



2025 ANNUAL SITE INSPECTION AND MONITORING REPORT FOR

Uranium Mill Tailings Radiation Control Act Title II Disposal Sites

DECEMBER
2025



Mountain Bluebird Eggs -
Edgemont, South Dakota



Eastern Collard Lizard -
L-Bar, New Mexico



Elk - Bluewater, New Mexico



Pronghorn - Split Rock, Wyoming



Cattle - Shirley Basin South, Wyoming



Sage Grouse - Maybell West, Colorado

Wild Horses - Sherwood, Washington

Contents

Abbreviations	ii
Executive Summary	iv
1.0 Bluewater, New Mexico, Disposal Site	1-1
2.0 Edgemont, South Dakota, Disposal Site	2-1
3.0 L-Bar, New Mexico, Disposal Site	3-1
4.0 Maybell West, Colorado, Disposal Site	4-1
5.0 Sherwood, Washington, Disposal Site	5-1
6.0 Shirley Basin South, Wyoming, Disposal Site	6-1
7.0 Split Rock, Wyoming, Disposal Site	7-1

Abbreviations

AAS	alternative abatement standard
ACL	alternate concentration limit
AS&T	Applied Studies and Technology
BIA	U.S. Bureau of Indian Affairs
BLM	U.S. Bureau of Land Management
CFR	<i>Code of Federal Regulations</i>
COC	constituent of concern
DOE	U.S. Department of Energy
EMP	erosion monitoring program
EPA	U.S. Environmental Protection Agency
ft	feet
ft/ft	feet per foot
FY	fiscal year
GEMS	Geospatial Environmental Mapping System
IC	institutional control
lidar	light detection and ranging
LM	Office of Legacy Management
LMS	Legacy Management Support
LOESS	locally estimated scatterplot smoothing
LTSB	long-term surveillance boundary
LTSP	Long-Term Surveillance Plan
MDL	method detection limit
mg/L	milligrams per liter
N	nitrogen
NAVD 88	North American Vertical Datum of 1988
NMED	New Mexico Environment Department
NRC	U.S. Nuclear Regulatory Commission
NWV	northwest valley
PCB	polychlorinated biphenyl
pCi/L	picocuries per liter
PL	photograph location
PMF	probable maximum flood

POC	point of compliance
POE	point of exposure
²²⁶ Ra	radium-226
²²⁸ Ra	radium-228
SAG	San Andres – Glorieta
SOARS	System Operation and Analysis at Remote Sites
SWV	southwest valley
TDS	total dissolved solids
²³⁰ Th	thorium-230
²³² Th	thorium-232
UMTRCA	Uranium Mill Tailings Radiation Control Act
USACE	U.S. Army Corps of Engineers
WDEQ	Wyoming Department of Environmental Quality
WNI	Western Nuclear Inc.

Executive Summary

This report, in fulfillment of a license requirement, presents the results of long-term surveillance and maintenance (LTS&M) activities conducted by the U.S. Department of Energy (DOE) Office of Legacy Management (LM) in 2025 at seven uranium mill tailings disposal sites reclaimed under Title II of the Uranium Mill Tailings Radiation Control Act (UMTRCA). These activities verified that the UMTRCA Title II disposal sites remain in compliance with license requirements. Site-specific Long-Term Surveillance Plans (LTSPs) and site compliance reports are accessible from the following webpage: <https://www.energy.gov/lm/sites/lm-sites>.

LM manages seven UMTRCA Title II disposal sites under a general license established by the U.S. Nuclear Regulatory Commission (NRC) found in Title 10 *Code of Federal Regulations* Section 40.28 (10 CFR 40.28). Reclamation and site transition activities continue at other sites. Of the 30 future Title II sites, LM anticipates adding one site, the Durita, Colorado, Disposal Site, to the LM management portfolio in 2026.

LTS&M activities and services for LM-managed disposal sites include inspecting and maintaining the sites; monitoring environmental media and institutional controls; conducting any necessary corrective actions; and performing administrative actions, records management, stakeholder relations, and other regulatory stewardship functions. Historical water quality data addressed in this report are available at <https://gems.lm.doe.gov> through the Geospatial Environmental Mapping System (GEMS).

Annual site inspections and monitoring are conducted in accordance with site-specific LTSPs and procedures established by LM to comply with license requirements. Each site inspection is performed to verify the integrity of visible features at the site, identify changes or new conditions that might affect the long-term performance of the site, and determine whether maintenance and follow-up inspections or corrective actions are needed in accordance with the LTSP.

All of the sites require some degree of routine monitoring and maintenance, which can include groundwater and surface water monitoring, minor erosion control, vegetation management, fence and gate repairs, sign replacement, and minor trash removal. The following nonroutine activities¹ occurred in 2025:

- **Bluewater, New Mexico, Disposal Site:** NRC concurrence was received in February 2025 to reduce the groundwater monitoring frequency at the site from semiannual to annual, though the LTSP only requires sampling every 3 years. Results from the fall 2025 sampling event will be documented in the 2026 Annual Site Inspection and Monitoring Report.

Results of the annual site inspections, maintenance, and monitoring activities are reported in the site-specific chapters that follow. Table ES-1 summarizes the issues and actions at each site.

¹ Nonroutine activities are activities implemented in response to changes in site conditions, the regulatory setting, or the management structure following an extraordinary event or regulatory compliance review.

Table ES-1. 2025 Summary of UMTRCA Title II Site Issues and Actions

Site	Chapter	Page(s)	Issues and Actions
Bluewater, New Mexico	1.0	1-1, 1-7 through 1-9 1-5 1-5 1-5 1-6 1-9 through 1-11	— Areas of settlement on the main tailings disposal cell continue to be monitored. DOE continues to coordinate with USACE and NRC on characterizing the settlement, which will lead to an analysis of design alternatives and, ultimately, a preferred restoration option. — Wildlife-friendly fence modifications were completed on the perimeter fence on the west and south sides of the site. These areas were identified as wildlife crossings by subject matter experts and installed to help reduce wildlife death and injury from fence crossings. — Windblown sediment continues to be an issue along the northern portion of the site near perimeter sign P6. The western and northern fence lines were identified for maintenance due to broken wire, hanging T-posts, or windblown burial. Maintenance was completed on these sections during the week of April 21, 2025. — Minor adjustments were made to perimeter sign numbers: the entrance sign formerly known as perimeter sign P1 is now identified as the entrance sign without a number assignment, perimeter sign P2 was reassigned as perimeter sign P1, and perimeter sign P2A was reassigned as perimeter sign P2. — The Bluewater site entrance sign was missing at the time of the inspection. A new sign was installed the week of April 21, 2025. — Other identified areas of minor depression on the main tailings or carbonate cell continue to be monitored.
Edgemont, South Dakota	2.0	2-4	— Depression no. 1 and depression no. 2, which were identified in 2021 and 2023, were inspected and measured during the 2025 inspection. Depression no. 3 could not be identified during the inspection.
L-Bar, New Mexico	3.0	3-2 3-4 3-4 3-4, 3-5 3-7 3-9, 3-10 3-10	— A silt fence placed by USACE east of the sediment trap has been damaged due to livestock. Repairs to the silt fence were conducted during the 2025 fall maintenance trip, and portions of the silt fence leading to the sediment trap were replaced with check dams. — Additional rock was added to select check dams associated with the USACE road repair project during the 2025 spring maintenance trip. Low water crossings and associated features will continue to be monitored annually. — Portions of the barbed-wire fence near perimeter signs P14 and P33 were found with broken top strands of barbed wire and leaning posts along the southern perimeter. The areas of damaged fence line were repaired during the 2025 spring and fall maintenance trips. — Perimeter sign P3 was illegible due to bullet holes and perimeter sign P31 was missing. Perimeter sign P3 was replaced during the spring maintenance event. A replacement perimeter sign P31 was installed during the fall maintenance event. — Surface degradation features on the top slope of the disposal cell continue to be monitored. Seven previously undocumented degradation features were identified during the 2025 annual site inspection and will be monitored annually. — Runoff Control Structures A, D, and G sustained severe erosion during previous runoff events and continue to erode. DOE will continue to monitor these structures, and USACE will complete a design for repairs and modifications to these structures. — The arroyo system that limits access to monitoring well 100 is more than 100 ft wide in places and 10 to 20 ft deep. Headcutting was observed in a northward trajectory toward Cerro Negro. LM has begun to track the yearly erosion rate via satellite imagery and erosion markers.

Table ES-1. 2025 Summary of UMTRCA Title II Site Issues and Actions (continued)

Site	Chapter	Page(s)	Issues and Actions
		3-11	— The 2022 triennial sampling event detected concentrations of sulfate and TDS in exceedance of state-approved background levels at certain wells. Easternmost wells 17B, 72, and 29A were sampled in a nonroutine event as a best management practice in November 2023, and the results confirmed the exceedances previously observed. The next sampling event was performed in November 2025, and the results will be included in the 2026 report. DOE is working on plans for additional sampling, which could include sulfur isotopes, to better determine the reason for elevated analyte concentrations.
Maybell West, Colorado	4.0	4-2	— A small section of fence line on the southeastern side of the site was previously damaged and was repaired during the 2025 maintenance trip.
		4-4, 4-5	— Four small depressions on the disposal cell top are not impacting disposal cell performance and will continue to be monitored.
		4-5, 4-6	— Small depressions continue to be observed on the crest of the top slope and the toe of the side slope of the ancillary cell.
		4-6	— Gullies continue to be observed near the rock berm west of the ancillary cell; there were no observed changes, and these features will continue to be monitored.
Sherwood, Washington	5.0	5-2	— Perimeter sign P6 was identified as missing during the 2025 inspection and will be replaced during 2026 fieldwork.
		5-5	— Gullies continue to be observed near perimeter sign P1 and the southeast portion of the dike road; these features require no action but will continue to be monitored.
Shirley Basin South, Wyoming	6.0	6-1, 6-22, and 6-23	— Groundwater monitoring was conducted in May 2025. ACLs continue to be exceeded for selenium at POC well 5-DC. Groundwater protection standards for sulfate and TDS also continue to be exceeded in three wells near the disposal cell, but no exceedances were measured in livestock well K.G.S. #3 or in any of the wells near the site boundary.
		6-5	— Cattle had worn paths around the north and south ends of the eastern riprap-armored slope, resulting in erosion that was repaired during the 2025 annual maintenance trip. This area will be protected from cattle by the rancher to prevent further degradation.
		6-6	— The riprap-armored drainage in Pit 4 was first noted to have erosion in 2016 and has continued to erode; repair of the riprap armor is not necessary at this time as erosion is not expected to impact slope stability.
Split Rock, Wyoming	7.0	7-1, 7-13	— Groundwater monitoring was conducted in August 2024 and August 2025. Because of the timing of sampling and laboratory analysis, there is a 1-year lag in reporting. The 2025 report includes data from the 2024 sampling event, and data from the 2025 sampling event will be included in the 2026 inspection report.
		7-4, 7-8	— The fence line along Ore Road was damaged, and repairs were completed during the 2025 annual maintenance trip.
		7-4, 7-8	— Vegetation was mowed along tertiary roads and the fence line.
		7-5, 7-8	— Ten new perimeter signs were installed.
		7-6, 7-8	— Deep-rooted vegetation was removed from the disposal cell.
		7-7, 7-8	— Rills along the tertiary road were top-dressed with gravel.

Abbreviations:

ACL = alternate concentration limit

ft = feet

POC = point of compliance

TDS = total dissolved solids

USACE = U.S. Army Corps of Engineers

1.0 Bluewater, New Mexico, Disposal Site

1.1 Compliance Summary

The Bluewater, New Mexico, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title II Disposal Site was inspected on March 24–27, 2025. Minor depressions on the side slopes of the main tailings disposal cell, as well as depressions on the north portion of the top slope continue to be observed. No new areas of concern were identified during the inspection, and previously observed features of concern had no significant changes. Inspectors found no cause for a follow-up or contingency inspection.

Groundwater was sampled in November 2024. Analytical results from the sampling event indicate that alternate concentration limits (ACLs) were not exceeded for any of the constituents monitored at the site (uranium is the primary contaminant of concern). The ACLs for uranium in both the alluvial and bedrock aquifers were based on a site-specific health-based concentration of 0.44 milligram per liter (mg/L) at the site boundary or point of exposure (POE). The U.S. Nuclear Regulatory Commission (NRC), the sole regulator of the site, approved these ACLs in 1996 when the State of New Mexico groundwater standard was 5.0 mg/L. The state reduced this standard to 0.03 mg/L in 2004, a level equivalent to the U.S. Environmental Protection Agency (EPA) drinking water standard. As such, uranium concentrations in several onsite alluvial and bedrock aquifer monitoring wells exceed the current state standard. The U.S. Department of Energy (DOE) Office of Legacy Management (LM) continues to monitor these groundwater conditions to ensure protection of human health and the environment, especially for nearby offsite communities. The state specifically exempts 11e.(2) byproduct material from the state groundwater protection program and, therefore, has no regulatory authority at the site. Any comparisons to standards other than ACLs provided in this report are for informational purposes only and do not indicate a need for further action under UMTRCA.

NRC concurrence to reduce the groundwater monitoring frequency at the site from semiannual to annual, with sampling to occur in the fall, was received on February 3, 2025 (NRC 2025). Annual sampling remains a best management practice as the regulatory groundwater monitoring program requires sampling every 3 years. Because the spring sampling events have since been discontinued, new data addressed in this compliance summary are limited to the November 2024 sampling event. Results from the fall 2025 sampling event, conducted in November 2025, will be documented in the 2026 Annual Inspection and Monitoring Report.

1.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the site-specific Long-Term Surveillance Plan (DOE 1997) (LTSP) in accordance with procedures established to comply with the requirements of the NRC general license at Title 10 *Code of Federal Regulations* Section 40.28 (10 CFR 40.28). Table 1-1 lists these requirements.

Table 1-1. License Requirements for the Bluewater, New Mexico, Disposal Site

Requirement	LTSP	This Report	10 CFR 40.28
Annual Inspection and Report	Sections 3.3 and 3.4	Section 1.4	(b)(3)
Follow-Up Inspections	Section 3.5	Section 1.5	(b)(4)
Routine Maintenance and Emergency Measures	Section 3.6	Section 1.6	(b)(5)
Environmental Monitoring	Section 3.7	Section 1.7	(b)(3)

1.3 Institutional Controls

The 3300-acre site, identified by the property boundary shown in Figure 1-1 and Figure 1-2, is owned by the United States and was accepted under the NRC general license in 1997. DOE is the licensee and, in accordance with the requirements for UMTRCA Title II sites, LM is responsible for the custody and long-term care of the site. Institutional controls (ICs) at the site include federal ownership of the property, administrative controls, and the following physical ICs that are inspected annually: disposal cells, disposal areas, dumps, the entrance gate and sign, the perimeter fence and signs, a site marker, boundary monuments, and monitoring wellhead protectors.

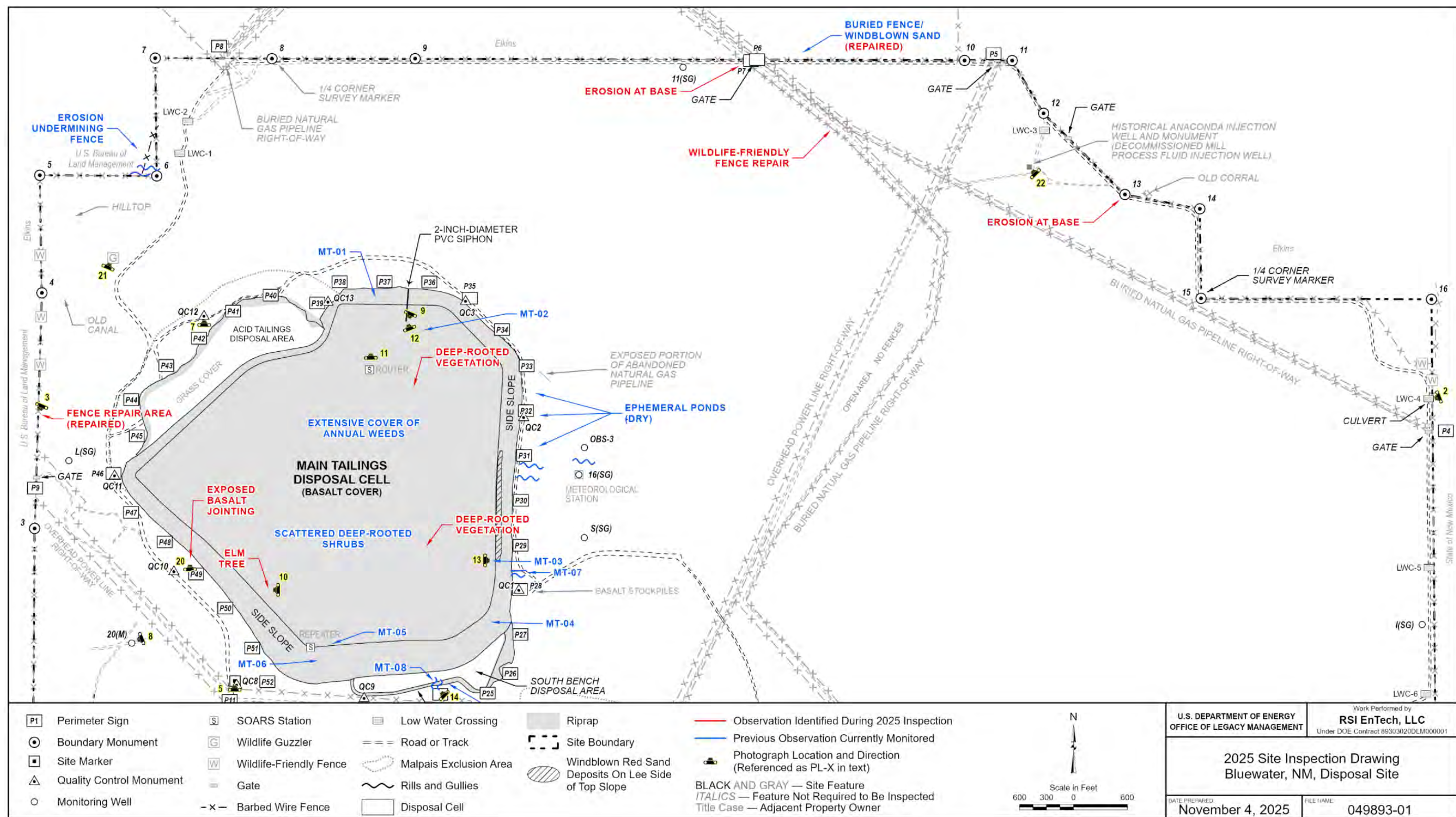
In addition to LM ICs, the New Mexico Office of the State Engineer implemented a well prohibition in the alluvial aquifer downgradient of the site in May 2018 (Romero 2018).

1.4 Inspection Results

The site, approximately 9 miles northwest of Grants, New Mexico, was inspected on March 24–27, 2025. The inspection was conducted by D. Atkinson, J. Cario, J. Coyne, E. Gaasche, J. Graham, and C. Murphy of the Legacy Management Support (LMS) contractor. C. Diamond and Y. Li (New Mexico Environment Department [NMED]) attended the inspection as well. The purposes of the inspection were to confirm the integrity of visible features at the site, identify changes in conditions that might affect conformance with the LTSP, and evaluate whether maintenance or follow-up inspection and monitoring are needed.

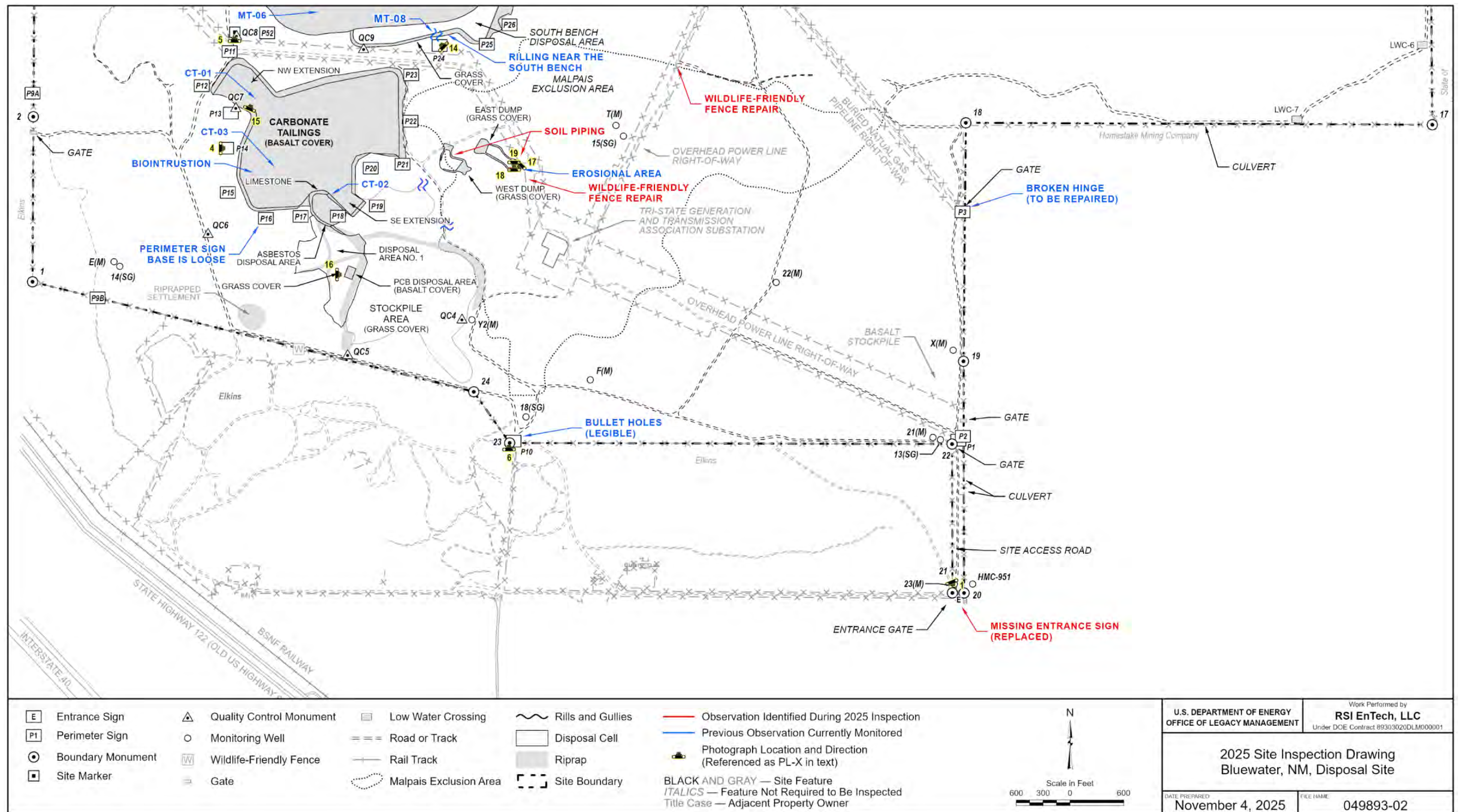
1.4.1 Site Surveillance Features

Figure 1-1 and Figure 1-2 show the locations of site features, including site surveillance features and inspection areas, in black and gray font. Some site features that are present but not required to be inspected are shown in italic font. Observations from previous inspections that are currently monitored are shown in blue, and new observations identified during the 2025 annual inspection are shown in red. Inspection results and recommended maintenance activities associated with site surveillance features are described in the following subsections. Photographs to support specific observations are noted in the text and in Figure 1-1 and Figure 1-2 by photograph location (PL) numbers. The photographs and photograph log are presented in Section 1.9.



Abbreviation: SOARS = System Operation and Analysis at Remote Sites

Figure 1-1. 2024 Annual Inspection Drawing for the Bluewater, New Mexico, Disposal Site (Northern Area)



Abbreviation: PCB = polychlorinated biphenyl

Figure 1-2. 2024 Annual Inspection Drawing for the Bluewater, New Mexico, Disposal Site (Southern Area)

1.4.1.1 Site Access, Entrance Gate, and Interior Roads

Access to the site is obtained from gravel-surfaced Cibola County Road 63 (also known as Anaconda Road); no private property is crossed to gain site access. The entrance gate is a tubular steel, double-swing gate secured by a chain and locks belonging to LM and the various utility companies that have rights-of-way across the site (PL-1). The site access road is surfaced with crushed basalt and extends northward along a narrow strip of LM property for approximately 1700 feet (ft) from the entrance gate to the main site access road gate. Two culverts allow drainage of surface runoff under the road.

Interior roads used to access LM assets consist of a dirt track, covered at places with crushed basalt. The roads are susceptible to erosion, and maintenance staff will routinely top-dress areas of the access roads to repair areas worn away by inclement weather and to reduce erosion. Seven low water crossings, consisting of articulated concrete mats, were installed on the perimeter access road in 2024 to improve site access, reduce erosion, and improve drainage (PL-2). Additionally, one culvert allows for drainage under the road. No maintenance needs were identified.

1.4.1.2 Perimeter Fence and Signs

A four-strand barbed-wire fence encloses the site to facilitate land management by LM, which retains a local subcontractor to periodically check the site perimeter fence, perform minor fence repairs, and remove trespassing cattle. Selected sections of the barbed-wire fence have been modified to prevent wildlife entanglement while keeping cattle out of the site. These areas are identified on Figure 1-1 and Figure 1-2. At these sections of the fence, the top strand has been lowered to a maximum height of 36–38 inches. The lower strand has been raised to 14–16 inches and replaced with straight wire. Numerous sections of the fence are in remote areas of the site and cannot be observed from site access roads. Windblown sediment continues to be an issue along the northern portion of the site near perimeter sign P6. LMS contractor staff routinely dig out or extend the fence height in this area. Several sections of the western and northern fence lines were identified for maintenance due to broken wire, hanging T-posts, or windblown burial (PL-3). Maintenance was completed on these sections during the week of April 21, 2025.

Inspectors observed the gullies, identified in the 2019 inspection, that are near the perimeter fence northwest of the main tailings disposal cell at boundary monument BM-6. The gullies are beginning to undermine the fence, and the fence was extended downward in September 2024; the fence remains protective. No significant changes were observed. LM will continue to monitor this area for damage to the perimeter fence.

There are 55 perimeter signs (warning and no-trespassing signs) at the site are mounted on steel posts. Thirteen signs, including the entrance sign, are along the site boundary, and 42 signs are around the main and carbonate tailings disposal cells. (PL-4). Minor adjustments were completed to the inspection drawing after the inspection to change the following perimeter sign number assignments: the entrance sign formally known as perimeter sign P1 is now identified as the entrance sign without a number assignment, perimeter sign P2 was reassigned as perimeter sign P1, and perimeter sign P2A was reassigned as perimeter sign P2. The perimeter sign numbers were renumbered in the field the week of July 7, 2025. Perimeter sign P7 is beginning to show signs of erosion at the base. Perimeter sign P10 has bullet hole damage but is legible. Perimeter sign P16 has a loose base but remains functional. Most signs at the site show signs of sun

damage but are legible. The Bluewater site entrance sign was missing at the time of the inspection. A new sign was installed the week of April 21, 2025. No other maintenance needs were identified.

1.4.1.3 Site Marker

The site has one granite site marker between the southwest corner of the main tailings disposal cell and the northwest corner of the carbonate tailings disposal cell (PL-5). The site marker is in good condition, and no maintenance needs were identified.

1.4.1.4 Boundary Monuments

Twenty-four boundary monuments define the site boundary (PL-6). These monuments are typically inside the perimeter fence and several feet inside the true corner or boundary line. Some monuments have become covered by drifting sand, and metal T-posts have been driven at those locations to help locate them. Other boundary monuments are in remote sections of the site and cannot be observed from site access roads. All boundary monuments were inspected during the 2025 annual inspection. Some erosion was observed at the base of boundary monument BM-13, but it is stable. No maintenance needs were identified.

1.4.1.5 Aerial Survey Quality Control Monuments

Thirteen aerial survey quality control monuments were installed in 2019, and an aerial survey was conducted by the U.S. Army Corps of Engineers (USACE) in 2021. The aerial survey quality control monuments were inspected during the 2025 annual inspection (PL-7). No maintenance needs were identified.

1.4.1.6 Monitoring Wells

The site groundwater monitoring network consisted of nine monitoring wells when the site was transferred to LM in 1997. Two additional wells were installed in summer 2011, and eight more wells were installed in summer 2012 in response to elevated uranium concentrations in the two aquifers (alluvial and bedrock) at the site. The onsite groundwater monitoring network now consists of 19 monitoring wells; 10 are completed in the bedrock aquifer and 9 in the alluvial aquifer. Eleven wells (three alluvial and eight bedrock) have telemetry towers, known as System Operation and Analysis at Remote Sites (SOARS) stations, which transmit groundwater level and weather data to the LM Field Support Center at Grand Junction, Colorado (example shown in PL-8). The monitoring wells and SOARS stations are identified in Figure 1-2. The wellhead protectors and SOARS stations were observed to be undamaged and locked. No maintenance needs were identified.

1.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into four inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection. The inspection areas are (1) the main tailings disposal cell, including the acid tailings and south bench disposal areas; (2) the carbonate tailings disposal cell, including the asbestos disposal area, the polychlorinated biphenyl (PCB) disposal area, and associated disposal areas and dumps; (3) the region between

the disposal structures and the site perimeter; and (4) the site perimeter and outlying area. Inspectors examined the specific site surveillance features within each area and looked for evidence of erosion, settling, slumping, or other modifying processes that might affect conformance with LTSP requirements.

1.4.2.1 Main Tailings Disposal Cell, Acid Tailings, and South Bench Disposal Areas

The 354-acre contiguous main tailings disposal cell, acid tailings, and south bench disposal areas constitute one large disposal area. The top slope of the main tailings disposal cell is covered with basalt riprap and was designed to shed runoff water over the north edge of the top slope. The top slope grade is 3% to 4% at the south end and decreases to less than 0.5% at the north end. The top slopes of the acid tailings and south bench disposal areas are nearly flat and covered by grass. Basalt riprap protects the side slopes of the disposal areas.

Plant encroachment (by annual weeds, perennial grasses, forbs, and scattered perennial shrubs) continues on the main tailings disposal cell top and side slopes (PL-9). Siberian elm saplings on the top slope are periodically treated with herbicide to prevent the establishment of trees that could damage the main tailings disposal cell cover materials. One possible live elm was observed during the inspection and treated with herbicide the week of August 11, 2025 (PL-10).

A large area of depressions is present at the north end of the top slope of the main tailings disposal cell and along the east and northwest edges of the top slope (MT-02). This portion of the top slope overlies predominantly clay-rich tailings referred to as slimes. Although the former licensee attempted to dewater the slimes to consolidate them, that portion of the top slope continued to settle after the site transitioned to LM. Annual inspections indicated that the depressions have enlarged in area and depth over time. LM, therefore, conducted high-resolution light detection and ranging (lidar) surveys in 2012 and 2016 to determine if the depression continued and to gauge its magnitude (DOE 2017). The 2016 lidar results, when compared to the 2012 lidar results and the original topographic map developed in 1997, demonstrated that the depression measures up to 4 ft in places. The rate of depression since 2012 (an average of 0.72 inch per year between 2012 and 2016) is much less than the rate before 2012 (an average of 1.8 inches per year between 1997 and 2012). In April 2024, USACE conducted a lidar survey. The data from this survey show that additional subsidence between 2015 and 2021 was nearly nondetectable. USACE is performing a settlement analysis to determine if the disposal cell has reached secondary settlement and to help forecast future settlement (expected fiscal year [FY] 2026).

Seasonal ponds occasionally develop in the depressions from stormwater and can coalesce into one large pond after a series of storm events. This area is monitored continuously using a remotely operated webcam to detect the presence of ponded water. No ponding was observed on the main tailings disposal cell during the inspection. However, signs of possible riprap degradation were observed in one of the depressions where seasonal ponding occurs (PL-11). LM will continue to monitor the riprap in the depression area. No algae were present during the inspection even though algae have been noted in previous reports.

A 2-inch-diameter siphon was installed in fall 2015 to dewater ponded water as needed (PL-12). The siphon is manually started when the webcam indicates that a large pond has developed. The intent is to avoid potential erosion of the main tailings disposal cell cover materials if the pond

surface reaches an elevation high enough to spill over the north side slope. Water would start to spill over at the lowest point along the north edge of the top slope, which could initiate erosion in that area.

The siphon is operated as needed based on precipitation, with nearly all water being removed. Any remaining water tends to evaporate. When operated, the siphon discharges water at a rate of approximately 100 gallons per minute at the toe of the north side slope where runoff water was intended to discharge. The discharged water collects over a large area north of the main tailings disposal cell and eventually either evaporates or infiltrates into the soil. The discharged water does not flow off the site. Due to the lack of significant precipitation during the 2025 monsoon season, the siphon did not require operation this year. The siphon was last operated in October 2022.

LM entered into an interagency agreement with USACE in October 2019 to evaluate settlement, design a repair to the depressions, and ensure continued positive drainage from the top slope of the main tailings disposal cell. In October 2023, USACE completed a geotechnical investigation on the top slope of the disposal cell to collect data on the condition of the cell cover and underlying material. Analysis of the data indicated a relatively weak soil layer at approximately 20 ft below the surface that extends to the foundation. There is indication that the weak soil layer is an artifact of construction techniques from placement of super-saturated slimes material overlain by a thick layer of windblown tailings that was indirectly and nonuniformly compacted. The full results of this investigation will be submitted to NRC when available (expected FY 2026) in the *DOE-LM Bluewater Disposal Site, Cibola County, New Mexico, Subsurface Characterization Report*. NRC will be involved in reviewing designs as they are developed and will concur upon the final design before construction.

The top slope, side slopes, and toe of the main tailings disposal cell were inspected for signs of erosion or sediment deposition. Table 1-2 and Table 1-3 include potential settlement or depression features and erosional features in the vicinity of the main tailings disposal cell that are identified in Figure 1-1 and Figure 1-2. These features have been assigned a feature number starting with MT followed by a unique number. This identifies the feature as being on the main tailings disposal cell. These feature numbers are designated for the purpose of discussion in this report. No apparent changes were observed in any of the potential depression areas. All identified depression features will continue to be monitored and may be further evaluated using lidar (or similar technology). No maintenance needs for the top slope, side slopes, acid tailings, or south bench disposal areas were identified.

*Table 1-2. Monitoring Status of Depression Features on the Main Tailings Disposal Cell
at the Bluewater, New Mexico, Disposal Site*

Depression No.	General Description	Initial Observation	Monitoring Status (Y/N)	Notes	Approximate Dimensions
MT-01	Area of potential depression was observed on the north side slope	2020	Y	No significant change observed since 2020. Feature will be removed from future inspection but will remain in this table.	12 ft long × 1.5 ft wide
MT-02	Area of ponding that occurs on the northern top slope of the cell	1997	Y	During annual inspections, inspectors monitor for ponded water and the presence of algae. Changes in the depression area are periodically monitored using lidar survey results. Riprap degradation was observed.	908 ft long × 440 ft wide × 4 ft deep
MT-03	Area of potential depression on the southeastern portion of the top slope	2023	Y	Photograph PL-13. No significant changes observed. More vegetation is growing in the depression area.	8 ft long × 3 ft wide
MT-04	Area of minor depression on the eastern end of the south side slope	2021	Y	Feature is difficult to find and was not observed this year. Feature will be removed from future inspection but will remain in this table.	20 ft long × 10 ft wide × 10–12 inches deep
MT-05	Area of minor depression on the south side slope	2018	Y	No change observed since 2018. Feature will be removed from future inspection but will remain in this table.	10 ft long × 10 ft wide
MT-06	Potential depression feature on the western side of the south side slope	2022	Y	No significant change.	15 ft long × 30 ft wide

Abbreviations:

N = no

Y = yes

*Table 1-3. Monitoring Status of Other Erosional Features near the Toe of the Main Tailings Disposal Cell
at the Bluewater, New Mexico, Disposal Site*

Erosional Feature No.	General Description	Initial Observation	Monitoring Status (Y/N)	Notes	Approximate Dimensions
MT-07	Rills occurring at the base of the east side slope between perimeter signs P28 and P29	2019	Y	No significant change	Up to 6 inches deep
MT-08	Rills occurring at the base of the south bench area near perimeter sign P24	2019	Y	Depth of rilling has increased from approximately 8 inches to ~12 inches. Photograph PL-14.	Up to 12 inches deep

Abbreviations:

N = no

Y = yes

1.4.2.2 Carbonate Tailings Disposal Cell, Other Disposal Areas, and Dumps

The 54-acre carbonate tailings disposal cell is south of the main tailings disposal cell. Basalt riprap covers the top and side slopes of the carbonate tailings disposal cell. The top slopes gently eastward. The carbonate tailings disposal cell includes extensions to the northwest and southeast. Table 1-4 includes a list of potential sediment or depression type features that are identified in Figure 1-2. These features have been assigned a feature number starting with CT followed by a unique number. This identifies the feature as being on or in the vicinity of the carbonate tailings disposal cell. These feature numbers are designated for the purpose of discussion in this report. These areas of depression do not appear to be enlarging but will continue to be visually inspected or evaluated using periodic lidar survey results.

Table 1-4. Monitoring Status of Depression Features on the Carbonate Tailings Cell at the Bluewater, New Mexico, Disposal Site

Depression No.	General Description	Initial Observation	Monitoring Status (Y/N)	Notes	Approximate Dimensions
CT-01	A shallow depression on the northwest extension	2012	Y	Photograph PL-15. Stormwater runoff occasionally ponds at this location. No significant changes observed.	73 ft long × 63 ft wide
CT-02	A depression on the north side slope of the asbestos cell	2019	Y	No change observed since 2019. Feature will be removed from future inspection but will remain in this table.	9.5 ft long × 1.5 ft wide
CT-03	Minor depression observed on the south-central top slope of the carbonate cell	2023	Y	Depression area appears to be about 3 inches deeper than observed during 2024 inspection. Vegetation is becoming denser.	8 ft long × 3 ft wide × 0.8 ft deep

Abbreviations:

N = no

Y = yes

A biointrusion area was identified west of minor depression CT-03 that appears to be caused by animals digging small potholes into the top slope riprap layer. Inspectors backfilled the potholes with the surrounding riprap. During the 2024 inspection, two areas of concentrated water drainage or ponding were identified on the southern and northern portions of the carbonate cell. These areas were dry during the 2025 inspection and show no signs of concerning erosion. Annual weeds, perennial grasses, and scattered woody shrubs were on the carbonate tailings disposal cell and its extensions. Siberian elm saplings are periodically treated with herbicide. No saplings were observed during the inspection. No maintenance needs were identified.

