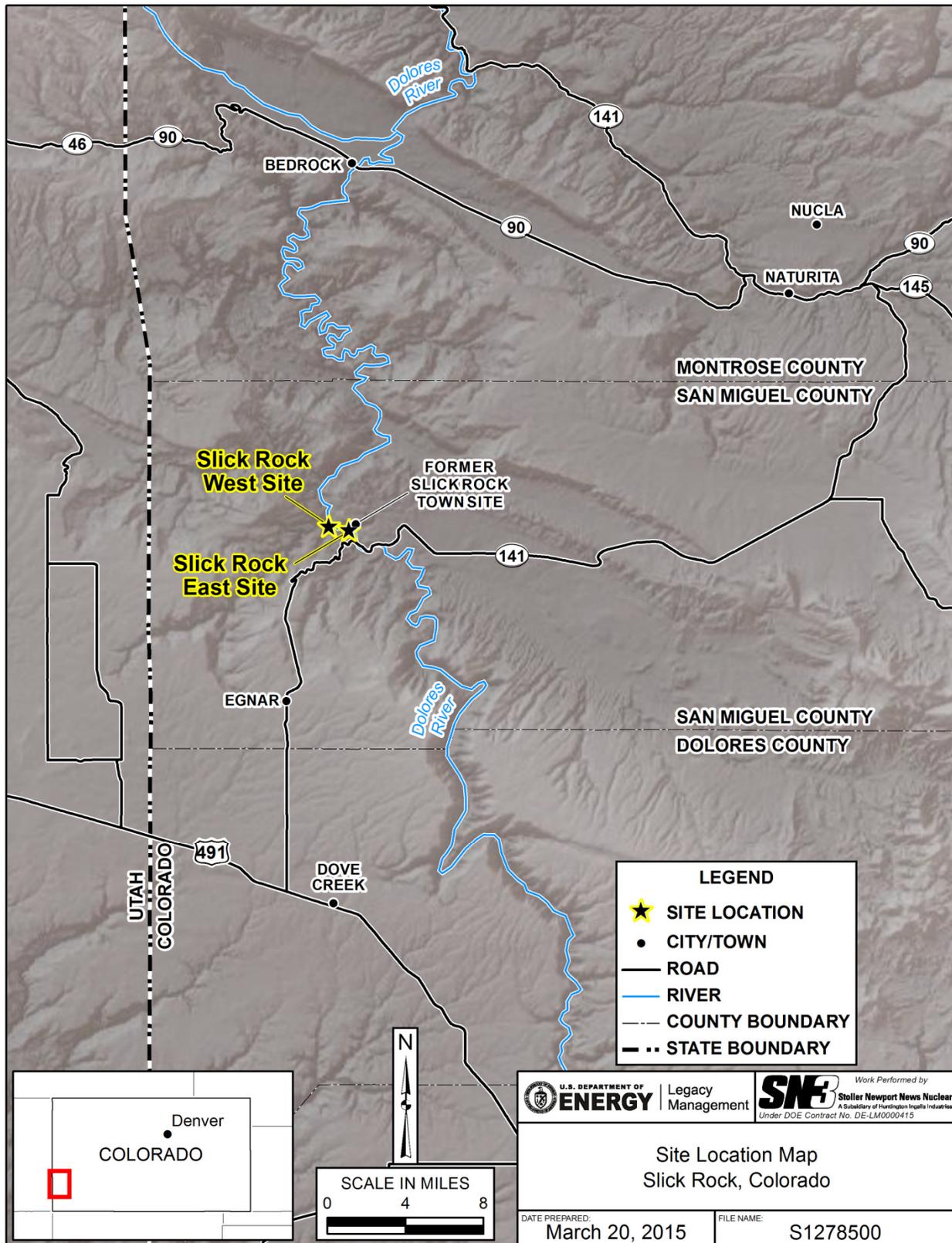
The purpose of this Verification Monitoring Report (VMR) is to evaluate groundwater and surface water monitoring data collected at the Slick Rock processing sites since 2000 and to assess the status of the compliance strategy for groundwater cleanup.

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). The GCAP states that public health will be protected during the natural flushing process through institutional controls, which will restrict access to contaminated alluvial groundwater. The institutional controls to 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. The environmental covenants are still pending for the Slick Rock sites, and the U.S. Nuclear Regulatory Commission (NRC) has not yet concurred with the GCAP.

Constituents of potential concern (COPCs) at the Slick Rock sites are manganese, molybdenum, nitrate, selenium, and uranium. Several other COPCs—benzene, toluene, ethylbenzene, and xylenes (collectively referred to as BTEX), radium-226 (Ra-226), and radium-228 (Ra-228)—are limited to a single SRW alluvial well (0319). Selenium and uranium are the only COPCs common to both the SRE and SRW sites.

To assess the status of compliance, COPC concentrations are compared to the benchmark values listed in Table 1. Groundwater benchmarks for molybdenum, nitrate, Ra-226, Ra-228, selenium (at SRE only), and uranium are the maximum concentration limits (MCLs) established under the Uranium Mill Tailings Radiation Control Act (UMTRCA) and codified in Title 40 *Code of Federal Regulations* Part 192 (40 CFR 192). At SRW, benchmarks for BTEX are maximum contaminant levels (also abbreviated as MCLs) established under the U.S. Environmental Protection Agency (EPA) Safe Drinking Water Act (SDWA). The benchmark for manganese is the maximum background (upgradient) concentration measured at the site. Groundwater modeling conducted for the Site Observational Work Plan (SOWP) (DOE 2002) predicted that natural flushing for all COPCs (except for selenium in SRW wells) would be completed within the 100-year regulatory time frame established in 40 CFR 192. Because selenium concentrations at SRW were not expected to decrease to levels below the 0.01 milligram per liter (mg/L) UMTRCA MCL within 100 years, a human health risk-based alternate concentration limit (ACL) of 0.18 mg/L was proposed for the SRW site (DOE 2006).



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

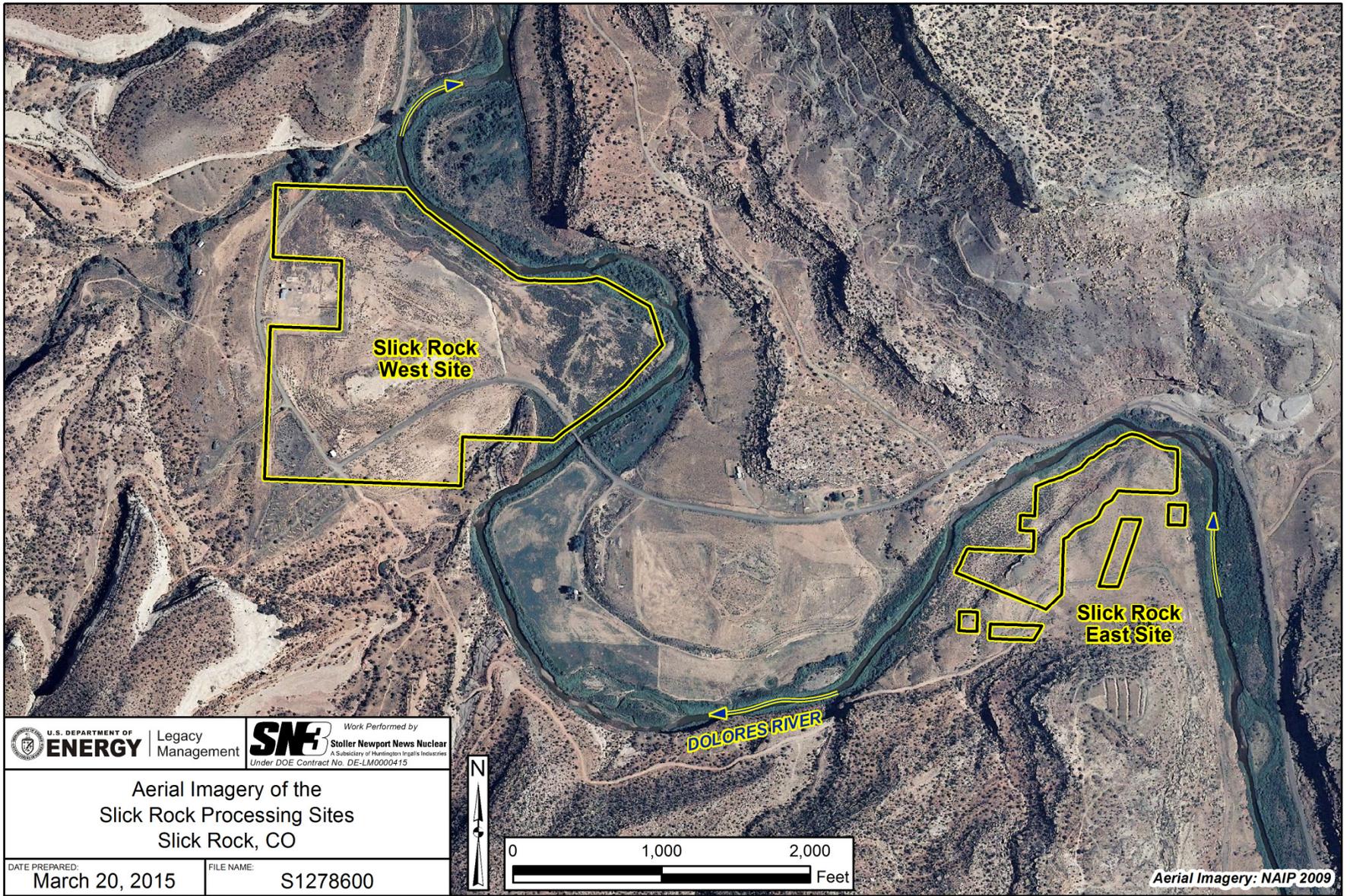


Figure 2. Aerial Photograph of the Slick Rock, Colorado, Processing Sites

Table 1. Groundwater Benchmarks for COPCs at the Slick Rock East and West Sites

COPC ^a	Benchmark	Basis for Benchmark	Applicable Site	Applicable Wells ^b	Comment
Uranium	0.044 mg/L	UMTRCA MCL	SRE, SRW	All wells except SRW wells 0317 and 0319	The 0.044 mg/L standard is equivalent to the uranium standard of 30 pCi/L in 40 CFR 192.
Selenium	SRE: 0.01 mg/L SRW: 0.18 mg/L ^c	SRE: UMTRCA MCL SRW: Proposed ACL (DOE 2002)	SRE, SRW	SRE wells 0305 and 0307 and all SRW wells	The UMTRCA MCL is less than the 0.05 mg/L SDWA MCL.
Manganese	4.2 mg/L	Maximum background	SRW	All SRW wells except 0317 and 0319	Maximum concentration measured at well 0300 in August 2001. ^d
Molybdenum	0.10 mg/L	UMTRCA MCL	SRW	All SRW wells except 0319	
Nitrate as NO ₃	44.3 mg/L	UMTRCA MCL	SRW	All SRW wells except 0317 and 0319	The 44.3 mg/L standard is equivalent to the nitrate as nitrogen standard of 10 mg/L in 40 CFR 192.
Radium-226 + Radium-228	5 pCi/L	UMTRCA MCL	SRW	SRW well 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	SRW well 0319	
Toluene	1 mg/L	SDWA MCL	SRW	SRW well 0319	
Ethylbenzene ^e	0.7 mg/L	SDWA MCL	SRW	SRW well 0319	The 0.7 mg/L SDWA MCL has never been exceeded.
Xylenes ^e	10 mg/L	SDWA MCL	SRW	SRW well 0319	The 10 mg/L SDWA MCL has never been exceeded.

^a Constituents are listed in order of prevalence at the Slick Rock sites. For example, uranium is most prevalent at both sites, whereas Ra-226 and Ra-228 are limited to the immediate vicinity of SRW well 0319.

^b Applicable wells are only those currently monitored. For historical results, refer to the SOWP (DOE 2002) and previous VMRs.

^c This proposed ACL for selenium was established in the SOWP (DOE 2002) based on the EPA Human Health Risk Table. Although the proposed ACL remains at 0.18 mg/L, as established in the SOWP, EPA revised the risk-based value to 0.078 mg/L in November 2011. The EPA Risk Table (http://www.epa.gov/reg3hscd/risk/human/rb-concentration_table/Generic_Tables/index.htm [refer to tap water screening level in the Summary Table]) was accessed in March 2015, and the most recent update was in January 2015.

^d The GCAP cited a maximum background value for manganese of 3.5 mg/L, which was the first (September 2000) measurement in background well 0300, not the highest measurement.

^e Although MCLs for ethylbenzene and total xylenes have never been exceeded in SRW well 0319, these constituents are typically analyzed along with the other BTEX COPCs, benzene and toluene (which have been elevated).

pCi/L = picocuries per liter

2.0 Site Conditions

2.1 Hydrogeology

The hydrostratigraphic units at the Slick Rock sites are, in descending stratigraphic order, the Dolores River alluvium (Quaternary period), the Salt Wash Member of the Morrison Formation, the Summerville Formation, the Entrada Sandstone, and the Navajo Sandstone (all Jurassic period). Although both sites overlie the Dolores River alluvium, not all other units are present at both sites.

The Dolores River alluvium contains the uppermost aquifer and is the only unit known to be affected by site-related contamination. The alluvial aquifer is unconfined and consists of unconsolidated material, primarily silty sands and silty sandy gravels with an occasional interbedded clay lens. The alluvium ranges from 15 to 20 feet (ft) in thickness and is laterally restricted by bedrock that forms the walls of the Dolores River canyon. 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 alluvial aquifer ranges from 7 to 15 ft below ground surface. Groundwater flow generally follows the downstream direction of the Dolores River, which is the main recharge source for the alluvial aquifer.

At the SRE site, the Salt Wash Member of the Morrison Formation and the Summerville Formation underlie the Dolores River alluvium. Because these formations have an abundance of fine-grained, low-permeability units, they are considered aquitards that prevent contaminated groundwater in the alluvial aquifer from moving downward into deeper aquifers (DOE 2002).

At the SRW site, Entrada Sandstone underlies the Dolores River alluvium. This formation ranges from 40 to 60 ft in thickness in the floodplain area (DOE 2002). The Entrada aquifer is unconfined near the top of the unit (in contact with the alluvial aquifer), and it may be semi-confined near the bottom (in partial contact with the underlying Navajo aquifer). In wells completed in the Navajo Sandstone, groundwater has an upward vertical gradient with respect to water in the overlying Entrada, signifying that the Navajo aquifer discharges upward. The Entrada aquifer receives recharge from upgradient infiltration of precipitation, creating artesian pressure. Entrada groundwater has a slight upward vertical gradient with respect to water in the overlying alluvial aquifer, and hydraulic conductivity in the alluvial aquifer is two orders of magnitude greater than that of the Entrada. These conditions inhibit groundwater from flowing downward from the alluvial aquifer into underlying aquifers.

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. This contamination is limited to the alluvial aquifer at the SRE site (Section 2.1) and consists only of uranium and selenium (DOE 2002). Uranium concentrations in wells 0303 and 0305 (wells with the highest concentrations) have averaged approximately 1 mg/L, exceeding the 0.044 mg/L UMTRCA MCL.

Selenium is not considered a major contaminant at the SRE site, as it has been elevated in only one well (0305). Since 2006, concentrations in well 0305 have remained at about 0.02 mg/L. Although this is twice the UMTRCA groundwater standard of 0.01 mg/L, concentrations have always been below the SDWA primary drinking water standard of 0.05 mg/L.

2.2.2 SRW Site

Former uranium-ore processing activities also contaminated the groundwater beneath the SRW site. COPCs in the alluvial aquifer at the SRW site are manganese, molybdenum, nitrate, selenium, uranium, Ra-226, Ra-228, and BTEX. Contamination in the alluvial aquifer is contained within the site boundary, while Ra-226, Ra-228, and BTEX contamination is isolated to the region of one well (0319). The primary COPCs in the alluvial aquifer are molybdenum, nitrate, selenium, and uranium (refer to Section 4.0 for contaminant distributions and trends).

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.¹ As discussed in Section 4.3, results for SRW sample location 0349 exceeded CDPHE water quality benchmarks for manganese and selenium in 2014. These exceedances are attributed to surface runoff at this location; heavy rain coinciding with the sampling event.

2.4 Remediation Activities

Surface remediation at the Slick Rock sites began in 1995 and was completed in 1996. As part of the remediation process, uranium mill tailings and other residual radioactive materials associated with the former milling operations were relocated to the Slick Rock disposal cell (formerly called the Burro Canyon disposal cell), approximately 5 miles east of the Slick Rock processing sites. The sites were regraded with onsite material, and subsequent revegetation efforts have been 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 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; land use includes alfalfa production (fields irrigated with water pumped from the Dolores River), livestock grazing, and gravel-mining operations. There is no current use of alluvial groundwater beneath the former processing sites. There are also no known uses of groundwater from the Entrada Sandstone in the area near the SRE and SRW sites. 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.

¹ This stream segment (Segment 2) of the Lower Dolores River Basin is classified as Aquatic Life Warm 1, Recreation E, Water Supply, and Agriculture, and the classifications with the most restrictive water quality standards apply (CDPHE 2014).

