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2019 Verification Monitoring Report for the Old and New Rifle, Colorado, Processing Sites

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Abbreviations

ACL	alternate concentration limit
CDPHE	Colorado Department of Public Health and Environment
CFR	*Code of Federal Regulations*
COC	contaminant of concern
DOE	U.S. Department of Energy
EC	environmental covenant
EPA	U.S. Environmental Protection Agency
ft	feet
GCAP	Groundwater Compliance Action Plan
IC	institutional control
IFRC	Integrated Field Research Challenge
LM	Office of Legacy Management
LOESS	locally estimated scatterplot smoothing
MCL	maximum concentration limit
mg/L	milligrams per liter
n	number of samples
NRC	U.S. Nuclear Regulatory Commission
p	*p*-value
POC	point of compliance
POE	point of exposure
RBC	risk-based concentration
SDWA	Safe Drinking Water Act
SOP	Standard Operating Procedure
SOWP	Site Observational Work Plan
UMTRA	Uranium Mill Tailings Remedial Action
UMTRCA	Uranium Mill Tailings Radiation Control Act
VMR	Verification Monitoring Report

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Executive Summary

This Verification Monitoring Report (VMR) presents and interprets groundwater and surface water monitoring data collected at the Old and New Rifle, Colorado, Processing Sites. These two former vanadium and uranium-ore processing sites are near the City of Rifle, Colorado, on a floodplain of the Colorado River. Both sites are managed by the U.S. Department of Energy (DOE) Office of Legacy Management (LM) under the Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I program. Surface remediation at both sites was completed in 1996.

Compliance strategies for the Old and New Rifle sites, formalized in corresponding *Groundwater Compliance Action Plans* (GCAPs) issued in 2001 and 2003, respectively, were developed based on site characterization conducted in the late 1990s and subsequent modeling efforts. For both sites, the initial selected strategy was natural flushing for selected contaminants of concern (COCs) in tandem with institutional controls (ICs). Presently, the selected compliance strategies at both sites appear to be adequately protective. However, subsequent reevaluation of the site conceptual models indicated that some contaminants (e.g., uranium and vanadium) were projected to persist in groundwater at concentrations above corresponding regulatory limits for longer than 100 years, the time frame permitted under UMTRCA regulations for a natural flushing strategy. Based on those observations, LM developed revised compliance strategies for both sites, as documented in revised GCAPs issued in 2016 and 2017.

Verification monitoring in 2019 at the Old and New Rifle sites entailed routine semiannual sampling of groundwater and surface water and monitoring of ICs. Sampling results continue to indicate that milling-related contamination persists at the sites. Compliance monitoring at the Old Rifle site includes sampling of eight monitoring wells (including two background wells) and five surface water locations. Uranium is the most prevalent mill-related contaminant occurring in alluvial groundwater at the site. Concentrations continue to exceed the UMTRCA standard of 0.044 milligrams per liter (mg/L) in five of the six onsite monitoring wells. In contrast to uranium, selenium and vanadium concentrations have exceeded relevant benchmarks in only two wells (0305 and 0655) coinciding with the former tailings area.

Compliance monitoring at the New Rifle site consists of sampling 16 onsite or downgradient alluvial monitoring wells, one background well, and eight surface water locations. Of the six COCs currently monitored in alluvial groundwater, uranium, molybdenum, and vanadium are the most prevalent. Although levels of these three constituents have generally decreased across the monitoring network, they are still elevated relative to corresponding benchmarks in most onsite and adjacent downgradient wells. Levels of remaining COCs—nitrate, selenium, and arsenic—also exceed corresponding benchmarks, but in a smaller percentage of wells. For example, based on 2019 sampling results, only four wells have nitrate concentrations exceeding the 10 mg/L standard. Although ammonia is not a COC, it is monitored because of its association with nitrate and historically elevated concentrations in onsite and adjacent downgradient wells.

Surface water quality of the Colorado River, a point of exposure (POE) at both the Old and New Rifle sites, remains unaffected by groundwater discharge from either site. Constituent concentrations in river samples adjacent to and downstream of both sites have been indistinguishable from those in background (upstream) samples.

In addition to the Colorado River, other surface water features at or near the New Rifle site include the Roaring Fork gravel ponds, proposed as POE locations in the 2016 draft GCAP, and the mitigation wetland. The only COCs currently exceeding agricultural or aquatic benchmarks in the ponds are molybdenum and selenium. Uranium concentrations in the ponds have been comparable to the 0.2 mg/L agricultural standard but always well below the corresponding aquatic benchmark (2.4 mg/L). Pond levels of all COCs have been well below corresponding risk-based concentrations derived for a conservative recreational swimming scenario. In summary, potential exposures to contaminants in the Roaring Fork ponds are unlikely to pose any potential risk that would warrant additional controls or restrictions. Restrictions have been placed on use of the surface water and groundwater for agricultural purposes, so that pathway is incomplete.

At both the Old and New Rifle sites, multiple ICs prevent domestic use of groundwater and ensure protection of human health and the environment. Three rigorous ICs—a zone overlay, a quitclaim deed, and an environmental covenant (EC)—are in place at the Old Rifle site. These overlapping measures restrict a number of activities at the site and limit access to the subsurface and groundwater without written permission from the Colorado Department of Public Health and Environment (CDPHE) and DOE.

At the New Rifle site, DOE, CDPHE, the City of Rifle, and Garfield County have enacted a series of four ICs to prevent humans and livestock from being exposed to site-related contaminants on the former mill site and downgradient properties. These controls consist of a quitclaim deed on the site proper, a large zone overlay to restrict consumption of contaminated groundwater, an EC to limit access to groundwater and prevent livestock from accessing water in former gravel ponds, and an overlay zone district that further limits activities on the former mill site.

1.0 Introduction

This Verification Monitoring Report (VMR) presents and interprets groundwater and surface water monitoring data collected at the Old and New Rifle, Colorado, Processing Sites. These two former vanadium and uranium-ore processing sites are near the City of Rifle in Garfield County, Colorado, on a floodplain of the Colorado River near the northeastern edge of the Colorado Plateau physiographic province (Figure 1). Both sites are managed by the U.S. Department of Energy (DOE) Office of Legacy Management (LM) under the Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I program. Surface remediation at both sites was completed in 1996, and tailings were stabilized in an engineered repository about 6 miles north of Rifle (the Rifle, Colorado, Disposal Site).

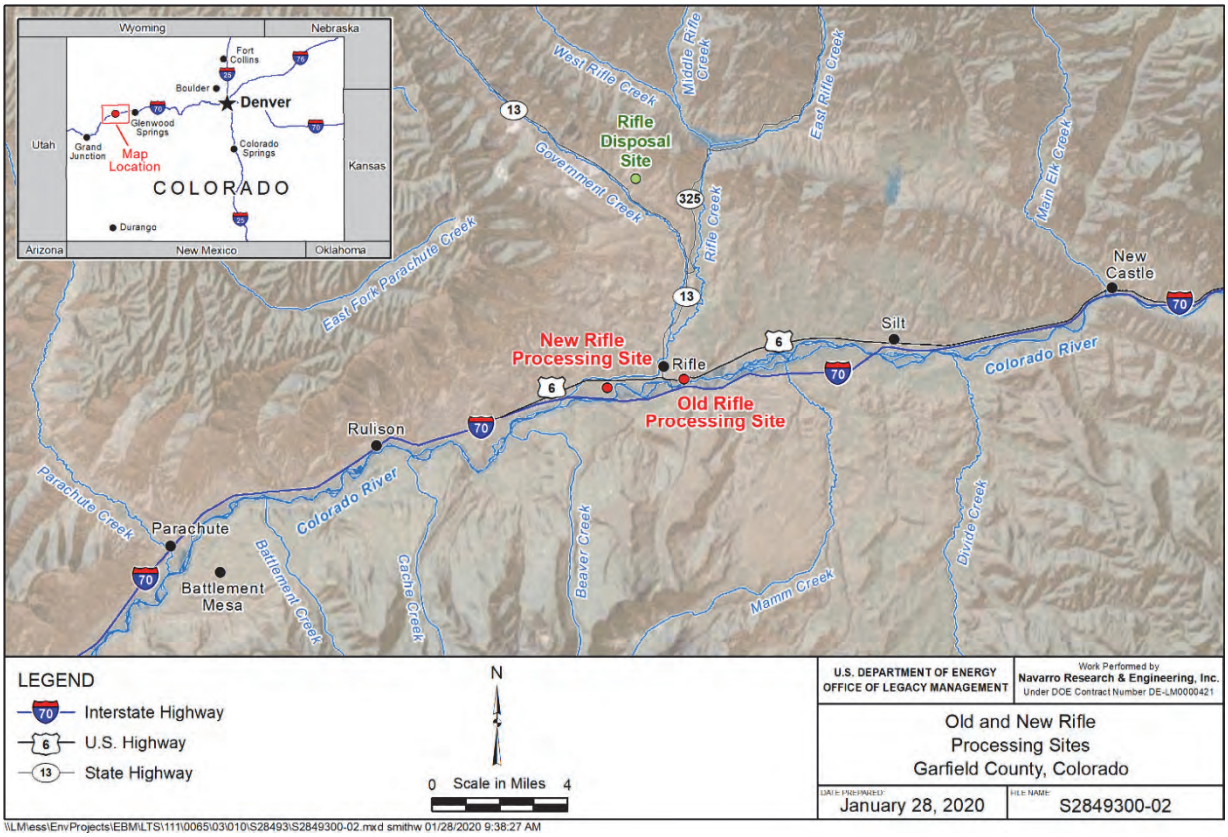


Figure 1. Locations of the Old and New Rifle, Colorado, Processing Sites

DOE has conducted regular water quality monitoring at both sites since 1998—semiannually at the Old Rifle site (typically June and November) and annually or semiannually at the New Rifle site. Monitoring locations are shown in Figure 2 and Figure 3, respectively. This report documents the most recent (2019) monitoring results and summarizes key findings and contaminant trends since the most recent VMR (DOE 2014) was issued. Detailed analytical results for the 2019 monitoring period are provided in Appendix A and Appendix B for the Old and New Rifle sites, respectively.

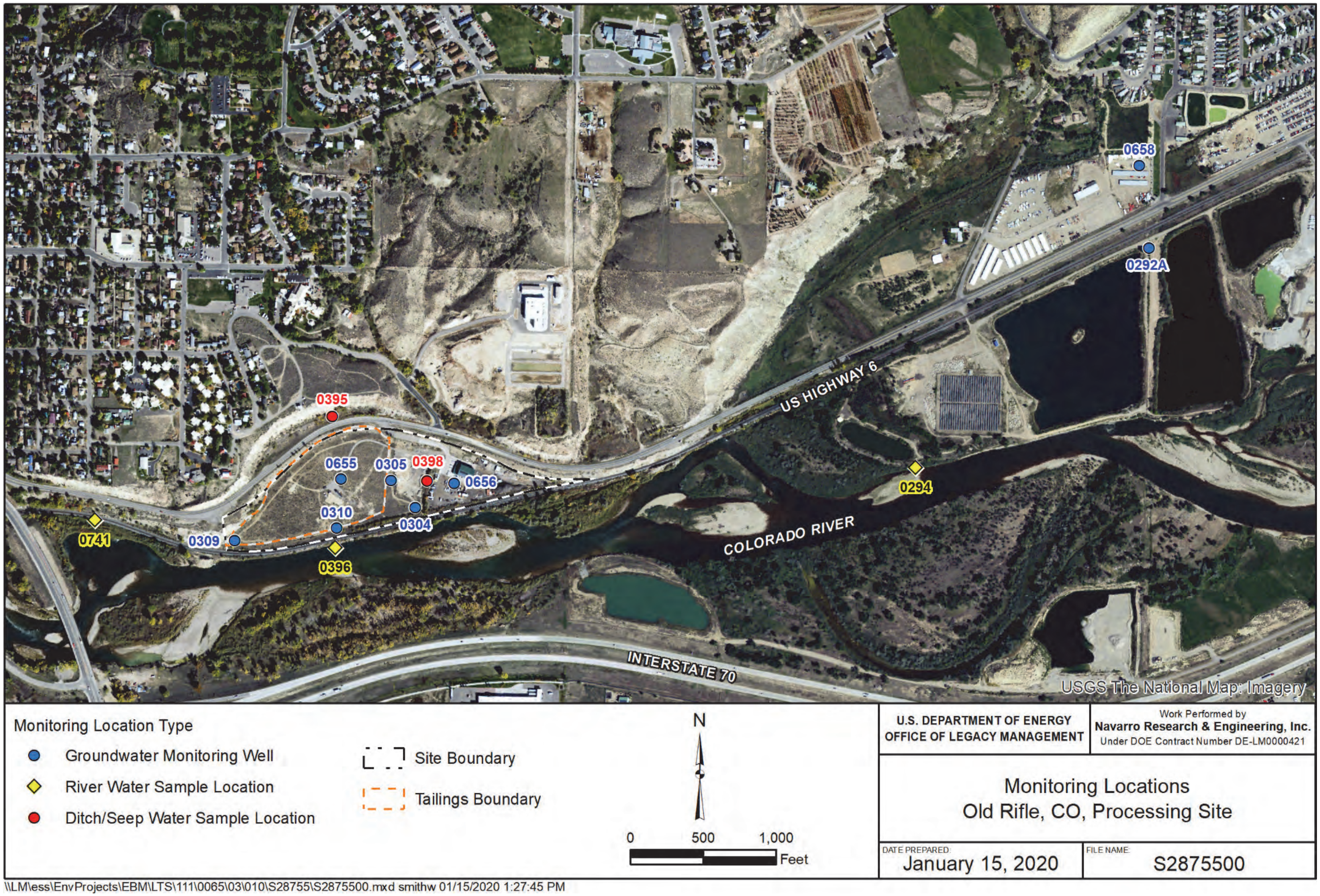


Figure 2. Monitoring Locations at the Old Rifle, Colorado, Processing Site

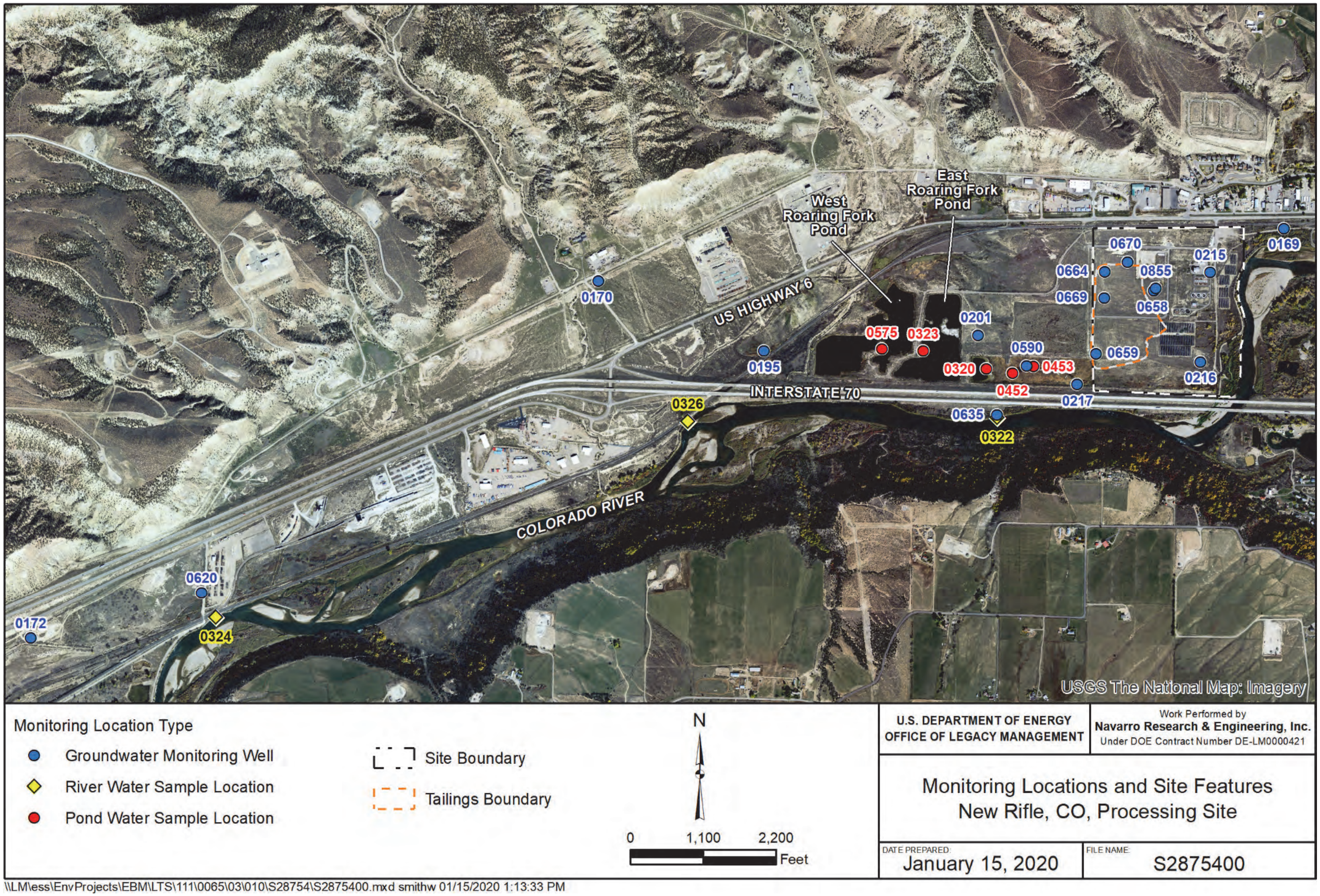


Figure 3. Monitoring Locations at the New Rifle, Colorado, Processing Site

1.1 Background

Primary historical site documents for the Old and New Rifle sites include the Site Observational Work Plan (SOWP), a detailed report documenting historical water quality data and the conceptual model developed for each site (DOE 1999a; DOE 1999b); the Groundwater Compliance Action Plan (GCAP), which documents the proposed strategy for groundwater cleanup (DOE 2001; DOE 2003a; DOE 2016; DOE 2017); and previous VMRs, which assess the progress of the groundwater remedy in achieving cleanup goals at both sites (e.g., DOE 2014). This section briefly summarizes relevant background information for the Old and New Rifle sites. Additional details can be found in the key site documents cited above. Numerous reports documenting each site's history and previous characterization and monitoring efforts can be accessed via LM's website.[1]

1.1.1 Old Rifle Site

The Old Rifle site is a former vanadium and uranium ore-processing mill approximately 0.3 mile east of Rifle, Colorado, a city on the north bank of the Colorado River (Figure 1; Figure 2). The ill operated on the 21-acre site during two separate periods between 1924 and 1958. U.S. Vanadium Company constructed the original mill in 1924 to produce vanadium (Merritt 1971). Union Carbide and Carbon Corporation (Union Carbide) purchased the assets of the U.S. Vanadium Company in 1926 and established U.S. Vanadium Corporation as a subsidiary (Chenoweth 1982). The subsidiary operated the former Old Rifle plant intermittently until 1946, when it was modified to include the recovery of uranium as well as vanadium. Production continued until 1958, when the old plant was replaced with a new mill approximately 2.3 miles west of Rifle, now referred to as the New Rifle site. In 1967, approximately 13 acres of tailings were stabilized at the Old Rifle site in accordance with State of Colorado regulations. Surface remediation began in spring 1992 and was completed in October 1996. Legacy contamination from the milling resides in sediments and groundwater within a shallow alluvial aquifer that overlies sedimentary bedrock.

The Old Rifle site was previously established as an Integrated Field Research Challenge (IFRC) site through DOE's Office of Science. Experiments were conducted at the site between 2003 and about 2015 to better understand the behavior of uranium in the alluvial aquifer. Observations and findings stemming from this work were considered in developing the draft GCAP (DOE 2017). A pilot study performed by Sandia National Laboratory, Lawrence Berkeley National Laboratory, and DOE is currently active and involves uranium sequestration in a permeable reactive barrier. Chemical injections, intended to form the mineral apatite in the subsurface, were performed in November 2017 in an existing research well plot. Upgradient and downgradient samples have been collected monthly for more than 2 years.

1.1.2 New Rifle Site

The 142-acre New Rifle site is approximately 2.3 miles west of Rifle (Figure 1; Figure 3), adjacent to and north of the Colorado River. Historical site activities included vanadium- and uranium-ore-processing (1958–1972); lignite ash processing (1964–1967); and vanadium processing, which did not produce tailings but may have produced milling solutions

[1] https://www.lm.doe.gov/Rifle/. Site data and sample location information, including well construction logs, can be found on LM's Geospatial Environmental Mapping System (GEMS) website (http://gems.lm.doe.gov/).

(1973–1984). All tailings, contaminated materials, and associated process buildings and structures were removed from the site during the surface remedial action completed in 1996. Prompted by the identification of contamination in the surficial alluvial aquifer beneath the site, characterization investigations in support of the SOWP began in 1997. Results of those investigations indicated the presence of site-related contamination in groundwater downgradient (west) of the site on private land.

Several historical nonmilling activities at or adjacent to the New Rifle site affected local groundwater conditions. For a period of time (start of operations not documented), Roaring Fork Resources operated a gravel mine on the property adjacent to and downgradient of the site. Water was pumped from an active onsite mining pit, where excavation was occurring, to another onsite pit for storage and infiltration. These pits are now referred to as the Roaring Fork ponds (locations shown in Figure 3). This pumping ultimately affected groundwater flow downgradient of the New Rifle site (DOE 1999b). The Roaring Fork gravel pit ceased operations in 2003, and the ponds have since filled with groundwater and equilibrated with the local water table. The State of Colorado subsequently transferred the site property to the City of Rifle in 2004. In 2008, the City began dewatering the aquifer in the eastern portion of the site (on City property) to provide dry footing for constructing foundations for a wastewater treatment plant. Dewatering created a cone of depression that extended west into areas of vanadium-contaminated sediments; the water table was lowered by 5 to 8 feet (ft) in places. The draft GCAP (DOE 2016) provides a more detailed discussion of historical site activities.

1.2 Compliance Strategies

Initial GCAPs for the Old and New Rifle sites were issued shortly after the SOWPs and corresponding site conceptual models were developed (DOE 2001; DOE 2003a). In both cases, results of early site characterization and modeling efforts supported a compliance strategy of natural flushing for selected contaminants of concern (COCs)—in particular, uranium—in tandem with institutional controls (ICs). Subsequent reevaluation of the site conceptual models indicated that some contaminants (e.g., uranium and vanadium) were projected to persist in groundwater at concentrations above corresponding regulatory limits for longer than 100 years, the time frame permitted under UMTRCA regulations for a natural flushing strategy. Based on those observations, LM developed revised compliance strategies for the Old and New Rifle sites, as documented in the corresponding recently updated GCAPs (DOE 2016; DOE 2017).

Current (based on the 2001 and 2003 GCAPs) and recent proposed compliance strategies for each site are summarized below. For both sites, the compliance strategy requires formal concurrence from the U.S. Nuclear Regulatory Commission (NRC) and consultation with the Colorado Department of Public Health and Environment (CDPHE). To date, only the initial Old Rifle site GCAP (DOE 2001) has received concurrence from NRC (Gillen 2002).

1.2.1 Old Rifle Site

Alluvial groundwater beneath the Old Rifle site was contaminated by former uranium- and vanadium-ore-processing operations that lasted from 1924 through 1958. The initial NRC-approved compliance strategy (DOE 2001) was a combination of natural flushing for uranium, the primary contaminant in terms of plume extent, and no remediation with the application of alternate concentration limits (ACLs) for selenium and vanadium, the other two

site COCs. The conditions of the natural flushing compliance strategy were to maintain ICs at the site and conduct routine monitoring until concentrations of COCs decreased to acceptable levels. Because subsequent evaluations revealed that the natural flushing compliance strategy was not performing as expected, LM issued a revised GCAP in 2017.[2] The revised (recommended) compliance strategy is no remediation with the application of ACLs for all three COCs—uranium, selenium, and vanadium. COCs currently monitored at the Old Rifle site are summarized in Table 1 along with corresponding benchmarks and proposed ACLs. All onsite wells were considered point of compliance (POC) wells (i.e., the wells to which ACLs would be applied), and the Colorado River was considered the point of exposure (POE) (DOE 2017).

Table 1. Groundwater COCs for the Old Rifle Site, Benchmarks, and Proposed ACLs

Contaminant[a]	40 CFR 192 (UMTRCA) MCL	Benchmark[b]	Background Range[c]	ACL Proposed in 2017[d]	Comments
Selenium	0.01	0.05[e]	0.00004–0.041	0.122	Benchmark historically exceeded in only two wells—0305 and 0655—coinciding with the former tailings area. Currently, the benchmark is exceeded in well 0655 only.
Uranium	0.044	0.044[f]	0.008–0.067	0.36	Uranium concentrations have been elevated relative to the 0.044 mg/L MCL in all site wells except 0309 (far western boundary).
Vanadium	–	0.33[g]	0.0002–0.0023	1.0	As observed for selenium, vanadium concentrations have exceeded the corresponding benchmark in only two wells, 0305 and 0655.

Notes:
All units in mg/L.
[a] Arsenic was initially identified as a COC (DOE 2001) but later eliminated from the monitoring program given levels in all wells consistently below the 0.05 mg/L MCL established in Title 40 *Code of Federal Regulations* Section 192 (40 CFR 192).
[b] Benchmarks are from Table 4 of the previous VMR (DOE 2014).
[c] Data are from background wells 0292A and 0658 (Figure 2); cited ranges reflect detections only.
[d] ACL proposed in draft GCAP (DOE 2017) based on data from well 0305, the well with the highest historical concentrations for the three constituents. ACLs for selenium and uranium are nonparametric 95% upper simultaneous limits (DOE 2017, Table 4). The proposed ACL for vanadium is the currently approved ACL from the 2001 GCAP (DOE 2017; DOE 2001). These ACLs are notably lower than those cited in the previous VMR (DOE 2014): 12.3 mg/L, 44.4 mg/L, and 126 mg/L for selenium, uranium, and vanadium, respectively.
[e] U.S. Environmental Protection Agency (EPA) Safe Drinking Water Act (SDWA) maximum contaminant level, the ACL proposed for selenium in the 2001 NRC-approved GCAP (DOE 2001).
[f] The previous VMR (DOE 2014, Table 1) also cited a benchmark for uranium of 0.067 mg/L, based on the maximum background concentration measured at Old Rifle site background well 0658. Because uranium trends at this well have not been stable, this evaluation uses the more conservative UMTRCA standard.
[g] Risk-based concentration for vanadium from approved GCAP (DOE 2001), based on an EPA residential screening value developed in 2000. The draft GCAP (DOE 2017) cited an updated risk-based concentration for vanadium of 0.15 mg/L based on EPA data available at that time. Note that the most recent (November 2019) EPA Regional Screening Level table cites an even lower risk-based value (for tapwater) of 0.086 mg/L (https://semspub.epa.gov/work/HQ/199626.pdf).

Abbreviations:
– = not applicable (contaminant does not have an MCL in 40 CFR 192)
CFR = *Code of Federal Regulations*
MCL = maximum concentration limit
mg/L = milligrams per liter

[2] On October 31, 2019, LM received comments from NRC requesting additional information (Saxton 2019).

1.2.2 New Rifle Site

The compliance strategy for the New Rifle site has undergone several iterations over the years as more data have been collected and the site conceptual model has been updated. A draft GCAP recommending a natural flushing compliance strategy (DOE 2003a) has been the basis for continued semiannual monitoring at the site. COCs initially identified for the underlying alluvial aquifer were ammonia, arsenic, fluoride, manganese, molybdenum, nitrate, selenium, uranium, and vanadium (DOE 2003a). Based on discussions with CDPHE, fluoride and manganese were deemed to be of little concern at the site and were eliminated from the monitoring program (DOE 2014). Cleanup goals for the site were initially established as UMTRCA (Title 40 *Code of Federal Regulations* Section 192 [40 CFR 192]) maximum concentration limits (MCLs) or risk-based goals that would allow future unrestricted use of groundwater.

Because more recent evaluations demonstrated that the natural flushing compliance strategy was not performing as expected, LM issued a revised GCAP in 2016. The proposed compliance strategy for the alluvial aquifer at the New Rifle site for all COCs is no remediation with the application of ACLs, implementation of ICs, and continued groundwater monitoring (DOE 2016).[3] Four wells—three onsite wells and one offsite downgradient well—were selected as POC wells, and the Roaring Fork gravel ponds were identified as the proposed POE (refer to Section 4.1 for additional details). COCs currently monitored at the New Rifle site are summarized in Table 2 along with corresponding current benchmarks and proposed ACLs.

1.3 Institutional Controls

ICs are restrictions to land or resources that effectively protect public health and the environment by limiting access to a contaminated medium. At both the Old and New Rifle sites, the contaminated medium is alluvial groundwater. To be effective, ICs must prevent intrusion into contaminated groundwater and restrict access to or use of contaminated groundwater for unacceptable purposes. ICs are required to:

- Protect public health and the environment
- Have a high degree of permanence
- Satisfy beneficial uses of groundwater
- Be enforceable by administrative or judicial branches of government entities
- Be implemented in a manner that can be effectively maintained and verified

Ultimately, the City of Rifle, CDPHE, and (for the New Rifle site) Garfield County are the regulatory agencies with the responsibility and authority to enforce the ICs. LM continues to work closely, in a supporting role, with the City, State, and County toward the successful implementation of ICs.

[3] The draft GCAP (DOE 2016) was submitted by letter dated January 19, 2017. NRC responded to the submittal by letter dated July 21, 2017, determining that "additional information is required to complete its review" (Koenick 2017). LM responded to NRC's Request for Additional Information (RAI) in September 2019 (Jasso 2019). NRC responded to LM's submittal on February 6, 2020, concluding that 12 of LM's responses to NRC's 15 comments in the RAI were adequate. However, NRC requested that LM provide additional technical justification for the remaining interrelated comments regarding groundwater quality west of the Roaring Fork ponds, groundwater levels, and spatial/temporal variations in groundwater flow in the alluvial aquifer (Saxton 2020).

Table 2. Groundwater COCs for the New Rifle Site, Benchmarks, and Proposed ACLs

Constituent[a]	40 CFR 192 (UMTRCA) MCL	Benchmark[b]	Background Range[c]	ACL Proposed in 2016[d]	Comments
Ammonia as N	–	–	RFN-0169: 0.078–0.11 RFO-0292A: 0.18–0.47	–	No longer considered a COC but monitored to understand nitrate behavior (DOE 2014).
Arsenic	0.05	0.05	RFN-0169: 0.0003–0.0009 RFO-0658: 0.0005–0.0017	0.313	Elevated arsenic (>0.05 mg/L) is currently limited to three onsite wells: 0658, 0659, and 0855.
Molybdenum	0.10	0.10	RFN-0169: 0.002–0.024 RFO-0658: 0.007–0.0165	7.3	Molybdenum remains elevated in most onsite wells and downgradient wells adjacent to the site, but decreasing trends are apparent in many of these wells.
Nitrate as N (Nitrate + Nitrite as Nitrogen)	10	10	RFN-0169: 0.89–5.3 RFO-0658: 0.011–2.7	75	Currently, the highest nitrate levels are measured immediately downgradient of the site, in adjacent offsite well 0201.
Selenium	0.01	0.05[e]	RFN-0169: 0.0015–0.028 RFO-0658: 0.00004–0.041	1.43	Selenium remains elevated relative to background in most onsite wells.
Uranium	0.044	0.067[f]	RFN-0169: 0.016–0.042 RFO-0658: 0.008–0.067	0.364	Elevated uranium concentrations persist throughout the monitoring network. The UMTRCA standard is exceeded as far downgradient as well 0620.
Vanadium[g]	–	0.33 (DOE 2016) 0.086 (updated)	RFN-0169: 0.0004–0.0023 RFO-0658: 0.0005–0.0023	52	Historically, elevated vanadium concentrations have been measured in only onsite or immediately downgradient wells.

Notes:
All units in mg/L.
[a] Fluoride and manganese, initially identified as COCs in the 2003 GCAP, are not listed because they were subsequently eliminated from the monitoring program (DOE 2014). Monitoring for fluoride ceased in 2007.
[b] Most benchmarks are from Table 1 of the previous VMR (DOE 2014); also refer to Table 1 of the draft GCAP (DOE 2016).
[c] Background wells used for the New Rifle site include New Rifle site well 0169 (RFN-0169) and the two Old Rifle site background wells, 0292A and 0658 (RFO-0292A, RFO-0658) (DOE 2014; DOE 2016). Cited ranges reflect detections only.
[d] ACLs proposed in draft GCAP (DOE 2016, Table 8). In all cases, the values are nonparametric 95% upper simultaneous limit values based on data from New Rifle site well 0658.
[e] Safe Drinking Water Act maximum contaminant level (benchmark used in draft GCAP [DOE 2016]). The previous VMR (DOE 2014) cited a benchmark of 0.041 mg/L, the maximum selenium concentration measured in Old Rifle site background well 0658.
[f] Maximum background value based on Old Rifle site (RFO-) background well 0658. Because uranium levels have been highly variable in this well, this report uses the 0.044 mg/L 40 CFR 192 MCL as the context for interpreting results.
[g] The draft GCAP cites a benchmark for vanadium of 0.33 mg/L, an older EPA risk-based concentration dating back to the 2001 Old Rifle site GCAP (DOE 2001). EPA's most recent risk-based level, from November 2019, is also used as a conservative context for interpreting corresponding time-trend plots and monitoring results. (https://semspub.epa.gov/work/HQ/199626.pdf).

Abbreviations:
– = not applicable or not established
mg/L = milligrams per liter
N = nitrogen

1.3.1 Old Rifle Site

Residual contamination will remain in the groundwater for an extended period; therefore, it is critical that restrictions on groundwater use be maintained to ensure protectiveness of the remedy. ICs are enforceable mechanisms for implementing these restrictions. Groundwater contamination at the Old Rifle site has not migrated into any offsite aquifers. Rather, it discharges directly into the Colorado River, the only POE to site-related contamination, where it rapidly mixes with river water. Constituent concentrations in samples of river water collected adjacent to and downstream of the former mill site are indistinguishable from those in background samples collected upstream of the site. Given these conditions, ICs only need to be applied within the site boundary (Figure 4). Multiple layers of ICs restricting groundwater use have been established for the Old Rifle site, including:

- quitclaim deed restrictions
- environmental covenant (EC)
- the Uranium Mill Tailings Remedial Action (UMTRA) Overlay Zone District

These three ICs are discussed in greater detail in Section 4.2 of the most recent draft GCAP (DOE 2017), along with the general requirements for verifying their performance. Appendix A of that report documents the ICs in their entirety.

1.3.2 New Rifle Site

A comprehensive ICs program has been implemented to prevent future use of contaminated groundwater associated with the New Rifle site. Figure 5 shows the areas impacted by various overlapping ICs. The ICs program consists of several enforceable mechanisms that can be combined into four types of administrative categories:

1. Quitclaim deed restrictions covering the former mill site property
2. Zone overlays from the City of Rifle and Garfield County covering uses of groundwater in an expanded area of potentially contaminated groundwater
3. State of Colorado EC with Umetco Minerals Corporation covering agricultural uses of groundwater at an adjacent and downgradient vicinity property
4. City of Rifle UMTRA zone overlay to address potential future development at the former mill site

Where these restrictions are required, DOE must ensure that the beneficial uses of the groundwater, had they not been restricted, could be satisfied. DOE funded two water line extensions to the current municipal system to ensure the availability of potable water to properties affected by site-related contamination. Because the water line extension did not cover the full extent of the contaminated groundwater plume, DOE also provides funding for reverse osmosis systems for users who are within the ICs boundary but beyond the reach of the water line. In the past few years, the city limit boundary was expanded west along the water line extension and residents were required to use municipal water.

New Rifle site ICs are discussed in greater detail in Section 4.2 of the most recent draft GCAP (DOE 2016); Appendix A of that report documents the ICs in their entirety.

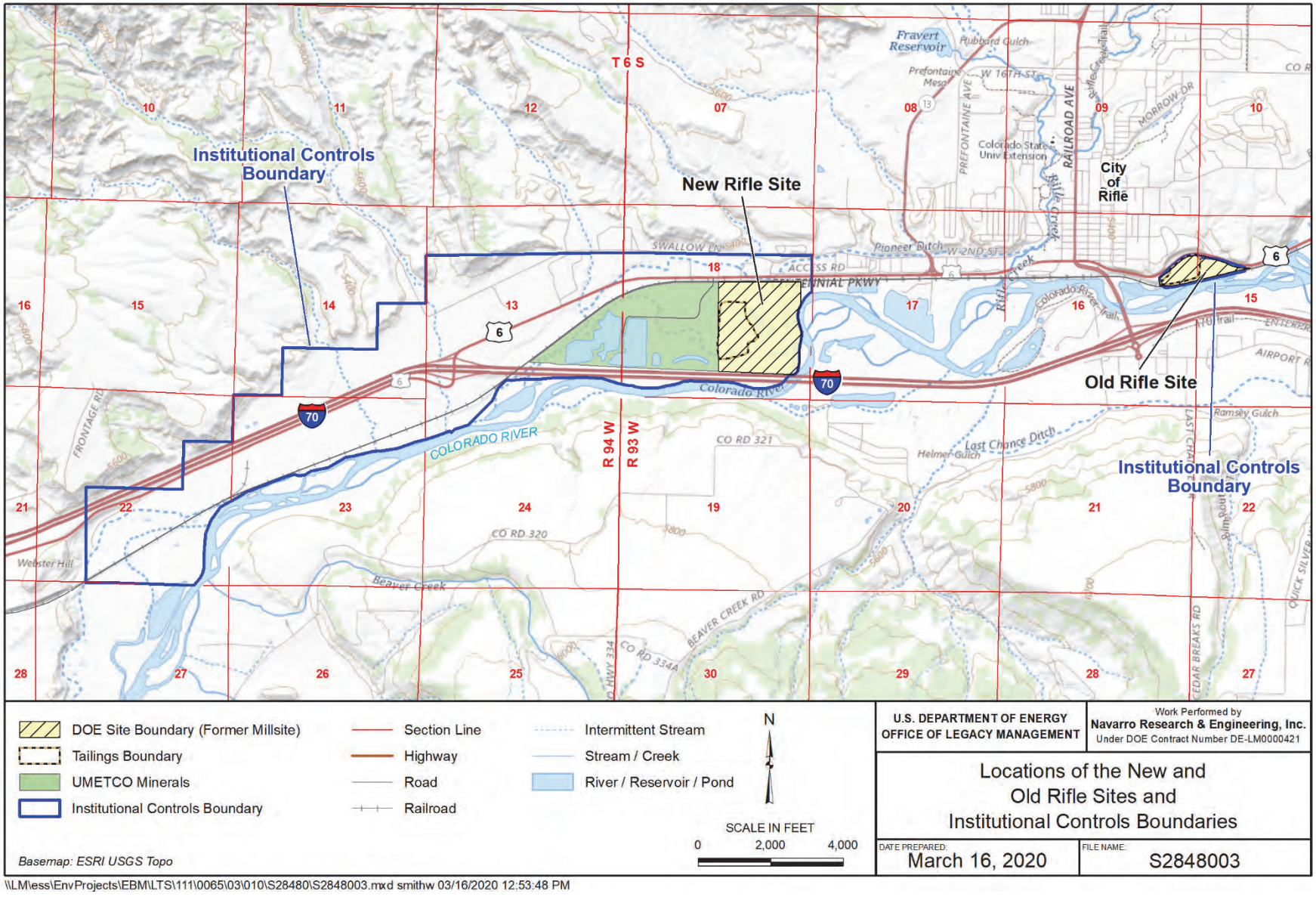
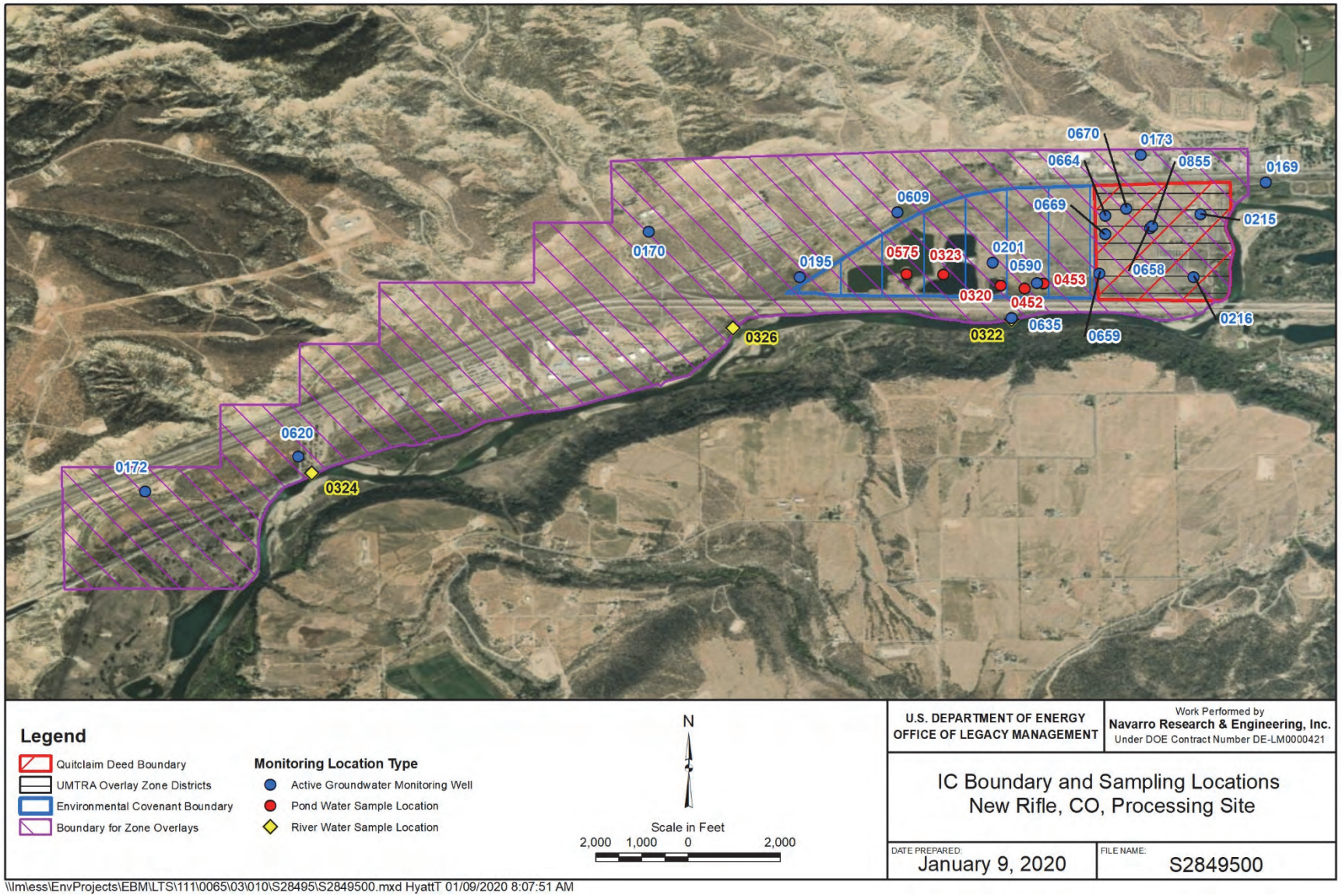


Figure 4. Institutional Control Boundaries Established for the Old and New Rifle Sites



Note: The UMTRA overlay zone district overlaps almost directly with the quitclaim deed boundary, shown above.

Figure 5. Institutional Control Boundaries, New Rifle, Colorado, Processing Site

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2.0 Hydrogeology

This section briefly summarizes hydrological conditions at both Old and New Rifle sites based on DOE's early site characterizations (DOE 1999a; DOE 1999b) and is consistent with descriptions provided in previous VMRs. More detailed descriptions of flow systems and contaminant transport are provided in the most recent GCAPs (DOE 2017; DOE 2016).

2.1 Old Rifle Site

The Old Rifle processing site is 0.3 mile southeast of the City of Rifle, situated on a floodplain north of the Colorado River (Figure 2). Groundwater is unconfined in the uppermost aquifer, which consists of river alluvium and the upper weathered portion of the bedrock, the Tertiary Wasatch Formation. The uppermost aquifer is 5 to 25 ft thick; saturation occurs from 5 to 10 ft below ground surface. The uppermost aquifer is composed of poorly sorted sediments that range from clay-sized material to cobbles and occasional boulders. Groundwater in the alluvial aquifer flows to the west-southwest. Hydraulic conductivity estimates for the alluvial aquifer range from 100 to 125 ft per day; estimates for the weathered Tertiary Wasatch Formation are about 0.02 ft per day (DOE 1999a).

Recharge to the alluvial aquifer is from an unlined irrigation return ditch that flows across the middle of the site, subsurface inflow from north of U.S. Highway 6, and precipitation. The Colorado River and the alluvial aquifer probably interact, but the monitoring network is insufficient to fully characterize the interaction (DOE 2011). Groundwater discharge is mainly to the Colorado River. At the Old Rifle site, alluvium pinches out against bedrock outcrops at the downgradient end of the site (DOE 2011). The alluvial aquifer at the Old Rifle site has no hydraulic connection to the alluvial aquifer at the New Rifle site (DOE 2014).

The Old Rifle SOWP (DOE 1999a) provides additional data regarding the hydrogeology of the Old Rifle site and the site conceptual model. Results of subsequent IFRC studies indicated that the site conceptual model was more complex than that developed based on initial modeling conducted for the SOWP. DOE revised the site conceptual model in 2011 to reflect IFRC's findings and to account for groundwater inputs from north of the site (DOE 2011).