The 2-acre asbestos disposal area is a bowl-like feature just south of the carbonate tailings disposal cell. The north, west, and south side slopes of this feature are covered by limestone riprap; the asbestos cell cover is covered with grass. A depression on the north side slope, CT-02, that was first identified during the 2019 annual inspection had no observed changes in 2025. This feature will be removed from monitoring. No immediate maintenance needs were identified.

An 11-acre grass-covered disposal area is south of the asbestos disposal area. A small riprap-covered PCB cell is within the disposal area (PL-16). Two grass-covered dumps, totaling approximately 2 acres, are east of the carbonate tailings disposal cell. Inspectors observed a minor erosional area along the basalt flow at the southern interface of the east dump that was first identified in 2019 (PL-17, PL-18). The erosional area was measured in 2022 at approximately 11.3 ft long × 5.1 ft wide × 4 ft deep. Wooden stakes were placed at the edges of the feature to monitor growth. Radon gas concentration and radiation dose rate surveys were completed near the erosional area by an LMS radiological control technician in 2023. The measurements were consistent with background levels. This area is showing evidence that riprap continues to slump into the depression. During 2025, the feature measured approximately 12 ft long × 2.2 ft wide. Depth was not measured, as inspectors determined depth may not be a reflective measurement due to the collapsed riprap. Minor soil piping was observed on both the east and west dump top slope areas (PL-19). The erosional areas will continue to be monitored. No immediate maintenance needs were identified.

1.4.2.3 Area Between the Disposal Cells and the Site Perimeter

Other areas inside the site were inspected by driving the site perimeter road and other roads and tracks. Much of the southern and western portions of the site are inaccessible by vehicle because they are covered by basalt flows.

Small ephemeral ponds often form in an area along the east side of the main tailings disposal cell and in other low spots following storms. The areas of ponding are far enough from the main tailings disposal cell that they do not have any impact. These areas did not have standing water but were wet from recent rain events during the inspection.

A small, exposed basalt joint area was observed between the access road and the southwest side of the main tailings disposal cell. Soil has eroded from over the top. This feature will be observed to ensure that it does not pose a risk to the disposal cell (PL-20). Scattered tamarisk shrubs and other plants listed as noxious weeds by the State of New Mexico are onsite. Noxious weeds were treated with herbicide following the inspection. Additional rilling and animal burrows are present in the area between the disposal cell and site perimeter but do not threaten any site features.

A self-sustaining wildlife drinking water system, also called a wildlife guzzler, was installed in the northwest area of the site in 2024 to help maintain and improve resident wildlife and pollinator habitat and improve water access in an important migratory corridor (PL-21). Additional gravel material was added around the drinking system the week of April 2, 2025, to prevent erosion and reduce windblown sediment from entering the trough.

The fluid injection well (associated with former milling processes) near the northeast corner of the site features a monument consisting of a steel well casing set in concrete. Information about the well is welded onto the monument (PL-22). No maintenance needs were identified.

Several utility companies have rights-of-way that cross the site. These rights-of-way are bordered by stock fences with locked gates where the rights-of-way cross the site boundary. Roads along the rights-of-way typically are covered with crushed basalt to provide the utility companies with all-weather access. LM is not responsible for maintaining the right-of-way roads

or fences. A broken hinge was observed on the right-of-way gate near perimeter sign P3 (Figure 1-2). During the inspection, a chain was wrapped around the gate and post as a temporary solution until the hinge is repaired by the utility company. An electric power substation, enclosed by a security fence, is near the center of the site. Utility company personnel visit the substation frequently. LM is not responsible for maintaining the substation or its security fence and access road. Although fence maintenance is not an LM responsibility, areas of fence along the interior rights-of-way where there is evidence of wildlife crossing sections of broken wire were removed to prevent injury from entanglement. These areas are identified in Figure 1-2 as fence repair areas and will be marked as wildlife-friendly fence areas.

1.4.2.4 Site Perimeter and Outlying Areas

The surrounding land is used for livestock grazing and wildlife habitat. The area beyond the site boundary for 0.25 mile was visually observed for erosion, development, changes in land use, or other phenomena that might affect conformance with LTSP requirements. No such changes were observed.

1.5 Follow-Up Inspections

LM will conduct follow-up inspections if (1) a condition is identified during the annual inspection or other site visit that requires a return to the site to evaluate the condition or (2) LM is notified by a citizen or outside agency that conditions at the site are substantially changed. No need for a follow-up inspection was identified during the inspection.

1.6 Routine Maintenance and Emergency Measures

Inspectors documented the following minor maintenance needs that were completed following the inspection:

- Treat the noxious weeds
- Continue to top-dress roads to improve weather access and reduce erosion along the road to the main tailings disposal cell
- Perform minor fence repairs and additional wildlife fence modifications
- Add erosion control around the wildlife guzzler
- Install new site entrance sign and pole
- Relabel perimeter sign numbers P2 and P2A as P1 and P2, respectively

Emergency measures are corrective actions that LM will take in response to unusual damage or disruption that threatens or compromises site health and safety, security, integrity, or compliance with 40 CFR 192. No emergency measures were identified.

1.7 Environmental Monitoring

Groundwater monitoring is required at the site (DOE 1997). The monitoring well network acquired by LM at the time of site transition and included in the LTSP consisted of wells E(M), F(M), T(M), X(M), Y2(M), L(SG), OBS-3, S(SG), and I(SG). Wells with an “(M)” suffix are screened in the alluvial aquifer, while wells with an “(SG)” suffix and well OBS-3 are screened in the San Andres-Glorieta (SAG) or bedrock aquifer. The LTSP requires triennial sampling for molybdenum, selenium, and uranium in the alluvial aquifer background and point of compliance (POC) wells. The LTSP also requires triennial sampling of the SAG (bedrock) aquifer background and POC wells for selenium and uranium. Alluvial aquifer well X(M) and bedrock aquifer well I(SG), which are POE wells along the east property boundary, were initially slated for sampling only if specified ACLs were exceeded at POC wells (DOE 1997).

In 2008, NMED requested LM’s assistance in investigating and evaluating regional groundwater contamination associated with the former Grants Mineral Belt uranium mining industry. NMED suspected that contaminants from the site had migrated offsite. In response to NMED, LM reinitiated annual sampling at most onsite monitoring wells, including the POE wells, in fall 2008. In 2009, to support NMED’s regional groundwater investigation, LM began reevaluating the hydrogeology and groundwater quality at the site and also expanded the analytical scope to include additional constituents than those required by the LTSP.¹

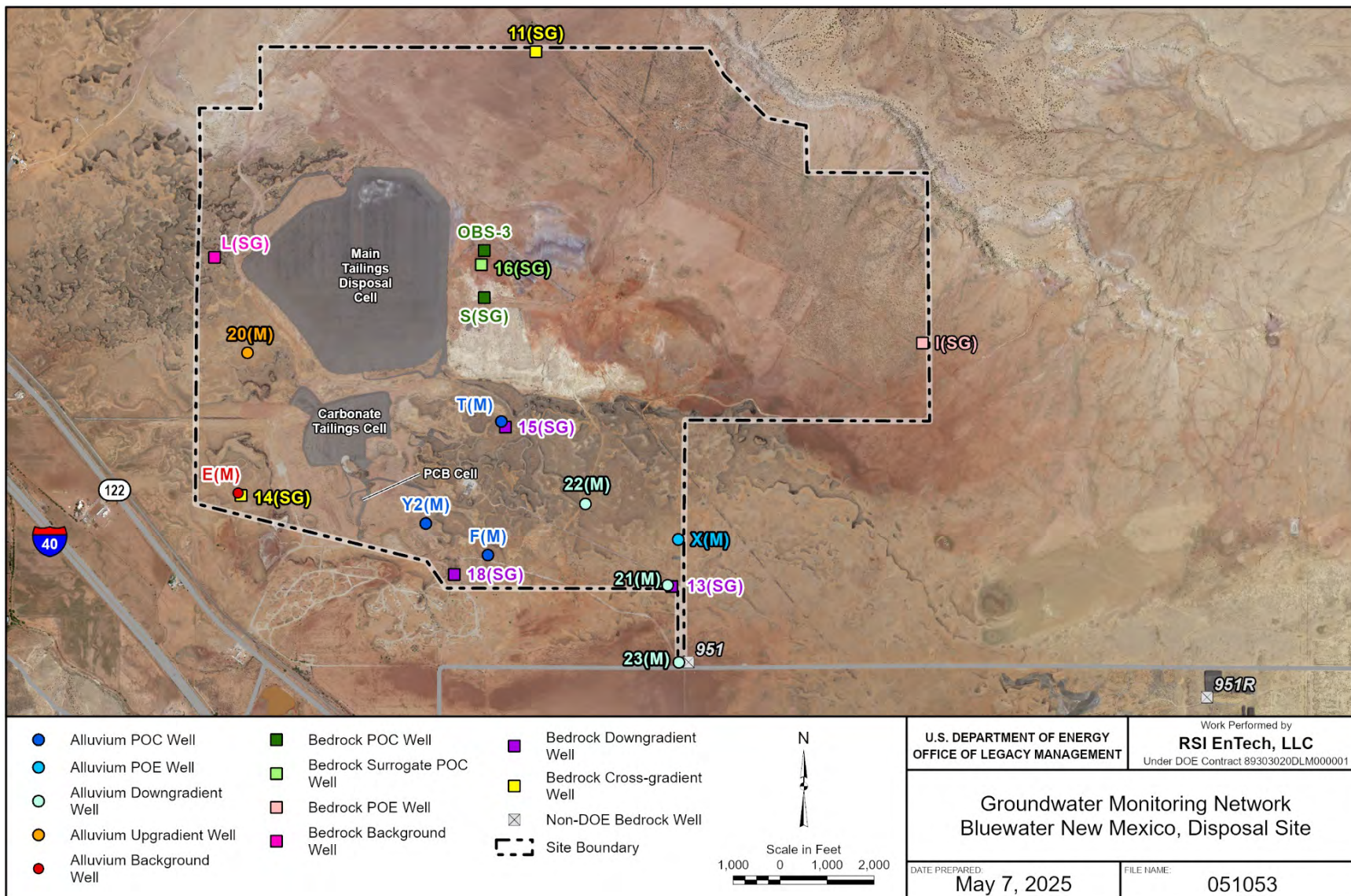
To address stakeholder concerns and in consultation with NRC, LM installed 10 additional monitoring wells in 2011–2012 and, in response to the initial exceedance of the uranium ACL in alluvial well T(M) in 2010 (discussed further in Section 1.7.1), began semiannual (versus annual) sampling at all wells.

The current groundwater monitoring network, including the 10 additional wells installed in 2011–2012, is shown in Figure 1-3. Until recently, all 19 site wells, including POC and POE wells, were sampled semiannually for an expanded list of constituents as described in the following sections. Because of the lack of variation between spring and fall sample results observed in the 2010–2022 dataset, LM notified NRC in August 2023 of its intent to reduce the sampling frequency to annually (DOE 2023). In February 2025, NRC concurred with LM’s determination that annual sampling is sufficient for monitoring groundwater contaminant trends at the site. Given this concurrence, starting in 2025, monitoring wells will continue to be sampled every fall to align with the annual offsite sampling conducted by NMED. The spring sampling events have been discontinued.

The sampling event addressed in this report is the fall semiannual sampling that occurred on November 11–13, 2024. Results from the fall 2025 sampling event, conducted in November 2025, will be documented in the 2026 Annual Inspection and Monitoring Report.

Table 1-5 lists the monitoring wells routinely sampled at the Bluewater site.

¹ In addition to molybdenum, selenium, and uranium (the primary constituents addressed in the LTSP), groundwater samples are analyzed routinely for chloride, nitrate + nitrite as nitrogen, sulfate, total dissolved solids, major cations, and field parameters (e.g., total alkalinity and dissolved oxygen).



Notes: Well T(M) has been dry or had insufficient water to sample since November 2012; well X(M) has been dry since May 2021. Well Y2(M) was identified as a POC for PCB monitoring given proximity to the PCB cell. Based on provisions in the LTSP (no detectable levels), PCB monitoring was discontinued in 2018.

Figure 1-3. Groundwater Monitoring Network at the Bluewater, New Mexico, Disposal Site

Table 1-5. Groundwater Monitoring Network at the Bluewater, New Mexico, Disposal Site

Monitoring Well	Date Installed	Description
Alluvial Aquifer		
E(M)	5/30/1978	Background well
F(M)	6/2/1978	POC
T(M)	11/14/1980	POC (dry since 2012)
X(M)	12/11/1980	POE (dry since 2021)
Y2(M)	9/10/1996	POC for PCB monitoring ^a
20(M)	7/19/2012	Upgradient well
21(M)	7/7/2011	Downgradient well, intended as surrogate for POE well X(M)
22(M)	7/12/2011	Surrogate POC well replacing T(M)
23(M)	6/28/2012	Downgradient well
SAG (Bedrock) Aquifer		
I(SG)	7/15/1979	POE
L(SG)	12/19/1980	Background
OBS-3 ^b	2/2/1981	POC
S(SG) ^b	1/19/1981	POC
11(SG)	7/12/2012	Cross-gradient well
13(SG)	6/21/2012	Downgradient well
14(SG)	7/1/2012	Cross-gradient well
15(SG)	6/15/2012	Downgradient well
16(SG)	6/13/2012	Surrogate POC well
18(SG)	6/2/2012	Downgradient well

Notes:

^a Well Y2(M) was designated as a POC well for PCBs given proximity of the PCB disposal cell. After 20 years of annual sampling indicated no detectable concentrations, PCB monitoring was discontinued in 2018 in accordance with provisions of the LTSP (DOE 1997).

^b Low (≤ 0.005 mg/L) uranium concentrations measured in POC wells S(SG) and OBS-3 between 2004 and 2010 were later found to be unrepresentative of the aquifer. Downhole videos identified severe iron scaling in both wells. Well 16(SG) now serves as a surrogate POC well.

Under Title II, contaminant concentrations must be below corresponding UMTRCA standards or as low as reasonably achievable (ALARA) upon transfer. Pursuant to the Atomic Energy Act (Title 42 *United States Code* Section 2011 et seq. [42 USC 2011 et seq.]), NRC has sole regulatory authority over groundwater issues at the site. ACLs for molybdenum (alluvial aquifer only), selenium, and uranium are listed in Table 1-6. The ACLs for uranium, the primary contaminant of concern, were based on a health-based concentration limit (0.44 mg/L) in POE wells for both aquifers at the site's east boundary.

Table 1-6. Groundwater ACLs at the Bluewater, New Mexico, Disposal Site

Aquifer	POC Wells	POE Wells	Constituent	ACL (applies to POC Wells) ^a	Health-Based Concentration Limit at POE ^{a,b}
Alluvial aquifer	T(M) ^c and F(M) <i>Well 22(M) is current surrogate for T(M)</i>	X(M) ^d <i>Well 21(M) is current surrogate</i>	Uranium	0.44 mg/L	0.44 mg/L
			Molybdenum	0.10 mg/L	0.10 mg/L
			Selenium	0.05 mg/L	0.05 mg/L
SAG aquifer	S(SG) and OBS-3 ^e <i>Well 16(SG) is current surrogate for both wells</i>	I(SG)	Uranium	2.15 mg/L	0.44 mg/L
			Selenium	0.05 mg/L	0.05 mg/L

Notes:

^a Sources: ARCO (1995) and Table 3-4 of the LTSP (DOE 1997).

^b The ACL for molybdenum is equivalent to the UMTRCA standard (40 CFR 192). The selenium ACL (both aquifers) is the same as the EPA (and state) drinking water standard. The uranium ACL for both aquifers is based on a human health-based risk standard of 0.44 mg/L at the site boundary as approved by NRC (NRC 1996).

^c After increasing uranium concentrations and exceedance of the 0.44 mg/L ACL starting in 2010, well T(M) went dry in 2012. Well 22(M) was installed in 2011 and now serves as a surrogate POC well for the alluvial aquifer.

^d Well X(M) has been dry or has had insufficient water to sample since August 2020. Well 21(M), installed in 2011, now serves as a surrogate POE well for the alluvial aquifer.

^e Low uranium concentrations (0.00022–0.0054 mg/L) measured in POC wells S(SG) and OBS-3 between 2004 and 2010 were later found to be unrepresentative of the aquifer. Well 16(SG), installed in 2012, now serves as a surrogate POC well. Although results are no longer considered representative of the aquifer, LM must continue monitoring S(SG) and OBS-3 until NRC concurs upon a revised LTSP.

Previous groundwater evaluations included an assessment of the main tailings disposal cell performance (DOE 2013) and development of a conceptual model of contaminant transport processes in the aquifers impacted by the Bluewater site (DOE 2014). LM updated the uranium plume maps for both the alluvial aquifer and the SAG aquifer in a 2019 report (DOE 2019). This analysis was followed by an evaluation of the influence of high-volume pumping wells near the site on groundwater flow and contaminant trends in the SAG aquifer (DOE 2020). In these reports, the extent of the uranium plumes for both aquifers is defined not by the ACLs (Table 1-6) but by the area with uranium concentrations exceeding 0.03 mg/L, the EPA maximum contaminant level for drinking water. DOE inherited the site when the state groundwater standard for uranium was 5 mg/L, a standard later reduced in 2004 when the state adopted the more stringent EPA standard.

Because DOE is committed to ensuring protection of human health and the environment for nearby offsite communities, the 0.03 mg/L state standard is applied as a context for interpreting uranium concentration trends in this report. However, neither the state nor EPA have regulatory authority at the site, so these comparisons are for informational purposes only and do not indicate a need for further action under UMTRCA regulations. LM continues to update the site conceptual model describing groundwater flow and contaminant transport using three-dimensional data visualization approaches and regularly updates stakeholders about the findings of these ongoing evaluations. Historical water quality data addressed in previous reports and in the following sections are available at <https://gems.lm.doe.gov> through the Geospatial Environmental Mapping System (GEMS).

1.7.1 Alluvial Aquifer

Alluvial aquifer analytical results from sampling events in November 2024 are provided in Table 1-7. As has been the case in the last several years, POC well T(M) and POE well X(M) were not sampled during either event because they were dry or had insufficient water to sample. Well T(M) has been dry since 2012; well X(M) has been dry or has had insufficient water to sample since August 2020.

*Table 1-7. Alluvial Aquifer Monitoring Results from November 2024
at the Bluewater, New Mexico, Disposal Site*

Monitoring Well	Purpose	Molybdenum (mg/L) ACL = 0.10 mg/L	Selenium (mg/L) ACL = 0.05 mg/L	Uranium (mg/L) ACL = 0.44 mg/L
E(M)	Background	ND	ND	ND
F(M)	POC	0.0093	ND	0.0055
T(M) ^a	POC	Not sampled (last sampled in May 2012)		
X(M) ^a	POE	Not sampled (last sampled in August 2020)		
Y2(M)	POC ^b	0.0016	0.0018	0.0041
20(M)	Upgradient well	0.0019	0.0040	0.011
21(M)	Surrogate POE	0.0010	0.0093	0.078
22(M)	Surrogate POC, replacing T(M)	0.0023	0.0051	0.32
23(M)	Downgradient well	0.0023	0.0034	0.013

Notes:

Results are rounded to two significant figures. Detection limit values for ND results are reported in GEMS, as are the results of duplicate analyses; the original sample results are reported above.

^a Wells T(M) and X(M) were not sampled during this reporting period because they were dry or there was insufficient water to sample.

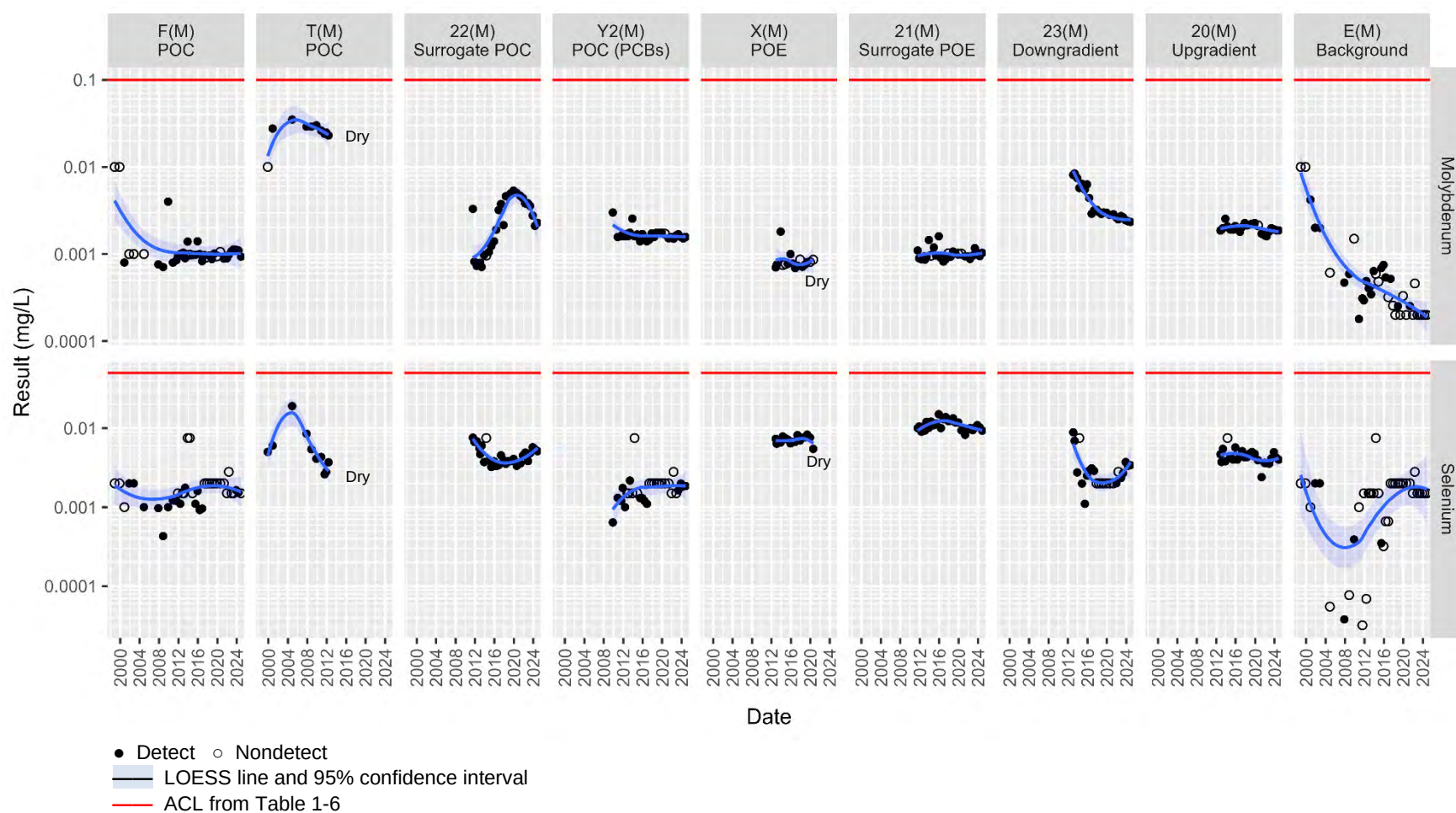
^b POC for monitoring of PCBs (only). LTSP requirements were met in 2018 when 20 years of sampling indicated no detectable concentrations, at which point LM discontinued monitoring for PCBs.

Abbreviation:

ND = not detected (below laboratory detection limit)

Because concentrations of molybdenum and selenium in all alluvial wells have been consistently below corresponding ACLs (Figure 1-4), the remainder of this section focuses mainly on uranium concentration trends. Figure 1-4 (and the remaining time-concentration plots presented in this section) use a faceting approach, whereby data are partitioned into a matrix of panels with each panel plotting data for a single well. In each facet plot, 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.

To support interpretation of these figures, Mann-Kendall trend analysis was performed for each well-parameter combination to characterize whether trends in uranium (the primary site contaminant), molybdenum, or selenium are upward, stable (no trend), or declining. Detailed Mann-Kendall trend test results for Bluewater site alluvial wells are documented in Table 1-8.



Notes: Data are plotted since 1998, the first sampling event after the LTSP was issued (DOE 1997). Wells are ordered by purpose as follows: POC and POE wells are listed first, followed by the remaining alluvial wells. Data for upgradient well 20(M) and the original background well E(M) are plotted last. As noted in Table 1-5, well 22(M) is a surrogate POC well replacing T(M).

Abbreviation: mg/L = milligrams per liter

Figure 1-4. Molybdenum (top) and Selenium (bottom) Concentrations in Alluvial Aquifer Monitoring Wells at the Bluewater, New Mexico, Disposal Site: 1998–2024

Table 1-8. Mann-Kendall Trend Analysis Results for Uranium, Molybdenum, and Selenium in Bluewater Site Alluvial Monitoring Wells

Well	Initial Trend Analysis Date	Final Trend Analysis Date	No. of Samples	No. of Nondetects	Kendall's tau	p-value	Trend
Uranium							
20(M)	11/14/2012	11/12/2024	25	0	-0.41	0.006	Decreasing
21(M) (POE*)	7/27/2011	11/11/2024	28	0	-0.80	<0.001	Decreasing
22(M) (POC*)	7/27/2011	11/11/2024	28	0	-0.01	0.94	No Trend
23(M)	1/28/2013	11/13/2024	24	0	-0.72	<0.001	Decreasing
E(M)	11/14/1998	11/12/2024	39	26	-0.24	0.02	Decreasing
F(M) (POC)	11/14/1998	11/11/2024	39	0	-0.69	<0.001	Decreasing
T(M) (POC)	11/11/1999	5/15/2012	12	0	0.88	<0.001	Increasing
X(M) (POE)	11/15/2012	8/5/2020	16	0	-0.76	<0.001	Decreasing
Y2(M) (POC)	5/13/2009	11/13/2024	31	0	-0.58	<0.001	Decreasing
Molybdenum							
20(M)	11/14/2012	11/12/2024	25	1	-0.13	0.37	No Trend
21(M) (POE*)	7/27/2011	11/11/2024	28	4	0.11	0.40	No Trend
22(M) (POC*)	7/27/2011	11/11/2024	28	1	0.46	<0.001	Increasing
23(M)	1/28/2013	11/13/2024	24	0	-0.88	<0.001	Decreasing
E(M)	11/14/1998	11/12/2024	38	19	-0.36	0.001	Decreasing
F(M) (POC)	11/14/1998	11/11/2024	38	9	0.19	0.09	No Trend
T(M) (POC)	11/11/1999	5/15/2012	10	1	-0.27	0.32	No Trend
X(M) (POE)	11/15/2012	8/5/2020	16	5	<0.001	1	No Trend
Y2(M) (POC)	11/10/2009	11/13/2024	30	1	-0.16	0.22	No Trend
Selenium							
20(M)	11/14/2012	11/12/2024	25	1	-0.18	0.22	No Trend
21(M) (POE*)	7/27/2011	11/11/2024	28	0	-0.07	0.62	No Trend
22(M) (POC*)	7/27/2011	11/11/2024	28	1	-0.04	0.75	No Trend
23(M)	1/28/2013	11/13/2024	24	9	-0.01	0.96	No Trend
E(M)	11/14/1998	11/12/2024	38	33	-0.08	0.47	No Trend
F(M) (POC)	11/14/1998	11/11/2024	38	22	-0.01	0.92	No Trend
T(M) (POC)	11/11/1999	5/15/2012	10	0	-0.56	0.03	Decreasing
X(M) (POE)	11/15/2012	8/5/2020	16	0	0.21	0.28	No Trend
Y2(M) (POC)	11/10/2009	11/13/2024	30	16	0.09	0.47	No Trend

Notes:

Trend tests were performed using the "NADA: Nondetects and Data Analysis for Environmental Data" package in R, version 1.6-1.1 (Lee 2025). The NADA trend test is similar to the traditional Mann-Kendall trend test except that it accounts for the presence of nondetects at multiple detection limits. Trend analyses were conducted at the 0.05 significance (or alpha) level using a two-sided test. The test statistic, Kendall's tau, is a measure of the strength of the association between two variables, with values always falling between -1 and +1.

Results for uranium are listed first as concentrations of molybdenum and selenium have been well below corresponding ACLs in all wells as shown in Figure 1-4.

* Denotes surrogate POC or POE designation (refer to Table 1-5).

Figure 1-5 shows historical uranium concentrations measured in all Bluewater site wells screened in the alluvial aquifer and listed in Table 1-5. Uranium concentrations in alluvial wells are currently below the corresponding ACL and NRC-approved health-based standard of 0.44 mg/L (Table 1-7). The only well in which the uranium ACL has been exceeded is POC well T(M) (uranium concentrations in well T(M) began trending upward in 1999), which increased from 0.096 mg/L to 0.56 mg/L in November 2010 (Figure 1-5). This measurement was the first of five results from this well that exceeded the ACL of 0.44 mg/L. LM notified NRC of the exceedance upon receiving the 2010 results from the laboratory (DOE 2010; DOE 2011a). Well T(M) was last sampled in May 2012, and the well has since been dry.

Wells 21(M) and 22(M) were installed in 2011 as a direct response to the ACL exceedance in well T(M) and to better monitor the alluvial aquifer downgradient of well T(M) (Table 1-5; Figure 1-3). Well 22(M) was intended as a surrogate for well T(M), which was observed to be nearly dry in 2010. Well 21(M) was intended as a surrogate for POE well X(M), which was dry in 2010 and 2011 (DOE 2011b). Although below the ACL, uranium concentrations in wells 21(M) and 22(M) continue to exceed the 0.03 mg/L state groundwater standard (Table 1-7; Figure 1-5). Uranium concentrations in well 22(M), at the approximate midpoint between POC well T(M) and downgradient well 21(M), have been stable between 0.30–0.40 mg/L, just below the 0.44 mg/L ACL.

Uranium concentrations in surrogate POE well 21(M), at the southeast corner of the site, have been slightly lower (0.09–0.15 mg/L) and have, along with most other alluvial wells, a statistically significant decreasing trend (Table 1-8). Uranium concentrations in well X(M) have been similar, with levels ranging from 0.073 to 0.15 mg/L (Figure 1-5). This well has not been sampled since August 2020 because it has been dry or had insufficient water to sample.

Although of no regulatory relevance, especially given the prohibition of groundwater use in the alluvial aquifer (Romero 2018), uranium concentrations in five of the nine alluvial wells have been consistently below the 0.03 mg/L state standard: POC wells F(M) and Y2(M), well 20(M), southeasternmost well 23(M), and background well E(M). Statistically significant decreasing trends in uranium concentrations were identified for all wells except T(M) (increasing trend before going dry in 2012) and well 22(M) (no trend) (Table 1-8).

1.7.2 SAG Bedrock Aquifer

To gain a better understanding of the hydrogeological characteristics of the SAG aquifer at the site, wells 11(SG), 13(SG), 14(SG), 15(SG), 16(SG), and 18(SG) were installed in summer 2012 at the locations shown in Figure 1-3. Wells 11(SG) and 14(SG) are cross-gradient of the disposal cell; all the other new wells are downgradient. Before installing the new SAG wells, POC wells OBS-3 and S(SG) were found to have highly corroded well screens, resulting in samples with anomalously low uranium concentrations. Therefore, well 16(SG) was installed in the same vicinity (Figure 1-3), intended as a surrogate or replacement POC well. Although wells OBS-3 and S(SG) continue to be sampled in accordance with the LTSP (DOE 1997), they are no longer considered representative of aquifer conditions in this region.

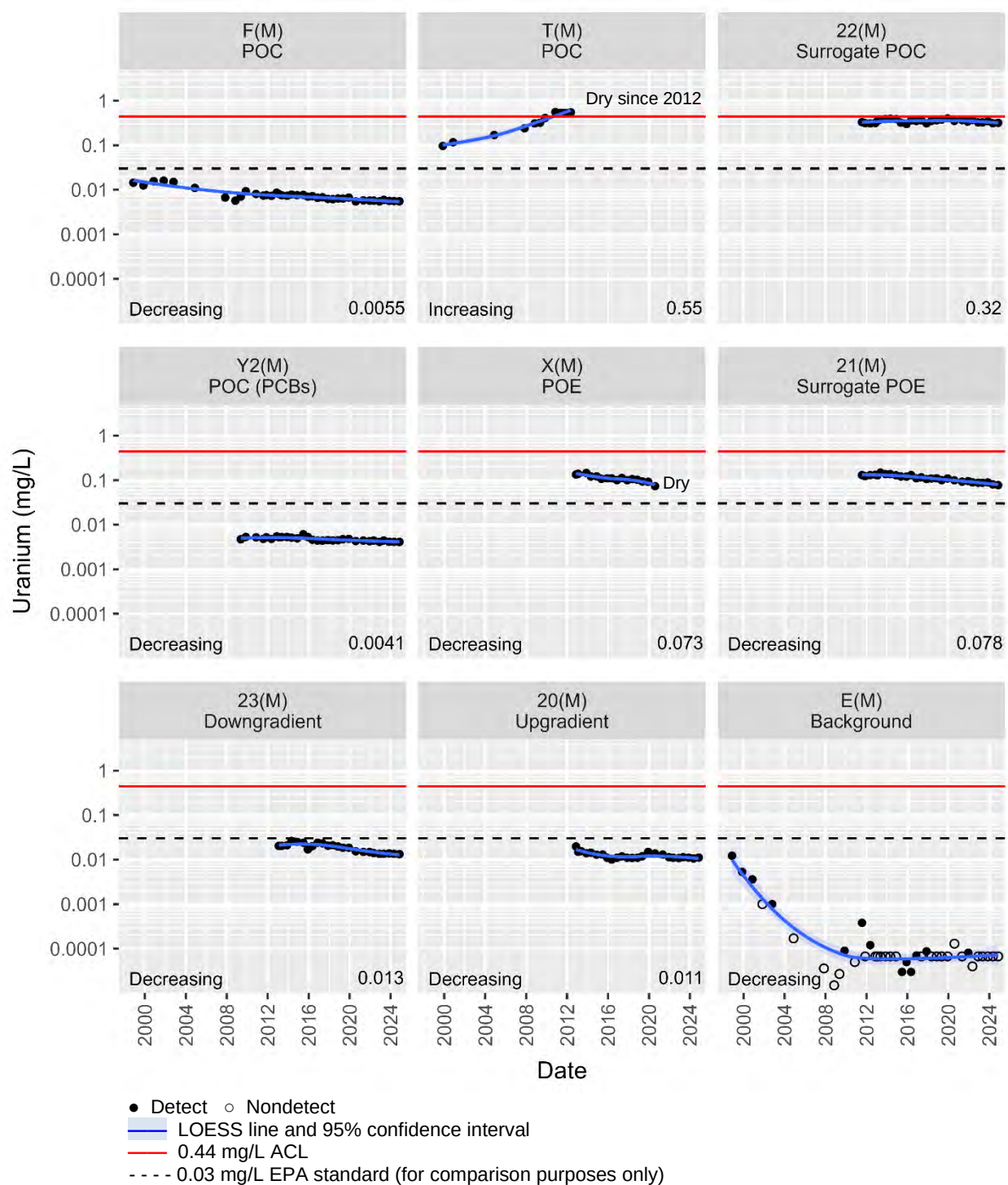


Figure 1-5. Uranium Concentrations in Alluvial Aquifer Monitoring Wells at the Bluewater, New Mexico, Disposal Site: 1998–2024

Table 1-9 lists analytical results for selenium and uranium in all onsite SAG aquifer wells for groundwater samples collected in November 2024. Across the SAG monitoring well network, there has been very little change in uranium concentrations since the previous annual inspection report was issued. As has been the case historically, selenium and uranium concentrations did not exceed corresponding ACLs in any of the site wells during this reporting period.

*Table 1-9. SAG Aquifer Monitoring Results for November 2024
at the Bluewater, New Mexico, Disposal Site*

Monitoring Well	Selenium (mg/L) ACL = 0.05 mg/L	Uranium (mg/L) ACL = 2.15 mg/L
11(SG)	ND	0.014
13(SG)	0.0068	0.12
14(SG)	ND	0.11
15(SG)	ND	0.020
16(SG) (Surrogate POC)	0.014	1.0
18(SG)	0.0061	0.26
I(SG) (POE)	0.0073	0.27
L(SG)	ND	0.0028
OBS-3 (POC) ^a	ND	0.0032
S(SG) (POC) ^a	0.0036	0.15

Notes:

Results are rounded to two significant figures. Detection limit values for ND results are reported in GEMS, as are corresponding data qualifiers and the results of duplicate analyses; the original sample results are reported above. GEMS can be accessed at <https://gems.lm.doe.gov>.