3.0 Monitoring Program

Monitoring at the Slick Rock processing site is to be performed annually for the first 10 years following NRC concurrence with the GCAP (DOE 2006). Annual monitoring has been performed at the site since 2003 (more frequent monitoring occurred between 2000 and 2002), although the NRC has not yet concurred with the GCAP. This section describes the monitoring programs for the SRE and SRW sites.

3.1 SRE Site

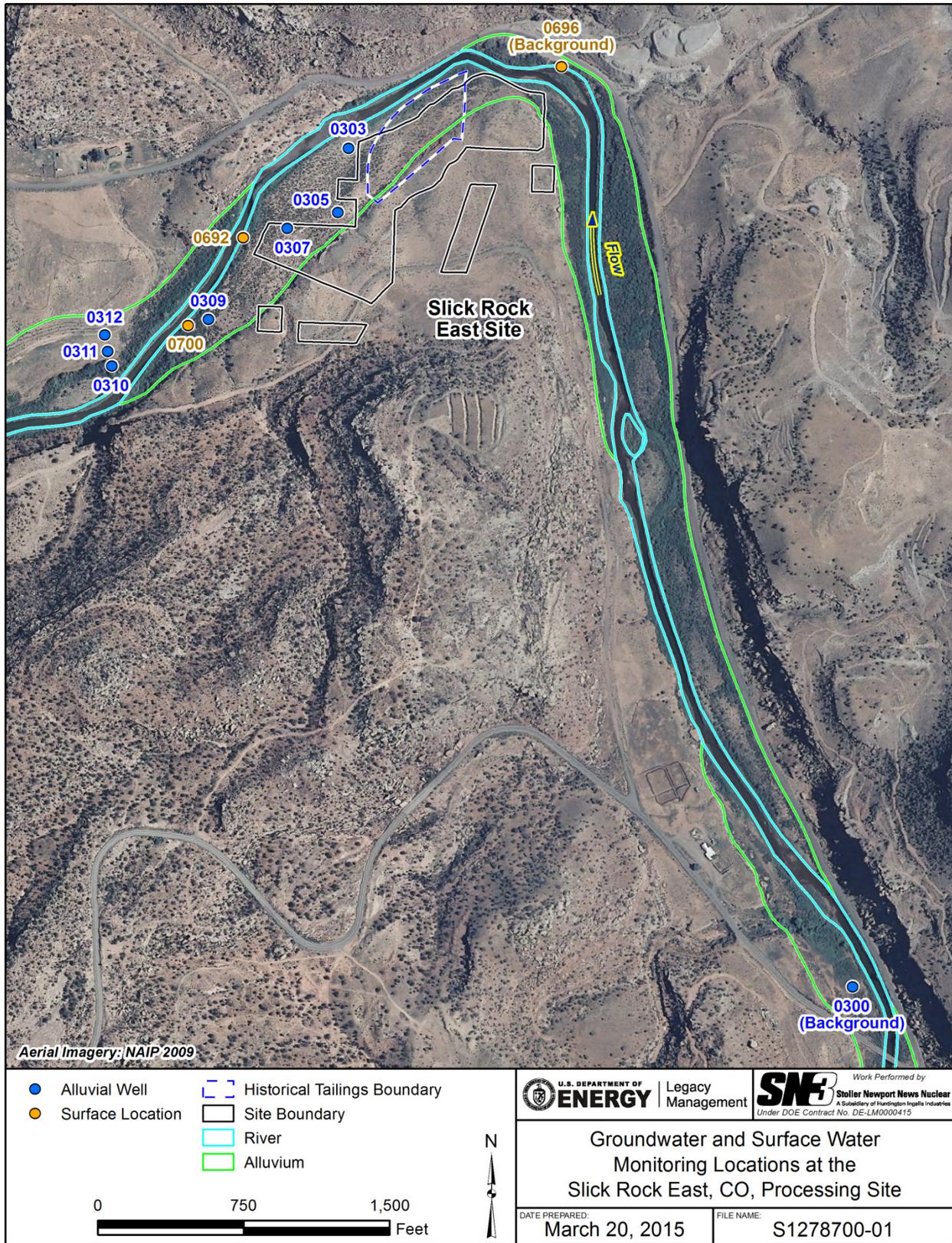
At the SRE site, the current monitoring network consists of eight monitoring wells and three surface water locations (Table 2 and Figure 3). The upgradient location (0300) is intended to be used as a background location for both SRE and SRW wells. Sampling at two monitoring wells, 0310 and 0312, resumed in 2005 (after a 3-year hiatus) to better characterize the extent of uranium contamination detected in well 0311. The farthest downstream SRE surface water location (0700) was also established at that time.

Table 2. Monitoring Program at the SRE Site

ID	Matrix	Location ^a	Rationale	Analytes
0300	Groundwater	Upgradient	Upgradient (background) monitoring location for both SRE and SRW sites.	Manganese, molybdenum, nitrate, selenium, and uranium
0303	Groundwater	Onsite	Hot spot for uranium.	Uranium
0305	Groundwater	Onsite	Hot spot for uranium; selenium above the UMTRCA MCL.	Selenium and uranium
0307	Groundwater	Onsite	Downgradient of hot spots, monitor plume migration.	Selenium and uranium
0309	Groundwater	Onsite	Farthest downgradient well onsite.	Uranium
0310	Groundwater	Offsite (across the Dolores River)	Monitor migration of uranium between the SRE and SRW sites.	Uranium
0311	Groundwater	Offsite, downgradient	Adjacent to and north of well 0310.	Uranium
0312	Groundwater	Offsite, downgradient	Adjacent to and north of well 0311.	Uranium ^b
0696	Surface Water	Upstream	Surface water background (inlet area).	Uranium
0692	Surface Water	Adjacent to site	Location where the centroid of the uranium plume was predicted to intersect the river.	Uranium
0700	Surface Water	Downstream	Established in 2005; located about 100 ft southwest of well 0309.	Uranium

^a The sampling locations in this table are listed first in order of matrix, and then by general flow direction (upgradient or upstream locations are listed first). Wells are listed in the same order in the figures.

^b In 2013 and 2014, well 0312 was dry.



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

3.2 SRW Site

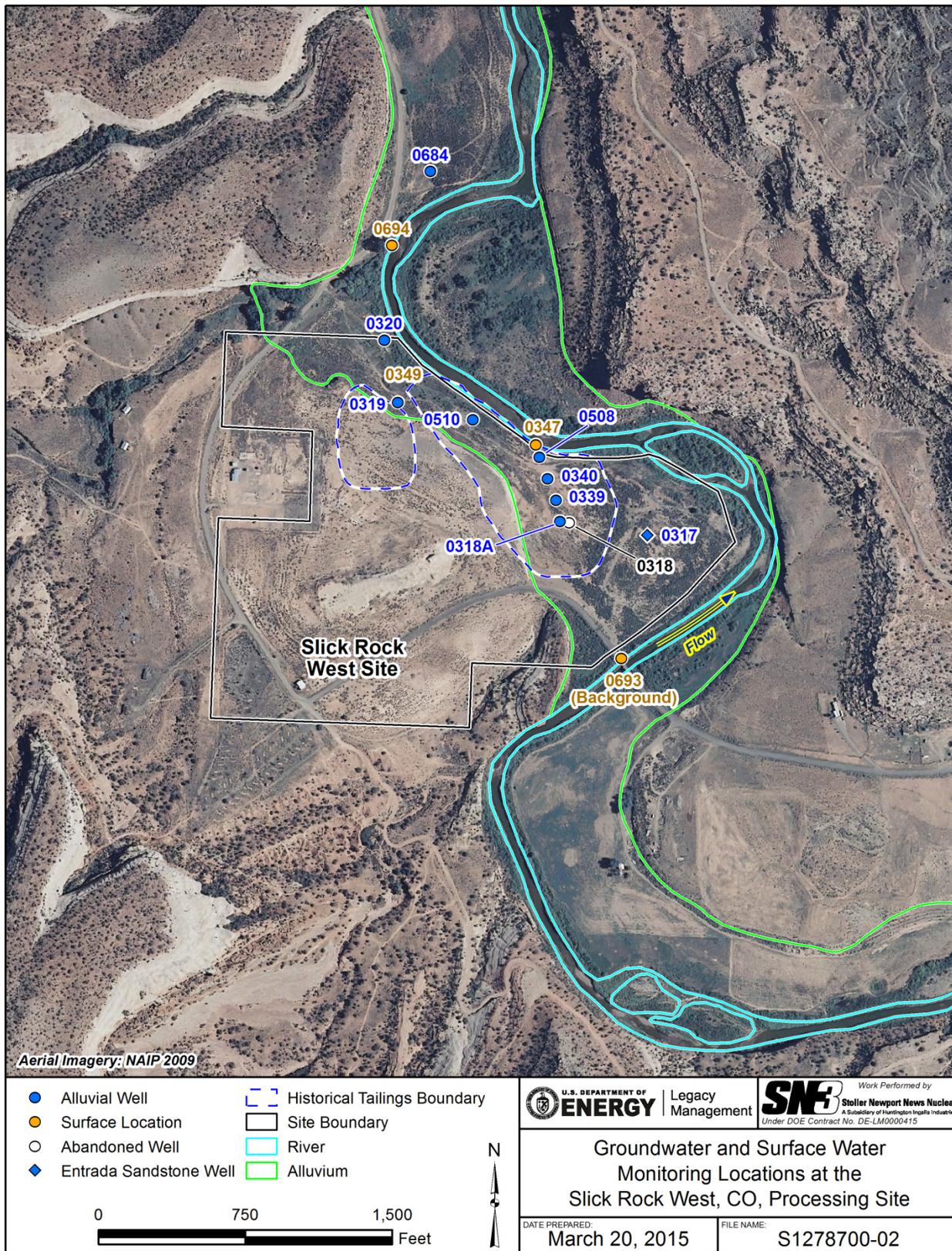
At the SRW site, the monitoring network consists of nine monitoring wells and four surface water locations (Table 3 and Figure 4). In 2010, three new wells were installed at the SRW site: 0318A, 0339, and 0340. Well 0318A replaced damaged well 0318, and wells 0339 and 0340 were installed to enable a better understanding of the distribution and movement of selenium in the alluvial aquifer in this region.

Table 3. Monitoring Program at the SRW Site

ID	Matrix	Location ^a	Rationale	Analytes
0317	Groundwater	Onsite	Entrada Sandstone well—molybdenum exceeds UMTRCA MCL.	Molybdenum and selenium ^b
0318A	Groundwater	Onsite	Area of highest measured concentrations for several COPCs. Well 0318A was installed in September 2010 to replace former well 0318.	Manganese, molybdenum, nitrate, selenium, and uranium
0339	Groundwater	Onsite	Installed in September 2010 to better characterize the extent of elevated selenium in the eastern area of the former tailings pile.	Manganese, molybdenum, nitrate, selenium, and uranium
0340	Groundwater	Onsite	Installed in September 2010 (same rationale as that for well 0339 above).	Manganese, molybdenum, nitrate, selenium, and uranium
0508	Groundwater	Onsite	High selenium, nitrate, molybdenum, and uranium.	Manganese, molybdenum, nitrate, selenium, and uranium
0510	Groundwater	Onsite	Edge of former tailings pile, high COPC concentrations.	Manganese, molybdenum, nitrate, selenium, and uranium
0319	Groundwater	Onsite	Hot spot for BTEX and radium.	BTEX, Ra-226, Ra-228, and selenium ^b
0320	Groundwater	Onsite	Farthest downgradient well onsite; monitor plume movement.	Manganese, molybdenum, nitrate, selenium, and uranium
0684	Groundwater	Offsite	Farthest downgradient well; purpose is to verify that contaminants are not migrating offsite.	Manganese, molybdenum, nitrate, selenium, and uranium
0693	Surface Water	Upstream	Upstream SRW surface water location (but downstream 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; potential 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 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

^a The sampling locations in this table are listed first in order of matrix, and then by general flow direction (upgradient or upstream are listed first). Unless stated otherwise, wells are listed in the same order in the figures.

^b In Entrada well 0317 and alluvial well 0319, monitoring for selenium resumed in 2010 after an 8-year hiatus.



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

4.0 Results of 2014 Monitoring

This section documents the results of groundwater and surface water monitoring conducted in 2014 for the SRE and SRW sites. Detailed analytical results for groundwater and surface water are provided in Appendixes A and B, respectively. Appendix C includes supporting static water level data and hydrographs. Additional information, including a data quality assessment and time-concentration graphs for all analytes and monitoring locations, is provided in the corresponding Data Validation Package (DOE 2014).

4.1 SRE Site Groundwater Monitoring Results

Apart from field parameters, uranium and selenium are the only constituents currently monitored at SRE, as levels of other constituents have been below respective benchmarks. (Background well 0300 is an exception [other analytes are monitored]; this well also serves as the background location for SRW.) While uranium is monitored at all SRE well locations, selenium is monitored at only two wells (0305 and 0307), in addition to the background location 0300. Recent and historical trends observed for each of these constituents are discussed below.

4.1.1 SRE Uranium

Figure 5 shows the historical distribution of uranium in currently active SRE wells, ordered from left to right by direction of groundwater flow (upgradient to downgradient).

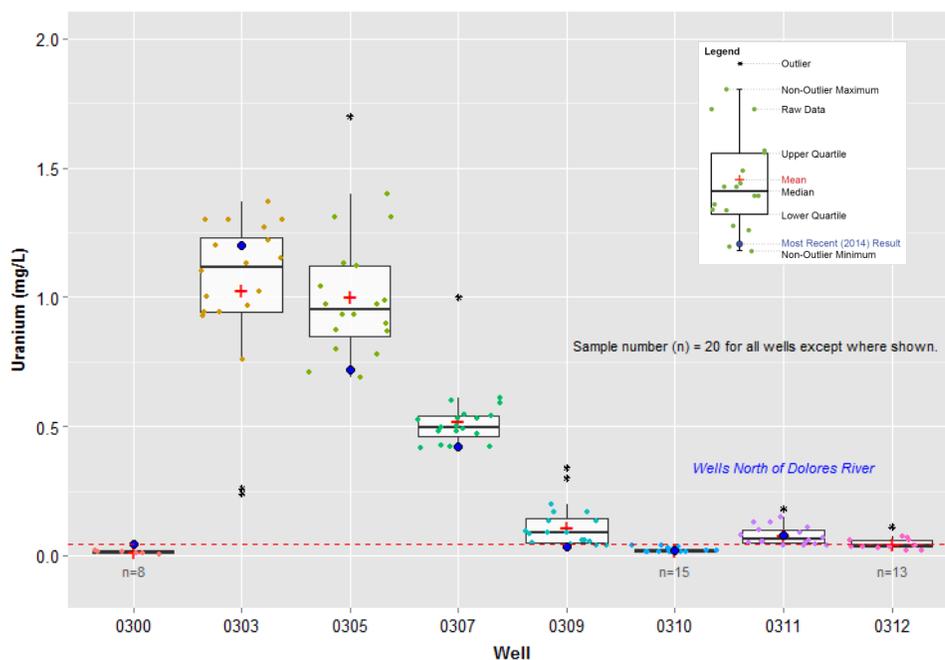


Figure 5. Distributions of Uranium in SRE Wells

As has been the case historically, uranium concentrations are highest in SRE wells 0303, 0305, and 0307, located in the central portion of the SRE site just downgradient of the historical tailings boundary (Figure 5). Uranium concentrations in these wells and in well 0309 have also been the most variable. Corresponding time-concentration plots are provided in Figure 6.

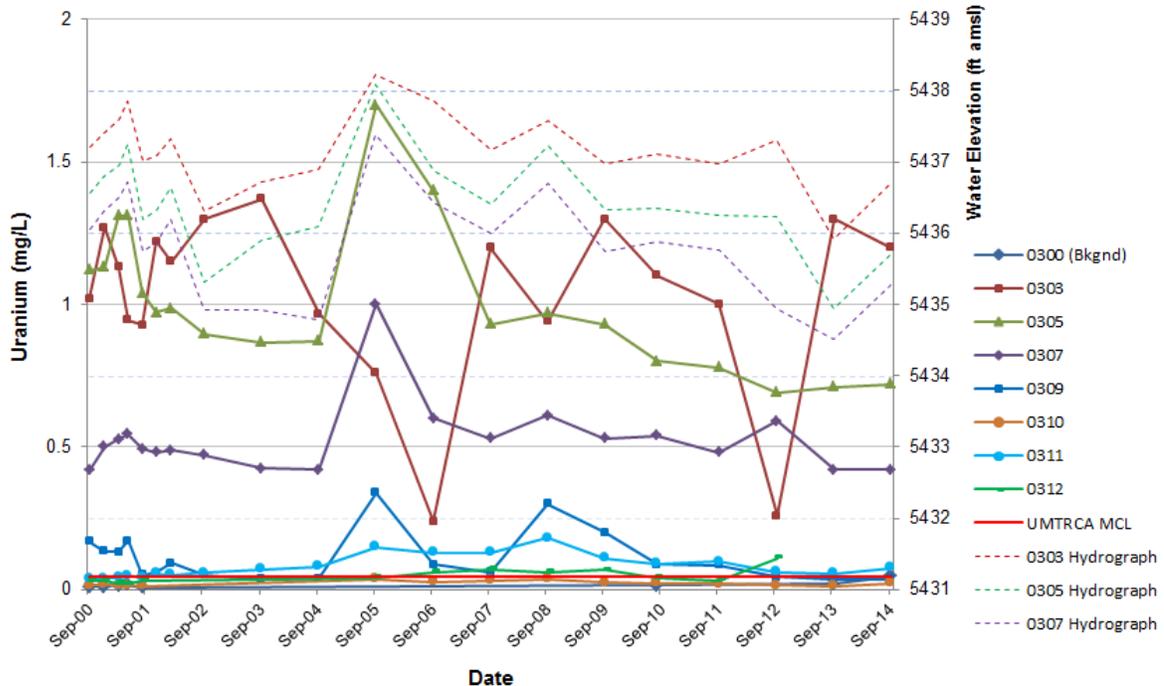


Figure 6. Uranium Concentrations Over Time in SRE Wells

As shown in Figure 6, the wide fluctuations in uranium concentrations may be at least partially attributable to changes in water levels. While uranium concentrations in wells 0305 and 0307 appear to vary directly with water levels, the opposite trend is apparent for well 0303. Because of the scaling in this figure (log scale not used), trends in uranium concentrations for wells more distal from the historical tailings area are obscured because of their relatively low magnitude.