2.2 New Rifle Site

The New Rifle former processing site is about 2.3 miles west of the City of Rifle and is also on the north floodplain of the Colorado River (Figure 3). As with the Old Rifle site, the uppermost aquifer consists of poorly sorted river alluvium and the upper weathered portion of the Wasatch Formation. Estimated hydraulic conductivities for the alluvial aquifer range from 53 to 275 ft per day with an average of 114 ft per day (DOE 1999b). Alluvium is thickest along the western and southern portions of the site and is continuous for at least 4 miles downgradient of the site. Recharge to the alluvial aquifer is from ephemeral streams from the north, precipitation, inflow from the Colorado River along the east side of the site (DOE 1999b), and potentially from discharge of Wasatch Formation groundwater along the alluvial aquifer's northern border (DOE 2016). Groundwater discharge is primarily to the Colorado River; groundwater also discharges to other surface water features, including the wetland area and Roaring Fork gravel ponds. Additionally, groundwater discharge occurs through evapotranspiration at parts of the site and at the IC boundary populated with phreatophytes (DOE 2016).

At one time, Roaring Fork Resources operated a gravel mine on the property adjacent to and downgradient of the New Rifle site. Water was pumped from an active onsite mining pit, where excavation was occurring, to another onsite pit for storage and infiltration. These pits are now referred to as the Roaring Fork ponds (Figure 3; DOE 2016). During Roaring Fork Resources' period of operation, the pumping affected groundwater flow downgradient of the New Rifle site, creating a cone of depression in—and a groundwater mound on—the alluvial aquifer water table (DOE 1999b). Although operation of the gravel mine ceased in early 2003, the effects of active pumping and injection into the ponds on the distribution of dissolved nitrate and uranium persist today (DOE 2003b; DOE 2014).

3.0 Old Rifle Site Monitoring Results

In accordance with the NRC-approved GCAP (DOE 2001), semiannual monitoring has been performed at the Old Rifle site since 2003. This section summarizes the Old Rifle site monitoring requirements and documents the results of groundwater and surface water sampling conducted in June and November 2019.[4] During both events, eight monitoring wells and five surface water locations, including three Colorado River locations, were sampled (Figure 3). Appendix A documents corresponding analytical results. Historical contaminant trends are also evaluated for 1998–2019, the period since post-remediation site characterization activities were initiated.

3.1 Monitoring Network

Table 3 lists the wells and surface water locations that constitute the routine monitoring network at the Old Rifle processing site. The network consists of eight monitoring wells—six onsite wells and two background wells—and five surface water locations (Figure 2). As indicated in Section 1.2.1, the draft GCAP (DOE 2017) considered all onsite wells as POC wells (i.e., wells to which ACLs would be applied). The Colorado River, where groundwater discharges from the site, was considered the POE for mill-related contamination.

Table 3. Summary of GCAP Monitoring Requirements for the Old Rifle Site

Location[a]	Monitoring Purpose	Analytes	Frequency
0305, 0655	Center of uranium plume, west side of ditch	Uranium Selenium Vanadium	Semiannually[c]
0656	Center of plume, east side of ditch		
0304, 0309, 0310	Downgradient edge of plume		
RFO-0292A, RFO-0658[b]	Background groundwater quality; upgradient monitoring wells		
0395, 0398	Monitor surface water recharging aquifer; seep and onsite ditch		
0294 (replaced 0538), 0396, 0741	Upgradient, adjacent to site, and downgradient locations along the Colorado River, respectively		

Note:
[a] Locations shown in Figure 2.
[b] RFO- prefix used to distinguish Old Rifle site well 0658 from New Rifle site monitoring well 0658 (RFN-0658). Old Rifle site background wells 0292A and 0658 have also been used as background wells for the New Rifle site (Table 5; DOE 2016).
[c] Semiannual frequency listed here is consistent with the current sampling frequency, previous VMRs (DOE 2014) and the early regime proposed in the NRC-approved GCAP (DOE 2001). In the most recent draft GCAP (DOE 2017), a reduced frequency was proposed: annually for the first 5 years (following acceptance of the GCAP), then at least every 5 years for the next 30 years.

[4] The organization of this VMR differs from that of the previous VMR (DOE 2014) in several respects. Previous VMRs included two spot plots for each contaminant (for both June and November sampling events), while corresponding time-concentration plots were provided in the appendixes. Because the June and November plots presented somewhat redundant information, in this report only the most recent (November 2019) results are plotted, and time-concentration plots are provided in the main body of the report. These exhibits supplant previous (DOE 2014) tabular summaries that averaged data across site wells.

3.2 Groundwater Monitoring Results

Uranium is the most prevalent milling-related contaminant in alluvial groundwater at the Old Rifle site. Levels continue to exceed the UMTRCA standard in five of the six onsite wells currently monitored. In contrast to uranium, selenium and vanadium concentrations have exceeded corresponding benchmarks in only two wells in the center of the former tailings area. Based on these observations, this section begins with a discussion of uranium, the most persistent contaminant at the site, followed by an evaluation of selenium and vanadium trends. This section concludes with a summary of Mann-Kendall trend tests run for each well/COC combination.

Time-concentration plots presented in this section and in the remainder of this report differ from those presented in previous VMRs (e.g., DOE 2014). In contrast to plotting data for multiple wells on a single plot, a facet approach is used whereby data are partitioned into a matrix of panels, each representing a single well. In each facet, a nonparametric smoothing method—locally estimated scatterplot smoothing (LOESS)—is used. The surrounding shaded area represents the 95% pointwise confidence interval. Using this approach, overall trends in the data are more apparent and not obscured by "noise" or random variation.[5] Because of the wide range in contaminant concentrations measured across site wells, most data are plotted using a semilogarithmic scale. In some cases, this plotting approach may mask relative magnitudes when making spatial or temporal comparisons.

To facilitate review of the time-concentration plots, Mann-Kendall trend analysis results (Section 3.2.4, Table 4) are overlain on each facet, indicating the direction of the trend—increasing or decreasing (if significant)—or that no significant trend was found. Trend tests were initially run for the period 1998–2019, a fairly large dataset (n = 48–49) representing measurements collected since post-remediation monitoring began. For several Old Rifle site wells, statistically significant decreasing trends were identified. However, based on visual examination of the plotted data for some wells, although decreases are apparent relative to baseline (1998–1999) conditions, trends appear to have stabilized more recently. Therefore, a second set of Mann-Kendall tests was run for a more recent (2010–2019) time frame.

3.2.1 Uranium

Figure 6 plots the most recent (November 2019) uranium results for Old Rifle site monitoring wells along with surface water sampling results. Corresponding time-series data for monitoring wells are plotted in Figure 7. Uranium concentrations in most site wells have exceeded both the UMTRCA standard (0.044 mg/L) and the maximum concentration measured in background well 0658 (0.067 mg/L). Based on the most recent (November 2019) results, this is still the case. An exception is well 0309, in the southwest corner of the site, where uranium levels have consistently been below the UMTRCA MCL. Recently, the highest uranium concentrations have been measured in well 0656 (the most recent result was 0.24 mg/L), where levels increased between about 2003 and 2015 but have since stabilized somewhat. Similar observations apply to well 0305, which is within the footprint of the former tailings area. In all wells, uranium concentrations are below the proposed ACL of 0.36 mg/L.

[5] Figure 7 and subsequent similar "facet" plot figures were developed using R Version 3.6.2 (R Core Team 2019) and the ggplot2 package, Version 3.2.1 (Wickham 2016).

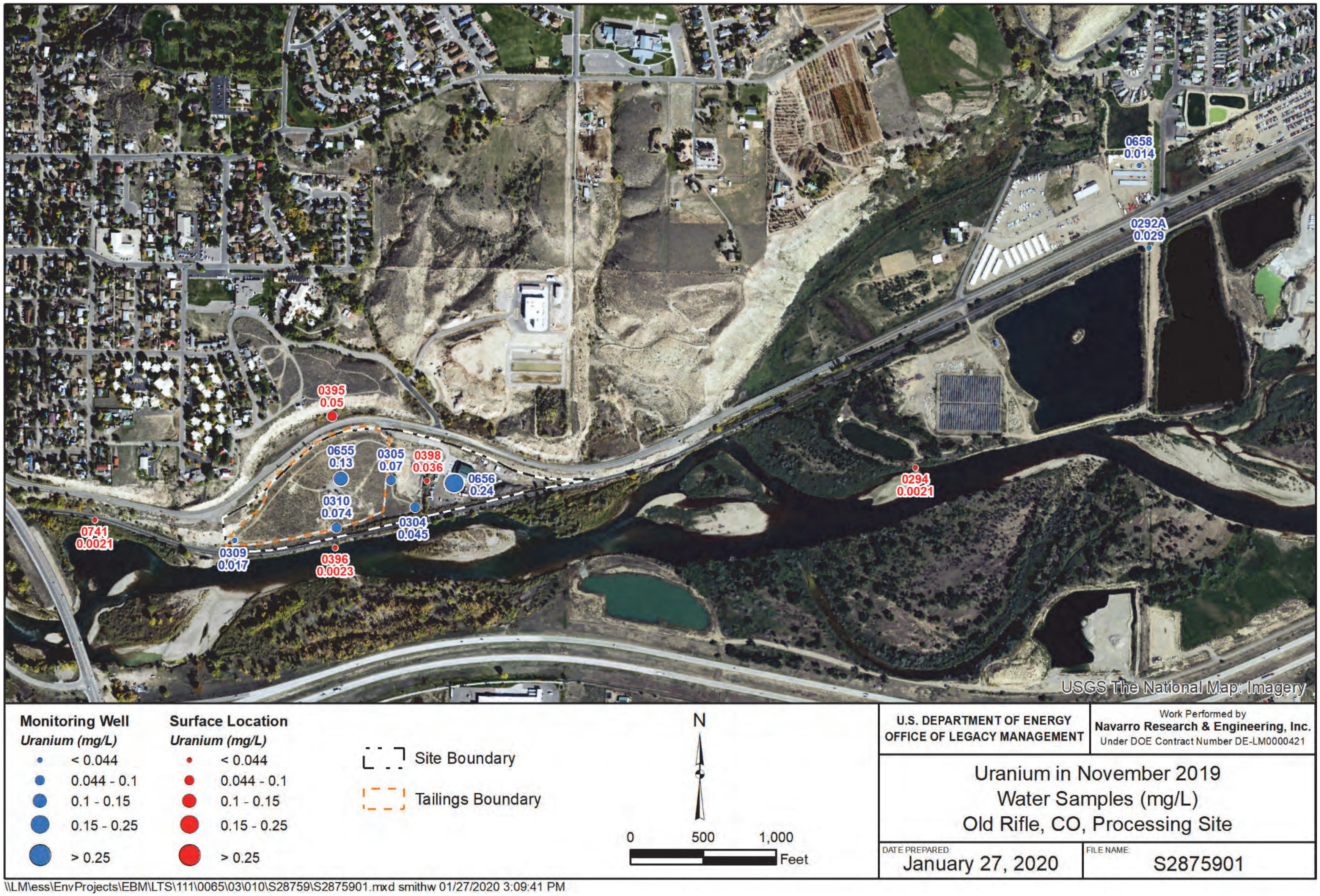
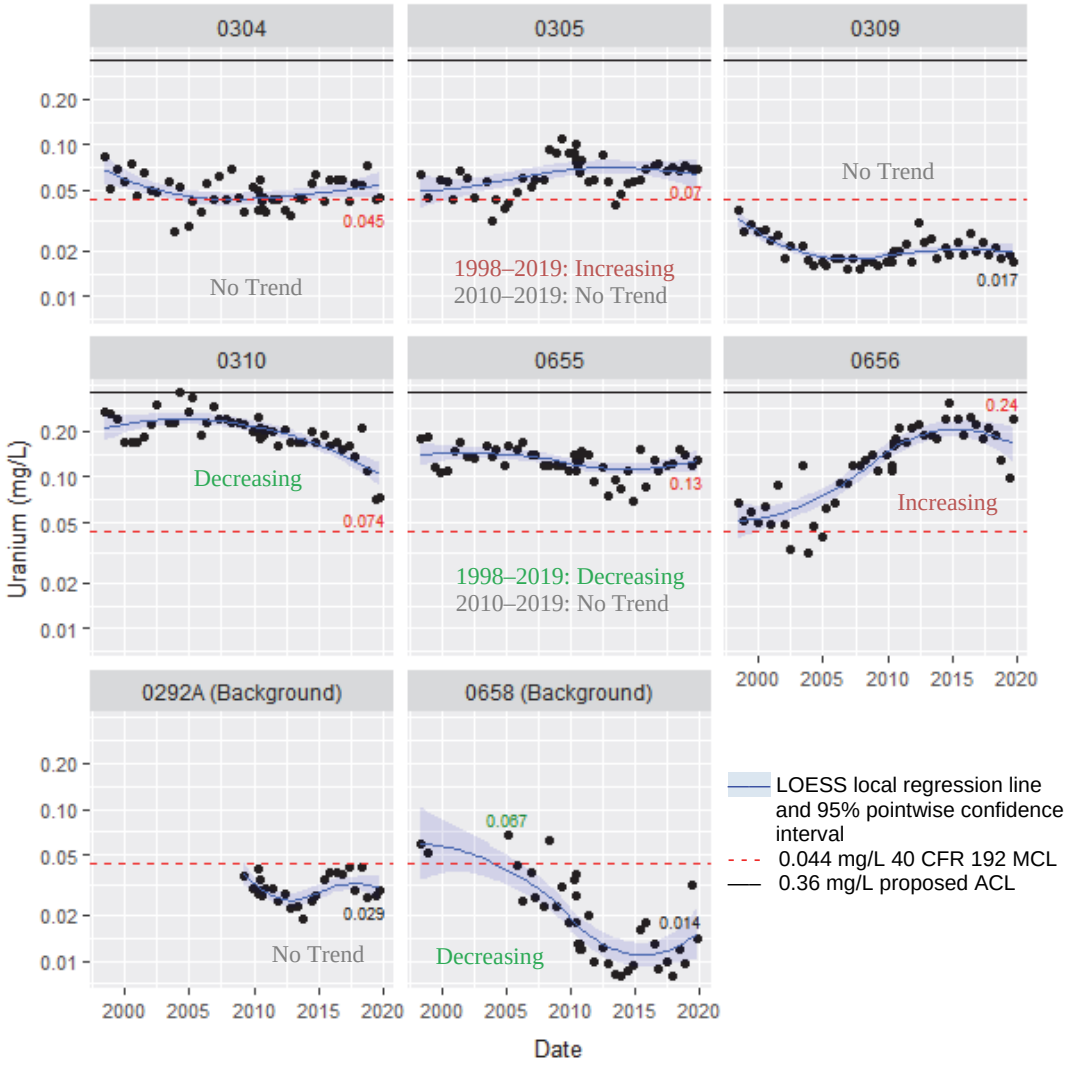


Figure 6. Uranium in November 2019 Groundwater and Surface Water Samples, Old Rifle, Colorado, Processing Site

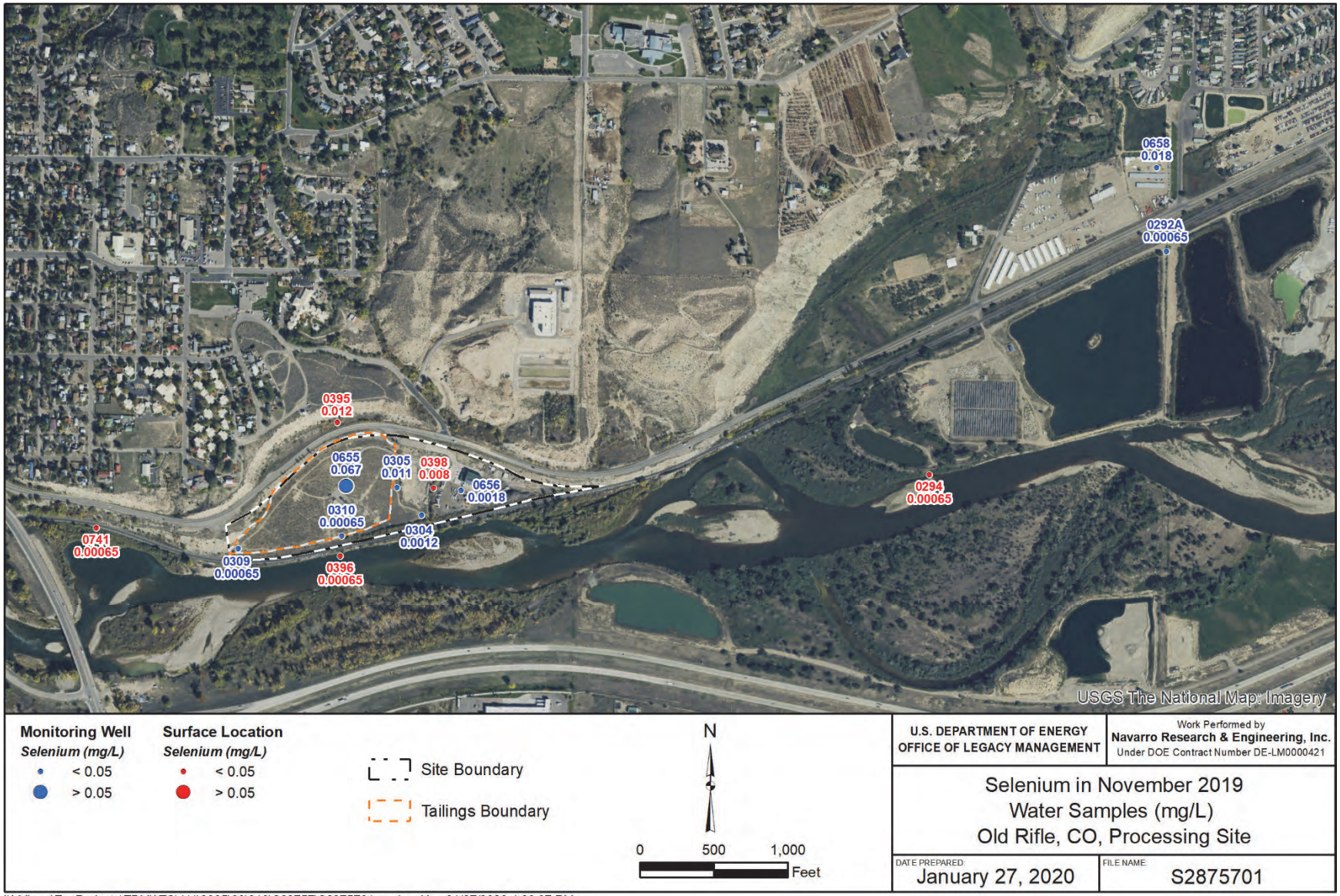


Notes:
Results are from 1998–2019; the most recent (November 2019) results are labeled in each plot; values in red font exceed the 40 CFR 192 (UMTRCA) MCL. The maximum background concentration, 0.067 mg/L in well 0658, is also labeled.
A semilogarithmic scale is used because of the wide range in uranium concentrations across site wells. Results of Mann-Kendall trend tests for the period 1998–2019 (Section 3.2.4, Table 4) are overlain on each plot. These results also apply to the more recent 2010–2019 period unless noted otherwise.

Figure 7. Time-Concentration Plots of Uranium in Old Rifle Site Monitoring Wells

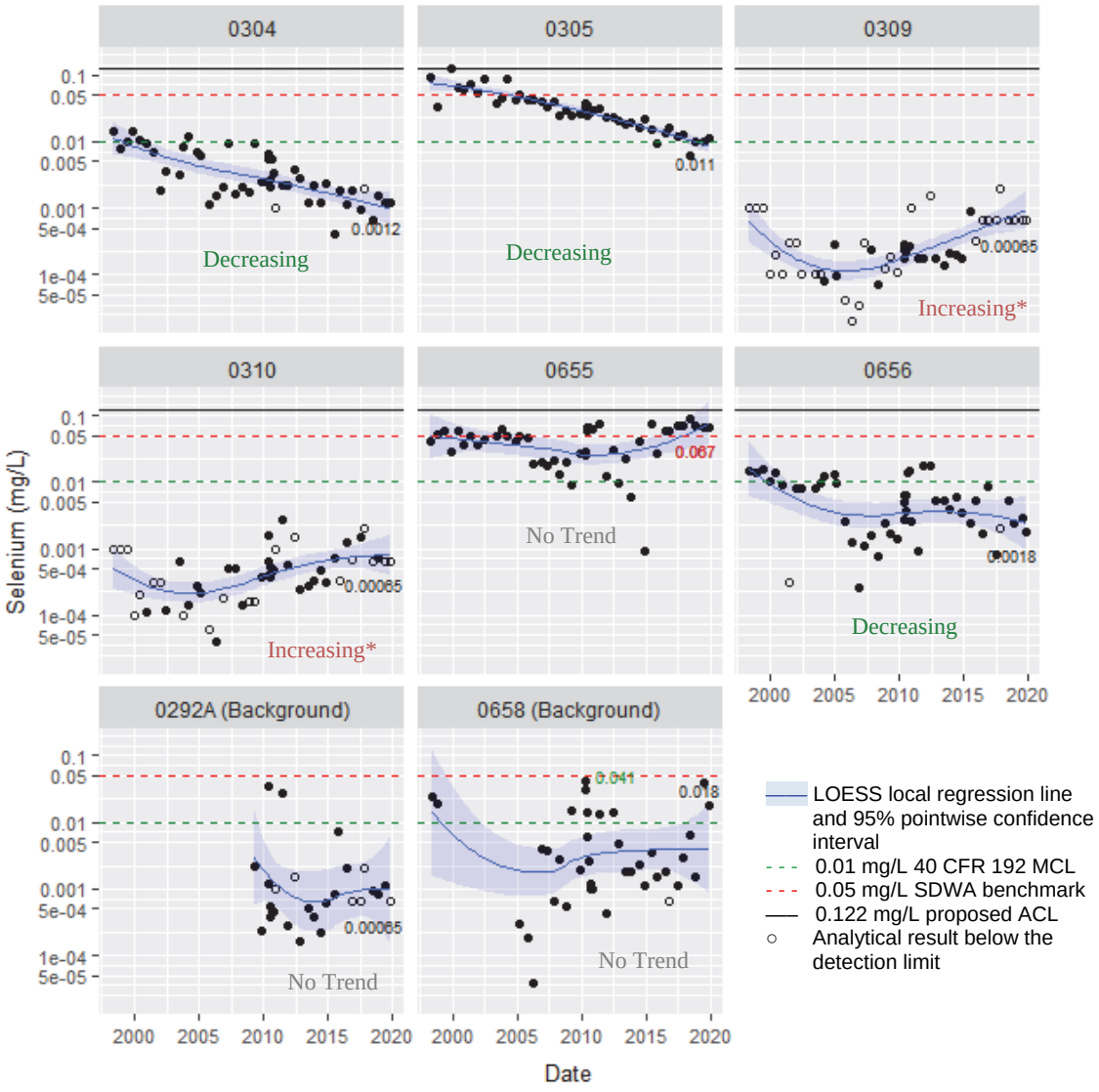
3.2.2 Selenium

Figure 8 plots the most recent (November 2019) selenium results for Old Rifle site monitoring wells along with surface water sampling results. Corresponding time-series data for monitoring wells are plotted in Figure 9. In contrast to uranium, selenium concentrations have exceeded the 0.05 mg/L benchmark in only two wells—0305 and 0655. Both wells are close to the center of the former tailings area and west of the north-south trending ditch that conveys surface runoff from north of the site to the Colorado River. Currently, the 0.05 mg/L benchmark—the U.S. Environmental Protection Agency (EPA) Safe Drinking Water Act (SDWA) maximum contaminant level (Table 1)—is exceeded in only one well, 0655. In all wells, selenium concentrations are below the proposed ACL of 0.122 mg/L.



Note: All labels of 0.00065 mg/L are nondetects; labels correspond to detection limit value.

Figure 8. Selenium in November 2019 Groundwater and Surface Water Samples, Old Rifle, Colorado, Processing Site



Notes:
Results are from 1998–2019; the most recent (November 2019) results are labeled in each plot; values in red font exceed the 0.05 mg/L SDWA benchmark. The maximum background concentration, 0.041 mg/L in well 0658, is also labeled. A semilogarithmic scale is used because of the wide range in selenium concentrations across site wells.
Results of Mann-Kendall trend tests for the period 1998–2019 (Section 3.2.4, Table 4) are overlain on each plot. These results also apply to the more recent 2010–2019 period unless noted otherwise (see below).
*Denotes that no trend was found for the more recent 2010–2019 period. For the two wells to which this applies—wells 0309 and 0310—there is also a large proportion of nondetects.

Figure 9. Time-Concentration Plots of Selenium in Old Rifle Site Monitoring Wells

3.2.3 Vanadium

Figure 10 plots the most recent vanadium results for Old Rifle site monitoring wells along with surface water sampling results. Corresponding time-series data for monitoring data are plotted in Figure 11. Overall trends are similar to those observed for selenium in that wells 0305 and 0655 are the only wells where vanadium concentrations have exceeded the 0.33 mg/L benchmark. Currently, this benchmark is only (barely) exceeded in well 0305 (0.34 mg/L). In all wells, vanadium concentrations have been below the proposed ACL of 1.0 mg/L.

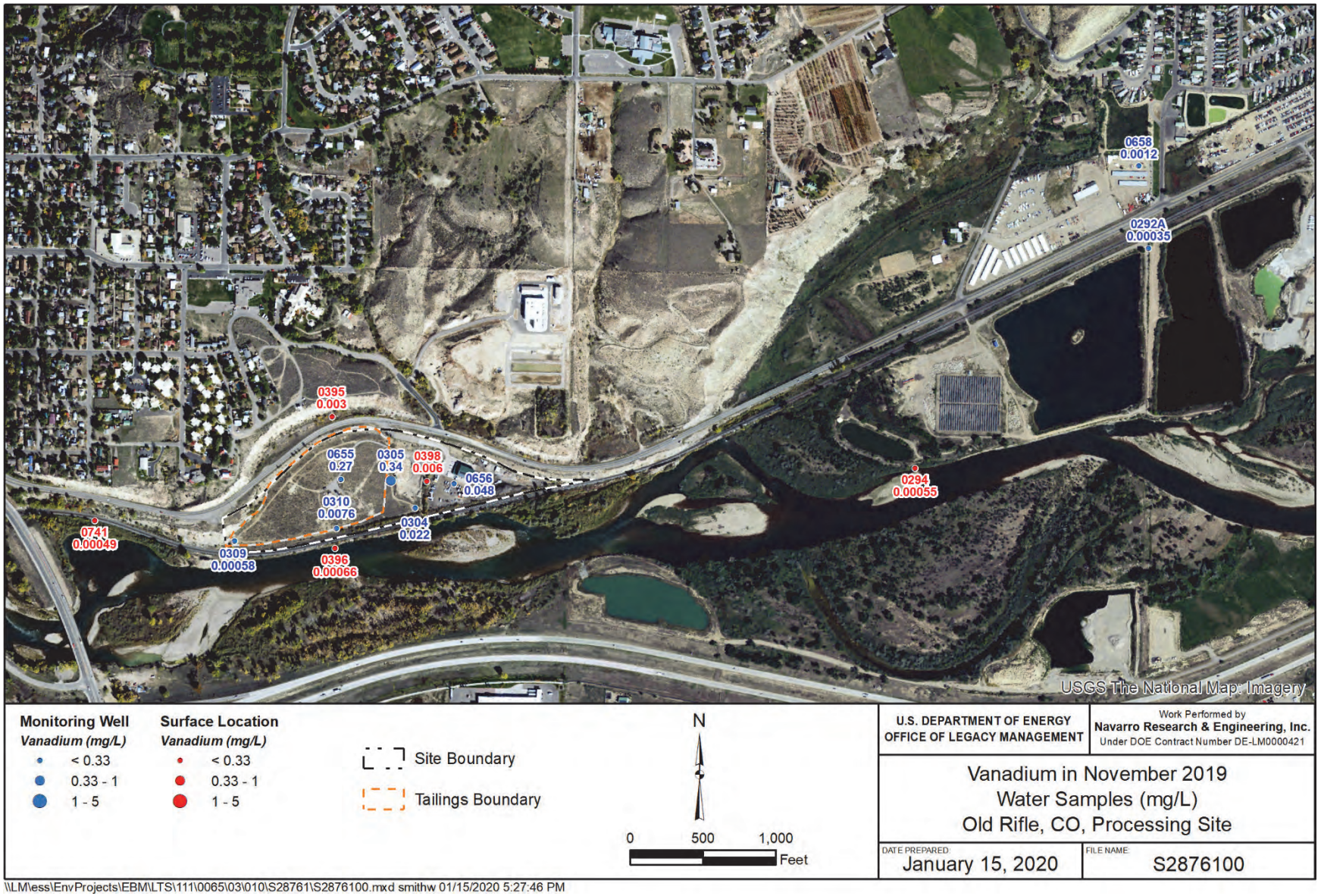
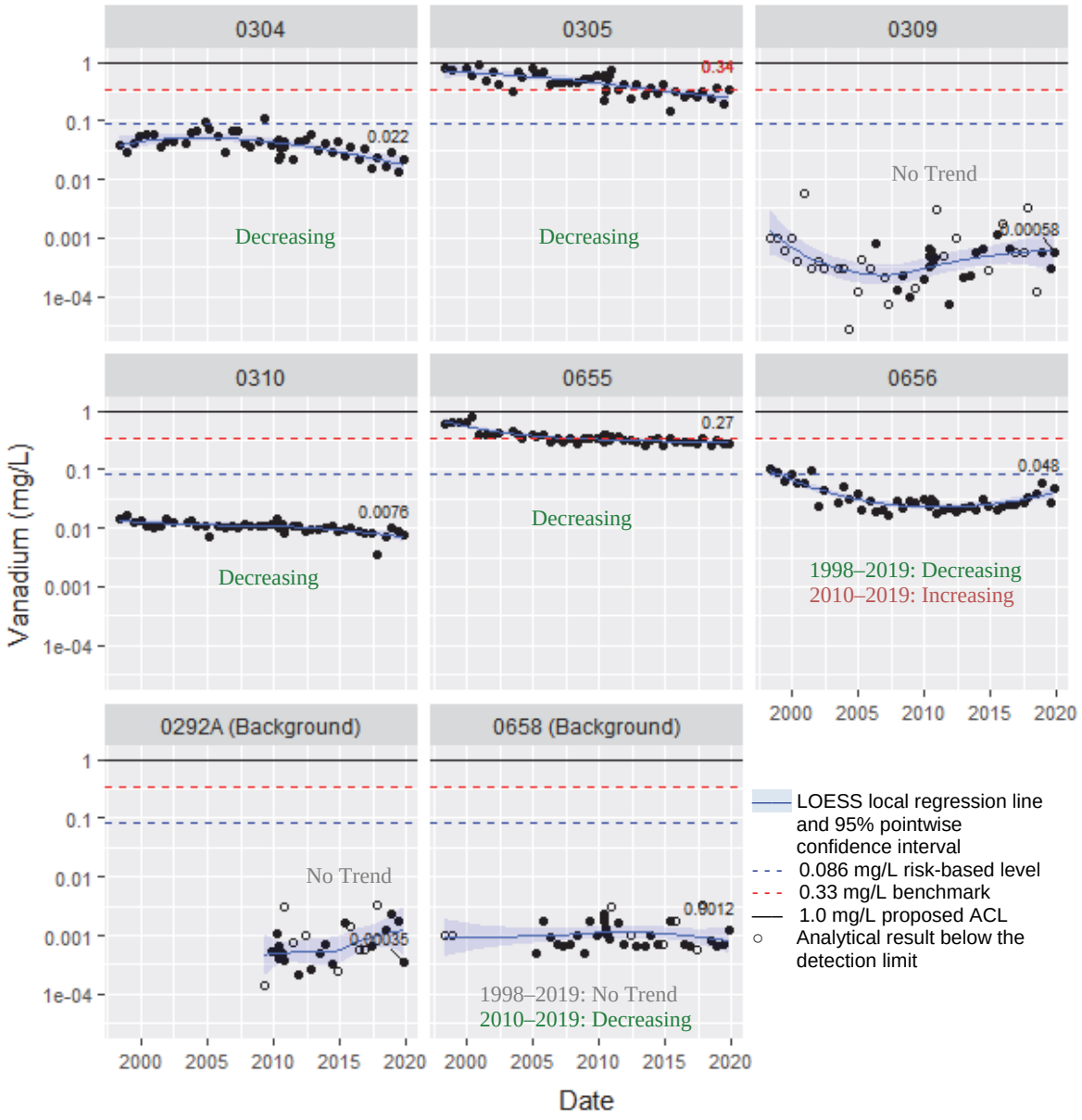


Figure 10. Vanadium in November 2019 Groundwater and Surface Water Samples, Old Rifle, Colorado, Processing Site



Notes:
Results are from 1998–2019; the most recent (November 2019) results are labeled in each plot; values in red font exceed the 0.33 mg/L benchmark (from Table 1).
A semilogarithmic scale is used because of the wide range in vanadium concentrations across site wells.
Results of Mann-Kendall trend tests (Table 4) are overlain on each plot. These results also apply to the more recent 2010–2019 period unless noted otherwise.
As shown above, wells 0305 and 0655 are the only onsite wells with historical vanadium concentrations exceeding the 0.33 mg/L benchmark. This benchmark is currently exceeded only in well 0305.

Figure 11. Time-Concentration Plots of Vanadium in Old Rifle Site Monitoring Wells

3.2.4 Mann-Kendall Trend Analysis

The Mann-Kendall nonparametric test is used to statistically assess if there is a monotonic upward or downward trend of the variable of interest over time. In the previous VMR (DOE 2014), Mann-Kendall trend tests were conducted for only a subset of New Rifle site wells. This updated VMR has been augmented to evaluate trends for all wells, including Old Rifle site wells. As shown in Table 4, many well-parameter combinations have statistically significant decreasing trends, as indicated by negative test statistics (S and Kendall's tau values) and *p*-values (*p)* <0.05. Exceptions are uranium in wells 0305 and 0656 and selenium in wells 0309 and 0310, for which statistically significant increasing trends were identified based on data from 1998–2019. In three of these cases, no trend was indicated based on Mann-Kendall test results for the more recent 2010–2019 time frame. Detailed Mann-Kendall test results, including trend analysis for background wells 0292A and 0658 and a second set of tests run for the 2010–2019 time period, are provided in Appendix C.

Table 4. Mann-Kendall Trend Test Results for Old Rifle Site Wells
Time Frame Evaluated: 1998–2019

Analyte	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent	Mann-Kendall Test Statistics and Results			
						Result (mg/L)	S Statistic	Kendall's tau	p-value	Trend
Uranium	0304	5/19/1998	11/7/2019	49	0	0.045	-101	-0.087	0.39	No Trend
	0305	5/19/1998	11/7/2019	48	0	0.070	243	0.217	0.031	Increasing*
	0309	5/19/1998	11/7/2019	49	0	0.017	-40	-0.035	0.74	No Trend
	0310	5/19/1998	11/7/2019	49	0	0.074	-593	-0.514	<0.0001	Decreasing
	0655	5/18/1998	11/7/2019	49	0	0.130	-294	-0.258	0.011	Decreasing*
	0656	5/20/1998	11/7/2019	49	0	0.240	773	0.665	<0.0001	Increasing
Selenium	0304	5/19/1998	11/7/2019	49	2	0.001	-609	-0.522	<0.0001	Decreasing
	0305	5/19/1998	11/7/2019	48	0	0.011	-897	-0.797	<0.0001	Decreasing
	0309	5/19/1998	11/7/2019	49	29	<0.00065	303	0.262	0.009	Increasing*
	0310	5/19/1998	11/7/2019	49	20	<0.00065	394	0.337	0.001	Increasing*
	0655	5/18/1998	11/7/2019	49	0	0.067	183	0.156	0.12	No Trend
	0656	5/20/1998	11/7/2019	49	2	0.002	-246	-0.210	0.035	Decreasing
Vanadium	0304	5/19/1998	11/7/2019	49	0	0.022	-450	-0.385	0.0001	Decreasing
	0305	5/19/1998	11/7/2019	48	0	0.34	-600	-0.534	<0.0001	Decreasing
	0309	5/19/1998	11/7/2019	49	27	0.0006	92	0.079	0.43	None
	0310	5/19/1998	11/7/2019	49	0	0.008	-595	-0.528	<0.0001	Decreasing
	0655	5/18/1998	11/7/2019	49	0	0.27	-660	-0.571	<0.0001	Decreasing
	0656	5/20/1998	11/7/2019	49	0	0.048	-255	-0.220	0.028	Decreasing†

0.021 Most recent result less than the corresponding benchmark: 0.044 mg/L uranium, 0.05 mg/L selenium, and 0.33 mg/L vanadium (Table 1).

Significant increasing trend based on Mann-Kendall test.

Significant decreasing trend based on Mann-Kendall test.

* No trend indicated using only data from 2010–2019 (*n* = 26 measurements)

† Increasing trend indicated using only data from 2010–2019

Notes:

Trend tests were run using the "Kendall" package in R, version 2.2 (McLeod 2011). Test statistics shown are the S statistic, Kendall's tau, and the two-sided *p* value. The null hypothesis of no change is rejected when S is significantly different from zero ($p \leq 0.05$), indicating a monotonic trend over time. Detailed trend test results are provided in Appendix C.

Trend test results for selenium in wells 0309 and 0310 should be interpreted with caution given the large proportion of nondetects in the dataset (Figure 9).

Abbreviations:

n = number of samples

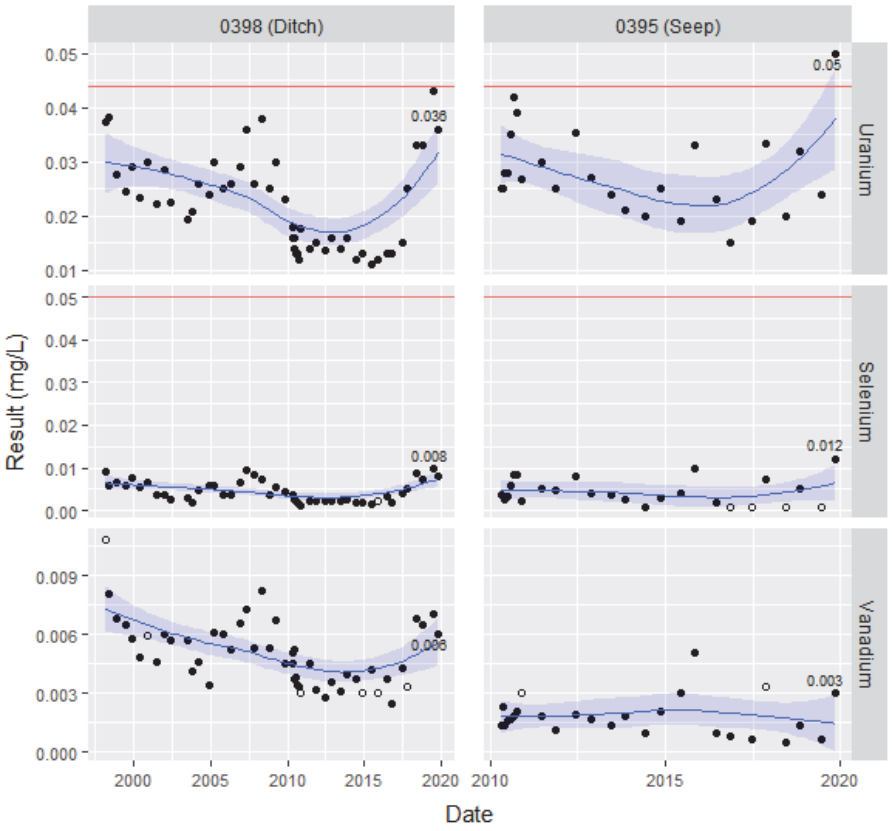
n ND = number of nondetects

3.3 Surface Water Monitoring Results

This section presents results of historical surface water monitoring at the Old Rifle site. Corresponding ditch, seep, and Colorado River monitoring locations are shown in Figure 3. The most recent (November 2019) surface water sampling results are plotted in the preceding spot plot figures (Figure 6, Figure 8, and Figure 10) along with groundwater monitoring results.

3.3.1 Ditch and Seep Locations

Figure 12 plots historical results for all three COCs in ditch (location 0398) and seep (0395) samples. Seep 0395 was recently characterized as a background location (DOE 2016; DOE 2017), as it represents groundwater as a source of recharge to the alluvial aquifer. Although not directly applicable to these surface water sampling results, groundwater benchmarks from Table 1 are shown to provide a context for evaluating results. Apart from recent increases in uranium concentrations in both the seep (background) and ditch locations, no notable trends are evident.



LOESS local regression line and 95% pointwise confidence interval
○ Analytical result below the detection limit
0.036 Most recent (November 2019) result
— Benchmark from Table 1, 0.044 and 0.05 mg/L for uranium and selenium, respectively

Note:
The benchmark for vanadium (0.33 mg/L) is not shown because it is off scale by more than an order of magnitude.

Figure 12. Time-Concentration Plots of COCs in Old Rifle Site Ditch and Seep Samples

3.3.2 Colorado River Water Quality Monitoring

In the most recent draft GCAP (DOE 2017), the Colorado River, where groundwater discharges from the site, was considered the POE for mill-related contamination. Recent and historical results of surface water monitoring indicate that the water quality of the river adjacent to and downgradient of the Old Rifle site (locations 0396 and 0741) is indistinguishable from background water quality (location 0294 and former location 0538). The Colorado River in the site vicinity is classified for agricultural, recreational, and water supply uses.[6] Water quality standards for the river are established in Regulation No. 37 of CDPHE's Water Quality Control Commission.

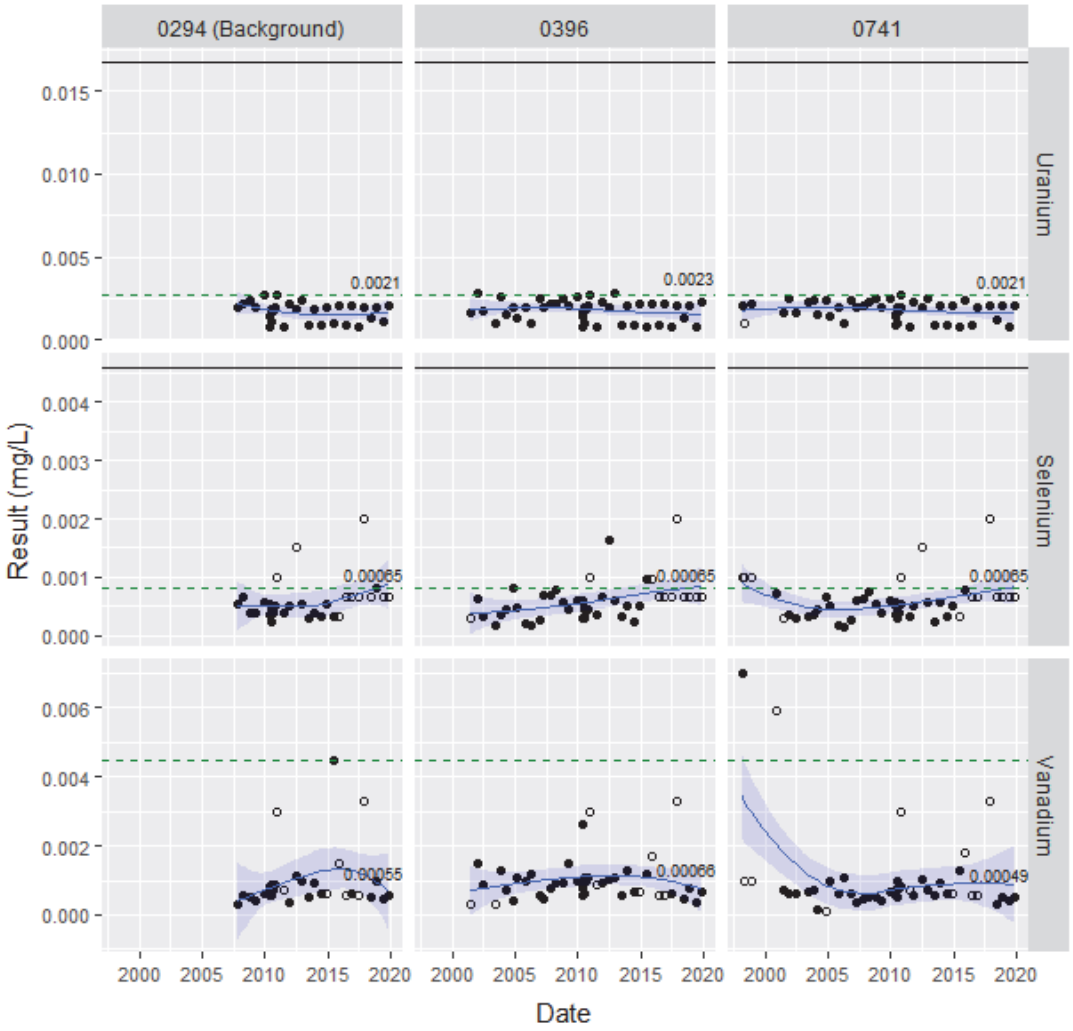
As shown in Figure 13, based on historical semiannual sampling results, the Colorado River water quality in the site vicinity does not exceed, nor has it exceeded, any of these standards, nor—with few exceptions—has it exceeded background surface water quality based on measurements from upgradient location 0294 and former location 0538.

3.4 Institutional Controls Monitoring

Most of the formal obligations for verifying and enforcing the ICs rest with the City of Rifle and CDPHE. According to Section 10 of the EC, the owner of the EC (City of Rifle) is required to submit to CDPHE an annual report of site activities. The annual report details the owner's compliance, and any lack of compliance, with the terms of the covenant. Verification of the restrictions in the zone overlay is required under No. 8 of Subsection (d), the Standard Operating Procedures (SOPs). The city manager shall annually inform all department heads of the SOPs, deed restrictions, and ECs affecting the UMTRA sites.