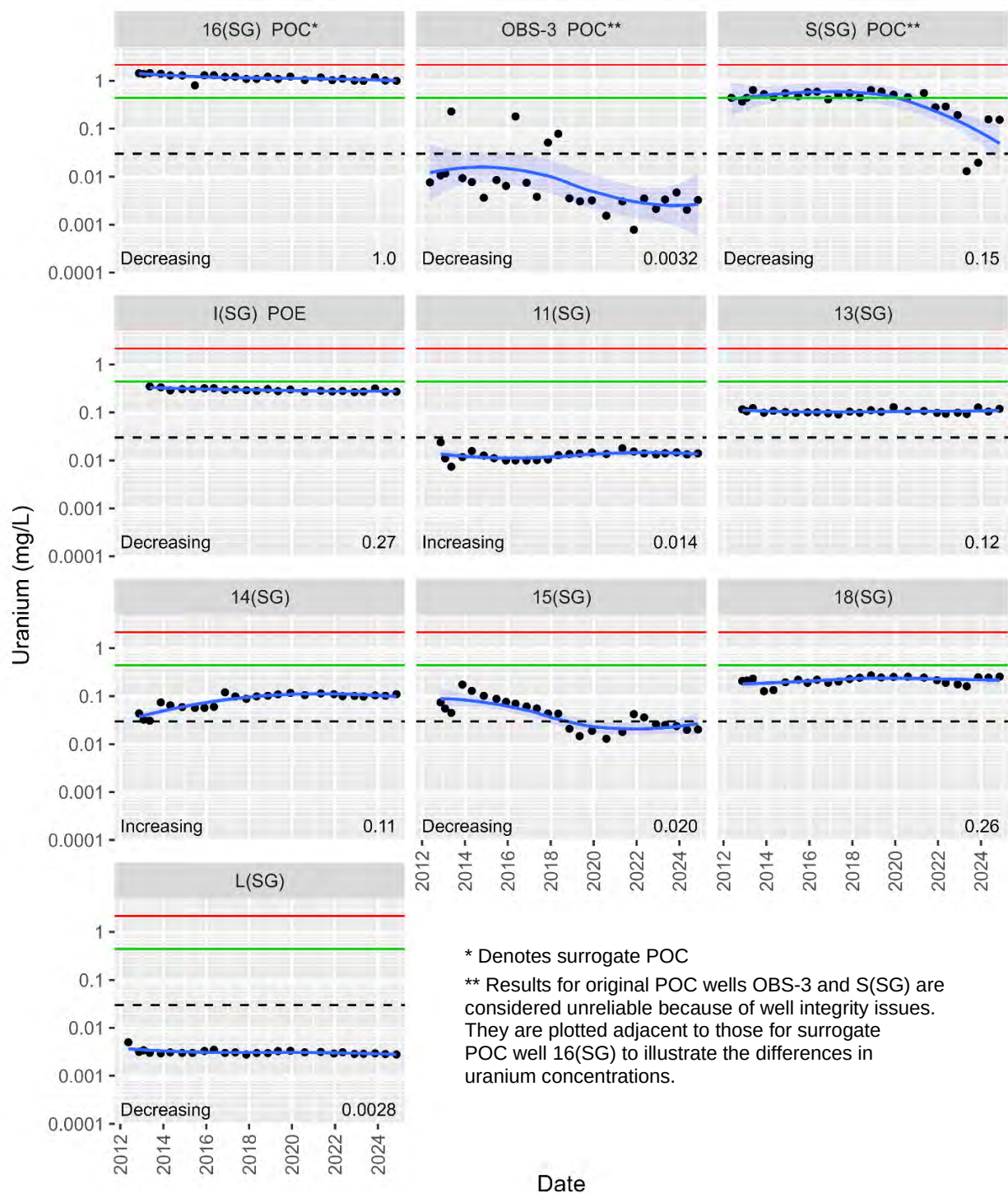
^a Results for POC wells OBS-3 and S(SG) (shaded cells) are not considered representative of aquifer conditions due to corrosion in the well screen and other factors. Results for surrogate POC well 16(SG) are considered most representative of aquifer conditions in this region of the site.

Abbreviation:

ND = not detected (below laboratory detection limit)

As shown in Table 1-9, in 2024, selenium results for half of the 10 SAG wells currently monitored were below detection limits (<0.0015 mg/L). Consistent with the historical record, selenium concentrations in the five remaining wells are well below the 0.05 mg/L ACL. Uranium concentrations in site wells continue to be below the 2.15 mg/L ACL. For all wells except surrogate POC well 16(SG), with current levels of about 1 mg/L, uranium concentrations are also below the 0.44 mg/L NRC-approved health-based standard.

Figure 1-6 and Figure 1-7 plot concentrations of uranium and selenium, respectively, in the SAG aquifer monitoring wells for 2012–2024. This time frame was chosen because (1) monitoring at most of the wells—11(SG) through 18(SG)—did not begin until November 2012 (following installation) and (2) some results for remaining wells with a longer monitoring history are considered erroneous due to either insufficient sample depths or well integrity issues. For example, previous results for well I(SG) are not shown because incorrect sampling depths in the well led to erroneously low results from 2008 to 2013 (DOE 2014). Uranium concentrations measured in POC wells S(SG) and, in particular, OBS-3 are not considered representative of aquifer conditions. Although results for these wells are shown alongside those for surrogate POC well 16(SG) in Figure 1-6, these data are not addressed in the following interpretations.



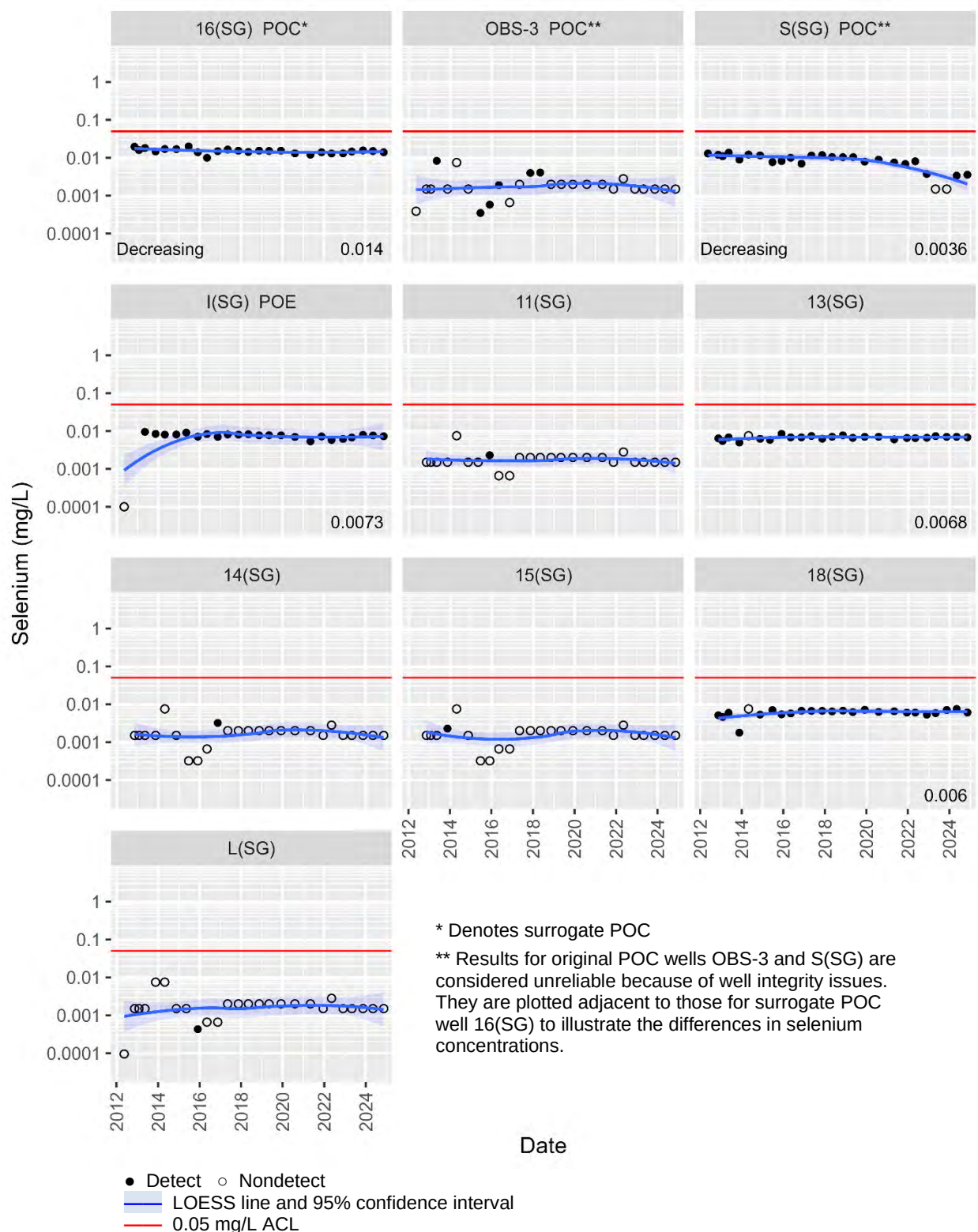
* Denotes surrogate POC

** Results for original POC wells OBS-3 and S(SG) are considered unreliable because of well integrity issues. They are plotted adjacent to those for surrogate POC well 16(SG) to illustrate the differences in uranium concentrations.

Notes: The date scale begins in 2012, coinciding with the installation of the 11–18(SG) well series. The most recent results are labeled in the lower right corner of each plot. For wells with statistically significant trends (see Table 1-10), the direction of the trend is also indicated.

Wells are ordered by purpose: POC and POE wells are listed first, followed by the remaining wells; data for background well L(SG) are plotted last.

Figure 1-6. Uranium Concentrations in the SAG Aquifer at the Bluewater, New Mexico, Disposal Site



Notes: The date scale begins in 2012, coinciding with the installation of the 11–18(SG) well series. For results above the detection limit, the most recent selenium concentrations are labeled in the lower right corner of each plot. For wells with statistically significant trends (see Table 1-10), the direction of the trend is also indicated. Wells are ordered by purpose: POC and POE wells are listed first, followed by the remaining wells listed in Table 1-5; data for background well L(SG) are plotted last.

Figure 1-7. Selenium Concentrations in the SAG Aquifer at the Bluewater, New Mexico, Disposal Site

Uranium concentrations in all Bluewater site SAG wells have been consistently below the 2.15 mg/L ACL (Figure 1-6). Also, uranium concentrations in POE well I(SG) have been consistently below the site-specific NRC-approved health-based standard of 0.44 mg/L (applied to groundwater leaving the site boundary). However, most onsite SAG wells, including SAG wells near the downgradient (eastern) site boundary, have consistently exceeded the 0.03 mg/L EPA drinking water standard for uranium. Exceptions are well 11(SG) at the northern site boundary, background well L(SG), and, periodically, well 15(SG) (Figure 1-6).

Mann-Kendall trend analysis identified statistically significant decreasing uranium trends in six SAG wells: 15(SG), installed near alluvial well T(M); surrogate POC well 16(SG); OBS-3; S(SG); POE well I(SG); and background well L(SG) (Table 1-10). Uranium concentrations in well I(SG), at the eastern site boundary downgradient of the disposal cell, have ranged from 0.15–0.35 mg/L; the most recent (November 2024) result was 0.27 mg/L (Table 1-9).

Consistent with the previous compliance report, statistically significant increasing trends in uranium concentrations were identified for two SAG wells: cross-gradient wells 11(SG) (northern site boundary) and 14(SG), at the southwestern site boundary. The significant increase in well 14(SG) reflects an increase from 0.031 mg/L in 2013 to 1.2 mg/L in November 2016, but since then, concentrations have remained relatively constant at about 0.1 mg/L; the most recent result was 0.11 mg/L. No significant trend was found for two wells: 13(SG) and 18(SG) (Table 1-10).

LM continues to monitor groundwater quality in offsite wells completed in the SAG aquifer as part of the Cooperative Agreement between DOE and NMED and to assess potential offsite migration of contaminants. Uranium concentration trends in offsite wells, including privately owned and nearby municipal drinking water wells monitored by Homestake Mining Company (Homestake) or NMED, were described in *Evaluating the Influence of High-Production Pumping Wells on Impacted Groundwater at the Bluewater, New Mexico, Disposal Site* (DOE 2020). Offsite wells either had a decreasing statistically significant trend or no statistical trend in uranium concentration between 2012 and 2018. At that time, all offsite wells had uranium concentrations below the EPA standard of 0.03 mg/L except for two wells (951 and 951R) owned by Homestake, with uranium concentrations slightly exceeding the EPA standard.

Well 951 is just outside the southeastern boundary of the Bluewater site (Figure 1-3) and is routinely monitored by LM (and was previously intermittently monitored by Homestake). Using validated data since 2013, uranium concentrations in this well have been stable (no significant trend), with a mean and standard deviation of 0.031 ± 0.005 mg/L. The November 2024 result for this well, 0.032 mg/L, slightly exceeded the EPA standard. Monitoring well 951R also had no trend (DOE 2020) and is approximately 2 miles southeast of the site, nearer to the Homestake site (Figure 1-3).

Although monitoring of the SAG aquifer at the site has focused on uranium, selenium is also a required analyte in accordance with the LTSP (Table 1-6). Selenium concentrations in most wells continue to be well below the 0.05 mg/L ACL and are often below detection limits (Figure 1-7). The highest selenium concentrations have been measured in well 16(SG), where results have ranged from 0.01–0.02 mg/L (most recent result of 0.014 mg/L) and a statistically significant decreasing trend was identified (Table 1-10). This decrease is very subtle (from 0.02 mg/L in 2012) and difficult to identify in Figure 1-7 because of the scaling in the figure.

A significant decreasing trend was also identified for well S(SG). No significant trends in selenium concentrations were found for the remaining SAG aquifer wells.

Table 1-10. Mann-Kendall Trend Analysis Results for Uranium and Selenium in Bluewater Site SAG Monitoring Wells, 2012–2024

Well	Initial Trend Analysis Date	Final Trend Analysis Date	No. of Samples	No. of Nondetects	Kendall's tau	p-value	Trend
Uranium							
11(SG)	11/14/2012	11/12/2024	25	0	0.33	0.023	Increasing
13(SG)	11/15/2012	11/11/2024	25	0	-0.04	0.80	No Trend
14(SG)	11/14/2012	11/12/2024	25	0	0.53	<0.001	Increasing
15(SG)	11/13/2012	11/12/2024	25	0	-0.61	<0.001	Decreasing
16(SG) (POC) ^a	11/13/2012	11/12/2024	25	0	-0.62	<0.001	Decreasing
18(SG)	11/14/2012	11/13/2024	25	0	0.28	0.06	No Trend
I(SG) (POE)	5/15/2013	11/12/2024	23	0	-0.58	<0.001	Decreasing
L(SG)	5/15/2012	11/12/2024	26	0	-0.39	0.007	Decreasing
OBS-3 (POC) ^b	5/15/2012	11/12/2024	26	0	-0.51	<0.001	Decreasing
S(SG) (POC) ^b	5/15/2012	11/12/2024	26	0	-0.30	0.03	Decreasing
Selenium							
11(SG)	11/14/2012	11/12/2024	25	24	-0.03	0.80	No Trend
13(SG)	11/15/2012	11/11/2024	25	1	0.23	0.12	No Trend
14(SG)	11/14/2012	11/12/2024	25	24	-0.02	0.87	No Trend
15(SG)	11/13/2012	11/12/2024	25	24	-0.05	0.69	No Trend
16(SG) (POC) ^a	11/13/2012	11/12/2024	25	0	-0.38	0.009	Decreasing
18(SG)	11/14/2012	11/13/2024	25	1	0.25	0.082	No Trend
I(SG) (POE)	5/15/2012	11/12/2024	26	4	-0.05	0.72	No Trend
L(SG)	5/15/2012	11/12/2024	26	25	0.003	1	No Trend
OBS-3 (POC) ^a	5/15/2012	11/12/2024	26	20	-0.06	0.64	No Trend
S(SG) (POC) ^a	5/15/2012	11/12/2024	26	2	-0.64	<0.001	Decreasing

Notes:

Trend tests were performed using the “NADA: Nondetects and Data Analysis for Environmental Data” package in R, version 1.6-1.1 (Lee 2025). The NADA trend test is similar to the traditional Mann-Kendall trend test except that it accounts for the presence of nondetects at multiple detection limits. Trend analyses were conducted at the 0.05 significance (or alpha) level using a two-sided test. The test statistic, Kendall's tau, is a measure of the strength of the association between two variables, with values always falling between -1 and +1.

^a Surrogate POC well for wells OBS-3 and S(SG).

^b Trend analysis results for initial POC wells OBS-3 and S(SG) should be interpreted with caution because these wells are no longer considered representative of aquifer conditions. Results for surrogate POC well 16(SG) are considered most representative of aquifer conditions in this region of the site.

1.8 References



Note

Site-related documents are available on the LM public webpages at <https://lmpublicsearch.lm.doe.gov/SitePages>.

10 CFR 40.28. U.S. Nuclear Regulatory Commission, “General License for Custody and Long-Term Care of Uranium or Thorium Byproduct Materials Disposal Sites,” *Code of Federal Regulations*.

40 CFR 192. U.S. Environmental Protection Agency, “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings,” *Code of Federal Regulations*.

42 USC 2011 et seq. “Atomic Energy Act of 1954,” *United States Code*.

ARCO (Atlantic Richfield Company), 1995. R.S. Ziegler, project manager, letter (about Groundwater Alternate Concentration Limits for Bluewater Mill) to J. Holonich, U.S. Nuclear Regulatory Commission, Uranium Recovery Branch, April 25.

DOE (U.S. Department of Energy), 1997. *Long-Term Surveillance Plan for the DOE Bluewater (UMTRCA Title II) Disposal Site Near Grants, New Mexico*, LTSM003407, July.

DOE (U.S. Department of Energy), 2010. C. Clayton, site manager, Office of Legacy Management, letter (about Uranium Concentrations in Monitoring Well T(M) at the Bluewater, New Mexico, UMTRCA Title II Disposal Site) to deputy director, U.S. Nuclear Regulatory Commission, May 26.

DOE (U.S. Department of Energy), 2011a. A. Gil, site manager, Office of Legacy Management, letter (about Notification of Alternate Concentration Limit Exceedance at the Bluewater, New Mexico, UMTRCA Title II Disposal Site) to deputy director, U.S. Nuclear Regulatory Commission, March 1.

DOE (U.S. Department of Energy), 2011b. *Proposed Evaluative Monitoring Work Plan for the Bluewater, New Mexico, Disposal Site to Determine the Cause of Uranium Alternate Concentration Limit Exceedance, Bluewater, New Mexico, Disposal Site*, LMS/BLU/S08130, Office of Legacy Management, August.

DOE (U.S. Department of Energy), 2013. *Bluewater, New Mexico, Disposal Cell Cover: Design, Observations, and Performance Evaluation Options*, LMS/BLU/S09632, Office of Legacy Management, January.

DOE (U.S. Department of Energy), 2014. *Site Status Report: Groundwater Flow and Contaminant Transport in the Vicinity of the Bluewater, New Mexico, Disposal Site*, LMS/BLU/S11381, Office of Legacy Management, November.

DOE (U.S. Department of Energy), 2017. *Evaluation of Disposal Cell Topography Using LiDAR Surveys, Bluewater, New Mexico, Disposal Site*, LMS/BLU/S14703, Office of Legacy Management, April.

DOE (U.S. Department of Energy), 2019. *2017 Uranium Plumes in the San Andres–Glorieta and Alluvial Aquifers at the Bluewater, New Mexico, Disposal Site*, LMS/BLU/S19565, Office of Legacy Management, February.

DOE (U.S. Department of Energy), 2020. *Evaluating the Influence of High-Production Pumping Wells on Impacted Groundwater at the Bluewater, New Mexico, Disposal Site*, LMS/BLU/S24765, Office of Legacy Management, August.

DOE (U.S. Department of Energy), 2023. N. Olin, site manager, Office of Legacy Management, letter (about Notification of Sampling Frequency Reduction in conformance with Long Term Surveillance Plan for the Bluewater, New Mexico, Disposal Site) to R. Linton, project manager, U.S. Nuclear Regulatory Commission, August 25.

Lee, L., 2025. “NADA: Nondetects and Data Analysis for Environmental Data,” R package, version 1.6-1.1, <https://cran.r-project.org/web/packages/NADA/NADA.pdf>, accessed May 20, 2025.

NRC (U.S. Nuclear Regulatory Commission), 1996. J.J. Holonich, chief, Uranium Recovery Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, letter (about Approval of Groundwater Alternate Concentration Limits, Amendment 30 to Source Material License SUA-1470) to R.S. Ziegler, project manager, Atlantic Richfield Company, February 22.

NRC (U.S. Nuclear Regulatory Commission), 2025. R. Linton, project manager, Uranium Recovery and Materials Decommissioning Branch, Office of Nuclear Material Safety and Safeguards, letter (about U.S. Nuclear Regulatory Commission Staff Review, U.S. Department of Energy Notification of Sampling Frequency Reduction in Conformance with the Long-Term Surveillance Plan for the Bluewater, New Mexico, Disposal Site, Docket No. 04008902) to N. Olin, site manager, Office of Legacy Management, U.S. Department of Energy, February 3.

Romero, J.T., 2018. J.T. Romero, PE, director, Water Rights, State of New Mexico Office of the State Engineer, letter (about Request for Well Drilling Prohibition Associated with the Remedial Action at the Former Homestake and Bluewater Mill Sites, Cibola County, New Mexico) to B. Yurdin, director, Water Protection Division, New Mexico Environment Department, May 3.

1.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	157	Entrance Gate
PL-2	247	Perimeter Access Road Low Water Crossing
PL-3	202	Western Perimeter Fence Repair Section
PL-4	90	Perimeter Sign P14
PL-5	0	Site Marker
PL-6	—	Boundary Monument BM-23
PL-7	—	Quality Control Monument QC-12
PL-8	247	Monitoring Well 20(M) with SOARS Station
PL-9	202	Overview of Vegetation on Main Tailings Disposal Cell
PL-10	270	Elm Tree on the Main Tailings Disposal Cell
PL-11	90	Potential Riprap Degradation Observed in Depression Area MT-02
PL-12	337	Siphon Inlet
PL-13	90	Potential Depression MT-03
PL-14	315	Rill Formation at the Base of the South Bench near Perimeter Sign P24 (MT-08)
PL-15	22	Shallow Depression CT-01
PL-16	90	Overview of the PCB Cell
PL-17	225	View of East Dump Erosional Area Facing West
PL-18	180	View of East Dump Erosional Area Facing South
PL-19	—	East Dump Soil Piping
PL-20	—	Exposed Basalt Joint
PL-21	22	Wildlife Drinking Water System
PL-22	315	Historical Anaconda Decommissioned Injection Well

Note:

— = Photograph taken vertically from above.



PL-1. Entrance Gate



PL-2. Perimeter Access Road Low Water Crossing



PL-3. Western Perimeter Fence Repair Section



PL-4. Perimeter Sign P14



PL-5. Site Marker



PL-6. Boundary Monument BM-23



PL-7. Quality Control Monument QC-12



PL-8. Monitoring Well 20(M) with SOARS Station



PL-9. Overview of Vegetation on Main Tailings Disposal Cell



PL-10. Elm Tree on the Main Tailings Disposal Cell



PL-11. Potential Riprap Degradation Observed in Depression Area MT-02



PL-12. Siphon Inlet



PL-13. Potential Depression MT-03



PL-14. Rill Formation at the Base of the South Bench near Perimeter Sign P24 (MT-08)



PL-15. Shallow Depression CT-01



PL-16. Overview of the PCB Cell



PL-17. View of East Dump Erosional Area Facing West



PL-18. View of East Dump Erosional Area Facing South



PL-19. East Dump Soil Piping



PL-20. Exposed Basalt Joint



PL-21. Wildlife Drinking Water System



PL-22. Historical Anaconda Decommissioned Injection Well

2.0 Edgemont, South Dakota, Disposal Site

2.1 Compliance Summary

The Edgemont, South Dakota, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title II Disposal Site was inspected on April 30, 2025. No changes were observed in the disposal cell cover or in associated drainage features. The grazing licensee and the Office of Legacy Management (LM) will remove the unmaintained interior fence. Inspectors also determined that the ponderosa pine on the containment dam will need to be removed in the future. No other maintenance needs or cause for a follow-up inspection were noted. Groundwater monitoring is not required at the site.

2.2 Compliance Requirements

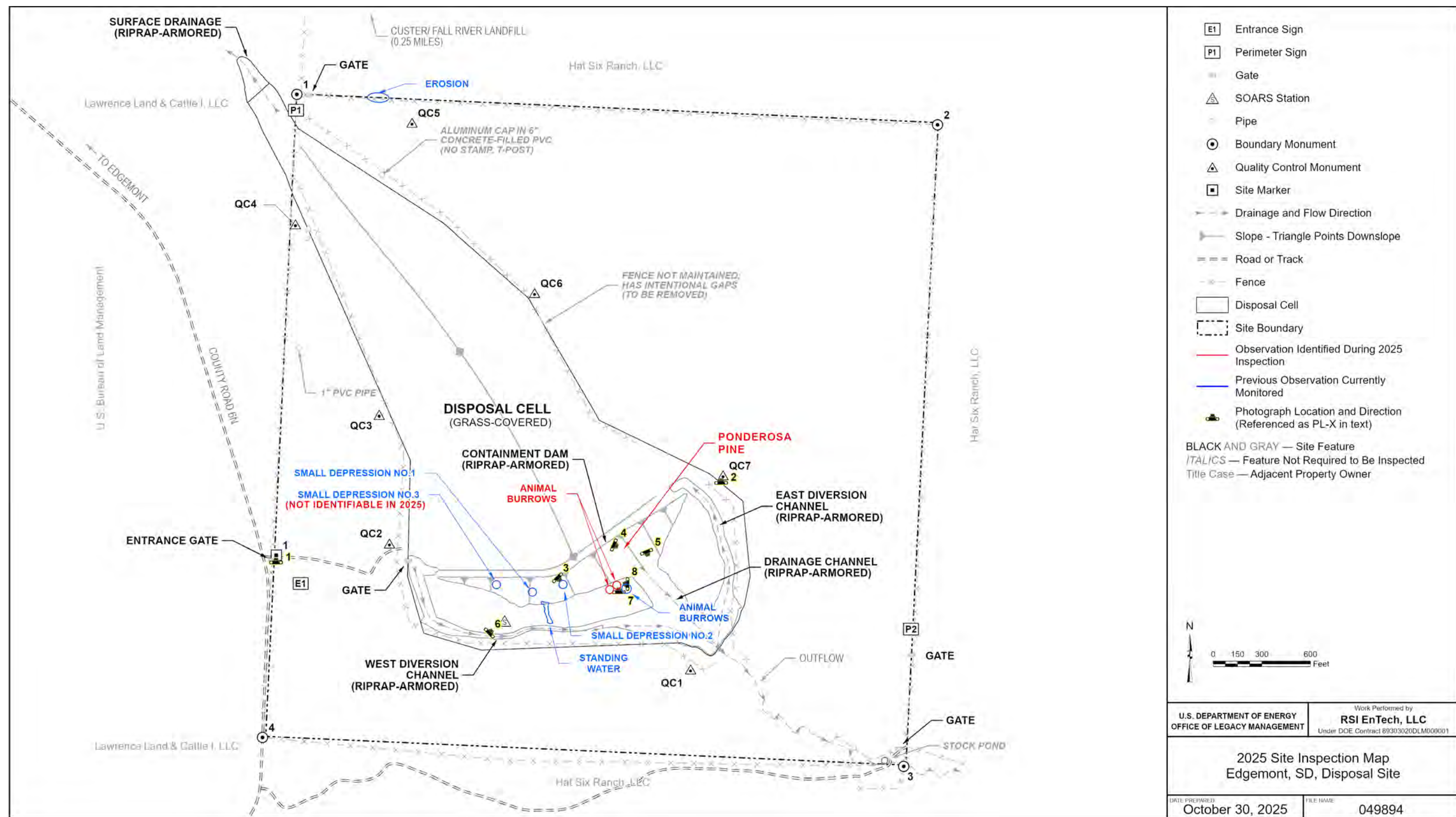
Requirements for the long-term surveillance and maintenance of the site are specified in the site-specific Long-Term Surveillance Plan (DOE 1996) (LTSP) in accordance with procedures established to comply with the requirements of the U.S. Nuclear Regulatory Commission (NRC) general license at Title 10 *Code of Federal Regulations* Section 40.28 (10 CFR 40.28). Table 2-1 lists these requirements.

Table 2-1. License Requirements for the Edgemont, South Dakota, Disposal Site

Requirement	LTSP	This Report	10 CFR 40.28
Annual Inspection and Report	Sections 3.3 and 3.4	Section 2.4	(b)(3)
Follow-Up Inspections	Section 3.5	Section 2.5	(b)(4)
Routine Maintenance and Emergency Measures	Section 3.6	Section 2.6	(b)(5)
Environmental Monitoring	Section 3.7	Section 2.7	(b)(3)

2.3 Institutional Controls

The 360-acre site, identified by the property boundary shown in Figure 2-1, is owned by the United States and was accepted under the NRC general license in 1996. The U.S. Department of Energy (DOE) is the licensee and, in accordance with the requirements for UMTRCA Title II sites, LM is responsible for the custody and long-term care of the site. Institutional controls (ICs) at the site include federal ownership of the property, administrative controls, and the following physical ICs that are inspected annually: the disposal cell, entrance gate and sign, perimeter fence and signs, site marker, and boundary monuments.



Abbreviation: SOARS = System Operation and Analysis at Remote Sites

Figure 2-1. 2025 Annual Inspection Drawing for the Edgemont, South Dakota, Disposal Site

2.4 Inspection Results

The site, approximately 2 miles south of Edgemont, South Dakota, was inspected on April 30, 2025. The inspection was conducted by T. Santonastaso, A. Soares, and N. Lind of the Legacy Management Support (LMS) contractor. M. Young, an LM site manager representing DOE, also participated in the inspection. The purposes of the inspection were to confirm the integrity of visible features at the site, identify changes in conditions that might affect conformance with the LTSP, and evaluate whether maintenance or follow-up inspection and monitoring are needed.

A grazing license, granted by LM, allows a local rancher to graze his cattle on the site. Livestock were present outside the site boundary. No concerns were identified related to livestock grazing on the site.

2.4.1 Site Surveillance Features

Figure 2-1 shows the locations of site features, including site surveillance features and inspection areas, in black and gray font. Some site features that are present but not required to be inspected are shown in italic font. Observations from previous inspections that are currently monitored are shown in blue, and new observations identified during the 2025 annual inspection are shown in red. Inspection results and recommended maintenance activities associated with site surveillance features are described in the following subsections. Photographs to support specific observations are noted in the text and in Figure 2-1 by photograph location (PL) numbers. The photographs and photograph log are presented in Section 2.9.

2.4.1.1 Site Access and Entrance Gate

Access to the site is from Fall River County Road 6N. The entrance sign, which is mounted on a steel post set in concrete, was in good condition. The tubular metal entrance gate was secured by a locked chain and was intact. The perimeter fence features three additional wire gates at the following locations: (1) the northwest corner of the property, (2) approximately 700 feet north of the southeast corner, and (3) the southeast corner of the site. All gates were closed, locked, and intact. No maintenance needs were identified.

2.4.1.2 Perimeter Fence and Signs

A four-strand barbed-wire fence encloses the site, truncating at the southeast corner to allow livestock access to a preexisting stock pond. There are two perimeter signs. Perimeter sign P1 is attached at the northwest corner and perimeter sign P2 is attached to the perimeter fence on the east side. No maintenance needs were identified.

The grazing licensee monitors site security and maintains the perimeter fence. An erosional feature is present along the northwest side of the fence but is not compromising the fence. No maintenance needs were identified.

The licensee proposed removing the unmaintained interior fence that had been installed to prevent grazing while vegetation was establishing after the disposal cell was closed. The LM

site manager concurred with this proposal, as this fence is no longer required. The fence will be removed by the grazing licensee in the future. No other maintenance needs were identified.

2.4.1.3 Site Marker

The granite site marker is inside the entrance gate (PL-1). No maintenance needs were identified.

2.4.1.4 Boundary Monuments

There are four boundary monuments, one at each corner of the site. In past inspections, the stock pond was observed to be encroaching on boundary monument BM-3. Boundary monument BM-3 will continue to be monitored to ensure that saturated soils do not displace it. No maintenance needs were identified.

2.4.1.5 Aerial Survey Quality Control Monuments

LM installed seven aerial survey quality control monuments in 2019 and conducted a baseline aerial survey in 2021. The quality control monuments were inspected during the 2025 annual inspection (PL-2). No maintenance needs were identified.

2.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three sections (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection. The inspection areas are (1) the cover of the disposal basin; (2) the containment dam and diversion channels; and (3) the site perimeter, outlying areas, and balance of the site. Inspectors examined specific site surveillance features within each area and looked for evidence of erosion, settling, slumping, or other modifying processes that might affect conformance with LTSP requirements.

2.4.2.1 Cover of the Disposal Cell

The grass-covered disposal cell, completed in 1989, occupies 100 acres. No signs of erosion, settling, or other modifying processes were found that could affect its integrity. No maintenance needs were identified.

2.4.2.2 Containment Dam and Diversion Channels

The face of the containment dam is armored with riprap. In 2021 and then in 2023, a total of three depressions were identified on the containment dam. During the 2025 inspection, depression no. 3 could not be identified and depressions no. 1 and no. 2 were inspected and measured (PL-3). No evidence of sediment deposition, human intervention, or other modifying processes have been observed near the depressions. The depressions do not threaten the integrity or performance of the disposal cell; however, monitoring will continue during annual inspections and subsequent surveys. Vegetation has established in the riprap. The vegetation helps to stabilize these areas and does not impair the function of the containment dam. A ponderosa pine (PL-4) is growing in the middle of the containment dam. In the future, the ponderosa pine will be removed.

The diversion and drainage channels (PL-5) are covered with grass on the upslope portions and armored with riprap on the downslope portions on steeper slopes. Sparse vegetation in the riprap helps to stabilize these areas and does not impair the function of the channels. Wetland vegetation is present at the base of the drainage channel outflow. No maintenance needs were identified.

In August 2023, a remote telemetry meteorological station, also known as a System Operation and Analysis at Remote Sites (SOARS) station (PL-6), was installed near the containment dam to monitor local weather conditions at the site and view conditions using a web camera. A fence was installed to protect the SOARS station from cattle. No maintenance needs were identified.

2.4.2.3 Site Perimeter, Outlying Areas, and Balance of the Site

The site is surrounded by private land used primarily for grazing and wildlife habitat. The area approximately 0.25 mile beyond the site boundary—including a surface drainage area just outside the northwest corner of the property that is riprap armored to prevent headward erosion onto the site—was visually observed for erosion, changes in land use, or other phenomena that might affect the long-term integrity of the site. No such changes were identified.

The Custer Fall River landfill is approximately 0.25-mile north of the site. Weather events cause small trash from the landfill to travel to the site. During inspections, inspection crews carry trash bags and collect unwanted items and discard them appropriately offsite. The trash does not impact the integrity of the site.

The balance of the site consists of undisturbed areas covered with native shrubs, grasses, and forbs and formerly disturbed areas covered primarily with seeded grasses and annual weeds. Animal burrows have been observed on the southwestern side of the drainage channel between the riprap-armored containment dam and the west diversion channel. In 2025, new animal burrows were observed along with the formerly observed animal burrows. It appears as if a bigger animal is using them (PL-7 and PL-8). The animal burrows are not impacting the functionality of the disposal cell or drainage features. No maintenance needs were identified.

2.5 Follow-Up Inspections

LM will conduct follow-up inspections if (1) a condition is identified during the annual inspection or other site visit that requires a return to the site to evaluate the condition or (2) LM is notified by a citizen or outside agency that conditions at the site are substantially changed. No need for a follow-up inspection was identified.

2.6 Routine Maintenance and Emergency Measures

Noxious weeds were treated in September 2024 and will be treated again in 2025. No other maintenance needs were identified.

Emergency measures are corrective actions that LM will take in response to unusual damage or disruption that threatens or compromises site health and safety, security, integrity, or compliance with 40 CFR 192. No emergency measures were identified.

2.7 Environmental Monitoring

In accordance with the LTSP, groundwater monitoring is not required at this site because a 300–700-foot-thick layer of competent shale bedrock lies between the encapsulated tailings and the uppermost confined aquifer. Additionally, clay liners were constructed to isolate the tailings from the shallower, unconfined, perched groundwater that is present because of local precipitation. There is no evidence of any direct hydraulic connection between the perched groundwater and the underlying confined bedrock aquifer.

An annual visual inspection of vegetation conditions required by the LTSP was conducted during the annual inspection. Vegetation was observed to be typical of late spring growing conditions. No additional vegetation management is required; however, LM conducts periodic rangeland health assessments as a best management practice to measure ecological health at the site. No cattle were grazing on the site during the inspection but were present outside the site boundary.

2.8 References



Site-related documents are available on the LM public webpages at <https://lmpublicsearch.lm.doe.gov/SitePages>.

10 CFR 40.28. U.S. Nuclear Regulatory Commission, “General License for Custody and Long-Term Care of Uranium or Thorium Byproduct Materials Disposal Sites,” *Code of Federal Regulations*.

40 CFR 192. U.S. Environmental Protection Agency, “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings,” *Code of Federal Regulations*.

DOE (U.S. Department of Energy), 1996. *Long-Term Surveillance Plan for the DOE Tennessee Valley Authority (UMTRCA Title II) Disposal Site, Edgemont, South Dakota*, NRC Docket File No. 040-01341, June.

2.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	—	Site Marker
PL-2	—	Quality Control Monument QC-7
PL-3	135	Depression No. 2, Measuring Depth
PL-4	113	Ponderosa Pine on Containment Dam
PL-5	158	Drainage Channel Looking Southeast
PL-6	45	SOARS Station
PL-7	—	Looking into Larger Animal Burrow
PL-8	270	Larger Animal Burrow

Note:

— = Photograph taken vertically from above.



PL-1. Site Marker



PL-2. Quality Control Monument QC-7



PL-3. Depression No. 2, Measuring Depth



PL-4. Ponderosa Pine on Containment Dam



PL-5. Drainage Channel Looking Southeast



PL-6. SOARS Station



PL-7. Looking into Larger Animal Burrow



PL-8. Larger Animal Burrow

3.0 L-Bar, New Mexico, Disposal Site

3.1 Compliance Summary

The L-Bar, New Mexico, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title II Disposal Site was inspected on March 26, 2025. Previous inspections performed since 2021, as required by the Long-Term Surveillance Plan (DOE 2004) (LTSP), and associated follow-up site visits identified numerous surface degradation features on the disposal cell top slope. Seven more degradation features were identified during the 2025 inspection. During an Applied Studies and Technology (AS&T) investigation in September and October 2022, several piping features were discovered on the side slope of the disposal cell. These features continue to be monitored and currently do not affect the performance of the top and side slope. Inspectors also identified several routine maintenance needs during the March 2025 inspection.

Erosion and vegetation measurements to monitor the condition of the disposal cell top slope were conducted in July 2025, and the results are included in Section 3.7.2.