To better illustrate trends for these wells, Figure 7 presents the same groundwater data as shown in Figure 6, but results are plotted separately (as facets) for each well. In each facet plot (Figure 7), a non-parametric smoothing method, "loess," is used. Shading around each loess line represents the 95 percent confidence interval about the data. Using this approach, overall trends in the data are more apparent and not obscured by "noise," as is the case in Figure 6. For reference, trend lines based on a standard linear model are also shown in Figure 7. Based on examination of both the linear and loess trend lines in Figure 7, overall, uranium trends have been fairly stable at most SRE onsite and downgradient wells.²

Apart from low (outlier) measurements in 2006 and 2012, uranium concentrations in SRE well 0303 have been relatively stable at about 1 mg/L. This is also the case for well 0305, although a slight decreasing trend is apparent. Uranium concentrations at well 0307 have been stable at 0.5 mg/L since 2000. Farther downgradient at well 0309, a slight decreasing trend is apparent; uranium concentrations have been just below the MCL since 2012 (0.036–0.043 mg/L). North of the Dolores River, uranium concentrations in alluvial wells 0311 and 0312 have exceeded the UMRCA MCL, but this is not the case for well 0310 (Figure 7).

² Figures 5 and 7 were developed using R version 3.1.2 (R Core Team 2014) and the ggplot2 package, version 1.0.0 (Wickham 2009).

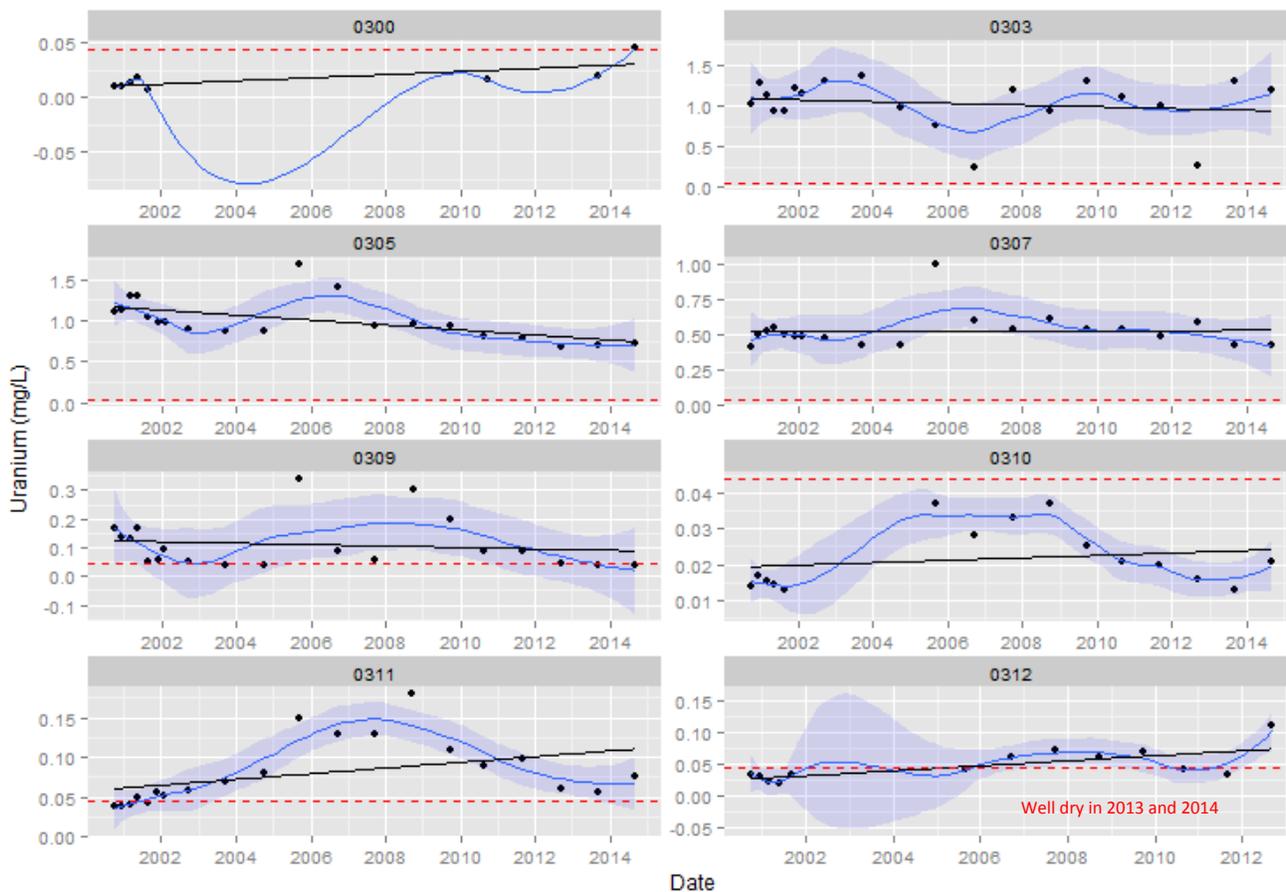
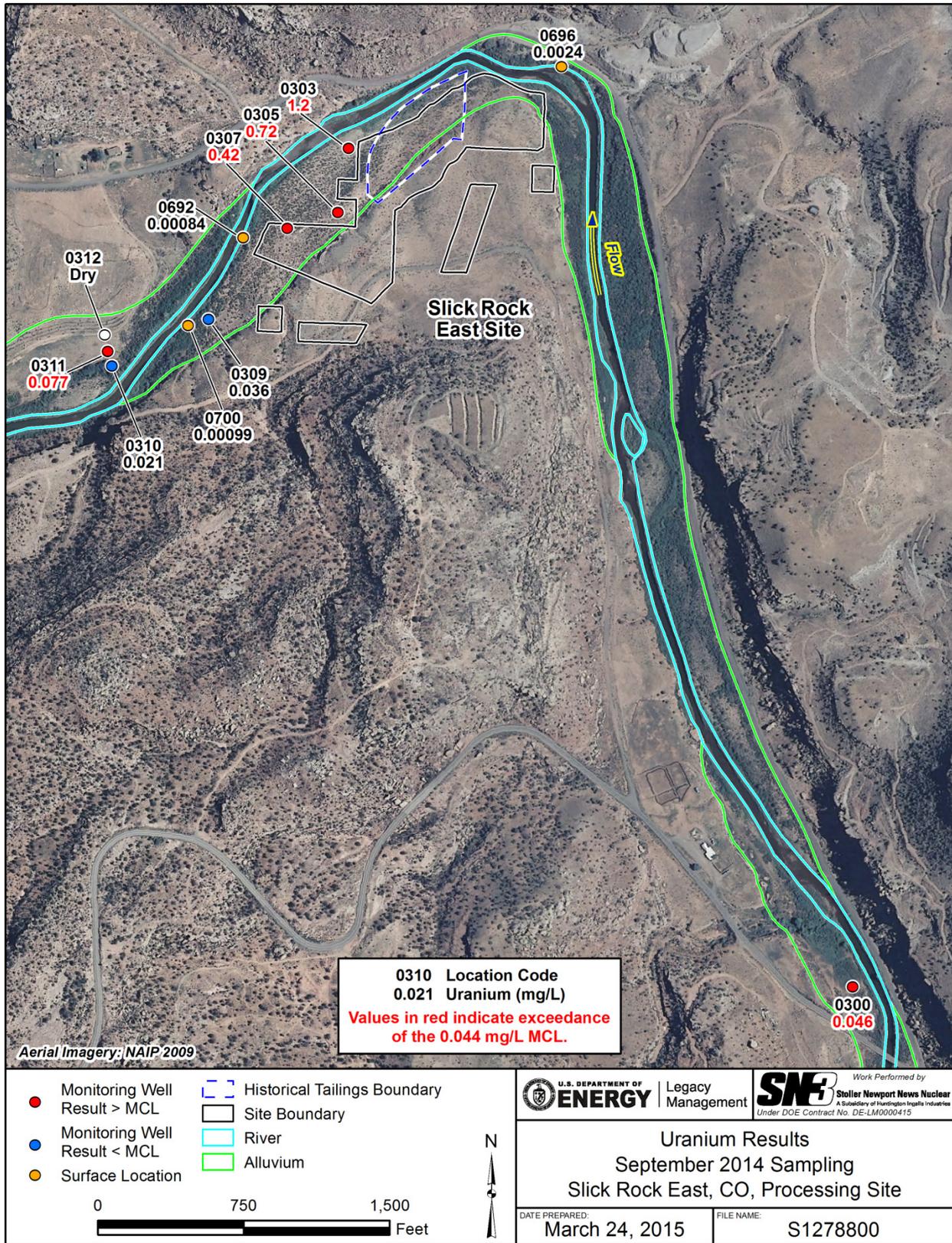


Figure 7. Facet Plot of Uranium Results for SRE Wells, 2000–Present

Figure 7 Explanation. This figure plots exactly the same groundwater uranium data as shown in Figure 6, but scales are unique for each well, facilitating visualization of trends. These plots also include additional components: — blue line is loess local regression line; shaded area is the 95% confidence interval about that line; — straight line is regression line using standard linear model; - - - denotes the 0.044 mg/L UMTRCA MCL. *Note:* the oddly shaped loess smoothing line and lack of a confidence limit band for well 0300 is an artifact of the gap in sampling between 2001 and 2010.

The last measurement in well 0312, taken in 2012, is a historical maximum for that well, but the well was dry in 2013 and 2014 and could not be sampled. Uranium may have become more concentrated as the well dried, and this may account for the higher levels in 2012. Although the cause of historically elevated uranium in wells 0311 and 0312 is not clear, these findings might reflect contamination from historical uranium mining operations north of the Dolores River.

At upgradient well 0300, uranium concentrations increased from 0.01 mg/L measured in 2000–2001 to 0.046 mg/L in 2014 (Figure 8), exceeding the UMTRCA MCL. Levels of other COPCs in this well have been stable and below corresponding benchmarks. The elevated uranium is not unexpected given historic uranium mining operations in the region, but the reason for the recent increase is not clear. It could be due to vertical stratification in the well, which was apparent based on specific conductance (SC) profiling conducted in June 2014. On average, SC levels in well 0300—14,887 and 11,962 microsiemens per centimeter ($\mu\text{S}/\text{cm}$) the last two sampling rounds—have been higher than any other SRE well. Well 0300 has not been developed in several years, but will be developed before the next annual sampling event.



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Figure 8. Uranium Distribution at SRE Monitoring Locations: September 2014 Sampling

4.1.2 SRE Selenium

Selenium is not considered a major contaminant at the SRE site because concentrations have been elevated only in well 0305. Figure 9 plots selenium concentrations in well 0305, nearby well 0307, and background well 0300—the only SRE wells currently monitored for this analyte. Selenium concentrations in well 0305 have ranged from 0.014 to 0.046 mg/L. Although levels more than halved between 2001 and 2006, they have since stabilized at about 0.02 mg/L. While historically exceeding the 0.01 mg/L UMTRCA MCL, all results have been below the 0.05 mg/L SDWA primary drinking water standard (SDWA MCL).

Selenium concentrations in background well 0300 and well 0307 have been less than 0.003 mg/L; many of these results have been below detection limit values (<0.0004 mg/L). All results are well below the UMTRCA MCL.

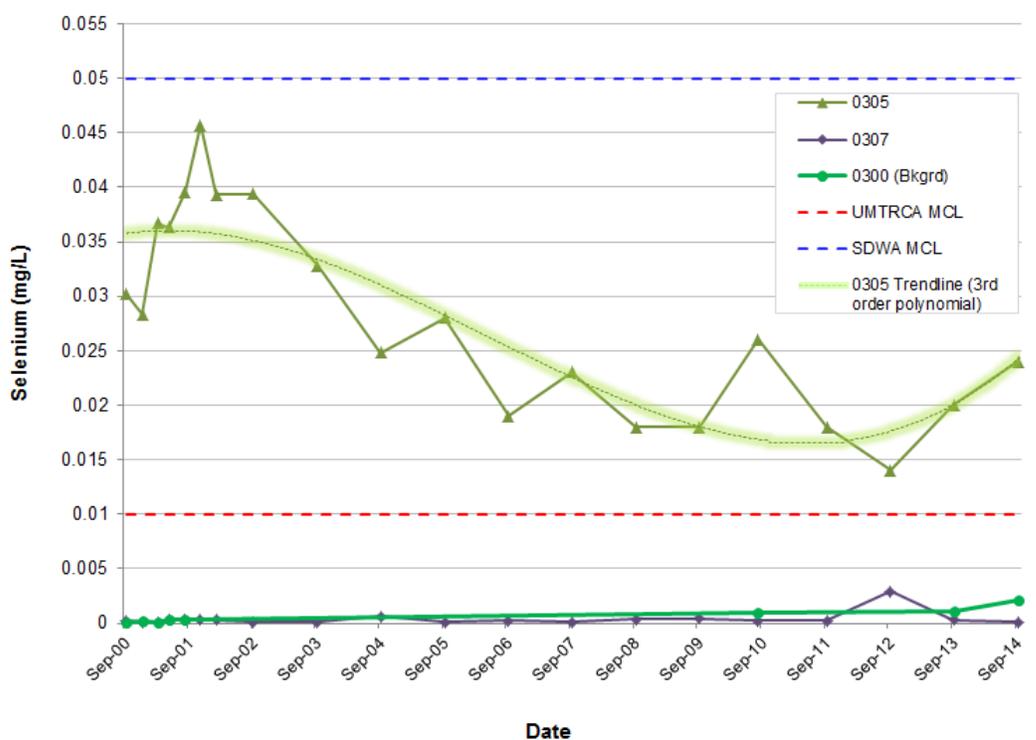


Figure 9. Selenium Concentrations Over Time in SRE Wells 0300, 0305 and 0307

4.2 SRW Site Groundwater Monitoring Results

The two COPCs common to both the SRW site and the SRE site are uranium and selenium. Other constituents monitored at the SRW site include manganese, molybdenum, and nitrate. BTEX, Ra-226, and Ra-228 are monitored at a single SRW well, 0319, as this is the only location where these constituents have been elevated. The box plots in Figure 10. illustrate the distributions of the primary COPCs (uranium, selenium, manganese, molybdenum, and nitrate) in SRW alluvial wells.