DOE verification that the City has upheld the quitclaim deed conditions is an ongoing process, accomplished throughout each year by (1) discussions with City officials about construction projects and possible incursions of groundwater that could result from these activities; (2) physical inspection of the site by the State of Colorado or DOE (or both), usually during the annual Rifle disposal site inspection; and (3) observations during groundwater sampling activities at other times of the year. Observations made during inspection or groundwater sampling events are documented in the trip reports for those events.

[6] Applicable segment is COLCLC01: Mainstem of the Colorado River from the confluence with the Roaring Fork River to immediately below the confluence with Rifle Creek, designated as Aquatic Cold Life 1 (Volume 5 *Code of Colorado Regulations* Section 1002-37 [5 CCR 1002-37]).



LOESS local regression line and 95% pointwise confidence interval

○ Analytical result below the detection limit

- - - Maximum COC detected concentration at upgradient (background) location 0294

——- Volume 5 *Code of Colorado Regulations* Section 1002-37 (5 CCR 1002-37) surface water standard.

–For uranium, the lower bound of the cited range (0.0168–0.03 mg/L) is used.
–For selenium, the chronic standard of 0.0046 mg/L is shown.
–There is no surface water standard for vanadium.

0.0021 Most recent (November 2019) result; values posted for selenium are detection limit values

Note:
Monitoring of background Colorado River location 0294 began in November 2007. Data from the previous background river location—0538, roughly 0.5 mile upstream of location 0294 (to the east)—are not plotted. Ranges of each COC measured at 0538 between late 1987 and May 2007 are 0.001–0.0079 mg/L uranium, 0.00014–0.0025 mg/L selenium, and 0.000034–0.0011 mg/L vanadium.

Figure 13. Historical COC Concentrations in Colorado River Water Samples, Old Rifle Site

4.0 New Rifle Site Monitoring Results

In accordance with the initial GCAP (DOE 2003a), routine, typically semiannual, monitoring has been performed at the New Rifle site since 2003. This section summarizes the New Rifle site monitoring requirements and documents the results of groundwater and surface water sampling conducted in 2019. At most locations (Figure 3), sampling occurred in June and November, consistent with historical monitoring frequencies and timing. However, during the June 2019 sampling event, monitoring wells 0216 and 0590 were inundated with floodwater and could not be accessed. The access road to well 0195 was also flooded, precluding access. Wetland pond locations 0320, 0452, and 0453 were also inaccessible due to flooding. Except for monitoring well 0195 (sampled only in November), samples at these initially inaccessible locations were collected in August 2019. Appendix B documents corresponding groundwater and surface water analytical results for calendar year 2019.

4.1 Monitoring Network

Table 5 lists the current monitoring requirements for the New Rifle site. The monitoring network currently consists of 17 monitoring wells and eight surface water sampling sites, including three Colorado River locations (Figure 3). In addition to the New Rifle site background well (0169), two Old Rifle site background wells (RFO-0658 and RFO-0292A) have also been used to represent background groundwater quality at the site (DOE 2014; DOE 2016).

As discussed in Section 1.1.2, groundwater beneath the New Rifle site was contaminated by former uranium and vanadium-ore-processing operations that were ongoing from 1958–1984. Site field investigations have shown that the alluvial aquifer is the only aquifer affected by the former milling operations. Site-related constituents that are currently monitored include ammonia, arsenic, molybdenum, nitrate, selenium, uranium, and vanadium (Table 3). However, a reduced analytical program was proposed for some offsite wells in the most recent GCAP (DOE 2016). The following sections evaluate historical trends in groundwater and surface water samples between 1998 and 2019, the period since post-remediation site characterization activities were initiated.

4.2 Groundwater Monitoring Results

As a prelude to the discussion of analyte-specific results that follow, Figure 14 provides a matrix of time-concentration plots for each New Rifle site monitoring well and analyte combination (background wells are excluded). A total of 112 distinct monitoring well and analyte combinations is represented. In this figure, wells are ordered and grouped consistent with the categories defined in the draft GCAP (DOE 2016) and listed in Table 5: onsite wells, adjacent downgradient wells (upgradient of the Roaring Fork ponds), and farther downgradient wells (downgradient of the Roaring Fork ponds). Offsite wells are listed in general order of increasing distance from the site and former source areas. The subsequent discussion of overall contamination trends is based on this matrix, the analyte-specific contaminant distribution maps (major COCs only), and the corresponding time-concentration plots that follow (Figure 15 through Figure 26).

Table 5. Summary of GCAP Monitoring Requirements for the New Rifle Site

Locations[a]	Monitoring Purpose	Analytes[b]	Frequency
0215, 0216, 0658, 0659[c], 0664[c], 0669[c], 0670, 0855	Monitor COCs in onsite wells	Ammonia as N Arsenic Molybdenum Nitrate as N Selenium Uranium Vanadium	Semiannually[d]
0201, 0217[c], 0590, 0635	Monitor COCs adjacent to and downgradient of the site and upgradient of the Roaring Fork ponds		
0170, 0172, 0195, 0620	Monitor COCs in wells farther downgradient from the site and downgradient from the Roaring Fork ponds		
0169 and Old Rifle site locations RFO-0292A, RFO-0658 (Table 3)	Monitor background groundwater quality (includes Old Rifle site locations)[e]		
Roaring Fork Ponds[f] 0323, 0575 Colorado River RFO-0294 (background), 0322, 0324, 0326[g] Wetland Locations 0320, 0452, 0453	Monitor surface water to determine impact of groundwater discharge to surface water and ecological receptors		

Notes:

[a] Locations shown in Figure 3.

[b] New Rifle site COCs and proposed monitoring requirements have varied over the years (e.g., DOE 1999b; DOE 2003a; DOE 2014). The most recent draft GCAP (DOE 2016, Table 10) proposed a reduced analytical scope for downgradient offsite wells 0170, 0172, 0195, and 0620 (excluding arsenic, selenium, and vanadium). However, until that GCAP is approved, all site locations listed above will continue to be monitored semiannually for the seven analytes listed above.

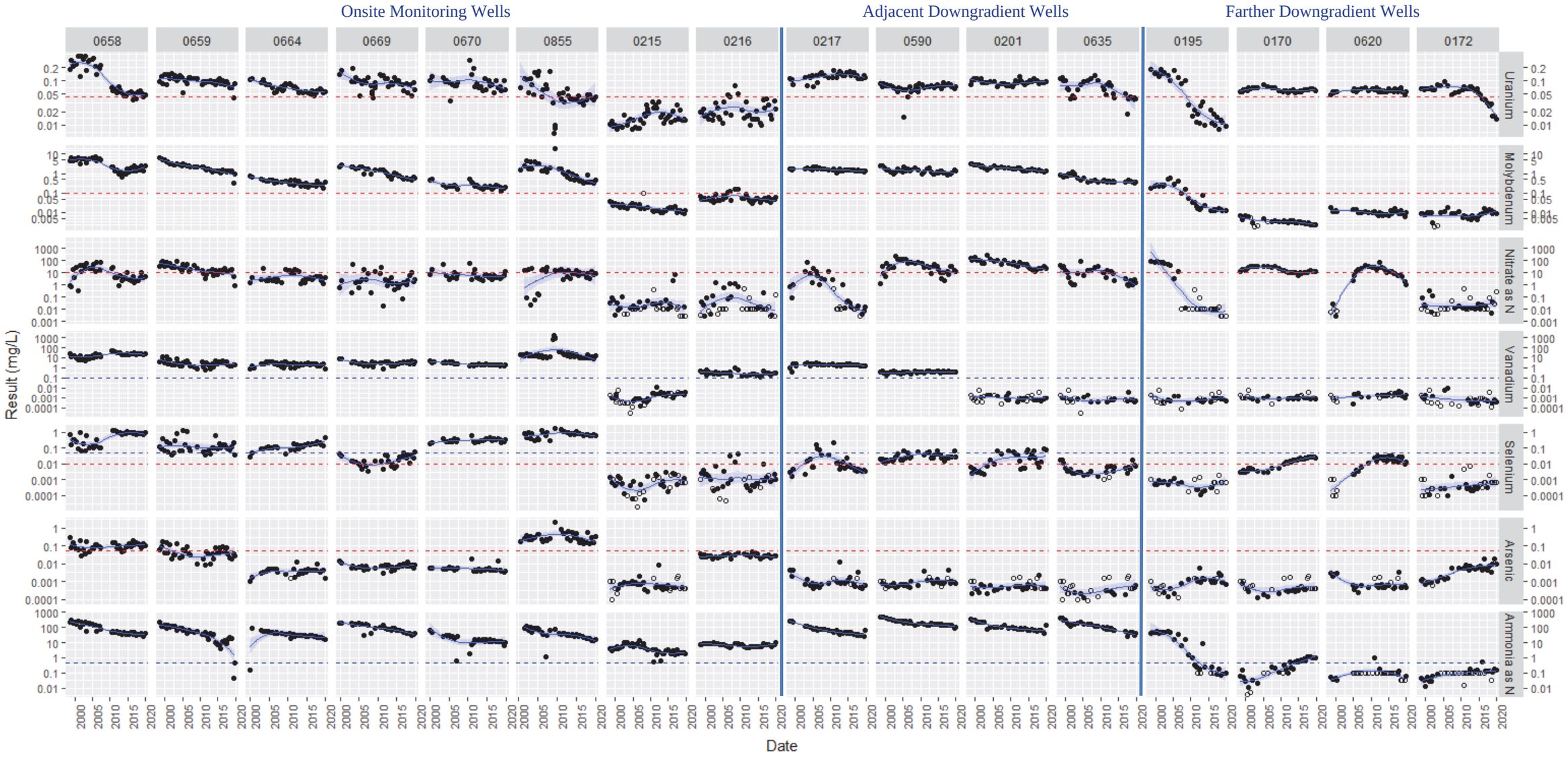
[c] Location designated as a POC well in the most recent draft GCAP (DOE 2016): 0659, 0664, 0669, and 0217.

[d] Semiannual frequency listed here is consistent with previous VMRs (e.g., DOE 2014) and, for onsite wells, the early sampling regime proposed in the initial GCAP (DOE 2003a). In the most recent draft GCAP (DOE 2016), a reduced frequency was proposed: annually for the first 5 years (following acceptance of the GCAP), after which monitoring requirements would be reevaluated. As the 2016 GCAP is pending approval by NRC and CDPHE, LM will continue semiannual monitoring at the New Rifle site.

[e] Although the 2016 draft GCAP proposed that background groundwater quality monitoring be discontinued (the background dataset was deemed to be adequate), these locations are still being monitored for the full suite of COCs.

[f] The Roaring Fork ponds were proposed as POE locations in the recent draft GCAP (DOE 2016).

[g] Colorado River location 0326 established in June 2015 (Figure 3).



LOESS local regression line and 95% pointwise confidence interval
40 CFR 192 MCL (UMTRCA standard) from Table 2: 0.044 mg/L uranium, 0.1 mg/L molybdenum, 10 mg/L nitrate, 0.01 mg/L selenium, and 0.05 mg/L arsenic
Alternate benchmark or interpretive context from Table 2: EPA residential risk-based level for vanadium, 0.086 mg/L; EPA SDWA maximum contaminant level for selenium, 0.05 mg/L; maximum ammonia concentration in background wells, 0.47 mg/L

Notes:
This figure is intended as an introduction to the discussion of individual constituents that follows; results plotted are for 1998–2019. Detailed plots providing greater resolution are provided in the COC-specific time-trend plots (Figure 16 through Figure 26).
Results for New Rifle site background well 0169 and Old Rifle site background wells RFO-0292A and RFO-0658 are not shown here.
Wells are ordered consistent with the groupings in Table 5, whereby onsite wells are listed first and adjacent and farther downgradient wells follow. In the latter two categories, wells are listed in general order of increasing distance from the site.
A semilogarithmic scale is used because of the wide range in constituent concentrations across site wells; *y*-axis labels are duplicated on the secondary (right) *y*-axis to facilitate review of trends in the farthest downgradient wells.

Figure 14. Introductory Facet Grid of COC Time-Trend Plots in New Rifle Site Monitoring Wells, 1998–2019

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4.2.1 Discussion

The following is a brief summary of overall findings and observations based on the preceding introductory matrix plot (Figure 14) and subsequent analyte-specific exhibits. Observed trends for uranium are addressed first because, as is true for the Old Rifle site, this constituent remains elevated in most New Rifle site monitoring wells. This section concludes with a summary of Mann-Kendall trend test results that were run for each well and COC combination and two periods: 1998–2019 (the historical monitoring record) and 2010–2019 (the last decade). To facilitate review, trend test results are overlain on each time-series data plot.

Uranium

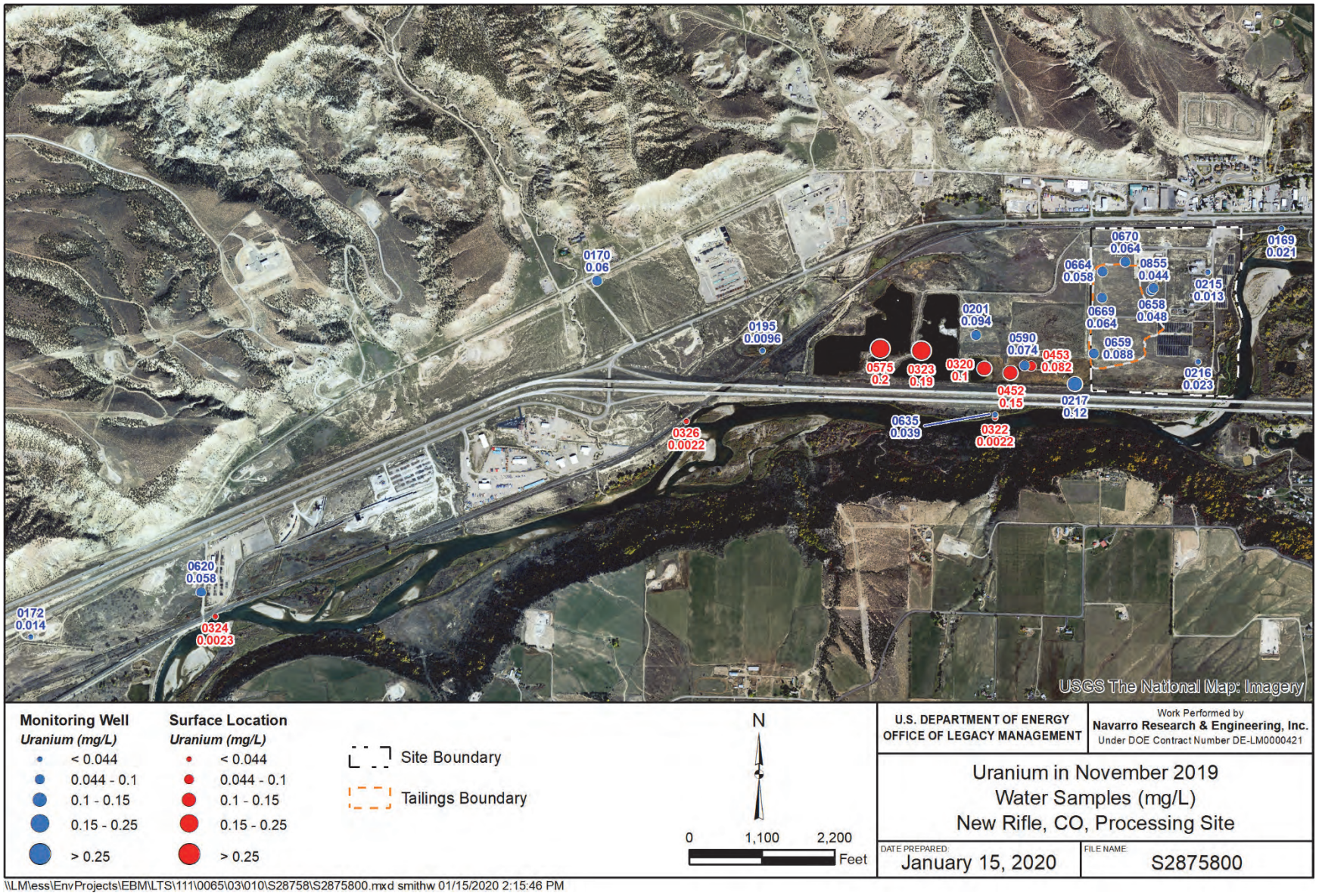
Figure 15 plots the most recent (November 2019) uranium results for New Rifle site monitoring wells along with surface water sampling results. Corresponding time-series data for monitoring wells are shown in Figure 16. As shown in these exhibits, elevated uranium concentrations persist throughout the monitoring network. The 0.044 mg/L 40 CFR 192 MCL is currently exceeded in 10 of the 16 onsite or offsite wells, as far downgradient as well 0620. Uranium concentrations in four of these wells—onsite well 0659 and adjacent downgradient wells 0217, 0590, and 0201—also exceed the 0.067 mg/L benchmark.[7] In 2019, the highest uranium concentrations in groundwater were measured in well 0217 (0.12–0.13 mg/L), immediately southwest of the former tailings pile. Levels in nearby onsite well 0659 were slightly lower (0.09 mg/L). Accounting for all monitoring locations, the highest uranium levels—0.2 mg/L—were measured in Roaring Fork pond locations 0323 and 0575 (Figure 15).

Across the monitoring network, the lowest uranium levels have been measured in onsite wells 0215 and 0216; almost all measurements have been below 0.044 mg/L. This is likely due to recharge from the north-south-aligned reach of the Colorado River that forms the east border of the site (Figure 15). COC concentrations in this region tend to be diluted by mixing with influent river water (DOE 2016); seasonal fluctuations are apparent in Figure 16.

Uranium concentrations in well 0195, about 400 ft downgradient of the West Roaring Fork Pond, have declined by more than an order of magnitude, from 0.18 mg/L in 1998 to 0.0096 mg/L in November 2019. Levels in wells 0170 and 0620 have remained relatively stable at about 0.06 mg/L, above the 0.044 UMTRCA standard but comparable to the 0.067 mg/L benchmark. Uranium concentrations in farthest downgradient well 0172 fluctuated between 0.05 mg/L and 0.1 mg/L between 1998 and about 2015 but have since declined to about 0.01 mg/L. Possible explanations for these trends are discussed in the most recent GCAP and subsequent correspondence (DOE 2016; Jasso 2019).

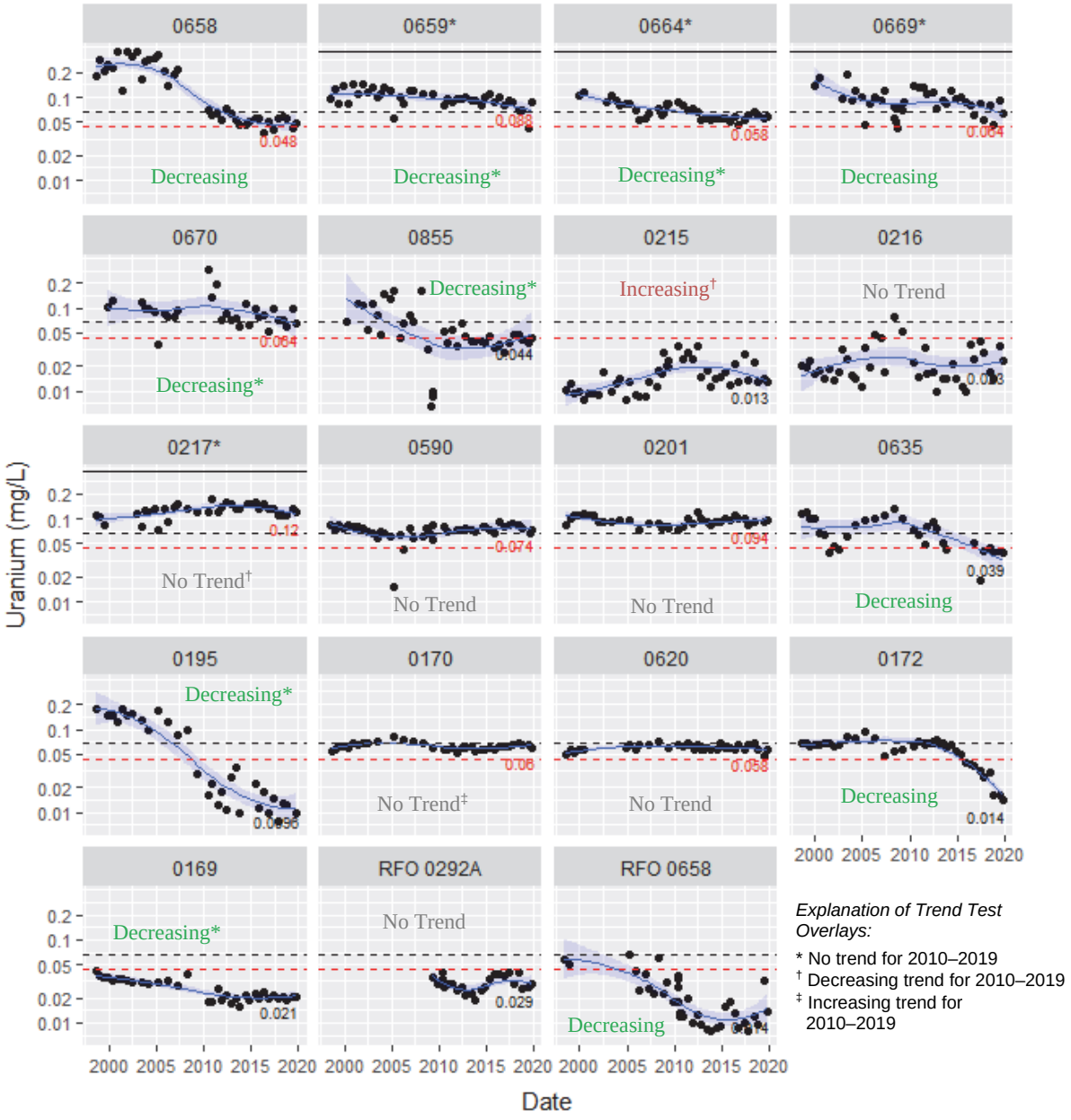
Although statistically significant decreasing trends were identified for 9 of the 16 wells based on evaluation of data from 1998–2019 (Figure 16; Table 6), this conclusion applies to only 4 wells—onsite wells 0658 and 0669 and offsite wells 0635 and 0172—if only the last decade is considered. A significant increasing trend was found for well 0170 for the 2010–2019 time frame, but corresponding measurements ranged from 0.053–0.067 mg/L, a fairly narrow range.

[7]This benchmark, proposed in the previous VMR (DOE 2014) and the draft GCAP (DOE 2016), is based on the maximum uranium concentration measured in Old Rifle site background well 0658 in 2005, 0.067 mg/L (Table 2). Uranium levels have been variable in this well, as evidenced by significant decreasing trends determined for both the 1998–2019 and 2010–2019 periods.



Note: Because surface location 0453 was dry at the time of the November 2019 sampling and inaccessible in June 2019 due to flooding, the posted result is from August 2019.

Figure 15. Uranium in November 2019 Groundwater and Surface Water Samples, New Rifle, Colorado, Processing Site



0659* Asterisk following well ID denotes proposed POC well (DOE 2016)
LOESS local regression line and 95% pointwise confidence interval
- - - 0.044 mg/L 40 CFR 192 MCL
- - - 0.067 mg/L benchmark (maximum concentration measured in RFO-0658 [Table 2])
—— 0.364 mg/L proposed ACL (POC wells only)
0.044 Most recent (November 2019) result ≤0.044 mg/L
0.048 Most recent result >0.044 mg/L

Notes: Results are from 1998–2019. Wells are ordered and grouped as follows:
Rows 1 and 2 = onsite wells
Row 3 = adjacent downgradient wells
Row 4 = farther downgradient offsite wells
Row 5 = New and Old Rifle site background wells

Onsite wells 0215 and 0216 are plotted last in the second row given historically low COC levels relative to other onsite wells. Offsite wells (rows 3–4) are listed in general order of increasing distance from the site and former source areas. Plots are overlain with Mann-Kendall trend test results (Table 6; Appendix C).

Figure 16. Time-Concentration Plots of Uranium in New Rifle Site Monitoring Wells

Molybdenum

Figure 17 plots the most recent (November 2019) molybdenum results for New Rifle site monitoring wells along with surface water sampling results. Corresponding time-series data for monitoring wells are shown in Figure 18. Molybdenum, one of the most widespread COCs at the New Rifle site, remains elevated in onsite and adjacent downgradient wells. Exceptions are wells 0215 and 0216, where mixing with river water likely occurs. Molybdenum concentrations in farther downgradient wells, west of the Roaring Fork ponds, are all less than the 0.1 mg/L benchmark (the 40 CFR 192 MCL).

Similar to trends found for uranium, nitrate, and ammonia (Figure 14), molybdenum concentrations in well 0195 have declined markedly, from a maximum of 0.6 mg/L in 2004 to 0.012 mg/L in November 2019. Levels in farther downgradient wells—0170, 0620, and 0172—have been about an order of magnitude less than the 0.1 mg/L benchmark. Mann-Kendall trend tests indicate significantly decreasing trends in molybdenum concentrations across the monitoring network (14 of 16 wells). However, for six of these wells, this conclusion is not maintained if only data from 2010–2019 are used in the analysis (Table 6; Appendix C).

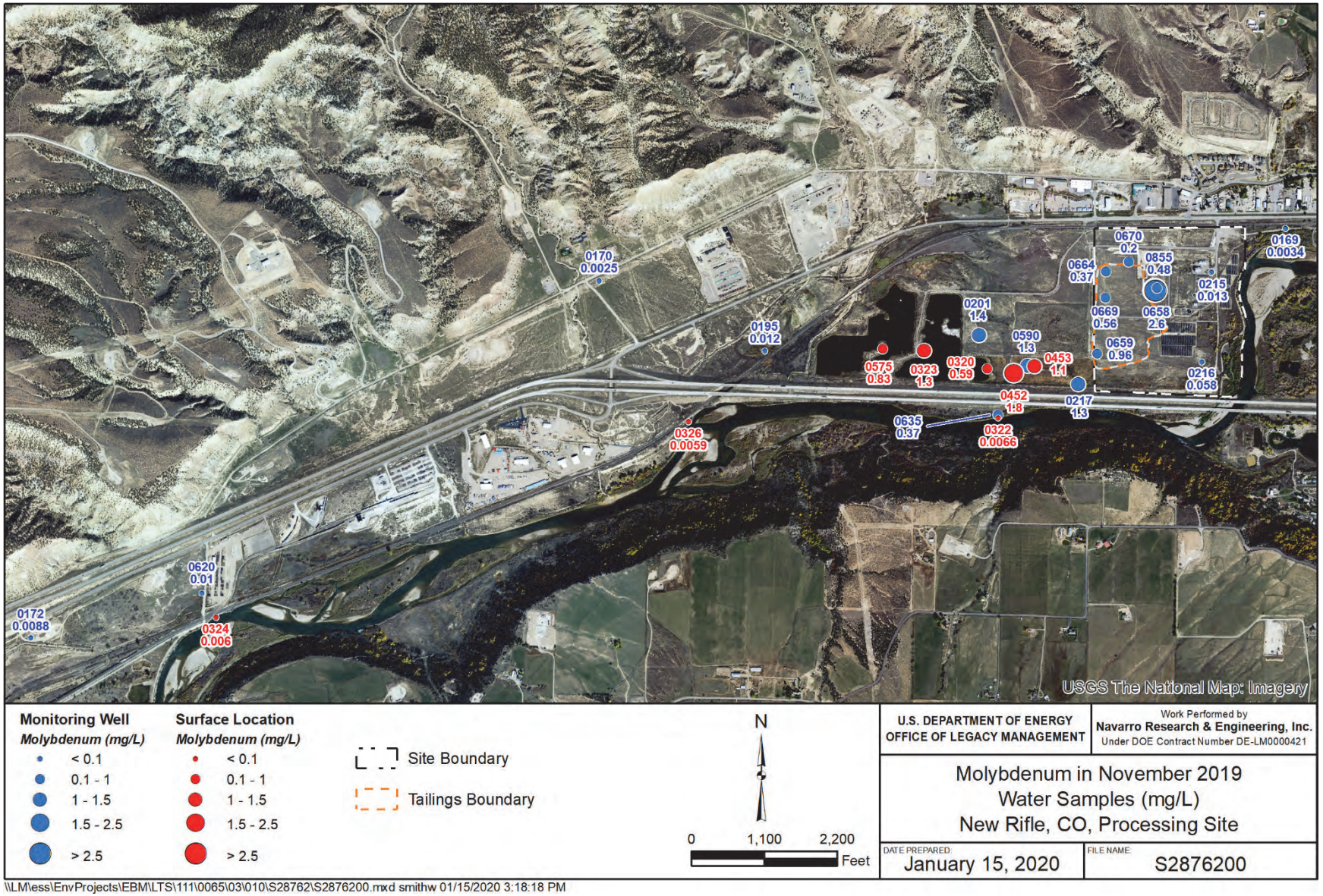
Nitrate

Figure 19 plots the most recent (November 2019) nitrate results for New Rifle site monitoring wells along with surface water sampling results. Corresponding time-series data for monitoring wells are shown in Figure 20. Nitrate currently exceeds the 10 mg/L (40 CFR 192 MCL) benchmark in only four monitoring wells, in most cases only slightly: onsite well 0670 (12 mg/L), adjacent downgradient wells 0590 and 0201 (13 and 25 mg/L, respectively) and farther downgradient well 0170 (13 mg/L). Although no significant trends were found for most onsite wells, significant decreasing trends were determined for adjacent downgradient wells (Table 6). Similar to observations for other analytes (Figure 14), nitrate concentrations have declined significantly in well 0195. Levels have been below detection limits since 2009.

Vanadium

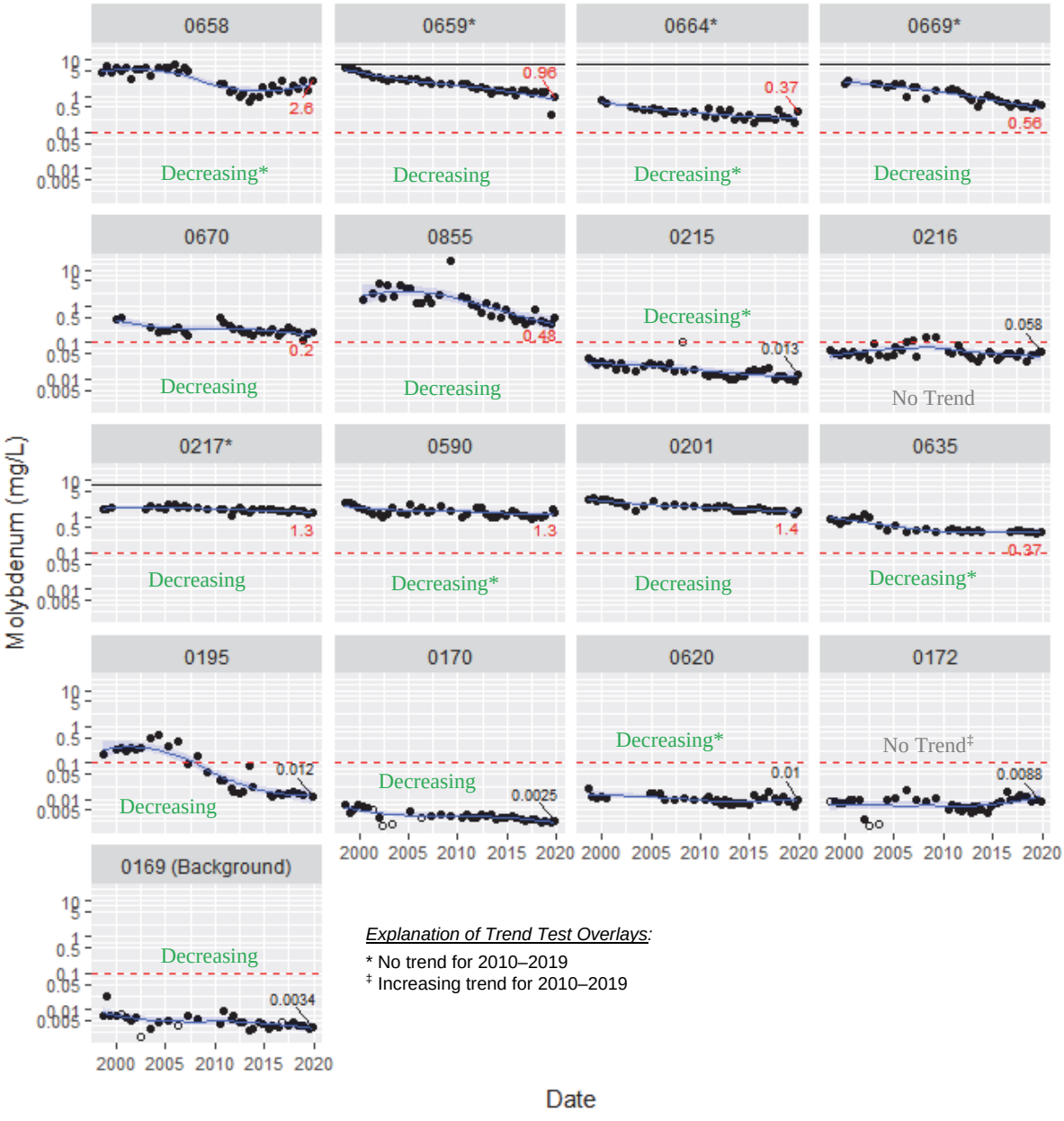
Figure 21 plots the most recent (November 2019) vanadium results for New Rifle site monitoring wells along with surface water sampling results. Corresponding time-series data for monitoring wells are shown in Figure 22. For context, this figure includes the previous 0.33 mg/L benchmark and EPA's recently updated risk-based concentration (RBC), 0.086 mg/L (Table 2). Vanadium concentrations remain elevated in all onsite wells except 0215 and adjacent downgradient wells 0217 and 0590. Levels have been consistently low and generally stable (nontrending), however, in farther downgradient wells.

The 2009 spike in vanadium concentrations in well 0855 (up to 1600 mg/L) coincided with the City of Rifle's previous construction work and attendant dewatering activities in the eastern portion of the site (DOE 2016). (Arsenic and molybdenum levels also increased markedly in well 0855 at that time.) This elevated concentration was not maintained; by 2010, vanadium levels had decreased to about 40 mg/L. For the 1998–2019 dataset, significant (increasing or decreasing) trends were identified in most onsite monitoring wells (Table 6). However, except for well 0855 (decreasing trend), no trend was found based on the more recent (2010–2019) dataset. That is, vanadium levels in most wells have been stable for the last 10 years.



Note: Because surface location 0453 was dry at the time of the November 2019 sampling and inaccessible in June 2019 due to flooding, the posted result is from August 2019.

Figure 17. Molybdenum in November 2019 Groundwater and Surface Water Samples, New Rifle, Colorado, Processing Site



Explanation of Trend Test Overlays:

* No trend for 2010–2019

‡ Increasing trend for 2010–2019

0659* Asterisk following well ID denotes proposed POC well (DOE 2016)

LOESS local regression line and 95% pointwise confidence interval

- - - 0.1 mg/L 40 CFR 192 MCL

—— 7.3 mg/L proposed ACL (POC wells only)

○ Analytical result below the detection limit

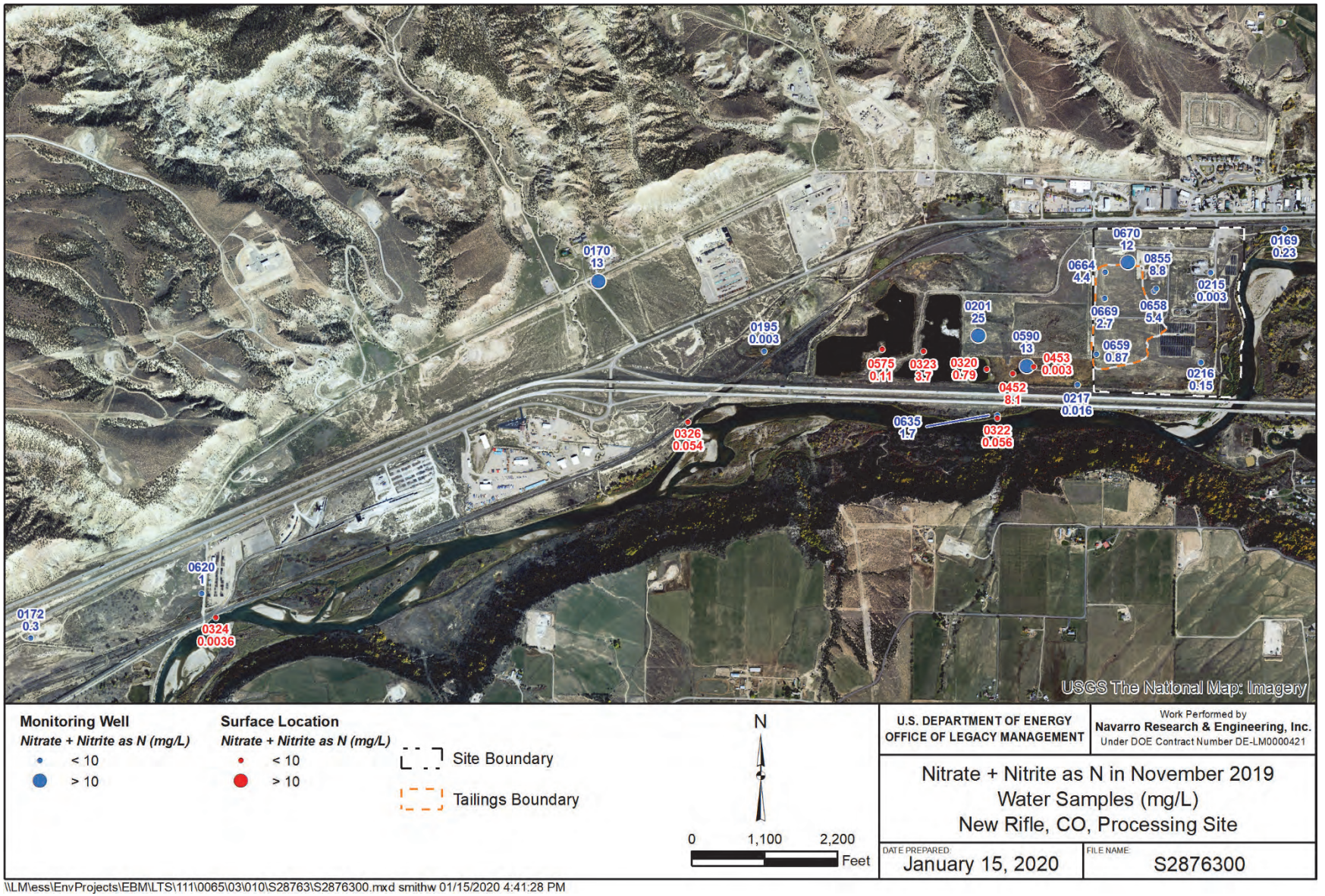
2.6 Most recent (November 2019) result >0.1 mg/L

0.013 Most recent result ≤0.1 mg/L

Notes:

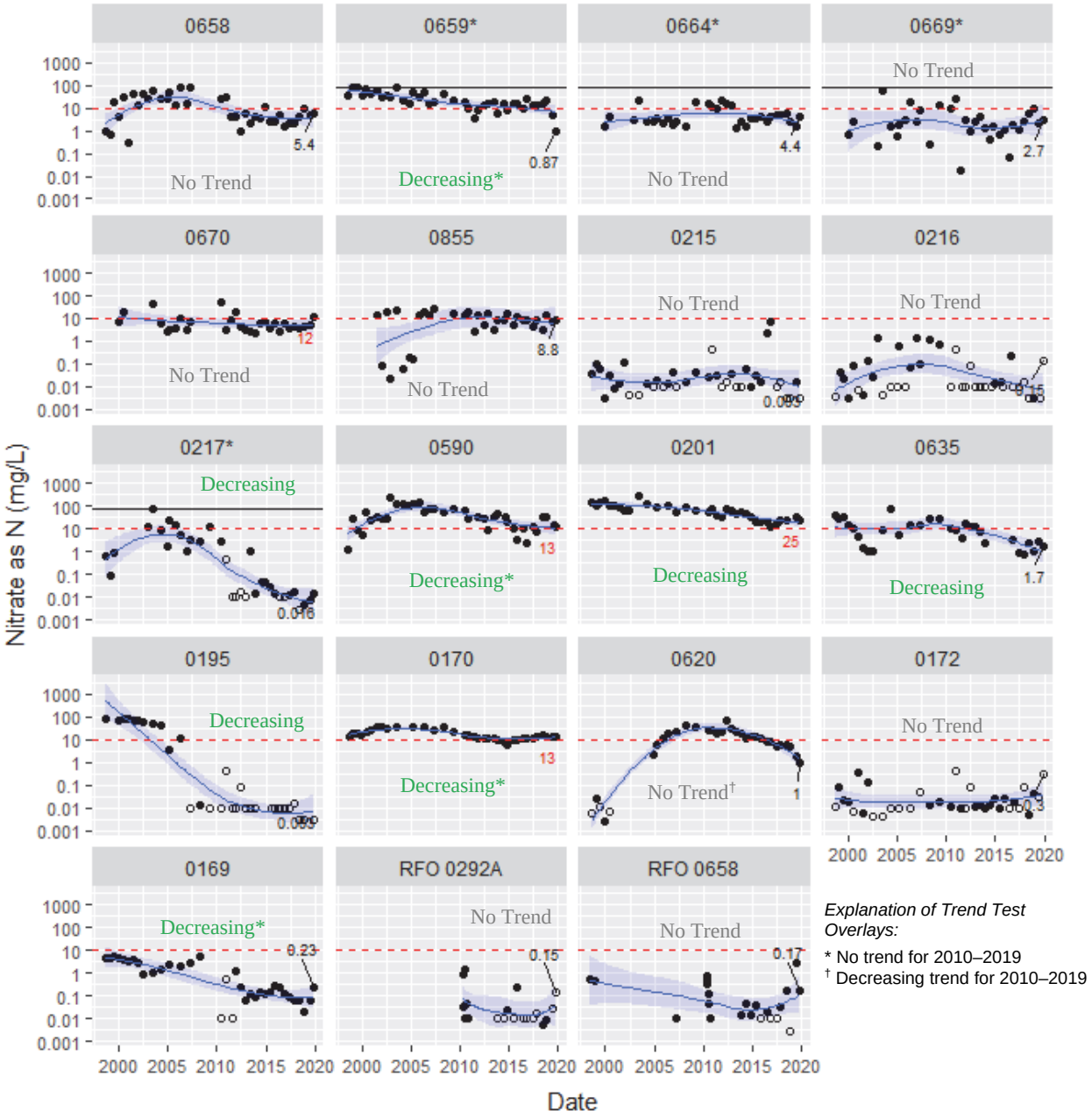
Results are from 1998–2019. Wells are grouped and ordered as follows:
Rows 1 and 2 = onsite wells; row 3 = adjacent downgradient wells; row 4 = farther downgradient offsite wells; row 5 = background well (molybdenum is not monitored at the Old Rifle site).
A semilogarithmic scale is used because of the wide range in molybdenum concentrations across site wells.
Plots are overlain with Mann-Kendall trend test results (Table 6; Appendix C).

Figure 18. Time-Concentration Plots of Molybdenum in New Rifle Site Monitoring Wells



Note: Because surface location 0453 was dry at the time of the November 2019 sampling and inaccessible in June 2019 due to flooding, the posted result is from August 2019.