Groundwater is monitored every 3 years in accordance with the site-specific U.S. Department of Energy (DOE) Office of Legacy Management (LM) LTSP (DOE 2004). The most recent routine groundwater sampling event was conducted on November 2, 2022, with follow-up exceedance sampling performed at three locations on November 15, 2023. Analytical results from these sampling events are presented in Section 3.7.1. Since sampling commenced in 2005, no alternate concentration limit (ACL) or alternative abatement standard (AAS) has been exceeded in any site well. State of New Mexico-approved background levels for sulfate and total dissolved solids (TDS) have been exceeded at the northeastern point of exposure (POE) (well 72), where chloride concentrations are also approaching the corresponding state standard. Results from the groundwater sampling event conducted in November 2025 will be included in the 2026 annual compliance report.

3.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the site-specific LTSP (DOE 2004) in accordance with procedures established to comply with the requirements of the U.S. Nuclear Regulatory Commission (NRC) general license at Title 10 *Code of Federal Regulations* Section 40.28 (10 CFR 40.28). Table 3-1 lists these requirements.

Table 3-1. License Requirements for the L-Bar, New Mexico, Disposal Site

Requirement	LTSP	This Report	10 CFR 40.28
Annual Inspection and Report	Sections 3.3 and 3.4	Section 3.4	(b)(3)
Follow-Up Inspections	Section 3.5	Section 3.5	(b)(4)
Routine Maintenance and Emergency Measures	Section 3.6	Section 3.6	(b)(5)
Environmental Monitoring	Section 3.7	Section 3.7	(b)(3)

3.3 Institutional Controls

The 738-acre site, identified by the property boundary shown in Figure 3-1, is owned by the United States and was accepted under the NRC general license in 2004. DOE is the licensee and, in accordance with the requirements for UMTRCA Title II sites, LM is responsible for the custody and long-term care of the site. Institutional controls (ICs) at the site include federal ownership of the property, administrative controls, and the following physical ICs that are inspected annually: disposal cell, entrance gate and sign, perimeter fence and signs, site marker, boundary monuments, and monitoring wellhead protectors.

3.4 Inspection Results

The site, approximately 15 miles north of Laguna, New Mexico, was inspected on March 26, 2025. The inspection was conducted by C. Murphy, D. Atkinson, J. Coyne, and J. Cario of the Legacy Management Support contractor. In addition, Y. Li and C. Dimond (New Mexico Environment Department [NMED]) attended the inspection. The erosion and vegetation monitoring event was conducted in July 2025. The purposes of the inspection were to confirm the integrity of visible features at the site, identify changes in conditions that might affect conformance with the LTSP, and evaluate whether maintenance or follow-up inspection and monitoring are needed.

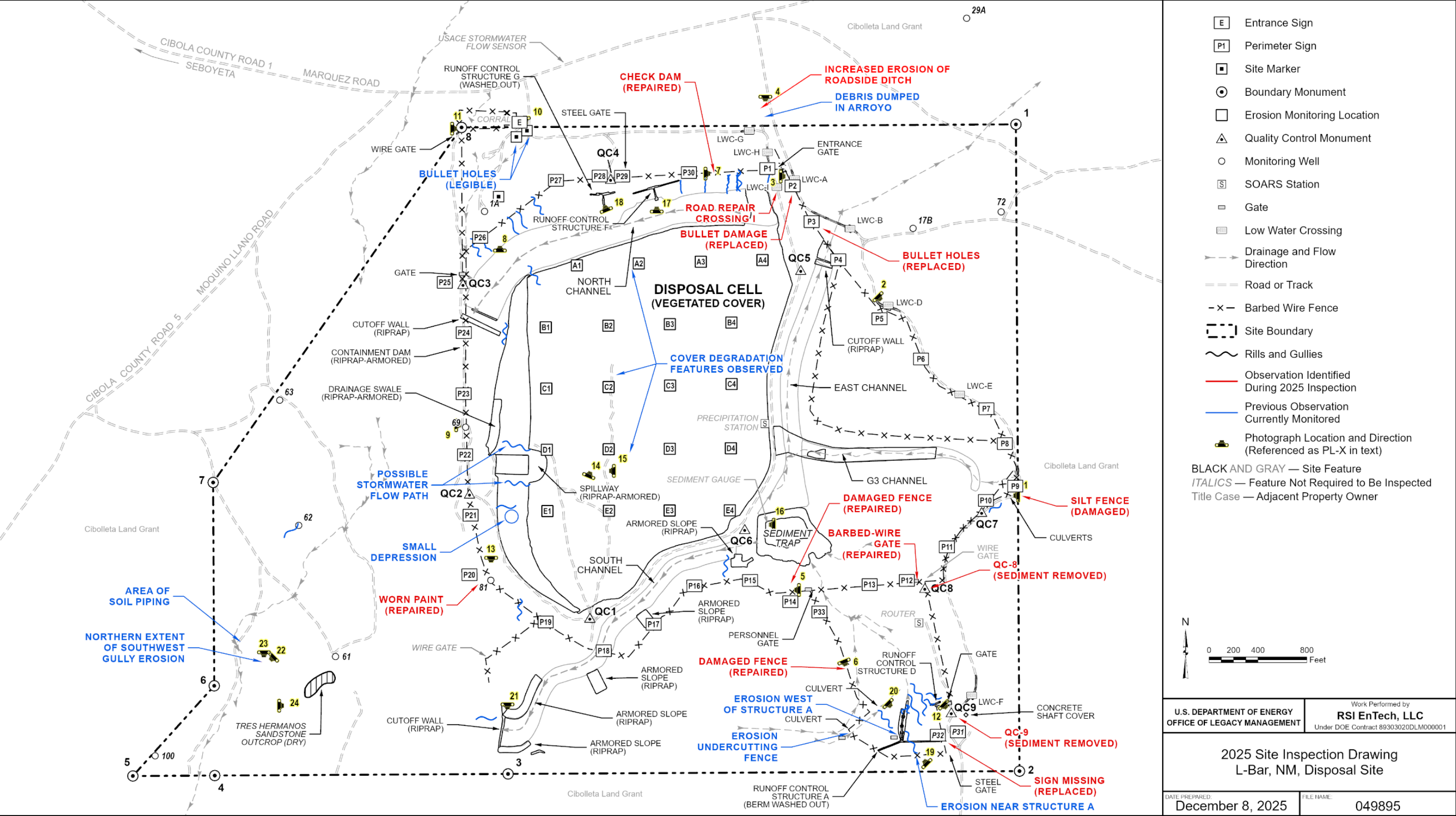
3.4.1 Site Surveillance Features

Figure 3-1 shows the locations of site features, including site surveillance features and inspection areas, in black and gray font. Some site features that are present but not required to be inspected are shown in italic font. Observations from previous inspections that are currently monitored are shown in blue, and new observations identified during the 2025 annual inspection are shown in red. Inspection results and recommended maintenance activities associated with site surveillance features are described in the following subsections. Photographs to support specific observations are noted in the text and in Figure 3-1 by photograph location (PL) numbers. The photographs and photograph log are presented in Section 3.9.

3.4.1.1 Site Access and Entrance Gate

Access to the site is from a public gravel road (Cibola County Road 1). Approximately 300 feet (ft) of Cebolleta Land Grant property is crossed to enter the site. Documentation of access is provided and described in the warranty and quitclaim deed for the site. The entrance gate is a tubular-steel stock gate. The gate was secured by a DOE lock with no other locks present.

Interior roads used to access LM assets consist of two-track dirt roads with drainage culverts and low water crossings to convey stormwater in key locations. A gully that formed through headcutting on a side slope of the G3 channel was encroaching on the east site access road. Culverts were installed along the access road in 2016 to prevent washout of the road and to control erosion. Sediment was previously accumulating around one of the three culvert inlets, and erosion was also undercutting the outlets. Two of the three culverts are functioning as designed. The U.S. Army Corps of Engineers (USACE) conducted culvert cleanout and replacement in addition to cleanout of the adjacent sediment trap in October 2024 (PL-1). A silt fence placed by USACE east of the sediment trap has been damaged due to livestock. Repairs to the silt fence were conducted during the fall 2025 maintenance trip, and portions of the silt fence leading to the sediment trap were replaced with check dams.



Abbreviation: SOARS = System Operation and Analysis at Remote Sites

Figure 3-1. 2025 Annual Inspection Drawing for the L-Bar, New Mexico, Disposal Site

Access roads are susceptible to erosion and are repaired when they become impassable. In fall 2023, through an interagency agreement with USACE, LM began to repair access roads and construct low water crossings in areas impacted by erosion. Road construction is in accordance with the engineering specifications and design plans in the *Department of Energy Legacy Management Bluewater and L-Bar Road Repairs Cibola County, New Mexico* document (USACE 2022). Construction of the low water crossings and placement of check dams was completed in October 2024. Since completion, portions of the turf reinforcement mats have been damaged due to local livestock at several low water crossing locations. Additionally, one of the articulating concrete blocks within low water crossing D has been damaged from vehicle traffic (PL-2). Additional rock was added to the check dams during the 2025 spring maintenance trip. In August 2025, alluvial sediment was observed accumulating in low water crossing A but is not impeding the crossing's functionality (PL-3). The crossing is being monitored and will be cleaned out during the next maintenance trip if the sediment does not disperse through natural fluvial runoff.

The sediment observed accumulating in low water crossing A is derived from significant erosion forming a roadside ditch first observed in June 2024 along the western edge of the access road leading from Marquez Road. Recent erosion has deepened the ditch and it is now better defined as an arroyo. The arroyo is most deeply incised north of the property line and has increased in depth since its discovery (PL-4). Downgradient, the road surface descends concurrently with the arroyo floor, resulting in a decrease of channel incision until the road elevation and bottom of the arroyo merge north of low water crossing A. This arroyo presents a safety issue presently as the edge of the access road inside and outside of the property line has begun to collapse into the arroyo, minimizing the access road width. Additionally, debris is being dumped into the deepest sections outside of the property line. Safety cones have been placed along the road and this new arroyo is being monitored and will most likely require corrective action in the future.

3.4.1.2 Fence and Perimeter Signs

A barbed-wire fence encloses the disposal cell and associated drainage structures and is intended to prohibit trespassing and livestock intrusion on the disposal cell to prevent gullies from developing from the livestock trails. The fence is about 3300 ft inside the property boundary, and the area between the fence and the boundary is grazed in accordance with an LM grazing license with the Cebolleta Land Grant stakeholders, who collectively own and manage the surrounding property. Inspectors discovered several portions of fence line with broken top strands of barbed wire and leaning posts along the southern perimeter (PL-5 and PL-6) and on the barbed-wire gate near perimeter sign P12. The areas of damaged fence line were repaired during the 2025 spring and fall maintenance trips. Erosion is undercutting the perimeter fence in several locations where the fence was extended vertically to prohibit livestock from entering the site. Erosion features were monitored along the northern fence line (PL-7 and PL-8). Two tubular steel gates were installed to allow personnel to cross the fence line safely. One gate was installed in 2021 on the west side near perimeter sign P23 (PL-9), and the other gate was installed in 2022 on the south side near perimeter sign P19.

The entrance sign is on the main site access road near the site marker. It has several bullet holes but remains legible. Thirty-three warning or perimeter signs are attached to the barbed-wire fence that surrounds the disposal site structures, as well as an area of excessive gully erosion in the southeast portion of the site. Perimeter sign P31 and its associated signpost was missing, and perimeter sign P3 was no longer legible due to bullet holes at the time of the inspection.

Perimeter sign P3 was replaced during the spring maintenance event. A replacement perimeter sign P31 was installed during the fall maintenance event. Additionally, the DOE phone number was updated on perimeter signs P6 and P8 and the radiation tri-foil symbol was repaired on perimeter signs P13 and P14. No other maintenance needs were identified.

3.4.1.3 Site Marker

The site has one granite site marker north of the disposal cell, adjacent to the site access road. Bullet damage was observed on the site marker, but it remains legible (PL-10). No maintenance needs were identified.

3.4.1.4 Boundary Monuments

Eight boundary monuments define the site boundary (PL-11). All eight boundary monuments were observed during the 2025 inspection. No maintenance needs were identified.

3.4.1.5 Aerial Survey Quality Control Monuments

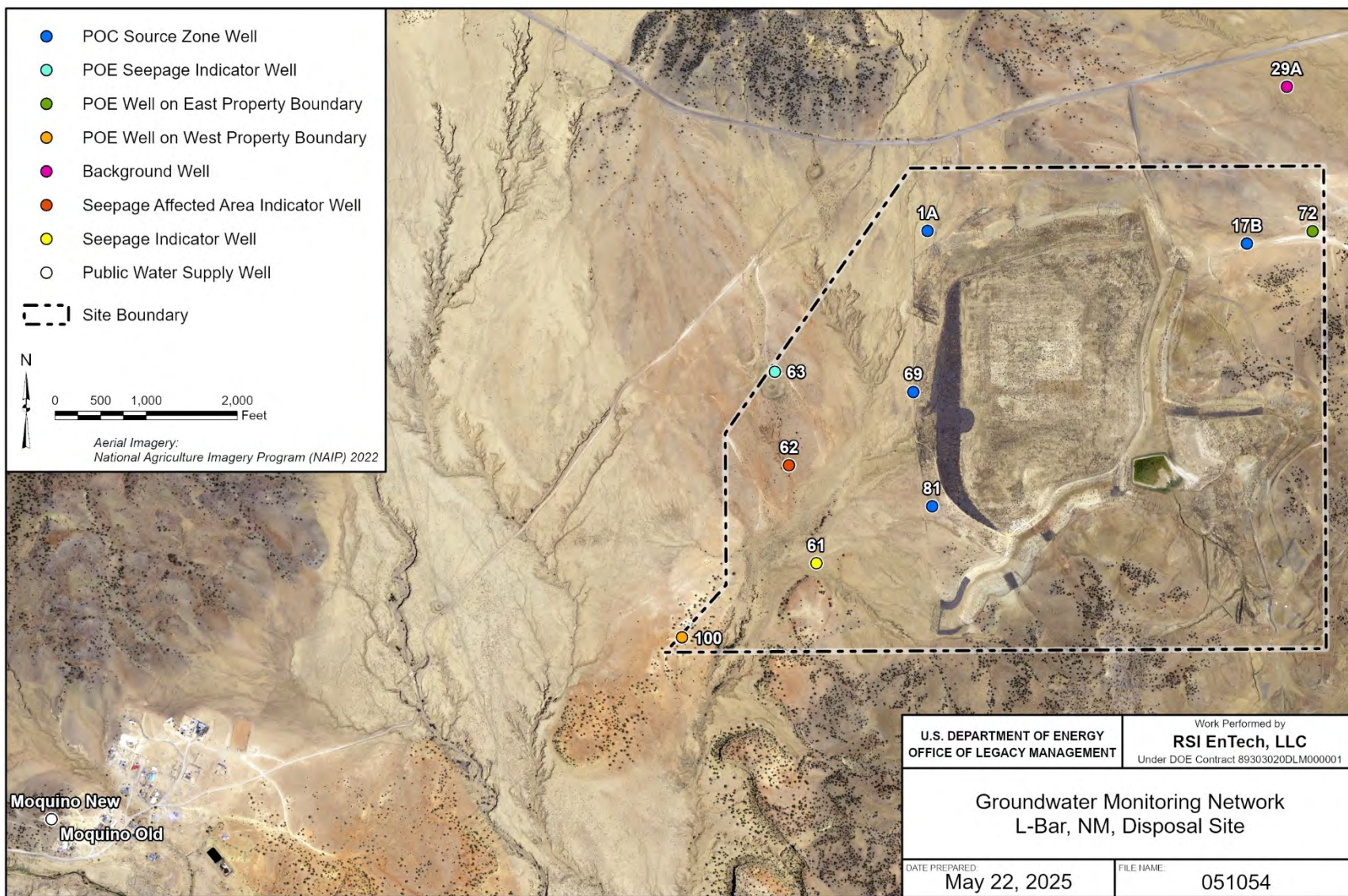
Nine aerial survey quality control monuments were inspected during the 2025 inspection (PL-12). Quality control monuments QC-8 and QC-9 were covered in sediment. T-posts were previously installed near these monuments to help locate them. The sediment was removed from both quality control monuments during the inspection. No additional maintenance needs were identified.

3.4.1.6 Monitoring Wells

The site groundwater monitoring network consists of 10 wells (Figure 3-1; Figure 3-2). Nine of the wells are on DOE property; background monitoring well 29A is outside the northeast property boundary of the site. The wellhead protectors observed during the 2025 inspection were undamaged and locked. The well designation number on well 81 was observed to be missing. It was repainted during the 2025 spring maintenance trip (PL-13). Erosion is propagating upstream near monitoring well 62 and will continue to be monitored to ensure that erosion does not impact the integrity of the well. No additional maintenance needs were identified.

3.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into four inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection. The inspection areas are (1) the cover of the disposal cell; (2) the containment dam; (3) the diversion channels; and (4) the site perimeter, outlying areas, and balance of the site. Inspectors examined the specific site surveillance features within each area and looked for evidence of erosion, settling, slumping, or other modifying processes that might affect site conformance with LTSP requirements.



Abbreviation: POC = point of compliance

Figure 3-2. Groundwater Monitoring Network at L-Bar, New Mexico, Disposal Site

3.4.2.1 Cover of the Disposal Cell

The disposal cell, completed in 2000, occupies approximately 100 acres. The disposal cell top slope surface is minimally sloped to the west toward the central portion of the containment dam; this promotes drainage and minimizes runoff water velocities to prevent erosion. Although the top slope was not seeded because plant growth was not expected to be successful, vegetation is occurring naturally with native and early successional weedy species. Vegetation was slow to establish in the southeast portion of the top slope, so a native seed mix was applied in 2009. This area has successfully vegetated, although several years of below-average precipitation have stressed the vegetation. The establishment and maturing of vegetation are expected to reduce wind and water erosion of the surface and help prevent precipitation from percolating into the tailings. In accordance with the LTSP, erosion and vegetation are monitored on the disposal cell top slope. Section 3.7.2 describes the erosion monitoring program and presents the results to date.

During the LTSP-required vegetation and erosion monitoring activity in August 2021, inspectors observed a single degradation feature on the top slope of the disposal cell. Subsequent visits to the site were conducted to further identify and document these features and resulted in the observations of several cover degradation features. Each surface degradation feature varied in overall size and depth, with the deepest feature measuring 8 ft both vertically and horizontally during the April 2022 site visit. A total of 33 features were identified across the entire top slope of the disposal cell. Depth measurements of one surface degradation feature indicate the potential for erosion of the radon barrier. During the February 2022 site visit, field radiological screening was performed using an alphaNUCLEAR Model 597-PX3 radon gas concentration monitor and a handheld sodium iodide scintillometer. Measurement results did not indicate release of radon gas above 10 CFR 835 or DOE Order 458.1 Chg 4 (LtdChg) actionable limits, or elevated radiation levels.

During the 2025 inspection, previously identified degradation features were observed and confirmed to have collapsed on themselves or filled in with sediment and now appear similar to minor depressions (PL-14) rather than degradation features. However, no changes were observed on the most prominent degradation feature, designated E-004, which descends diagonally from the surface with a subterranean length of 8 ft (PL-15). Additionally, seven previously undocumented degradation features were identified during the 2025 annual site inspection.

These features represent a change in the characteristics of the condition of the disposal cell cover and may require annual monitoring. Preliminary evaluations suggest that surface degradation features were caused by stormwater flows penetrating the disposal cell cover via desiccation cracking, animal burrows, and vegetation root systems.

To evaluate the surface degradation features, a geophysical investigation was performed in 2023 to support further evaluation of cover degradation conditions. Multiple methods of nonintrusive geophysical techniques were implemented to analyze the subsurface tailings, radon attenuation barrier, and the common fill layer for potential void spaces. Initial findings did not indicate the potential for significant void spaces to be present. Based on the results of the recent inspection and currently available information, the disposal cell cover continues to function as designed.

3.4.2.2 Containment Dam

The disposal cell was constructed during mill operations by damming the head of a natural drainage basin. The face of the earthen containment dam has a 20% slope and is riprap armored to prevent erosion and degradation. Large-diameter riprap was used to protect the spillway in the central portion of the containment dam where precipitation runoff would discharge from the disposal cell cover. Native vegetation is well-established on the spillway face, which is desirable for increasing the erosion protection of the surface. A potential stormwater flow path was observed during the 2022 inspection on the northern and southern edge of the spillway where the armored spillway and armored containment dam meet. Inspectors visually inspected the spillway during the 2025 annual inspection, and the stormwater pathways do not appear to affect the integrity of the spillway. Maintenance is not needed at this time.

A geotechnical investigation was performed by USACE in September 2022 to characterize surface and subsurface erosion along a transect of the containment dam side slope. This effort was in support of an AS&T project to characterize and inform erosion risks across the LM portfolio. During this investigation, five erosional piping features were identified in an observation area focused near the riprap spillway on the western side slope. These features are difficult to characterize, and the longest piping feature extended roughly 5 ft into the side slope. No defined sediment outlets or evidence that mill tailings have been exposed or mobilized were identified. To monitor the above-stated observations, LM approved the use of annual terrestrial light detection and ranging (lidar) scanning of the riprap-covered side slope, which was conducted for the first time in March 2024. The analysis of data from the 2024 terrestrial lidar scanning is in progress and will be included in the 2026 annual compliance report. Any indications of erosion, settlement, mounding, or other modifying processes that might affect the integrity of the containment dam will be compared to previous 2022 baseline aerial survey lidar for changes in topographical conditions. If any changes are detected, further monitoring will be conducted to assess the condition. As of the March 2025 inspection, the performance of the disposal cell side slope is functioning as designed. No maintenance needs were identified.

3.4.2.3 Diversion Channels

The surface water diversion system consists primarily of the east, north, and south channels that divert runoff water away from the disposal cell. The system is designed to accommodate probable maximum flood discharges. Cutoff walls composed of large-diameter riprap were constructed at the outlet of each channel. The cutoff walls are designed to prevent headward erosion into the diversion channels that could eventually impact the disposal cell. Runoff from an upgradient watershed east of the disposal cell is designed to be conveyed away from the site to a northeastward-flowing drainage via the east channel. The east channel is separated from the disposal cell by a dike that serves as an onsite access road. Gullies are present along the east slope of the east channel, but the erosion and sediment deposition are not impairing the function of the east-channel. Runoff flow in the channel could potentially erode the adjacent weathered shale and fill materials and thus bypass the cutoff wall, causing headward erosion into the channel. This feature will continue to be monitored. The east channel was dry at the time of the inspection.

A tributary channel (G3) was constructed to divert runoff from a smaller watershed into the east channel. The erosion and sediment deposition are not impairing the function of the channel.

Some erosion was also observed in a watershed that encompasses the southeast portion of the site and adjacent property. Stormwater runoff from this watershed discharges into a sediment trap where the sediment load settles out. If runoff overtops the sediment trap, the flow is diverted to the east channel. Standing water was not observed in the sediment trap at the time of the inspection. The sediment accumulation within the sediment trap has reached a level of 5.25 ft (PL-16).

Since the completion of site reclamation, multiple high-intensity storms have caused deep gullies to form in the highly erodible soils and fill materials upgradient of the sediment trap. Construction of runoff control structures to reduce the rate of erosion in the area and prevent headward migration of gullies into adjoining private property was completed in December 2009. Runoff from a storm event in September 2011 overtopped an earthen runoff control berm of Runoff Control Structure A and caused substantial damage to the berm. Subsequent runoff events have caused erosion adjacent to gabion drop structures associated with Runoff Control Structure A near Runoff Control Structure D. Because of continued excessive erosion, an interagency agreement was established with USACE to design replacement structures and additional structures in the watershed. Runoff water from the area north of the disposal cell is captured by the north channel. The water is diverted away from the site to the west. Deep gullies had formed in the alluvium and weathered shale along a portion of the north bank of the channel, and headward erosion was rapidly migrating to the north toward the site access road and property boundary. The eroded channel bank was restored to the original design configuration, and two runoff control structures were constructed in 2009 to reduce erosion and sedimentation. Runoff Control Structure F is showing signs of undermining erosion but was stable and functional at the time of the inspection (PL-17). However, Runoff Control Structure G suffered severe erosion during runoff events in August and September 2011 and continues to erode (PL-18). Runoff Control Structure A is experiencing gully erosion (PL-19) and undermining at portions of the gabion block sections (PL-20), and it is likely that continued erosion will lead to failure of the structure. DOE will continue to monitor these structures and, as part of the interagency agreement, USACE will complete its work with DOE by providing a design alternatives analysis proposing several options for repairs and modifications to these structures in spring 2026.

The north channel cutoff wall does not extend to the toe of the containment dam slope, allowing runoff to bypass the cutoff wall; minimal erosion in the form of rills has occurred at this location. This area will continue to be monitored for erosion and other impacts to the north channel and containment dam.

The east channel diverts stormwater runoff from the G3 channel and higher terrain immediately east of the disposal cell toward the sediment trap to the north. A northern riprap cutoff wall exists to inhibit erosion and sedimentation north of the east channel northern cutoff wall. Minimal erosion in the form of rills has occurred at this location.

The south channel diverts stormwater runoff from higher terrain immediately south of the disposal cell toward the channel outlet to the west. Two riprap structures are on the north-facing slope (south bank) to inhibit erosion along natural drainage swales. Erosion is occurring on the unprotected slope surfaces, resulting in sediment accumulation in the south channel. The erosion and sediment deposition are not impairing the function of the south channel. Erosion headcutting that has migrated to the edge of the riprap cutoff wall at the outlet of the channel was monitored

during the inspection. The cutoff wall is functioning as designed and will continue to be monitored (PL-21).

Erosion in diversion channels and other features will continue to be monitored through aerial and terrestrial surveys using photogrammetry and lidar. A baseline aerial survey was conducted in 2018 using photogrammetry to obtain accurate site topography for future comparison. The most recent aerial survey was conducted in November 2022.

3.4.2.4 Site Perimeter, Outlying Areas, and Balance of the Site

The site is surrounded by open private land that is used primarily for grazing. Uranium mine reclamation activities occur periodically, and access road repairs have occurred in recent years in areas adjacent to the site. These activities have not been detrimental to site security.

The access road to monitoring well 100 in the southwest corner of the site is damaged by subsurface erosion (soil piping) near the head of an arroyo. The affected area has been mapped, metal fence posts have been installed next to soil collapse features, and the information has been identified on the inspection and sampling maps to prevent injury or vehicle damage. Consequently, monitoring well 100 is accessed by foot or all-terrain vehicle during sampling events.

The arroyo system that limits access to monitoring well 100 presents a possible major risk to the site. This arroyo is over 100 ft wide in places and ranges from 10 to 20 ft in depth. It is headcutting in a northward trajectory toward Cerro Negro (PL-22). LM has begun to track the yearly erosion rate and direction of headcutting via satellite imagery and the three surface erosion markers placed in a linear trajectory parallel to the flow of surface water northeast of the arroyo system (PL-23). At this time, no maintenance actions are needed.

A Tres Hermanos Sandstone unit of the Mancos Shale crops out in the southwest corner of the site. This unit is reported to be hydraulically connected to contaminated groundwater under the disposal cell, and the outcrop is considered a potential evapotranspiration area. The outcrop was dry at the time of the inspection, and there is no evidence that seepage has occurred (PL-24). This location will continue to be monitored for seepage and recommended for sampling if seep water is present.

Several legacy features, including concrete pads (e.g., a large pad covers the mine shaft) and abandoned sewer manholes, are near the southeast corner of the site. These features were observed as stable and secure and do not require attention at this time. These features will continue to be monitored to ensure that they do not present a safety hazard and continue to prevent access to the underground mine structures.

3.5 Follow-Up Inspections

LM will conduct follow-up inspections if (1) a condition is identified during the annual inspection or other site visit that requires a return to the site to evaluate the condition or (2) LM is notified by a citizen or outside agency that conditions at the site are substantially changed.

3.6 Routine Maintenance and Emergency Measures

LM requested design and construction support for ongoing road repair needs from the USACE Albuquerque District. The work included maintenance and repairs to existing off-cell locations to repair the existing two-track perimeter at 10 road and ditch sections, one eroded bank area, one soil stockpile site, and one contractor staging area. Work included grading, V-ditch construction, riprap revetment construction, placement of articulated concrete mat, culvert construction, and incidental related work with the total disturbed area estimated to be 1.29 acres. This work was completed in 2024.

LM also completed the following maintenance in 2025:

- Repaired the fence near perimeter signs P14 and P33 and barbed wire gate near sign P12
- Repainted the well designation number on well 81
- Replaced perimeter signs P3 and P31
- Updated the DOE phone number on perimeter signs P6 and P8
- Repaired radiation tri-foil symbols on perimeter signs P13 and P14
- Removed sediment from quality control monuments QC-8 and QC-9
- Added additional rock to the check dams along the tertiary road

Emergency measures are corrective actions that LM will take in response to unusual damage or disruption that threatens or compromises site health and safety, security, integrity, or compliance with 40 CFR 192. No emergency measures were identified.

3.7 Environmental Monitoring

3.7.1 Groundwater Monitoring

In accordance with the LTSP, groundwater monitoring is required at the site once every 3 years. The monitoring network consists of 10 LM wells on or adjacent to the site and two Moquino Water Users Association wells approximately 2 miles west of the site in the village of Moquino. Table 3-2 lists these wells along with their network application as defined in the LTSP. Corresponding locations are shown in Figure 3-2. All monitoring wells are screened within the First Tres Hermanos Sandstone, which is the uppermost permeable unit within the Mancos Shale beneath the site. The most recent routine triennial sampling event was conducted on November 2, 2022. Results from the groundwater sampling event conducted in November 2025 will be included in the 2026 annual compliance report.

In November 2023, easternmost wells 17B, 72, and 29A (background) were sampled to confirm results for this region after the triennial sampling event in 2022 showed concentrations of sulfate and TDS in exceedance of state-approved background levels (4000 and 5880 mg/L, respectively). Although not explicitly required by the LTSP (no ACLs or AASs were exceeded), LM conducted this supplemental sampling as a best management practice given exceedances of state standards at POE well 72. An evaluation of the 2023 results in comparison to the 2022 results and an updated analysis of corresponding groundwater flow patterns and trends in water quality are provided below.

Table 3-2. Groundwater Monitoring Network for the L-Bar, New Mexico, Disposal Site

Monitoring Well	Network Application ^a
1A	POC source zone well
17B	POC source zone well
29A	Background well
61	Seepage indicator well
62	Seepage indicator well; affected area well
63	POE; seepage indicator well
69	POC source zone well
72	POE well on east property boundary
81	POC source zone well
100	POE well on west property boundary
Moquino New ^b	Public water supply well in Moquino
Moquino Old ^c	Backup public water supply well in Moquino

Notes:

^a The four POC wells are within the source zone; the three POE wells are on the property boundary. The source zone and the affected area are shown in Figure 3-2 of the LTSP (DOE 2004).

^b The Moquino New well has been sampled four times: in 2005, 2007, 2013, and 2022. LM was unable to access this well in 2016 and 2019.

^c The backup water supply well (Moquino Old) has never been sampled by LM, initially because of inability to access the well and more recently because the well is no longer operational and secured.

Abbreviations:

POC = point of compliance

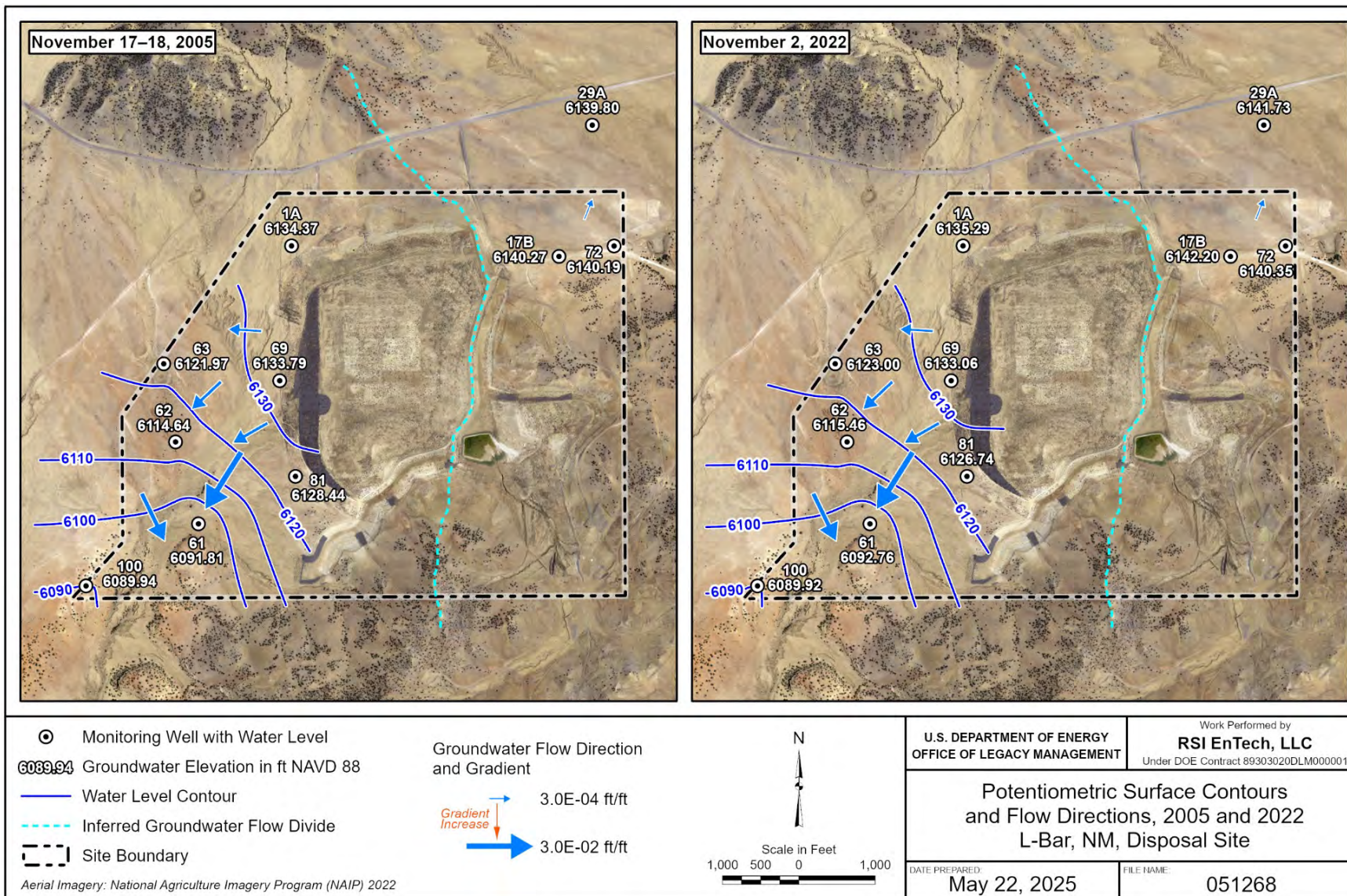
POE = point of exposure

3.7.1.1 Groundwater Elevation Monitoring

Previous groundwater-level elevation evaluations for the L-Bar site (Kennecott 1996) showed that groundwater generally flowed to the southwest on the western side of the former tailings impoundment. Three-point vector analysis using 2005 and 2022 water-level elevations shows that groundwater still generally flows to the southwest on the western side of the disposal cell, which was constructed over the former tailings impoundment (Figure 3-3).

On the eastern side of the disposal cell, one three-point vector was calculated using the only three wells at this location: wells 72, 17B, and 29A. The three-point vector at this location shows groundwater generally flowing to the northeast. The 180-degree difference in horizontal flow direction between wells on opposite sides of the disposal cell suggests the presence of a groundwater divide somewhere between the two groups of wells (Figure 3-3). Horizontal hydraulic gradients at the site range from 3.0×10^{-4} feet per foot (ft/ft) relative to up to 0.03 ft/ft.

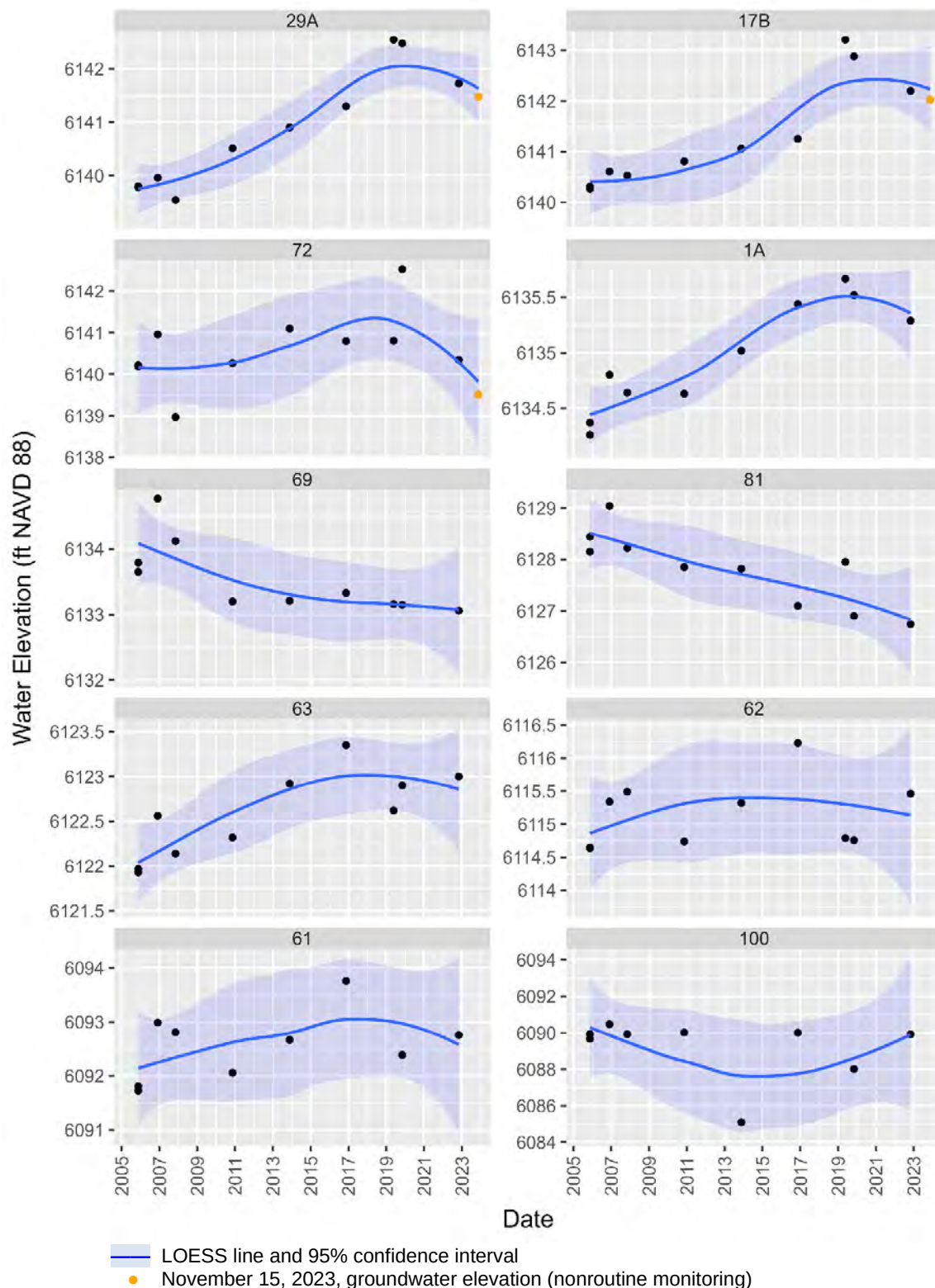
In general, groundwater levels have been relatively stable in L-Bar site monitoring wells (Figure 3-4). Water levels increased by as much as 2 ft in wells 72, 17B, and 29A northeast of the cell from 2005 to 2019, then began decreasing after 2019. Water levels in wells 69 and 81 at the western edge of the disposal cell have decreased as much as 2 ft from 2005 to 2022. The localized groundwater elevation declines immediately downgradient from the western cell embankment indicate a potential reduction in the rate of gravity drainage of tailings fluid from the disposal cell.