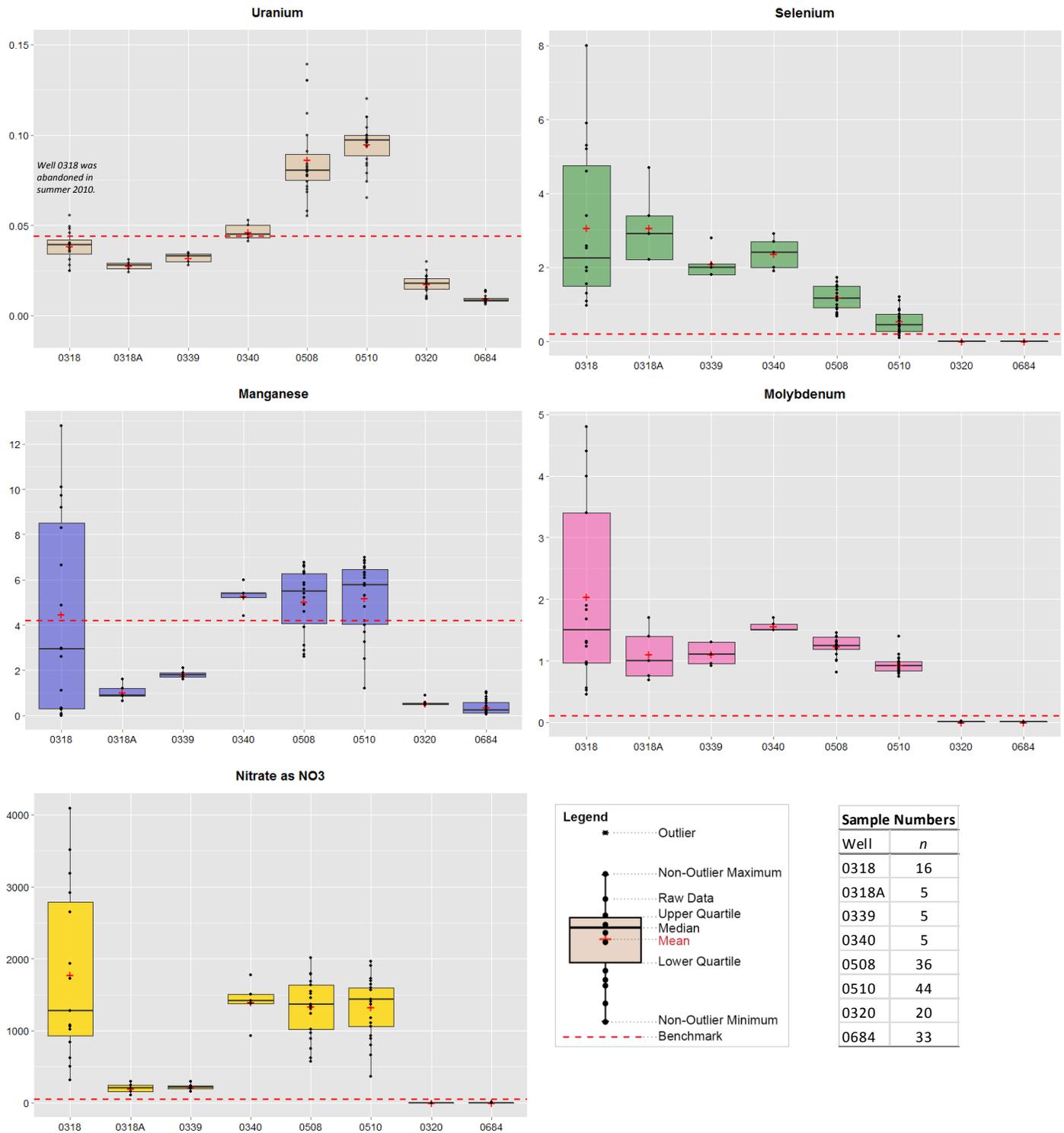


Figure 10. Distributions of Primary COPCs at SRW Alluvial Wells, 2000–Present

Concentrations in mg/L. Results for well 0318 are from February 2000 through August 2010, after which the well was abandoned because it was damaged. (This damage probably accounts for the wide fluctuation in COPC concentrations shown above.) Data for wells 0318A, 0339, and 0340 (installed in 2010) are from September 2010 through present (5 results). Alluvial well 0319 is not included in the plots above because this well is monitored for a different suite of COPCs (BTEX, Ra-226, Ra-228, and selenium). Sample numbers listed to right of legend are for uranium; there may be a few minor discrepancies in total counts for other COPCs.

As shown in Figure 10., uranium concentrations are highest in central SRW wells (0340, 0508, and 0510), coinciding with the portion of the former tailings area closest to the Dolores River. In contrast, selenium has been most elevated in the area around well 0318A (and former well 0318), the southern portion of the former tailings area. As is the case for uranium, concentrations of manganese and nitrate (as NO₃) have been highest in wells 0340, 0508, and 0510. Molybdenum concentrations have been fairly stable at about 1 mg/L in most SRW wells except for downgradient wells 0320 and 0684, where levels have been below the 0.1 mg/L MCL since monitoring began.

4.2.1 SRW Uranium

Uranium concentrations have consistently exceeded the 0.044 mg/L UMTRCA MCL in only two SRW wells—wells 0508 and 0510, located within the historical tailings boundary. No trending is apparent (Figure 11).

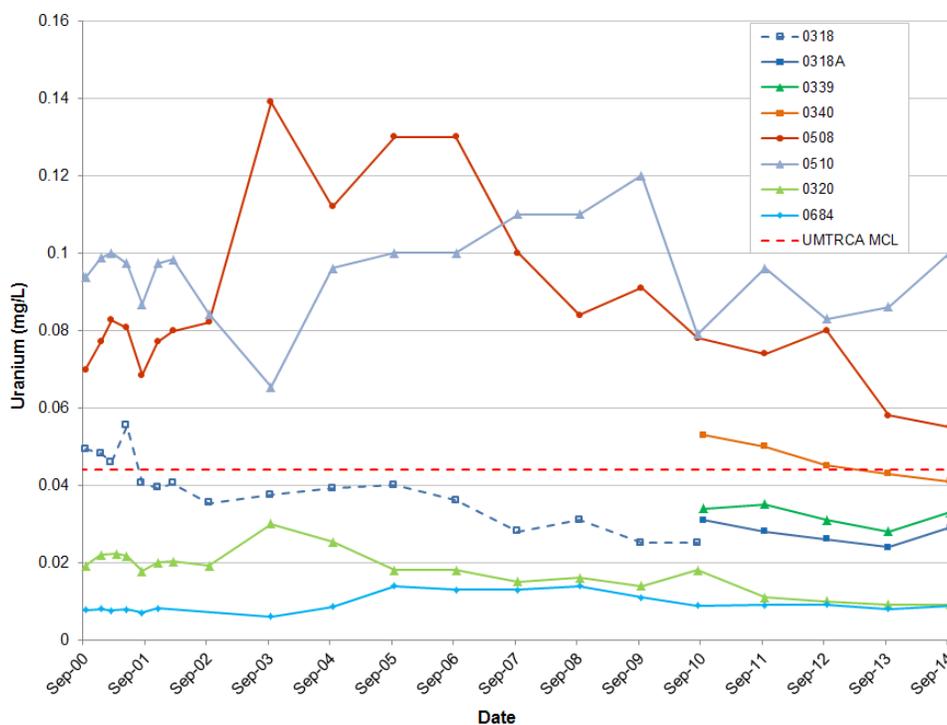
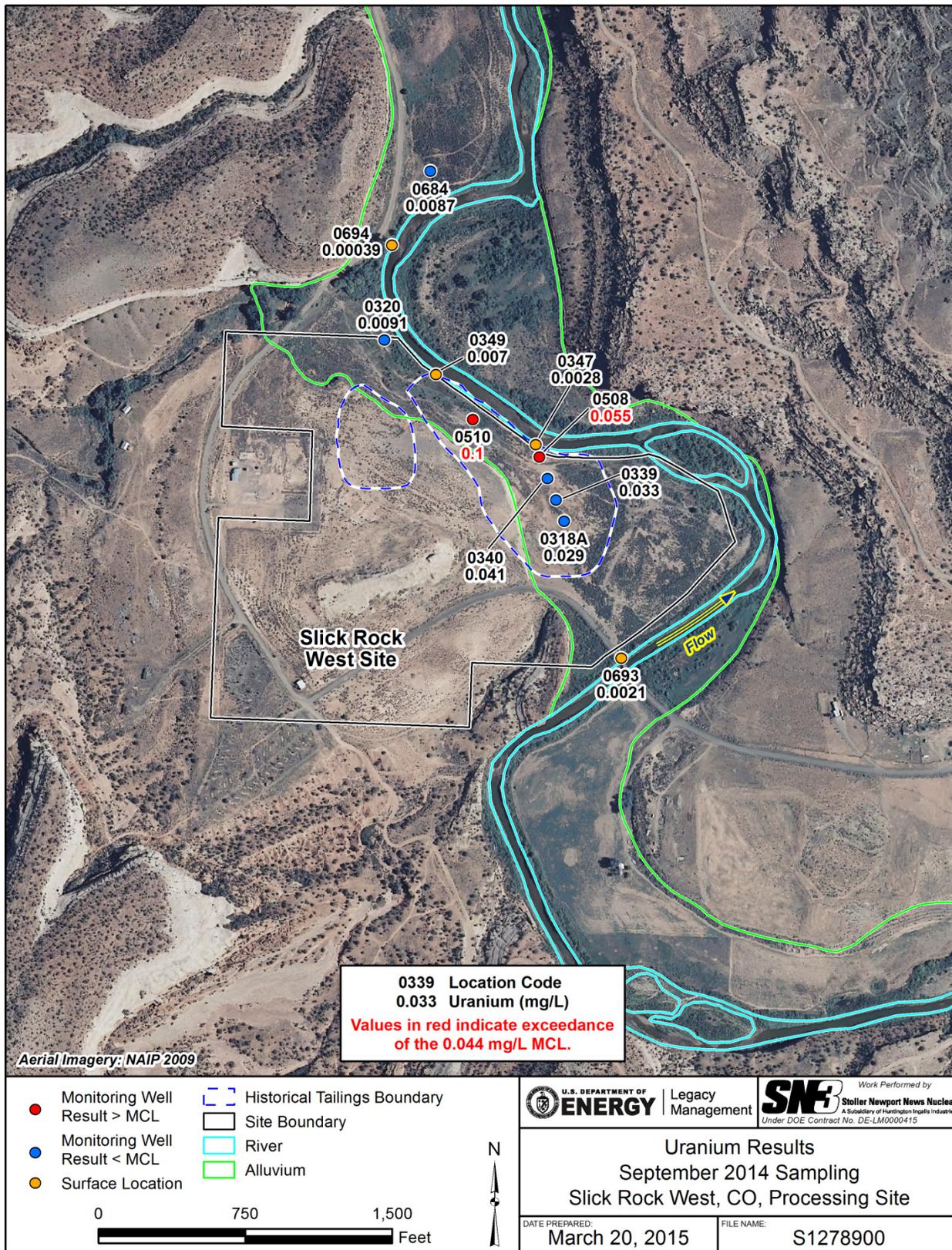


Figure 11. Uranium Concentrations Over Time in SRW Monitoring Wells

Uranium concentrations in former well 0318 dropped below the benchmark in 2001, and then stabilized at about 0.03 mg/L between 2007 and 2010, when it was abandoned. For the last four sampling periods, uranium concentrations in nearby well 0318A (which replaced well 0318) have also been at about 0.03 mg/L. Uranium concentrations in recently installed well 0340 slightly exceeded the UMTRCA MCL in 2010 and 2011. Concentrations were below the MCL for the last two sampling events (September 2013 and September 2014). Uranium concentrations in SRW wells 0508 and 0510 are slightly above the MCL; the remaining SRW wells, including recently installed well 0339, have remained below 0.04 mg/L. Figure 12 presents the most recent (September 2014) uranium results for all SRW wells and also depicts the Dolores River surface water monitoring results (discussed in Section 4.3).



Aerial Imagery: NAIP 2009

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Figure 12. Uranium Distribution at Slick Rock West Site, September 2014

4.2.2 SRW Selenium

Selenium has been historically elevated in SRW alluvial wells 0318, 0318A, 0508, and 0510 within the historical tailings area, and it has also been elevated in recently installed wells 0339 and 0340. Selenium levels in well 0508 have averaged about 1 mg/L, and levels in 0510 have averaged about 0.5 mg/L. Although levels have fluctuated, no trending is apparent (Figure 13). The marked increase in selenium concentrations in former well 0318 between 2004 and 2008 (peaking at 8 mg/L) is likely due to accumulation of sediment within the damaged well. In September 2010, the selenium level in replacement well 0318A was half of that measured in the collocated (later abandoned) well 0318. Selenium concentrations in wells 0339 and 0340 have been comparable to those measured in well 0318A.

In wells 0319, 0320, and 0684, selenium concentrations have always been below the UMTRCA MCL of 0.01 mg/L and, as a result, are not shown on Figure 13. Installation of wells 0339 and 0340 in 2010 prompted the U.S. Department of Energy (DOE) to reinstate monitoring for selenium at Entrada well 0317 and alluvial well 0319 (previously only sampled for BTEX and radium), mainly to verify the extent of the selenium plume. In the last 4 years, results have been consistent with historical results for well 0319, indicating that monitoring for selenium in these wells can be discontinued. Figure 14 maps the most recent (September 2014) monitoring results for selenium at SRW.

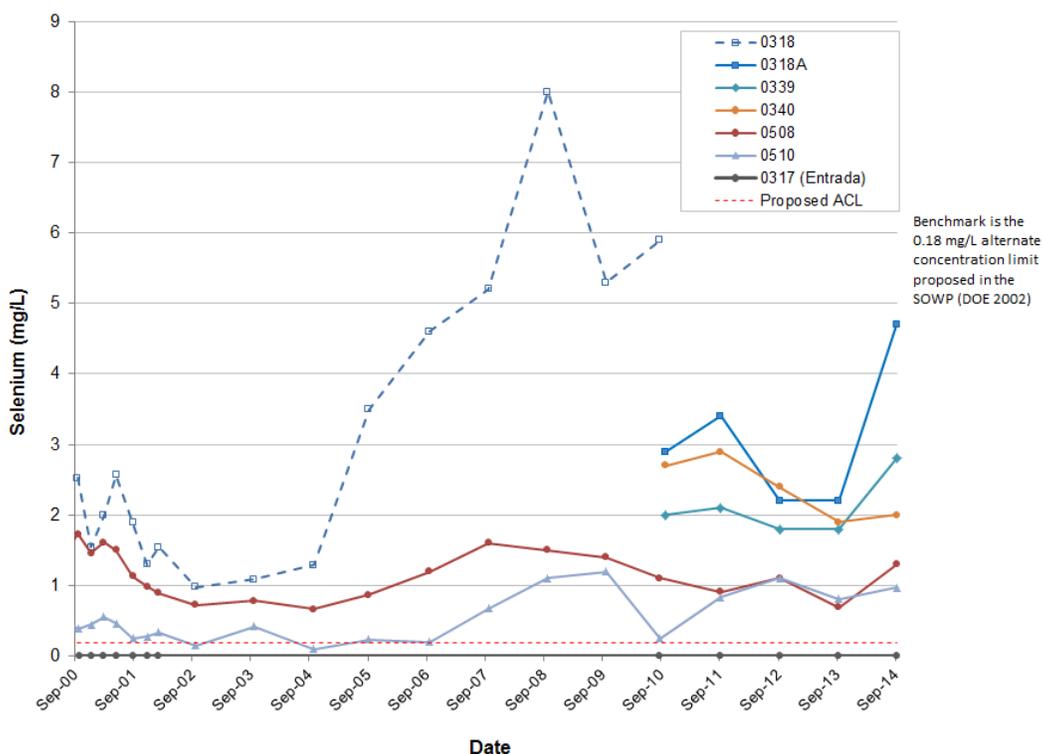
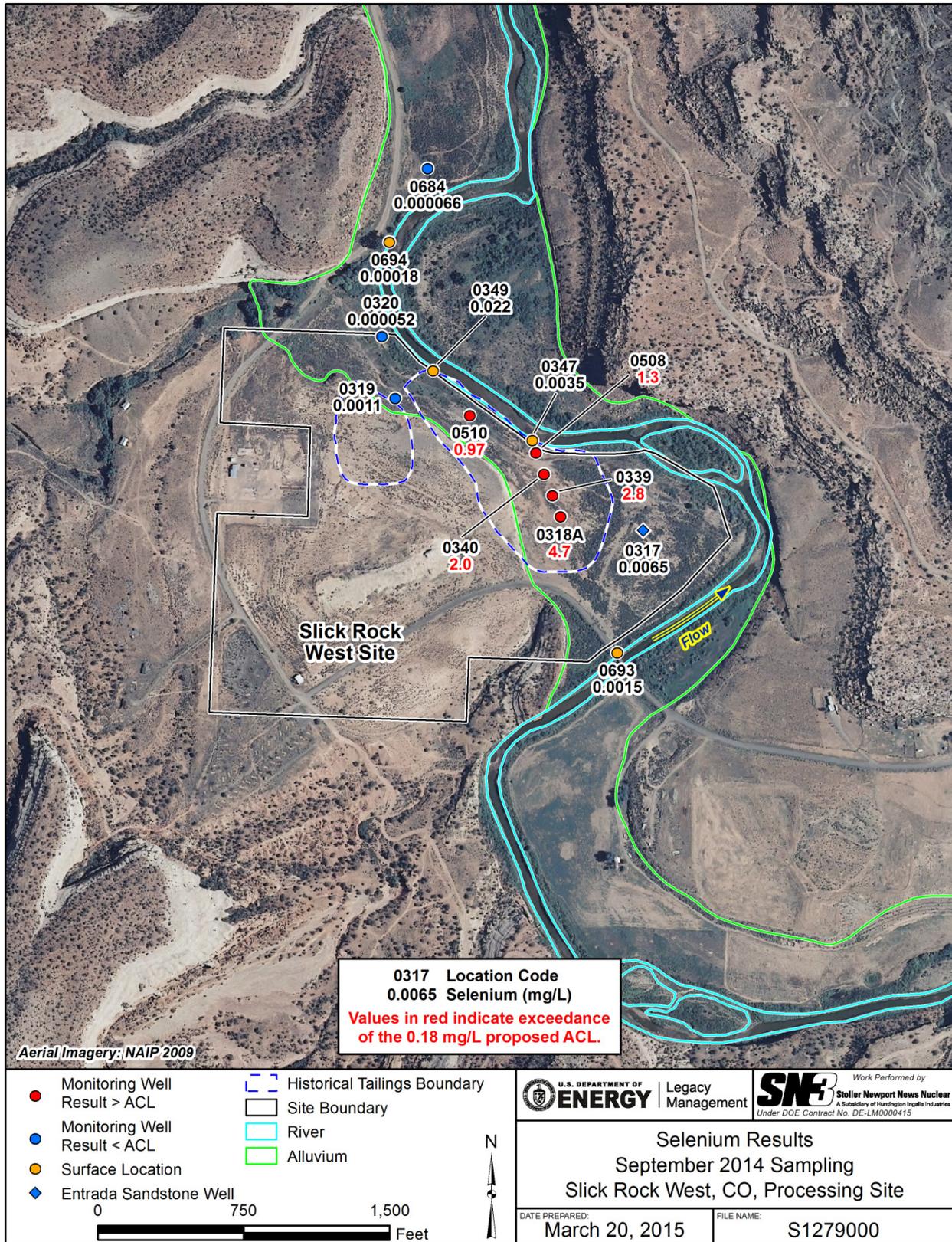


Figure 13. Selenium Concentrations Over Time in SRW Wells with Elevated Selenium



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Figure 14. Selenium Distribution at Slick Rock West Site, September 2014

4.2.3 Manganese

Concentrations of manganese are generally declining over time in the SRW wells. In wells 0508 and 0510, historic concentrations of this constituent have been higher than in other wells (Figure 10.), but manganese is also elevated in recently installed well 0340. Figure 15 shows concentrations over time in the SRW wells. Since September 2011, manganese has been at or below the 4.2 mg/L benchmark in well 0510. The only measurements above the benchmark that have approached the MCL are in well 0340. Historically high concentrations in well 0318 declined below the benchmark in 2002, and levels in well 0318A, which replaced damaged well 0318 in 2010, have been less than half of the benchmark value. Entrada well 0317 and alluvial well 0319 have not been tested for manganese since 2002 because values were low (<0.5 mg/L) and not trending.