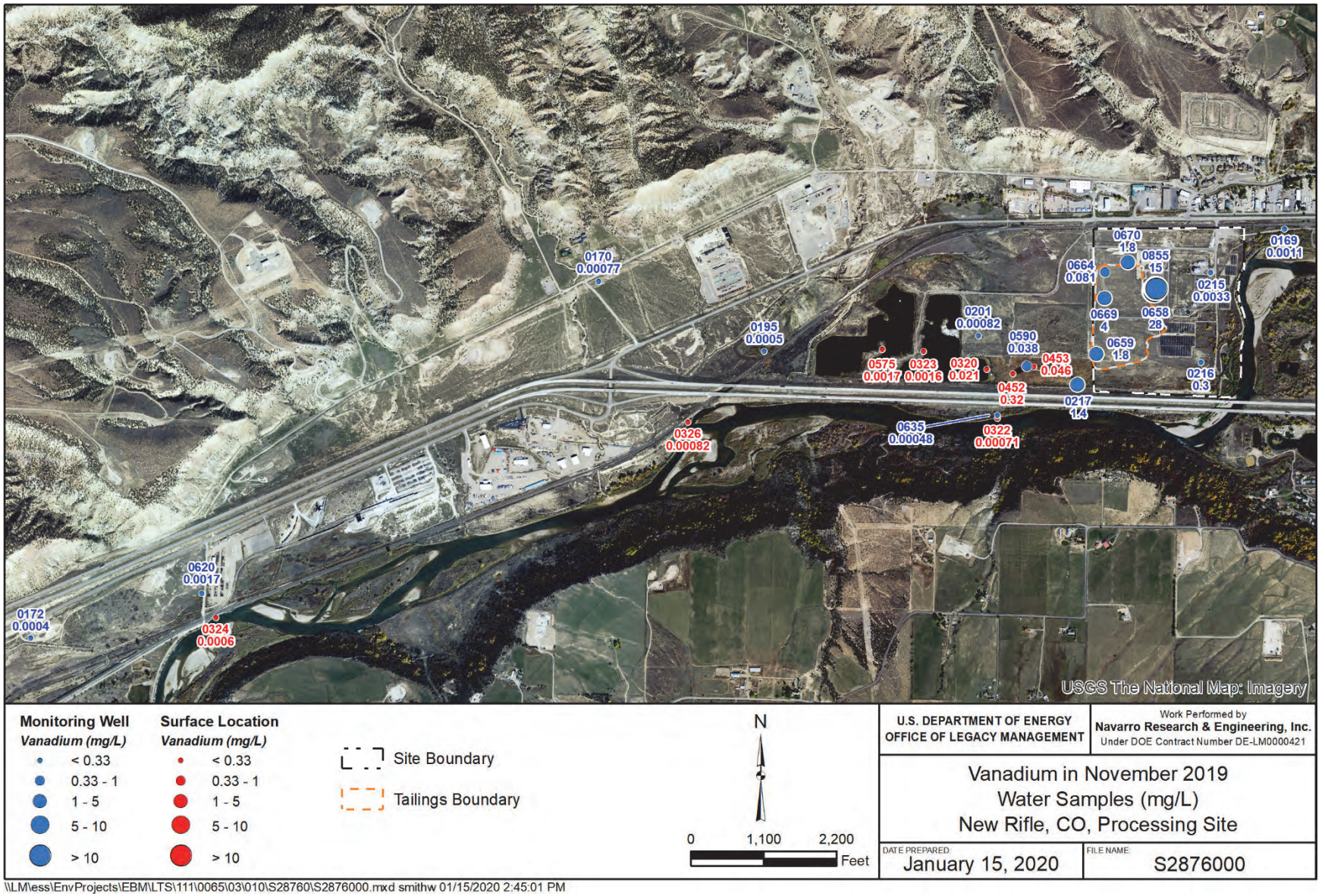
Figure 19. Nitrate in November 2019 Groundwater and Surface Water Samples, New Rifle, Colorado, Processing Site



0659* Asterisk following well ID denotes proposed POC well (DOE 2016)
LOESS local regression line and 95% pointwise confidence interval
10 mg/L 40 CFR 192 MCL
75 mg/L proposed ACL (POC wells only)
○ Analytical result below the detection limit
5.4 Most recent (November 2019) result ≤10 mg/L
12 Most recent result >10 mg/L

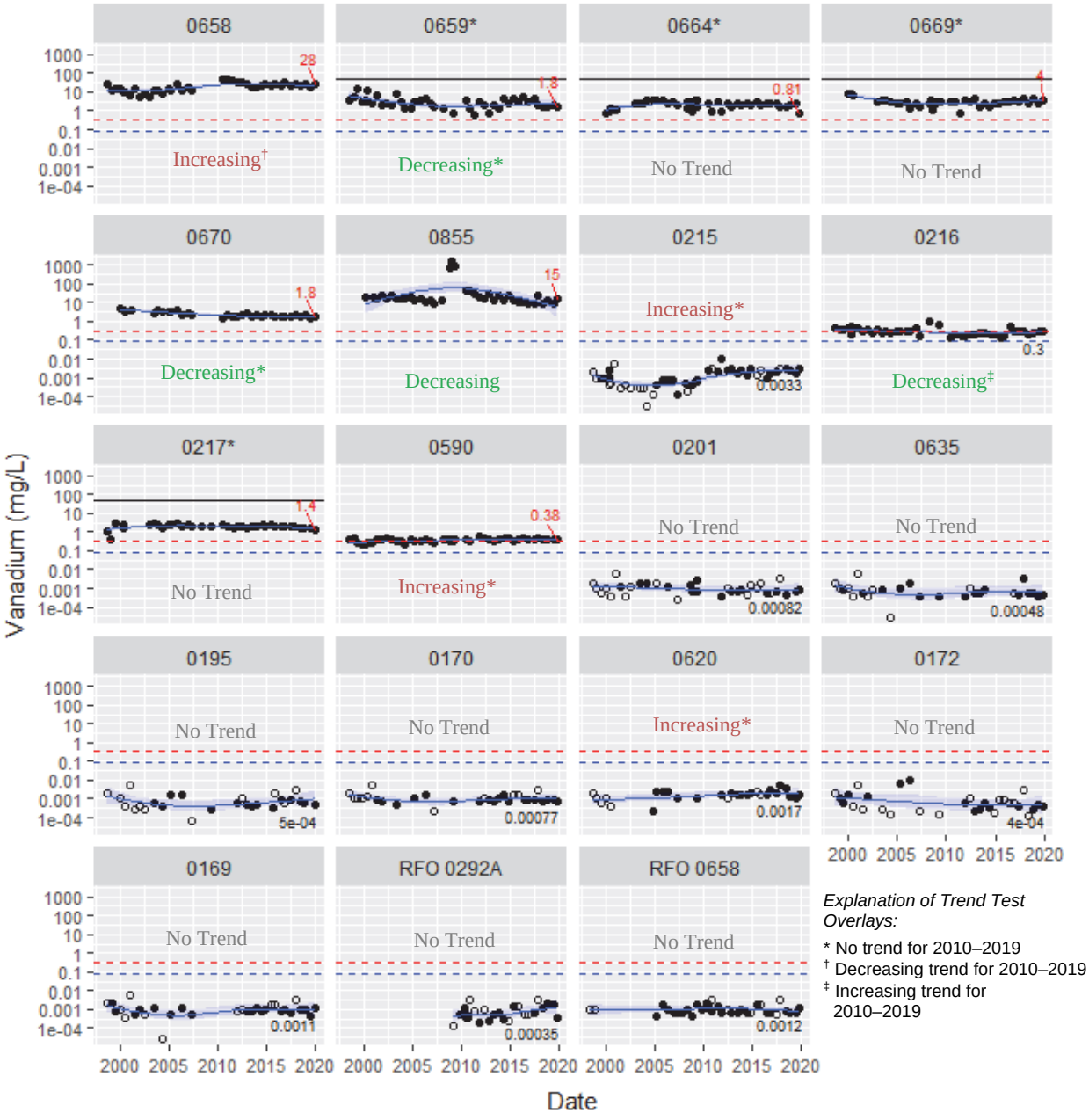
Notes:
Results are from 1998–2019. Wells are grouped and ordered as follows:
Rows 1 and 2 = onsite wells; row 3 = adjacent downgradient wells; row 4 = farther downgradient wells; row 5 = background wells. Plots are overlain with Mann-Kendall trend test results (Table 6; Appendix C).
A semilogarithmic scale is used because of the wide range in nitrate (as N) concentrations across site wells.

Figure 20. Time-Concentration Plots of Nitrate in New Rifle Site Monitoring Wells



Note: Because surface location 0453 was dry at the time of the November 2019 sampling and inaccessible in June 2019 due to flooding, the posted result is from August 2019.

Figure 21. Vanadium in November 2019 Groundwater and Surface Water Samples, New Rifle, Colorado, Processing Site



0659* Asterisk following well ID denotes proposed POC well (DOE 2016)
LOESS local regression line and 95% pointwise confidence interval
0.33 mg/L, previous benchmark from DOE 2016
0.086 mg/L, current EPA risk-based value (Table 2)
52 mg/L proposed ACL (POC wells only)
○ Analytical result below the detection limit
0.3 Most recent result (November 2019) ≤0.33 mg/L
28 Most recent result >0.33 mg/L

Notes:
Results are from 1998–2019. Wells are grouped and ordered as follows:
Rows 1 and 2 = onsite wells; row 3 = offsite adjacent wells; row 4 = farther downgradient offsite wells; row 5 = background wells. Plots are overlain with Mann-Kendall trend test results (Table 6; Appendix C).
A semilogarithmic scale is used because of the wide range in vanadium concentrations across site wells.

Figure 22. Time-Concentration Plots of Vanadium in New Rifle Site Monitoring Wells

Selenium

Figure 23 plots the most recent (November 2019) nitrate results for New Rifle site monitoring wells along with surface water sampling results. Corresponding time-series data for monitoring wells are plotted in Figure 24. Because selenium concentrations have occasionally exceeded the 40 CFR 192 (UMTRCA) standard of 0.01 mg/L in background wells, the SDWA standard of 0.05 mg/L is used as the selenium benchmark (Table 2). Selenium concentrations exceed the 0.05 mg/L benchmark in five of the eight onsite wells. As observed for other COCs, levels in wells 0215 and 0216 are typically lower due to river influences. Offsite, selenium exceeds the benchmark only in well 0201 (0.076 mg/L). In most remaining downgradient wells, selenium concentrations are also lower than the 0.01 mg/L UMTRCA standard.

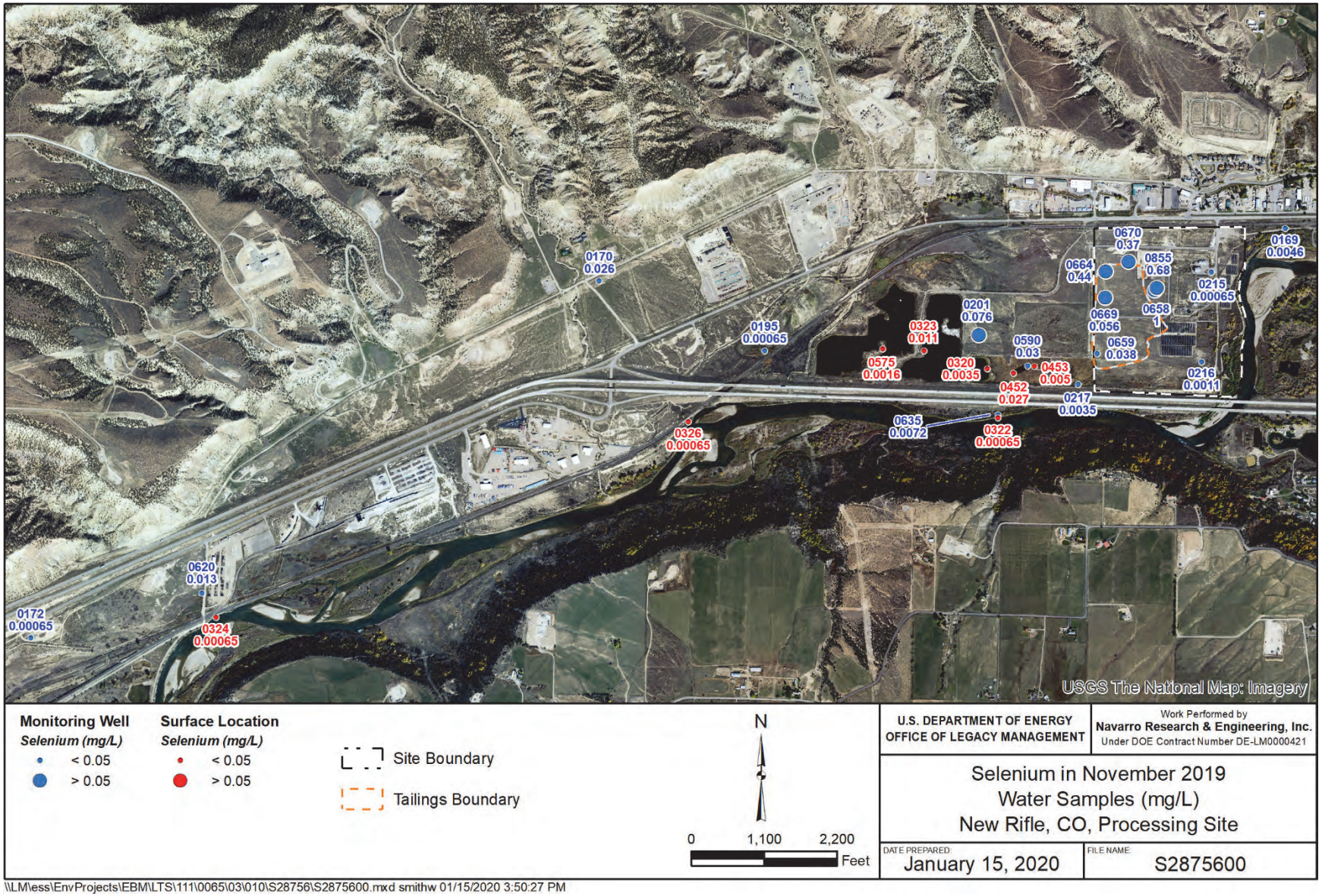
Based on historical monitoring data (1998–2019), Mann-Kendall trend tests indicated significant increasing trends for 8 of the 16 monitoring onsite or downgradient monitoring wells. Trend analysis of 2010–2019 data (only) yielded different results. Only 5 wells—onsite wells 0216, 0664, and 0669 and offsite wells 0635 and 0170—had significant increasing trends (Table 6). Wells 0664 and 0170 are the only wells with significant increasing trends for both 1998–2019 and 2010–2019 time frames (Table 6). Trend analysis results should be interpreted with caution for downgradient wells 0195 and 0172 due to the large proportion of nondetects.

Arsenic

Historically, arsenic has only been elevated relative to the 0.05 mg/L benchmark in three onsite wells: 0658, 0659, and 0855 (Figure 14; Figure 25). As observed for molybdenum and vanadium, the highest concentrations have been measured in well 0855, where levels spiked in 2009 coinciding with adjacent dewatering activities. As of November 2019, the 0.05 mg/L benchmark was exceeded in only two wells: 0658 (0.1 mg/L) and 0855 (0.33 mg/L). Based on historical monitoring data (1998–2019), Mann-Kendall trend tests indicated significant increasing trends for offsite wells 0590, 0195, and 0172. Since 2010, arsenic levels have stabilized in those wells; no significant trend was found (Table 6). In general, arsenic concentrations have been stable and below the benchmark across the monitoring network.

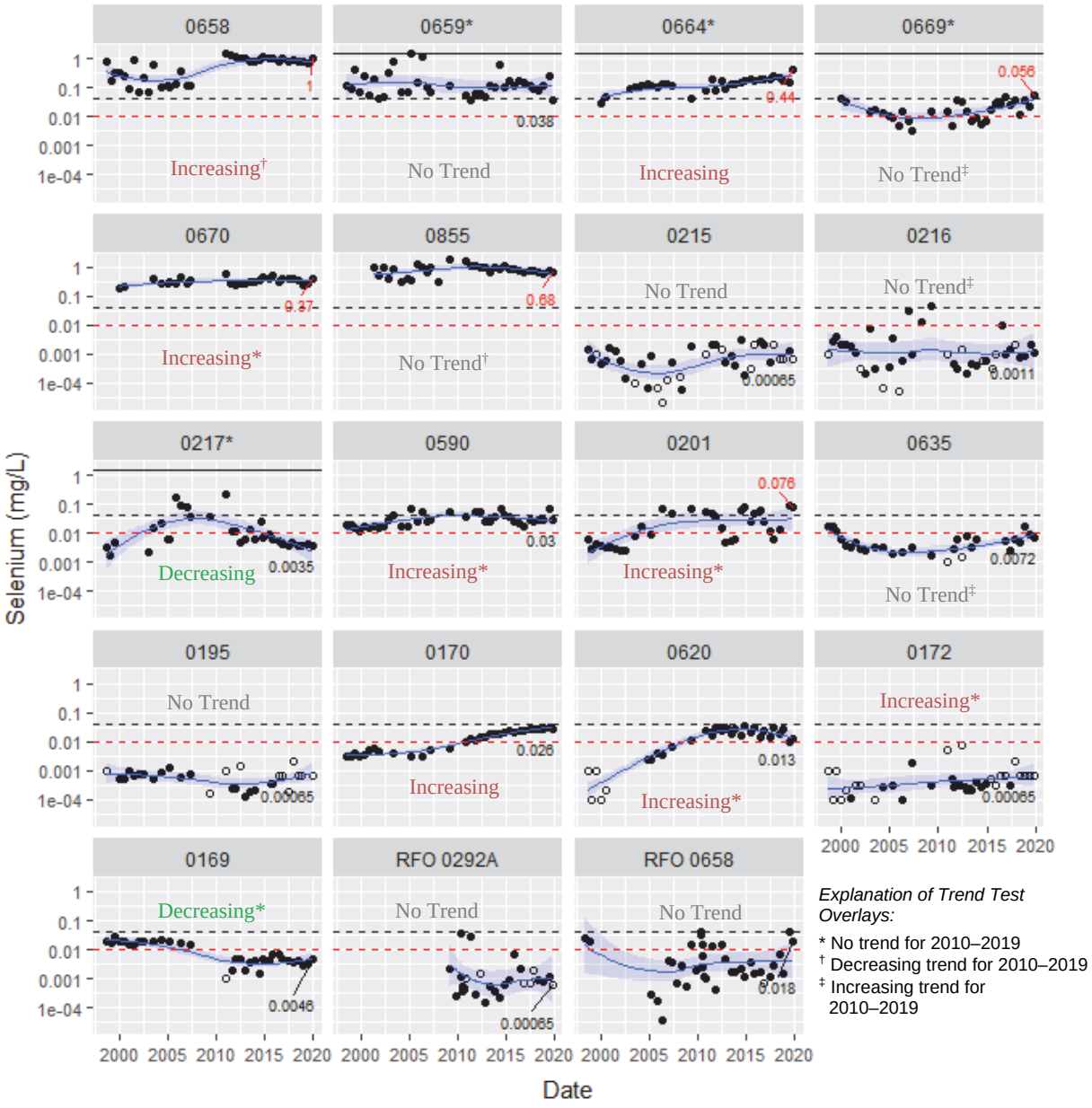
Ammonia

Ammonia is not a COC because it is not regulated under 40 CFR 192. However, it is addressed in this and previous reports because nitrate, which is a COC, was likely derived from ammonia at the site (DOE 2016). Ammonia concentrations have declined significantly in onsite wells since 1998 (Figure 26). The most recent (November 2019) results ranged from 0.43–39 mg/L; the highest levels were measured in wells 0658 and 0669. Across the monitoring network, ammonia concentrations are currently highest (40-130 mg/L) in adjacent downgradient wells east of the Roaring Fork ponds. Mann-Kendall trend tests indicate significant decreasing trends in all four of these wells. Farther downgradient, ammonia concentrations are less than 1 mg/L, mostly within the range of background levels listed in Table 2. Similar to trends found for uranium, molybdenum, and nitrate (Figure 14), ammonia levels in offsite well 0195 have declined markedly, from a maximum of 53 mg/L in 2003 to 0.091 mg/L in November 2019. Although ammonia concentrations in well 0170 increased significantly since 1998, levels have stabilized at about 1 mg/L in the last 5 years (Figure 26). Most results for farthest downgradient wells 0620 and 0172 have been below detection limit values.



Note: Because offsite well 0201 was dry at the time of the November 2018 sampling, the corresponding posted result (0.014 mg/L) is from the June 2018 sampling event.

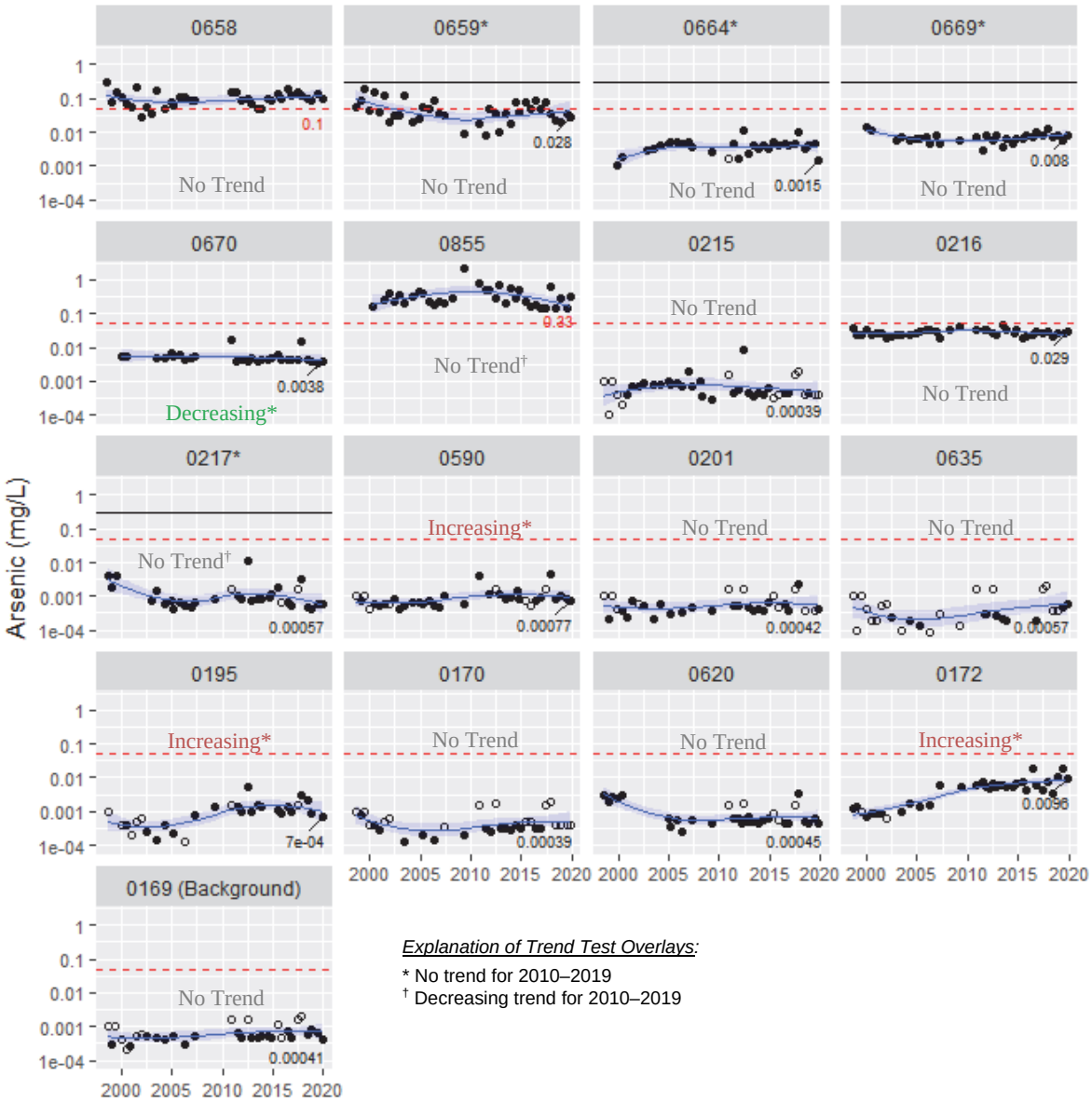
Figure 23. Selenium in November 2019 Groundwater and Surface Water Samples, New Rifle, Colorado, Processing Site



0659* Asterisk following well ID denotes proposed POC well (DOE 2016)
LOESS local regression line and 95% pointwise confidence interval
- - - 0.01 mg/L 40 CFR 192 MCL
- - - 0.05 mg/L SDWA MCL (historical benchmark)
—— 1.43 mg/L proposed ACL (POC wells only)
○ Analytical result below the detection limit
0.038 Most recent (November 2019) result ≤0.05 mg/L benchmark
1 Most recent result >0.05 mg/L benchmark

Notes:
Results are from 1998–2019. Wells are grouped and ordered as follows:
Rows 1 and 2 = onsite wells; row 3 = offsite adjacent wells; row 4 = farther downgradient offsite wells; row 5 = background wells. Plots are overlain with Mann-Kendall trend test results (Table 6; Appendix C).
A semilogarithmic scale is used because of the wide range in selenium concentrations across site wells.

Figure 24. Time-Concentration Plots of Selenium in New Rifle Site Monitoring Wells



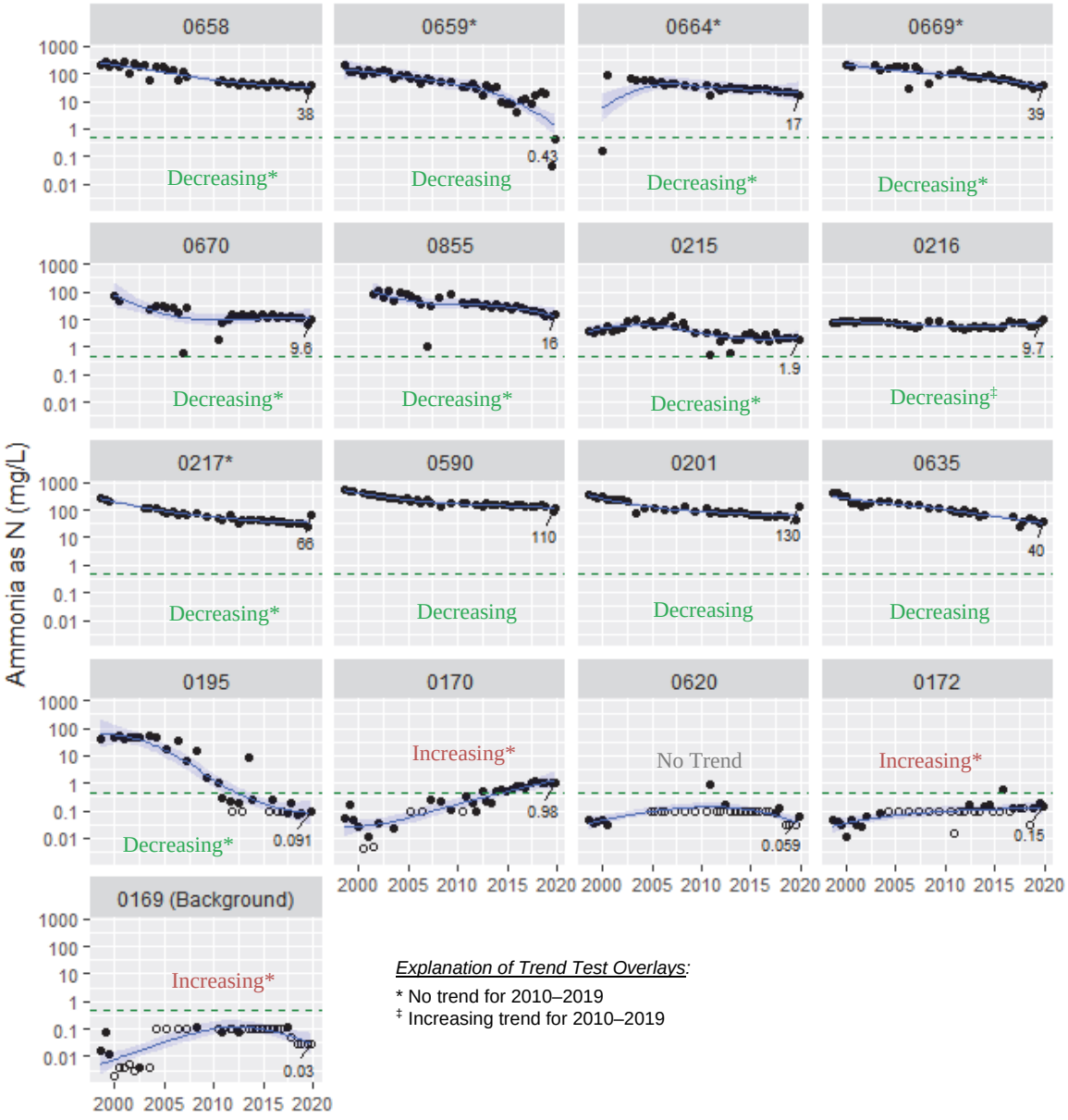
Explanation of Trend Test Overlays:

* No trend for 2010–2019
† Decreasing trend for 2010–2019

0659* Asterisk following well ID denotes proposed POC well (DOE 2016)
LOESS local regression line and 95% pointwise confidence interval
- - - 0.05 mg/L 40 CFR 192 MCL
—— 0.313 mg/L proposed ACL (POC wells only)
○ Analytical result below the detection limit
0.028 Most recent (November 2019) result ≤0.05 mg/L benchmark
0.1 Most recent (November 2019) result >0.05 mg/L benchmark

Notes:
Results are from 1998–2019. Wells are grouped and ordered as follows:
Rows 1 and 2 = onsite wells; row 3 = adjacent downgradient wells; row 4 = farther downgradient offsite wells; row 5 = New Rifle site background well (arsenic is not monitored in Old Rifle site wells).
A semilogarithmic scale is used because of the wide range in arsenic concentrations across site wells.
Plots are overlain with Mann-Kendall trend test results (Table 6; Appendix C).

Figure 25. Time-Concentration Plots of Arsenic in New Rifle Site Monitoring Wells



Explanation of Trend Test Overlays:

* No trend for 2010–2019

‡ Increasing trend for 2010–2019

0659* Asterisk following well ID denotes proposed POC well (DOE 2016)

LOESS local regression line and 95% pointwise confidence interval

0.5 mg/L maximum concentration in background wells (Table 2)

○ Analytical result below the detection limit

38 Most recent (November 2019) result

Notes:

Results are from 1998–2019. Wells are grouped and ordered as follows:
Rows 1 and 2 = onsite wells; row 3 = adjacent downgradient wells; row 4 = farther downgradient wells; row 5 = New Rifle site background well (ammonia is not monitored in Old Rifle site wells).
A semilogarithmic scale is used because of the wide range in ammonia (as N) concentrations across site wells.
Plots are overlain with Mann-Kendall trend test results (Table 6; Appendix C). For wells with a high proportion of nondetects, trend test results should be interpreted with caution.

Figure 26. Time-Concentration Plots of Ammonia in New Rifle Site Monitoring Wells

4.2.2 Mann-Kendall Trend Analysis

In the previous VMR (DOE 2014), Mann-Kendall trend tests were conducted for only a subset of New Rifle site monitoring wells: onsite wells 0664 and 0669 and offsite wells 0201 and 0195. This updated VMR has been augmented to evaluate trends for all wells. Similar to the approach used for the Old Rifle site, trend tests were initially run for the period 1998–2019, a fairly large dataset (n = 27–47) representing measurements collected since post-remediation monitoring began. For many well and analyte combinations, statistically significant (increasing or decreasing) trends were identified. However, as evident in the preceding time-concentration plot figures, although COC concentrations clearly decreased in some wells relative to baseline (1998–1999) conditions, trends appear to have stabilized more recently. Therefore, a second set of Mann-Kendall tests was run for the 2010–2019 time frame (n = 12–25). Table 6 provides a high-level summary of the Mann-Kendall trend tests run for all New Rifle site COCs and ammonia. Due to the number of wells and analytes, details of the Mann-Kendall test runs—including test statistics (S and Kendall's tau values) and p-values—are provided in Appendix C.

In Table 6, wells are grouped and ordered consistent with the categories used in the draft GCAP (DOE 2016) and in the preceding time-series data plots. Onsite wells are listed first, followed by adjacent downgradient wells and farther downgradient wells. Offsite wells are listed in general order of increasing distance from the site and former source areas. For each analyte, cross-references to corresponding time-concentration plots are provided to facilitate review.

Mann-Kendall trend test results for New Rifle site wells are somewhat difficult to summarize because in many cases trend directions or results identified based on the larger (1998–2019) dataset do not apply to the more recent (2010–2019) dataset. These cases are indicated by gold shading in Table 6. Of the 96 well and COC permutations evaluated for the approximate 20-year time frame (ammonia and background wells excluded), about 38% of the cases had decreasing trends and 46% had no trend. Only a small percentage (17%) had increasing trends. Alternatively, using the recent 2010–2019 dataset, the majority of wells (65%) have no trends, 27% had decreasing trends, and only 8% had increasing trends.

Table 6. Mann-Kendall Trend Test Results for New Rifle Site Monitoring Wells
Time Frame Evaluated: 1998–2019

	Uranium	Molybdenum	Nitrate	Vanadium	Selenium	Arsenic	Ammonia
40 CFR 192 MCL (mg/L)	0.044	0.1	10	–	0.01	0.05	–
Benchmark (mg/L)	0.067	0.1	10	0.33 / 0.086	0.05	0.05	–
ACL (mg/L)	0.364	7.3	75	52	1.43	0.313	–
Figure Cross-Reference	Figure 16	Figure 18	Figure 20	Figure 22	Figure 24	Figure 25	Figure 26
Onsite Wells							
0658	Decreasing	Decreasing*	No Trend	Increasing†	Increasing†	No Trend	Decreasing*
0659 (POC)	Decreasing*	Decreasing	Decreasing*	Decreasing*	No Trend	No Trend	Decreasing
0664 (POC)	Decreasing*	Decreasing*	No Trend	No Trend	Increasing	No Trend	Decreasing*
0669 (POC)	Decreasing	Decreasing	No Trend	No Trend	No Trend‡	No Trend	Decreasing*
0670	Decreasing*	Decreasing	No Trend	Decreasing*	Increasing*	Decreasing*	Decreasing*
0855	Decreasing*	Decreasing	No Trend	Decreasing	No Trend†	No Trend†	Decreasing*
0215	Increasing†	Decreasing*	No Trend	Increasing*	No Trend	No Trend	Decreasing*
0216	No Trend	No Trend	No Trend	Decreasing‡	No Trend‡	No Trend	Decreasing‡
Adjacent Downgradient Wells							
0217 (POC)	No Trend†	Decreasing	Decreasing	No Trend	Decreasing	No Trend†	Decreasing*
0590	No Trend	Decreasing*	Decreasing*	Increasing*	Increasing*	Increasing*	Decreasing
0201	No Trend	Decreasing	Decreasing	No Trend	Increasing*	No Trend	Decreasing
0635	Decreasing	Decreasing*	Decreasing	No Trend	No Trend‡	No Trend	Decreasing
Downgradient Wells							
0195	Decreasing*	Decreasing	Decreasing	No Trend	No Trend	Increasing*	Decreasing*
0170	No Trend‡	Decreasing	Decreasing*	No Trend	Increasing	No Trend	Increasing*
0620	No Trend	Decreasing*	No Trend†	Increasing*	Increasing*	No Trend	No Trend
0172	Decreasing	No Trend‡	No Trend	No Trend	Increasing*	Increasing*	Increasing*
Background Wells							
RFN 0169	Decreasing*	Decreasing	Decreasing*	No Trend	Decreasing*	No Trend	Increasing*
RFO 0292A	No Trend	–	No Trend	No Trend	No Trend	–	–
RFO 0658	Decreasing	–	No Trend	No Trend	No Trend	–	–

Significant increasing trend based on Mann-Kendall test for both 1998–2019 and 2010–2019 time frames.
Significant decreasing trend based on Mann-Kendall test for both 1998–2019 and 2010–2019 time frames.
Mann-Kendall trend test results for 2010–2019 time frame differ from those listed above for 1998–2019, as follows:

* No trend indicated using only data from 2010–2019
† Decreasing trend indicated using only data from 2010–2019
‡ Increasing trend indicated using only data from 2010–2019

Notes:
Benchmarks and ACLs listed above are from Table 2.
Trend tests were run using the "Kendall" package in R, version 2.2 (McLeod 2011).
Detailed test statistics for both 1998–2019 and 2010–2019 test runs are provided in Appendix C (significance level = 0.05).

Abbreviations:
– = Not established or insufficient data to evaluate
RFN = New Rifle site well
RFO = Old Rifle site well

4.3 Surface Water Monitoring Results

The primary surface water features at or near the New Rifle site include the Colorado River, the Roaring Fork gravel ponds, and the mitigation wetland. This section includes a brief summary of contaminant trends measured at these locations. A more detailed discussion, including an evaluation of potential ecological risks, is provided in the most recent GCAP (DOE 2016).

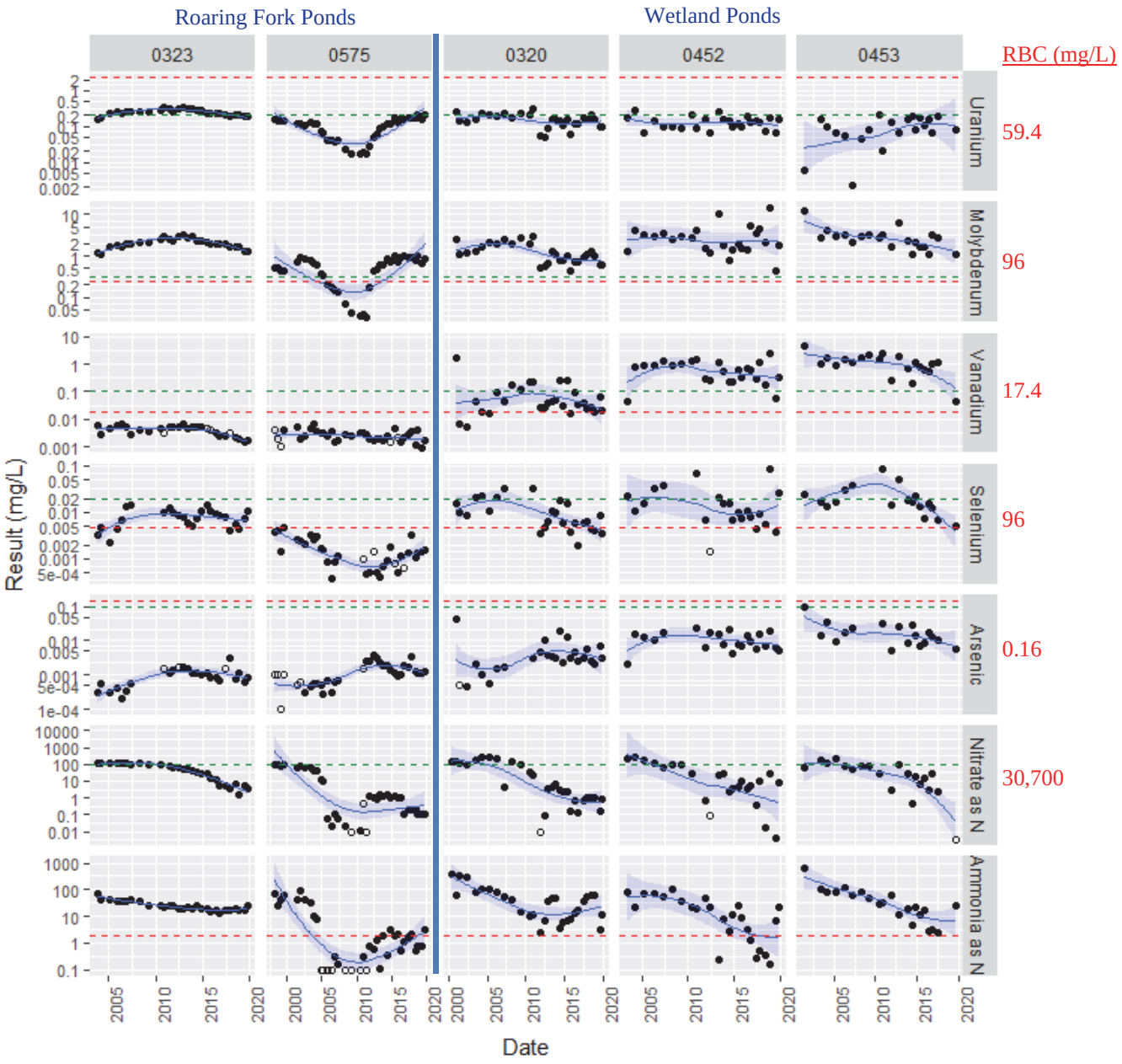
4.3.1 Roaring Fork Gravel Ponds and Wetland Areas

Figure 27 shows time-concentration plots of all COCs and ammonia for New Rifle site pond locations. Locations 0323 and 0575 are in the Roaring Fork gravel ponds, while locations 0320, 0452, and 0453 are in the reconstructed wetland. There is no regular land use of these areas other than the monitoring conducted by LM; much of the area is heavily vegetated. Water is only continuously present at locations 0323, the former East Roaring Fork Pond, and 0575, the former West Roaring Fork Pond. Water is usually present at wetland location 0320, but it does dry up occasionally during periods of very low Colorado River flows. Wetland locations 0452 and 0453 dry up more frequently, again during low-water periods in the river. The higher concentrations of some COCs—arsenic, molybdenum, selenium, and vanadium—at these two "temporary" locations, evident in Figure 27, have been attributed to evaporation effects (DOE 2016).

This discussion begins with an evaluation of monitoring data for the Roaring Fork ponds (locations 0323 and 0575) because they were proposed as POE locations in the draft GCAP. These large gravel ponds are essentially permanent features, although the eastern pond (0323) can lose a significant volume of water during dry periods (DOE 2016). The latter may explain why COC concentrations generally have been higher at this location than at the western pond (0575). To provide a context for interpreting results, data plotted in Figure 27 are shown relative to agricultural standards and aquatic benchmarks established in the draft GCAP. RBCs corresponding to a recreational swimming scenario were also derived.[8] These values are shown to the right of the time-series plots in Figure 27 because in most cases they are much greater than the scale of the plots.

The only COCs currently exceeding one or both benchmarks in the Roaring Fork ponds are molybdenum and selenium, for which the most recent (2019) results were 1.3 mg/L and 0.011 mg/L, respectively. These most recent results are 1 to 3 orders of magnitude lower than corresponding RBCs of 96 mg/L. Uranium concentrations have been comparable to (sometimes just slightly exceeding) the 0.2 mg/L agricultural standard but have always been well below the corresponding aquatic benchmark (2.4 mg/L). Restrictions have been placed on use of surface water and groundwater for agricultural purposes, so that pathway is incomplete. Current uranium levels in the pond (about 0.2 mg/L) are well below the 59 mg/L RBC derived for a recreational (swimming) scenario.

[8]As indicated in Section 2.5.1 (human health risk evaluation) of the draft GCAP (DOE 2016), it was assumed that children (the most sensitive receptors) could have access to the Roaring Fork ponds and would regularly swim in those ponds during summer months. The ponds are not known to be used for swimming; however, values for exposure parameters were chosen to provide conservative estimates of risk.



LOESS local regression line and 95% pointwise confidence interval

Analytical result below the detection limit

Agricultural standard from Table 4 (Ecological Risk Screening Table) of the draft GCAP (DOE 2016):
uranium = 0.2 mg/L, molybdenum = 0.3 mg/L, vanadium = 0.1 mg/L, selenium = 0.02 mg/L, arsenic = 0.1 mg/L, nitrate + nitrate as N = 100 mg/L

Aquatic benchmark from Table 4 of the draft GCAP (DOE 2016). Where ranges are cited, lower bound values are used:
uranium = 2.4 mg/L, molybdenum = 0.24 mg/L, vanadium = 0.019 mg/L, selenium = 0.0046 mg/L, arsenic = 0.15 mg/L, ammonia (total) as N = 2 mg/L

Note:
RBCs derived for a conservative recreational (swimming) scenario are shown in the right-hand margin because in most cases the RBCs are greater than the scale of the plots. RBC derivation is described in detail in the draft GCAP (DOE 2016).

Figure 27. Time-Concentration Plots of COCs and Ammonia in New Rifle Site Pond Samples

Levels of vanadium and arsenic have consistently been below both agricultural and aquatic benchmarks, as well as corresponding RBCs (Figure 27). Although nitrate concentrations in the gravel ponds have at times slightly exceeded the 100 mg/L agricultural benchmark, levels are now much lower. Although not a COC, ammonia concentrations have consistently exceeded the 2 mg/L aquatic benchmark at location 0323; levels have been stable at about 15–25 mg/L for the last 10 years.

In summary, although the Roaring Fork ponds have been a focus in recent reviews of the draft GCAP (e.g., Saxton 2019; Saxton 2020), analysis of historical monitoring data in tandem with the comprehensive risk evaluations developed in support of the draft GCAP indicate that potential exposures to contaminants in the Roaring Fork ponds—assuming those pathways are complete— are unlikely to pose any potential risk that would warrant additional controls or restrictions.

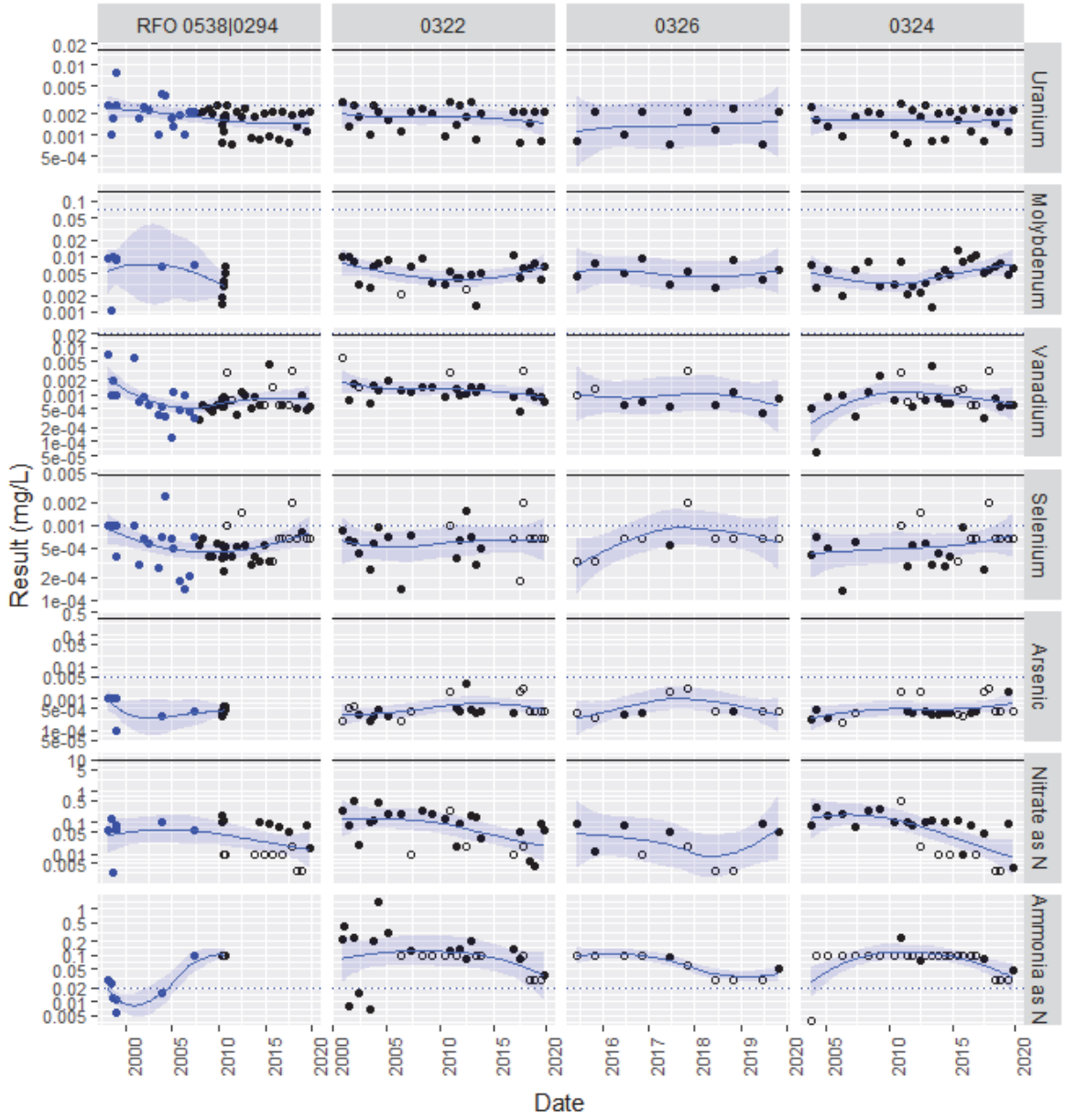
Higher concentrations of most COCs—molybdenum, vanadium, selenium, arsenic, and ammonia—are found in the wetland ponds. However, except for nitrate and ammonia, for which downward trends are apparent, no pronounced trends are evident. These higher levels are likely caused, in part, by evaporation of pond waters, which tends to concentrate the dissolved constituents.