Notes: Because wells are monitored triennially (last routine sampling conducted in 2022), this figure duplicates the potentiometric surface presented in the 2023 annual report (DOE 2023). Groundwater elevations measured at the three wells sampled in November 2023 (nonroutine event) were 6142.03 ft (well 17B), 6141.48 ft (well 29A), and 6139.51 ft (well 72).

Abbreviation: NAVD 88 = North American Vertical Datum of 1988

Figure 3-3. Potentiometric Contours and Groundwater Flow Directions in the First Tres Hermanos Sandstone in 2005 and 2022



Notes: Because of the approximate 60 ft range in groundwater elevations across site wells (highest in well 17B at 6143 ft NAVD 88 and lowest in well 100 at 6085 ft NAVD 88), y-axis scales are unique to facilitate interpretation of water elevation trends. Data for background well 29A are plotted first; plots for remaining wells are shown in approximate order of decreasing average groundwater elevations.

Abbreviation: NAVD 88 = North American Vertical Datum of 1988

Figure 3-4. Groundwater Elevation Trends in L-Bar Monitoring Wells, 2005–2023

3.7.1.2 Groundwater Quality Monitoring

Samples collected during the last routine (November 2022) sampling event were analyzed for chloride, nitrate, selenium, sulfate, TDS, and uranium. The same suite of constituents was also analyzed in samples collected from the three easternmost monitoring locations—point of compliance (POC) well 17B, POE well 72, and background well 29A—during the November 2023 nonroutine event. Analytical results are measured in milligrams per liter (mg/L) and compared to the LTSP-required concentration limits listed in Table 3-3 that consist of ACLs granted by NRC and AASs stipulated by NMED. By definition, ACLs are applied to the four POC wells (1A, 17B, 69, and 81) shown in Figure 3-2; these wells also constitute the source zone wells. POE wells should have chloride, nitrate, selenium, and uranium concentrations that are below the State of New Mexico standards, along with sulfate and TDS concentrations that are below background values approved by the State of New Mexico (Table 3-3).

Table 3-3. Groundwater Alternate Concentration Limits and Alternative Abatement Standards for the L-Bar, New Mexico, Disposal Site

Analyte	State of New Mexico Standard ^a	ACL (POC Wells) ^b	AAS Source Zone (POC Wells) ^b	AAS Affected Area (Well 62)
Chloride (mg/L)	250	NA	1127	NA
Nitrate (mg/L)	10.0	NA	1180	NA
Selenium (mg/L)	0.05	2.0	2.0	NA
Sulfate (mg/L)	4000 ^c (600)	NA	13,110	5185
TDS (mg/L)	5880 ^c (1000)	NA	20,165	7846
Uranium (mg/L)	0.03 ^d	13.0	13.0	NA

Notes:

^a <https://www.env.nm.gov/wp-content/uploads/sites/27/2016/06/20.6.2.pdf>.

^b ACLs and source zone AASs apply only to the four POC wells (1A, 17B, 69, and 81).

^c Background value approved by the State of New Mexico for the L-Bar site (for sulfate and TDS); corresponding current state standards are listed in parentheses.

^d The LTSP listed the former State of New Mexico standard of 5.0 mg/L.

Abbreviation:

NA = not applicable

The LTSP states that if an ACL or AAS is exceeded in any monitoring well, LM will inform NRC of the exceedance and conduct confirmatory sampling. If confirmatory sampling verifies the exceedance, LM will develop an evaluative monitoring work plan and submit that plan to NRC for review before initiating the evaluative monitoring program. Results of the evaluative monitoring program will be used, in consultation with NRC, to determine if corrective action is necessary (DOE 2004).

ACLs require both POC and POE locations, with the ACL being applied to the POC and applicable groundwater standards or background concentrations being applied to the POE. While not explicitly stated in the LTSP, by extension, POE exceedances also require verification monitoring and, if the exceedance is confirmed, reporting of the results to NRC (provided by this report).

Groundwater monitoring results for the November 2022 and 2023 sampling events are listed in Table 3-4. For the three wells sampled during the November 2023 nonroutine event, both 2022 and 2023 results are listed. All historical groundwater monitoring results for the site are reported and published on the LM Geospatial Environmental Mapping System (GEMS) website at <https://gems.lm.doe.gov>. The requirements for annual groundwater monitoring stipulated in the LTSP were met in 2007, when the sampling frequency changed to once every 3 years. In accordance with the LTSP, groundwater monitoring will continue for as long as groundwater contamination, defined as exceeding New Mexico standards or background concentrations (Table 3-4), is present at the site (DOE 2004).

Table 3-4. November 2022 and 2023 Groundwater Monitoring Results for the L-Bar, New Mexico, Disposal Site^a

Monitoring Well	Analyte (mg/L) ^{a,b}					
	Chloride	Nitrate ^c	Selenium	Sulfate	TDS	Uranium
Applicable Standards						
State of New Mexico	250.0	10.0	0.05	4000 ^d	5880 ^d	0.03
POC wells	1127	1180	2.0	13,110	20,165	13.0
Affected area wells				5185	7846	
POC Source Zone Wells						
1A	294	0.144	ND	3480	6420	0.0034
17B (2022)	283	838	0.26	4630	12,100	0.032
(2023)	288	880	0.25	4400	12,700	0.033
69	675	ND	ND	8010	16,400	1.55
81	154	28.8	0.072	4090	7360	0.017
Affected Area Well						
62	51.4	ND	ND	534	1540	ND
POE Wells						
63	49	ND	ND	487	1420	ND
72 (2022)	182	9.88	0.032	4820	7820	0.017
(2023)	243	8.35	0.022	6080	7360	0.016
100	38.5	0.227	ND	2160	3570	0.0014
Remaining Wells						
29A (2022)	183	ND	ND	5280	7970	ND
(2023)	221			4880	8470	
61	98.6	0.0696	ND	3120	5090	ND
63	49.4	ND	ND	487	1420	ND
Moquino New	6.3	0.164	ND	102	454	ND

Notes:

^a Results shown are for November 2022 except where indicated. Results are rounded to the number of significant figures in the corresponding applicable standards (from Table 3-3). Detection limit values for ND results are reported in GEMS, as are corresponding data qualifiers and the results of duplicate analyses; the original sample results are reported above.

^b *Italicized* results exceed the corresponding State of New Mexico standard (does not apply to POC wells).

^c Nitrate plus nitrite as nitrogen (NO₃ + NO₂ as N).

^d State-approved background levels from Table 3-3 warrant comparison with results from background well 29A.

Abbreviation:

ND = not detected (below laboratory detection limit)

Figure 3-5 through Figure 3-10 plot results for the six analytes from 2005–2023 relative to the limits and standards listed in Table 3-3. For most wells, the data shown are the same as those included in the 2023 annual report (DOE 2023). For the three wells where nonroutine samples were collected in 2023 (17B, 72, and 29A), results from that event are denoted with a distinct (●) symbol.

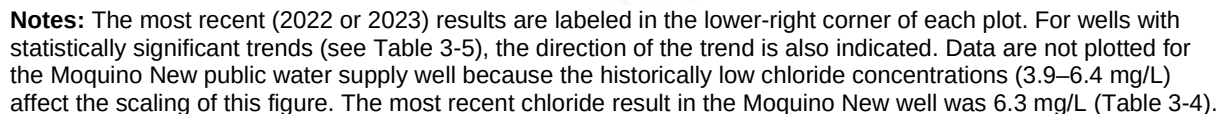
Although the focus of the monitoring program is to demonstrate compliance with LTSP requirements (i.e., to ensure that no ACL or AAS source zone levels are exceeded), results are also plotted relative to corresponding New Mexico standards to facilitate review. Since sampling commenced in 2005, no ACL or AAS source zone levels have been exceeded in any of the POC wells, and no AAS affected area levels have been exceeded in monitoring well 62.

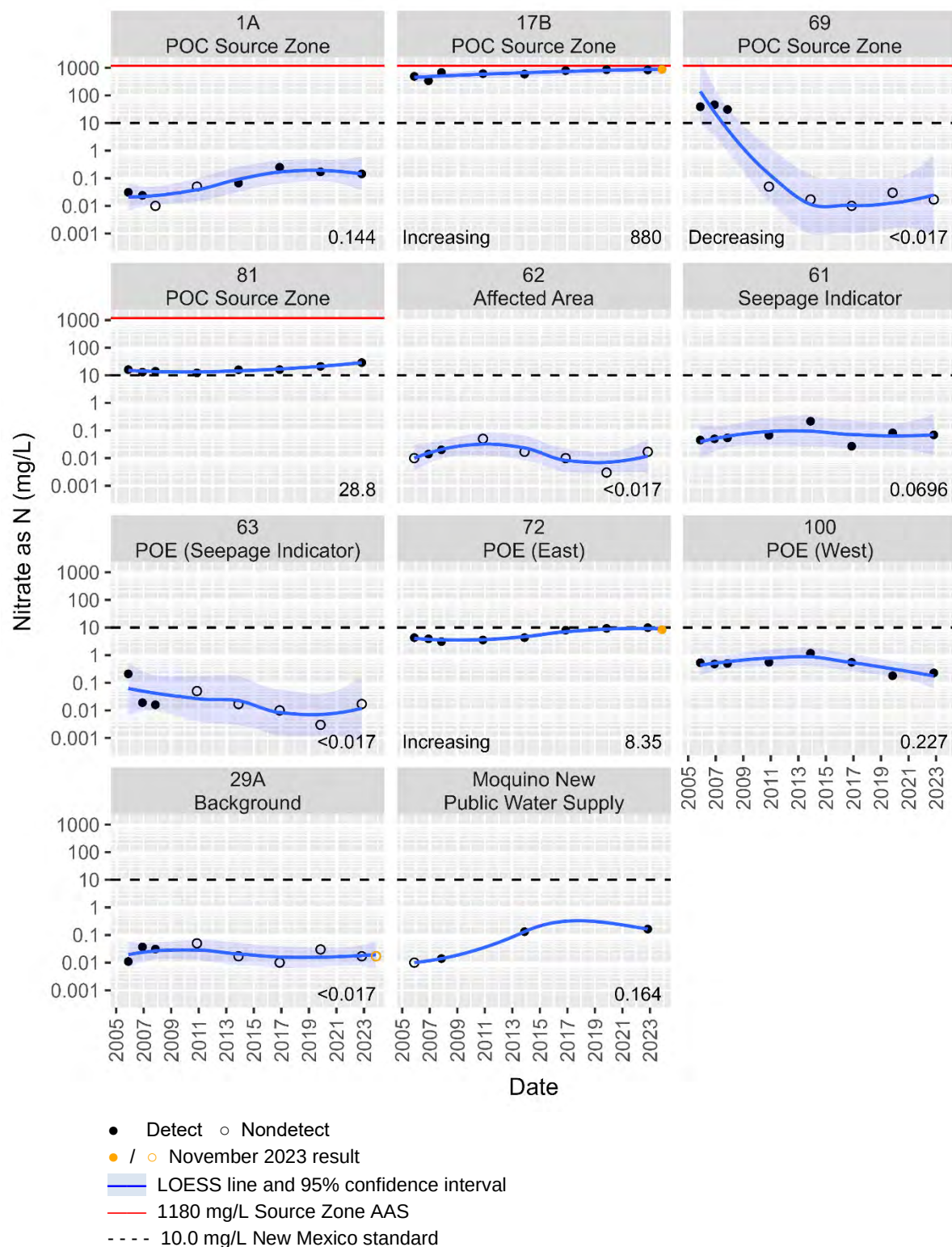
The time-concentration plots provided in this section were generated using a faceting approach, whereby data for each well are plotted separately. A nonparametric locally estimated scatterplot smoothing (LOESS) method is applied to facilitate interpretation of the figures. Using this approach, overall trends in the data are more apparent and not obscured by “noise” or random variation. In each of these figures, wells are ordered by purpose: POC source zone wells are listed first, followed by affected area seepage indicator well 62 and remaining indicator and POE wells. Data for background well 29A and (for most parameters) the Moquino New public water supply well are plotted last.

To support interpretation of these figures, Mann-Kendall trend analysis was performed for each well-parameter combination to characterize whether trends in analyte concentrations are upward, stable (no trend), or declining. Detailed trend analysis results are provided in Table 3-5. For most (49 of 60) well-parameter combinations that were evaluated, no statistically significant increasing or decreasing trend was found. Exceptions to the latter are identified in Figure 3-5 through Figure 3-9 and that information is discussed below.

Chloride concentrations in POC source zone wells 1A, 17B, and 69 continue to exceed the 250 mg/L State of New Mexico standard but are below the corresponding 1127 mg/L AAS (Figure 3-5). The highest chloride concentrations have been measured in well 69 (590–850 mg/L). Chloride concentrations have decreased significantly in well 17B, from a maximum of 450 mg/L in 2007 to about 280–290 mg/L in 2022 and 2023, slightly exceeding the 250 mg/L standard. Chloride concentrations in the remaining wells, including the remaining POC well (81) and the three POE locations, have been consistently below the state standard. As found for background well 29A, chloride concentrations in POE well 72 have a statistically significant increasing trend and are approaching the 250 mg/L state standard. At both locations, temporal chloride concentrations have been similar (Figure 3-5) and the November 2023 result was the highest on record (221 and 243 mg/L at wells 29A and 72, respectively).

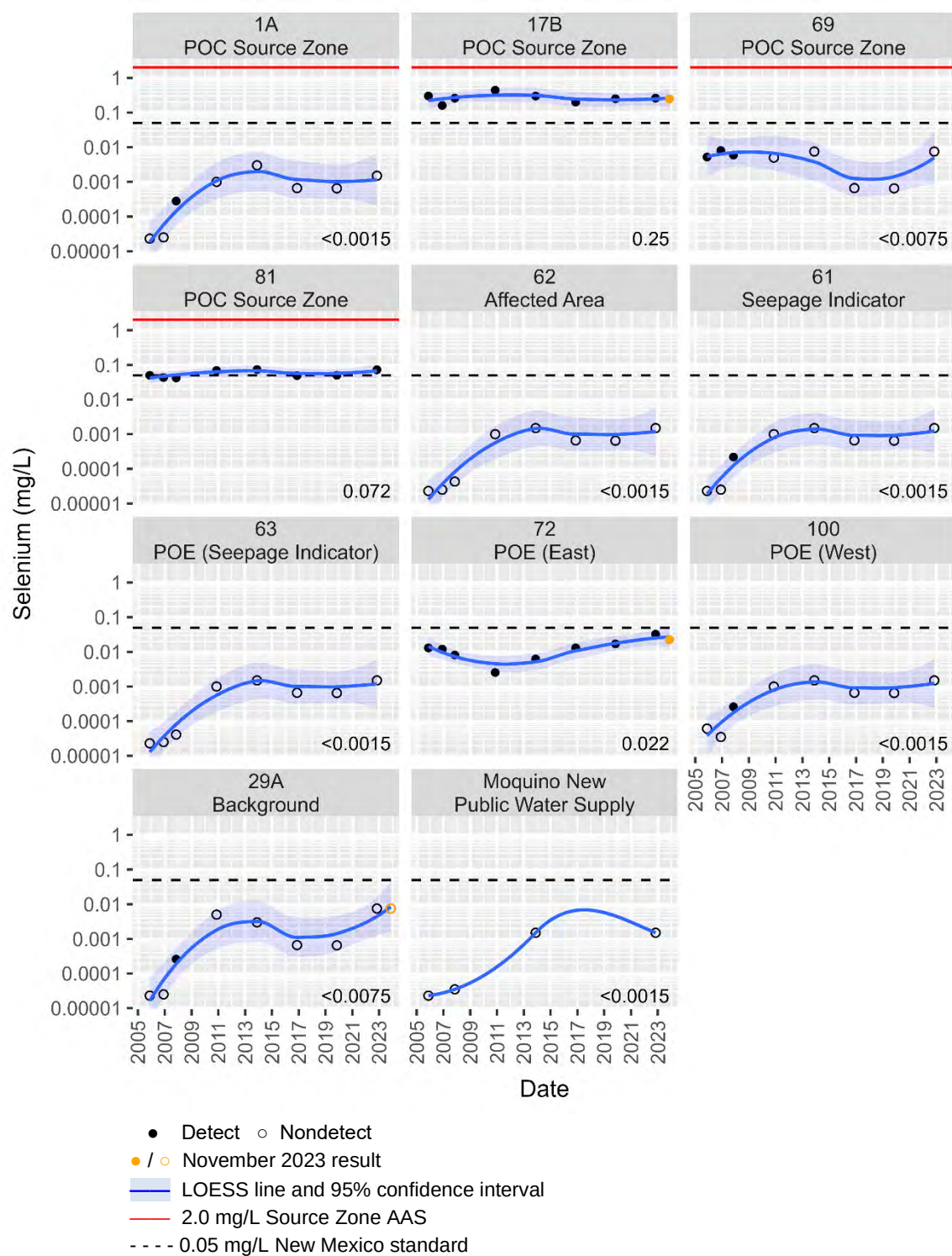
Nitrate (+ nitrite as nitrogen [N]) concentrations have exceeded the 10.0 mg/L State of New Mexico standard in only three wells: POC zone wells 17B, 69, and 81 (Figure 3-6). The highest nitrate concentrations have been measured in well 17B (340–880 mg/L) and, based on Mann-Kendall trend analysis, have a significant increasing trend (Table 3-5). The most recent (2023) measurement (880 mg/L) is the highest on record for this well. Although below the 1180 mg/L AAS, if the increasing trend continues, the AAS could be met or potentially exceeded. Nitrate concentrations in POC source zone well 81 have remained at levels slightly exceeding the 10 mg/L standard but well below the 1180 mg/L AAS.





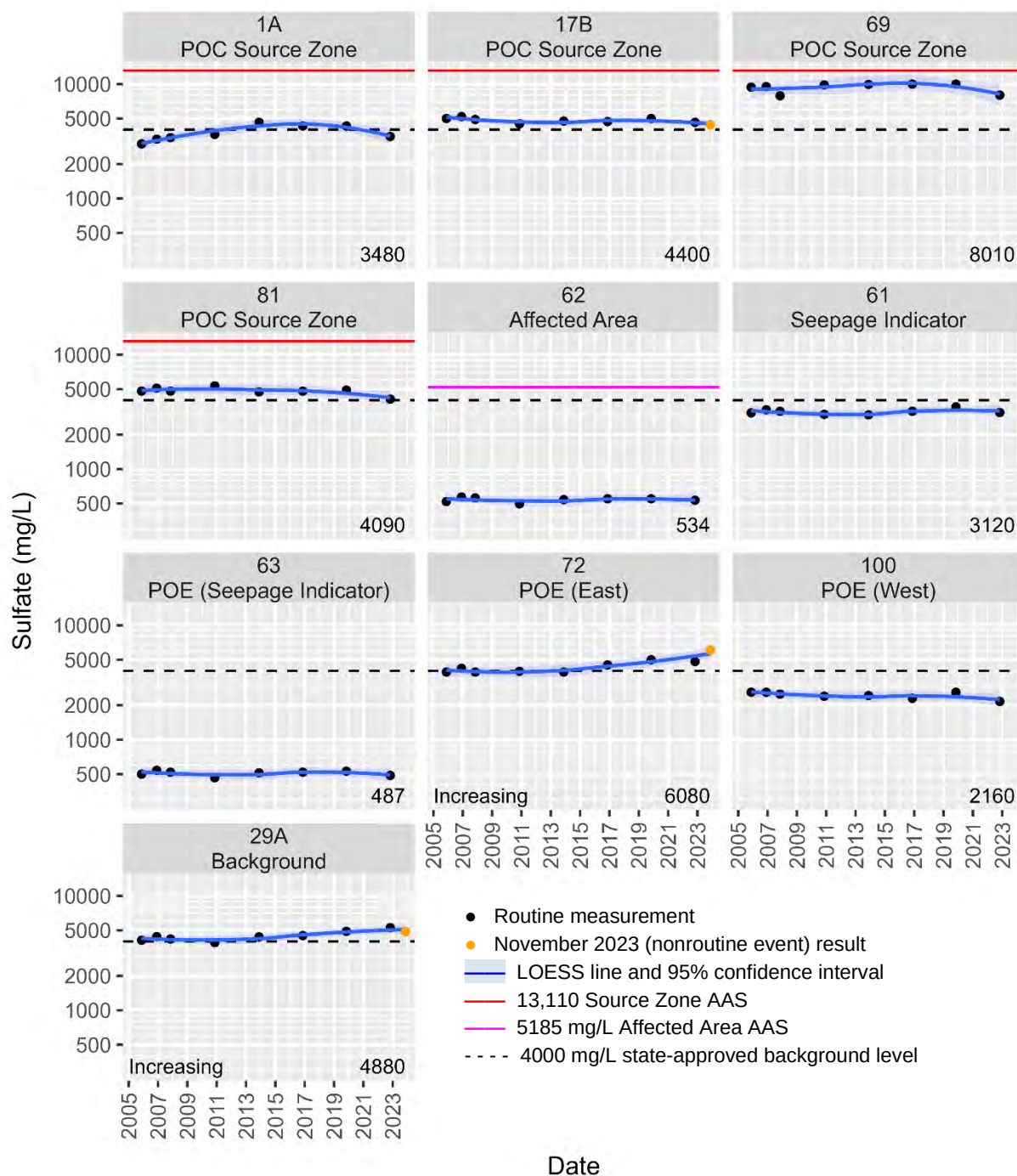
Notes: The most recent (2022 or 2023) results are labeled in the lower-right corner of each plot. For wells with statistically significant trends (Table 3-5), the direction of the trend is also indicated.

Figure 3-6. Nitrate Concentrations in Groundwater at the L-Bar Disposal Site, 2005–2023



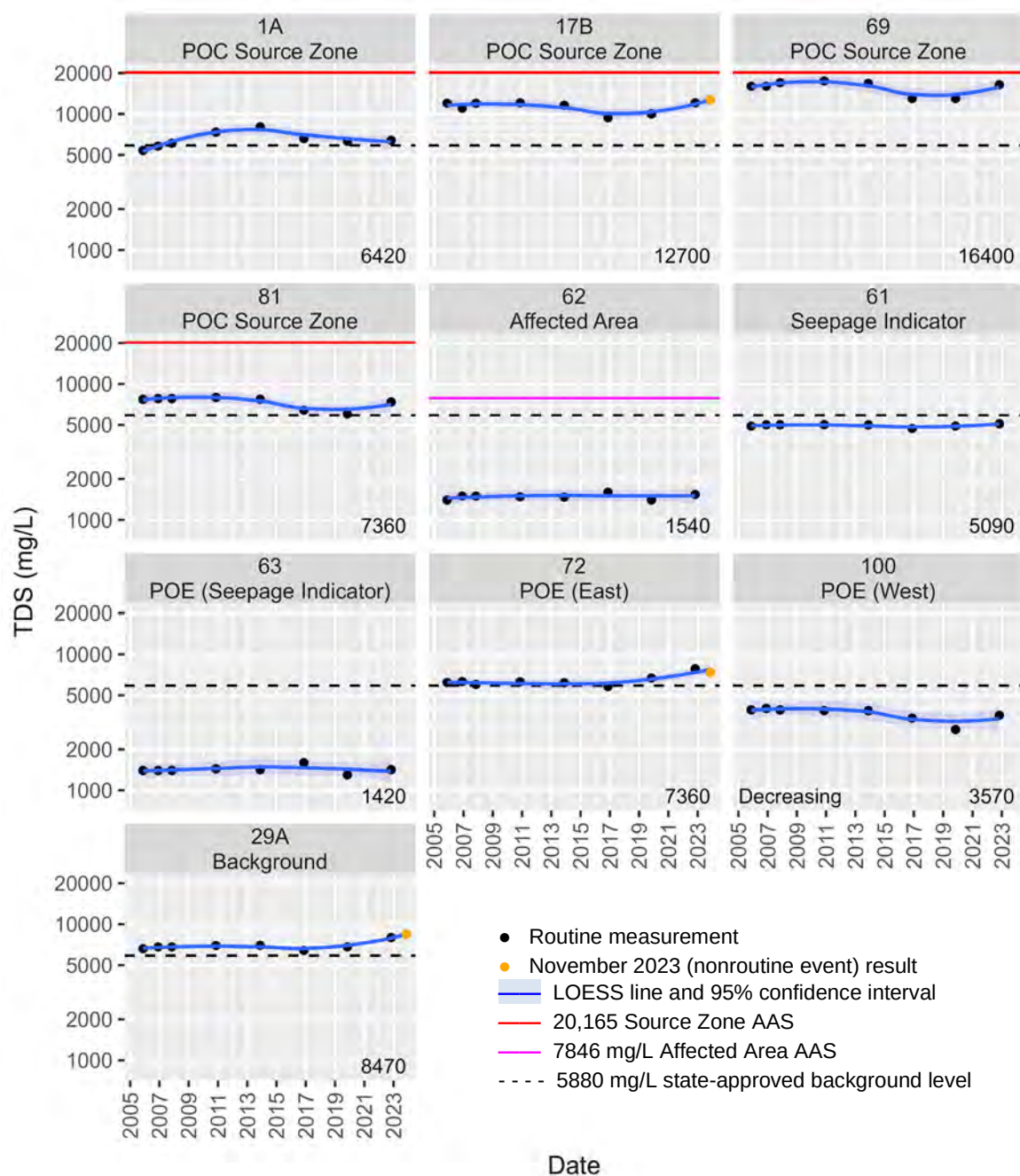
Notes: The most recent (2022 or 2023) results are labeled in the lower-right corner of each plot. For all wells, no statistically significant trend in selenium concentrations was found based on Mann-Kendall trend analysis (Table 3-5); most wells have a high proportion of nondetects.

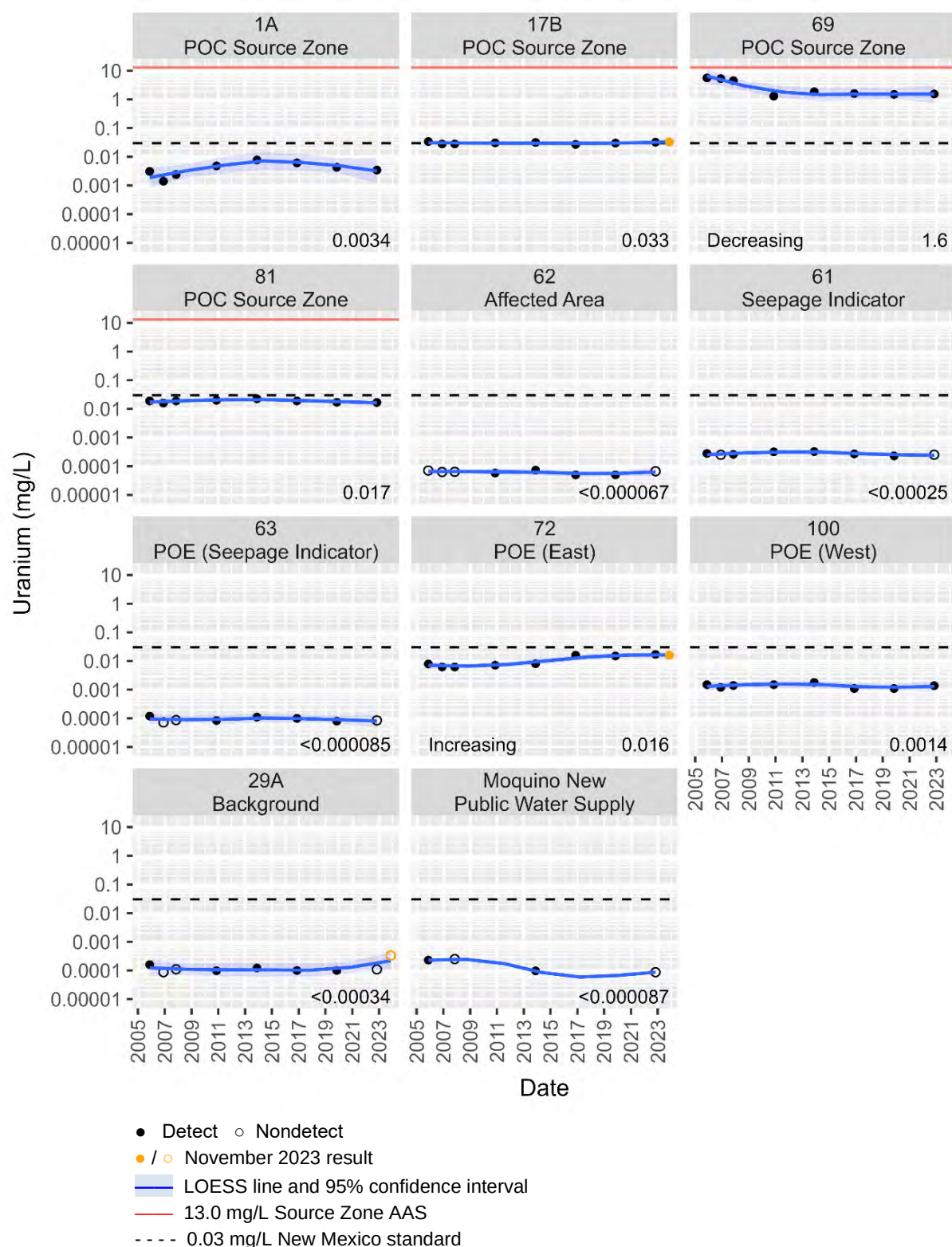
Figure 3-7. Selenium Concentrations in Groundwater at the L-Bar Disposal Site, 2005–2023



Notes: The most recent (2022 or 2023) results are labeled in the lower-right corner of each plot. For wells with statistically significant trends (Table 3-5), the direction of the trend is also indicated. Data are not plotted for the Moquino New public water supply well because the historically low sulfate concentrations (91.9–120 mg/L) affect the scaling of this figure. The most recent sulfate result in the Moquino New well was 100 mg/L (Table 3-4).

Figure 3-8. Sulfate Concentrations in Groundwater at the L-Bar Disposal Site, 2005–2023





Notes: The most recent (2022 or 2023) results are labeled in the lower-right corner of each plot. For wells with statistically significant trends (Table 3-5), the direction of the trend is also indicated.

Figure 3-10. Uranium Concentrations in Groundwater at the L-Bar Disposal Site, 2005–2023

Table 3-5. Trend Analysis Results for Analytes in L-Bar Site Monitoring Wells, 2005–2023^a

Well ^b	Initial Trend Analysis Date	Final Trend Analysis Date	Number of Samples	Number of Nondetects	Kendall's tau ^c	p-value ^d	Trend ^{c,d}
Chloride							
1A	11/17/2005	11/02/2022	8	0	0.28	0.39	No Trend
17B	11/18/2005	11/15/2023	9	0	-0.65	0.021	Decreasing
69	11/17/2005	11/02/2022	8	0	0.00	1.0	No Trend
81	11/17/2005	11/02/2022	8	0	0.47	0.13	No Trend
62	11/17/2005	11/02/2022	8	0	0.47	0.13	No Trend
61	11/17/2005	11/02/2022	8	0	0.11	0.80	No Trend
63	11/17/2005	11/02/2022	8	0	0.36	0.26	No Trend
72	11/18/2005	11/15/2023	9	0	0.57	0.045	Increasing
100	11/17/2005	11/02/2022	8	0	0.33	0.32	No Trend
29A	11/18/2005	11/15/2023	9	0	0.65	0.021	Increasing
Nitrate + Nitrite as N							
1A	11/17/2005	11/02/2022	8	2	0.46	0.13	No Trend
17B	11/18/2005	11/15/2023	9	0	0.72	0.009	Increasing
69	11/17/2005	11/02/2022	8	5	-0.57	0.044	Decreasing
81	11/17/2005	11/02/2022	8	0	0.54	0.081	No Trend
62	11/17/2005	11/02/2022	8	6	-0.11	0.77	No Trend
61	11/17/2005	11/02/2022	8	0	0.43	0.17	No Trend
63	11/17/2005	11/02/2022	8	5	-0.33	0.07	No Trend
72	11/18/2005	11/15/2023	9	0	0.61	0.028	Increasing
100	11/17/2005	11/02/2022	8	0	-0.11	0.80	No Trend
29A	11/18/2005	11/15/2023	9	6	-0.28	0.28	No Trend
Selenium							
1A	11/17/2005	11/02/2022	8	7	0.07	0.87	No Trend
17B	11/18/2005	11/15/2023	9	0	-0.17	0.60	No Trend
69	11/17/2005	11/02/2022	8	5	-0.36	0.21	No Trend
81	11/17/2005	11/02/2022	8	0	0.33	0.32	No Trend
62	11/17/2005	11/02/2022	8	8	NA (all results BDL)		
61	11/17/2005	11/02/2022	8	7	0.07	0.87	No Trend
63	11/17/2005	11/02/2022	8	8	NA (all results BDL)		
72	11/18/2005	11/15/2023	9	0	0.42	0.14	No Trend
100	11/17/2005	11/02/2022	8	7	0.07	0.87	No Trend
29A	11/18/2005	11/15/2023	9	8	0.06	0.90	No Trend
Sulfate							
1A	11/17/2005	11/02/2022	8	0	0.54	0.081	No Trend
17B	11/18/2005	11/15/2023	9	0	-0.54	0.059	No Trend
69	11/17/2005	11/02/2022	8	0	0.40	0.21	No Trend
81	11/17/2005	11/02/2022	8	0	-0.26	0.44	No Trend
62	11/17/2005	11/02/2022	8	0	-0.11	0.80	No Trend
61	11/17/2005	11/02/2022	8	0	0.04	1.0	No Trend

Table 3-5. Trend Analysis Results for Analytes in L-Bar Site Monitoring Wells, 2005–2023^a (continued)

Well ^b	Initial Trend Analysis Date	Final Trend Analysis Date	Number of Samples	Number of Nondetects	Kendall's tau ^c	p-value ^d	Trend ^{c,d}
Sulfate (continued)							
63	11/17/2005	11/02/2022	8	0	−0.04	1.0	No Trend
72	11/18/2005	11/15/2023	9	0	0.67	0.019	Increasing
100	11/17/2005	11/02/2022	8	0	−0.57	0.075	No Trend
29A	11/18/2005	11/15/2023	9	0	0.61	0.028	Increasing
TDS							
1A	11/17/2005	11/02/2022	8	0	0.43	0.17	No Trend
17B	11/18/2005	11/15/2023	9	0	0.17	0.60	No Trend
69	11/17/2005	11/02/2022	8	0	−0.15	0.71	No Trend
81	11/17/2005	11/02/2022	8	0	−0.40	0.21	No Trend
62	11/17/2005	11/02/2022	8	0	0.15	0.71	No Trend
61	11/17/2005	11/02/2022	8	0	0.07	0.90	No Trend
63	11/17/2005	11/02/2022	8	0	0.23	0.52	No Trend
72	11/18/2005	11/15/2023	9	0	0.33	0.25	No Trend
100	11/17/2005	11/02/2022	8	0	−0.76	0.013	Decreasing
29A	11/18/2005	11/15/2023	9	0	0.55	0.055	No Trend
Uranium							
1A	11/17/2005	11/02/2022	8	0	0.28	0.39	No Trend
17B	11/18/2005	11/15/2023	9	0	0.20	0.53	No Trend
69	11/17/2005	11/02/2022	8	0	−0.64	0.035	Decreasing
81	11/17/2005	11/02/2022	8	0	−0.11	0.80	No Trend
62	11/17/2005	11/02/2022	8	4	−0.04	1.0	No Trend
61	11/17/2005	11/02/2022	8	2	−0.18	0.61	No Trend
63	11/17/2005	11/02/2022	8	3	−0.18	0.60	No Trend
72	11/18/2005	11/15/2023	9	0	0.68	0.015	Increasing
100	11/17/2005	11/02/2022	8	0	−0.22	0.53	No Trend
29A	11/18/2005	11/15/2023	9	4	−0.06	0.91	No Trend

Notes:

^a Trend analyses were conducted at the 0.05 significance (or alpha) level using a two-sided test. For well-analyte combinations with no nondetects, trend analyses were conducted using the Kendall package in R, version 2.2.1 (McLeod 2022). For parameters with nondetect results, trend analyses were conducted using the NADA package (Lee 2020).

^b Wells are listed in the order shown in the preceding figures. POC wells are listed first, followed by affected area and seepage indicator wells, POE wells, and background well 29A.