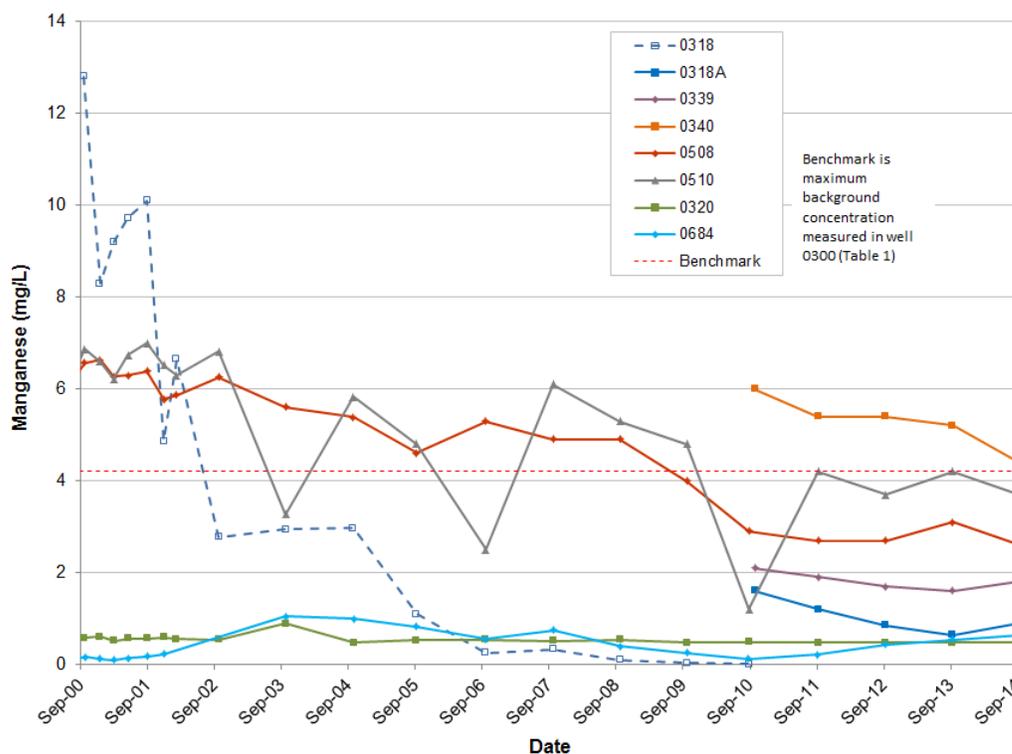


Figure 15. Manganese Concentrations Over Time at the SRW Site

4.2.4 Molybdenum

Molybdenum has been elevated in all SRW wells except those farthest downgradient (0320 and 0684). Figure 16 plots molybdenum concentrations over time at SRW wells. Wells 0320 and 0684 are not shown in Figure 16 because concentrations in these wells have always been low (<0.02 mg/L) and are not trending. Like selenium, former well 0318 showed a marked increase in molybdenum between 2004 and 2008, likely due to sediment accumulation within the damaged well. The sediment accumulation caused samples to be collected from the very top of the water table rather than the bottom of the screened interval. The top zone was frequently flushed due to the rise and fall of water levels, which may have caused the increase in

molybdenum. In September 2010, the molybdenum level in replacement well 0318A was less than half of that measured in the collocated (later abandoned) well 0318. Molybdenum concentrations in well 0318A have been similar to other SRW wells and are more than an order of magnitude above the 0.1 mg/L UMTRCA MCL. Concentrations of molybdenum have generally been between about 0.75 and 1.50 mg/L. No upward or downward trends are apparent.

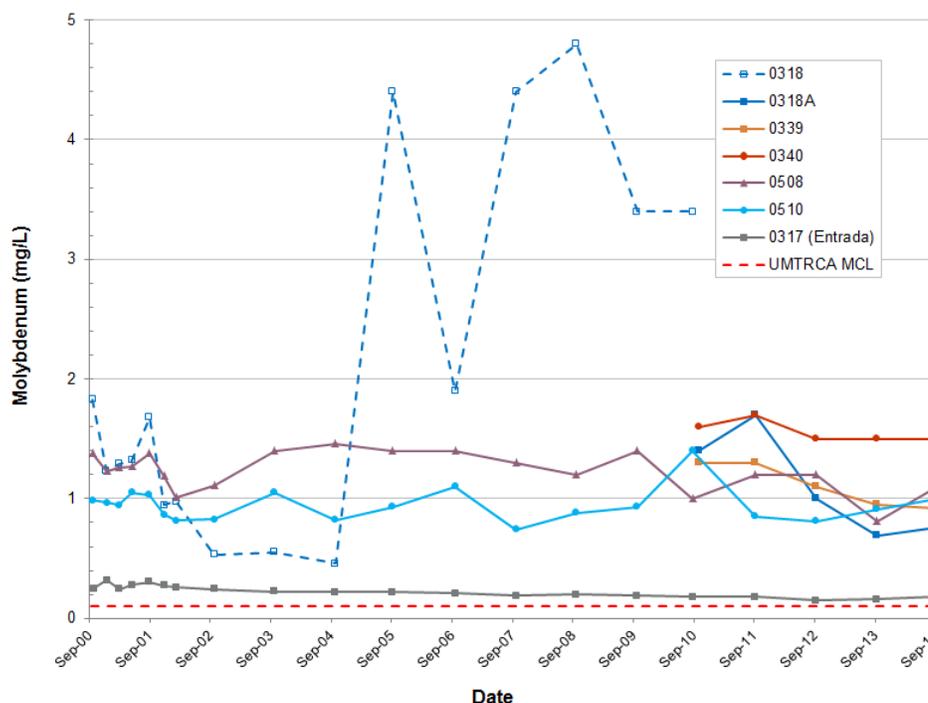


Figure 16. Molybdenum Concentrations Over Time in SRW Wells with Elevated Concentrations

Molybdenum concentrations in Entrada Sandstone well 0317 also exceed the UMTRCA MCL, but only slightly. Levels in this well appear to be trending slightly downward, from a maximum of 0.32 mg/L in December 2000 to the current level of 0.18 mg/L in September 2014.

4.2.5 Nitrate

Figure 17 shows nitrate concentrations over time at currently monitored SRW wells where this constituent has been elevated. Data from wells 0320 and 0684 are not shown because levels have been well below the 44.3 mg/L UMTRCA MCL (for nitrate as NO₃). Although nitrate concentrations have been variable, concentrations in all wells appear to be trending downward over time. Nonetheless, nitrate concentrations are still substantially above the benchmark in SRW wells 0508 and 0510 (619 and 841 mg/L, respectively, in September 2014) and in the more recently installed well 0340 (929 mg/L). Concentrations in wells 0318A and 0339 are much lower (203 and 239 mg/L, respectively, in September 2014), but are still above the UMTRCA MCL.

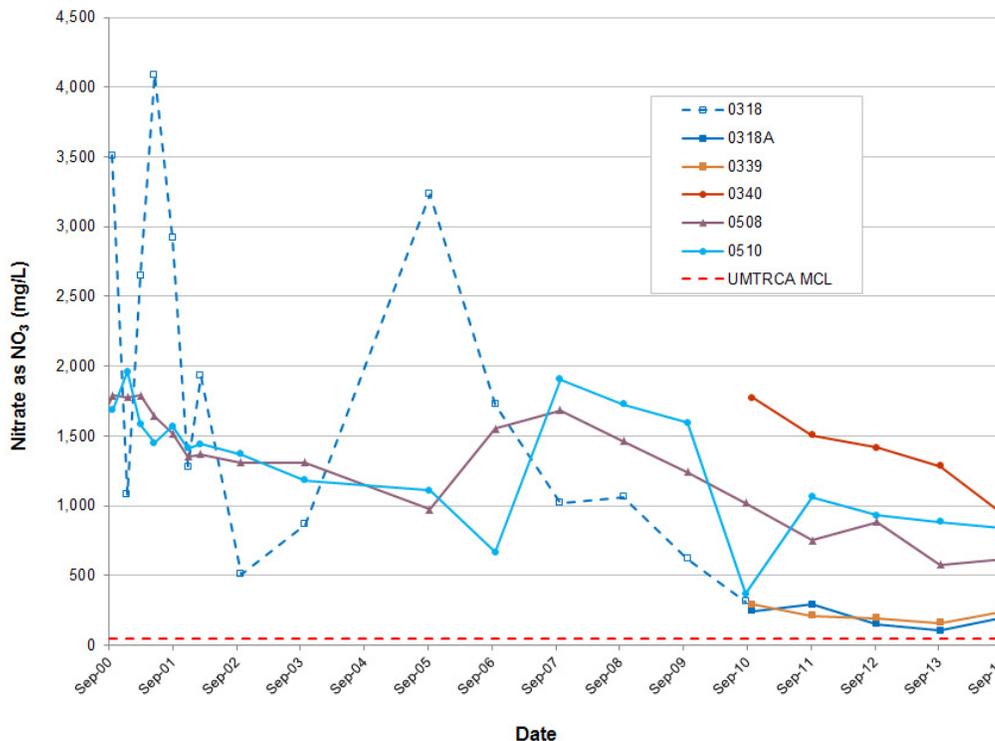


Figure 17. Nitrate (as NO₃) Concentrations Over Time in SRW Wells with Elevated Concentrations

4.2.6 BTEX (Well 0319)

During site characterization activities conducted for the SOWP (DOE 2002), a localized aromatic hydrocarbon plume was identified in the area of alluvial well 0319, where nonaqueous phase liquid had been identified. This is the only SRW well currently monitored for BTEX.³ Corresponding time trends are plotted in Figure 18. Benzene is the only constituent that exceeds the SDWA MCLs. Concentrations of this constituent reached a peak in May 2001 (19.8 mg/L) and has fluctuated over time, with an overall decline. The SDWA MCLs are drinking water standards, and exceeding these benchmarks presents no known risks at the SRW site because there is no exposure to alluvial groundwater. For the past 3 sampling years, toluene concentrations have been below the benchmark. The SDWA MCLs for xylenes has never been exceeded at the SRW site. The SDWA MCLs for ethylbenzene was once slightly exceeded in November 2001.

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

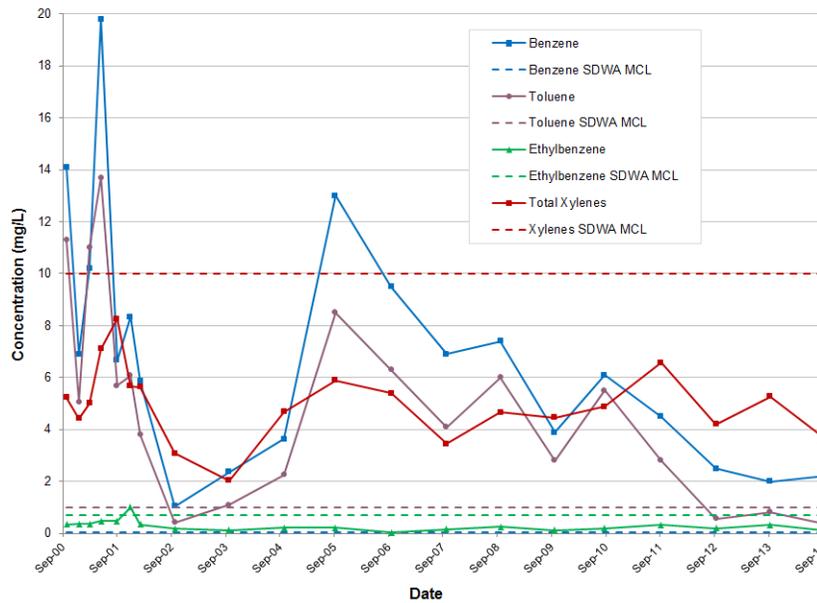


Figure 18. BTEX Concentrations Over Time in SRW Well 0319

4.2.7 Ra-226 and Ra-228 (Well 0319)

Although Ra-226 and Ra-228 have been detected in other wells, their presence above the 5 picocuries per liter (pCi/L) UMTRCA MCL has historically been limited to well 0319, which is also the BTEX hot spot. Figure 19, which plots Ra-226 and Ra-228 concentrations in well 0319 over time, shows that radium levels (Ra-226 and Ra-228 combined) have been below the 5 pCi/L UMTRCA MCL since 2008. Based on these results, radium's localized presence is not considered a major concern at SRW. If concentrations continue to decline and remain below the 5 pCi/L benchmark, cessation of monitoring for this constituent may be justified.

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

Since monitoring began in 2000, surface water sampling results have demonstrated minimal impact to the Dolores River from historical milling activities at either the SRE or SRW sites. At most Dolores River monitoring locations, CDPHE water quality benchmarks were not exceeded in 2014 (Table 4), consistent with historical results. However, at SRW location 0349, 2014 results for manganese and selenium did exceed these benchmarks. These exceedances are attributed to surface runoff at this location, which is close to the former tailings piles, as heavy rain coincided with the sampling event.

As noted in the trip report for the September 2014 sampling event (DOE 2014), surface water samples along the Dolores River were collected both during and after a heavy rain storm. Also, because of accessibility issues stemming from the heavy rain and dense vegetation, monitoring point 0349 was sampled upstream from the location shown on Figure 14. During the next sampling event, this area will be inspected to determine if there are surface drainage discharge points in the area around location 0349 that may have contributed to the elevated results.

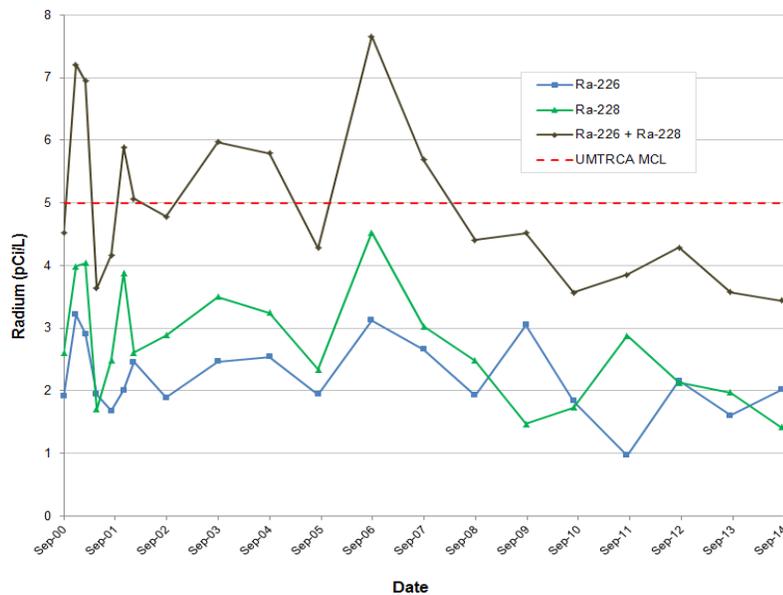


Figure 19. Ra-226 and Ra-228 Concentrations in SRW Well 0319

Table 4. Comparison of 2014 COPC Concentrations in the Dolores River to CDPHE Benchmarks

COPC	CDPHE Benchmark ^a (mg/L)	Dolores River Location						
		SRE Site			SRW Site			
		0696 Bkgd.	0692	0700	0693 Bkgd.	0347	0349	0694
		2014 Result (mg/L)						
Manganese ^b	0.05	–	–	–	0.0056	0.02	0.17 ^d	0.0035
Molybdenum	0.16	–	–	–	0.0049	0.0079	0.019	0.0004
Nitrate as NO ₃	44.3 ^c	–	–	–	2.08	0.97	2.30	0.29
Selenium ^d	0.0046	–	–	–	0.0015	0.0035	0.022 ^e	0.00018
Uranium	0.0168–0.03 ^c	0.0024	0.00084	0.00099	0.0021	0.0028	0.007	0.00039

Abbreviations

Bkgd. = background

Notes

^a CDPHE 2014.