4.3.2 Colorado River Water Quality Monitoring

The Colorado River forms the southern boundary of the New Rifle site and is the dominant surface water feature, ultimately receiving most of the surface drainage from the New Rifle site. Precipitation falling on the site drains directly into the river and into the mitigation wetland ponds south of the site. The river also receives groundwater discharge from the alluvial aquifer along the southern portion of the site. Although this east-west-trending reach of the Colorado River is mostly a site of groundwater discharge, some surface water probably seeps into the groundwater system (i.e., recharges the aquifer) throughout each year (DOE 2016).

Concentrations at locations 0322 and 0324, in the Colorado River, were indistinguishable from background. A relatively new location—0326, between 0322 and 0324—was established in 2010 (Figure 3). The Colorado River in the site vicinity is classified for agricultural, recreational, and water supply uses.[9] As illustrated in Figure 28, the river water in the site vicinity does not exceed, nor has it exceeded, any of these standards, nor—with few exceptions—has it exceeded background surface water quality based on measurements from Old Rifle site upgradient locations 0294 (and former 0538).

[9] Applicable segment is COLCLC02A: Mainstem of the Colorado River from immediately below the confluence with Rifle Creek to immediately above the confluence of Rapid Creek, designated as Aquatic Cold Warm 1 (Volume 5 *Code of Colorado Regulations* Section 1002-37 [5 CCR 1002-37]). Although the aquatic life designation differs from that assigned to the river segment adjacent to the Old Rifle site (COLCLCO1, Aquatic Life Cold 1), surface water quality standards are essentially the same.



Note:
Monitoring of background Colorado River location 0294 began in November 2007. Data from the previous background river location—0538 (blue symbol above), roughly 0.5 mile upstream of location 0294—are also shown (denoted by blue symbol).

Figure 28. Historical COC Concentrations in Colorado River Water Samples, New Rifle Site

4.4 Institutional Controls Monitoring

A comprehensive ICs program has been implemented to prevent future use of contaminated groundwater associated with the New Rifle processing site. The ICs program consists of several enforceable mechanisms that can be combined into four types of administrative categories, described in Section 1.3.2.

To verify that the described ICs are being maintained, DOE conducts regular inspections and holds discussions with City of Rifle staff and other affected parties. As with the quitclaim deed verification, DOE accomplishes this by (1) discussions with City officials about construction projects and possible incursions of groundwater that could result from these activities, (2) physical inspection of the site by State of Colorado or DOE staff (or both), usually during the annual Rifle disposal site inspection, and (3) observations during groundwater sampling activities at other times of the year.

5.0 Summary and Conclusions

Verification monitoring in 2019 at the Old and New Rifle sites entailed routine semiannual sampling of groundwater and surface water and monitoring of ICs. Monitoring results continue to indicate that milling-related contamination persists at the sites.

Uranium is the most prevalent mill-related contaminant occurring in alluvial groundwater at the Old Rifle site. Concentrations continue to exceed the UMTRCA standard of 0.044 mg/L in five of the six onsite monitoring wells. Mann-Kendall trend tests of data collected since 2010 indicate no trending in four of the wells and an increasing uranium trend in one well (0656). In contrast to uranium, selenium and vanadium concentrations have exceeded relevant benchmarks in only two wells (0305 and 0655) coinciding with the former tailings area.

At the New Rifle site, uranium, molybdenum, and vanadium receive the most focus because of their magnitude and spatial extent. Although levels of these three constituents have generally decreased across the monitoring network (at times significantly), they are still elevated relative to corresponding benchmarks in most onsite and adjacent downgradient wells. For example, uranium concentrations exceed the 0.044 mg/L UMTRCA standard in 10 of the 16 monitoring wells (excluding background) as far downgradient as well 0620. Exceptions are onsite wells 0215 and 0216, where mixing with river water occurs. While molybdenum concentrations exceed the 0.1 mg/L benchmark in all adjacent downgradient wells east of the Roaring Fork ponds, elevated vanadium in offsite wells is limited to wells 0217 and 0590. Levels of both constituents have been consistently low and stable, however, in the farthest downgradient wells.

Nitrate currently exceeds the 10 mg/L benchmark in only four monitoring wells (three are downgradient), in most cases only slightly. Selenium concentrations exceed the 0.05 mg/L SDWA benchmark in five of the eight onsite wells but in only one adjacent downgradient well (0201). Except for three onsite wells, arsenic concentrations have generally been stable and below the 0.05 mg/L benchmark across the monitoring network. Although ammonia is not a COC, it is monitored at the New Rifle site because of its association with nitrate and historically elevated concentrations relative to background. Ammonia concentrations are currently highest (40–130 mg/L) in adjacent downgradient wells.

Surface water quality of the Colorado River, a POE at both the Old and New Rifle sites, remains unaffected by groundwater discharge from either site. Constituent concentrations in river samples adjacent to and downstream of both sites have been similar to or lower than those in background (upstream) samples.

In addition to the Colorado River, other surface water features at or near the New Rifle site include the Roaring Fork gravel ponds and the mitigation wetland. Because water is continuously present only in the Roaring Fork ponds (and not in the mitigation wetland), these sampling sites (0323 and 0575) were proposed as POE locations in the draft GCAP. The only COCs currently exceeding agricultural or aquatic benchmarks in the ponds are molybdenum and selenium. However, the most recent results are 1 to 3 orders of magnitude lower than corresponding RBCs derived for a recreational swimming scenario (96 mg/L). Uranium concentrations in the ponds have been comparable to the 0.2 mg/L agricultural standard but have always been well below the corresponding aquatic benchmark (2.4 mg/L) and the 59 mg/L RBC.

In summary, potential exposures to contaminants in the Roaring Fork ponds—assuming those pathways are complete—are unlikely to pose any potential risk that would warrant additional controls or restrictions. Restrictions have been placed on use of the surface water and groundwater for agricultural purposes, so that pathway is incomplete.

At both the Old and New Rifle sites, multiple ICs are in place to prevent domestic use of groundwater and to ensure protection of human health and the environment. Three rigorous ICs—a zone overlay, a quitclaim deed, and an EC—are in place at the Old Rifle site. These overlapping measures restrict a number of activities at the site and limit access to the subsurface and groundwater without written permission from CDPHE and DOE.

At the New Rifle site, DOE, CDPHE, the City of Rifle, and Garfield County have enacted a series of four ICs to prevent humans and livestock from being exposed to site-related contaminants on the former mill site and on downgradient properties. These controls consist of a quitclaim deed on the site proper, a large zone overlay to restrict consumption of contaminated groundwater, an EC to limit access to groundwater and to prevent livestock from accessing water in former gravel ponds, and an overlay zone district that further limits activities on the former mill site.

LM will continue to work closely with CDPHE, as well as City and County officials, to maintain successful implementation of ICs and to ensure protection of human health and the environment. Semiannual verification monitoring of groundwater and surface water at the Old and New Rifle sites will also continue, and be documented in annual VMRs, pending regulatory concurrence on the corresponding draft GCAPs.

6.0 References

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Appendix A

Groundwater and Surface Water Monitoring Results for Calendar Year 2019

Old Rifle Processing Site

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GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:29:55 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Alkalinity, Total (As CaCO3)													
Alkalinity, Total (As CaCO3)	0292A	WL	6/25/2019	(N)F			514	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0292A	WL	11/7/2019	(N)F			490	mg/L				-	-
Alkalinity, Total (As CaCO3)	0304	WL	6/25/2019	(N)F			238	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0304	WL	11/7/2019	(N)F			347	mg/L				-	-
Alkalinity, Total (As CaCO3)	0305	WL	6/25/2019	(N)F			375	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0305	WL	11/7/2019	(N)F			320	mg/L				-	-
Alkalinity, Total (As CaCO3)	0309	WL	6/25/2019	(N)F			416	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0309	WL	11/7/2019	(N)F			384	mg/L				-	-
Alkalinity, Total (As CaCO3)	0310	WL	6/25/2019	(N)F			403	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0310	WL	11/7/2019	(N)F			433.333	mg/L				-	-
Alkalinity, Total (As CaCO3)	0655	WL	6/25/2019	(N)F			432	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0655	WL	11/7/2019	(N)F			427	mg/L				-	-
Alkalinity, Total (As CaCO3)	0656	WL	6/25/2019	(N)F			296	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0656	WL	11/7/2019	(N)F			342	mg/L				-	-
Alkalinity, Total (As CaCO3)	0658	WL	6/25/2019	(N)F			420	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0658	WL	11/7/2019	(N)F			483	mg/L				-	-
Calcium													
Calcium	0292A	WL	6/25/2019	(T)F			220	mg/L		F	#	0.21	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:29:55 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Calcium	0292A	WL	11/7/2019	(T)F			190	mg/L				0.21	-
Calcium	0304	WL	6/25/2019	(T)F			270	mg/L		F	#	0.21	-
Calcium	0304	WL	11/7/2019	(T)F			210	mg/L				0.21	-
Calcium	0305	WL	6/25/2019	(T)F			260	mg/L		F	#	0.21	-
Calcium	0305	WL	11/7/2019	(T)D			180	mg/L				0.21	-
Calcium	0305	WL	11/7/2019	(T)F			180	mg/L				0.21	-
Calcium	0309	WL	6/25/2019	(T)F			200	mg/L		F	#	0.21	-
Calcium	0309	WL	11/7/2019	(T)F			180	mg/L				0.21	-
Calcium	0310	WL	6/25/2019	(T)F			120	mg/L		F	#	0.21	-
Calcium	0310	WL	11/7/2019	(T)F			170	mg/L				0.21	-
Calcium	0655	WL	6/25/2019	(T)F			190	mg/L		F	#	0.21	-
Calcium	0655	WL	11/7/2019	(T)F			190	mg/L				0.21	-
Calcium	0656	WL	6/25/2019	(T)F			160	mg/L		F	#	0.21	-
Calcium	0656	WL	6/25/2019	(T)D			160	mg/L		F	#	0.21	-
Calcium	0656	WL	11/7/2019	(T)F			180	mg/L				0.21	-
Calcium	0658	WL	6/25/2019	(T)F			160	mg/L		F	#	0.21	-
Calcium	0658	WL	11/7/2019	(T)F			150	mg/L				0.21	-
Chloride													
Chloride	0292A	WL	6/25/2019	(N)F			190	mg/L		F	#	3	-
Chloride	0292A	WL	11/7/2019	(N)F			140	mg/L				6.1	-
Chloride	0304	WL	6/25/2019	(N)F			230	mg/L		F	#	3	-
Chloride	0304	WL	11/7/2019	(N)F			160	mg/L				6.1	-
Chloride	0305	WL	6/25/2019	(N)F			350	mg/L		F	#	3	-
Chloride	0305	WL	11/7/2019	(N)D			240	mg/L				6.1	-
Chloride	0305	WL	11/7/2019	(N)F			230	mg/L				6.1	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:29:55 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Chloride	0309	WL	6/25/2019	(N)F			150	mg/L		F	#	3	-
Chloride	0309	WL	11/7/2019	(N)F			160	mg/L				6.1	-
Chloride	0310	WL	6/25/2019	(N)F			150	mg/L		F	#	1.2	-
Chloride	0310	WL	11/7/2019	(N)F			260	mg/L				6.1	-
Chloride	0655	WL	6/25/2019	(N)F			210	mg/L		F	#	3	-
Chloride	0655	WL	11/7/2019	(N)F			250	mg/L				12	-
Chloride	0656	WL	6/25/2019	(N)F			940	mg/L		F	#	3	-
Chloride	0656	WL	6/25/2019	(N)D			930	mg/L		F	#	3	-
Chloride	0656	WL	11/7/2019	(N)F			450	mg/L				12	-
Chloride	0658	WL	6/25/2019	(N)F			42	mg/L		F	#	1.2	-
Chloride	0658	WL	11/7/2019	(N)F			45	mg/L				3	-
Magnesium													
Magnesium	0292A	WL	6/25/2019	(T)F			130	mg/L		F	#	0.089	-
Magnesium	0292A	WL	11/7/2019	(T)F			110	mg/L				0.089	-
Magnesium	0304	WL	6/25/2019	(T)F			87	mg/L		F	#	0.089	-
Magnesium	0304	WL	11/7/2019	(T)F			82	mg/L				0.089	-
Magnesium	0305	WL	6/25/2019	(T)F			100	mg/L		F	#	0.089	-
Magnesium	0305	WL	11/7/2019	(T)D			75	mg/L				0.089	-
Magnesium	0305	WL	11/7/2019	(T)F			76	mg/L				0.089	-
Magnesium	0309	WL	6/25/2019	(T)F			140	mg/L		F	#	0.089	-
Magnesium	0309	WL	11/7/2019	(T)F			120	mg/L				0.089	-
Magnesium	0310	WL	6/25/2019	(T)F			57	mg/L		F	#	0.089	-
Magnesium	0310	WL	11/7/2019	(T)F			84	mg/L				0.089	-
Magnesium	0655	WL	6/25/2019	(T)F			120	mg/L		F	#	0.089	-
Magnesium	0655	WL	11/7/2019	(T)F			130	mg/L				0.089	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:29:55 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Magnesium	0656	WL	6/25/2019	(T)F			75	mg/L		F	#	0.089	-
Magnesium	0656	WL	6/25/2019	(T)D			74	mg/L		F	#	0.089	-
Magnesium	0656	WL	11/7/2019	(T)F			89	mg/L				0.089	-
Magnesium	0658	WL	6/25/2019	(T)F			83	mg/L		F	#	0.089	-
Magnesium	0658	WL	11/7/2019	(T)F			77	mg/L				0.089	-
Nitrate + Nitrite as Nitrogen													
Nitrate + Nitrite as Nitrogen	0292A	WL	6/25/2019	(N)F			0.03	mg/L	U	F	#	0.03	-
Nitrate + Nitrite as Nitrogen	0292A	WL	11/7/2019	(N)F			0.15	mg/L	U			0.15	-
Nitrate + Nitrite as Nitrogen	0304	WL	6/25/2019	(N)F			0.03	mg/L	U	F	#	0.03	-
Nitrate + Nitrite as Nitrogen	0304	WL	11/7/2019	(N)F			0.15	mg/L	U			0.15	-
Nitrate + Nitrite as Nitrogen	0305	WL	6/25/2019	(N)F			0.003	mg/L	U	F	#	0.003	-
Nitrate + Nitrite as Nitrogen	0305	WL	11/7/2019	(N)D			0.003	mg/L	U			0.003	-
Nitrate + Nitrite as Nitrogen	0305	WL	11/7/2019	(N)F			0.003	mg/L	U			0.003	-
Nitrate + Nitrite as Nitrogen	0309	WL	6/25/2019	(N)F			0.03	mg/L	U	F	#	0.03	-
Nitrate + Nitrite as Nitrogen	0309	WL	11/7/2019	(N)F			0.15	mg/L	U			0.15	-
Nitrate + Nitrite as Nitrogen	0310	WL	6/25/2019	(N)F			0.03	mg/L	U	F	#	0.03	-
Nitrate + Nitrite as Nitrogen	0310	WL	11/7/2019	(N)F			0.15	mg/L	U			0.15	-
Nitrate + Nitrite as Nitrogen	0655	WL	6/25/2019	(N)F			0.56	mg/L		F	#	0.003	-
Nitrate + Nitrite as Nitrogen	0655	WL	11/7/2019	(N)F			2	mg/L				0.3	-
Nitrate + Nitrite as Nitrogen	0656	WL	6/25/2019	(N)F			0.62	mg/L		F	#	0.003	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

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PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Nitrate + Nitrite as Nitrogen	0656	WL	6/25/2019	(N)D			0.62	mg/L		F	#	0.003	-
Nitrate + Nitrite as Nitrogen	0656	WL	11/7/2019	(N)F			0.016	mg/L				0.003	-
Nitrate + Nitrite as Nitrogen	0658	WL	6/25/2019	(N)F			2.7	mg/L		F	#	0.015	-
Nitrate + Nitrite as Nitrogen	0658	WL	11/7/2019	(N)F			0.17	mg/L				0.003	-
Oxidation Reduction Potential													
Oxidation Reduction Potential	0292A	WL	6/25/2019	(N)F			91.1	mV		F	#	-	-
Oxidation Reduction Potential	0292A	WL	11/7/2019	(N)F			91.3	mV				-	-
Oxidation Reduction Potential	0304	WL	6/25/2019	(N)F			41.3	mV		F	#	-	-
Oxidation Reduction Potential	0304	WL	11/7/2019	(N)F			115.7	mV				-	-
Oxidation Reduction Potential	0305	WL	6/25/2019	(N)F			86.7	mV		F	#	-	-
Oxidation Reduction Potential	0305	WL	11/7/2019	(N)F			160.1	mV				-	-
Oxidation Reduction Potential	0309	WL	6/25/2019	(N)F			7.9	mV		F	#	-	-
Oxidation Reduction Potential	0309	WL	11/7/2019	(N)F			74.5	mV				-	-
Oxidation Reduction Potential	0310	WL	6/25/2019	(N)F			-16.7	mV		F	#	-	-
Oxidation Reduction Potential	0310	WL	11/7/2019	(N)F			34.5	mV				-	-
Oxidation Reduction Potential	0655	WL	6/25/2019	(N)F			106.5	mV		F	#	-	-
Oxidation Reduction Potential	0655	WL	11/7/2019	(N)F			173.4	mV				-	-
Oxidation Reduction Potential	0656	WL	6/25/2019	(N)F			93.5	mV		F	#	-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:29:55 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Oxidation Reduction Potential	0656	WL	11/7/2019	(N)F			71.2	mV				-	-
Oxidation Reduction Potential	0658	WL	6/25/2019	(N)F			85.1	mV		F	#	-	-
Oxidation Reduction Potential	0658	WL	11/7/2019	(N)F			99.2	mV				-	-
pH													
pH	0292A	WL	6/25/2019	(N)F			6.91	s.u.		F	#	-	-
pH	0292A	WL	11/7/2019	(N)F			7.3	s.u.				-	-
pH	0304	WL	6/25/2019	(N)F			7.04	s.u.		F	#	-	-
pH	0304	WL	11/7/2019	(N)F			7.32	s.u.				-	-
pH	0305	WL	6/25/2019	(N)F			6.94	s.u.		F	#	-	-
pH	0305	WL	11/7/2019	(N)F			7.28	s.u.				-	-
pH	0309	WL	6/25/2019	(N)F			6.98	s.u.		F	#	-	-
pH	0309	WL	11/7/2019	(N)F			7.38	s.u.				-	-
pH	0310	WL	6/25/2019	(N)F			7.06	s.u.		F	#	-	-
pH	0310	WL	11/7/2019	(N)F			7.42	s.u.				-	-
pH	0655	WL	6/25/2019	(N)F			6.94	s.u.		F	#	-	-
pH	0655	WL	11/7/2019	(N)F			7.2	s.u.				-	-
pH	0656	WL	6/25/2019	(N)F			7.16	s.u.		F	#	-	-
pH	0656	WL	11/7/2019	(N)F			7.32	s.u.				-	-
pH	0658	WL	6/25/2019	(N)F			6.93	s.u.		F	#	-	-
pH	0658	WL	11/7/2019	(N)F			7.32	s.u.				-	-
Potassium													
Potassium	0292A	WL	6/25/2019	(T)F			12	mg/L		F	#	0.13	-
Potassium	0292A	WL	11/7/2019	(T)F			11	mg/L				0.13	-
Potassium	0304	WL	6/25/2019	(T)F			11	mg/L		F	#	0.13	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:29:55 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Potassium	0304	WL	11/7/2019	(T)F			9.1	mg/L				0.13	-
Potassium	0305	WL	6/25/2019	(T)F			11	mg/L		F	#	0.13	-
Potassium	0305	WL	11/7/2019	(T)D			9.8	mg/L				0.13	-
Potassium	0305	WL	11/7/2019	(T)F			9.9	mg/L				0.13	-
Potassium	0309	WL	6/25/2019	(T)F			11	mg/L		F	#	0.13	-
Potassium	0309	WL	11/7/2019	(T)F			12	mg/L				0.13	-
Potassium	0310	WL	6/25/2019	(T)F			12	mg/L		F	#	0.13	-
Potassium	0310	WL	11/7/2019	(T)F			15	mg/L				0.13	-
Potassium	0655	WL	6/25/2019	(T)F			13	mg/L		F	#	0.13	-
Potassium	0655	WL	11/7/2019	(T)F			15	mg/L				0.13	-
Potassium	0656	WL	6/25/2019	(T)F			19	mg/L		F	#	0.13	-
Potassium	0656	WL	6/25/2019	(T)D			19	mg/L		F	#	0.13	-
Potassium	0656	WL	11/7/2019	(T)F			20	mg/L				0.13	-
Potassium	0658	WL	6/25/2019	(T)F			5.2	mg/L		F	#	0.13	-
Potassium	0658	WL	11/7/2019	(T)F			4.9	mg/L				0.13	-
Selenium													
Selenium	0292A	WL	6/25/2019	(T)F			0.0011	mg/L	J	F	#	0.00065	-
Selenium	0292A	WL	11/7/2019	(T)F			0.00065	mg/L	U			0.00065	-
Selenium	0304	WL	6/25/2019	(T)F			0.0012	mg/L	J	F	#	0.00065	-
Selenium	0304	WL	11/7/2019	(T)F			0.0012	mg/L	J			0.00065	-
Selenium	0305	WL	6/25/2019	(T)F			0.01	mg/L		F	#	0.00065	-
Selenium	0305	WL	11/7/2019	(T)D			0.012	mg/L				0.00065	-
Selenium	0305	WL	11/7/2019	(T)F			0.011	mg/L				0.00065	-
Selenium	0309	WL	6/25/2019	(T)F			0.00065	mg/L	U	F	#	0.00065	-
Selenium	0309	WL	11/7/2019	(T)F			0.00065	mg/L	U			0.00065	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

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PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Selenium	0310	WL	6/25/2019	(T)F			0.00065	mg/L	U	F	#	0.00065	-
Selenium	0310	WL	11/7/2019	(T)F			0.00065	mg/L	U			0.00065	-
Selenium	0655	WL	6/25/2019	(T)F			0.064	mg/L		F	#	0.00065	-
Selenium	0655	WL	11/7/2019	(T)F			0.067	mg/L				0.00065	-
Selenium	0656	WL	6/25/2019	(T)F			0.0029	mg/L	J	F	#	0.00065	-
Selenium	0656	WL	6/25/2019	(T)D			0.0028	mg/L	J	F	#	0.00065	-
Selenium	0656	WL	11/7/2019	(T)F			0.0018	mg/L	J			0.00065	-
Selenium	0658	WL	6/25/2019	(T)F			0.039	mg/L		F	#	0.00065	-
Selenium	0658	WL	11/7/2019	(T)F			0.018	mg/L				0.00065	-
Sodium													
Sodium	0292A	WL	6/25/2019	(T)F			280	mg/L		F	#	0.38	-
Sodium	0292A	WL	11/7/2019	(T)F			260	mg/L				0.38	-
Sodium	0304	WL	6/25/2019	(T)F			170	mg/L		F	#	0.38	-
Sodium	0304	WL	11/7/2019	(T)F			190	mg/L				0.38	-
Sodium	0305	WL	6/25/2019	(T)F			240	mg/L		F	#	0.38	-
Sodium	0305	WL	11/7/2019	(T)D			230	mg/L				0.38	-
Sodium	0305	WL	11/7/2019	(T)F			230	mg/L				0.38	-
Sodium	0309	WL	6/25/2019	(T)F			200	mg/L		F	#	0.38	-
Sodium	0309	WL	11/7/2019	(T)F			240	mg/L				0.38	-
Sodium	0310	WL	6/25/2019	(T)F			210	mg/L		F	#	0.38	-
Sodium	0310	WL	11/7/2019	(T)F			260	mg/L				0.38	-
Sodium	0655	WL	6/25/2019	(T)F			240	mg/L		F	#	0.38	-
Sodium	0655	WL	11/7/2019	(T)F			280	mg/L				0.38	-
Sodium	0656	WL	6/25/2019	(T)F			480	mg/L		F	#	0.38	-
Sodium	0656	WL	6/25/2019	(T)D			480	mg/L		F	#	0.38	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

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PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Sodium	0656	WL	11/7/2019	(T)F			330	mg/L				0.38	-
Sodium	0658	WL	6/25/2019	(T)F			94	mg/L		F	#	0.038	-
Sodium	0658	WL	11/7/2019	(T)F			90	mg/L				0.038	-
Specific Conductance													
Specific Conductance	0292A	WL	6/25/2019	(N)F			2981	umhos/cm		F	#	-	-
Specific Conductance	0292A	WL	11/7/2019	(N)F			2639	umhos/cm				-	-
Specific Conductance	0304	WL	6/25/2019	(N)F			2350	umhos/cm		F	#	-	-
Specific Conductance	0304	WL	11/7/2019	(N)F			2221	umhos/cm				-	-
Specific Conductance	0305	WL	6/25/2019	(N)F			2881	umhos/cm		F	#	-	-
Specific Conductance	0305	WL	11/7/2019	(N)F			2356	umhos/cm				-	-
Specific Conductance	0309	WL	6/25/2019	(N)F			2523	umhos/cm		F	#	-	-
Specific Conductance	0309	WL	11/7/2019	(N)F			2572	umhos/cm				-	-
Specific Conductance	0310	WL	6/25/2019	(N)F			1848	umhos/cm		F	#	-	-
Specific Conductance	0310	WL	11/7/2019	(N)F			2462	umhos/cm				-	-
Specific Conductance	0655	WL	6/25/2019	(N)F			2573	umhos/cm		F	#	-	-
Specific Conductance	0655	WL	11/7/2019	(N)F			2898	umhos/cm				-	-
Specific Conductance	0656	WL	6/25/2019	(N)F			3966	umhos/cm		F	#	-	-
Specific Conductance	0656	WL	11/7/2019	(N)F			3002	umhos/cm				-	-
Specific Conductance	0658	WL	6/25/2019	(N)F			1683	umhos/cm		F	#	-	-
Specific Conductance	0658	WL	11/7/2019	(N)F			1595	umhos/cm				-	-
Sulfate													
Sulfate	0292A	WL	6/25/2019	(N)F			900	mg/L		F	#	15	-
Sulfate	0292A	WL	11/7/2019	(N)F			900	mg/L				30	-
Sulfate	0304	WL	6/25/2019	(N)F			800	mg/L		F	#	15	-
Sulfate	0304	WL	11/7/2019	(N)F			770	mg/L				30	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

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PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Sulfate	0305	WL	6/25/2019	(N)F			720	mg/L		F	#	15	-
Sulfate	0305	WL	11/7/2019	(N)D			660	mg/L				30	-
Sulfate	0305	WL	11/7/2019	(N)F			630	mg/L				30	-
Sulfate	0309	WL	6/25/2019	(N)F			880	mg/L		F	#	15	-
Sulfate	0309	WL	11/7/2019	(N)F			940	mg/L				30	-
Sulfate	0310	WL	6/25/2019	(N)F			370	mg/L		F	#	6	-
Sulfate	0310	WL	11/7/2019	(N)F			630	mg/L				30	-
Sulfate	0655	WL	6/25/2019	(N)F			700	mg/L		F	#	15	-
Sulfate	0655	WL	11/7/2019	(N)F			1000	mg/L				60	-
Sulfate	0656	WL	6/25/2019	(N)F			290	mg/L		F	#	1.5	-
Sulfate	0656	WL	6/25/2019	(N)D			290	mg/L		F	#	1.5	-
Sulfate	0656	WL	11/7/2019	(N)F			740	mg/L				60	-
Sulfate	0658	WL	6/25/2019	(N)F			460	mg/L		F	#	6	-
Sulfate	0658	WL	11/7/2019	(N)F			410	mg/L				15	-
Temperature													
Temperature	0292A	WL	6/25/2019	(N)F			12.85	C		F	#	-	-
Temperature	0292A	WL	11/7/2019	(N)F			15.81	C				-	-
Temperature	0304	WL	6/25/2019	(N)F			13.1	C		F	#	-	-
Temperature	0304	WL	11/7/2019	(N)F			13.8	C				-	-
Temperature	0305	WL	6/25/2019	(N)F			12.82	C		F	#	-	-
Temperature	0305	WL	11/7/2019	(N)F			14.7	C				-	-
Temperature	0309	WL	6/25/2019	(N)F			14.57	C		F	#	-	-
Temperature	0309	WL	11/7/2019	(N)F			15.58	C				-	-
Temperature	0310	WL	6/25/2019	(N)F			14.25	C		F	#	-	-
Temperature	0310	WL	11/7/2019	(N)F			14.16	C				-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

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PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Temperature	0655	WL	6/25/2019	(N)F			12.89	C		F	#	-	-
Temperature	0655	WL	11/7/2019	(N)F			14.2	C				-	-
Temperature	0656	WL	6/25/2019	(N)F			15.68	C		F	#	-	-
Temperature	0656	WL	11/7/2019	(N)F			17.91	C				-	-
Temperature	0658	WL	6/25/2019	(N)F			11.77	C		F	#	-	-
Temperature	0658	WL	11/7/2019	(N)F			11.05	C				-	-
Turbidity													
Turbidity	0292A	WL	6/25/2019	(N)F			5.18	NTU		F	#	-	-
Turbidity	0292A	WL	11/7/2019	(N)F			3.57	NTU				-	-
Turbidity	0304	WL	6/25/2019	(N)F			8.84	NTU		F	#	-	-
Turbidity	0304	WL	11/7/2019	(N)F			3.47	NTU				-	-
Turbidity	0305	WL	6/25/2019	(N)F			1.27	NTU		F	#	-	-
Turbidity	0305	WL	11/7/2019	(N)F			1.58	NTU				-	-
Turbidity	0309	WL	6/25/2019	(N)F			3.05	NTU		F	#	-	-
Turbidity	0309	WL	11/7/2019	(N)F			6.46	NTU				-	-
Turbidity	0310	WL	6/25/2019	(N)F			6.13	NTU		F	#	-	-
Turbidity	0310	WL	11/7/2019	(N)F			0.63	NTU				-	-
Turbidity	0655	WL	6/25/2019	(N)F			1.86	NTU		F	#	-	-
Turbidity	0655	WL	11/7/2019	(N)F			0.87	NTU				-	-
Turbidity	0656	WL	6/25/2019	(N)F			5.25	NTU		F	#	-	-
Turbidity	0656	WL	11/7/2019	(N)F			3.18	NTU				-	-
Turbidity	0658	WL	6/25/2019	(N)F			9.19	NTU		F	#	-	-
Turbidity	0658	WL	11/7/2019	(N)F			9.06	NTU				-	-
Uranium													
Uranium	0292A	WL	6/25/2019	(T)F			0.027	mg/L		F	#	0.0000049	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

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PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Uranium	0292A	WL	11/7/2019	(T)F			0.029	mg/L				0.0000049	-
Uranium	0304	WL	6/25/2019	(T)F			0.043	mg/L		F	#	0.0000049	-
Uranium	0304	WL	11/7/2019	(T)F			0.045	mg/L				0.0000049	-
Uranium	0305	WL	6/25/2019	(T)F			0.07	mg/L		F	#	0.0000049	-
Uranium	0305	WL	11/7/2019	(T)D			0.07	mg/L				0.0000049	-
Uranium	0305	WL	11/7/2019	(T)F			0.07	mg/L				0.0000049	-
Uranium	0309	WL	6/25/2019	(T)F			0.019	mg/L		F	#	0.0000049	-
Uranium	0309	WL	11/7/2019	(T)F			0.017	mg/L				0.0000049	-
Uranium	0310	WL	6/25/2019	(T)F			0.072	mg/L		F	#	0.0000049	-
Uranium	0310	WL	11/7/2019	(T)F			0.074	mg/L				0.0000049	-
Uranium	0655	WL	6/25/2019	(T)F			0.12	mg/L		F	#	0.0000049	-
Uranium	0655	WL	11/7/2019	(T)F			0.13	mg/L				0.0000049	-
Uranium	0656	WL	6/25/2019	(T)F			0.098	mg/L		F	#	0.0000049	-
Uranium	0656	WL	6/25/2019	(T)D			0.095	mg/L		F	#	0.0000049	-
Uranium	0656	WL	11/7/2019	(T)F			0.24	mg/L				0.0000049	-
Uranium	0658	WL	6/25/2019	(T)F			0.032	mg/L		F	#	0.0000049	-
Uranium	0658	WL	11/7/2019	(T)F			0.014	mg/L				0.0000049	-
Vanadium													
Vanadium	0292A	WL	6/25/2019	(T)F			0.0018	mg/L	J	F	#	0.00012	-
Vanadium	0292A	WL	11/7/2019	(T)F			0.00035	mg/L	J			0.00012	-
Vanadium	0304	WL	6/25/2019	(T)F			0.013	mg/L		F	#	0.00012	-
Vanadium	0304	WL	11/7/2019	(T)F			0.022	mg/L				0.00012	-
Vanadium	0305	WL	6/25/2019	(T)F			0.19	mg/L		F	#	0.00012	-
Vanadium	0305	WL	11/7/2019	(T)D			0.35	mg/L				0.00012	-
Vanadium	0305	WL	11/7/2019	(T)F			0.34	mg/L				0.00012	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:29:55 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Vanadium	0309	WL	6/25/2019	(T)F			0.0003	mg/L	J	F	#	0.00012	-
Vanadium	0309	WL	11/7/2019	(T)F			0.00058	mg/L	J			0.00012	-
Vanadium	0310	WL	6/25/2019	(T)F			0.0089	mg/L		F	#	0.00012	-
Vanadium	0310	WL	11/7/2019	(T)F			0.0076	mg/L				0.00012	-
Vanadium	0655	WL	6/25/2019	(T)F			0.28	mg/L		F	#	0.00012	-
Vanadium	0655	WL	11/7/2019	(T)F			0.27	mg/L				0.00012	-
Vanadium	0656	WL	6/25/2019	(T)F			0.027	mg/L		F	#	0.00012	-
Vanadium	0656	WL	6/25/2019	(T)D			0.026	mg/L		F	#	0.00012	-
Vanadium	0656	WL	11/7/2019	(T)F			0.048	mg/L				0.00012	-
Vanadium	0658	WL	6/25/2019	(T)F			0.00068	mg/L	J	F	#	0.00012	-
Vanadium	0658	WL	11/7/2019	(T)F			0.0012	mg/L	J			0.00012	-

LOCATION TYPE:

WL WELL

DATA QUALIFIERS:

F Low flow sampling method used.

LAB QUALIFIERS:

J Estimated Value.

U Parameter analyzed for but was not detected.

SAMPLE TYPES:

Fraction:
(T) Total (for metal concentrations)
(D) Dissolved (for dissolved or filtered metal concentrations)
(N) Organic (or other) constituents for which neither total nor dissolved is applicable

Type Codes:
F-Field Sample R-Replicate FR-Field Sample with Replicates
D-Duplicate N-Not Known S-Split Sample

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

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SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:52:46 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Alkalinity, Total (As CaCO3)										
Alkalinity, Total (As CaCO3)	0294	6/25/2019	(D)F	74	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0294	11/7/2019	(N)F	123	mg/L				-	-
Alkalinity, Total (As CaCO3)	0395	6/25/2019	(N)F	396	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0395	11/7/2019	(N)F	292	mg/L				-	-
Alkalinity, Total (As CaCO3)	0396	6/18/2019	(T)F	58	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0396	11/4/2019	(N)F	121	mg/L				-	-
Alkalinity, Total (As CaCO3)	0398	6/25/2019	(N)F	347	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0398	11/7/2019	(N)F	302	mg/L				-	-
Alkalinity, Total (As CaCO3)	0741	6/18/2019	(T)F	48	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0741	11/4/2019	(N)F	117	mg/L				-	-
Calcium										
Calcium	0294	6/25/2019	(D)F	35	mg/L			#	0.21	-
Calcium	0294	11/7/2019	(T)F	65	mg/L				0.21	-
Calcium	0395	6/25/2019	(T)F	90	mg/L			#	0.21	-
Calcium	0395	11/7/2019	(T)F	140	mg/L				0.21	-
Calcium	0396	6/18/2019	(D)F	31	mg/L			#	0.21	-
Calcium	0396	11/4/2019	(T)F	66	mg/L				0.21	-
Calcium	0398	6/25/2019	(T)F	260	mg/L			#	0.21	-
Calcium	0398	11/7/2019	(T)F	180	mg/L				0.21	-
Calcium	0741	6/18/2019	(D)F	30	mg/L			#	0.21	-
Calcium	0741	11/4/2019	(T)F	64	mg/L				0.21	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:52:46 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Chloride										
Chloride	0294	6/25/2019	(N)F	24	mg/L			#	0.61	-
Chloride	0294	11/7/2019	(N)F	170	mg/L				0.61	-
Chloride	0395	6/25/2019	(N)F	16	mg/L			#	0.061	-
Chloride	0395	11/7/2019	(N)F	73	mg/L				3	-
Chloride	0396	6/18/2019	(N)F	16	mg/L			#	0.061	-
Chloride	0396	11/4/2019	(N)F	180	mg/L				0.61	-
Chloride	0398	6/25/2019	(N)F	180	mg/L			#	3	-
Chloride	0398	11/7/2019	(N)F	130	mg/L				6.1	-
Chloride	0741	6/18/2019	(N)F	16	mg/L			#	0.061	-
Chloride	0741	11/4/2019	(N)F	180	mg/L				0.61	-
Magnesium										
Magnesium	0294	6/25/2019	(D)F	7.1	mg/L			#	0.089	-
Magnesium	0294	11/7/2019	(T)F	14	mg/L				0.089	-
Magnesium	0395	6/25/2019	(T)F	58	mg/L			#	0.089	-
Magnesium	0395	11/7/2019	(T)F	94	mg/L				0.089	-
Magnesium	0396	6/18/2019	(D)F	6	mg/L			#	0.089	-
Magnesium	0396	11/4/2019	(T)F	14	mg/L				0.089	-
Magnesium	0398	6/25/2019	(T)F	130	mg/L			#	0.089	-
Magnesium	0398	11/7/2019	(T)F	89	mg/L				0.089	-
Magnesium	0741	6/18/2019	(D)F	5.9	mg/L			#	0.089	-
Magnesium	0741	11/4/2019	(T)F	13	mg/L				0.089	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:52:46 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Nitrate + Nitrite as Nitrogen										
Nitrate + Nitrite as Nitrogen	0294	6/25/2019	(N)F	0.083	mg/L			#	0.003	-
Nitrate + Nitrite as Nitrogen	0294	11/7/2019	(N)F	0.016	mg/L				0.003	-
Nitrate + Nitrite as Nitrogen	0395	6/25/2019	(N)F	0.03	mg/L	U		#	0.03	-
Nitrate + Nitrite as Nitrogen	0395	11/7/2019	(N)F	1.1	mg/L				0.003	-
Nitrate + Nitrite as Nitrogen	0396	6/18/2019	(N)F	0.094	mg/L			#	0.003	-
Nitrate + Nitrite as Nitrogen	0396	11/4/2019	(N)F	0.068	mg/L				0.003	-
Nitrate + Nitrite as Nitrogen	0398	6/25/2019	(N)F	1.7	mg/L			#	0.015	-
Nitrate + Nitrite as Nitrogen	0398	11/7/2019	(N)F	1.8	mg/L				0.003	-
Nitrate + Nitrite as Nitrogen	0741	6/18/2019	(N)F	0.095	mg/L			#	0.003	-
Nitrate + Nitrite as Nitrogen	0741	11/4/2019	(N)F	0.068	mg/L				0.003	-
Oxidation Reduction Potential										
Oxidation Reduction Potential	0294	6/25/2019	(N)F	73.7	mV			#	-	-
Oxidation Reduction Potential	0294	11/7/2019	(N)F	95.7	mV				-	-
Oxidation Reduction Potential	0395	6/25/2019	(N)F	149.1	mV			#	-	-
Oxidation Reduction Potential	0395	11/7/2019	(N)F	167.9	mV				-	-
Oxidation Reduction Potential	0396	6/18/2019	(N)F	200.4	mV			#	-	-
Oxidation Reduction Potential	0396	11/4/2019	(N)F	246	mV				-	-
Oxidation Reduction Potential	0398	6/25/2019	(N)F	91.7	mV			#	-	-
Oxidation Reduction Potential	0398	11/7/2019	(N)F	68.2	mV				-	-
Oxidation Reduction Potential	0741	6/18/2019	(N)F	200.7	mV			#	-	-
Oxidation Reduction Potential	0741	11/4/2019	(N)F	229	mV				-	-
pH										
pH	0294	6/25/2019	(N)F	7.94	s.u.			#	-	-
pH	0294	11/7/2019	(N)F	8.67	s.u.				-	-
pH	0395	6/25/2019	(N)F	7.83	s.u.			#	-	-
pH	0395	11/7/2019	(N)F	8.28	s.u.				-	-
pH	0396	6/18/2019	(N)F	7.42	s.u.			#	-	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:52:46 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
pH	0396	11/4/2019	(N)F	7.07	s.u.				-	-
pH	0398	6/25/2019	(N)F	8.01	s.u.			#	-	-
pH	0398	11/7/2019	(N)F	8.51	s.u.				-	-
pH	0741	6/18/2019	(N)F	7.29	s.u.			#	-	-
pH	0741	11/4/2019	(N)F	7.57	s.u.				-	-
Potassium										
Potassium	0294	6/25/2019	(D)F	1.6	mg/L			#	0.13	-
Potassium	0294	11/7/2019	(T)F	5.1	mg/L				0.13	-
Potassium	0395	6/25/2019	(T)F	3.5	mg/L			#	0.13	-
Potassium	0395	11/7/2019	(T)F	4.1	mg/L				0.13	-
Potassium	0396	6/18/2019	(D)F	1.3	mg/L			#	0.13	-
Potassium	0396	11/4/2019	(T)F	5.4	mg/L				0.13	-
Potassium	0398	6/25/2019	(T)F	6.9	mg/L			#	0.13	-
Potassium	0398	11/7/2019	(T)F	6.1	mg/L				0.13	-
Potassium	0741	6/18/2019	(D)F	1.3	mg/L			#	0.13	-
Potassium	0741	11/4/2019	(T)F	5.2	mg/L				0.13	-
Selenium										
Selenium	0294	6/25/2019	(D)F	0.00065	mg/L	U		#	0.00065	-
Selenium	0294	11/7/2019	(T)F	0.00065	mg/L	U			0.00065	-
Selenium	0395	6/25/2019	(T)F	0.00065	mg/L	U		#	0.00065	-
Selenium	0395	11/7/2019	(T)F	0.012	mg/L				0.00065	-
Selenium	0396	6/18/2019	(D)F	0.00065	mg/L	U		#	0.00065	-
Selenium	0396	11/4/2019	(T)F	0.00065	mg/L	U			0.00065	-
Selenium	0398	6/25/2019	(T)F	0.01	mg/L			#	0.00065	-
Selenium	0398	11/7/2019	(T)F	0.008	mg/L	J			0.00065	-
Selenium	0741	6/18/2019	(D)F	0.00065	mg/L	U		#	0.00065	-
Selenium	0741	11/4/2019	(T)F	0.00065	mg/L	U			0.00065	-
Sodium										
Sodium	0294	6/25/2019	(D)F	19	mg/L			#	0.038	-
Sodium	0294	11/7/2019	(T)F	92	mg/L				0.038	-
Sodium	0395	6/25/2019	(T)F	51	mg/L			#	0.038	-
Sodium	0395	11/7/2019	(T)F	63	mg/L				0.038	-
Sodium	0396	6/18/2019	(D)F	14	mg/L			#	0.038	-
Sodium	0396	11/4/2019	(T)F	100	mg/L				0.038	-
Sodium	0398	6/25/2019	(T)F	190	mg/L			#	0.38	-
Sodium	0398	11/7/2019	(T)F	140	mg/L				0.038	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:52:46 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Sodium	0741	6/18/2019	(D)F	13	mg/L			#	0.038	-
Sodium	0741	11/4/2019	(T)F	99	mg/L				0.038	-
Specific Conductance										
Specific Conductance	0294	6/25/2019	(N)F	371	umhos/cm			#	-	-
Specific Conductance	0294	11/7/2019	(N)F	1043	umhos/cm				-	-
Specific Conductance	0395	6/25/2019	(N)F	1092	umhos/cm			#	-	-
Specific Conductance	0395	11/7/2019	(N)F	1566	umhos/cm				-	-
Specific Conductance	0396	6/18/2019	(N)F	268	umhos/cm			#	-	-
Specific Conductance	0396	11/4/2019	(N)F	1004	umhos/cm				-	-
Specific Conductance	0398	6/25/2019	(N)F	2613	umhos/cm			#	-	-
Specific Conductance	0398	11/7/2019	(N)F	2038	umhos/cm				-	-
Specific Conductance	0741	6/18/2019	(N)F	270	umhos/cm			#	-	-
Specific Conductance	0741	11/4/2019	(N)F	1037	umhos/cm				-	-
Sulfate										
Sulfate	0294	6/25/2019	(N)F	34	mg/L			#	0.3	-
Sulfate	0294	11/7/2019	(N)F	110	mg/L				3	-
Sulfate	0395	6/25/2019	(N)F	260	mg/L			#	3	-
Sulfate	0395	11/7/2019	(N)F	500	mg/L				15	-
Sulfate	0396	6/18/2019	(N)F	26	mg/L			#	0.3	-
Sulfate	0396	11/4/2019	(N)F	120	mg/L				3	-
Sulfate	0398	6/25/2019	(N)F	920	mg/L			#	15	-
Sulfate	0398	11/7/2019	(N)F	720	mg/L				30	-
Sulfate	0741	6/18/2019	(N)F	26	mg/L			#	0.3	-
Sulfate	0741	11/4/2019	(N)F	120	mg/L				3	-
Temperature										
Temperature	0294	6/25/2019	(N)F	13.57	C			#	-	-
Temperature	0294	11/7/2019	(N)F	7.96	C				-	-
Temperature	0395	6/25/2019	(N)F	25.85	C			#	-	-
Temperature	0395	11/7/2019	(N)F	15.76	C				-	-
Temperature	0396	6/18/2019	(N)F	11.5	C			#	-	-
Temperature	0396	11/4/2019	(N)F	5.21	C				-	-
Temperature	0398	6/25/2019	(N)F	18.67	C			#	-	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:52:46 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Temperature	0398	11/7/2019	(N)F	10.4	C				-	-
Temperature	0741	6/18/2019	(N)F	11.65	C			#	-	-
Temperature	0741	11/4/2019	(N)F	5.18	C				-	-
Turbidity										
Turbidity	0294	6/25/2019	(N)F	29.4	NTU			#	-	-
Turbidity	0294	11/7/2019	(N)F	2.45	NTU				-	-
Turbidity	0395	6/25/2019	(N)F	7.92	NTU			#	-	-
Turbidity	0395	11/7/2019	(N)F	7.09	NTU				-	-
Turbidity	0396	6/18/2019	(N)F	30.7	NTU			#	-	-
Turbidity	0396	11/4/2019	(N)F	2.37	NTU				-	-
Turbidity	0398	6/25/2019	(N)F	8.67	NTU			#	-	-
Turbidity	0398	11/7/2019	(N)F	1.05	NTU				-	-
Turbidity	0741	6/18/2019	(N)F	36.3	NTU			#	-	-
Turbidity	0741	11/4/2019	(N)F	1.58	NTU				-	-
Uranium										
Uranium	0294	6/25/2019	(D)F	0.0011	mg/L			#	0.0000049	-
Uranium	0294	11/7/2019	(T)F	0.0021	mg/L				0.0000049	-
Uranium	0395	6/25/2019	(T)F	0.024	mg/L			#	0.0000049	-
Uranium	0395	11/7/2019	(T)F	0.05	mg/L				0.0000049	-
Uranium	0396	6/18/2019	(D)F	0.00081	mg/L			#	0.0000049	-
Uranium	0396	11/4/2019	(T)F	0.0023	mg/L				0.0000049	-
Uranium	0398	6/25/2019	(T)F	0.043	mg/L			#	0.0000049	-
Uranium	0398	11/7/2019	(T)F	0.036	mg/L				0.0000049	-
Uranium	0741	6/18/2019	(D)F	0.00076	mg/L			#	0.0000049	-
Uranium	0741	11/4/2019	(T)F	0.0021	mg/L				0.0000049	-
Vanadium										
Vanadium	0294	6/25/2019	(D)F	0.00048	mg/L	J		#	0.00012	-
Vanadium	0294	11/7/2019	(T)F	0.00055	mg/L	J			0.00012	-
Vanadium	0395	6/25/2019	(T)F	0.00064	mg/L	J		#	0.00012	-
Vanadium	0395	11/7/2019	(T)F	0.003	mg/L	J			0.00012	-
Vanadium	0396	6/18/2019	(D)F	0.00037	mg/L	J		#	0.00012	-
Vanadium	0396	11/4/2019	(T)F	0.00066	mg/L	J			0.00012	-
Vanadium	0398	6/25/2019	(T)F	0.007	mg/L			#	0.00012	-
Vanadium	0398	11/7/2019	(T)F	0.006	mg/L				0.00012	-
Vanadium	0741	6/18/2019	(D)F	0.00041	mg/L	J		#	0.00012	-
Vanadium	0741	11/4/2019	(T)F	0.00049	mg/L	J			0.00012	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 1/14/2020 7:52:46 AM

LAB QUALIFIERS:

*	Replicate analysis not within control limits.
+	Correlation coefficient for MSA < 0.995.
>	Result above upper detection limit.
J	Estimated Value.
U	Parameter analyzed for but was not detected.