^c The test statistic Kendall's tau is a measure of the strength of the association between two variables, with values always falling between −1 and +1. A tau value of 1.0 corresponds to a perfect strong association between the time series, indicating a significant increasing trend. Conversely, a perfect association in the negative direction (for decreasing trends) will have a tau value of −1.0. Time-series data with no statistically significant trend will have a tau value closer to 0.0.

^d A calculated p-value of <0.05 indicates that the null hypothesis is rejected and a significant trend in the time series exists.

Abbreviations:

BDL = below detection limit

NA = not applicable (trend analysis results are not meaningful given the high proportion of nondetects)

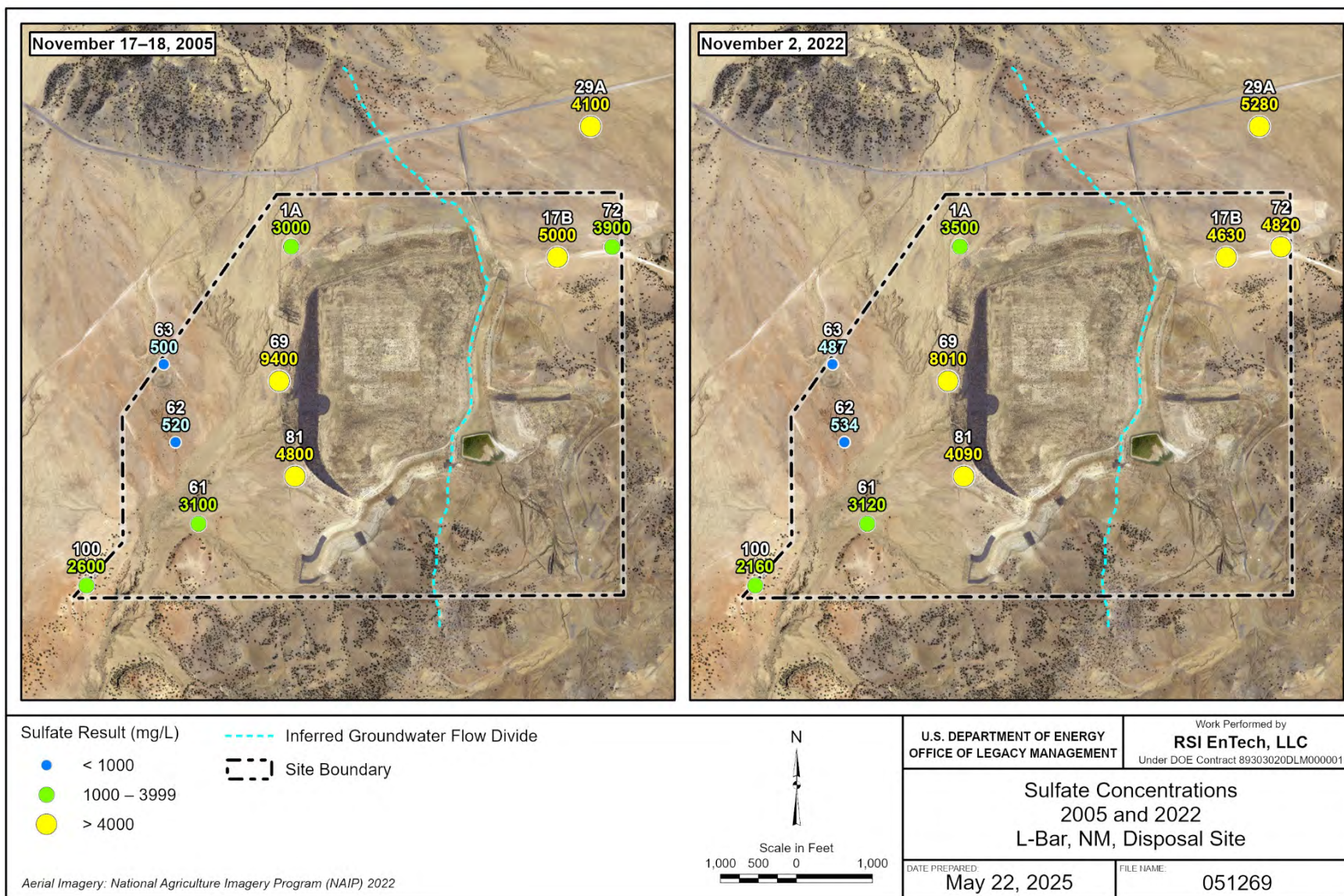
Nitrate concentrations are increasing in POC well 81, having more than doubled since 2010 (from 12.2 mg/L to a maximum of 28.8 mg/L in 2022), but the trend is not significant. Nitrate levels in POC source zone well 69 exceeded the 10 mg/L standard between 2005 and 2007 (31–46 mg/L), but then declined to nondetectable levels (≤ 0.05 mg/L) (Figure 3-6). In addition to POC well 17B, a statistically significant increasing trend in nitrate concentrations was also found for eastern POE well 72 (Table 3-5), where the November 2022 result (9.88 mg/L) was approximately equal to the 10.0 mg/L State of New Mexico standard. Although the most recent nonroutine (2023) measurement declined somewhat (to 8.35 mg/L), if the increasing concentration trend continues, the State of New Mexico nitrate standard will soon be exceeded.

Selenium concentrations in POC source zone wells have been consistently below the corresponding 2.0 mg/L ACL and AAS (Figure 3-7). Except for POC wells 17B and 81 (0.16–0.44 and 0.042–0.073 mg/L, respectively), selenium concentrations in all site monitoring wells have also been below the 0.05 mg/L New Mexico standard. Results for most remaining wells have been below the detection limit. An exception is POE well 72, where selenium concentrations are approaching the 0.05 mg/L standard; the most recent (2023) result was 0.022 mg/L. Although concentrations in this well are trending upward (as indicated by a positive tau value), the trend (as true for all site wells) is not statistically significant (Table 3-5).

Sulfate concentrations in the four POC source zone wells continue to be below the corresponding 13,110 mg/L AAS. The highest concentrations (7900–10,000 mg/L) have been measured in well 69. Sulfate concentrations in remaining POC source zone wells (1A, 17B, and 81) are comparable to (usually just slightly exceeding) the 4000 mg/L state-approved background level (Figure 3-8). Sulfate concentrations in AAS affected area well 62 (496–570 mg/L) have been well below the corresponding AAS of 5185 mg/L. Similar levels have been measured in POE seepage indicator well 63 (Figure 3-8). Concentrations in seepage indicator well 61 have been higher (2980–3500 mg/L) but stable (non-trending) at levels just below 4000 mg/L.

Sulfate concentrations in all wells are non-trending except for easternmost wells 72 (POE) and 29A (background). Sulfate concentrations in POE well 72 have exceeded the 4000 mg/L standard since 2016 (4500–6080 mg/L) and have a statistically significant increasing trend (Table 3-5). A significant increasing trend is also found for background well 29A, where sulfate concentrations have exceeded the state-approved background level in all but one sample, with the maximum (5280 mg/L) measured in November 2022. The most recent (nonroutine) 2023 result was 4880 mg/L, also exceeding the state-approved background level. As shown in Figure 3-8, sulfate concentrations in POE well 72 are very similar to those measured in well 29A. Both wells have concentrations now exceeding those measured in upgradient POC well 17B.

Figure 3-11 was developed to satisfy a requirement in Section 3.7.1 of the LTSP, which states that annual inspection reports are to include a groundwater level contour map (provided in Figure 3-3) and a sulfate isoconcentration map for the years that sampling has been conducted (DOE 2004). As discussed in previous annual reports, bubble plot maps for sulfate were generated in lieu of isoconcentration maps because of the limited number of well locations. No water quality measurements have been taken directly beneath the tailings impoundment, so interpolated isoconcentrations would likely not be representative of site conditions.



Notes: Because wells are monitored triennially (last routine sampling conducted in 2022), this figure duplicates that presented in the 2023 annual report (DOE 2023). For the three wells sampled in November 2023 (nonroutine event), sulfate results were as follows: 4400 mg/L at well 17B, 6080 mg/L at well 72 (duplicate result of 5060 mg/L), and 4880 mg/L at offsite background well 29A.

Figure 3-11. Sulfate Concentrations in 2005 and 2022, L-Bar Site Monitoring Wells

All site monitoring wells are screened within the First Tres Hermanos Sandstone unit and do not represent contaminant levels in porous media above or below this stratigraphic unit. Sulfate concentrations continue to be highest in POC source zone well 69 (most recent result of 8010 mg/L). The state-approved background level is also currently exceeded in POC well 81 and the three easternmost wells: POC source zone well 17B, POE well 72, and background well 29A.

General observations for TDS in L-Bar site wells are similar to those discussed above for sulfate. TDS levels in POC source zone wells have exceeded the state-approved background level of 5880 mg/L but have been below the corresponding AAS of 20,165 mg/L (Figure 3-9). TDS concentrations have been highest in POC source zone well 69 (13,000–17,500 mg/L) and lowest in affected area well 62 (1400–1600 mg/L, below the corresponding AAS of 7846 mg/L) and POE seepage indicator well 63 (1300–1600 mg/L).

As observed for sulfate, TDS concentrations in eastern POE well 72 are similar to those in background well 29A (>5880 mg/L for the last three sampling events), and the trend in both wells is slightly increasing but not statistically significant (Table 3-5). TDS concentrations in background well 29A have exceeded 5880 mg/L in all nine samples, with a maximum of 8470 mg/L measured in November 2023 (nonroutine sampling event). Consistent with the 2023 annual report (DOE 2023), the only statistically significant trend in TDS concentrations was found for western POE well 100, which has a decreasing trend (Table 3-5).

Uranium concentrations in POC wells 17B and 69 were above the 0.03 mg/L State of New Mexico standard in 2022–2023 (Figure 3-10). Historically, uranium concentrations in POC source zone well 17B have remained stable at or slightly exceeding the standard (0.027–0.034 mg/L), while concentrations in well 69 have exceeded the standard by 1 to 2 orders of magnitude (1.3–5.6 mg/L). Although Mann-Kendall trend analysis yielded a statistically significant decreasing trend for well 69 from 2005–2022 (Table 3-5), concentrations have stabilized at about 1–2 mg/L since 2010 (Figure 3-10). Uranium concentrations in all POC source zone wells continue to be below the 13.0 mg/L ACL and AAS.

Uranium concentrations in eastern POE well 72, although historically below the 0.03 mg/L standard, are increasing and approaching this value (most recent result of 0.016 mg/L in 2023). If this increasing trend continues, uranium concentrations in POE well 72 may exceed the State of New Mexico standard in the future.

3.7.1.3 Groundwater Quality Compliance Summary

Concentrations of all analytes in POC and affected area wells remain below corresponding AAS values. The only analyte to have an increasing trend is nitrate (+ nitrite as N) in well 17B with a 2023 concentration of 880 mg/L compared to the AAS of 1180 mg/L. Although below the AAS, if the increasing trend continues, the AAS could be met or potentially exceeded. This trend will continue to be evaluated in future compliance reports.

For POE wells 63 and 100, all analytes remain below State of New Mexico standards with no increasing trends (Table 3-5). For POE well 72, chloride, nitrate, selenium, and uranium remain lower than State of New Mexico standards. However, sulfate and TDS concentrations are greater than the background concentrations approved by the State of New Mexico (Table 3-3) with increasing concentration trends for chloride, nitrate, sulfate, and uranium (Table 3-4).

In comparison, notable increases in chloride, sulfate, and TDS concentrations (last few samples, not an overall statistically significant trend) were observed for background well 29A. At this location, approved background concentrations for sulfate and TDS have been exceeded in all nine sampling events except one (sulfate in 2010). Chloride concentrations are significantly increasing in background well 29A and POE well 72 with concentrations approaching the 250 mg/L state standard. The concentration increases in multiple analytes at background well 29A correlate with those found at POE well 72, where state-approved background values have been exceeded in five and eight (respectively) of the nine sampling events. Thus, it appears that either state-approved background concentrations are too low, or well 29A does not represent true background concentrations. DOE is working on plans for additional sampling, which could include sulfur isotopes, to better determine the reason for elevated analyte concentrations, some with increasing trends, in POE well 72 and background well 29A.

3.7.2 Erosion Monitoring Program

An erosion monitoring program (EMP) was developed to address potential erosion of the disposal cell cover over time and was incorporated as an LTSP requirement. Sohio Western Mining Company developed the plan at the request of the New Mexico Water Quality Control Commission as a condition for granting AASs for groundwater at the site. In accordance with Appendix C of the LTSP, erosion measurements will be performed annually for 20 years, through 2023, and then once every 10 years for the following 80 years. In accordance with the EMP, erosion will be considered excessive when 2 ft of erosion is noted at more than half of the monitoring locations.

The cover of the disposal cell consists of several feet of clay-rich soil materials and a 4.1-foot-thick (minimum) compacted layer of clay that functions as a radon barrier. The total thickness of the cover ranges from 6–10 ft. The EMP has two requirements: (1) measure surface soil erosion and (2) measure the progress of revegetation. Erosion and vegetation monitoring was performed on July 15, 2025.

3.7.2.1 Erosion Monitoring

In accordance with the EMP, the former licensee installed a grid of 20 evenly spaced monitoring locations on the cover in November 2003 (Figure 3-1). The locations were initially measured in December 2003 by the former licensee to establish baseline values.

Each monitoring location consists of a 5-foot length of half-inch-diameter, epoxy-coated rebar surrounded by three metal T-posts. The rebar was driven at each location so that approximately 1 ft remained above the soil surface. The three T-posts are set approximately 6 ft from the rebar and form an equilateral triangle, with one point of the triangle due east of the rebar. An 8-foot length of PVC pipe was mounted over the east T-post at each monitoring location in 2016 to aid in finding the monitoring locations in the increasingly tall vegetation.

Erosion measurement is accomplished by placing a 4-foot-long level centered at the base of the rebar (and on the north side of the rebar) so the east end of the level points to the easternmost T-post. The height of the rebar is measured from the base of the level to the top of the rebar and is recorded to the nearest 1/16 inch using the method established during baseline measurements in 2003.

Results of the 2025 measurements are presented in Table 3-6. The surface elevation has increased by 0.06–1.9 inches at the monitoring locations when compared to the baseline measurements taken in 2003. These results indicate that the surface of the disposal cell is rising compared to 2003. Since 2003, the surface has risen an average of 0.91 inch and dropped 0.310 inch since 2024. The 0.310-inch decrease since 2024 is probably because, during 2025 monitoring, soils were very dry compared to soils more saturated from rainfall in 2024 since heavy clay soils such as those on the disposal cell cover tend to expand when wet. System Operation and Analysis at Remote Sites (SOARS) data indicated there was zero precipitation from January to April in 2025. The drop in surface is probably also due mainly to the decrease in vegetation in the plots (Figure 3-12). As vegetation develops on the disposal cell cover, the surface elevation rises through underground root growth and the accumulation of organic matter in the soil. Vegetation also prevents or slows surface erosion, and wind-borne sediment deposition can also increase in vegetated areas as the plants' foliage and stems slow wind speeds, allowing sediment to accumulate more quickly.

*Table 3-6. Surface Elevation Changes on the L-Bar Site
Disposal Cell Cover Between 2003 and 2025*

Monitoring Location	Length of Rebar Above Surface (inches)				Change in Surface Elevation ^a Baseline to Present (decimal inches)
	2003 (Baseline)		2025		
	(fraction)	(decimal)	(fraction)	(decimal)	
A1	12 10/16	12.625	10 12/16	10.75	1.875
A2	12 7/16	12.438	11 12/16	11.75	0.688
A3	12 15/16	12.938	11 10/16	11.63	1.308
A4	12 6/16	12.375	11 4/16	11.25	1.125
B1	12 10/16	12.625	11 2/16	11.13	1.495
B2	12 8/16	12.500	11 15/16	11.94	0.56
B3	13 0/16	13.000	12 8/16	12.5	0.5
B4	12 15/16	12.938	11 9/16	11.56	1.378
C1	12 8/16	12.500	10 13/16	10.81	1.69
C2	13 1/16	13.063	12 9/16	12.56	0.503
C3	12 2/16	12.125	11 8/16	11.5	0.625
C4	12 6/16	12.375	11 13/16	11.81	0.565
D1	12 7/16	12.438	11 9/16	11.56	0.878
D2	12 12/16	12.750	12 12/16	12.75	0
D3	12 3/16	12.188	11 1/16	11.06	1.128
D4	12 12/16	12.750	12 11/16	12.69	0.06
E1	13 1/16	13.063	11 11/16	11.69	1.373
E2	12 14/16	12.875	12 4/16	12.25	0.625
E3	12 9/16	12.563	11 8/16	11.5	1.063
E4	12 15/16	12.938	12 2/16	12.13	0.808

Note:

^a A positive change indicates that the surface elevation at that monitoring point increased; a negative change indicates that the surface elevation at that location decreased. Negative changes were apparent in 2025.



Figure 3-12. Monitoring Location E1 in 2024 (Left) and 2025 (Right)

3.7.2.2 Vegetation Monitoring

Vegetation monitoring plots were established at 10 of the erosion monitoring locations to record changes in the vegetation over time. Plots were established at locations A1, A3, B2, B4, C1, C3, D2, D4, E1, and E3. At each plot, the three existing T-posts were used to form three corners of the plot, and a fourth point was projected south of the three T-posts to form a parallelogram covering approximately 100 square ft. An ecologist visually estimated the percent foliar cover of each species of live vegetation within each plot. Percent foliar cover is the vertical projection of leaf area onto the ground surface. Foliar cover would equal the shadow cast by the vegetation if the sun was directly overhead, excluding openings or overlaps in the canopy.

In accordance with the EMP, LM will perform annual vegetation monitoring until at least 20% average foliar cover is achieved and when more than half of the monitoring plots exceed 20% cover by perennial plants. In 2025, the total foliar cover was 15% and the average cover of perennial plants was 15%. Four of the 10 plots contained 20% or more perennial cover. The decrease in vegetation cover was due to lower precipitation at the site. The success criterion was not met in 2025; thus, additional annual monitoring will be required until continued significant increase in plant density is noted during future annual site inspections.

Perennial plant species observed in the plots in 2025 include, in order of abundance: fourwing saltbush (*Atriplex canescens*), broom snakeweed (*Gutierrezia sarothrae*), rubber rabbitbrush (*Ericameria nauseosa*), plains pricklypear (*Opuntia polyacantha*) and dropseed (*Sporobolus* spp.) (USDA 2025).

3.8 References



Site-related documents are available on the LM public webpages at <https://lmpublicsearch.lm.doe.gov/SitePages>.

10 CFR 40.28. U.S. Nuclear Regulatory Commission, “General License for Custody and Long-Term Care of Uranium or Thorium Byproduct Materials Disposal Sites,” *Code of Federal Regulations*.

10 CFR 835. U.S. Department of Energy, “Occupational Radiation Protection Program,” *Code of Federal Regulations*.

40 CFR 192. U.S. Environmental Protection Agency, “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings,” *Code of Federal Regulations*.

DOE (U.S. Department of Energy), 2004. *Long-Term Surveillance Plan for the U.S. Department of Energy L-Bar, New Mexico, (UMTRCA Title II) Disposal Site, Seboyeta, New Mexico*, DOE-LM/GJ709-2004, September.

DOE (U.S. Department of Energy), 2023. *2023 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title II Disposal Sites*, LMS/46122, Office of Legacy Management, December.

DOE Order 458.1 Chg 4 (LtdChg), *Radiation Protection of the Public and the Environment*, U.S. Department of Energy, archived January 30, 2025.

Kennecott Corporation, 1996. *Final Report: Hydrogeology Investigation of the L-Bar Uranium Mill Tailings Pile, Cibola County, New Mexico*, prepared by Intera Inc., December.

Lee, L., 2020. “NADA: Nondetects and Data Analysis for Environmental Data,” R package, version 1.6-1.1, <https://CRAN.R-project.org/package=NADA>, accessed May 14, 2025.

McLeod, A.I., 2022. “Kendall: Kendall Rank Correlation and Mann-Kendall Trend Test,” R package, version 2.2.1, <https://cran.r-project.org/web/packages/Kendall/index.html>, accessed May 14, 2025.

USACE (U.S. Army Corps of Engineers), 2022. *Department of Energy Legacy Management Bluewater and L-Bar Road Repairs Cibola County, New Mexico*, Albuquerque District, November.

USDA (U.S. Department of Agriculture), 2025. “PLANTS Database,” Natural Resources Conservation Service, <https://plants.usda.gov/home>, accessed May 19, 2025.

3.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	270	Culverts
PL-2	135	Low Water Crossing D
PL-3	90	Low Water Crossing A
PL-4	180	Road Arroyo
PL-5	270	Broken Fence
PL-6	157	Loose and Leaning Fence Line
PL-7	90	Check Dam
PL-8	0	Slope Erosion near Perimeter Sign P26
PL-9	90	Western Tubular Steel Gate
PL-10	157	Site Marker
PL-11	90	Boundary Monument BM-8
PL-12	135	Quality Control Monument QC-9
PL-13	180	New Paint at Monitoring Well 81
PL-14	22	Collapsed Degradation Feature
PL-15	270	Degradation Feature E-004
PL-16	270	Sediment Trap
PL-17	0	Runoff Control Structure F
PL-18	337	Runoff Control Structure G
PL-19	330	Erosion near Runoff Control Structure A
PL-20	135	Runoff Control Structure A
PL-21	180	Cutoff Wall Riprap
PL-22	180	Northern Extent of Southwest Gully Erosion
PL-23	210	Erosion Marker EM-01
PL-24	90	Tres Hermanos Sandstone Outcrop—Dry

Note:

— = Photograph taken vertically from above.



PL-1. Culverts



PL-2. Low Water Crossing D



PL-3. Low Water Crossing A



PL-4. Road Arroyo



PL-5. Broken Fence



PL-6. Loose and Leaning Fence Line



PL-7. Check Dam



PL-8. Slope Erosion near Perimeter Sign P26



PL-9. Western Tubular Steel Gate



PL-10. Site Marker



PL-11. Boundary Monument BM-8



PL-12. Quality Control Monument QC-9



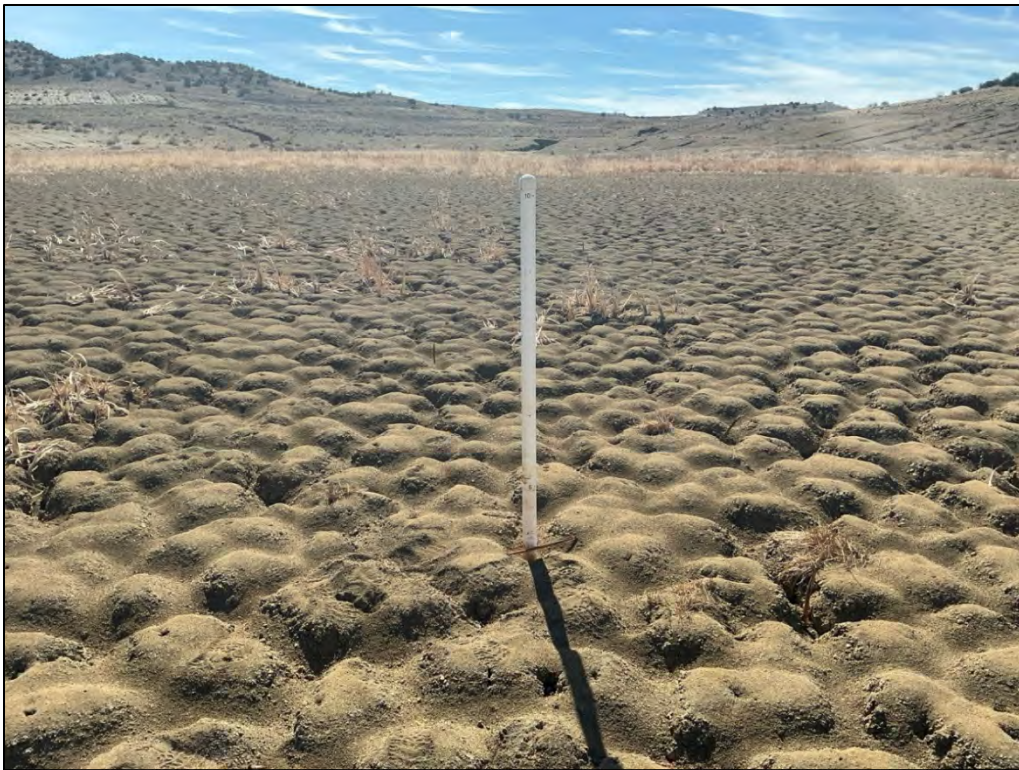
PL-13. New Paint at Monitoring Well 81



PL-14. Collapsed Degradation Feature



PL-15. Degradation Feature E-004



PL-16. Sediment Trap



PL-17. Runoff Control Structure F



PL-18. Runoff Control Structure G



PL-19. Erosion near Runoff Control Structure A



PL-20. Runoff Control Structure A



PL-21. Cutoff Wall Riprap



PL-22. Northern Extent of Southwest Gully Erosion



PL-23. Erosion Marker EM-01



PL-24. Tres Hermanos Sandstone Outcrop—Dry

4.0 Maybell West, Colorado, Disposal Site

4.1 Compliance Summary

The Maybell West, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title II Disposal Site was inspected on September 16, 2025. Several depressions on the disposal cell and ancillary cell continue to be evaluated and no changes were observed during the inspection. None of the depressions threaten the integrity or performance of the disposal cells, and monitoring of the depressions will continue. No changes were observed in associated drainage features. Groundwater monitoring is not required at the site. Three minor maintenance needs were identified and completed in 2025. Inspectors identified no cause for a follow-up inspection.

4.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the site-specific *Long-Term Surveillance Plan for the Maybell West (UMTRCA Title II) Disposal Site, Moffat County, Colorado* (DOE 2010) (LTSP) in accordance with procedures established to comply with the requirements of the U.S. Nuclear Regulatory Commission (NRC) general license at Title 10 *Code of Federal Regulations* Section 40.28 (10 CFR 40.28). Table 4-1 lists these requirements.

Table 4-1. License Requirements for the Maybell West, Colorado, Disposal Site

Requirement	LTSP	This Report	10 CFR 40.28
Annual Inspection and Report	Sections 3.3 and 3.4	Section 4.4	(b)(3)
Follow-Up Inspections	Section 3.5	Section 4.5	(b)(4)
Routine Maintenance and Emergency Measures	Section 3.6	Section 4.6	(b)(5)
Environmental Monitoring	Section 3.7	Section 4.7	(b)(3)

4.3 Institutional Controls

The 180-acre site, identified by the property boundary shown in Figure 4-1, is owned by the United States and was accepted under the NRC general license in 2010. The U.S. Department of Energy (DOE) is the licensee and, in accordance with the requirements for UMTRCA Title II sites, the Office of Legacy Management (LM) is responsible for the custody and long-term care of the site. Institutional controls (ICs) at the site include federal ownership of the property and the following physical ICs that are inspected annually: disposal cell, ancillary cell, entrance gate and sign, perimeter fence and signs, site marker, and boundary monuments.

4.4 Inspection Results

The site, approximately 4 miles northeast of Maybell, Colorado, was inspected on September 16, 2025. The inspection was conducted by Z. Aldous and J. Coyne of the Legacy Management Support (LMS) contractor. S. Woods (LM) and A. Lawrence (Colorado Department of Public Health and Environment) attended the inspection. The purposes of the inspection were to confirm the integrity of visible features at the site, identify changes in conditions that might affect

conformance with the LTSP, and evaluate whether maintenance or follow-up inspection and monitoring are needed.

4.4.1 Site Surveillance Features

Figure 4-1 shows the locations of site features, including site surveillance features and inspection areas, in black and gray font. Some site features that are present but not required to be inspected are shown in italic font. Observations from previous inspections that are currently monitored are shown in blue, and new observations identified during the 2025 annual inspection are shown in red. Inspection results and recommended maintenance activities associated with site surveillance features are described in the following subsections. Photographs to support specific observations are noted in the text and in Figure 4-1 by photograph location (PL) numbers. The photographs and photograph log are presented in Section 4.9.

4.4.1.1 Site Access and Entrance Gate

Access to the site is from Moffat County Road 53, which runs north from U.S. Highway 40 approximately 8 miles east of Maybell, Colorado. County Road 53 ends at an unlocked gate near the northeast corner of the Maybell, Colorado, UMTRCA Title I Disposal Site (approximately 3 miles from U.S. Highway 40). LM is responsible for maintenance of the road from the end of County Road 53 to the site and has access under a U.S. Bureau of Land Management (BLM) right-of-way permit.

The dirt two-track access road continues west from the end of County Road 53 on BLM property and through a second unlocked gate. Just past the second gate, the access road turns south and continues for approximately 0.5 mile past an abandoned open pit uranium mine known as Rob Pit; it then bends north, following the route of the former haul road for approximately 0.25 mile to the site entrance gate.

The access road was passable, and no maintenance needs were identified. The entrance gate, a standard tubular metal stock gate, is near the southeast corner of the site. No maintenance needs were identified.

4.4.1.2 Perimeter Fence and Signs

A four-strand barbed-wire fence encloses the disposal cell, the ancillary cell, the drainage structures, and much of the site. The fence primarily serves to prevent livestock from trespassing because the site is surrounded by open rangeland used for cattle grazing. Minor damage to the perimeter fence occurs periodically because the site is in wintering grounds frequented by big game animals (primarily pronghorn, deer, and elk). A small section of fence line on the southeastern side of the site was damaged (PL-1); it was repaired during the 2025 maintenance trip. Plastic fence flags are attached to the top two strands of the perimeter fence to serve as a visual marker to wildlife to reduce entanglement or striking of the fence lines. The majority of the fence line is heavily covered in brush. Clearing brush provides access to the fence for maintenance and repair and increases its visibility, which hopefully will reduce the likelihood of an animal becoming entangled. During the 2023 maintenance trip, the entire interior fence line was cleared, except for two small areas that could not be accessed with the equipment. Work on the exterior of the fence was started, and the southern fence line was cleared. This work was not continued in 2024 or 2025 but will resume in 2026 until the fence lines are cleared on both sides.

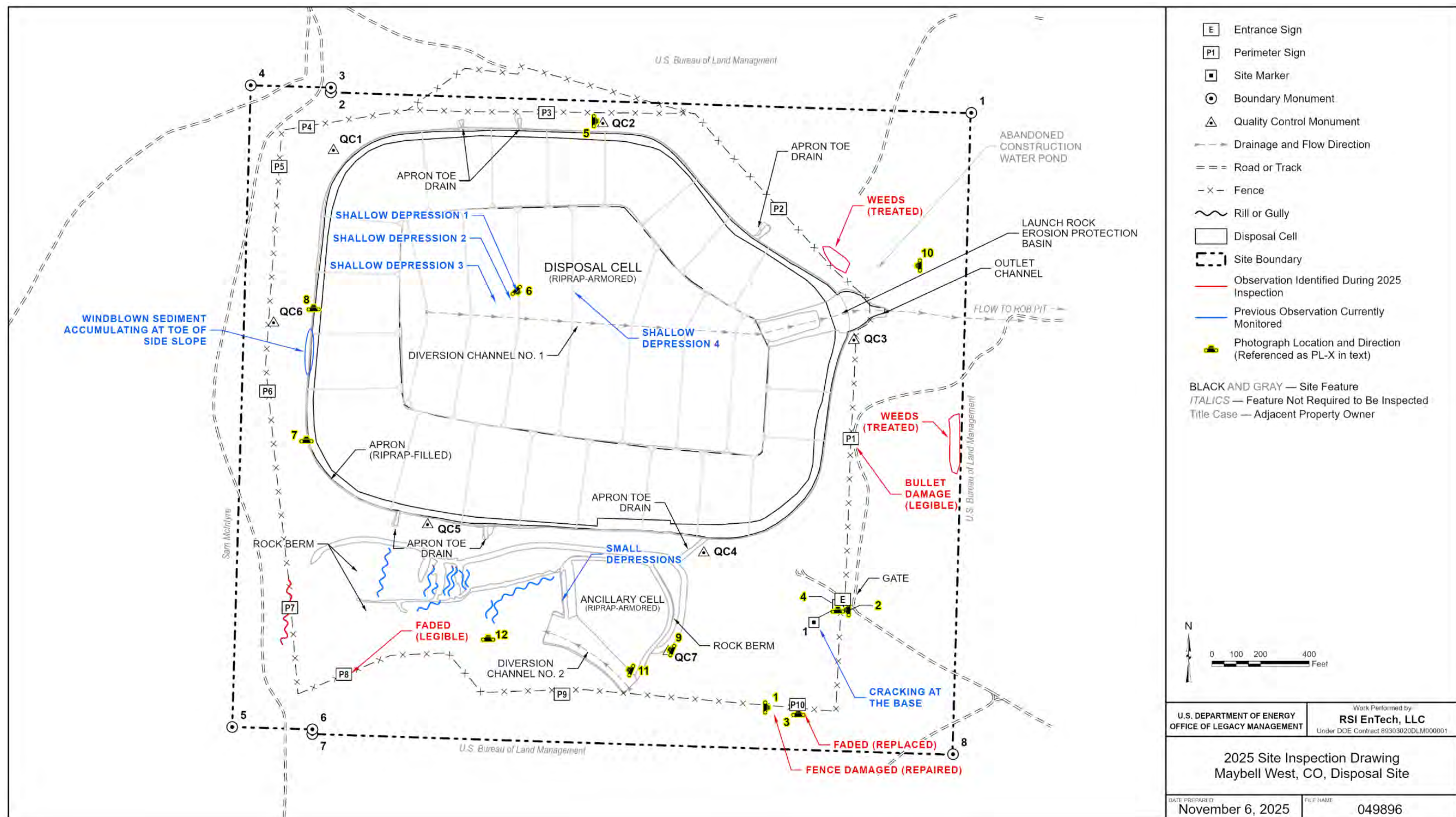


Figure 4-1. 2025 Annual Inspection Drawing for the Maybell West, Colorado, Disposal Site

The entrance sign is mounted on a metal T-post directly south of the entrance gate (PL-2). Ten warning or perimeter signs are mounted on metal T-posts around the site. Perimeter sign P10 was faded and replaced during the maintenance trip (PL-3). Perimeter sign P8 is faded and perimeter sign P1 has bullet damage, but both remain legible. No other maintenance needs were identified.

4.4.1.3 Site Marker

The site has one granite site marker near the entrance gate (PL-4). There is minimal cracking in the cement at the base of the site marker. It does not affect the integrity of the marker. No maintenance needs were identified.

4.4.1.4 Boundary Monuments

Eight boundary monuments are on the site boundary outside the fenced area. Four of the monuments are at the property corners, and the other four define an approximate 20-foot offset along the north and south boundaries where the private land that LM acquired in fee adjoins the BLM withdrawal area on the western portion of the site. Boundary monuments BM-3 and BM-6 (capped pieces of rebar) define the two 20-foot offsets. Boundary monument BM-3 was previously missing. It was surveyed and replaced in 2024. No additional maintenance needs were identified.

4.4.1.5 Aerial Survey Quality Control Monuments

The seven aerial survey quality control monuments were inspected during the inspection (PL-5). No maintenance needs were identified.

4.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into five inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection. The inspection areas are (1) the top slope of the disposal cell, (2) the side slopes of the disposal cell, (3) the ancillary cell, (4) the diversion and drainage channels, and (5) the site perimeter and balance of the site.

4.4.2.1 Top Slope of the Disposal Cell

The disposal cell is on the reclaimed site of a former heap leach processing area. The top slope of the riprap-armored disposal cell occupies about 60 acres of the site. The top of the disposal cell showed no signs of significant erosion, settling, or other modifying processes that would affect disposal cell integrity. However, four small, shallow depressions have been observed (just north of Diversion Channel No. 1) since the site transitioned to DOE in 2010. These depressions appear to be the result of settlement of the underlying materials since completion of the disposal cell. Shallow Depression 1 was discovered during the initial annual inspection in 2010 (PL-6). A second smaller and shallower depression (Shallow Depression 2) was first noted just west of the first depression during the 2016 annual inspection. A third depression (Shallow Depression 3) was first observed during the 2018 annual inspection. A fourth depression (Shallow Depression 4), east of the previous three depressions, was noted during the 2023 inspection. Shallow Depression 4 does not appear to be new, but it was not specifically

noted during previous inspections. During the inspection, Shallow Depressions 1–4 appeared to be approximately the same size, as observed during the previous annual inspection.

An LMS engineer participated in the 2023 inspection to evaluate the depressions on the top of the cell. Shallow Depressions 1, 2, and 4 are shallow and widespread; these are likely settlement made more evident by accumulating surface water that is infiltrating and forcing additional consolidation as it flushes through the cover and waste profile. This is not a concern from a risk standpoint, and it is anticipated that additional features become more prominent and easier to identify with each inspection. Several minimally visible depression features were noticed while inspectors walked the western half of the cover. These features might become more noticeable over the years. Shallow Depression 3 is a very localized but deep depression that is concerning due to its depth to relative size. It is recommended to continue monitoring it and to perform localized light detection and ranging (lidar) testing or even standard land surveying of the area.

All four depressions will continue to be monitored during annual inspections to determine if additional, more significant settlement is occurring. Aerial surveys are currently scheduled to be conducted every 5 years to assist in monitoring the depressions. No standing water was observed in any of the depressions during the inspection. These depressions currently do not threaten the integrity or performance of the disposal cell. No maintenance needs were identified.

While various species of plants were present on the top slope of the disposal cell, no deep-rooted vegetation was observed. If encroachment by deep-rooted vegetation is observed, an evaluation will be conducted as required by the LTSP to determine if any action is necessary.

4.4.2.2 Side Slopes of the Disposal Cell

The disposal cell was designed to control surface water runoff resulting from a probable maximum flood event. The side slopes of the disposal cell were constructed with a 20% slope and are covered with a 1-foot-thick layer of riprap (PL-7). Minor sediment accumulation observed at the base of the apron below the northwest side slope appears to be windblown (PL-8), and there was no evidence of side slope instability, erosion, or settlement. This area of sediment accumulation will continue to be monitored to ensure that the apron and side slope are functioning properly.

Surface water runoff from the side slopes is conveyed by an apron at the toe of the slope to six riprap-armored toe drains at low points in the apron. The apron and toe drains are constructed channels filled with riprap. No maintenance needs were identified.