^b The standards listed for manganese and selenium are for chronic exposure.

^c CDPHE (2014) benchmark is 10 mg/L NO₃ as N; value in table is converted to 44.3 mg/L to express NO₃ as NO₃.

^d The uranium standard is a range, from the CDPHE Water Quality Control Commission's health-based value (0.0168 mg/L) to the SDWA MCL (0.03 mg/L).

^e Result exceeds CDPHE benchmark.

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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 concentrations of site COPCs in the alluvial aquifer to levels below benchmark values within 100 years (DOE 2002). Because modeling predicted that site COPCs would be below benchmarks within 50 years, natural flushing was selected as a compliance strategy.

This section evaluates the status of natural flushing for the Slick Rock former processing sites by plotting predicted versus actual concentrations for modeled constituents in the target wells, SRE well 0305 and SRW well 0508.

5.1 SRE Site

Figure 20 plots uranium concentrations in SRE well 0305 versus groundwater model predictions. Uranium concentrations, although decreasing, are not attenuating as rapidly as predicted. Actual concentrations, 0.7–0.8 mg/L in the last several years, are more than an order of magnitude above predicted values. As shown in Figure 9, the selenium trend plot for well 0305, selenium levels have stabilized at about 0.02–0.025 mg/L, close to the 0.01 mg/L UMTRCA MCL and below the 0.05 mg/L SDWA MCL.

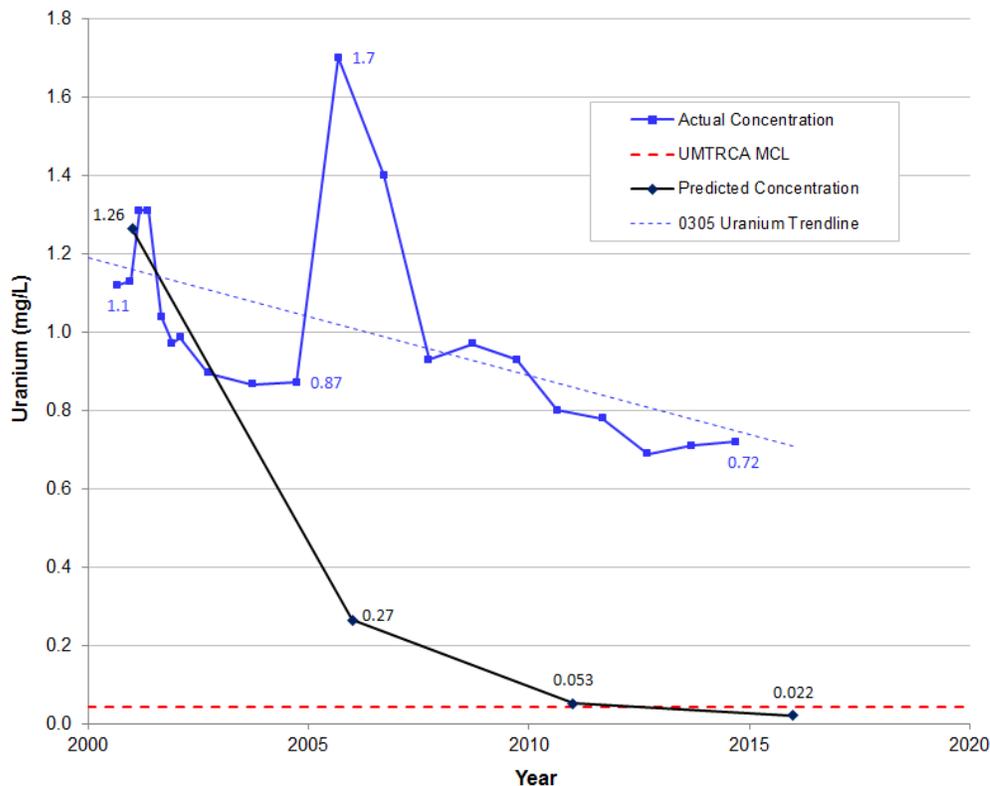


Figure 20. Predicted Versus Actual Uranium Concentrations in SRE Well 0305 (trend projected MCL intercept 03/2038)

5.2 SRW Site

Figures 21 through 25 plot concentrations of manganese, molybdenum, nitrate, selenium, and uranium in SRW well 0508 versus model predictions. For manganese, the actual trend agrees with the groundwater model prediction (Figure 21), and concentrations of this constituent have been below the maximum background concentration of 4.2 mg/L since 2009. Results for the other constituents are not in close agreement with values predicted from the model. Molybdenum (Figure 22) may be trending slightly downward, but it has generally been at about 1.2 mg/L (more than an order of magnitude above the benchmark) since 2000. Nitrate concentrations are trending downward, but they are also still well above predicted values (Figure 23). Selenium concentrations appear to be trending downward, but wide fluctuations in the levels of this constituent preclude any meaningful assessment of trends (Figure 24). Decreasing selenium trends are also not apparent in the other SRW wells (Figure 13). Except for a period of slightly higher concentrations from 2004 through 2007, uranium concentrations have continued dropping slowly to about 0.055 mg/L, which is slightly less than the initial measurement taken in 2000 and about 5 times the predicted values shown in Figure 25.

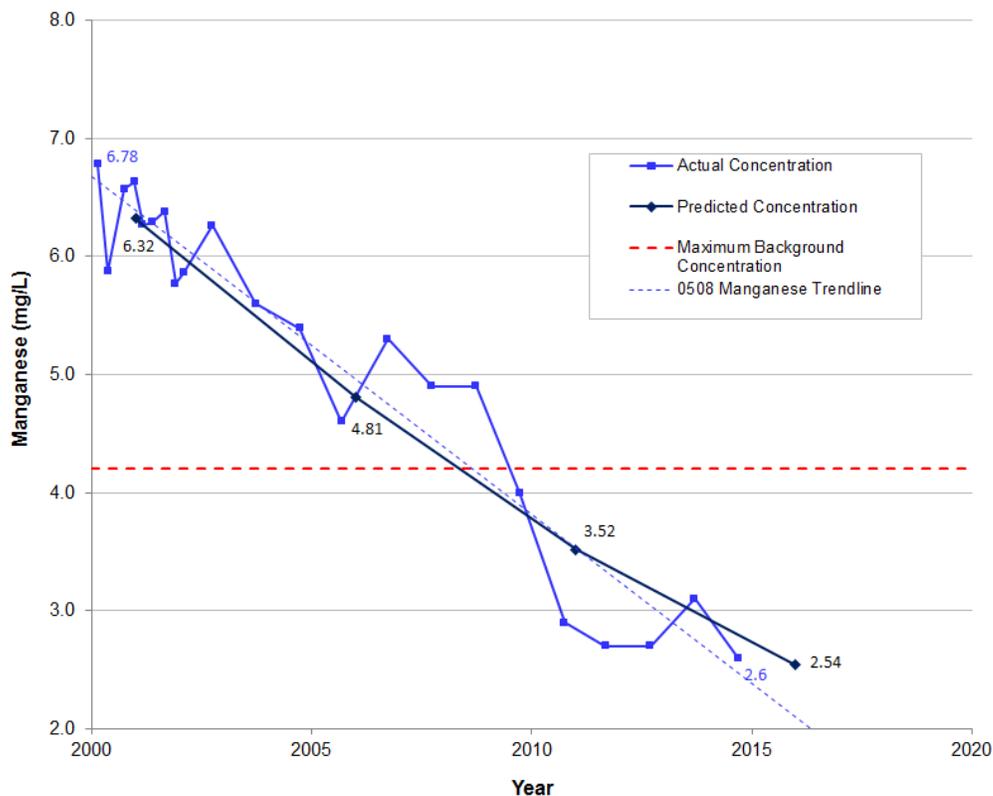


Figure 21. Predicted Versus Actual Manganese Concentrations in SRW Well 0508 (trend projected Maximum Background Concentration intercept 08/2008)

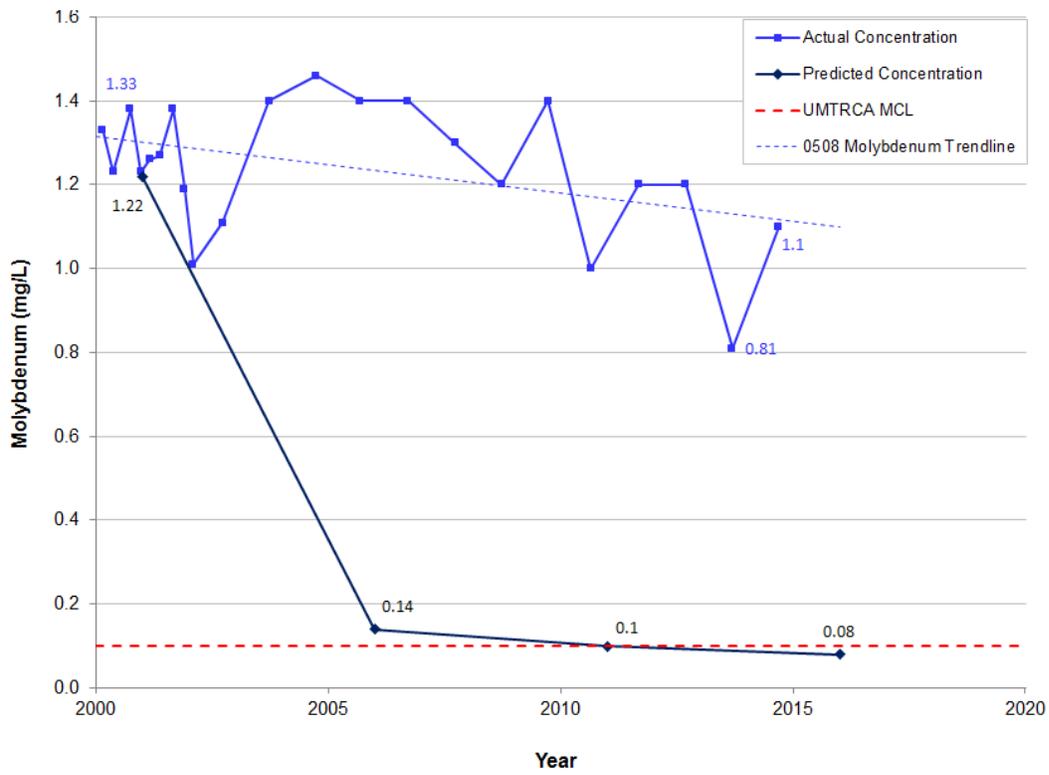


Figure 22. Predicted Versus Actual Molybdenum Concentrations in SRW Well 0508 (trend projected MCL intercept 09/2089)

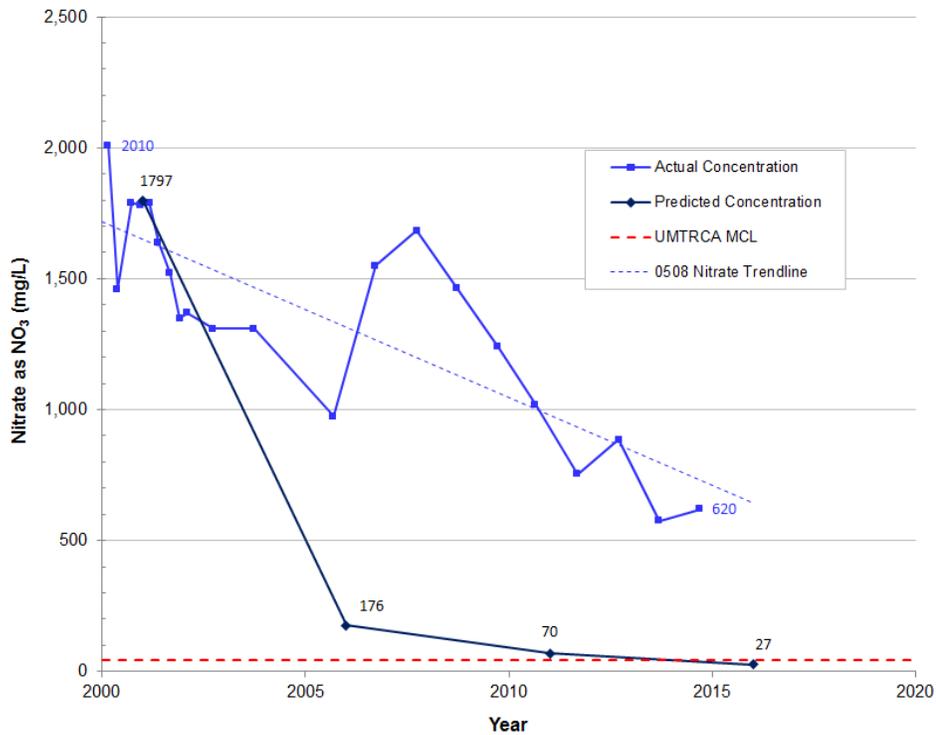


Figure 23. Predicted Versus Actual Nitrate (as NO₃) Concentrations in SRW Well 0508 (trend projected MCL intercept 11/2024)

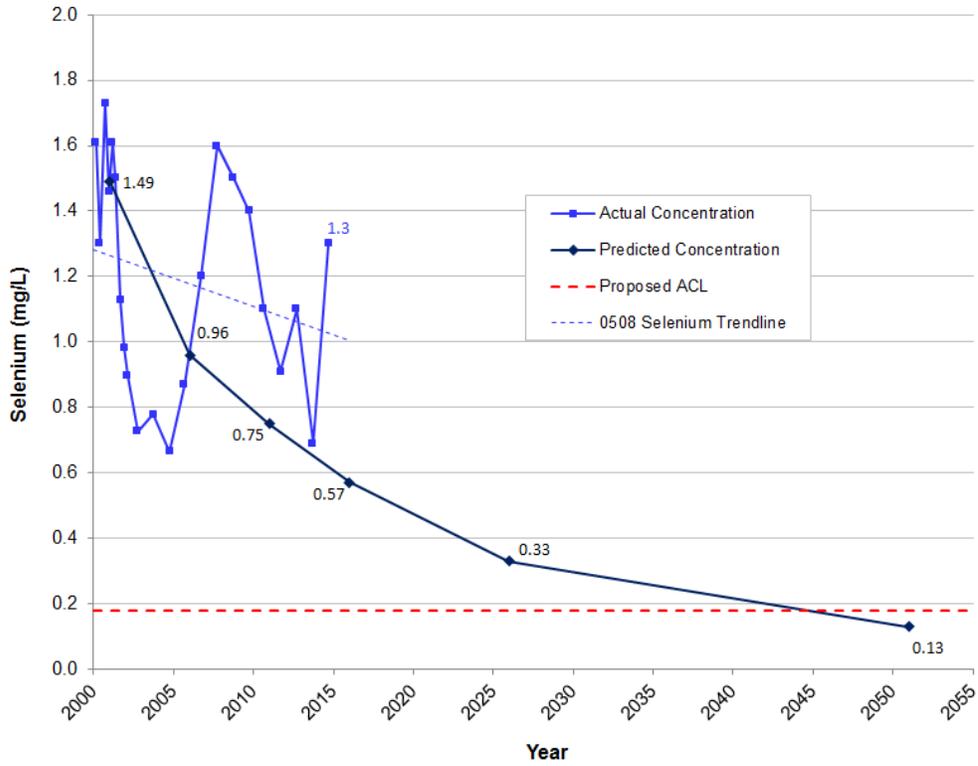


Figure 24. Predicted Versus Actual Selenium Concentrations in SRW Well 0508 (trend projected proposed ACL intercept 03/2063)

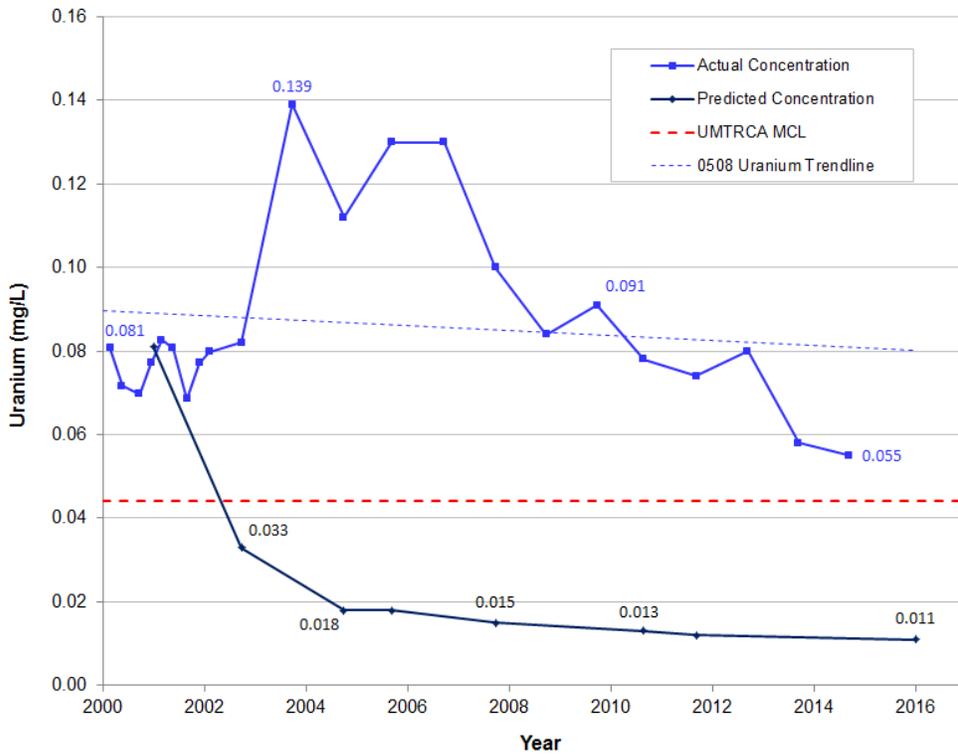


Figure 25. Predicted Versus Actual Uranium Concentrations in SRW Well 0508 (trend projected MCL intercept 10/2044)

6.0 Conclusions

6.1 Status of Site Compliance

Although the 100-year time frame established in 40 CFR 192 does not commence until NRC approves the GCAP (DOE 2006), data presented in Sections 4.0 and 5.0 suggest that many constituents are not attenuating as initially predicted by groundwater modeling conducted for the SOWP (DOE 2002). In fact, time-concentration plots provided in this report indicate relatively stable contaminant trends for most site COPCs. Exceptions to this trend are selenium at SRE, and manganese and nitrate at SRW. Uranium at SRE and molybdenum at SRW may be trending slightly downward; if so, attenuation is much slower than model predictions. Downward trending is not occurring for uranium and is probably not occurring for selenium at the SRW site. In SRW well 0319, concentrations of BTEX are slowly declining, but benzene is still above the benchmark. Concentrations of Ra-226 and Ra-228 in SRW well 0319 have declined below benchmark values, so discontinuing monitoring for these constituents may be warranted.