SAMPLE TYPES:

(T) Total (for metal concentrations)
(D) Dissolved (for dissolved or filtered metal concentrations)
(N) Organic (or other) constituents for which neither total nor dissolved is applicable

Type Codes: F-Field Sample R-Replicate FR-Field Sample with Replicates
D-Duplicate N-Not Known S-Split Sample

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

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Appendix B

Groundwater and Surface Water Monitoring Results for Calendar Year 2019

New Rifle Processing Site

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GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:13 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Alkalinity, Total (As CaCO3)													
Alkalinity, Total (As CaCO3)	0169	WL	6/25/2019	(N)F			480	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0169	WL	11/12/2019	(N)F			483	mg/L				-	-
Alkalinity, Total (As CaCO3)	0170	WL	6/26/2019	(N)F			531	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0170	WL	11/13/2019	(N)F			507	mg/L				-	-
Alkalinity, Total (As CaCO3)	0172	WL	6/26/2019	(N)F			1012	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0172	WL	11/13/2019	(N)F			897	mg/L				-	-
Alkalinity, Total (As CaCO3)	0195	WL	11/13/2019	(D)F			393	mg/L				-	-
Alkalinity, Total (As CaCO3)	0201	WL	6/24/2019	(N)F			243	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0201	WL	11/12/2019	(N)F			283	mg/L				-	-
Alkalinity, Total (As CaCO3)	0215	WL	6/25/2019	(N)F			305	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0215	WL	11/12/2019	(N)F			267	mg/L				-	-
Alkalinity, Total (As CaCO3)	0216	WL	8/8/2019	(N)F			239	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0216	WL	11/12/2019	(N)F			243	mg/L				-	-
Alkalinity, Total (As CaCO3)	0217	WL	6/24/2019	(N)F			189	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0217	WL	11/12/2019	(N)F			207	mg/L				-	-
Alkalinity, Total (As CaCO3)	0590	WL	8/8/2019	(N)F			217	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0590	WL	11/12/2019	(N)F			265	mg/L				-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:13 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Alkalinity, Total (As CaCO3)	0620	WL	6/26/2019	(N)F			506	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0620	WL	11/13/2019	(N)F			568	mg/L				-	-
Alkalinity, Total (As CaCO3)	0635	WL	6/25/2019	(N)F			286	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0635	WL	11/13/2019	(N)F			261	mg/L				-	-
Alkalinity, Total (As CaCO3)	0658	WL	6/24/2019	(N)F			240	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0658	WL	11/12/2019	(N)F			234	mg/L				-	-
Alkalinity, Total (As CaCO3)	0659	WL	6/24/2019	(N)F			116	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0659	WL	11/12/2019	(N)F			203	mg/L				-	-
Alkalinity, Total (As CaCO3)	0664	WL	6/24/2019	(D)F			410	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0664	WL	11/12/2019	(N)F			404	mg/L				-	-
Alkalinity, Total (As CaCO3)	0669	WL	6/24/2019	(N)F			327	mg/L		FQ	#	-	-
Alkalinity, Total (As CaCO3)	0669	WL	11/12/2019	(D)F			356	mg/L				-	-
Alkalinity, Total (As CaCO3)	0670	WL	6/24/2019	(N)F			399	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0670	WL	11/12/2019	(N)F			418	mg/L				-	-
Alkalinity, Total (As CaCO3)	0855	WL	6/24/2019	(N)F			250	mg/L		F	#	-	-
Alkalinity, Total (As CaCO3)	0855	WL	11/12/2019	(N)F			230	mg/L				-	-
Ammonia Total as N													
Ammonia Total as N	0169	WL	6/25/2019	(N)F			0.03	mg/L	U	F	#	0.03	-
Ammonia Total as N	0169	WL	11/12/2019	(N)F			0.03	mg/L	U			0.03	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Ammonia Total as N	0170	WL	6/26/2019	(N)F			0.99	mg/L		F	#	0.03	-
Ammonia Total as N	0170	WL	11/13/2019	(N)F			0.98	mg/L				0.03	-
Ammonia Total as N	0172	WL	6/26/2019	(N)F			0.18	mg/L		F	#	0.03	-
Ammonia Total as N	0172	WL	11/13/2019	(N)F			0.15	mg/L				0.03	-
Ammonia Total as N	0195	WL	11/13/2019	(N)F			0.091	mg/L	J			0.03	-
Ammonia Total as N	0201	WL	6/24/2019	(N)F			43	mg/L		F	#	0.3	-
Ammonia Total as N	0201	WL	11/12/2019	(N)F			130	mg/L				3	-
Ammonia Total as N	0215	WL	6/25/2019	(N)F			2.1	mg/L		F	#	0.03	-
Ammonia Total as N	0215	WL	11/12/2019	(N)F			1.9	mg/L				0.03	-
Ammonia Total as N	0216	WL	8/8/2019	(N)F			7.5	mg/L		F	#	0.3	-
Ammonia Total as N	0216	WL	11/12/2019	(N)F			9.7	mg/L				0.3	-
Ammonia Total as N	0217	WL	6/24/2019	(N)F			24	mg/L		F	#	0.3	-
Ammonia Total as N	0217	WL	11/12/2019	(N)F			66	mg/L				3	-
Ammonia Total as N	0590	WL	8/8/2019	(N)F			93	mg/L		F	#	3	-
Ammonia Total as N	0590	WL	11/12/2019	(N)F			110	mg/L				3	-
Ammonia Total as N	0590	WL	11/12/2019	(N)D			100	mg/L				3	-
Ammonia Total as N	0620	WL	6/26/2019	(N)F			0.03	mg/L	U	F	#	0.03	-
Ammonia Total as N	0620	WL	11/13/2019	(N)F			0.059	mg/L	J			0.03	-
Ammonia Total as N	0635	WL	6/25/2019	(N)F			32	mg/L		F	#	0.3	-
Ammonia Total as N	0635	WL	11/13/2019	(N)F			40	mg/L				3	-
Ammonia Total as N	0658	WL	6/24/2019	(N)F			25	mg/L		F	#	0.3	-
Ammonia Total as N	0658	WL	11/12/2019	(N)F			38	mg/L				3	-
Ammonia Total as N	0659	WL	6/24/2019	(N)F			0.046	mg/L	J	F	#	0.03	-
Ammonia Total as N	0659	WL	11/12/2019	(N)F			0.43	mg/L				0.03	-
Ammonia Total as N	0664	WL	6/24/2019	(N)F			19	mg/L		F	#	0.3	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Ammonia Total as N	0664	WL	11/12/2019	(N)F			17	mg/L				0.3	-
Ammonia Total as N	0669	WL	6/24/2019	(N)F			35	mg/L		FQ	#	0.3	-
Ammonia Total as N	0669	WL	11/12/2019	(N)F			39	mg/L				3	-
Ammonia Total as N	0670	WL	6/24/2019	(N)F			6.6	mg/L		F	#	0.3	-
Ammonia Total as N	0670	WL	11/12/2019	(N)F			9.6	mg/L				0.3	-
Ammonia Total as N	0855	WL	6/24/2019	(N)F			14	mg/L		F	#	0.3	-
Ammonia Total as N	0855	WL	11/12/2019	(N)F			16	mg/L				0.3	-
Arsenic													
Arsenic	0169	WL	6/25/2019	(T)F			0.00062	mg/L	J	F	#	0.00039	-
Arsenic	0169	WL	11/12/2019	(T)F			0.00041	mg/L	J			0.00039	-
Arsenic	0170	WL	6/26/2019	(T)F			0.00039	mg/L	U	F	#	0.00039	-
Arsenic	0170	WL	11/13/2019	(T)F			0.00039	mg/L	U			0.00039	-
Arsenic	0172	WL	6/26/2019	(T)F			0.018	mg/L		F	#	0.00039	-
Arsenic	0172	WL	11/13/2019	(T)F			0.0096	mg/L				0.00039	-
Arsenic	0195	WL	11/13/2019	(D)F			0.0007	mg/L	J			0.00039	-
Arsenic	0201	WL	6/24/2019	(T)F			0.00039	mg/L	U	F	#	0.00039	-
Arsenic	0201	WL	11/12/2019	(T)F			0.00042	mg/L	J			0.00039	-
Arsenic	0215	WL	6/25/2019	(T)F			0.00039	mg/L	U	F	#	0.00039	-
Arsenic	0215	WL	11/12/2019	(T)F			0.00039	mg/L	U			0.00039	-
Arsenic	0216	WL	8/8/2019	(T)F			0.026	mg/L		F	#	0.00039	-
Arsenic	0216	WL	11/12/2019	(T)F			0.029	mg/L				0.00039	-
Arsenic	0217	WL	6/24/2019	(T)F			0.00062	mg/L	J	F	#	0.00039	-
Arsenic	0217	WL	11/12/2019	(T)F			0.00057	mg/L	J			0.00039	-
Arsenic	0590	WL	8/8/2019	(T)F			0.00084	mg/L	J	F	#	0.00039	-
Arsenic	0590	WL	11/12/2019	(T)F			0.00077	mg/L	J			0.00039	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Arsenic	0590	WL	11/12/2019	(T)D			0.00086	mg/L	J			0.00039	-
Arsenic	0620	WL	6/26/2019	(T)F			0.00061	mg/L	J	F	#	0.00039	-
Arsenic	0620	WL	11/13/2019	(T)F			0.00045	mg/L	J			0.00039	-
Arsenic	0635	WL	6/25/2019	(T)F			0.00047	mg/L	J	F	#	0.00039	-
Arsenic	0635	WL	11/13/2019	(T)F			0.00057	mg/L	J			0.00039	-
Arsenic	0658	WL	6/24/2019	(T)F			0.14	mg/L		F	#	0.00039	-
Arsenic	0658	WL	11/12/2019	(T)F			0.1	mg/L				0.00039	-
Arsenic	0659	WL	6/24/2019	(T)F			0.037	mg/L		F	#	0.00039	-
Arsenic	0659	WL	11/12/2019	(T)F			0.028	mg/L				0.00039	-
Arsenic	0664	WL	6/24/2019	(D)F			0.0045	mg/L		F	#	0.00039	-
Arsenic	0664	WL	11/12/2019	(T)F			0.0015	mg/L	J			0.00039	-
Arsenic	0669	WL	6/24/2019	(T)F			0.0058	mg/L		FQ	#	0.00039	-
Arsenic	0669	WL	11/12/2019	(D)F			0.008	mg/L				0.00039	-
Arsenic	0670	WL	6/24/2019	(T)F			0.0033	mg/L		F	#	0.00039	-
Arsenic	0670	WL	11/12/2019	(T)F			0.0038	mg/L				0.00039	-
Arsenic	0855	WL	6/24/2019	(T)F			0.15	mg/L		F	#	0.00039	-
Arsenic	0855	WL	11/12/2019	(T)F			0.33	mg/L				0.00039	-
Calcium													
Calcium	0169	WL	6/25/2019	(T)F			190	mg/L		F	#	0.21	-
Calcium	0169	WL	11/12/2019	(T)F			170	mg/L				0.21	-
Calcium	0170	WL	6/26/2019	(T)F			210	mg/L		F	#	0.21	-
Calcium	0170	WL	11/13/2019	(T)F			180	mg/L				0.21	-
Calcium	0172	WL	6/26/2019	(T)F			300	mg/L		F	#	1	-
Calcium	0172	WL	11/13/2019	(T)F			270	mg/L				1	-
Calcium	0195	WL	11/13/2019	(D)F			72	mg/L				0.21	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Calcium	0201	WL	6/24/2019	(T)F			570	mg/L		F	#	1	-
Calcium	0201	WL	11/12/2019	(T)F			500	mg/L				1	-
Calcium	0215	WL	6/25/2019	(T)F			95	mg/L		F	#	0.21	-
Calcium	0215	WL	11/12/2019	(T)F			64	mg/L				0.21	-
Calcium	0216	WL	8/8/2019	(T)F			130	mg/L		F	#	0.21	-
Calcium	0216	WL	11/12/2019	(T)F			77	mg/L				0.21	-
Calcium	0217	WL	11/12/2019	(T)F			590	mg/L				1	-
Calcium	0590	WL	8/8/2019	(T)F			510	mg/L		F	#	2.1	-
Calcium	0590	WL	11/12/2019	(T)F			530	mg/L				1	-
Calcium	0590	WL	11/12/2019	(T)D			530	mg/L				2.1	-
Calcium	0620	WL	6/26/2019	(T)F			360	mg/L		F	#	1	-
Calcium	0620	WL	11/13/2019	(T)F			380	mg/L				1	-
Calcium	0635	WL	6/25/2019	(T)F			260	mg/L		F	#	0.21	-
Calcium	0635	WL	11/13/2019	(T)F			240	mg/L				0.21	-
Calcium	0658	WL	6/24/2019	(T)F			380	mg/L		F	#	0.21	-
Calcium	0658	WL	11/12/2019	(T)F			540	mg/L				1	-
Calcium	0659	WL	6/24/2019	(T)F			390	mg/L		F	#	0.21	-
Calcium	0659	WL	11/12/2019	(T)F			480	mg/L				2.1	-
Calcium	0664	WL	6/24/2019	(D)F			120	mg/L		F	#	0.21	-
Calcium	0664	WL	11/12/2019	(T)F			150	mg/L				0.21	-
Calcium	0669	WL	6/24/2019	(T)F			370	mg/L		FQ	#	0.21	-
Calcium	0669	WL	11/12/2019	(D)F			230	mg/L				0.21	-
Calcium	0670	WL	6/24/2019	(T)F			140	mg/L		F	#	0.21	-
Calcium	0670	WL	11/12/2019	(T)F			140	mg/L				0.21	-
Calcium	0855	WL	6/24/2019	(T)F			190	mg/L		F	#	0.21	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Calcium	0855	WL	11/12/2019	(T)F			270	mg/L				0.21	-
Chloride													
Chloride	0169	WL	6/25/2019	(N)F			73	mg/L		F	#	1.2	-
Chloride	0169	WL	11/12/2019	(N)F			69	mg/L				6.1	-
Chloride	0170	WL	6/26/2019	(N)F			210	mg/L		F	#	3	-
Chloride	0170	WL	11/13/2019	(N)F			220	mg/L				6.1	-
Chloride	0172	WL	6/26/2019	(N)F			1000	mg/L		F	#	6.1	-
Chloride	0172	WL	11/13/2019	(N)F			1100	mg/L				12	-
Chloride	0195	WL	11/13/2019	(N)F			24	mg/L				0.61	-
Chloride	0201	WL	6/24/2019	(N)F			170	mg/L		F	#	3	-
Chloride	0201	WL	11/12/2019	(N)F			170	mg/L				6.1	-
Chloride	0215	WL	6/25/2019	(N)F			140	mg/L		F	#	3	-
Chloride	0215	WL	11/12/2019	(N)F			52	mg/L				0.61	-
Chloride	0216	WL	8/8/2019	(N)F			240	mg/L		F	#	1.2	-
Chloride	0216	WL	11/12/2019	(N)F			150	mg/L				6.1	-
Chloride	0217	WL	6/24/2019	(N)F			150	mg/L		F	#	3	-
Chloride	0217	WL	11/12/2019	(N)F			240	mg/L				6.1	-
Chloride	0590	WL	8/8/2019	(N)F			230	mg/L		F	#	3	-
Chloride	0590	WL	11/12/2019	(N)F			460	mg/L				12	-
Chloride	0590	WL	11/12/2019	(N)D			340	mg/L				6.1	-
Chloride	0620	WL	6/26/2019	(N)F			1400	mg/L		F	#	6.1	-
Chloride	0620	WL	11/13/2019	(N)F			1700	mg/L				12	-
Chloride	0635	WL	6/25/2019	(N)F			160	mg/L		F	#	1.2	-
Chloride	0635	WL	11/13/2019	(N)F			170	mg/L				6.1	-
Chloride	0658	WL	6/24/2019	(N)F			120	mg/L		F	#	3	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Chloride	0658	WL	11/12/2019	(N)F			150	mg/L				6.1	-
Chloride	0659	WL	6/24/2019	(N)F			21	mg/L		F	#	1.2	-
Chloride	0659	WL	11/12/2019	(N)F			160	mg/L				6.1	-
Chloride	0664	WL	6/24/2019	(N)F			90	mg/L		F	#	1.2	-
Chloride	0664	WL	11/12/2019	(N)F			97	mg/L				6.1	-
Chloride	0669	WL	6/24/2019	(N)F			120	mg/L		FQ	#	3	-
Chloride	0669	WL	11/12/2019	(N)F			120	mg/L				6.1	-
Chloride	0670	WL	6/24/2019	(N)F			82	mg/L		F	#	1.2	-
Chloride	0670	WL	11/12/2019	(N)F			110	mg/L				6.1	-
Chloride	0855	WL	6/24/2019	(N)F			140	mg/L		F	#	1.2	-
Chloride	0855	WL	11/12/2019	(N)F			160	mg/L				6.1	-
Magnesium													
Magnesium	0169	WL	6/25/2019	(T)F			110	mg/L		F	#	0.089	-
Magnesium	0169	WL	11/12/2019	(T)F			100	mg/L				0.089	-
Magnesium	0170	WL	6/26/2019	(T)F			130	mg/L		F	#	0.089	-
Magnesium	0170	WL	11/13/2019	(T)F			110	mg/L				0.089	-
Magnesium	0172	WL	6/26/2019	(T)F			330	mg/L		F	#	0.44	-
Magnesium	0172	WL	11/13/2019	(T)F			320	mg/L				0.44	-
Magnesium	0195	WL	11/13/2019	(D)F			39	mg/L				0.089	-
Magnesium	0201	WL	6/24/2019	(T)F			46	mg/L		F	#	0.44	-
Magnesium	0201	WL	11/12/2019	(T)F			40	mg/L				0.44	-
Magnesium	0215	WL	6/25/2019	(T)F			41	mg/L		F	#	0.089	-
Magnesium	0215	WL	11/12/2019	(T)F			29	mg/L				0.089	-
Magnesium	0216	WL	8/8/2019	(T)F			27	mg/L		F	#	0.089	-
Magnesium	0216	WL	11/12/2019	(T)F			16	mg/L				0.089	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Magnesium	0217	WL	11/12/2019	(T)F			19	mg/L				0.44	-
Magnesium	0590	WL	8/8/2019	(T)F			42	mg/L		F	#	0.089	-
Magnesium	0590	WL	11/12/2019	(T)F			48	mg/L				0.44	-
Magnesium	0590	WL	11/12/2019	(T)D			45	mg/L				0.089	-
Magnesium	0620	WL	6/26/2019	(T)F			220	mg/L		F	#	0.44	-
Magnesium	0620	WL	11/13/2019	(T)F			230	mg/L				0.44	-
Magnesium	0635	WL	6/25/2019	(T)F			19	mg/L		F	#	0.089	-
Magnesium	0635	WL	11/13/2019	(T)F			18	mg/L				0.089	-
Magnesium	0658	WL	6/24/2019	(T)F			32	mg/L		F	#	0.089	-
Magnesium	0658	WL	11/12/2019	(T)F			31	mg/L				0.44	-
Magnesium	0659	WL	6/24/2019	(T)F			29	mg/L		F	#	0.089	-
Magnesium	0659	WL	11/12/2019	(T)F			27	mg/L				0.089	-
Magnesium	0664	WL	6/24/2019	(D)F			70	mg/L		F	#	0.089	-
Magnesium	0664	WL	11/12/2019	(T)F			65	mg/L				0.089	-
Magnesium	0669	WL	6/24/2019	(T)F			70	mg/L		FQ	#	0.089	-
Magnesium	0669	WL	11/12/2019	(D)F			43	mg/L				0.089	-
Magnesium	0670	WL	6/24/2019	(T)F			76	mg/L		F	#	0.089	-
Magnesium	0670	WL	11/12/2019	(T)F			81	mg/L				0.089	-
Magnesium	0855	WL	6/24/2019	(T)F			37	mg/L		F	#	0.089	-
Magnesium	0855	WL	11/12/2019	(T)F			34	mg/L				0.089	-
Molybdenum													
Molybdenum	0169	WL	6/25/2019	(T)F			0.003	mg/L		F	#	0.000079	-
Molybdenum	0169	WL	11/12/2019	(T)F			0.0034	mg/L				0.000079	-
Molybdenum	0170	WL	6/26/2019	(T)F			0.0024	mg/L		F	#	0.000079	-
Molybdenum	0170	WL	11/13/2019	(T)F			0.0025	mg/L				0.000079	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Molybdenum	0172	WL	6/26/2019	(T)F			0.01	mg/L		F	#	0.000079	-
Molybdenum	0172	WL	11/13/2019	(T)F			0.0088	mg/L				0.000079	-
Molybdenum	0195	WL	11/13/2019	(D)F			0.012	mg/L				0.000079	-
Molybdenum	0201	WL	6/24/2019	(T)F			1.2	mg/L		F	#	0.000079	-
Molybdenum	0201	WL	11/12/2019	(T)F			1.4	mg/L				0.000079	-
Molybdenum	0215	WL	6/25/2019	(T)F			0.0086	mg/L		F	#	0.000079	-
Molybdenum	0215	WL	11/12/2019	(T)F			0.013	mg/L				0.000079	-
Molybdenum	0216	WL	8/8/2019	(T)F			0.05	mg/L		F	#	0.000079	-
Molybdenum	0216	WL	11/12/2019	(T)F			0.058	mg/L				0.000079	-
Molybdenum	0217	WL	6/24/2019	(T)F			1.2	mg/L		F	#	0.000079	-
Molybdenum	0217	WL	11/12/2019	(T)F			1.3	mg/L				0.000079	-
Molybdenum	0590	WL	8/8/2019	(T)F			1.6	mg/L		F	#	0.000079	-
Molybdenum	0590	WL	11/12/2019	(T)F			1.3	mg/L				0.000079	-
Molybdenum	0590	WL	11/12/2019	(T)D			1.3	mg/L				0.000079	-
Molybdenum	0620	WL	6/26/2019	(T)F			0.0065	mg/L		F	#	0.000079	-
Molybdenum	0620	WL	11/13/2019	(T)F			0.01	mg/L				0.000079	-
Molybdenum	0635	WL	6/25/2019	(T)F			0.34	mg/L		F	#	0.000079	-
Molybdenum	0635	WL	11/13/2019	(T)F			0.37	mg/L				0.000079	-
Molybdenum	0658	WL	6/24/2019	(T)F			1.4	mg/L		F	#	0.000079	-
Molybdenum	0658	WL	11/12/2019	(T)F			2.6	mg/L				0.000079	-
Molybdenum	0659	WL	6/24/2019	(T)F			0.31	mg/L		F	#	0.000079	-
Molybdenum	0659	WL	11/12/2019	(T)F			0.96	mg/L				0.000079	-
Molybdenum	0664	WL	6/24/2019	(D)F			0.18	mg/L		F	#	0.000079	-
Molybdenum	0664	WL	11/12/2019	(T)F			0.37	mg/L				0.000079	-
Molybdenum	0669	WL	6/24/2019	(T)F			0.63	mg/L		FQ	#	0.000079	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Molybdenum	0669	WL	11/12/2019	(D)F			0.56	mg/L				0.000079	-
Molybdenum	0670	WL	6/24/2019	(T)F			0.18	mg/L		F	#	0.000079	-
Molybdenum	0670	WL	11/12/2019	(T)F			0.2	mg/L				0.000079	-
Molybdenum	0855	WL	6/24/2019	(T)F			0.34	mg/L		F	#	0.000079	-
Molybdenum	0855	WL	11/12/2019	(T)F			0.48	mg/L				0.000079	-
Nitrate + Nitrite as Nitrogen													
Nitrate + Nitrite as Nitrogen	0169	WL	6/25/2019	(N)F			0.064	mg/L		F	#	0.003	-
Nitrate + Nitrite as Nitrogen	0169	WL	11/12/2019	(N)F			0.23	mg/L				0.003	-
Nitrate + Nitrite as Nitrogen	0170	WL	6/26/2019	(N)F			14	mg/L		F	#	0.03	-
Nitrate + Nitrite as Nitrogen	0170	WL	11/13/2019	(N)F			13	mg/L				0.3	-
Nitrate + Nitrite as Nitrogen	0172	WL	6/26/2019	(N)F			0.03	mg/L	U	F	#	0.03	-
Nitrate + Nitrite as Nitrogen	0172	WL	11/13/2019	(N)F			0.3	mg/L	U			0.3	-
Nitrate + Nitrite as Nitrogen	0195	WL	11/13/2019	(N)F			0.003	mg/L	U			0.003	-
Nitrate + Nitrite as Nitrogen	0201	WL	6/24/2019	(N)F			37	mg/L		F	#	0.15	-
Nitrate + Nitrite as Nitrogen	0201	WL	11/12/2019	(N)F			25	mg/L				0.3	-
Nitrate + Nitrite as Nitrogen	0215	WL	6/25/2019	(N)F			0.016	mg/L		F	#	0.003	-
Nitrate + Nitrite as Nitrogen	0215	WL	11/12/2019	(N)F			0.003	mg/L	U			0.003	-
Nitrate + Nitrite as Nitrogen	0216	WL	8/8/2019	(N)F			0.003	mg/L	U	F	#	0.003	-
Nitrate + Nitrite as Nitrogen	0216	WL	11/12/2019	(N)F			0.15	mg/L	U			0.15	-
Nitrate + Nitrite as Nitrogen	0217	WL	6/24/2019	(N)F			0.0079	mg/L	J	F	#	0.003	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Nitrate + Nitrite as Nitrogen	0217	WL	11/12/2019	(N)F			0.016	mg/L				0.003	-
Nitrate + Nitrite as Nitrogen	0590	WL	8/8/2019	(N)F			16	mg/L		F	#	0.15	-
Nitrate + Nitrite as Nitrogen	0590	WL	11/12/2019	(N)F			13	mg/L				0.03	-
Nitrate + Nitrite as Nitrogen	0590	WL	11/12/2019	(N)D			12	mg/L				0.3	-
Nitrate + Nitrite as Nitrogen	0620	WL	6/26/2019	(N)F			2	mg/L		F	#	0.03	-
Nitrate + Nitrite as Nitrogen	0620	WL	11/13/2019	(N)F			1	mg/L				0.003	-
Nitrate + Nitrite as Nitrogen	0635	WL	6/25/2019	(N)F			2.9	mg/L		F	#	0.015	-
Nitrate + Nitrite as Nitrogen	0635	WL	11/13/2019	(N)F			1.7	mg/L				0.03	-
Nitrate + Nitrite as Nitrogen	0658	WL	6/24/2019	(N)F			4.5	mg/L		F	#	0.015	-
Nitrate + Nitrite as Nitrogen	0658	WL	11/12/2019	(N)F			5.4	mg/L				0.03	-
Nitrate + Nitrite as Nitrogen	0659	WL	6/24/2019	(N)F			4.8	mg/L		F	#	0.03	-
Nitrate + Nitrite as Nitrogen	0659	WL	11/12/2019	(N)F			0.87	mg/L				0.003	-
Nitrate + Nitrite as Nitrogen	0664	WL	6/24/2019	(N)F			1.4	mg/L		F	#	0.003	-
Nitrate + Nitrite as Nitrogen	0664	WL	11/12/2019	(N)F			4.4	mg/L				0.03	-
Nitrate + Nitrite as Nitrogen	0669	WL	6/24/2019	(N)F			2	mg/L		FQ	#	0.03	-
Nitrate + Nitrite as Nitrogen	0669	WL	11/12/2019	(N)F			2.7	mg/L				0.03	-
Nitrate + Nitrite as Nitrogen	0670	WL	6/24/2019	(N)F			5.5	mg/L		F	#	0.03	-
Nitrate + Nitrite as Nitrogen	0670	WL	11/12/2019	(N)F			12	mg/L				0.3	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Nitrate + Nitrite as Nitrogen	0855	WL	6/24/2019	(N)F			6.8	mg/L		F	#	0.03	-
Nitrate + Nitrite as Nitrogen	0855	WL	11/12/2019	(N)F			8.8	mg/L				0.3	-
Oxidation Reduction Potential													
Oxidation Reduction Potential	0169	WL	6/25/2019	(N)F			132.7	mV		F	#	-	-
Oxidation Reduction Potential	0169	WL	11/12/2019	(N)F			217.4	mV				-	-
Oxidation Reduction Potential	0170	WL	6/26/2019	(N)F			97.8	mV		F	#	-	-
Oxidation Reduction Potential	0170	WL	11/13/2019	(N)F			179	mV				-	-
Oxidation Reduction Potential	0172	WL	6/26/2019	(N)F			29	mV		F	#	-	-
Oxidation Reduction Potential	0172	WL	11/13/2019	(N)F			101	mV				-	-
Oxidation Reduction Potential	0195	WL	11/13/2019	(N)F			144	mV				-	-
Oxidation Reduction Potential	0201	WL	6/24/2019	(N)F			270.1	mV		F	#	-	-
Oxidation Reduction Potential	0201	WL	11/12/2019	(N)F			215.2	mV				-	-
Oxidation Reduction Potential	0215	WL	6/25/2019	(N)F			103	mV		F	#	-	-
Oxidation Reduction Potential	0215	WL	11/12/2019	(N)F			200.7	mV				-	-
Oxidation Reduction Potential	0216	WL	8/8/2019	(N)F			131.8	mV		F	#	-	-
Oxidation Reduction Potential	0216	WL	11/12/2019	(N)F			170.4	mV				-	-
Oxidation Reduction Potential	0217	WL	6/24/2019	(N)F			274.4	mV		F	#	-	-
Oxidation Reduction Potential	0217	WL	11/12/2019	(N)F			196.9	mV				-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Oxidation Reduction Potential	0590	WL	8/8/2019	(N)F			206.4	mV		F	#	-	-
Oxidation Reduction Potential	0590	WL	11/12/2019	(N)F			216.2	mV				-	-
Oxidation Reduction Potential	0620	WL	6/26/2019	(N)F			223.8	mV		F	#	-	-
Oxidation Reduction Potential	0620	WL	11/13/2019	(N)F			221.5	mV				-	-
Oxidation Reduction Potential	0635	WL	6/25/2019	(N)F			209.6	mV		F	#	-	-
Oxidation Reduction Potential	0635	WL	11/13/2019	(N)F			166	mV				-	-
Oxidation Reduction Potential	0658	WL	6/24/2019	(N)F			226.2	mV		F	#	-	-
Oxidation Reduction Potential	0658	WL	11/12/2019	(N)F			184.7	mV				-	-
Oxidation Reduction Potential	0659	WL	6/24/2019	(N)F			237.3	mV		F	#	-	-
Oxidation Reduction Potential	0659	WL	11/12/2019	(N)F			170.1	mV				-	-
Oxidation Reduction Potential	0664	WL	6/24/2019	(N)F			217.8	mV		F	#	-	-
Oxidation Reduction Potential	0664	WL	11/12/2019	(N)F			185.4	mV				-	-
Oxidation Reduction Potential	0669	WL	6/24/2019	(N)F			242.6	mV		FQ	#	-	-
Oxidation Reduction Potential	0669	WL	11/12/2019	(N)F			176.8	mV				-	-
Oxidation Reduction Potential	0670	WL	6/24/2019	(N)F			213.4	mV		F	#	-	-
Oxidation Reduction Potential	0670	WL	11/12/2019	(N)F			182.7	mV				-	-
Oxidation Reduction Potential	0855	WL	6/24/2019	(N)F			210.9	mV		F	#	-	-
Oxidation Reduction Potential	0855	WL	11/12/2019	(N)F			183.5	mV				-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
pH													
pH	0169	WL	6/25/2019	(N)F			6.93	s.u.		F	#	-	-
pH	0169	WL	11/12/2019	(N)F			7.11	s.u.				-	-
pH	0170	WL	6/26/2019	(N)F			6.92	s.u.		F	#	-	-
pH	0170	WL	11/13/2019	(N)F			7.24	s.u.				-	-
pH	0172	WL	6/26/2019	(N)F			7.07	s.u.		F	#	-	-
pH	0172	WL	11/13/2019	(N)F			7.48	s.u.				-	-
pH	0195	WL	11/13/2019	(N)F			7.45	s.u.				-	-
pH	0201	WL	6/24/2019	(N)F			6.69	s.u.		F	#	-	-
pH	0201	WL	11/12/2019	(N)F			7.11	s.u.				-	-
pH	0215	WL	6/25/2019	(N)F			7.1	s.u.		F	#	-	-
pH	0215	WL	11/12/2019	(N)F			7.59	s.u.				-	-
pH	0216	WL	8/8/2019	(N)F			7.28	s.u.		F	#	-	-
pH	0216	WL	11/12/2019	(N)F			7.7	s.u.				-	-
pH	0217	WL	6/24/2019	(N)F			6.59	s.u.		F	#	-	-
pH	0217	WL	11/12/2019	(N)F			7.2	s.u.				-	-
pH	0590	WL	8/8/2019	(N)F			6.65	s.u.		F	#	-	-
pH	0590	WL	11/12/2019	(N)F			7.06	s.u.				-	-
pH	0620	WL	6/26/2019	(N)F			6.97	s.u.		F	#	-	-
pH	0620	WL	11/13/2019	(N)F			7.35	s.u.				-	-
pH	0635	WL	6/25/2019	(N)F			6.84	s.u.		F	#	-	-
pH	0635	WL	11/13/2019	(N)F			7.32	s.u.				-	-
pH	0658	WL	6/24/2019	(N)F			6.72	s.u.		F	#	-	-
pH	0658	WL	11/12/2019	(N)F			7.03	s.u.				-	-
pH	0659	WL	6/24/2019	(N)F			7.1	s.u.		F	#	-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
pH	0659	WL	11/12/2019	(N)F			7.41	s.u.				-	-
pH	0664	WL	6/24/2019	(N)F			6.93	s.u.		F	#	-	-
pH	0664	WL	11/12/2019	(N)F			7.24	s.u.				-	-
pH	0669	WL	6/24/2019	(N)F			6.84	s.u.		FQ	#	-	-
pH	0669	WL	11/12/2019	(N)F			7.37	s.u.				-	-
pH	0670	WL	6/24/2019	(N)F			6.89	s.u.		F	#	-	-
pH	0670	WL	11/12/2019	(N)F			7.34	s.u.				-	-
pH	0855	WL	6/24/2019	(N)F			6.91	s.u.		F	#	-	-
pH	0855	WL	11/12/2019	(N)F			7.17	s.u.				-	-
Potassium													
Potassium	0169	WL	6/25/2019	(T)F			8.5	mg/L		F	#	0.13	-
Potassium	0169	WL	11/12/2019	(T)F			8.3	mg/L				0.13	-
Potassium	0170	WL	6/26/2019	(T)F			13	mg/L		F	#	0.13	-
Potassium	0170	WL	11/13/2019	(T)F			11	mg/L				0.13	-
Potassium	0172	WL	6/26/2019	(T)F			18	mg/L		F	#	0.65	-
Potassium	0172	WL	11/13/2019	(T)F			17	mg/L				0.65	-
Potassium	0195	WL	11/13/2019	(D)F			7.8	mg/L				0.13	-
Potassium	0201	WL	6/24/2019	(T)F			13	mg/L		F	#	0.65	-
Potassium	0201	WL	11/12/2019	(T)F			12	mg/L				0.65	-
Potassium	0215	WL	6/25/2019	(T)F			6.2	mg/L		F	#	0.13	-
Potassium	0215	WL	11/12/2019	(T)F			5.2	mg/L				0.13	-
Potassium	0216	WL	8/8/2019	(T)F			15	mg/L		F	#	0.13	-
Potassium	0216	WL	11/12/2019	(T)F			11	mg/L				0.13	-
Potassium	0217	WL	11/12/2019	(T)F			19	mg/L				0.65	-
Potassium	0590	WL	8/8/2019	(T)F			28	mg/L		F	#	0.13	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