4.4.2.3 Ancillary Cell

The ancillary cell (PL-9) was constructed to contain waste materials associated with the reclaimed evaporation pond area. It slopes gently toward the southwest. A rock berm wraps around its eastern and northern sides to protect it from surface water runoff. Small depressions were observed previously on the west end of the ancillary cell on the crest and toe of the side slope. These are very likely channelized flow from the cover eroding out areas of the top to side slope transition. During the 2024 inspection, it was noted that these depressions appeared to be smaller and self-healing. None of the depressions are impacting the performance of the cell, but

they will continue to be monitored. Various species of deep-rooted vegetation are present on the top and side slopes of the ancillary cell.

4.4.2.4 *Diversion and Drainage Channels*

Final surface conditions at the site include a combination of rock armoring and contouring to achieve the surface water drainage control and erosion protection necessary to satisfy the design longevity requirements. The top slope of the disposal cell was designed to drain surface water runoff to the center and into riprap-armored Diversion Channel No. 1, which is graded toward and then down the east side slope of the disposal cell. Surface water runoff ultimately discharges into Rob Pit east of the site. An erosion protection structure, referred to as the Launch Rock Erosion Protection Basin (PL-10), was constructed at the outfall of Diversion Channel No. 1 to protect the disposal cell from headcutting that may occur from the deep channel that runs into Rob Pit. Diversion Channel No. 2 runs along the south side of the ancillary cell to convey surface water runoff away from the ancillary cell (PL-11). The diversion channels and outlet channel of the Launch Rock Erosion Protection Basin continue to function as designed.

The rock berm that runs along the northern edge of the ancillary cell continues west across the slope south of the disposal cell to protect the disposal cell against erosion and headcutting. Several gullies (PL-12) and rills have developed on this south slope but do not threaten the integrity of the disposal cell. The gullies will continue to be monitored and repaired as needed. No maintenance needs were identified.

4.4.2.5 *Site Perimeter and Balance of the Site*

Reclaimed surfaces at the site were planted with a mixture of native and adaptive grasses to provide soil stability, and the vegetation continues to improve. Noxious weeds are controlled with herbicide in accordance with the LTSP.

During each site inspection, the area surrounding the site for a distance of 0.25 mile is visually observed for erosion, changes in land use, or other phenomena that might affect the long-term integrity of the site. In 2024, it was noted that exploratory uranium drilling was being conducted 0.5 mile northeast of the disposal cell. Drilling is outside of the site boundary and does not affect the site condition. A small rill was identified adjacent to the fence near perimeter sign P7 during the 2025 inspection. No other changes were identified.

4.5 Follow-Up Inspections

LM will conduct follow-up inspections if (1) a condition is identified during the annual inspection or other site visit that requires a return to the site to evaluate the condition or (2) LM is notified by a citizen or outside agency that conditions at the site are substantially changed. No need for a follow-up inspection was identified.

4.6 Routine Maintenance and Emergency Measures

The following maintenance actions were completed in 2025:

- Noxious weeds were treated with herbicide
- Fence repair was completed
- Perimeter sign P10 was replaced

No other maintenance needs were identified.

Emergency measures are corrective actions that LM will take in response to unusual damage or disruption that threatens or compromises site health and safety, security, integrity, or compliance with 40 CFR 192. No emergency measures were identified.

4.7 Environmental Monitoring

In accordance with the LTSP, groundwater monitoring is not required at the site because the results of 30 years of historical groundwater monitoring performed at the site by the former licensee (20 years before reclamation and 10 years after reclamation) indicated that groundwater was not contaminated by site-related activities.

4.8 References



Note

Site-related documents are available on the LM public webpages at <https://lmpublicsearch.lm.doe.gov/SitePages>.

10 CFR 40.28. U.S. Nuclear Regulatory Commission, “General License for Custody and Long-Term Care of Uranium or Thorium Byproduct Materials Disposal Sites,” *Code of Federal Regulations*.

40 CFR 192. U.S. Environmental Protection Agency, “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings,” *Code of Federal Regulations*.

DOE (U.S. Department of Energy), 2010. *Long-Term Surveillance Plan for the Maybell West (UMTRCA Title II) Disposal Site, Moffat County, Colorado*, LMS/MAW/S01879-0.0, Office of Legacy Management, February.

4.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	90	Damaged Fence Line
PL-2	270	Entrance Sign
PL-3	0	New Perimeter Sign P10
PL-4	—	Site Marker SMK-1
PL-5	90	Quality Control Monument QC-2
PL-6	135	Shallow Depression 1
PL-7	0	West Side Slope of the Disposal Cell
PL-8	—	Sediment Accumulation at Toe of Side Slope
PL-9	293	Ancillary Cell
PL-10	270	Launch Rock Erosion Protection Basin
PL-11	293	Diversion Channel No. 2
PL-12	0	Gullies South of Disposal Cell

Note:

— = Photograph taken vertically from above.



PL-1. Damaged Fence Line



PL-2. Entrance Sign



PL-3. New Perimeter Sign P10



PL-4. Site Marker SMK-1



PL-5. Quality Control Monument QC-2



PL-6. Shallow Depression 1



PL-7. West Side Slope of the Disposal Cell



PL-8. Sediment Accumulation at Toe of Side Slope



PL-9. Ancillary Cell



PL-10. Launch Rock Erosion Protection Basin



PL-11. Diversion Channel No. 2



PL-12. Gullies South of Disposal Cell

5.0 Sherwood, Washington, Disposal Site

5.1 Compliance Summary

The Sherwood, Washington, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title II Disposal Site was inspected on June 26, 2025. No changes were observed to the disposal cell, containment dam, or associated drainage features. Inspectors identified one routine maintenance need but found no cause for a follow-up or contingency inspection.

Groundwater monitoring is not required at the site; however, the U.S. Department of Energy (DOE) Office of Legacy Management (LM) conducts limited groundwater monitoring for chloride, sulfate, and total dissolved solids (TDS) at three wells as a best management practice in accordance with the site-specific Long-Term Surveillance Plan (DOE 2001) (LTSP). The most recent sampling event occurred on June 24, 2025. Concentrations of chloride and sulfate, the primary indicator parameters defined in the LTSP, were well below corresponding action levels in downgradient point of compliance (POC) wells MW-4 and MW-10. Chloride concentrations in these two wells were below those measured in background well MW-2B.

5.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the site-specific LTSP (DOE 2001) in accordance with procedures established to comply with the requirements of the U.S. Nuclear Regulatory Commission (NRC) general license at Title 10 *Code of Federal Regulations* Section 40.28 (10 CFR 40.28). Table 5-1 lists these requirements.

Table 5-1. License Requirements for the Sherwood, Washington, Disposal Site

Requirement	LTSP	This Report	10 CFR 40.28
Annual Inspection and Report	Sections 3.3 and 3.4	Section 5.4	(b)(3)
Follow-Up Inspections	Section 3.5	Section 5.5	(b)(4)
Routine Maintenance and Emergency Measures	Section 3.6	Section 5.6	(b)(5)
Environmental Monitoring	Section 3.7	Section 5.7	(b)(3)

5.3 Institutional Controls

The 380-acre site, identified by the property boundary shown in Figure 5-1, is owned by the United States in trust for the Spokane Tribe of Indians. The site was accepted under the NRC general license in 2001. Because the site is on the Spokane Indian Reservation, no agreement of transfer was necessary to convey the property rights to DOE. However, an agreement was executed between the U.S. Bureau of Indian Affairs (BIA), the Spokane Tribe, NRC, and DOE for permanent right of access, which allows LM to fulfill its long-term surveillance and maintenance custodial responsibilities. Institutional controls (ICs) at the site include federal custody of the disposal cell and its engineered features, administrative controls, and the following physical ICs that are inspected annually: disposal cell, perimeter signs, site marker, boundary monuments, and monitoring wellhead protection.

5.4 Inspection Results

The site, approximately 5 miles west of Wellpinit, Washington, and 35 miles northwest of Spokane, Washington, was inspected on June 26, 2025. The inspection was conducted by Z. Aldous and G. Nishimura of the Legacy Management Support (LMS) contractor. K. Kreie and H. Katz (LM), as well as M. Aunan (Washington State Department of Health) attended the inspection. The purposes of the inspection were to confirm the integrity of visible features at the site, identify changes in conditions that might affect conformance with the LTSP, and evaluate whether maintenance or follow-up inspection and monitoring are needed.

5.4.1 Site Surveillance Features

Figure 5-1 shows the locations of site features, including site surveillance features and inspection areas, in black and gray font. Some site features that are present but not required to be inspected are shown in italic font. Observations from previous inspections that are currently monitored are shown in blue. Inspection results and recommended maintenance activities associated with site surveillance features are described in the following subsections. Photographs to support specific observations are noted in the text and in Figure 5-1 by photograph location (PL) numbers. The photographs and photograph log are presented in Section 5.9.

5.4.1.1 Site Access and Entrance Gates

Access to the site is from Elijah Road, a gravel-surfaced, BIA-maintained road over which LM has permanent right of access. The entrance gates are present but no longer used. They are permanently open and allow unrestricted access to the site.

5.4.1.2 Perimeter Signs

There are six warning or perimeter signs, attached to steel posts set in concrete, positioned along the site boundary at likely access points around the site. Perimeter sign P6 was identified as missing during the 2025 inspection and will be replaced during the 2026 fieldwork (PL-1). No additional maintenance needs were identified.

5.4.1.3 Site Marker

There is one granite site marker on the southwest side of the site where the access road lies closest to the site boundary (PL-2). No maintenance needs were identified.

5.4.1.4 Boundary Monuments

Six boundary monuments set in concrete define the site boundary. Because surrounding vegetation has made it difficult to locate some of the monuments, metal T-posts were installed at each boundary monument location. All boundary monuments were located during the inspection. Boundary monument BM-3A is bent but still visible and intact (PL-3). No maintenance needs were identified.

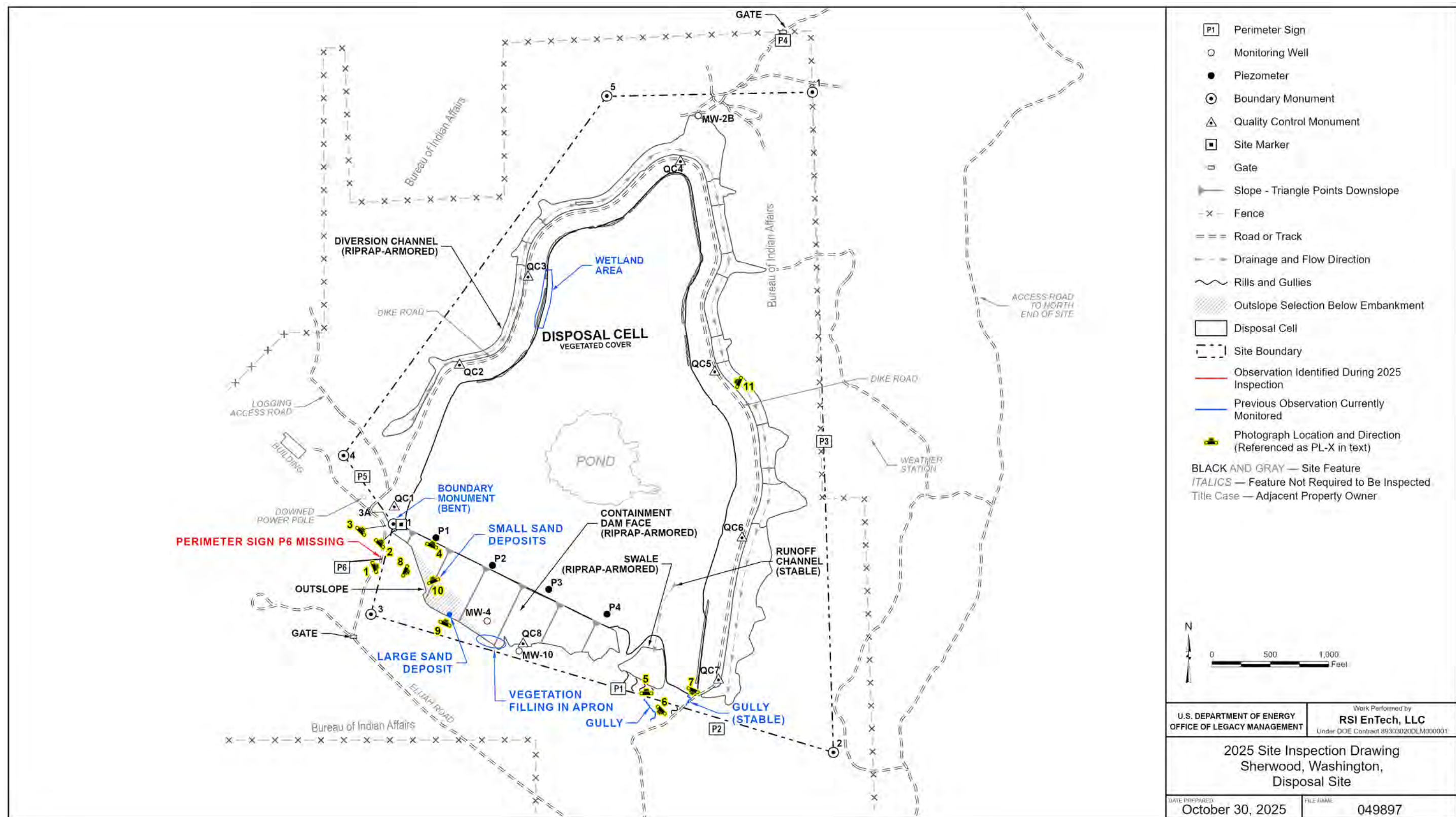


Figure 5-1. 2025 Annual Inspection Drawing for the Sherwood, Washington, Disposal Site

5.4.1.5 Aerial Survey Quality Control Monuments

Eight aerial survey quality control monuments were inspected during the 2025 inspection. LM conducted a baseline aerial survey in October 2021. No maintenance needs were identified.

5.4.1.6 Monitoring Wells and Piezometers

The site groundwater monitoring network consists of monitoring wells MW-2B, MW-4, and MW-10. Each monitoring well is protected by eight surrounding bollards. At monitoring well MW-4, one of the outermost bollards was knocked over and was removed during the 2024 maintenance event. The LMS groundwater sampling team verified that the integrity of the well has not been affected. As part of the dam safety inspection program, four piezometers were installed in November 2000 along the crest of the containment dam at a depth equivalent to the base of the dam. All piezometers were undamaged and locked. Previously, the piezometer wellheads did not have any designation of their number. During the 2025 sampling event, the piezometers and the monitoring wells were numbered (PL-4). No additional maintenance needs were identified.

5.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection. The inspection areas are (1) the site perimeter, outlying areas, and balance of site; (2) the cover of the disposal cell (tailings impoundment); and (3) the containment dam and diversion channel. Inspectors examined specific site surveillance features within each area and looked for evidence of erosion, settling, slumping, or other modifying processes that might affect conformance with LTSP requirements.

5.4.2.1 Site Perimeter, Outlying Areas, and Balance of Site

Most of the area outside of the diversion channel that encircles the disposal cell is ponderosa pine forest. The surrounding lands are part of the Spokane Indian Reservation and are used for timber harvesting, hunting, and wildlife habitat. The area approximately 0.25 mile beyond the site boundary showed no evidence of changes in land use, new construction or development, or other activities that might affect the site. A vacant metal building, left in place from earlier mining operations, is about 500 feet (ft) west of the site. The building has not changed significantly since the last inspection and remains vacant. Large boulders line the southwest border of the disposal cell outside of the site boundary along Elijah Road. These boulders are not part of the cell design, but they may reduce vehicle access to the cell. Boulders near boundary monument BM-3A have been moved in the past, making vehicle access possible. The area will continue to be monitored to ensure that vehicle traffic does not increase on the site.

A small, shallow runoff channel near the southeast corner of the disposal cell discharges water into a riprap-armored swale east of the containment dam (PL-5). The channel is stable and is not above the tailings impoundment. In previous inspections, rilling was found below the riprap-armored swale. These features will continue to be monitored to ensure that they do not affect the integrity of the disposal cell.

Two prominent gullies are present: one is outside the site boundary between perimeter sign P1 and P2 (PL-6) and the other is along the access road near the dike road on the southeast corner of the disposal cell (PL-7). The erosion areas are stable and are not impacting site features but will continue to be monitored. No maintenance needs were identified.

5.4.2.2 Cover of Disposal Cell

The disposal cell, completed in 1996, occupies 100 acres. The cover consists of 12 to 20 ft of uncompacted soils. During site reclamation, the surface was seeded with native species and live ponderosa pine trees were planted on portions of the cell.

As described in detail in the LTSP (DOE 2001), the disposal cell cover was designed to stabilize, and settlement was expected to occur. The largest area of settlement is at the center of the disposal cell where plant species adapted to wetland environments are present. Four distinct ponds, or wetland areas, were mapped during past inspections, but they are merging into one distinct pond. A settlement analysis of the ponding area completed in 2023 indicated that a maximum of 5.54 ft of settlement has occurred near the pond since construction of the disposal cell (DOE 2023). The cover design allowed for up to 10 ft of settlement (DOE 2018b). The disposal cell surface will continue to be monitored for unusual settlement features to ensure that the disposal cell is performing as designed. In October 2021, aerial light detection and ranging (lidar) surveys were conducted to collect high-resolution topographic data of the disposal cell and surrounding area. The data collected include natural color imagery and lidar elevation data to be used as a baseline. A follow-up aerial survey is scheduled for 2028. The data collected in the 2021 aerial survey confirm that settlement is less than the 10 ft allowance. No maintenance needs were identified.

5.4.2.3 Containment Dam and Diversion Channel

The tailings embankment on the site is classified as a containment dam because of the saturated condition of the impoundment; therefore, an annual dam safety inspection is required by the LTSP (DOE 2001) to ensure continued compliance with the National Dam Safety Program. The containment dam face was inspected in June 2025, and water levels were measured in four piezometers during the June 2025 groundwater sampling event in accordance with the *Dam Inspection Checklist*, which is included at the end of this chapter.

The piezometers, installed in 2000, directly measure moisture conditions in the containment dam. Measurements collected on June 24, 2025, are listed in Table 5-2 and in the attached *Dam Inspection Checklist*. Figure 5-2 plots corresponding historical groundwater elevations; the vertical datum used in this and subsequent water elevation plots is North American Vertical Datum of 1988. Because the scale in this initial figure spans approximately 50 ft, to provide greater resolution, Figure 5-3 plots the same data but using unique scales (results for piezometer P3 are not shown because this well has been predominantly dry). Following a 0.7 ft increase in water elevation between 2021 and 2022, piezometer P1 has been dry the last 3 years. Since 2001, water elevations in piezometer P2 have declined by approximately 1 ft (general trend), while those in shallow piezometer P4 have increased 0.6 ft (Figure 5-3). This slight increase is not considered indicative of potential performance issues. No statistically significant increasing trends in water elevations were found for monitoring wells MW-4 and MW-10 near the base of the dam (see Section 5.7).

Table 5-2. 2025 Sherwood, Washington, Disposal Site Piezometer Water Depths

Piezometer	Total Depth of Piezometer (ft) ^{a,b}	Water Level (ft btoc) ^a	Depth of Water in Well (ft)
P1	22.55	Dry	Dry
P2	63.07	61.35	1.72
P3	67.62	Dry	Dry
P4	22.70	21.95	0.75

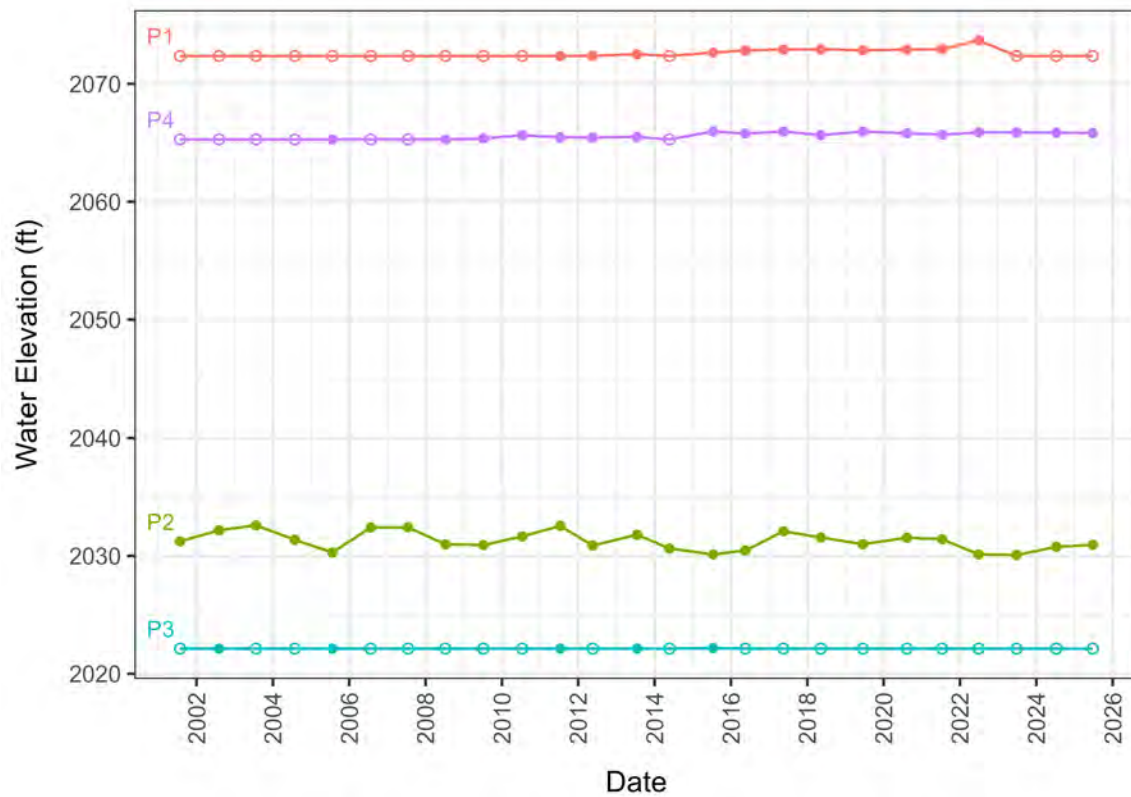
Notes:

^a Measured from the top of the inner casing.

^b Total piezometer depths based on measurements collected during the 2025 sampling event.

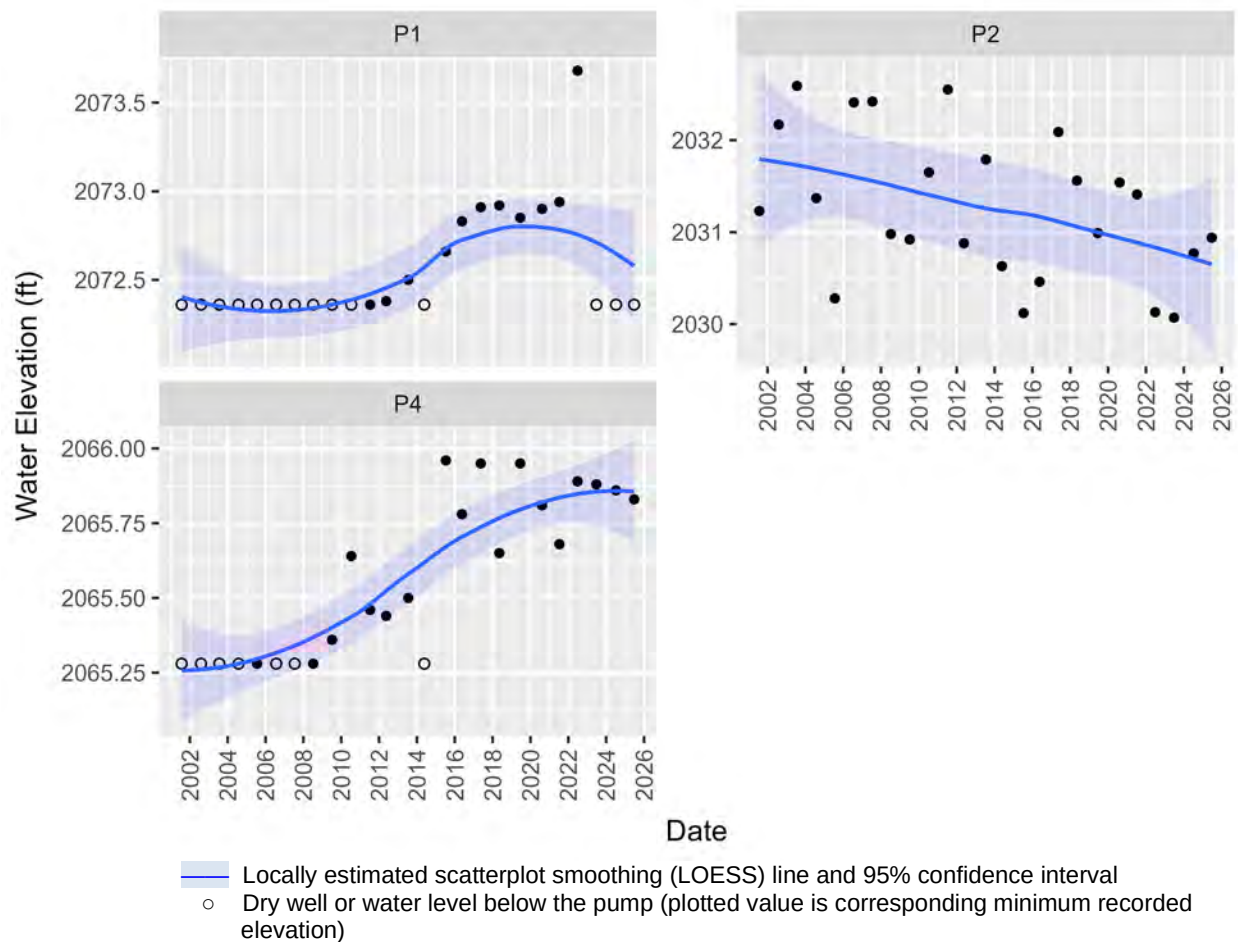
Abbreviation:

btoc = below top of casing



Note: Hollow symbols indicate that the well was dry or that the water level was below the pump (plotted values are corresponding minimum recorded elevation).

Figure 5-2. Groundwater Elevations at Piezometer Locations P1 Through P4, Sherwood, Washington, Disposal Site



Note: Results for piezometer P3 are not shown because the well has been dry since 2016 and in most preceding sampling events (Figure 5-2).

Figure 5-3. Groundwater Elevations in Piezometers P1, P2, and P4: Unique Scales, Sherwood, Washington, Disposal Site

The containment dam face has a rock cover consisting primarily of highly durable quartz monzonite. The face was designed to allow for a vegetated cover, including mature trees, to establish and stabilize the surface and mitigate erosion. The dam face was heavily vegetated in 2025 (PL-8). No maintenance needs were identified.

During past inspections, areas of sand deposition have been described that indicate that materials have washed out from underneath the dam rock cover (DOE 2018a). The largest sand deposit (PL-9), measuring approximately 16 × 14 ft, was evaluated by a soil erosion specialist during the 2022 inspection. This area will be visually monitored and measured during future inspections and by periodic lidar surveys. Several smaller sand deposits on the dam (PL-10), especially on the western half, were also mapped and evaluated, as were several areas along the toe of the dam. DOE will continue to monitor or implement repair options in consultation with NRC as necessary. Deposition is occurring in several areas along the toe of the containment dam. Continued deposition over time could lead to accumulation in amounts rendering the water-draining ability of the containment dam toe inefficient. This is not an issue currently, but inspectors will continue to monitor the areas.

A riprap-armored diversion channel surrounds the disposal cell, diverting runoff away from the cell. The diversion channel was designed to allow for sedimentation and for vegetation to establish over time. Trees, shrubs, grasses, and wetland plants have established in most areas of the diversion channel (PL-11). Sediment deposition is found in many places in the diversion channel, and trails in these areas indicate that wildlife frequently access the disposal cell for forage and water. No evidence of erosion was observed downgradient of the diversion channel outlets. No maintenance needs were identified.

5.5 Follow-Up Inspections

LM will conduct follow-up inspections if (1) a condition is identified during the annual inspection or other site visit that requires a return to the site to evaluate the condition or (2) LM is notified by a citizen or outside agency that conditions at the site are substantially changed. No need for a follow-up inspection was identified.

5.6 Routine Maintenance and Emergency Measures

During the 2025 inspection, inspectors documented the following minor maintenance need that will be addressed during fieldwork in 2026:

- Replacement of missing perimeter sign P6

Emergency measures are corrective actions that LM will take in response to unusual damage or disruption that threatens or compromises site health and safety, security, integrity, or compliance with 40 CFR 192. No emergency measures were identified.

5.7 Environmental Monitoring

5.7.1 Groundwater Monitoring

Groundwater compliance monitoring is not required at the site; however, as a best management practice stipulated in the LTSP (DOE 2001), LM conducts limited groundwater monitoring for several indicator parameters. Samples are collected annually from background well MW-2B, north of the disposal cell, and from downgradient POC monitoring wells MW-4 and MW-10 near the base of the containment dam (Figure 5-4). Groundwater samples are analyzed for chloride and sulfate, the primary indicator parameters identified in the LTSP (DOE 2001), and for TDS. Historical water quality data for this site are available through the Geospatial Environmental Mapping System (GEMS) at <https://gems.lm.doe.gov>.

Groundwater quality results for the June 2025 sampling event are listed in Table 5-3. Chloride and sulfate concentrations in groundwater in monitoring wells MW-4 and MW-10 continue to be below the corresponding State of Washington groundwater quality criterion (250 milligrams per liter [mg/L] for both parameters), considered the action level for confirmatory sampling in the LTSP (DOE 2001).

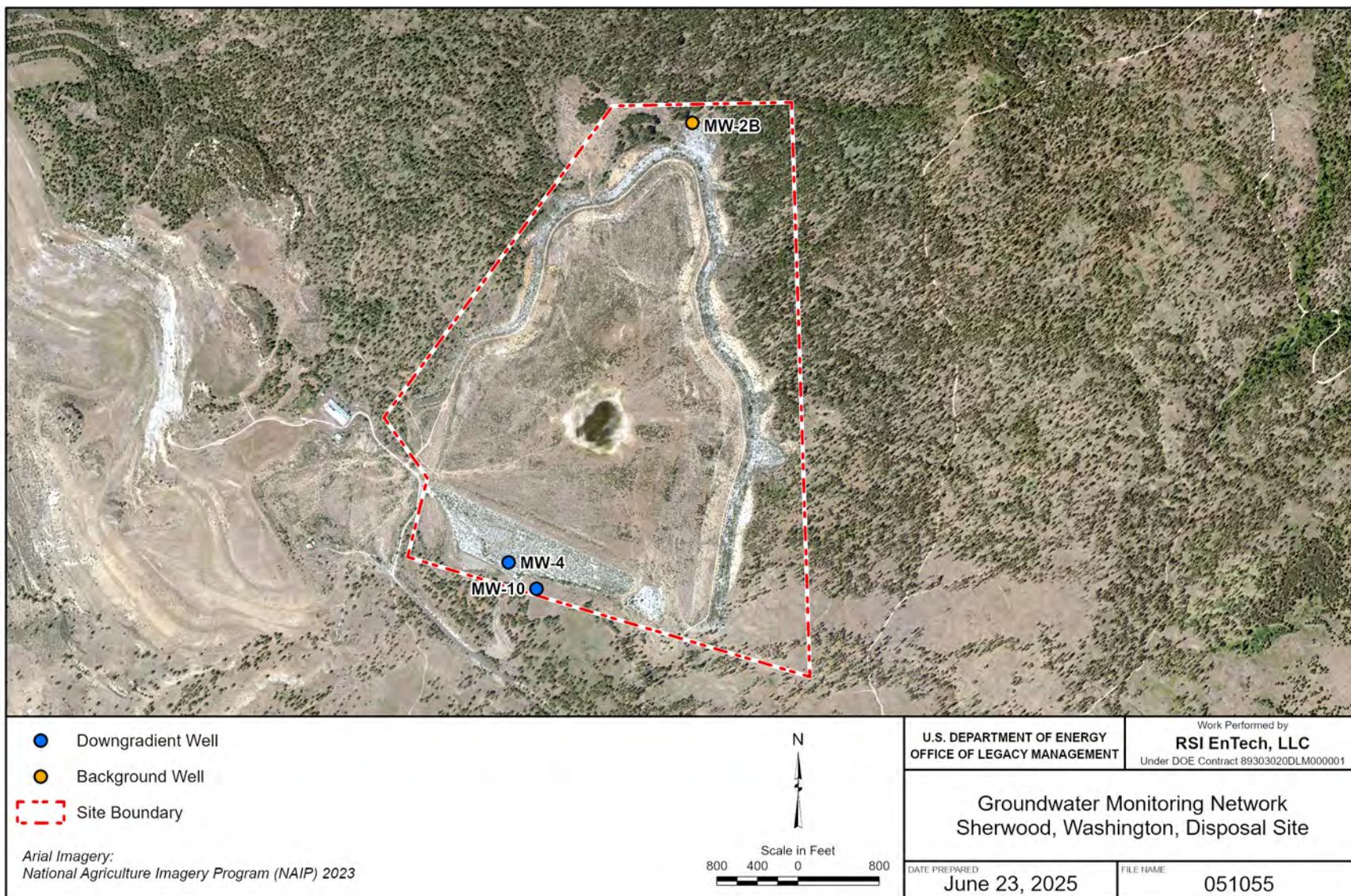


Figure 5-4. Groundwater Monitoring Network at the Sherwood, Washington, Disposal Site

Table 5-3. 2025 Groundwater Quality Results for the Sherwood, Washington, Disposal Site

Constituent	Groundwater Quality Criterion	Background Well MW-2B	Downgradient POC Well MW-4	Downgradient POC Well MW-10
Chloride (mg/L)	250 ^{a,b}	1.46	0.598	0.984
Sulfate (mg/L)	250 ^{a,b}	2.40	13.7	28.6
TDS (mg/L)	500 ^{b,c}	173	491	633

Notes:

^a Criteria used as action levels for chloride and sulfate in accordance with the LTSP (DOE 2001).

^b State of Washington groundwater quality criteria for secondary contaminants:

<https://app.leg.wa.gov/WAC/default.aspx?cite=173-200-040>.

^c Although TDS is not considered a primary indicator parameter in the LTSP (Section 3.7.1 of DOE 2001), the corresponding State of Washington secondary groundwater quality criterion is listed here. There is no requirement for this standard to be met in the LTSP.

According to the LTSP (DOE 2001), should the concentration of chloride or sulfate exceed the corresponding action levels in Table 5-3, LM would conduct confirmatory sampling. If the confirmatory sampling verifies the exceedance, LM will develop an evaluative monitoring work plan, in consultation with the Spokane Tribe and BIA, and submit that plan to NRC for review before initiating an evaluative monitoring program. Results of the evaluative monitoring program would then be used to determine if corrective action is necessary.

Time-concentration plots of chloride and sulfate measured in monitoring wells MW-4 and MW-10 and background well MW-2B are shown in Figure 5-5 and Figure 5-6, respectively. In all three wells, chloride concentrations have been consistently below the 250 mg/L water quality criterion and typically less than 10 mg/L. The exceptions (chloride greater than 10 mg/L) shown in Figure 5-5 for monitoring well MW-4 correspond to higher sulfate concentrations measured at the same location in 2006, 2011, and 2016–2017. There is also an apparent correlation with corresponding TDS results (Figure 5-7) and, particularly in 2017, increases in groundwater elevations in monitoring well MW-4 and background well MW-2B (Figure 5-8 and Figure 5-9). In 2025, chloride concentrations in monitoring wells MW-4 and MW-10 (0.60 and 0.98 mg/L, respectively) were lower than the corresponding background (MW-2B) result of 1.5 mg/L (Table 5-3).

As observed for chloride, sulfate concentrations in monitoring well MW-4 have been highly variable. However, all results have been at or below the 250 mg/L criterion, except for the May 2017 result of 260 mg/L (Figure 5-6) (Kreie 2018). Sulfate concentrations in monitoring well MW-10 and background well MW-2B have been less variable, with historical averages of 30 mg/L and 3.3 mg/L, respectively (excluding the low outliers reported in 2022). In 2025, sulfate concentrations in all three wells were consistent with results reported in the last 2 years. As shown in Table 5-3, all results are well below the 250 mg/L criterion.

Although TDS is not considered an indicator parameter, this analyte is routinely monitored in accordance with the LTSP (DOE 2001; Table 5-3). As shown in Figure 5-7, TDS concentrations in monitoring wells MW-4 and MW-10 have consistently exceeded concentrations measured in background well MW-2B. Consistent with observations for chloride and sulfate, TDS concentrations in monitoring well MW-4 have been highly variable, ranging from 280 to 990 mg/L and averaging 519 mg/L.