6.2 Recommendations

Annual verification monitoring of groundwater from designated monitoring wells and surface water locations, and from new wells 0339 and 0340, should continue as specified in the draft final GCAP (DOE 2006), with the modifications recommended in this report. Annual monitoring is planned for 10 years after NRC concurrence with the GCAP, after which monitoring requirements will be reevaluated. Based on earlier modeling predictions it was anticipated that monitoring at the Slick Rock processing site could eventually be decreased to once every 5 years. However, given historical fluctuations in contaminant concentrations in some wells and persistent contamination north of the Dolores River, it may be advisable to adjust this projected decrease to monitoring once every 2 years until contaminant concentrations stabilize or decline.

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7.0 References

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Appendix A

Groundwater Quality Data by Parameter

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GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK06, Slick Rock East Processing Site
 REPORT DATE: 3/17/2015 11:25 am

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:			UN-CERTAINTY
				DATE	ID			LAB	DATA	QA	
Alkalinity, Total (As CaCO3)	mg/L	0300	WL	09/08/2014	N001	9.50 - 19.50	769	F	#	-	-
	mg/L	0303	WL	09/08/2014	N001	4.30 - 14.30	508	F	#	-	-
	mg/L	0305	WL	09/08/2014	N001	8.70 - 18.70	527	F	#	-	-
	mg/L	0307	WL	09/08/2014	N001	4.40 - 14.40	686	F	#	-	-
	mg/L	0309	WL	09/08/2014	N001	10.20 - 20.20	622	F	#	-	-
	mg/L	0310	WL	09/09/2014	N001	14.70 - 19.70	188	F	#	-	-
	mg/L	0311	WL	09/09/2014	N001	14.10 - 19.10	288	F	#	-	-
Manganese	mg/L	0300	WL	09/08/2014	N001	9.50 - 19.50	2.300	JF	#	0.00011	-
	mg/L	0300	WL	09/08/2014	N002	9.50 - 19.50	2.200	JF	#	0.00011	-
Molybdenum	mg/L	0300	WL	09/08/2014	N001	9.50 - 19.50	0.010	F	#	0.00016	-
	mg/L	0300	WL	09/08/2014	N002	9.50 - 19.50	0.0093	F	#	0.00016	-
Nitrate + Nitrite as Nitrogen	mg/L	0300	WL	09/08/2014	N001	9.50 - 19.50	0.017	F	#	0.01	-
	mg/L	0300	WL	09/08/2014	N002	9.50 - 19.50	0.014	F	#	0.01	-
Oxidation Reduction Potential	mV	0305	WL	09/08/2014	N001	8.70 - 18.70	77.0	F	#	-	-
	mV	0311	WL	09/09/2014	N001	14.10 - 19.10	66.7	F	#	-	-
pH	s.u.	0300	WL	09/08/2014	N001	9.50 - 19.50	6.75	F	#	-	-
	s.u.	0303	WL	09/08/2014	N001	4.30 - 14.30	7.18	F	#	-	-
	s.u.	0305	WL	09/08/2014	N001	8.70 - 18.70	7.11	F	#	-	-
	s.u.	0307	WL	09/08/2014	N001	4.40 - 14.40	7.09	F	#	-	-
	s.u.	0309	WL	09/08/2014	N001	10.20 - 20.20	7.57	F	#	-	-
	s.u.	0310	WL	09/09/2014	N001	14.70 - 19.70	7.31	F	#	-	-
	s.u.	0311	WL	09/09/2014	N001	14.10 - 19.10	6.88	F	#	-	-
Radium-226	pCi/L	0300	WL	09/08/2014	N001	9.50 - 19.50	0.17	U	JF	#	0.17 ± 0.11
	pCi/L	0300	WL	09/08/2014	N002	9.50 - 19.50	0.13	U	F	#	0.13 ± 0.09

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK06, Slick Rock East Processing Site
 REPORT DATE: 3/17/2015 11:25 am

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Radium-228	pCi/L	0300	WL	09/08/2014	N001	9.50 - 19.50	0.64	U F #	0.64	± 0.43
	pCi/L	0300	WL	09/08/2014	N002	9.50 - 19.50	0.72	U F #	0.72	± 0.48
Selenium	mg/L	0300	WL	09/08/2014	N001	9.50 - 19.50	0.0021	F #	0.00016	-
	mg/L	0300	WL	09/08/2014	N002	9.50 - 19.50	0.0016	F #	0.00016	-
	mg/L	0305	WL	09/08/2014	N001	8.70 - 18.70	0.024	F #	0.0016	-
	mg/L	0307	WL	09/08/2014	N001	4.40 - 14.40	0.00008	B F #	3.2E-05	-
Specific Conductance	umhos/cm	0300	WL	09/08/2014	N001	9.50 - 19.50	11962	F #	-	-
	umhos/cm	0303	WL	09/08/2014	N001	4.30 - 14.30	3516	F #	-	-
	umhos/cm	0305	WL	09/08/2014	N001	8.70 - 18.70	2874	F #	-	-
	umhos/cm	0307	WL	09/08/2014	N001	4.40 - 14.40	5587	F #	-	-
	umhos/cm	0309	WL	09/08/2014	N001	10.20 - 20.20	1813	F #	-	-
	umhos/cm	0310	WL	09/09/2014	N001	14.70 - 19.70	949	F #	-	-
	umhos/cm	0311	WL	09/09/2014	N001	14.10 - 19.10	1469	F #	-	-
Temperature	C	0300	WL	09/08/2014	N001	9.50 - 19.50	14.45	F #	-	-
	C	0303	WL	09/08/2014	N001	4.30 - 14.30	17.40	F #	-	-
	C	0305	WL	09/08/2014	N001	8.70 - 18.70	15.98	F #	-	-
	C	0307	WL	09/08/2014	N001	4.40 - 14.40	15.11	F #	-	-
	C	0309	WL	09/08/2014	N001	10.20 - 20.20	14.28	F #	-	-
	C	0310	WL	09/09/2014	N001	14.70 - 19.70	14.97	F #	-	-
	C	0311	WL	09/09/2014	N001	14.10 - 19.10	15.85	F #	-	-
Turbidity	NTU	0300	WL	09/08/2014	N001	9.50 - 19.50	3.72	FJ #	-	-
	NTU	0303	WL	09/08/2014	N001	4.30 - 14.30	8.30	FJ #	-	-
	NTU	0305	WL	09/08/2014	N001	8.70 - 18.70	4.50	FJ #	-	-
	NTU	0307	WL	09/08/2014	N001	4.40 - 14.40	9.67	FJ #	-	-
	NTU	0309	WL	09/08/2014	N001	10.20 - 20.20	9.62	FJ #	-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK06, Slick Rock East Processing Site
 REPORT DATE: 3/17/2015 11:25 am

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Turbidity	NTU	0310	WL	09/09/2014	N001	14.70 - 19.70	9.49	FJ #	-	-
	NTU	0311	WL	09/09/2014	N001	14.10 - 19.10	8.25	FJ #	-	-
Uranium	mg/L	0300	WL	09/08/2014	N001	9.50 - 19.50	0.045	F #	1.5E-05	-
	mg/L	0300	WL	09/08/2014	N002	9.50 - 19.50	0.046	F #	1.5E-05	-
	mg/L	0303	WL	09/08/2014	N001	4.30 - 14.30	1.200	F #	0.00029	-
	mg/L	0305	WL	09/08/2014	N001	8.70 - 18.70	0.720	F #	0.00015	-
	mg/L	0307	WL	09/08/2014	N001	4.40 - 14.40	0.420	F #	1.5E-05	-
	mg/L	0309	WL	09/08/2014	N001	10.20 - 20.20	0.036	F #	2.9E-05	-
	mg/L	0310	WL	09/09/2014	N001	14.70 - 19.70	0.021	F #	2.9E-05	-
	mg/L	0311	WL	09/09/2014	N001	14.10 - 19.10	0.077	F #	2.9E-05	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK06, Slick Rock East Processing Site
 REPORT DATE: 3/17/2015 11:25 am

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('0300','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 cas in('ALKALINITY','000071-43-2','000100-41-4','M&P XYLENE','07439-96-5','07439-98-7','NO3+NO2 AS N','ORP','000095-47-6','PH','RA-226','RA-228','07782-49-2','EC','TMP','000108-88-3','TURBIDITY','07440-61-1') AND result >= 0 AND DATE_SAMPLED between #1/1/2014# and #12/30/2014#

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 Aroclor 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.

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site
 REPORT DATE: 3/17/2015 11:17 am

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	09/09/2014	N001	19.46 - 39.52	278	F #	-	-
	mg/L	0318A	WL	09/09/2014	N001	9.20 - 14.20	261	F #	-	-
	mg/L	0319	WL	09/09/2014	N001	4.55 - 14.58	1042	F #	-	-
	mg/L	0320	WL	09/09/2014	N001	4.92 - 9.96	352	F #	-	-
	mg/L	0339	WL	09/09/2014	N001	11.00 - 14.00	282	F #	-	-
	mg/L	0340	WL	09/09/2014	N001	6.51 - 11.51	286	F #	-	-
	mg/L	0508	WL	09/09/2014	N001	1.01 - 11.01	255	F #	-	-
	mg/L	0510	WL	09/09/2014	N001	4.92 - 13.92	275	F #	-	-
	mg/L	0684	WL	09/09/2014	N001	11.00 - 21.00	156	F #	-	-
Benzene	ug/L	0319	WL	09/09/2014	N001	4.55 - 14.58	2200	F #	15	-
Ethylbenzene	ug/L	0319	WL	09/09/2014	N001	4.55 - 14.58	130	F #	15	-
m,p-Xylene	ug/L	0319	WL	09/09/2014	N001	4.55 - 14.58	3000	F #	15	-
Manganese	mg/L	0318A	WL	09/09/2014	N001	9.20 - 14.20	0.900	F #	0.00011	-
	mg/L	0320	WL	09/09/2014	N001	4.92 - 9.96	0.490	F #	0.00011	-
	mg/L	0339	WL	09/09/2014	N001	11.00 - 14.00	1.800	F #	0.00011	-
	mg/L	0340	WL	09/09/2014	N001	6.51 - 11.51	4.400	F #	0.00011	-
	mg/L	0508	WL	09/09/2014	N001	1.01 - 11.01	2.600	F #	0.00011	-
	mg/L	0510	WL	09/09/2014	N001	4.92 - 13.92	3.700	F #	0.00011	-
	mg/L	0510	WL	09/09/2014	N002	4.92 - 13.92	3.700	F #	0.00011	-
	mg/L	0684	WL	09/09/2014	N001	11.00 - 21.00	0.640	F #	0.00011	-
Molybdenum	mg/L	0317	WL	09/09/2014	N001	19.46 - 39.52	0.180	F #	0.00032	-
	mg/L	0318A	WL	09/09/2014	N001	9.20 - 14.20	0.760	F #	0.0032	-
	mg/L	0320	WL	09/09/2014	N001	4.92 - 9.96	0.011	F #	3.2E-05	-
	mg/L	0339	WL	09/09/2014	N001	11.00 - 14.00	0.920	F #	0.0032	-
	mg/L	0340	WL	09/09/2014	N001	6.51 - 11.51	1.500	F #	0.0032	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site
 REPORT DATE: 3/17/2015 11:17 am

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Molybdenum	mg/L	0508	WL	09/09/2014	N001	1.01 - 11.01	1.100	F #	0.0032	-
	mg/L	0510	WL	09/09/2014	N001	4.92 - 13.92	0.890	F #	0.0032	-
	mg/L	0510	WL	09/09/2014	N002	4.92 - 13.92	1.000	F #	0.00032	-
	mg/L	0684	WL	09/09/2014	N001	11.00 - 21.00	0.0065	F #	3.2E-05	-
Nitrate + Nitrite as Nitrogen	mg/L	0318A	WL	09/09/2014	N001	9.20 - 14.20	46	F #	0.5	-
	mg/L	0320	WL	09/09/2014	N001	4.92 - 9.96	0.011	F #	0.01	-
	mg/L	0339	WL	09/09/2014	N001	11.00 - 14.00	54	F #	0.5	-
	mg/L	0340	WL	09/09/2014	N001	6.51 - 11.51	210	F #	2	-
	mg/L	0508	WL	09/09/2014	N001	1.01 - 11.01	140	F #	2	-
	mg/L	0510	WL	09/09/2014	N001	4.92 - 13.92	180	F #	2	-
	mg/L	0510	WL	09/09/2014	N002	4.92 - 13.92	190	F #	2	-
	mg/L	0684	WL	09/09/2014	N001	11.00 - 21.00	0.01	U F #	0.01	-
Oxidation Reduction Potential	mV	0317	WL	09/09/2014	N001	19.46 - 39.52	177.1	F #	-	-
	mV	0318A	WL	09/09/2014	N001	9.20 - 14.20	159.9	F #	-	-
	mV	0319	WL	09/09/2014	N001	4.55 - 14.58	-100.0	F #	-	-
	mV	0320	WL	09/09/2014	N001	4.92 - 9.96	-45.8	F #	-	-
	mV	0339	WL	09/09/2014	N001	11.00 - 14.00	161.3	F #	-	-
	mV	0340	WL	09/09/2014	N001	6.51 - 11.51	164.5	F #	-	-
	mV	0508	WL	09/09/2014	N001	1.01 - 11.01	96.0	F #	-	-
	mV	0510	WL	09/09/2014	N001	4.92 - 13.92	187.4	F #	-	-
	mV	0684	WL	09/09/2014	N001	11.00 - 21.00	57.6	F #	-	-
o-Xylene	ug/L	0319	WL	09/09/2014	N001	4.55 - 14.58	670	F #	15	-
pH	s.u.	0317	WL	09/09/2014	N001	19.46 - 39.52	7.19	F #	-	-
	s.u.	0318A	WL	09/09/2014	N001	9.20 - 14.20	6.89	F #	-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site
 REPORT DATE: 3/17/2015 11:17 am