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PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Potassium	0590	WL	11/12/2019	(T)F			28	mg/L				0.65	-
Potassium	0590	WL	11/12/2019	(T)D			31	mg/L				0.13	-
Potassium	0620	WL	6/26/2019	(T)F			16	mg/L		F	#	0.65	-
Potassium	0620	WL	11/13/2019	(T)F			17	mg/L				0.65	-
Potassium	0635	WL	6/25/2019	(T)F			28	mg/L		F	#	0.13	-
Potassium	0635	WL	11/13/2019	(T)F			30	mg/L				0.13	-
Potassium	0658	WL	6/24/2019	(T)F			12	mg/L		F	#	0.13	-
Potassium	0658	WL	11/12/2019	(T)F			10	mg/L				0.65	-
Potassium	0659	WL	6/24/2019	(T)F			13	mg/L		F	#	0.13	-
Potassium	0659	WL	11/12/2019	(T)F			13	mg/L				0.13	-
Potassium	0664	WL	6/24/2019	(D)F			13	mg/L		F	#	0.13	-
Potassium	0664	WL	11/12/2019	(T)F			14	mg/L				0.13	-
Potassium	0669	WL	6/24/2019	(T)F			12	mg/L		FQ	#	0.13	-
Potassium	0669	WL	11/12/2019	(D)F			9.8	mg/L				0.13	-
Potassium	0670	WL	6/24/2019	(T)F			12	mg/L		F	#	0.13	-
Potassium	0670	WL	11/12/2019	(T)F			12	mg/L				0.13	-
Potassium	0855	WL	6/24/2019	(T)F			14	mg/L		F	#	0.13	-
Potassium	0855	WL	11/12/2019	(T)F			13	mg/L				0.13	-
Selenium													
Selenium	0169	WL	6/25/2019	(T)F			0.0032	mg/L	J	F	#	0.00065	-
Selenium	0169	WL	11/12/2019	(T)F			0.0046	mg/L	J			0.00065	-
Selenium	0170	WL	6/26/2019	(T)F			0.03	mg/L		F	#	0.00065	-
Selenium	0170	WL	11/13/2019	(T)F			0.026	mg/L				0.00065	-
Selenium	0172	WL	6/26/2019	(T)F			0.00065	mg/L	U	F	#	0.00065	-
Selenium	0172	WL	11/13/2019	(T)F			0.00065	mg/L	U			0.00065	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Selenium	0195	WL	11/13/2019	(D)F			0.00065	mg/L	U			0.00065	-
Selenium	0201	WL	6/24/2019	(T)F			0.092	mg/L		F	#	0.00065	-
Selenium	0201	WL	11/12/2019	(T)F			0.076	mg/L				0.00065	-
Selenium	0215	WL	6/25/2019	(T)F			0.0013	mg/L	J	F	#	0.00065	-
Selenium	0215	WL	11/12/2019	(T)F			0.00065	mg/L	U			0.00065	-
Selenium	0216	WL	8/8/2019	(T)F			0.0022	mg/L	J	F	#	0.00065	-
Selenium	0216	WL	11/12/2019	(T)F			0.0011	mg/L	J			0.00065	-
Selenium	0217	WL	6/24/2019	(T)F			0.0042	mg/L	J	F	#	0.00065	-
Selenium	0217	WL	11/12/2019	(T)F			0.0035	mg/L	J			0.00065	-
Selenium	0590	WL	8/8/2019	(T)F			0.067	mg/L		F	#	0.00065	-
Selenium	0590	WL	11/12/2019	(T)F			0.03	mg/L				0.00065	-
Selenium	0590	WL	11/12/2019	(T)D			0.031	mg/L				0.00065	-
Selenium	0620	WL	6/26/2019	(T)F			0.01	mg/L		F	#	0.00065	-
Selenium	0620	WL	11/13/2019	(T)F			0.013	mg/L				0.00065	-
Selenium	0635	WL	6/25/2019	(T)F			0.0091	mg/L	J	F	#	0.00065	-
Selenium	0635	WL	11/13/2019	(T)F			0.0072	mg/L	J			0.00065	-
Selenium	0658	WL	6/24/2019	(T)F			0.71	mg/L		F	#	0.00065	-
Selenium	0658	WL	11/12/2019	(T)F			1	mg/L				0.00065	-
Selenium	0659	WL	6/24/2019	(T)F			0.24	mg/L		F	#	0.00065	-
Selenium	0659	WL	11/12/2019	(T)F			0.038	mg/L				0.00065	-
Selenium	0664	WL	6/24/2019	(D)F			0.15	mg/L		F	#	0.00065	-
Selenium	0664	WL	11/12/2019	(T)F			0.44	mg/L				0.00065	-
Selenium	0669	WL	6/24/2019	(T)F			0.023	mg/L		FQ	#	0.00065	-
Selenium	0669	WL	11/12/2019	(D)F			0.056	mg/L				0.00065	-
Selenium	0670	WL	6/24/2019	(T)F			0.27	mg/L		F	#	0.00065	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Selenium	0670	WL	11/12/2019	(T)F			0.37	mg/L				0.00065	-
Selenium	0855	WL	6/24/2019	(T)F			0.73	mg/L		F	#	0.00065	-
Selenium	0855	WL	11/12/2019	(T)F			0.68	mg/L				0.00065	-
Sodium													
Sodium	0169	WL	6/25/2019	(T)F			170	mg/L		F	#	0.38	-
Sodium	0169	WL	11/12/2019	(T)F			160	mg/L				0.38	-
Sodium	0170	WL	6/26/2019	(T)F			450	mg/L		F	#	0.38	-
Sodium	0170	WL	11/13/2019	(T)F			420	mg/L				0.38	-
Sodium	0172	WL	6/26/2019	(T)F			1700	mg/L		F	#	1.9	-
Sodium	0172	WL	11/13/2019	(T)F			1600	mg/L				1.9	-
Sodium	0195	WL	11/13/2019	(D)F			100	mg/L				0.038	-
Sodium	0201	WL	6/24/2019	(T)F			240	mg/L		F	#	0.19	-
Sodium	0201	WL	11/12/2019	(T)F			240	mg/L				0.19	-
Sodium	0215	WL	6/25/2019	(T)F			90	mg/L		F	#	0.038	-
Sodium	0215	WL	11/12/2019	(T)F			82	mg/L				0.038	-
Sodium	0216	WL	8/8/2019	(T)F			200	mg/L		F	#	0.38	-
Sodium	0216	WL	11/12/2019	(T)F			170	mg/L				0.38	-
Sodium	0217	WL	11/12/2019	(T)F			190	mg/L				0.19	-
Sodium	0590	WL	8/8/2019	(T)F			320	mg/L		F	#	0.38	-
Sodium	0590	WL	11/12/2019	(T)F			360	mg/L				0.19	-
Sodium	0590	WL	11/12/2019	(T)D			390	mg/L				0.38	-
Sodium	0620	WL	6/26/2019	(T)F			1100	mg/L		F	#	1.9	-
Sodium	0620	WL	11/13/2019	(T)F			1200	mg/L				1.9	-
Sodium	0635	WL	6/25/2019	(T)F			130	mg/L		F	#	0.038	-
Sodium	0635	WL	11/13/2019	(T)F			140	mg/L				0.038	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Sodium	0658	WL	6/24/2019	(T)F			170	mg/L		F	#	0.38	-
Sodium	0658	WL	11/12/2019	(T)F			170	mg/L				0.19	-
Sodium	0659	WL	6/24/2019	(T)F			68	mg/L		F	#	0.038	-
Sodium	0659	WL	11/12/2019	(T)F			160	mg/L				0.38	-
Sodium	0664	WL	6/24/2019	(D)F			190	mg/L		F	#	0.38	-
Sodium	0664	WL	11/12/2019	(T)F			200	mg/L				0.38	-
Sodium	0669	WL	6/24/2019	(T)F			220	mg/L		FQ	#	0.38	-
Sodium	0669	WL	11/12/2019	(D)F			190	mg/L				0.38	-
Sodium	0670	WL	6/24/2019	(T)F			190	mg/L		F	#	0.38	-
Sodium	0670	WL	11/12/2019	(T)F			210	mg/L				0.38	-
Sodium	0855	WL	6/24/2019	(T)F			150	mg/L		F	#	0.038	-
Sodium	0855	WL	11/12/2019	(T)F			170	mg/L				0.38	-
Specific Conductance													
Specific Conductance	0169	WL	6/25/2019	(N)F			2128	umhos/cm		F	#	-	-
Specific Conductance	0169	WL	11/12/2019	(N)F			2010	umhos/cm				-	-
Specific Conductance	0170	WL	6/26/2019	(N)F			3563	umhos/cm		F	#	-	-
Specific Conductance	0170	WL	11/13/2019	(N)F			3439	umhos/cm				-	-
Specific Conductance	0172	WL	6/26/2019	(N)F			9867	umhos/cm		F	#	-	-
Specific Conductance	0172	WL	11/13/2019	(N)F			9810	umhos/cm				-	-
Specific Conductance	0195	WL	11/13/2019	(N)F			1080	umhos/cm				-	-
Specific Conductance	0201	WL	6/24/2019	(N)F			3788	umhos/cm		F	#	-	-
Specific Conductance	0201	WL	11/12/2019	(N)F			3579	umhos/cm				-	-
Specific Conductance	0215	WL	6/25/2019	(N)F			1274	umhos/cm		F	#	-	-
Specific Conductance	0215	WL	11/12/2019	(N)F			941	umhos/cm				-	-
Specific Conductance	0216	WL	8/8/2019	(N)F			1864	umhos/cm		F	#	-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Specific Conductance	0216	WL	11/12/2019	(N)F			1321	umhos/cm				-	-
Specific Conductance	0217	WL	6/24/2019	(N)F			3162	umhos/cm		F	#	-	-
Specific Conductance	0217	WL	11/12/2019	(N)F			3352	umhos/cm				-	-
Specific Conductance	0590	WL	8/8/2019	(N)F			4295	umhos/cm		F	#	-	-
Specific Conductance	0590	WL	11/12/2019	(N)F			4736	umhos/cm				-	-
Specific Conductance	0620	WL	6/26/2019	(N)F			7333	umhos/cm		F	#	-	-
Specific Conductance	0620	WL	11/13/2019	(N)F			8404	umhos/cm				-	-
Specific Conductance	0635	WL	6/25/2019	(N)F			2165	umhos/cm		F	#	-	-
Specific Conductance	0635	WL	11/13/2019	(N)F			2154	umhos/cm				-	-
Specific Conductance	0658	WL	6/24/2019	(N)F			2640	umhos/cm		F	#	-	-
Specific Conductance	0658	WL	11/12/2019	(N)F			3162	umhos/cm				-	-
Specific Conductance	0659	WL	6/24/2019	(N)F			1877	umhos/cm		F	#	-	-
Specific Conductance	0659	WL	11/12/2019	(N)F			2685	umhos/cm				-	-
Specific Conductance	0664	WL	6/24/2019	(N)F			1961	umhos/cm		F	#	-	-
Specific Conductance	0664	WL	11/12/2019	(N)F			2041	umhos/cm				-	-
Specific Conductance	0669	WL	6/24/2019	(N)F			2710	umhos/cm		FQ	#	-	-
Specific Conductance	0669	WL	11/12/2019	(N)F			2353	umhos/cm				-	-
Specific Conductance	0670	WL	6/24/2019	(N)F			1939	umhos/cm		F	#	-	-
Specific Conductance	0670	WL	11/12/2019	(N)F			2071	umhos/cm				-	-
Specific Conductance	0855	WL	6/24/2019	(N)F			1920	umhos/cm		F	#	-	-
Specific Conductance	0855	WL	11/12/2019	(N)F			2247	umhos/cm				-	-
Sulfate													
Sulfate	0169	WL	6/25/2019	(N)F			660	mg/L		F	#	6	-
Sulfate	0169	WL	11/12/2019	(N)F			640	mg/L				30	-
Sulfate	0170	WL	6/26/2019	(N)F			1200	mg/L		F	#	15	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Sulfate	0170	WL	11/13/2019	(N)F			1200	mg/L				30	-
Sulfate	0172	WL	6/26/2019	(N)F			3700	mg/L		F	#	30	-
Sulfate	0172	WL	11/13/2019	(N)F			4000	mg/L				60	-
Sulfate	0195	WL	11/13/2019	(N)F			190	mg/L				3	-
Sulfate	0201	WL	6/24/2019	(N)F			1600	mg/L		F	#	15	-
Sulfate	0201	WL	11/12/2019	(N)F			1700	mg/L				30	-
Sulfate	0215	WL	6/25/2019	(N)F			190	mg/L		F	#	15	-
Sulfate	0215	WL	11/12/2019	(N)F			190	mg/L				3	-
Sulfate	0216	WL	8/8/2019	(N)F			340	mg/L		F	#	1.5	-
Sulfate	0216	WL	11/12/2019	(N)F			210	mg/L				30	-
Sulfate	0217	WL	6/24/2019	(N)F			1500	mg/L		F	#	15	-
Sulfate	0217	WL	11/12/2019	(N)F			1600	mg/L				30	-
Sulfate	0590	WL	8/8/2019	(N)F			2000	mg/L		F	#	15	-
Sulfate	0590	WL	11/12/2019	(N)F			2900	mg/L				60	-
Sulfate	0590	WL	11/12/2019	(N)D			2200	mg/L				30	-
Sulfate	0620	WL	6/26/2019	(N)F			1700	mg/L		F	#	30	-
Sulfate	0620	WL	11/13/2019	(N)F			2200	mg/L				60	-
Sulfate	0635	WL	6/25/2019	(N)F			620	mg/L		F	#	6	-
Sulfate	0635	WL	11/13/2019	(N)F			680	mg/L				30	-
Sulfate	0658	WL	6/24/2019	(N)F			930	mg/L		F	#	15	-
Sulfate	0658	WL	11/12/2019	(N)F			1600	mg/L				30	-
Sulfate	0659	WL	6/24/2019	(N)F			900	mg/L		F	#	6	-
Sulfate	0659	WL	11/12/2019	(N)F			1300	mg/L				30	-
Sulfate	0664	WL	6/24/2019	(N)F			490	mg/L		F	#	6	-
Sulfate	0664	WL	11/12/2019	(N)F			600	mg/L				30	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Sulfate	0669	WL	6/24/2019	(N)F			1200	mg/L		FQ	#	15	-
Sulfate	0669	WL	11/12/2019	(N)F			800	mg/L				30	-
Sulfate	0670	WL	6/24/2019	(N)F			490	mg/L		F	#	6	-
Sulfate	0670	WL	11/12/2019	(N)F			580	mg/L				30	-
Sulfate	0855	WL	6/24/2019	(N)F			510	mg/L		F	#	6	-
Sulfate	0855	WL	11/12/2019	(N)F			780	mg/L				30	-
Temperature													
Temperature	0169	WL	6/25/2019	(N)F			15.12	C		F	#	-	-
Temperature	0169	WL	11/12/2019	(N)F			14.14	C				-	-
Temperature	0170	WL	6/26/2019	(N)F			14.84	C		F	#	-	-
Temperature	0170	WL	11/13/2019	(N)F			14.83	C				-	-
Temperature	0172	WL	6/26/2019	(N)F			13.81	C		F	#	-	-
Temperature	0172	WL	11/13/2019	(N)F			15.97	C				-	-
Temperature	0195	WL	11/13/2019	(N)F			10.83	C				-	-
Temperature	0201	WL	6/24/2019	(N)F			14.21	C		F	#	-	-
Temperature	0201	WL	11/12/2019	(N)F			14.94	C				-	-
Temperature	0215	WL	6/25/2019	(N)F			14.77	C		F	#	-	-
Temperature	0215	WL	11/12/2019	(N)F			14.58	C				-	-
Temperature	0216	WL	8/8/2019	(N)F			15.74	C		F	#	-	-
Temperature	0216	WL	11/12/2019	(N)F			13.94	C				-	-
Temperature	0217	WL	6/24/2019	(N)F			11.02	C		F	#	-	-
Temperature	0217	WL	11/12/2019	(N)F			9.89	C				-	-
Temperature	0590	WL	8/8/2019	(N)F			13.73	C		F	#	-	-
Temperature	0590	WL	11/12/2019	(N)F			12.46	C				-	-
Temperature	0620	WL	6/26/2019	(N)F			14.39	C		F	#	-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Temperature	0620	WL	11/13/2019	(N)F			12.73	C				-	-
Temperature	0635	WL	6/25/2019	(N)F			11.92	C		F	#	-	-
Temperature	0635	WL	11/13/2019	(N)F			12.52	C				-	-
Temperature	0658	WL	6/24/2019	(N)F			13.67	C		F	#	-	-
Temperature	0658	WL	11/12/2019	(N)F			13.92	C				-	-
Temperature	0659	WL	6/24/2019	(N)F			15.07	C		F	#	-	-
Temperature	0659	WL	11/12/2019	(N)F			13.02	C				-	-
Temperature	0664	WL	6/24/2019	(N)F			13.93	C		F	#	-	-
Temperature	0664	WL	11/12/2019	(N)F			14.89	C				-	-
Temperature	0669	WL	6/24/2019	(N)F			15.07	C		FQ	#	-	-
Temperature	0669	WL	11/12/2019	(N)F			13.32	C				-	-
Temperature	0670	WL	6/24/2019	(N)F			13.76	C		F	#	-	-
Temperature	0670	WL	11/12/2019	(N)F			15.1	C				-	-
Temperature	0855	WL	6/24/2019	(N)F			15.72	C		F	#	-	-
Temperature	0855	WL	11/12/2019	(N)F			14.57	C				-	-
Turbidity													
Turbidity	0169	WL	6/25/2019	(N)F			2.67	NTU		F	#	-	-
Turbidity	0169	WL	11/12/2019	(N)F			0.4	NTU				-	-
Turbidity	0170	WL	6/26/2019	(N)F			8.84	NTU		F	#	-	-
Turbidity	0170	WL	11/13/2019	(N)F			3.47	NTU				-	-
Turbidity	0172	WL	6/26/2019	(N)F			6.78	NTU		F	#	-	-
Turbidity	0172	WL	11/13/2019	(N)F			3.25	NTU				-	-
Turbidity	0195	WL	11/13/2019	(N)F			15.7	NTU				-	-
Turbidity	0201	WL	6/24/2019	(N)F			0.48	NTU		F	#	-	-
Turbidity	0201	WL	11/12/2019	(N)F			1.41	NTU				-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Turbidity	0215	WL	6/25/2019	(N)F			1.36	NTU		F	#	-	-
Turbidity	0215	WL	11/12/2019	(N)F			0.86	NTU				-	-
Turbidity	0216	WL	8/8/2019	(N)F			3.82	NTU		F	#	-	-
Turbidity	0216	WL	11/12/2019	(N)F			5.16	NTU				-	-
Turbidity	0217	WL	6/24/2019	(N)F			0.8	NTU		F	#	-	-
Turbidity	0217	WL	11/12/2019	(N)F			0.69	NTU				-	-
Turbidity	0590	WL	8/8/2019	(N)F			1.49	NTU		F	#	-	-
Turbidity	0590	WL	11/12/2019	(N)F			0.63	NTU				-	-
Turbidity	0620	WL	6/26/2019	(N)F			3.53	NTU		F	#	-	-
Turbidity	0620	WL	11/13/2019	(N)F			3.25	NTU				-	-
Turbidity	0635	WL	6/25/2019	(N)F			1.91	NTU		F	#	-	-
Turbidity	0635	WL	11/13/2019	(N)F			0.7	NTU				-	-
Turbidity	0658	WL	6/24/2019	(N)F			7.87	NTU		F	#	-	-
Turbidity	0658	WL	11/12/2019	(N)F			3.22	NTU				-	-
Turbidity	0659	WL	6/24/2019	(N)F			9.97	NTU		F	#	-	-
Turbidity	0659	WL	11/12/2019	(N)F			9.23	NTU				-	-
Turbidity	0664	WL	6/24/2019	(N)F			40.9	NTU		F	#	-	-
Turbidity	0664	WL	11/12/2019	(N)F			9.82	NTU				-	-
Turbidity	0669	WL	6/24/2019	(N)F			9.71	NTU		FQ	#	-	-
Turbidity	0669	WL	11/12/2019	(N)F			21.1	NTU				-	-
Turbidity	0670	WL	6/24/2019	(N)F			2.59	NTU		F	#	-	-
Turbidity	0670	WL	11/12/2019	(N)F			5.09	NTU				-	-
Turbidity	0855	WL	6/24/2019	(N)F			4.35	NTU		F	#	-	-
Turbidity	0855	WL	11/12/2019	(N)F			2.13	NTU				-	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Uranium													
Uranium	0169	WL	6/25/2019	(T)F			0.021	mg/L		F	#	0.0000049	-
Uranium	0169	WL	11/12/2019	(T)F			0.021	mg/L				0.0000049	-
Uranium	0170	WL	6/26/2019	(T)F			0.064	mg/L		F	#	0.0000049	-
Uranium	0170	WL	11/13/2019	(T)F			0.06	mg/L				0.0000049	-
Uranium	0172	WL	6/26/2019	(T)F			0.016	mg/L		F	#	0.0000049	-
Uranium	0172	WL	11/13/2019	(T)F			0.014	mg/L				0.0000049	-
Uranium	0195	WL	11/13/2019	(D)F			0.0096	mg/L				0.0000049	-
Uranium	0201	WL	6/24/2019	(T)F			0.093	mg/L		F	#	0.0000049	-
Uranium	0201	WL	11/12/2019	(T)F			0.094	mg/L				0.0000049	-
Uranium	0215	WL	6/25/2019	(T)F			0.014	mg/L		F	#	0.0000049	-
Uranium	0215	WL	11/12/2019	(T)F			0.013	mg/L				0.0000049	-
Uranium	0216	WL	8/8/2019	(T)F			0.035	mg/L		F	#	0.0000049	-
Uranium	0216	WL	11/12/2019	(T)F			0.023	mg/L				0.0000049	-
Uranium	0217	WL	6/24/2019	(T)F			0.13	mg/L		F	#	0.0000049	-
Uranium	0217	WL	11/12/2019	(T)F			0.12	mg/L				0.0000049	-
Uranium	0590	WL	8/8/2019	(T)F			0.068	mg/L		F	#	0.0000049	-
Uranium	0590	WL	11/12/2019	(T)F			0.074	mg/L				0.0000049	-
Uranium	0590	WL	11/12/2019	(T)D			0.073	mg/L				0.0000049	-
Uranium	0620	WL	6/26/2019	(T)F			0.048	mg/L		F	#	0.0000049	-
Uranium	0620	WL	11/13/2019	(T)F			0.058	mg/L				0.0000049	-
Uranium	0635	WL	6/25/2019	(T)F			0.041	mg/L		F	#	0.0000049	-
Uranium	0635	WL	11/13/2019	(T)F			0.039	mg/L				0.0000049	-
Uranium	0658	WL	6/24/2019	(T)F			0.043	mg/L		F	#	0.0000049	-
Uranium	0658	WL	11/12/2019	(T)F			0.048	mg/L				0.0000049	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Uranium	0659	WL	6/24/2019	(T)F			0.042	mg/L		F	#	0.0000049	-
Uranium	0659	WL	11/12/2019	(T)F			0.088	mg/L				0.0000049	-
Uranium	0664	WL	6/24/2019	(D)F			0.055	mg/L		F	#	0.0000049	-
Uranium	0664	WL	11/12/2019	(T)F			0.058	mg/L				0.0000049	-
Uranium	0669	WL	6/24/2019	(T)F			0.09	mg/L		FQ	#	0.0000049	-
Uranium	0669	WL	11/12/2019	(D)F			0.064	mg/L				0.0000049	-
Uranium	0670	WL	6/24/2019	(T)F			0.1	mg/L		F	#	0.0000049	-
Uranium	0670	WL	11/12/2019	(T)F			0.064	mg/L				0.0000049	-
Uranium	0855	WL	6/24/2019	(T)F			0.038	mg/L		F	#	0.0000049	-
Uranium	0855	WL	11/12/2019	(T)F			0.044	mg/L				0.0000049	-
Vanadium													
Vanadium	0169	WL	6/25/2019	(T)F			0.00045	mg/L	J	F	#	0.00012	-
Vanadium	0169	WL	11/12/2019	(T)F			0.0011	mg/L	J			0.00012	-
Vanadium	0170	WL	6/26/2019	(T)F			0.00097	mg/L	J	F	#	0.00012	-
Vanadium	0170	WL	11/13/2019	(T)F			0.00077	mg/L	J			0.00012	-
Vanadium	0172	WL	6/26/2019	(T)F			0.00053	mg/L	J	F	#	0.00012	-
Vanadium	0172	WL	11/13/2019	(T)F			0.0004	mg/L	J			0.00012	-
Vanadium	0195	WL	11/13/2019	(D)F			0.0005	mg/L	J			0.00012	-
Vanadium	0201	WL	6/24/2019	(T)F			0.00065	mg/L	J	F	#	0.00012	-
Vanadium	0201	WL	11/12/2019	(T)F			0.00082	mg/L	J			0.00012	-
Vanadium	0215	WL	6/25/2019	(T)F			0.0017	mg/L	J	F	#	0.00012	-
Vanadium	0215	WL	11/12/2019	(T)F			0.0033	mg/L	J			0.00012	-
Vanadium	0216	WL	8/8/2019	(T)F			0.3	mg/L		F	#	0.00012	-
Vanadium	0216	WL	11/12/2019	(T)F			0.3	mg/L				0.00012	-
Vanadium	0217	WL	6/24/2019	(T)F			1.6	mg/L		F	#	0.00012	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

PARAMETER	LOCATION CODE/TYPE		SAMPLE DATE	SAMPLE TYPE	DEPTH RANGE (FT BLS)		RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECTION LIMIT	UNCERTAINTY
Vanadium	0217	WL	11/12/2019	(T)F			1.4	mg/L				0.00012	-
Vanadium	0590	WL	8/8/2019	(T)F			0.39	mg/L		F	#	0.00012	-
Vanadium	0590	WL	11/12/2019	(T)F			0.38	mg/L				0.00012	-
Vanadium	0590	WL	11/12/2019	(T)D			0.39	mg/L				0.00012	-
Vanadium	0620	WL	6/26/2019	(T)F			0.001	mg/L	J	F	#	0.00012	-
Vanadium	0620	WL	11/13/2019	(T)F			0.0017	mg/L	J			0.00012	-
Vanadium	0635	WL	6/25/2019	(T)F			0.0004	mg/L	J	F	#	0.00012	-
Vanadium	0635	WL	11/13/2019	(T)F			0.00048	mg/L	J			0.00012	-
Vanadium	0658	WL	6/24/2019	(T)F			18	mg/L		F	#	0.0012	-
Vanadium	0658	WL	11/12/2019	(T)F			28	mg/L				0.0012	-
Vanadium	0659	WL	6/24/2019	(T)F			2.1	mg/L		F	#	0.00012	-
Vanadium	0659	WL	11/12/2019	(T)F			1.8	mg/L				0.00012	-
Vanadium	0664	WL	6/24/2019	(D)F			2.6	mg/L		F	#	0.00012	-
Vanadium	0664	WL	11/12/2019	(T)F			0.81	mg/L				0.00012	-
Vanadium	0669	WL	6/24/2019	(T)F			2.6	mg/L		FQ	#	0.00012	-
Vanadium	0669	WL	11/12/2019	(D)F			4	mg/L				0.00012	-
Vanadium	0670	WL	6/24/2019	(T)F			1.5	mg/L		F	#	0.00012	-
Vanadium	0670	WL	11/12/2019	(T)F			1.8	mg/L				0.00012	-
Vanadium	0855	WL	6/24/2019	(T)F			8.3	mg/L		F	#	0.0012	-
Vanadium	0855	WL	11/12/2019	(T)F			15	mg/L				0.0012	-

GROUNDWATER QUALITY DATA BY PARAMETER WITH DEPTH (EQuIS200) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:24:14 AM

LOCATION TYPE:

WL	WELL

DATA QUALIFIERS:

F	Low flow sampling method used.
Q	Qualitative result due to sampling technique

LAB QUALIFIERS:

J	Estimated Value.
U	Parameter analyzed for but was not detected.

SAMPLE TYPES:

Fraction:
(T) Total (for metal concentratio
(D) Dissolved (for dissolved or filtered metal concentratio
(N) Organic (or other) constituents for which neither total nor dissolved is applica

Type Codes:
F-Field Sample R-Replicate FR
D-Duplicate N-Not Known S-S

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

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SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:26:37 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Alkalinity, Total (As CaCO3)										
Alkalinity, Total (As CaCO3)	0320	8/8/2019	(N)F	170	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0320	11/12/2019	(N)F	81	mg/L				-	-
Alkalinity, Total (As CaCO3)	0322	6/18/2019	(D)F	57	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0322	11/4/2019	(N)F	123	mg/L				-	-
Alkalinity, Total (As CaCO3)	0323	6/24/2019	(N)F	122	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0323	11/13/2019	(N)F	138	mg/L				-	-
Alkalinity, Total (As CaCO3)	0324	6/26/2019	(D)F	89	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0324	11/13/2019	(N)F	123	mg/L				-	-
Alkalinity, Total (As CaCO3)	0326	6/18/2019	(D)F	68	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0326	11/4/2019	(N)F	122	mg/L				-	-
Alkalinity, Total (As CaCO3)	0452	8/8/2019	(D)F	302	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0452	11/12/2019	(N)F	175	mg/L				-	-
Alkalinity, Total (As CaCO3)	0453	8/8/2019	(D)F	309	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0575	6/24/2019	(D)F	123	mg/L			#	-	-
Alkalinity, Total (As CaCO3)	0575	11/13/2019	(D)F	154	mg/L				-	-
Ammonia Total as N										
Ammonia Total as N	0320	8/8/2019	(N)F	3	mg/L			#	0.3	-
Ammonia Total as N	0320	11/12/2019	(N)F	11	mg/L				0.3	-
Ammonia Total as N	0322	6/18/2019	(N)F	0.03	mg/L	U		#	0.03	-
Ammonia Total as N	0322	11/4/2019	(N)F	0.036	mg/L	J			0.03	-
Ammonia Total as N	0323	6/24/2019	(N)F	18	mg/L			#	0.3	-
Ammonia Total as N	0323	6/24/2019	(N)D	18	mg/L			#	0.3	-
Ammonia Total as N	0323	11/13/2019	(N)F	24	mg/L				3	-
Ammonia Total as N	0324	6/26/2019	(N)F	0.03	mg/L	U		#	0.03	-
Ammonia Total as N	0324	11/13/2019	(N)F	0.048	mg/L	J			0.03	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:26:37 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Ammonia Total as N	0326	6/18/2019	(N)F	0.03	mg/L	U		#	0.03	-
Ammonia Total as N	0326	11/4/2019	(N)F	0.05	mg/L	J			0.03	-
Ammonia Total as N	0452	8/8/2019	(N)F	7	mg/L			#	0.3	-
Ammonia Total as N	0452	11/12/2019	(N)F	22	mg/L				3	-
Ammonia Total as N	0453	8/8/2019	(N)F	26	mg/L			#	0.3	-
Ammonia Total as N	0575	6/24/2019	(N)F	0.78	mg/L			#	0.03	-
Ammonia Total as N	0575	11/13/2019	(N)F	3.1	mg/L				0.03	-
Arsenic										
Arsenic	0320	8/8/2019	(T)F	0.0068	mg/L			#	0.00039	-
Arsenic	0320	11/12/2019	(T)F	0.003	mg/L				0.00039	-
Arsenic	0322	6/18/2019	(D)F	0.00039	mg/L	U		#	0.00039	-
Arsenic	0322	11/4/2019	(T)F	0.00039	mg/L	U			0.00039	-
Arsenic	0323	6/24/2019	(T)F	0.00061	mg/L	J		#	0.00039	-
Arsenic	0323	6/24/2019	(T)D	0.00043	mg/L	J		#	0.00039	-
Arsenic	0323	11/13/2019	(T)F	0.00086	mg/L	J			0.00039	-
Arsenic	0324	6/26/2019	(D)F	0.0016	mg/L	J		#	0.00039	-
Arsenic	0324	11/13/2019	(T)F	0.00039	mg/L	U			0.00039	-
Arsenic	0326	6/18/2019	(D)F	0.00039	mg/L	U		#	0.00039	-
Arsenic	0326	11/4/2019	(T)F	0.00039	mg/L	U			0.00039	-
Arsenic	0452	8/8/2019	(D)F	0.0066	mg/L			#	0.00039	-
Arsenic	0452	11/12/2019	(T)F	0.0051	mg/L				0.00039	-
Arsenic	0453	8/8/2019	(D)F	0.0057	mg/L			#	0.00039	-
Arsenic	0575	6/24/2019	(D)F	0.0011	mg/L	J		#	0.00039	-
Arsenic	0575	11/13/2019	(D)F	0.0013	mg/L	J			0.00039	-
Calcium										
Calcium	0320	8/8/2019	(T)F	350	mg/L			#	0.21	-
Calcium	0320	11/12/2019	(T)F	450	mg/L				1	-
Calcium	0322	6/18/2019	(D)F	30	mg/L			#	0.21	-
Calcium	0322	11/4/2019	(T)F	66	mg/L				0.21	-
Calcium	0323	6/24/2019	(T)F	530	mg/L			#	1	-
Calcium	0323	6/24/2019	(T)D	530	mg/L			#	1	-
Calcium	0323	11/13/2019	(T)F	560	mg/L				1	-
Calcium	0324	6/26/2019	(D)F	35	mg/L			#	0.21	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:26:37 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Calcium	0324	11/13/2019	(T)F	68	mg/L				0.21	-
Calcium	0326	6/18/2019	(D)F	29	mg/L			#	0.21	-
Calcium	0326	11/4/2019	(T)F	64	mg/L				0.21	-
Calcium	0452	8/8/2019	(D)F	470	mg/L			#	2.1	-
Calcium	0452	11/12/2019	(T)F	640	mg/L				1	-
Calcium	0453	8/8/2019	(D)F	600	mg/L			#	2.1	-
Calcium	0575	6/24/2019	(D)F	520	mg/L			#	1	-
Calcium	0575	11/13/2019	(D)F	560	mg/L				2.1	-
Chloride										
Chloride	0320	8/8/2019	(N)F	360	mg/L			#	3	-
Chloride	0320	11/12/2019	(N)F	490	mg/L				12	-
Chloride	0322	6/18/2019	(N)F	16	mg/L			#	0.061	-
Chloride	0322	11/4/2019	(N)F	180	mg/L				0.61	-
Chloride	0323	6/24/2019	(N)F	360	mg/L			#	3	-
Chloride	0323	6/24/2019	(N)D	360	mg/L			#	3	-
Chloride	0323	11/13/2019	(N)F	450	mg/L				12	-
Chloride	0324	6/26/2019	(N)F	25	mg/L			#	0.61	-
Chloride	0324	11/13/2019	(N)F	190	mg/L				0.61	-
Chloride	0326	6/18/2019	(N)F	16	mg/L			#	0.061	-
Chloride	0326	11/4/2019	(N)F	180	mg/L				0.61	-
Chloride	0452	8/8/2019	(N)F	390	mg/L			#	3	-
Chloride	0452	11/12/2019	(N)F	570	mg/L				12	-
Chloride	0453	8/8/2019	(N)F	350	mg/L			#	3	-
Chloride	0575	6/24/2019	(N)F	660	mg/L			#	6.1	-
Chloride	0575	11/13/2019	(N)F	850	mg/L				12	-
Magnesium										
Magnesium	0320	8/8/2019	(T)F	59	mg/L			#	0.089	-
Magnesium	0320	11/12/2019	(T)F	80	mg/L				0.44	-
Magnesium	0322	6/18/2019	(D)F	6	mg/L			#	0.089	-
Magnesium	0322	11/4/2019	(T)F	14	mg/L				0.089	-
Magnesium	0323	6/24/2019	(T)F	120	mg/L			#	0.44	-
Magnesium	0323	6/24/2019	(T)D	120	mg/L			#	0.44	-
Magnesium	0323	11/13/2019	(T)F	120	mg/L				0.44	-
Magnesium	0324	6/26/2019	(D)F	7.3	mg/L			#	0.089	-
Magnesium	0324	11/13/2019	(T)F	14	mg/L				0.089	-
Magnesium	0326	6/18/2019	(D)F	5.9	mg/L			#	0.089	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:26:37 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Magnesium	0326	11/4/2019	(T)F	13	mg/L				0.089	-
Magnesium	0452	8/8/2019	(D)F	64	mg/L			#	0.089	-
Magnesium	0452	11/12/2019	(T)F	80	mg/L				0.44	-
Magnesium	0453	8/8/2019	(D)F	55	mg/L			#	0.089	-
Magnesium	0575	6/24/2019	(D)F	310	mg/L			#	0.44	-
Magnesium	0575	11/13/2019	(D)F	320	mg/L				0.89	-
Molybdenum										
Molybdenum	0320	8/8/2019	(T)F	0.6	mg/L			#	0.000079	-
Molybdenum	0320	11/12/2019	(T)F	0.59	mg/L				0.000079	-
Molybdenum	0322	6/18/2019	(D)F	0.0038	mg/L			#	0.000079	-
Molybdenum	0322	11/4/2019	(T)F	0.0066	mg/L				0.000079	-
Molybdenum	0323	6/24/2019	(T)F	1.3	mg/L			#	0.000079	-
Molybdenum	0323	6/24/2019	(T)D	1.3	mg/L			#	0.000079	-
Molybdenum	0323	11/13/2019	(T)F	1.3	mg/L				0.000079	-
Molybdenum	0324	6/26/2019	(D)F	0.0047	mg/L			#	0.000079	-
Molybdenum	0324	11/13/2019	(T)F	0.006	mg/L				0.000079	-
Molybdenum	0326	6/18/2019	(D)F	0.0038	mg/L			#	0.000079	-
Molybdenum	0326	11/4/2019	(T)F	0.0059	mg/L				0.000079	-
Molybdenum	0452	8/8/2019	(D)F	0.43	mg/L			#	0.000079	-
Molybdenum	0452	11/12/2019	(T)F	1.8	mg/L				0.000079	-
Molybdenum	0453	8/8/2019	(D)F	1.1	mg/L			#	0.000079	-
Molybdenum	0575	6/24/2019	(D)F	0.68	mg/L			#	0.000079	-
Molybdenum	0575	11/13/2019	(D)F	0.83	mg/L				0.000079	-
Nitrate + Nitrite as Nitrogen										
Nitrate + Nitrite as Nitrogen	0320	8/8/2019	(N)F	0.18	mg/L			#	0.003	-
Nitrate + Nitrite as Nitrogen	0320	11/12/2019	(N)F	0.79	mg/L				0.03	-
Nitrate + Nitrite as Nitrogen	0322	6/18/2019	(N)F	0.096	mg/L			#	0.003	-
Nitrate + Nitrite as Nitrogen	0322	11/4/2019	(N)F	0.056	mg/L				0.003	-
Nitrate + Nitrite as Nitrogen	0323	6/24/2019	(N)F	5.3	mg/L			#	0.03	-
Nitrate + Nitrite as Nitrogen	0323	6/24/2019	(N)D	5.4	mg/L			#	0.03	-
Nitrate + Nitrite as Nitrogen	0323	11/13/2019	(N)F	3.7	mg/L				0.03	-
Nitrate + Nitrite as Nitrogen	0324	6/26/2019	(N)F	0.089	mg/L			#	0.003	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:26:37 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Nitrate + Nitrite as Nitrogen	0324	11/13/2019	(N)F	0.0036	mg/L	J			0.003	-
Nitrate + Nitrite as Nitrogen	0326	6/18/2019	(N)F	0.097	mg/L			#	0.003	-
Nitrate + Nitrite as Nitrogen	0326	11/4/2019	(N)F	0.054	mg/L				0.003	-
Nitrate + Nitrite as Nitrogen	0452	8/8/2019	(N)F	0.0042	mg/L	J		#	0.003	-
Nitrate + Nitrite as Nitrogen	0452	11/12/2019	(N)F	8.1	mg/L				0.03	-
Nitrate + Nitrite as Nitrogen	0453	8/8/2019	(N)F	0.003	mg/L	U		#	0.003	-
Nitrate + Nitrite as Nitrogen	0575	6/24/2019	(N)F	0.12	mg/L			#	0.003	-
Nitrate + Nitrite as Nitrogen	0575	11/13/2019	(N)F	0.11	mg/L				0.003	-
Oxidation Reduction Potential										
Oxidation Reduction Potential	0320	8/8/2019	(N)F	222.5	mV			#	-	-
Oxidation Reduction Potential	0320	11/12/2019	(N)F	221.6	mV				-	-
Oxidation Reduction Potential	0322	6/18/2019	(N)F	179.9	mV			#	-	-
Oxidation Reduction Potential	0322	11/4/2019	(N)F	234	mV				-	-
Oxidation Reduction Potential	0323	6/24/2019	(N)F	283.1	mV			#	-	-
Oxidation Reduction Potential	0323	11/13/2019	(N)F	202	mV				-	-
Oxidation Reduction Potential	0324	6/26/2019	(N)F	219.5	mV			#	-	-
Oxidation Reduction Potential	0324	11/13/2019	(N)F	208	mV				-	-
Oxidation Reduction Potential	0326	6/18/2019	(N)F	176.3	mV			#	-	-
Oxidation Reduction Potential	0326	11/4/2019	(N)F	233	mV				-	-
Oxidation Reduction Potential	0452	8/8/2019	(N)F	189.1	mV			#	-	-
Oxidation Reduction Potential	0452	11/12/2019	(N)F	227	mV				-	-
Oxidation Reduction Potential	0453	8/8/2019	(N)F	185.2	mV			#	-	-
Oxidation Reduction Potential	0575	6/24/2019	(N)F	306.2	mV			#	-	-
Oxidation Reduction Potential	0575	11/13/2019	(N)F	204	mV				-	-
pH										
pH	0320	8/8/2019	(N)F	7.44	s.u.			#	-	-
pH	0320	11/12/2019	(N)F	7.98	s.u.				-	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:26:37 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
pH	0322	6/18/2019	(N)F	7.84	s.u.			#	-	-
pH	0322	11/4/2019	(N)F	8.45	s.u.				-	-
pH	0323	6/24/2019	(N)F	7.83	s.u.			#	-	-
pH	0323	11/13/2019	(N)F	8.2	s.u.				-	-
pH	0324	6/26/2019	(N)F	6.75	s.u.			#	-	-
pH	0324	11/13/2019	(N)F	8.78	s.u.				-	-
pH	0326	6/18/2019	(N)F	7.81	s.u.			#	-	-
pH	0326	11/4/2019	(N)F	8.11	s.u.				-	-
pH	0452	8/8/2019	(N)F	7.46	s.u.			#	-	-
pH	0452	11/12/2019	(N)F	8.07	s.u.				-	-
pH	0453	8/8/2019	(N)F	7.18	s.u.			#	-	-
pH	0575	6/24/2019	(N)F	6.58	s.u.			#	-	-
pH	0575	11/13/2019	(N)F	8.26	s.u.				-	-
Potassium										
Potassium	0320	8/8/2019	(T)F	42	mg/L			#	0.13	-
Potassium	0320	11/12/2019	(T)F	55	mg/L				0.65	-
Potassium	0322	6/18/2019	(D)F	1.5	mg/L			#	0.13	-
Potassium	0322	11/4/2019	(T)F	5.4	mg/L				0.13	-
Potassium	0323	6/24/2019	(T)F	66	mg/L			#	0.65	-
Potassium	0323	6/24/2019	(T)D	66	mg/L			#	0.65	-
Potassium	0323	11/13/2019	(T)F	69	mg/L				0.65	-
Potassium	0324	6/26/2019	(D)F	1.9	mg/L			#	0.13	-
Potassium	0324	11/13/2019	(T)F	5.6	mg/L				0.13	-
Potassium	0326	6/18/2019	(D)F	1.5	mg/L			#	0.13	-
Potassium	0326	11/4/2019	(T)F	5.2	mg/L				0.13	-
Potassium	0452	8/8/2019	(D)F	48	mg/L			#	0.13	-
Potassium	0452	11/12/2019	(T)F	57	mg/L				0.65	-
Potassium	0453	8/8/2019	(D)F	41	mg/L			#	0.13	-
Potassium	0575	6/24/2019	(D)F	130	mg/L			#	0.65	-
Potassium	0575	11/13/2019	(D)F	130	mg/L				1.3	-
Selenium										
Selenium	0320	8/8/2019	(T)F	0.0086	mg/L	J		#	0.00065	-
Selenium	0320	11/12/2019	(T)F	0.0035	mg/L	J			0.00065	-
Selenium	0322	6/18/2019	(D)F	0.00065	mg/L	U		#	0.00065	-
Selenium	0322	11/4/2019	(T)F	0.00065	mg/L	U			0.00065	-
Selenium	0323	6/24/2019	(T)F	0.0074	mg/L	J		#	0.00065	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFN01, Rifle New Processing Site

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PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Selenium	0323	6/24/2019	(T)D	0.0079	mg/L	J		#	0.00065	-
Selenium	0323	11/13/2019	(T)F	0.011	mg/L				0.00065	-
Selenium	0324	6/26/2019	(D)F	0.00065	mg/L	U		#	0.00065	-
Selenium	0324	11/13/2019	(T)F	0.00065	mg/L	U			0.00065	-
Selenium	0326	6/18/2019	(D)F	0.00065	mg/L	U		#	0.00065	-
Selenium	0326	11/4/2019	(T)F	0.00065	mg/L	U			0.00065	-
Selenium	0452	8/8/2019	(D)F	0.0037	mg/L	J		#	0.00065	-
Selenium	0452	11/12/2019	(T)F	0.027	mg/L				0.00065	-
Selenium	0453	8/8/2019	(D)F	0.005	mg/L	J		#	0.00065	-
Selenium	0575	6/24/2019	(D)F	0.0014	mg/L	J		#	0.00065	-
Selenium	0575	11/13/2019	(D)F	0.0016	mg/L	J			0.00065	-
Sodium										
Sodium	0320	8/8/2019	(T)F	350	mg/L			#	0.38	-
Sodium	0320	11/12/2019	(T)F	480	mg/L				0.19	-
Sodium	0322	6/18/2019	(D)F	14	mg/L			#	0.038	-
Sodium	0322	11/4/2019	(T)F	100	mg/L				0.038	-
Sodium	0323	6/24/2019	(T)F	590	mg/L			#	0.19	-
Sodium	0323	6/24/2019	(T)D	580	mg/L			#	0.19	-
Sodium	0323	11/13/2019	(T)F	670	mg/L				0.19	-
Sodium	0324	6/26/2019	(D)F	22	mg/L			#	0.038	-
Sodium	0324	11/13/2019	(T)F	110	mg/L				0.038	-
Sodium	0326	6/18/2019	(D)F	14	mg/L			#	0.038	-
Sodium	0326	11/4/2019	(T)F	100	mg/L				0.038	-
Sodium	0452	8/8/2019	(D)F	380	mg/L			#	0.38	-
Sodium	0452	11/12/2019	(T)F	560	mg/L				0.19	-
Sodium	0453	8/8/2019	(D)F	370	mg/L			#	0.38	-
Sodium	0575	6/24/2019	(D)F	1400	mg/L			#	1.9	-
Sodium	0575	11/13/2019	(D)F	1400	mg/L				0.38	-
Specific Conductance										
Specific Conductance	0320	8/8/2019	(N)F	3443	umhos/cm			#	-	-
Specific Conductance	0320	11/12/2019	(N)F	4584	umhos/cm				-	-
Specific Conductance	0322	6/18/2019	(N)F	268	umhos/cm			#	-	-
Specific Conductance	0322	11/4/2019	(N)F	1020	umhos/cm				-	-
Specific Conductance	0323	6/24/2019	(N)F	5477	umhos/cm			#	-	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:26:37 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Specific Conductance	0323	11/13/2019	(N)F	6180	umhos/cm				-	-
Specific Conductance	0324	6/26/2019	(N)F	347	umhos/cm			#	-	-
Specific Conductance	0324	11/13/2019	(N)F	1376	umhos/cm				-	-
Specific Conductance	0326	6/18/2019	(N)F	271	umhos/cm			#	-	-
Specific Conductance	0326	11/4/2019	(N)F	1021	umhos/cm				-	-
Specific Conductance	0452	8/8/2019	(N)F	2639	umhos/cm			#	-	-
Specific Conductance	0452	11/12/2019	(N)F	5492	umhos/cm				-	-
Specific Conductance	0453	8/8/2019	(N)F	4407	umhos/cm			#	-	-
Specific Conductance	0575	6/24/2019	(N)F	8720	umhos/cm			#	-	-
Specific Conductance	0575	11/13/2019	(N)F	9736	umhos/cm				-	-
Sulfate										
Sulfate	0320	8/8/2019	(N)F	1300	mg/L			#	15	-
Sulfate	0320	11/12/2019	(N)F	2100	mg/L				60	-
Sulfate	0322	6/18/2019	(N)F	27	mg/L			#	0.3	-
Sulfate	0322	11/4/2019	(N)F	120	mg/L				3	-
Sulfate	0323	6/24/2019	(N)F	2500	mg/L			#	15	-
Sulfate	0323	6/24/2019	(N)D	2500	mg/L			#	15	-
Sulfate	0323	11/13/2019	(N)F	2900	mg/L				60	-
Sulfate	0324	6/26/2019	(N)F	35	mg/L			#	0.3	-
Sulfate	0324	11/13/2019	(N)F	120	mg/L				3	-
Sulfate	0326	6/18/2019	(N)F	27	mg/L			#	0.3	-
Sulfate	0326	11/4/2019	(N)F	120	mg/L				3	-
Sulfate	0452	8/8/2019	(N)F	1600	mg/L			#	15	-
Sulfate	0452	11/12/2019	(N)F	2700	mg/L				60	-
Sulfate	0453	8/8/2019	(N)F	2100	mg/L			#	15	-
Sulfate	0575	6/24/2019	(N)F	4400	mg/L			#	30	-
Sulfate	0575	11/13/2019	(N)F	5900	mg/L				60	-
Temperature										
Temperature	0320	8/8/2019	(N)F	22.56	C			#	-	-
Temperature	0320	11/12/2019	(N)F	10.92	C				-	-
Temperature	0322	6/18/2019	(N)F	11.49	C			#	-	-
Temperature	0322	11/4/2019	(N)F	5.37	C				-	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:26:37 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Temperature	0323	6/24/2019	(N)F	19.27	C			#	-	-
Temperature	0323	11/13/2019	(N)F	6.84	C				-	-
Temperature	0324	6/26/2019	(N)F	13.16	C			#	-	-
Temperature	0324	11/13/2019	(N)F	4.72	C				-	-
Temperature	0326	6/18/2019	(N)F	11.53	C			#	-	-
Temperature	0326	11/4/2019	(N)F	5.91	C				-	-
Temperature	0452	8/8/2019	(N)F	23.79	C			#	-	-
Temperature	0452	11/12/2019	(N)F	9.14	C				-	-
Temperature	0453	8/8/2019	(N)F	21.21	C			#	-	-
Temperature	0575	6/24/2019	(N)F	19.44	C			#	-	-
Temperature	0575	11/13/2019	(N)F	6.13	C				-	-
Turbidity										
Turbidity	0320	8/8/2019	(N)F	2.51	NTU			#	-	-
Turbidity	0320	11/12/2019	(N)F	2.97	NTU				-	-
Turbidity	0322	6/18/2019	(N)F	31.7	NTU			#	-	-
Turbidity	0322	11/4/2019	(N)F	1.78	NTU				-	-
Turbidity	0323	6/24/2019	(N)F	2.15	NTU			#	-	-
Turbidity	0323	11/13/2019	(N)F	1.56	NTU				-	-
Turbidity	0324	6/26/2019	(N)F	91.3	NTU			#	-	-
Turbidity	0324	11/13/2019	(N)F	3.41	NTU				-	-
Turbidity	0326	6/18/2019	(N)F	38.8	NTU			#	-	-
Turbidity	0326	11/4/2019	(N)F	1.94	NTU				-	-
Turbidity	0452	8/8/2019	(N)F	13.7	NTU			#	-	-
Turbidity	0452	11/12/2019	(N)F	1.94	NTU				-	-
Turbidity	0453	8/8/2019	(N)F	33.6	NTU			#	-	-
Turbidity	0575	6/24/2019	(N)F	19.5	NTU			#	-	-
Turbidity	0575	11/13/2019	(N)F	11.4	NTU				-	-
Uranium										
Uranium	0320	8/8/2019	(T)F	0.1	mg/L			#	0.0000049	-
Uranium	0320	11/12/2019	(T)F	0.1	mg/L				0.0000049	-
Uranium	0322	6/18/2019	(D)F	0.00081	mg/L			#	0.0000049	-
Uranium	0322	11/4/2019	(T)F	0.0022	mg/L				0.0000049	-
Uranium	0323	6/24/2019	(T)F	0.19	mg/L			#	0.0000049	-
Uranium	0323	6/24/2019	(T)D	0.18	mg/L			#	0.0000049	-
Uranium	0323	11/13/2019	(T)F	0.19	mg/L				0.0000049	-
Uranium	0324	6/26/2019	(D)F	0.0011	mg/L			#	0.0000049	-

SURFACE WATER QUALITY DATA BY PARAMETER (EQuIS800) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 1/14/2020 7:26:37 AM

PARAMETER	LOCATION CODE	SAMPLE DATE	SAMPLE TYPE	RESULT	UNITS	QUALIFIERS LAB/DATA		QA	DETECT. LIMIT	UNCERTAINTY
Uranium	0324	11/13/2019	(T)F	0.0023	mg/L				0.0000049	-
Uranium	0326	6/18/2019	(D)F	0.00075	mg/L			#	0.0000049	-
Uranium	0326	11/4/2019	(T)F	0.0022	mg/L				0.0000049	-
Uranium	0452	8/8/2019	(D)F	0.067	mg/L			#	0.0000049	-
Uranium	0452	11/12/2019	(T)F	0.15	mg/L				0.0000049	-
Uranium	0453	8/8/2019	(D)F	0.082	mg/L			#	0.0000049	-
Uranium	0575	6/24/2019	(D)F	0.16	mg/L			#	0.0000049	-
Uranium	0575	11/13/2019	(D)F	0.2	mg/L				0.0000049	-
Vanadium										
Vanadium	0320	8/8/2019	(T)F	0.061	mg/L			#	0.00012	-
Vanadium	0320	11/12/2019	(T)F	0.021	mg/L				0.00012	-
Vanadium	0322	6/18/2019	(D)F	0.00093	mg/L	J		#	0.00012	-
Vanadium	0322	11/4/2019	(T)F	0.00071	mg/L	J			0.00012	-
Vanadium	0323	6/24/2019	(T)F	0.0015	mg/L	J		#	0.00012	-
Vanadium	0323	6/24/2019	(T)D	0.0023	mg/L	J		#	0.00012	-
Vanadium	0323	11/13/2019	(T)F	0.0016	mg/L	J			0.00012	-
Vanadium	0324	6/26/2019	(D)F	0.00061	mg/L	J		#	0.00012	-
Vanadium	0324	11/13/2019	(T)F	0.0006	mg/L	J			0.00012	-
Vanadium	0326	6/18/2019	(D)F	0.00041	mg/L	J		#	0.00012	-
Vanadium	0326	11/4/2019	(T)F	0.00082	mg/L	J			0.00012	-
Vanadium	0452	8/8/2019	(D)F	0.054	mg/L			#	0.00012	-
Vanadium	0452	11/12/2019	(T)F	0.32	mg/L				0.00012	-
Vanadium	0453	8/8/2019	(D)F	0.046	mg/L			#	0.00012	-
Vanadium	0575	6/24/2019	(D)F	0.00091	mg/L	J		#	0.00012	-
Vanadium	0575	11/13/2019	(D)F	0.0017	mg/L	J			0.00012	-

LAB QUALIFIERS:

J Estimated Value.