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.	0319	WL	09/09/2014	N001	4.55 - 14.58	6.93	F #	-	-
	s.u.	0320	WL	09/09/2014	N001	4.92 - 9.96	7.06	F #	-	-
	s.u.	0339	WL	09/09/2014	N001	11.00 - 14.00	6.91	F #	-	-
	s.u.	0340	WL	09/09/2014	N001	6.51 - 11.51	6.63	F #	-	-
	s.u.	0508	WL	09/09/2014	N001	1.01 - 11.01	6.69	F #	-	-
	s.u.	0510	WL	09/09/2014	N001	4.92 - 13.92	6.57	F #	-	-
	s.u.	0684	WL	09/09/2014	N001	11.00 - 21.00	7.22	F #	-	-
Radium-226	pCi/L	0319	WL	09/09/2014	N001	4.55 - 14.58	2.02	F #	0.18	± 0.62
Radium-228	pCi/L	0319	WL	09/09/2014	N001	4.55 - 14.58	1.42	F #	0.7	± 0.59
Selenium	mg/L	0317	WL	09/09/2014	N001	19.46 - 39.52	0.0065	F #	0.00032	-
	mg/L	0318A	WL	09/09/2014	N001	9.20 - 14.20	4.700	F #	0.0032	-
	mg/L	0319	WL	09/09/2014	N001	4.55 - 14.58	0.0011	F #	0.00016	-
	mg/L	0320	WL	09/09/2014	N001	4.92 - 9.96	0.00005 B	F #	3.2E-05	-
	mg/L	0339	WL	09/09/2014	N001	11.00 - 14.00	2.800	F #	0.0032	-
	mg/L	0340	WL	09/09/2014	N001	6.51 - 11.51	2.000	F #	0.0032	-
	mg/L	0508	WL	09/09/2014	N001	1.01 - 11.01	1.300	F #	0.0032	-
	mg/L	0510	WL	09/09/2014	N001	4.92 - 13.92	0.870	F #	0.0032	-
	mg/L	0510	WL	09/09/2014	N002	4.92 - 13.92	0.970	F #	0.00032	-
	mg/L	0684	WL	09/09/2014	N001	11.00 - 21.00	0.00006 B	F #	3.2E-05	-
Specific Conductance	umhos/cm	0317	WL	09/09/2014	N001	19.46 - 39.52	2741	F #	-	-
	umhos/cm	0318A	WL	09/09/2014	N001	9.20 - 14.20	2006	F #	-	-
	umhos/cm	0319	WL	09/09/2014	N001	4.55 - 14.58	3299	F #	-	-
	umhos/cm	0320	WL	09/09/2014	N001	4.92 - 9.96	852	F #	-	-
	umhos/cm	0339	WL	09/09/2014	N001	11.00 - 14.00	2017	F #	-	-
	umhos/cm	0340	WL	09/09/2014	N001	6.51 - 11.51	3537	F #	-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site
 REPORT DATE: 3/17/2015 11:17 am

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	0508	WL	09/09/2014	N001	1.01 - 11.01	3166	F #	-	-
	umhos/cm	0510	WL	09/09/2014	N001	4.92 - 13.92	3673	F #	-	-
	umhos/cm	0684	WL	09/09/2014	N001	11.00 - 21.00	761	F #	-	-
Temperature	C	0317	WL	09/09/2014	N001	19.46 - 39.52	13.76	F #	-	-
	C	0318A	WL	09/09/2014	N001	9.20 - 14.20	17.44	F #	-	-
	C	0319	WL	09/09/2014	N001	4.55 - 14.58	16.78	F #	-	-
	C	0320	WL	09/09/2014	N001	4.92 - 9.96	15.74	F #	-	-
	C	0339	WL	09/09/2014	N001	11.00 - 14.00	16.36	F #	-	-
	C	0340	WL	09/09/2014	N001	6.51 - 11.51	17.92	F #	-	-
	C	0508	WL	09/09/2014	N001	1.01 - 11.01	18.64	F #	-	-
	C	0510	WL	09/09/2014	N001	4.92 - 13.92	17.09	F #	-	-
	C	0684	WL	09/09/2014	N001	11.00 - 21.00	13.48	F #	-	-
Toluene	ug/L	0319	WL	09/09/2014	N001	4.55 - 14.58	370	F #	15	-
Turbidity	NTU	0317	WL	09/09/2014	N001	19.46 - 39.52	2.62	FJ #	-	-
	NTU	0318A	WL	09/09/2014	N001	9.20 - 14.20	8.80	FJ #	-	-
	NTU	0319	WL	09/09/2014	N001	4.55 - 14.58	6.40	FJ #	-	-
	NTU	0320	WL	09/09/2014	N001	4.92 - 9.96	9.36	FJ #	-	-
	NTU	0339	WL	09/09/2014	N001	11.00 - 14.00	5.32	FJ #	-	-
	NTU	0340	WL	09/09/2014	N001	6.51 - 11.51	6.05	FJ #	-	-
	NTU	0508	WL	09/09/2014	N001	1.01 - 11.01	3.56	FJ #	-	-
	NTU	0510	WL	09/09/2014	N001	4.92 - 13.92	2.27	FJ #	-	-
	NTU	0684	WL	09/09/2014	N001	11.00 - 21.00	5.11	FJ #	-	-
Uranium	mg/L	0318A	WL	09/09/2014	N001	9.20 - 14.20	0.029	F #	0.00029	-
	mg/L	0320	WL	09/09/2014	N001	4.92 - 9.96	0.0091	F #	2.9E-06	-
	mg/L	0339	WL	09/09/2014	N001	11.00 - 14.00	0.033	F #	0.00029	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site
 REPORT DATE: 3/17/2015 11:17 am

PARAMETER	UNITS	LOCATION CODE	LOCATION TYPE	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:			UN-CERTAINTY
				DATE	ID			LAB	DATA	QA	
Uranium	mg/L	0340	WL	09/09/2014	N001	6.51 - 11.51	0.041	F	#	0.00029	-
	mg/L	0508	WL	09/09/2014	N001	1.01 - 11.01	0.055	F	#	0.00029	-
	mg/L	0510	WL	09/09/2014	N001	4.92 - 13.92	0.100	F	#	0.00029	-
	mg/L	0510	WL	09/09/2014	N002	4.92 - 13.92	0.100	F	#	2.9E-05	-
	mg/L	0684	WL	09/09/2014	N001	11.00 - 21.00	0.0087	F	#	2.9E-06	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE SRK05, Slick Rock West Processing Site
 REPORT DATE: 3/17/2015 11:17 am

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','0318A','0319','0320','0339','0340','0508','0510','0684') AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%') AND cas in('ALKALINITY','000071-43-2','000100-41-4','M&P XYLENE','07439-96-5','07439-98-7','NO3+NO2 AS N','ORP','000095-47-6','PH','RA-226','RA-228','07782-49-2','EC','TMP','000108-88-3','TURBIDITY','07440-61-1') AND DATE_SAMPLED between #1/1/2014# and #12/30/2014#

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 Aroclor 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: 3/17/2015 11:37 am

PARAMETER	UNITS	LOCATION CODE	SAMPLE:		RESULT	QUALIFIERS:			DETECTION LIMIT	UN-CERTAINTY	
			DATE	ID		LAB	DATA	QA			
Alkalinity, Total (As CaCO3)	mg/L	0692	09/08/2014	N001	110				#	-	-
	mg/L	0696	09/09/2014	0001	76				#	-	-
	mg/L	0700	09/08/2014	N001	121				#	-	-
Oxidation Reduction Potential	mV	0692	09/08/2014	N001	22.2				#	-	-
	mV	0696	09/09/2014	N001	174.0				#	-	-
pH	s.u.	0692	09/08/2014	N001	8.35				#	-	-
	s.u.	0696	09/09/2014	N001	7.15				#	-	-
	s.u.	0700	09/08/2014	N001	8.10				#	-	-
Specific Conductance	umhos/cm	0692	09/08/2014	N001	335				#	-	-
	umhos/cm	0696	09/09/2014	N001	842				#	-	-
	umhos/cm	0700	09/08/2014	N001	339				#	-	-
Temperature	C	0692	09/08/2014	N001	19.94				#	-	-
	C	0696	09/09/2014	N001	17.77				#	-	-
	C	0700	09/08/2014	N001	20.60				#	-	-
Turbidity	NTU	0692	09/08/2014	N001	94.8		J		#	-	-
	NTU	0696	09/09/2014	N001	1000	>	J		#	-	-
	NTU	0700	09/08/2014	N001	190		J		#	-	-
Uranium	mg/L	0692	09/08/2014	0001	0.0008				#	2.9E-05	-
	mg/L	0696	09/09/2014	0001	0.0024				#	2.9E-05	-
	mg/L	0700	09/08/2014	0001	0.0009				#	2.9E-05	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE SRK06, Slick Rock East Processing Site
 REPORT DATE: 3/17/2015 11:37 am

PARAMETER	UNITS	LOCATION CODE	SAMPLE: DATE	ID	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
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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 cas in('ALKALINITY','000071-43-2','000100-41-4',M&P XYLENE','07439-96-5','07439-98-7','NO3+NO2 AS N','ORP','000095-47-6','PH','RA-226','RA-228','07782-49-2','EC','TMP','000108-88-3','TURBIDITY','07440-61-1') AND result >= 0 AND DATE_SAMPLED between #1/1/2014# and #12/30/2014#

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 Aroclor 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: 3/17/2015 11:41 am

PARAMETER	UNITS	LOCATION CODE	SAMPLE:		RESULT	QUALIFIERS:			DETECTION LIMIT	UN-CERTAINTY	
			DATE	ID		LAB	DATA	QA			
Alkalinity, Total (As CaCO3)	mg/L	0347	09/09/2014	N001	162				#	-	-
	mg/L	0349	09/09/2014	N001	90				#	-	-
	mg/L	0693	09/09/2014	0001	60				#	-	-
	mg/L	0694	09/09/2014	N001	58				#	-	-
Manganese	mg/L	0347	09/09/2014	0001	0.020	E	J		#	0.00011	-
	mg/L	0349	09/09/2014	0001	0.170				#	0.00011	-
	mg/L	0693	09/09/2014	0001	0.0056				#	0.00011	-
	mg/L	0694	09/09/2014	0001	0.0035	B			#	0.00011	-
Molybdenum	mg/L	0347	09/09/2014	0001	0.0079				#	0.00016	-
	mg/L	0349	09/09/2014	0001	0.019				#	0.00016	-
	mg/L	0693	09/09/2014	0001	0.0049				#	0.00016	-
	mg/L	0694	09/09/2014	0001	0.0004				#	3.2E-05	-
Nitrate + Nitrite as Nitrogen	mg/L	0347	09/09/2014	0001	0.22				#	0.01	-
	mg/L	0349	09/09/2014	0001	0.52				#	0.01	-
	mg/L	0693	09/09/2014	0001	0.47				#	0.01	-
	mg/L	0694	09/09/2014	0001	0.066				#	0.01	-
Oxidation Reduction Potential	mV	0347	09/09/2014	N001	124.0				#	-	-
	mV	0349	09/09/2014	N001	160.2				#	-	-
	mV	0693	09/09/2014	N001	173.1				#	-	-
	mV	0694	09/09/2014	N001	37.4				#	-	-
pH	s.u.	0347	09/09/2014	N001	7.96				#	-	-
	s.u.	0349	09/09/2014	N001	7.39				#	-	-
	s.u.	0693	09/09/2014	N001	7.96				#	-	-
	s.u.	0694	09/09/2014	N001	8.33				#	-	-
Selenium	mg/L	0347	09/09/2014	0001	0.0035				#	0.00016	-
	mg/L	0349	09/09/2014	0001	0.022	E	J		#	0.00016	-
	mg/L	0693	09/09/2014	0001	0.0015				#	0.00016	-
	mg/L	0694	09/09/2014	0001	0.0001				#	3.2E-05	-
Specific Conductance	umhos/cm	0347	09/09/2014	N001	1108				#	-	-
	umhos/cm	0349	09/09/2014	N001	2310				#	-	-
	umhos/cm	0693	09/09/2014	N001	730				#	-	-
	umhos/cm	0694	09/09/2014	N001	107				#	-	-
Temperature	C	0347	09/09/2014	N001	21.83				#	-	-
	C	0349	09/09/2014	N001	21.60				#	-	-
	C	0693	09/09/2014	N001	17.05				#	-	-

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE SRK05, Slick Rock West Processing Site
 REPORT DATE: 3/17/2015 11:41 am

PARAMETER	UNITS	LOCATION CODE	SAMPLE:		RESULT	QUALIFIERS:			DETECTION LIMIT	UN-CERTAINTY	
			DATE	ID		LAB	DATA	QA			
Temperature	C	0694	09/09/2014	N001	17.83				#	-	-
Turbidity	NTU	0347	09/09/2014	N001	1000	>	J		#	-	-
	NTU	0349	09/09/2014	N001	1000	>	J		#	-	-
	NTU	0693	09/09/2014	N001	1000	>	J		#	-	-
	NTU	0694	09/09/2014	N001	1000	>	J		#	-	-
Uranium	mg/L	0347	09/09/2014	0001	0.0028				#	1.5E-05	-
	mg/L	0349	09/09/2014	0001	0.007				#	1.5E-05	-
	mg/L	0693	09/09/2014	0001	0.0021				#	1.5E-05	-
	mg/L	0694	09/09/2014	0001	0.0003				#	2.9E-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 cas in('ALKALINITY','000071-43-2','000100-41-4','M&P XYLENE','07439-96-5','07439-98-7','NO3+NO2 AS N','ORP','000095-47-6','PH','RA-226','RA-228','07782-49-2','EC','TMP','000108-88-3','TURBIDITY','07440-61-1') AND result >= 0 AND DATE_SAMPLED between #1/1/2014# and #12/30/2014#

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.
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- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
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- 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.

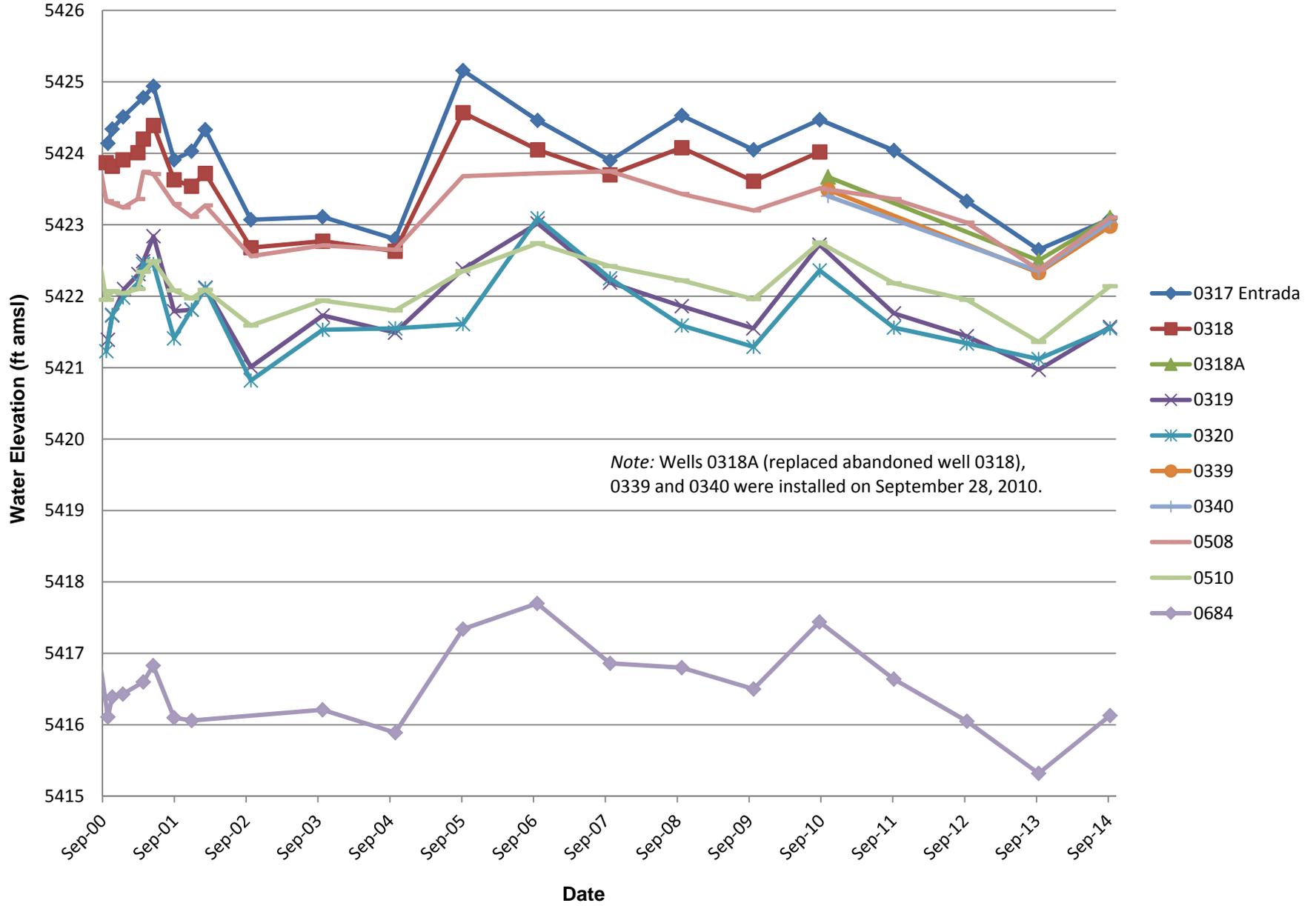
QA QUALIFIER: # = validated according to Quality Assurance guidelines.

Appendix C

Hydrographs and Static Water Level Data

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Slick Rock West Processing Site Hydrograph



Slick Rock East Processing Site Hydrograph