U Parameter analyzed for but was not detected.

SAMPLE TYPES:
(T) Total (for metal concentrations)
(D) Dissolved (for dissolved or filtered metal concentrations)
(N) Organic (or other) constituents for which neither total nor dissolved is applicable

Type Codes: F-Field Sample R-Replicate FR-Field Sample with Replicates
D-Duplicate N-Not Known S-Split Sample

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

Appendix C

Detailed Mann-Kendall Trend Test Results

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Table C.1. Mann-Kendall Trend Test Results for Old Rifle Site Wells
Time Frame Evaluated: 1998–2019

Analyte	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Uranium	0304	5/19/1998	11/7/2019	49	0	0.045	-101	-0.087	0.39	No Trend
	0305	5/19/1998	11/7/2019	48	0	0.070	243	0.217	0.031	Increasing*
	0309	5/19/1998	11/7/2019	49	0	0.017	-40	-0.035	0.74	No Trend
	0310	5/19/1998	11/7/2019	49	0	0.074	-593	-0.514	<0.0001	Decreasing
	0655	5/18/1998	11/7/2019	49	0	0.130	-294	-0.258	0.011	Decreasing*
	0656	5/20/1998	11/7/2019	49	0	0.240	773	0.665	<0.0001	Increasing
	0292A	4/14/2009	11/7/2019	28	0	0.029	-8	-0.022	0.89	No Trend
	0658	5/21/1998	11/7/2019	38	0	0.014	-394	-0.565	<0.0001	Decreasing
Selenium	0304	5/19/1998	11/7/2019	49	2	0.001	-609	-0.522	<0.0001	Decreasing
	0305	5/19/1998	11/7/2019	48	0	0.011	-897	-0.797	<0.0001	Decreasing
	0309	5/19/1998	11/7/2019	49	29	<0.00065	303	0.262	0.009	Increasing*
	0310	5/19/1998	11/7/2019	49	20	<0.00065	394	0.337	0.001	Increasing*
	0655	5/18/1998	11/7/2019	49	0	0.067	183	0.156	0.12	No Trend
	0656	5/20/1998	11/7/2019	49	2	0.002	-246	-0.210	0.035	Decreasing
	0292A	4/14/2009	11/7/2019	28	6	0.001	8	0.021	0.89	No Trend
	0658	5/21/1998	11/7/2019	38	2	0.018	11	0.016	0.90	No Trend
Vanadium	0304	5/19/1998	11/7/2019	49	0	0.022	-450	-0.385	0.0001	Decreasing
	0305	5/19/1998	11/7/2019	48	0	0.340	-600	-0.534	<0.0001	Decreasing
	0309	5/19/1998	11/7/2019	49	27	0.0006	92	0.079	0.43	None
	0310	5/19/1998	11/7/2019	49	0	0.008	-595	-0.528	<0.0001	Decreasing
	0655	5/18/1998	11/7/2019	49	0	0.27	-660	-0.571	<0.0001	Decreasing
	0656	5/20/1998	11/7/2019	49	0	0.048	-255	-0.220	0.028	Decreasing†
	0292A	4/14/2009	11/7/2019	28	9	0.0004	92	0.244	0.072	No Trend
	0658	5/21/1998	11/7/2019	38	8	0.0012	-62	-0.089	0.44	No Trend‡

0.017 Most recent result less than the corresponding benchmark: 0.044 mg/L uranium, 0.05 mg/L selenium, and 0.33 mg/L vanadium (Table 1).

Significant increasing trend based on Mann-Kendall test.

Significant decreasing trend based on Mann-Kendall test.

* No trend indicated using only data from 2010–2019 (*n* = 26 measurements)

† Increasing trend indicated using only data from 2010–2019

‡ Decreasing trend indicated using only data from 2010–2019

Notes:

Trend tests were run using the "Kendall" package in R, version 2.2 (McLeod 2011). Test statistics shown are the S statistic, Kendall's tau, and the two-sided *p* value. The null hypothesis of no change is rejected when S is significantly different from zero ($p \leq 0.05$), indicating a monotonic trend over time.

Trend test results for selenium in wells 0309 and 0310 should be interpreted with caution given the large proportion of nondetects in the dataset.

Wells 0292A and 0658 are Old Rifle site background wells (results not listed in Table 4).

Abbreviations:

n = number of samples

n ND = number of nondetects

Table C.2. Mann-Kendall Trend Test Results for Old Rifle Site Wells
Time Frame Evaluated: 2010–2019

Analyte	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Uranium	0304	4/28/2010	11/7/2019	26	0	0.045	67	0.210	0.14	No Trend
	0305	4/28/2010	11/7/2019	26	0	0.070	-48	-0.149	0.30	No Trend
	0309	4/28/2010	11/7/2019	26	0	0.017	-4	-0.013	0.95	No Trend
	0310	4/29/2010	11/7/2019	26	0	0.074	-183	-0.587	0.0001	Decreasing
	0655	4/28/2010	11/7/2019	26	0	0.130	-19	-0.061	0.69	No Trend
	0656	4/28/2010	11/7/2019	26	0	0.240	103	0.326	0.024	Increasing
	0658	4/29/2010	11/7/2019	26	0	0.014	-97	-0.302	0.034	Decreasing
Selenium	0304	4/28/2010	11/7/2019	26	2	0.001	-163	-0.511	0.0003	Decreasing
	0305	4/28/2010	11/7/2019	26	0	0.011	-254	-0.785	<0.0001	Decreasing
	0309	4/28/2010	11/7/2019	26	11	<0.00065	88	0.280	0.053	No Trend
	0310	4/29/2010	11/7/2019	26	8	<0.00065	40	0.124	0.39	No Trend
	0655	4/28/2010	11/7/2019	26	0	0.067	63	0.194	0.17	No Trend
	0656	4/28/2010	11/7/2019	26	1	0.002	-92	-0.284	0.045	Decreasing
	0658	4/29/2010	11/7/2019	26	2	0.018	-35	-0.109	0.45	No Trend
Vanadium	0304	4/28/2010	11/7/2019	26	0	0.022	-125	-0.388	0.006	Decreasing
	0305	4/28/2010	11/7/2019	26	0	0.340	-105	-0.326	0.022	Decreasing
	0309	4/28/2010	11/7/2019	26	9	0.0006	22	0.068	0.64	No Trend
	0310	4/29/2010	11/7/2019	26	0	0.008	-178	-0.566	0.0001	Decreasing
	0655	4/28/2010	11/7/2019	26	0	0.27	-128	-0.406	0.005	Decreasing
	0656	4/28/2010	11/7/2019	26	0	0.048	101	0.320	0.027	Increasing
	0658	4/28/2010	11/7/2019	26	6	0.0012	-112	-0.346	0.014	Decreasing

0.017 Most recent result less than the corresponding benchmark: 0.044 mg/L uranium; 0.05 mg/L selenium; and 0.33 mg/L vanadium (Table 1).
Significant increasing trend based on Mann-Kendall test.
Significant decreasing trend based on Mann-Kendall test.

Notes:
Trend tests were run using the "Kendall" package in R, version 2.2 (McLeod 2011). Test statistics shown are the S statistic, Kendall's tau, and the two-sided *p* value. The null hypothesis of no change is rejected when S is significantly different from zero ($p \leq 0.05$), indicating a monotonic trend over time.
Well 0658 is an Old Rifle site background well.

Abbreviations:
n = number of samples
n ND = number of nondetects

Table C.3a. Mann-Kendall Trend Test Results for Uranium in New Rifle Site Wells: 1998–2019

Area	Well	Initial Date	Final Date	*n*	Most Recent	Mann-Kendall Test Statistics and Results			
					Result (mg/L)	S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	8/13/1998	11/12/2019	39	0.048	-449	-0.607	<0.0001	Decreasing
Onsite	0659	8/13/1998	11/12/2019	41	0.088	-341	-0.420	0.0001	Decreasing*
Onsite	0664	12/14/1999	11/12/2019	40	0.058	-388	-0.500	<0.0001	Decreasing*
Onsite	0669	12/14/1999	11/12/2019	40	0.064	-197	-0.254	0.022	Decreasing
Onsite	0670	12/14/1999	11/12/2019	31	0.064	-145	-0.315	0.014	Decreasing*
Onsite	0855	4/28/2000	11/12/2019	39	0.044	-276	-0.374	0.001	Decreasing*
Onsite	0215	8/14/1998	11/12/2019	45	0.013	330	0.337	0.001	Increasing†
Onsite	0216	8/18/1998	11/12/2019	41	0.023	-1	-0.001	1.0	None
Adjacent	0217	8/18/1998	11/12/2019	35	0.12	127	0.225	0.07	None†
Adjacent	0590	8/12/1998	11/12/2019	44	0.074	79	0.084	0.43	None
Adjacent	0201	8/18/1998	11/12/2019	39	0.094	-14	-0.019	0.87	None
Adjacent	0635	8/18/1998	11/13/2019	31	0.039	-205	-0.443	0.001	Decreasing
Downgradient	0195	8/19/1998	11/13/2019	31	0.0096	-334	-0.722	<0.0001	Decreasing*
Downgradient	0170	8/20/1998	11/13/2019	35	0.060	-23	-0.039	0.75	None‡
Downgradient	0620	8/17/1998	11/13/2019	37	0.058	28	0.043	0.72	None
Downgradient	0172	8/19/1998	11/13/2019	41	0.014	-369	-0.453	<0.0001	Decreasing
Background	0169	8/20/1998	11/12/2019	35	0.021	-316	-0.536	<0.0001	Decreasing*

0.044 Most recent result ≤0.044 mg/L 40 CFR 192 MCL (Table 2).
Significant increasing trend based on Mann-Kendall test.
Significant decreasing trend based on Mann-Kendall test.
* No trend indicated using only data from 2010–2019
† Decreasing trend indicated using only data from 2010–2019
‡ Increasing trend indicated using only data from 2010–2019

Notes:
Trend tests were run using the "Kendall" package in R, version 2.2 (McLeod 2011). Test statistics shown are the S statistic, Kendall's tau, and the two-sided *p* value. The null hypothesis of no change is rejected when S is significantly different from zero ($p \leq 0.05$), indicating a monotonic trend over time. Tables C.3a and C.3b provide details supporting the summary in Table 6.
Abbreviation: *n* = number of samples

Table C.3b. Mann-Kendall Trend Test Results for Uranium in New Rifle Site Wells: 2010–2019

Area	Well	Initial Date	Final Date	*n*	Most Recent	Mann-Kendall Test Statistics and Results			
					Result (mg/L)	S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	6/23/2010	11/12/2019	20	0.048	-66	-0.349	0.035	Decreasing
Onsite	0659	6/23/2010	11/12/2019	20	0.088	-54	-0.290	0.08	None
Onsite	0664	6/23/2010	11/12/2019	20	0.058	-55	-0.293	0.08	None
Onsite	0669	6/23/2010	11/12/2019	20	0.064	-113	-0.596	0.0003	Decreasing
Onsite	0670	6/23/2010	11/12/2019	20	0.064	-60	-0.319	0.05	None
Onsite	0855	6/23/2010	11/12/2019	20	0.044	-28	-0.149	0.38	None
Onsite	0215	6/24/2010	11/12/2019	20	0.013	-71	-0.379	0.023	Decreasing
Onsite	0216	6/24/2010	11/12/2019	20	0.023	27	0.145	0.40	None
Adjacent	0217	6/22/2010	11/12/2019	20	0.12	-63	-0.356	0.040	Decreasing
Adjacent	0590	6/22/2010	11/12/2019	19	0.074	18	0.106	0.55	None
Adjacent	0201	6/22/2010	11/12/2019	19	0.094	38	0.226	0.19	None
Adjacent	0635	6/24/2010	11/13/2019	15	0.039	-60	-0.574	0.003	Decreasing
Downgradient	0195	6/22/2010	11/13/2019	17	0.0096	-45	-0.335	0.07	None
Downgradient	0170	6/24/2010	11/13/2019	20	0.060	98	0.533	0.002	Increasing
Downgradient	0620	6/24/2010	11/13/2019	25	0.058	-66	-0.226	0.13	None
Downgradient	0172	6/24/2010	11/13/2019	25	0.014	-221	-0.745	<0.0001	Decreasing
Background	0169	6/24/2010	11/12/2019	20	0.021	40	0.216	0.20	None

Refer to notes for Table C.3a above.

Table C.4a. Mann-Kendall Trend Test Results for Molybdenum in New Rifle Site Wells: 1998–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	8/13/1998	11/12/2019	38	0	2.6	-297	-0.424	0.0002	Decreasing*
Onsite	0659	8/13/1998	11/12/2019	40	0	1.0	-683	-0.885	<0.0001	Decreasing
Onsite	0664	12/14/1999	11/12/2019	33	0	0.37	-289	-0.553	<0.0001	Decreasing*
Onsite	0669	12/14/1999	11/12/2019	33	0	0.56	-405	-0.772	<0.0001	Decreasing
Onsite	0670	12/14/1999	11/12/2019	30	0	0.20	-144	-0.340	0.010	Decreasing
Onsite	0855	4/28/2000	11/12/2019	35	0	0.48	-410	-0.691	<0.0001	Decreasing
Onsite	0215	8/14/1998	11/12/2019	40	1	0.013	-426	-0.553	<0.0001	Decreasing*
Onsite	0216	8/18/1998	11/12/2019	40	0	0.058	-96	-0.124	0.27	None
Adjacent	0217	8/18/1998	11/12/2019	34	0	1.3	-283	-0.529	<0.0001	Decreasing
Adjacent	0590	8/12/1998	11/12/2019	39	0	1.3	-286	-0.394	0.001	Decreasing*
Adjacent	0201	8/18/1998	11/12/2019	35	0	1.4	-437	-0.754	<0.0001	Decreasing
Adjacent	0635	8/18/1998	11/13/2019	31	0	0.37	-272	-0.596	<0.0001	Decreasing*
Downgradient	0195	8/19/1998	11/13/2019	31	0	0.012	-307	-0.666	<0.0001	Decreasing
Downgradient	0170	8/20/1998	11/13/2019	35	4	0.003	-335	-0.570	<0.0001	Decreasing
Downgradient	0620	8/17/1998	11/13/2019	37	0	0.010	-226	-0.342	0.003	Decreasing*
Downgradient	0172	8/19/1998	11/13/2019	41	3	0.009	66	0.081	0.46	None‡
Background	0169	8/20/1998	11/12/2019	35	4	0.003	-260	-0.440	0.0002	Decreasing

0.013 Most recent result ≤0.1 mg/L 40 CFR 192 MCL (Table 2).

Significant increasing trend based on Mann-Kendall test.

Significant decreasing trend based on Mann-Kendall test.

* No trend indicated using only data from 2010–2019

‡ Increasing trend indicated using only data from 2010–2019

Notes:

Trend tests were run using the "Kendall" package in R, version 2.2 (McLeod 2011). Test statistics shown are the S statistic, Kendall's tau, and the two-sided *p* value. The null hypothesis of no change is rejected when S is significantly different from zero ($p \leq 0.05$), indicating a monotonic trend over time. Tables C.4a and C.4b provide details supporting the summary in Table 6.

Abbreviations: *n* = number of samples; *n* ND = number of nondetects

Table C.4b. Mann-Kendall Trend Test Results for Molybdenum in New Rifle Site Wells: 2010–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	6/23/2010	11/12/2019	20	0	2.6	44	0.235	0.16	None
Onsite	0659	6/23/2010	11/12/2019	20	0	1.0	-124	-0.674	0.0001	Decreasing
Onsite	0664	6/23/2010	11/12/2019	20	0	0.37	-35	-0.189	0.27	None
Onsite	0669	6/23/2010	11/12/2019	20	0	0.56	-128	-0.677	<0.0001	Decreasing
Onsite	0670	6/23/2010	11/12/2019	20	0	0.20	-73	-0.394	0.02	Decreasing
Onsite	0855	6/23/2010	11/12/2019	20	0	0.48	-125	-0.660	0.0001	Decreasing
Onsite	0215	6/24/2010	11/12/2019	20	0	0.013	-11	-0.060	0.74	None
Onsite	0216	6/24/2010	11/12/2019	20	0	0.058	-15	-0.080	0.65	None
Adjacent	0217	6/22/2010	11/12/2019	20	0	1.3	-60	-0.342	0.049	Decreasing
Adjacent	0590	6/22/2010	11/12/2019	19	0	1.3	-13	-0.079	0.67	None
Adjacent	0201	6/22/2010	11/12/2019	19	0	1.4	-91	-0.566	0.001	Decreasing
Adjacent	0635	6/24/2010	11/13/2019	15	0	0.37	-33	-0.327	0.11	None
Downgradient	0195	6/22/2010	11/13/2019	17	0	0.012	-69	-0.521	0.005	Decreasing
Downgradient	0170	6/24/2010	11/13/2019	20	0	0.003	-124	-0.667	0.0001	Decreasing
Downgradient	0620	6/24/2010	11/13/2019	25	0	0.010	3	0.010	0.96	None
Downgradient	0172	6/24/2010	11/13/2019	25	0	0.009	138	0.463	0.001	Increasing
Background	0169	6/24/2010	11/12/2019	20	1	0.003	-69	-0.366	0.027	Decreasing

Refer to notes for Table C.4a above.

Table C.5a. Mann-Kendall Trend Test Results for Nitrate as N in New Rifle Site Wells: 1998–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	8/13/1998	11/12/2019	38	0	5.4	-150	-0.214	0.061	None
Onsite	0659	8/13/1998	11/12/2019	40	0	0.87	-421	-0.542	<0.0001	Decreasing*
Onsite	0664	12/14/1999	11/12/2019	33	0	4.4	21	0.040	0.76	None
Onsite	0669	12/14/1999	11/12/2019	33	0	2.7	3	0.006	0.98	None
Onsite	0670	12/14/1999	11/12/2019	30	0	12	-57	-0.132	0.32	None
Onsite	0855	6/14/2001	11/12/2019	34	1	8.8	-20	-0.036	0.78	None
Onsite	0215	8/14/1998	11/12/2019	40	16	0.003	-43	-0.056	0.62	None
Onsite	0216	8/18/1998	11/12/2019	40	22	0.15	-51	-0.069	0.55	None
Adjacent	0217	8/18/1998	11/12/2019	34	8	0.016	-306	-0.551	<0.0001	Decreasing
Adjacent	0590	8/12/1998	11/12/2019	39	0	13	-172	-0.233	0.039	Decreasing*
Adjacent	0201	8/18/1998	11/12/2019	35	0	25	-408	-0.689	<0.0001	Decreasing
Adjacent	0635	8/18/1998	11/13/2019	31	0	1.7	-182	-0.392	0.002	Decreasing
Downgradient	0195	8/19/1998	11/13/2019	31	19	0.003	-326	-0.771	<0.0001	Decreasing
Downgradient	0170	8/20/1998	11/13/2019	35	0	13	-233	-0.398	0.001	Decreasing*
Downgradient	0620	8/17/1998	11/13/2019	32	3	1.0	-22	-0.044	0.73	None†
Downgradient	0172	8/19/1998	11/13/2019	36	16	0.30	67	0.110	0.36	None
Background	0169	8/20/1998	11/12/2019	35	3	0.23	-357	-0.601	<0.0001	Decreasing*

5.4 Most recent result ≤10 mg/L 40 CFR 192 MCL (Table 2).
Significant increasing trend based on Mann-Kendall test.
Significant decreasing trend based on Mann-Kendall test.
* No trend indicated using only data from 2010–2019
† Decreasing trend indicated using only data from 2010–2019

Notes:
Trend tests were run using the "Kendall" package in R, version 2.2 (McLeod 2011). Test statistics shown are the S statistic, Kendall's tau, and the two-sided *p* value. The null hypothesis of no change is rejected when S is significantly different from zero ($p \leq 0.05$), indicating a monotonic trend over time. Tables C.5a and C.5b provide details supporting the summary in Table 6.

Abbreviations: *n* = number of samples; *n* ND = number of nondetects

Table C.5b. Mann-Kendall Trend Test Results for Nitrate as N in New Rifle Site Wells: 2010–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	6/23/2010	11/12/2019	20	0	5.4	-15	-0.079	0.65	None
Onsite	0659	6/23/2010	11/12/2019	20	0	0.87	8	0.043	0.82	None
Onsite	0664	6/23/2010	11/12/2019	20	0	4.4	-47	-0.248	0.14	None
Onsite	0669	6/23/2010	11/12/2019	20	0	2.7	11	0.058	0.75	None
Onsite	0670	6/23/2010	11/12/2019	20	0	12	-10	-0.053	0.77	None
Onsite	0855	6/23/2010	11/12/2019	20	0	8.8	-31	-0.164	0.33	None
Onsite	0215	6/24/2010	11/12/2019	20	10	0.003	-51	-0.280	0.10	None
Onsite	0216	6/24/2010	11/12/2019	20	16	0.15	-24	-0.145	0.42	None
Adjacent	0217	6/22/2010	11/12/2019	20	8	0.016	-65	-0.352	0.036	Decreasing
Adjacent	0590	6/22/2010	11/12/2019	19	0	13	-49	-0.288	0.09	None
Adjacent	0201	6/22/2010	11/12/2019	19	0	25	-82	-0.487	0.004	Decreasing
Adjacent	0635	6/24/2010	11/13/2019	15	0	1.7	-55	-0.524	0.008	Decreasing
Downgradient	0195	6/22/2010	11/13/2019	17	17	0.003	-48	-0.466	0.022	Decreasing
Downgradient	0170	6/24/2010	11/13/2019	20	0	13	9	0.050	0.79	None
Downgradient	0620	6/24/2010	11/13/2019	20	0	1.0	-155	-0.818	<0.0001	Decreasing
Downgradient	0172	6/24/2010	11/13/2019	20	8	0.30	25	0.138	0.43	None
Background	0169	6/24/2010	11/12/2019	20	3	0.23	-26	-0.138	0.42	None

Refer to notes for Table C.5a above.

Table C.6a. Mann-Kendall Trend Test Results for Vanadium in New Rifle Site Wells: 1998–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	8/13/1998	11/12/2019	40	0	28.0	290	0.374	0.001	Increasing†
Onsite	0659	8/13/1998	11/12/2019	42	0	1.8	-198	-0.231	0.033	Decreasing*
Onsite	0664	12/14/1999	11/12/2019	42	0	0.81	-58	-0.068	0.54	None
Onsite	0669	12/14/1999	11/12/2019	41	0	4.0	-28	-0.035	0.76	None
Onsite	0670	12/14/1999	11/12/2019	33	0	1.8	-323	-0.623	<0.0001	Decreasing*
Onsite	0855	4/28/2000	11/12/2019	40	0	15.0	-207	-0.267	0.016	Decreasing
Onsite	0215	8/14/1998	11/12/2019	47	18	0.003	370	0.346	0.001	Increasing*
Onsite	0216	8/18/1998	11/12/2019	43	0	0.30	-285	-0.318	0.003	Decreasing‡
Adjacent	0217	8/18/1998	11/12/2019	37	0	1.4	-116	-0.178	0.13	None
Adjacent	0590	8/12/1998	11/12/2019	45	0	0.38	276	0.282	0.007	Increasing*
Adjacent	0201	8/18/1998	11/12/2019	35	17	0.0008	-75	-0.127	0.29	None
Adjacent	0635	8/18/1998	11/13/2019	27	10	0.0005	-64	-0.186	0.19	None
Downgradient	0195	8/19/1998	11/13/2019	27	12	0.0005	26	0.075	0.60	None
Downgradient	0170	8/20/1998	11/13/2019	30	11	0.0008	-43	-0.101	0.45	None
Downgradient	0620	8/17/1998	11/13/2019	28	8	0.002	103	0.277	0.043	Increasing*
Downgradient	0172	8/19/1998	11/13/2019	31	16	0.0004	-94	-0.203	0.11	None
Background	0169	8/20/1998	11/12/2019	31	11	0.001	19	0.041	0.76	None

0.003 Most recent result ≤0.086 mg/L EPA risk-based level (Table 2).
Significant increasing trend based on Mann-Kendall test.
Significant decreasing trend based on Mann-Kendall test.
* No trend indicated using only data from 2010–2019
† Decreasing trend indicated using only data from 2010–2019
‡ Increasing trend indicated using only data from 2010–2019

Notes:
Trend tests were run using the "Kendall" package in R, version 2.2 (McLeod 2011). Test statistics shown are the S statistic, Kendall's tau, and the two-sided *p* value. The null hypothesis of no change is rejected when S is significantly different from zero ($p \leq 0.05$), indicating a monotonic trend over time. Tables C.6a and C.6b provide details supporting the summary in Table 6.
Abbreviations: *n* = number of samples; *n* ND = number of nondetects

Table C.6b. Mann-Kendall Trend Test Results for Vanadium in New Rifle Site Wells: 2010–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	6/23/2010	11/12/2019	20	0	28.0	-68	-0.364	0.03	Decreasing
Onsite	0659	6/23/2010	11/12/2019	20	0	1.8	10	0.053	0.77	None
Onsite	0664	6/23/2010	11/12/2019	20	0	0.81	-11	-0.059	0.74	None
Onsite	0669	6/23/2010	11/12/2019	20	0	4.0	39	0.208	0.22	None
Onsite	0670	6/23/2010	11/12/2019	20	0	1.8	-24	-0.133	0.45	None
Onsite	0855	6/23/2010	11/12/2019	20	0	15.0	-103	-0.546	0.00	Decreasing
Onsite	0215	6/24/2010	11/12/2019	20	4	0.003	-11	-0.060	0.74	None
Onsite	0216	6/24/2010	11/12/2019	20	0	0.30	89	0.475	0.00	Increasing
Adjacent	0217	6/22/2010	11/12/2019	20	0	1.4	-55	-0.298	0.078	None
Adjacent	0590	6/22/2010	11/12/2019	19	0	0.38	1	0.006	1.00	None
Adjacent	0201	11/16/2011	11/12/2019	16	7	0.0008	10	0.084	0.685	None
Adjacent	0635	11/17/2011	11/13/2019	12	2	0.0005	-3	-0.046	0.891	None
Downgradient	0195	11/17/2011	11/13/2019	14	4	0.0005	8	0.088	0.701	None
Downgradient	0170	11/21/2011	11/13/2019	17	4	0.0008	-4	-0.030	0.90	None
Downgradient	0620	11/16/2011	11/13/2019	17	3	0.002	22	0.164	0.3854	None
Downgradient	0172	11/16/2011	11/13/2019	17	8	0.0004	-10	-0.074	0.71	None
Background	0169	11/18/2011	11/12/2019	17	5	0.001	11	0.082	0.68	None

Refer to notes for Table C.6a above.

Table C.7a. Mann-Kendall Trend Test Results for Selenium in New Rifle Site Wells: 1998–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	8/13/1998	11/12/2019	37	0	1.0	209	0.316	0.006	Increasing†
Onsite	0659	8/13/1998	11/12/2019	38	0	0.038	-20	-0.029	0.81	None
Onsite	0664	12/14/1999	11/12/2019	31	0	0.44	281	0.619	<0.0001	Increasing
Onsite	0669	12/14/1999	11/12/2019	31	0	0.056	88	0.190	0.14	None‡
Onsite	0670	12/14/1999	11/12/2019	29	0	0.37	116	0.289	0.031	Increasing*
Onsite	0855	6/14/2001	11/12/2019	33	0	0.68	-47	-0.090	0.48	None†
Onsite	0215	8/14/1998	11/12/2019	39	14	0.0007	114	0.155	0.17	None
Onsite	0216	8/18/1998	11/12/2019	39	10	0.001	-15	-0.020	0.87	None‡
Adjacent	0217	8/18/1998	11/12/2019	32	0	0.004	-130	-0.263	0.036	Decreasing
Adjacent	0590	8/12/1998	11/12/2019	37	0	0.030	212	0.320	0.006	Increasing*
Adjacent	0201	8/18/1998	11/12/2019	33	0	0.076	207	0.393	0.001	Increasing*
Adjacent	0635	8/18/1998	11/13/2019	29	2	0.007	-2	-0.005	0.99	None‡
Downgradient	0195	8/19/1998	11/13/2019	29	12	0.0007	-48	-0.119	0.38	None
Downgradient	0170	8/20/1998	11/13/2019	32	0	0.026	426	0.862	<0.0001	Increasing
Downgradient	0620	8/17/1998	11/13/2019	35	5	0.013	244	0.415	0.001	Increasing*
Downgradient	0172	8/19/1998	11/13/2019	38	19	0.001	205	0.295	0.010	Increasing*
Background	0169	8/20/1998	11/12/2019	33	1	0.005	-247	-0.469	0.0001	Decreasing*

0.038 Most recent result ≤0.05 mg/L Safe Drinking Water Act maximum contaminant level (Table 2).
Significant increasing trend based on Mann-Kendall test.
Significant decreasing trend based on Mann-Kendall test.
* No trend indicated using only data from 2010–2019
† Decreasing trend indicated using only data from 2010–2019
‡ Increasing trend indicated using only data from 2010–2019

Notes:
Trend tests were run using the "Kendall" package in R, version 2.2 (McLeod 2011). Test statistics shown are the S statistic, Kendall's tau, and the two-sided *p* value. The null hypothesis of no change is rejected when S is significantly different from zero ($p \leq 0.05$), indicating a monotonic trend over time. Tables C.7a and C.7b provide details supporting the summary in Table 6.
Abbreviations: *n* = number of samples; *n* ND = number of nondetects

Table C.7b. Mann-Kendall Trend Test Results for Selenium in New Rifle Site Wells: 2010–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	11/17/2010	11/12/2019	19	0	1.0	-80	-0.481	0.005	Decreasing
Onsite	0659	11/18/2010	11/12/2019	19	0	0.038	45	0.266	0.12	None
Onsite	0664	11/18/2010	11/12/2019	19	0	0.44	84	0.511	0.003	Increasing
Onsite	0669	11/17/2010	11/12/2019	19	0	0.056	58	0.340	0.046	Increasing
Onsite	0670	11/18/2010	11/12/2019	19	0	0.37	16	0.095	0.60	None
Onsite	0855	11/17/2010	11/12/2019	19	0	0.68	-113	-0.669	0.0001	Decreasing
Onsite	0215	11/16/2010	11/12/2019	19	8	0.0007	-15	-0.089	0.62	None
Onsite	0216	11/18/2010	11/12/2019	19	6	0.001	62	0.364	0.033	Increasing
Adjacent	0217	11/18/2010	11/12/2019	19	0	0.004	-110	-0.645	0.0001	Decreasing
Adjacent	0590	11/18/2010	11/12/2019	18	0	0.030	-20	-0.131	0.47	None
Adjacent	0201	11/16/2010	11/12/2019	18	0	0.076	16	0.105	0.57	None
Adjacent	0635	11/17/2010	11/13/2019	14	2	0.007	37	0.407	0.049	Increasing
Downgradient	0195	11/17/2010	11/13/2019	16	10	0.0007	20	0.171	0.39	None
Downgradient	0170	11/16/2010	11/13/2019	19	0	0.026	148	0.873	<0.0001	Increasing
Downgradient	0620	11/17/2010	11/13/2019	24	0	0.013	-58	-0.214	0.16	None
Downgradient	0172	11/17/2010	11/13/2019	24	11	0.001	61	0.226	0.14	None
Background	0169	11/18/2010	11/12/2019	19	1	0.005	27	0.159	0.36	None

Refer to notes for Table C.7a above.

Table C.8a. Mann-Kendall Trend Test Results for Arsenic in New Rifle Site Wells: 1998–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	8/13/1998	11/12/2019	37	0	0.10	86	0.130	0.27	None
Onsite	0659	8/13/1998	11/12/2019	38	0	0.028	-133	-0.189	0.10	None
Onsite	0664	12/14/1999	11/12/2019	31	1	0.002	58	0.126	0.33	None
Onsite	0669	12/14/1999	11/12/2019	31	0	0.008	62	0.134	0.30	None
Onsite	0670	12/14/1999	11/12/2019	29	0	0.004	-170	-0.426	0.001	Decreasing*
Onsite	0855	4/28/2000	11/12/2019	34	0	0.33	-50	-0.090	0.47	None†
Onsite	0215	8/14/1998	11/12/2019	39	13	0.0004	-86	-0.117	0.30	None
Onsite	0216	8/18/1998	11/12/2019	39	0	0.029	41	0.056	0.63	None
Adjacent	0217	8/18/1998	11/12/2019	32	3	0.001	-67	-0.135	0.28	None†
Adjacent	0590	8/12/1998	11/12/2019	37	8	0.001	192	0.290	0.012	Increasing*
Adjacent	0201	8/18/1998	11/12/2019	33	11	0.0004	54	0.103	0.41	None
Adjacent	0635	8/18/1998	11/13/2019	29	18	0.001	59	0.147	0.28	None
Downgradient	0195	8/19/1998	11/13/2019	29	8	0.0007	144	0.356	0.007	Increasing*
Downgradient	0170	8/20/1998	11/13/2019	32	16	0.0004	34	0.070	0.59	None
Downgradient	0620	8/17/1998	11/13/2019	35	5	0.0005	-133	-0.225	0.061	None
Downgradient	0172	8/19/1998	11/13/2019	38	2	0.010	387	0.554	<0.0001	Increasing*
Background	0169	8/20/1998	11/12/2019	33	12	0.0004	114	0.217	0.080	None

0.028 Most recent result ≤0.05 mg/L 40 CFR 192 MCL (Table 2).
Significant increasing trend based on Mann-Kendall test.
Significant decreasing trend based on Mann-Kendall test.
* No trend indicated using only data from 2010–2019
† Decreasing trend indicated using only data from 2010–2019

Notes:
Trend tests were run using the "Kendall" package in R, version 2.2 (McLeod 2011). Test statistics shown are the S statistic, Kendall's tau, and the two-sided *p* value. The null hypothesis of no change is rejected when S is significantly different from zero ($p \leq 0.05$), indicating a monotonic trend over time. Tables C.8a and C.8b provide details supporting the summary in Table 6.
Abbreviations: *n* = number of samples; *n* ND = number of nondetects

Table C.8b. Mann-Kendall Trend Test Results for Arsenic in New Rifle Site Wells: 2010–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Onsite	0658	11/17/2010	11/12/2019	19	0	0.10	18	0.106	0.55	None
Onsite	0659	11/18/2010	11/12/2019	19	0	0.028	26	0.152	0.38	None
Onsite	0664	11/18/2010	11/12/2019	19	1	0.002	21	0.124	0.48	None
Onsite	0669	11/17/2010	11/12/2019	19	0	0.008	47	0.275	0.11	None
Onsite	0670	11/18/2010	11/12/2019	19	0	0.004	-37	-0.223	0.20	None
Onsite	0855	11/17/2010	11/12/2019	19	0	0.33	-69	-0.408	0.017	Decreasing
Onsite	0215	11/16/2010	11/12/2019	19	8	0.0004	-34	-0.203	0.25	None
Onsite	0216	11/18/2010	11/12/2019	19	0	0.029	-43	-0.254	0.14	None
Adjacent	0217	11/18/2010	11/12/2019	19	3	0.001	-66	-0.387	0.023	Decreasing
Adjacent	0590	11/18/2010	11/12/2019	18	4	0.001	-41	-0.270	0.13	None
Adjacent	0201	11/16/2010	11/12/2019	18	7	0.0004	-19	-0.126	0.49	None
Adjacent	0635	11/17/2010	11/13/2019	14	6	0.001	8	0.089	0.70	None
Downgradient	0195	11/17/2010	11/13/2019	16	2	0.0007	-24	-0.202	0.30	None
Downgradient	0170	11/16/2010	11/13/2019	19	10	0.0004	42	0.256	0.15	None
Downgradient	0620	11/17/2010	11/13/2019	24	5	0.0005	-52	-0.190	0.21	None
Downgradient	0172	11/17/2010	11/13/2019	24	0	0.010	51	0.186	0.21	None
Background	0169	11/18/2010	11/12/2019	19	6	0.0004	-10	-0.059	0.75	None

Refer to notes for Table C.8a above.

Table C.9a. Mann-Kendall Trend Test Results for Ammonia as N in New Rifle Site Wells: 1998–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Background	0169	3/24/2004	11/12/2019	35	27	0.030	136	0.259	0.043	Increasing*
Downgradient	0170	8/20/1998	11/13/2019	34	5	0.98	410	0.737	<0.0001	Increasing*
Downgradient	0172	8/19/1998	11/13/2019	35	17	0.15	309	0.565	<0.0001	Increasing*
Downgradient	0195	8/19/1998	11/13/2019	31	5	0.091	-347	-0.756	<0.0001	Decreasing*
Adjacent	0201	8/18/1998	11/12/2019	35	0	130	-459	-0.775	<0.0001	Decreasing
Onsite	0215	8/14/1998	11/12/2019	40	0	1.9	-324	-0.418	0.0002	Decreasing*
Onsite	0216	8/18/1998	11/12/2019	40	0	9.7	-220	-0.284	0.011	Decreasing‡
Adjacent	0217	8/18/1998	11/12/2019	34	0	66.0	-459	-0.821	<0.0001	Decreasing*
Adjacent	0590	8/12/1998	11/12/2019	38	0	110	-573	-0.829	<0.0001	Decreasing
Downgradient	0620	8/17/1998	11/13/2019	32	22	0.059	6	0.015	0.93	None
Adjacent	0635	8/18/1998	11/13/2019	31	0	40.0	-389	-0.838	<0.0001	Decreasing
Onsite	0658	8/13/1998	11/12/2019	38	0	38.0	-534	-0.761	<0.0001	Decreasing*
Onsite	0659	8/13/1998	11/12/2019	40	0	0.43	-615	-0.789	<0.0001	Decreasing
Onsite	0664	12/14/1999	11/12/2019	33	0	17.0	-374	-0.710	<0.0001	Decreasing*
Onsite	0669	12/14/1999	11/12/2019	33	0	39.0	-379	-0.721	<0.0001	Decreasing*
Onsite	0670	12/14/1999	11/12/2019	30	0	9.6	-215	-0.504	0.0001	Decreasing*
Onsite	0855	6/14/2001	11/12/2019	34	0	16.0	-405	-0.725	<0.0001	Decreasing*

0.030 Most recent result ≤0.11 maximum background concentration in well 0169 (Table 2).
Significant increasing trend based on Mann-Kendall test.
Significant decreasing trend based on Mann-Kendall test.
* No trend indicated using only data from 2010–2019
‡ Increasing trend indicated using only data from 2010–2019

Notes:
Trend tests were run using the "Kendall" package in R, version 2.2 (McLeod 2011). Test statistics shown are the S statistic, Kendall's tau, and the two-sided *p* value. The null hypothesis of no change is rejected when S is significantly different from zero ($p \leq 0.05$), indicating a monotonic trend over time. Tables C.9a and C.9b provide details supporting the summary in Table 6.
Abbreviations: *n* = number of samples; *n* ND = number of nondetects

Table C.9b. Mann-Kendall Trend Test Results for Ammonia as N in New Rifle Site Wells: 2010–2019

Area	Well	Initial Date	Final Date	*n*	*n* ND	Most Recent Result (mg/L)	Mann-Kendall Test Statistics and Results			
							S Statistic	Kendall's tau	p-value	Trend
Background	0169	6/24/2010	11/12/2019	20	17	0.030	58	0.135	0.32	None
Downgradient	0170	6/24/2010	11/13/2019	20	1	0.98	114	0.208	0.093	None
Downgradient	0172	6/24/2010	11/13/2019	20	11	0.15	64	0.122	0.35	None
Downgradient	0195	6/22/2010	11/13/2019	17	5	0.091	-65	-0.149	0.27	None
Adjacent	0201	6/22/2010	11/12/2019	19	0	130	-175	-0.30	0.013	Decreasing
Onsite	0215	6/24/2010	11/12/2019	20	0	1.9	6	0.008	0.95	None
Onsite	0216	6/24/2010	11/12/2019	20	0	9.7	172	0.225	0.046	Increasing
Adjacent	0217	6/22/2010	11/12/2019	20	0	66.0	-92	-0.168	0.18	None
Adjacent	0590	6/22/2010	11/12/2019	19	0	110	-202	-0.306	0.010	Decreasing
Downgradient	0620	6/24/2010	11/13/2019	20	15	0.059	-38	-0.106	0.46	None
Adjacent	0635	6/24/2010	11/13/2019	15	0	40.0	-122	-0.267	0.039	Decreasing
Onsite	0658	6/23/2010	11/12/2019	20	0	38.0	-141	-0.204	0.078	None
Onsite	0659	6/23/2010	11/12/2019	20	0	0.43	-176	-0.229	0.041	Decreasing
Onsite	0664	6/23/2010	11/12/2019	20	0	17.0	-62	-0.119	0.34	None
Onsite	0669	6/23/2010	11/12/2019	20	0	39.0	-119	-0.228	0.067	None
Onsite	0670	6/23/2010	11/12/2019	20	0	9.6	21	0.051	0.72	None
Onsite	0855	6/23/2010	11/12/2019	20	0	16.0	-129	-0.234	0.057	None

Refer to notes for Table C.9a above.

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