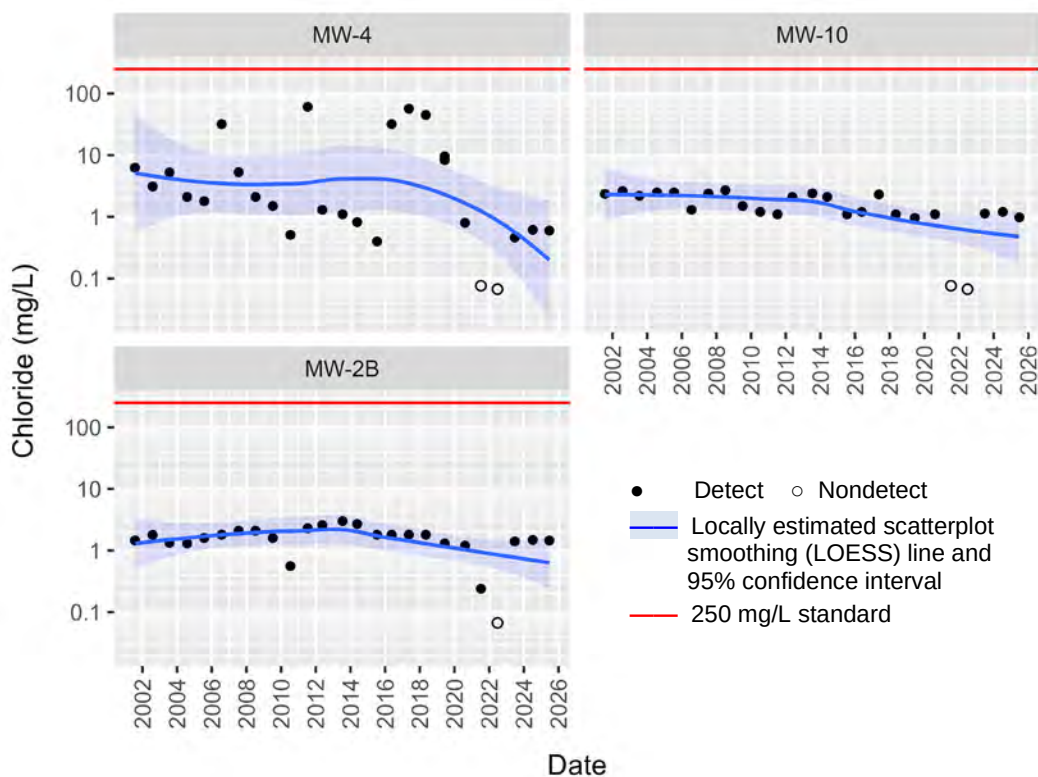


Figure 5-5. Chloride Concentrations in Monitoring Wells at the Sherwood, Washington, Disposal Site

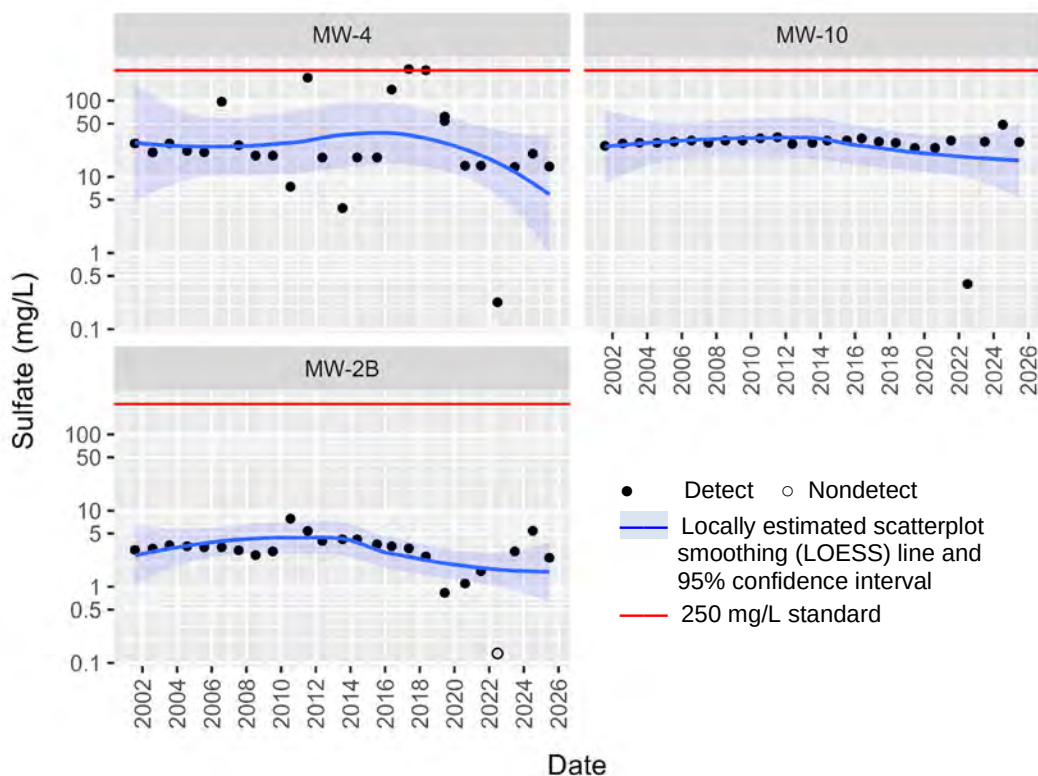


Figure 5-6. Sulfate Concentrations in Monitoring Wells at the Sherwood, Washington, Disposal Site

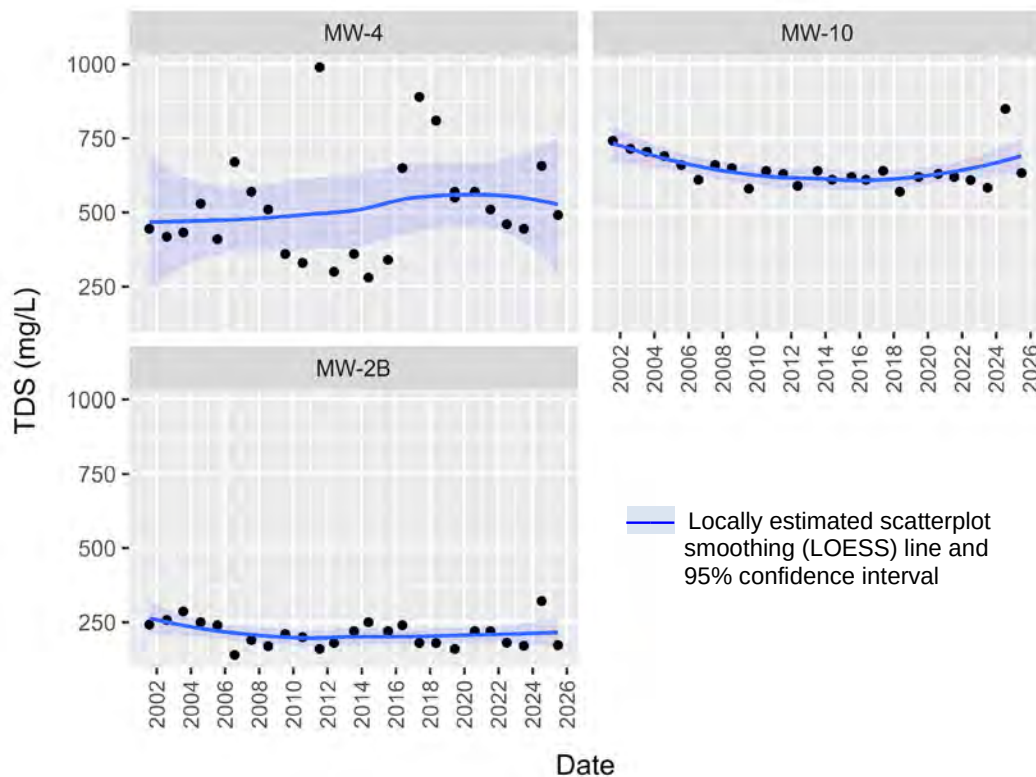


Figure 5-7. TDS Concentrations in Monitoring Wells at the Sherwood, Washington, Disposal Site

Regarding the observed fluctuations in indicator parameter concentrations in monitoring well MW-4, an early technical evaluation report prepared by the Washington State Department of Health attributed the variable water quality in this well to seasonal variation in annual infiltration (rainfall) and static water levels (WDOH 2000).

Groundwater elevations recorded at each of the monitoring wells are shown in Figure 5-8 (common y-axis) and Figure 5-9 (unique scaling). Groundwater occurs in two hydrostratigraphic units: (1) the alluvium that lies on top of the bedrock surface and (2) the conductive bedrock, including weathered bedrock in the upper portion and unweathered or competent bedrock below. Monitoring wells MW-10 and MW-4 are completed in the alluvium, while background well MW-2B is screened across the alluvium, weathered bedrock, and competent bedrock.

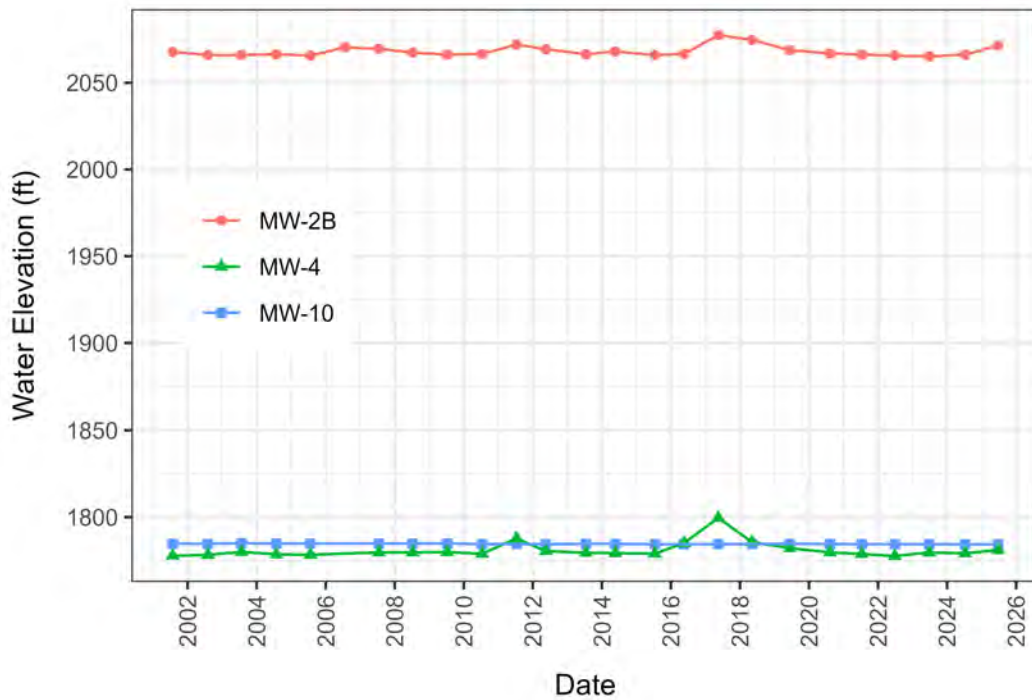


Figure 5-8. Groundwater Elevations in Monitoring Wells at the Sherwood, Washington, Disposal Site

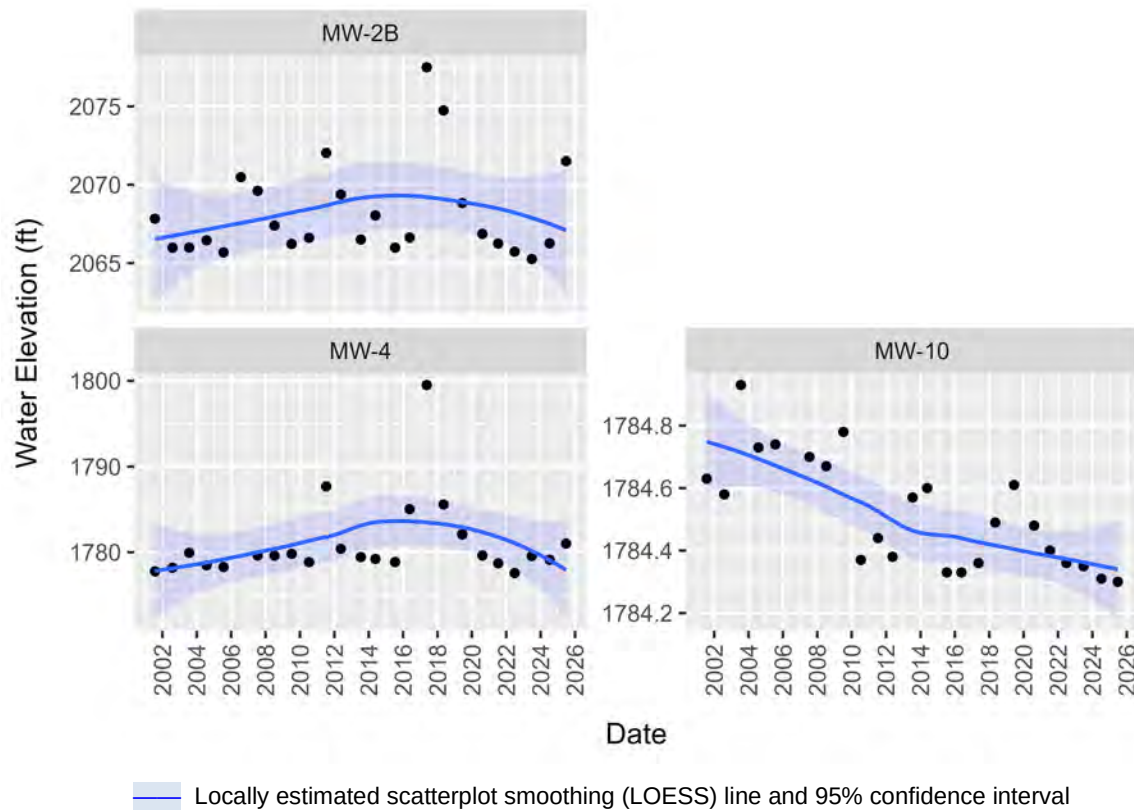


Figure 5-9. Groundwater Elevations in Monitoring Wells MW-4, MW-10, and MW-2B: Unique Scales, Sherwood, Washington, Disposal Site

5.7.2 Vegetation Monitoring

The LTSP (DOE 2001) requires annual visual inspections of the disposal cell vegetated cover to ensure that it satisfies erosional stability criteria and stabilizes. Vegetation on the disposal cell cover includes trees (primarily ponderosa pine), shrubs, and a mixture of native and introduced grasses and forbs. No areas of concern, such as patterns of dead vegetation or erosional features, were identified during the 2025 annual inspection.

LM has released various biological control insects in the past to help control noxious weeds and periodically treats weed infestations with herbicide. No biological controls or herbicide applications were warranted in 2025.

5.8 References



Note

Site-related documents are available on the LM public webpages at <https://lmpublicsearch.lm.doe.gov/SitePages>.

10 CFR 40.28. U.S. Nuclear Regulatory Commission, “General License for Custody and Long-Term Care of Uranium or Thorium Byproduct Materials Disposal Sites,” *Code of Federal Regulations*.

40 CFR 192. U.S. Environmental Protection Agency, “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings,” *Code of Federal Regulations*.

DOE (U.S. Department of Energy), 2001. *Long-Term Surveillance Plan for the DOE Sherwood Project (UMTRCA Title II) Reclamation Cell, Wellpinit, Washington*, S00204, Grand Junction Office, Grand Junction, Colorado, February.

DOE (U.S. Department of Energy), 2018a. *Follow-Up Inspection and Evaluation, Sherwood, Washington, Disposal Site*, LMS/SHE/S15417, Office of Legacy Management, March.

DOE (U.S. Department of Energy), 2018b. *Settlement Survey and Analysis, Sherwood, Washington, Disposal Site*, LMS/SHE/S19518, Office of Legacy Management, June.

DOE (U.S. Department of Energy), 2023. *Settlement Analysis of Ponding Area on Sherwood, Washington, Disposal Cell*, LMS/SHE/45587, Office of Legacy Management, September.

Kreie, K., 2018. K. Kreie, site manager, Office of Legacy Management, U.S. Department of Energy, letter (about Groundwater Monitoring Results at the Sherwood, Washington, Disposal Site Indicates Elevated Sulfate Concentration in Point of Compliance Well) to deputy director, U.S. Nuclear Regulatory Commission, November 5.

WDOH (Washington State Department of Health), 2000. *Sherwood Uranium Mill Project, Technical Evaluation Report, Monitoring and Stabilization Plan Supplement*, February.

5.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	67	Missing Perimeter Sign P6
PL-2	45	Site Marker
PL-3	67	Bent Boundary Monument BM-3A
PL-4	22	Piezometer P1
PL-5	0	Riprap-Armored Swale
PL-6	225	Gully near Perimeter Sign P1
PL-7	202	Gully near Perimeter Sign P2
PL-8	112	Containment Dam Face
PL-9	22	Large Sand Deposit at Base of Containment Dam Face
PL-10	337	Small Sand Deposits on Dam Face
PL-11	292	Riprap-Armored Diversion Channel

Note:

— = Photograph taken vertically from above.



PL-1. Missing Perimeter Sign P6



PL-2. Site Marker



PL-3. Bent Boundary Monument BM-3A



PL-4. Piezometer P1



PL-5. Riprap-Armored Swale



PL-6. Gully near Perimeter Sign P1



PL-7. Gully near Perimeter Sign P2



PL-8. Containment Dam Face



PL-9. Large Sand Deposit at Base of Containment Dam Face



PL-10. Small Sand Deposits on Dam Face



PL- 11. Riprap-Armored Diversion Channel

Attachment 5-1

Dam Inspection Checklist

Dam Inspection Checklist

Sherwood, Washington, UMTRCA Title II Disposal Site

Date of Inspection: June 26, 2025

Inspector: Zoe Aldous

Organization: RSI EnTech, LLC

Piezometer water levels measured during groundwater monitoring event:

(All depths in feet; TOC = top of casing)

Piezometer P-1 fluid level (TOC to top of fluid): Dry Fluid amount: Dry
Total depth: 22.5

Piezometer P-2 fluid level (TOC to top of fluid): 61.35 Fluid amount: 1.72
Total depth: 63.07

Piezometer P-3 fluid level (TOC to top of fluid): Dry Fluid amount: Dry
Total depth: 67.62

Piezometer P-4 fluid level (TOC to top of fluid): 21.95 Fluid amount: 0.75
Total depth: 22.7

Was evidence of significant seepage observed on the dam face?

No

Was evidence of significant slumping observed on the dam?

No

Was evidence of significant erosion observed on the dam?

No

Was vegetative growth that could compromise dam stability observed?

No

Was any condition that presents an imminent hazard to human health and safety or to the environment observed?

No

Emergency Notification Contacts:

DOE Site Manager: Hallie Katz (970) 248-6201

NRC Operations Center: (301) 951-0550

Spokane Tribal Police/Sheriff: (509) 258-4400

State Department of Ecology—Dam Safety Office: (360) 407-6625

Following completion of the inspection, this Dam Inspection Checklist is to be sent to: Gustavo Ordonez at gord461@ecy.wa.gov and James DeMay at jade461@ecy.wa.gov of the Washington Department of Ecology, Dam Safety Office

ZOE ALDOUS

Inspector Signature: (Affiliate)

Digitally signed by ZOE
ALDOUS (Affiliate)
Date: 2025.10.22 12:07:02
-06'00'

Date: _____

6.0 Shirley Basin South, Wyoming, Disposal Site

6.1 Compliance Summary

The Shirley Basin South, Wyoming, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title II Disposal Site was inspected on August 7, 2025. No significant changes were observed on the disposal cell or in associated drainage features. Inspectors identified routine maintenance needs but found no cause for a follow-up inspection.

Groundwater is monitored annually in accordance with the site-specific U.S. Department of Energy (DOE) Office of Legacy Management (LM) Long-Term Surveillance Plan (DOE 2004) (LTSP). The most recent sampling event occurred in late May 2025. Alternate concentration limits (ACLs) continue to be exceeded in point of compliance (POC) well 5-SC for selenium and in POC well 5-DC for selenium and radium-228 (^{228}Ra). Groundwater protection standards for sulfate and total dissolved solids (TDS) also continue to be exceeded in three wells (5SC, 54SC, and 5DC) near the disposal cell, but no exceedances were measured in livestock well K.G.S. #3 or in any of the wells near the site boundary. No risks to human health and the environment were identified.

6.2 Compliance Requirements

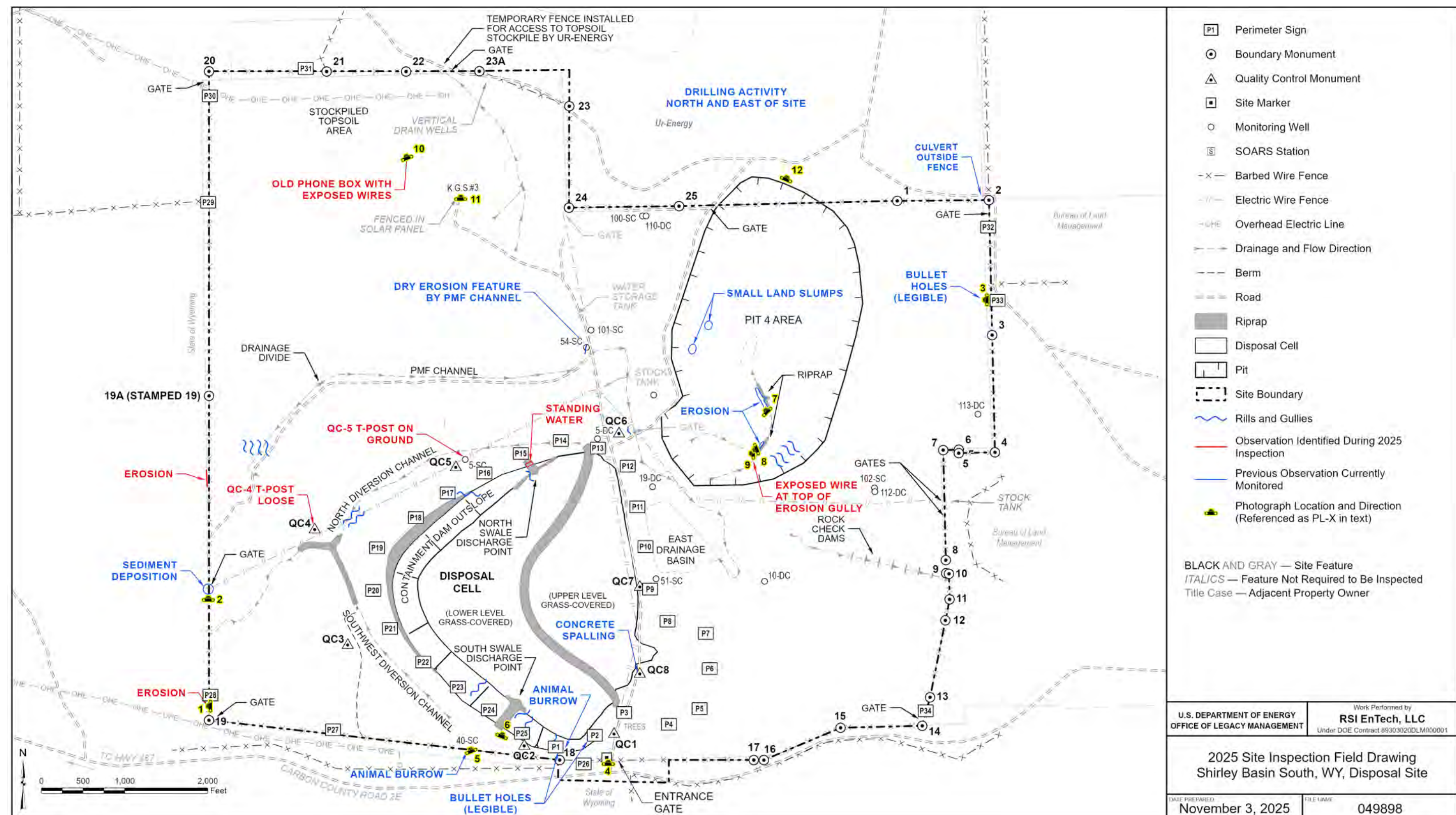
Requirements for the long-term surveillance and maintenance of the site are specified in the site-specific LTSP (DOE 2004) in accordance with procedures established to comply with the requirements of the U.S. Nuclear Regulatory Commission (NRC) general license at Title 10 *Code of Federal Regulations* Section 40.28 (10 CFR 40.28). Table 6-1 lists these requirements.

Table 6-1. License Requirements for the Shirley Basin South, Wyoming, Disposal Site

Requirement	LTSP	This Report	10 CFR 40.28
Annual Inspection and Report	Sections 3.3 and 3.4	Section 6.4	(b)(3)
Follow-Up Inspections	Section 3.5	Section 6.5	(b)(4)
Routine Maintenance and Emergency Measures	Section 3.6	Section 6.6	(b)(5)
Environmental Monitoring	Section 3.7	Section 6.7	(b)(3)

6.3 Institutional Controls

The 1527-acre site, identified by the property boundary shown in Figure 6-1, is owned by the United States and was accepted under the NRC general license in 2005. The LTSP disposal site description section states that the U.S. government owns 1512 acres (also known as Parcel 1), whereas Appendix A of the LTSP includes the deed that conveyed 1527 acres of Petrotonics Company (Petrotonics) land (Parcel 1 and Parcel 2). DOE is the licensee and, in accordance with the requirements for UMTRCA Title II sites, LM is responsible for the custody and long-term care of the site. Institutional controls (ICs) at the site include federal ownership of the property, administrative controls, and the following physical ICs that are inspected annually: disposal cell, entrance gate and sign, perimeter fence and signs, site marker, boundary monuments, and monitoring wellhead protectors.



Abbreviations: PMF = probable maximum flood, SOARS = System Operation and Analysis at Remote Sites

Figure 6-1. 2025 Annual Inspection Drawing for the Shirley Basin South, Wyoming, Disposal Site

6.4 Inspection Results

The site, approximately 60 miles south of Casper, Wyoming, was inspected by A. Soares and T. Santonastaso of the Legacy Management Support contractor. N. Olin, P. Schwarz, and C. Long (LM) also attended the inspection. The purposes of the inspection were to confirm the integrity of visible features at the site, identify changes in conditions that might affect conformance with the LTSP, and evaluate whether maintenance or follow-up inspection and monitoring are needed.

6.4.1 Site Surveillance Features

Figure 6-1 shows the locations of site features, including site surveillance features and inspection areas, in black and gray font. Site features that are present but not required to be inspected are shown in italic font. Observations from previous inspections that are currently monitored are shown in blue, and new observations identified during the 2025 annual inspection are shown in red. Inspection results and recommended maintenance activities associated with site surveillance features are described in the following subsections. Photographs to support specific observations are noted in the text and in Figure 6-1 by photograph location (PL) numbers. The photographs and photograph log are presented in Section 6.9.

6.4.1.1 Site Access and Entrance Gate

Access to the site is immediately off Carbon County Road 2E. The entrance gate is a barbed-wire gate in the perimeter fence. The gate, along the southern portion of the perimeter fence, was secured by a locked chain. In 2007, LM granted a grazing license to a local rancher that allows grazing of livestock in exchange for maintenance. Multiple perimeter gates utilized by the grazing licensee along the boundary were locked with a combination lock placed there by the grazing licensee. The combination to the locks has been acquired. No maintenance needs were identified.

6.4.1.2 Perimeter Fence and Signs

A four-strand barbed-wire fence encloses the site. Sections along the north site boundary are secured with a temporary wire fence. Ur-Energy Inc. (Ur-Energy), the adjacent landowner, may use these sections to reach a topsoil stockpile area on the site.

In previous years, an animal burrow was present under the fence near boundary monument BM-18, but it was not observed in 2025. The fence line will continue to be monitored for biointrusion.

Two gullies have formed perpendicularly beneath the boundary fence by the southwestern corner (PL-1). The grazing licensee has modified and repaired the fence in these sections to deter cattle from going under the fence. All fence posts appeared stable during the time of the inspection and will continue to be monitored. No maintenance needs were identified.

An arroyo formed beneath the fence on the southern portion of the west boundary in 2023. The arroyo formed in line with the fence, damaging several sections. Sediment from the erosional event was deposited below the slope break (PL-2). The damaged fence was removed, and the

perimeter fence was realigned approximately 30 feet (ft) east and away from the arroyo in October 2023. A similar arroyo is forming north of the one previously observed and addressed. A significant rain event could cause the sediment to damage the fence similarly to the previous arroyo from 2023. This feature will continue to be monitored. No maintenance needs were identified.

The entrance sign identified as perimeter sign P26 is on the main site access road near the site marker. Nine perimeter signs (warning and no-trespassing signs) are posted along the site perimeter at potential points of access, and another 25 signs are positioned around the disposal cell. Perimeter signs P1, P2, and P33 (PL-3) have bullet holes but remain legible. No maintenance needs were identified.

6.4.1.3 Site Marker

The site has one granite site marker (PL-4) near the entrance gate. No maintenance needs were identified.

6.4.1.4 Boundary Monuments

There are 27 boundary monuments delineating the site property boundary. All boundary monuments were inspected. No maintenance needs were identified.

6.4.1.5 Aerial Survey Quality Control Monuments

In July 2019, eight permanent aerial survey quality control monuments were installed at the site for an aerial survey of the disposal cell. The quality control monument locations are shown in Figure 6-1. Concrete is spalling around quality control monument QC-8, but it is still functioning as intended. T-posts identifying the locations of quality control monuments QC-4 and QC-5 have become dislodged and are either loose or lying on the ground. The T-posts require stabilization or replacement. No other maintenance needs were identified.

6.4.1.6 Monitoring Wells

The site groundwater monitoring network consisted of eight monitoring wells when the site was transferred to LM. Six additional wells (100-SC, 101-SC, and 102-SC in the Upper Sand Aquifer and 110-DC, 112-DC, and 113-DC in the Main Sand Aquifer) were installed in 2008 to provide a better understanding of the characteristics and behavior of the affected aquifers at the site. The groundwater monitoring network now consists of 14 monitoring wells. The wellhead protectors were undamaged and locked. Monitoring well 40-SC has two animal burrows (PL-5) under the concrete slab but remains stable. No maintenance needs were identified.

6.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection. The inspection areas are (1) the cover of the disposal cell, (2) the containment dam and diversion channels, and (3) the site perimeter and balance of the site. Inspectors examined specific site surveillance features within

each area and looked for evidence of erosion, settling, slumping, or other modifying processes that might affect conformance with LTSP requirements.

6.4.2.1 Cover of the Disposal Cell

The disposal cell, completed in 2000, occupies 142 acres. It has a soil cover and was revegetated primarily with rangeland and native grasses. The vegetation on the disposal cell and throughout the site is managed through the grazing license. The disposal cell surface is constructed at two elevations (the upper, eastern surface and the lower, western surface) that are separated by a riprap-armored slope. There were no signs of erosion, settlement, or other modifying processes on the disposal cell cover or side slopes that might affect the integrity of the disposal cell.

Erosion trails caused by cattle on the north and south ends of the eastern riprap-armored slope were repaired in July 2025. The trails were backfilled with road base gravel and seeded using an approved site compatible seed mix. Grazing of the paddock containing the disposal cell was paused in 2022 to consider options for addressing the erosion. The grazing agreement was amended in August 2024 and grazing has resumed on the disposal cell with the stipulation that the licensee protect and mitigate traffic on and around engineered structures of the disposal cell.

Gradual vegetation encroachment has been observed in the riprap on the slope that separates the two elevations and on the lower riprap slope. The establishment of perennial vegetation enhances slope stability. Riparian vegetation has established at the toe of the slopes in areas that accumulate snowmelt runoff and summer precipitation.

The upper surface is contoured to drain into a basin east of the disposal cell and west over the riprap-protected slope to the lower surface. The lower surface is contoured to drain to a riprap-armored north swale discharge point and south swale discharge point. The riprap dissipation basins at the discharge points usually hold runoff water in spring and early summer. The south swale discharge point was dry during the inspection. The north swale discharge point held standing water during the inspection. Vegetation has established in both the north swale and south swale discharge points. Cattle have worn a path along the bottom of the south swale discharge point (PL-6); the functionality and stability of the engineered structure are not compromised by the erosion but will continue to be monitored. No maintenance needs were identified.

6.4.2.2 Containment Dam and Diversion Channels

The tailings pile was reclaimed in place and contained behind a horseshoe-shaped earthen containment dam. The containment dam is predominantly grass covered, but the steeper portion (5:1 slope) of the dam outslope is protected by riprap. There were no signs of erosion, settlement, or other modifying processes that might affect the integrity of the dam. Encroaching vegetation on riprap surfaces enhances the stability of the slope.

The surface water diversion system consists of a combination of diversion channels, drainage basins, and contoured surfaces. Two primary diversion channels, the north and southwest diversion channels, keep runoff away from the disposal cell. Rock armor was placed on the steeper slopes and flow concentration points where design flow velocities could erode surfaces and impact the disposal cell. A probable maximum flood (PMF) channel was constructed

north of the disposal cell along the side of the reclaimed mine overburden soil pile. Part of the PMF channel drains to the west and discharges to a small, closed basin, which was dry. The portion of the PMF channel that flows eastward and discharges into the east drainage basin captures stormwater from a larger drainage area. These drainage basins are large enough to accommodate PMF water volumes.

Discharge plumbing from the water storage tank has caused minor erosion near monitoring well 54-SC and the PMF channel. This discharge is not impacting site features currently, but headcutting erosion could occur toward the well and well pad, causing the well pad to become destabilized. Inspectors will continue to monitor this area. No maintenance needs were identified.

6.4.2.3 Site Perimeter and Balance of Site

A major site feature is the reclaimed Pit 4 area in the northeast portion of the site. Reclamation activities included rounding the side slopes, partially backfilling the pit to an elevation above the projected surface of the uppermost aquifer, revegetating the surfaces, and protecting against potential erosion areas with riprap. Vegetation is well established, and a potential wetland area has formed at the bottom of the pit but was dry during the inspection. Some minor slumps and displacement features are present on the west and southeast side slopes of the pit, but they do not represent a significant slope stability concern. Riprap-armored drainage channels within the pit, first reported to have eroded in 2016, have continued to erode (PL-7 and PL-8). Repair of the riprap armor is not necessary because continued erosion in that portion of the pit is not expected to impact the disposal cell.

Further erosion to the northern riprap-armored drainage channel in Pit 4 uncovered a portion of exposed insulated wire (PL-9). Similar wires were found protruding from a newly discovered abandoned telephone box by the northern site boundary (PL-10). Further investigation will be done to determine if these discoveries pose a hazard and if they require removal or mitigation.

The site is surrounded by public land administered by the U.S. Bureau of Land Management and the State of Wyoming, as well as private land. Land on three sides is used primarily for livestock grazing. Ur-Energy is the property owner north of the site and can access and use stockpiled topsoil on the site. This access is in accordance with an agreement originally established between Petrotoomics, the former site licensee, and Pathfinder Mines Corporation (Pathfinder), which was acquired by Ur-Energy. LM is the successor to Petrotoomics. The Wyoming Department of Environmental Quality (WDEQ) extended Pathfinder's mine area permit to include the soil stockpile area. In accordance with the permit, Ur-Energy will be required to reclaim the disturbed area, including replacing fences, when it has finished removing topsoil from the stockpile. No stockpiled topsoil has been removed.

Vertical drain wells (VD-2 and VD-3), which were installed by the former licensee before site transition, were discovered during the 2024 inspection. The drain wells are plugged and capped and do not pose any concerns.

Monitoring well K.G.S. #3 is completed in a deep formation (Lower Sand Aquifer). The grazing license allows the rancher to pump water from well K.G.S. #3 (PL-11) to water livestock and to operate solar-powered electric fences to manage livestock rotation.

The area 0.25 mile beyond the site boundary was visually observed for erosion, changes in land use, or other phenomena that might affect the long-term integrity of the site. Land use changes since the 2024 inspection include increased drilling activity and construction of a building north of the site on Ur-Energy property (PL-12). Road improvements and culvert installation associated with ongoing land use changes were previously identified in 2024 near the northeast corner of the site. No other changes were identified.

6.5 Follow-Up Inspections

LM will conduct follow-up inspections if (1) a condition is identified during the annual inspection or other site visit that requires a return to the site to evaluate the condition or (2) LM is notified by a citizen or outside agency that conditions at the site are substantially changed. No need for a follow-up inspection was identified.

6.6 Routine Maintenance and Emergency Measures

In accordance with the LTSP (DOE 2004), routine site maintenance will be performed by LM as needed. Minor fence and T-post repairs will be conducted as needed, and cattle trail erosion will be protected by the rancher. No other maintenance needs were identified.

Emergency measures are corrective actions LM will take in response to unusual damage or disruption that threatens or compromises site health and safety, security, integrity, or compliance with 40 CFR 192. No emergency measures were identified.

6.7 Environmental Monitoring

In accordance with the LTSP (DOE 2004), annual groundwater monitoring is required at the site to verify that ACLs are not exceeded at POC wells and to verify continued compliance with applicable groundwater protection standards. The monitoring network described in the LTSP consists of seven wells in the uppermost (Upper Sand and Main Sand) aquifers in the Wind River Formation. A third aquifer, the Lower Sand Aquifer, is separated by approximately 50 ft of claystone, siltstone, and bedded sandstone from the overlying Main Sand unit (DOE 2011b). LM monitors one well (K.G.S. #3) in this unit. In consultation with NRC, LM installed six additional downgradient monitoring wells in fall 2008 to provide a better understanding of the groundwater chemistry and flow direction in the Upper Sand and Main Sand Aquifers.

The current monitoring network is described in Table 6-2 and shown in Figure 6-2. Although no monitoring wells are designated as points of exposure, groundwater chemistry in wells 100-SC, 102-SC, 110-DC, and 113-DC is considered representative of water quality for groundwater flowing offsite in the Upper Sand and Main Sand Aquifers.

Table 6-2. Groundwater Monitoring Network at the Shirley Basin South, Wyoming, Disposal Site

Monitoring Well ^a	Network Application
5-SC	POC well; Upper Sand Aquifer
40-SC	Upgradient well; Upper Sand Aquifer
51-SC	POC well; Upper Sand Aquifer
54-SC ^b	Downgradient well; Upper Sand Aquifer
100-SC*	Downgradient well; Upper Sand Aquifer
101-SC*	Downgradient well; Upper Sand Aquifer
102-SC*	Downgradient well; Upper Sand Aquifer
5-DC	POC well; Main Sand Aquifer
10-DC	Downgradient well; Main Sand Aquifer
19-DC	POC well; Main Sand Aquifer
110-DC*	Downgradient well; Main Sand Aquifer
112-DC*	Downgradient well; Main Sand Aquifer
113-DC*	Downgradient well; Main Sand Aquifer
K.G.S. #3	Lower Sand Aquifer

Notes:

^a Wells followed by an asterisk denote wells installed by LM in 2008 (corresponding rows are shaded).

^b According to the well construction log, monitoring well 54-SC is screened across the Upper Sand and Main Sand Aquifers. In 2010, DOE submitted a request to decommission the well, stating that it represented a conduit for potential contamination migration between the Upper Sand and Main Sand Aquifers. DOE withdrew this request in 2011 based on a determination that, although it is difficult to discern the exact unit the screen is located within, groundwater elevations and updated hydrogeological evaluations indicated that well 54-SC is most likely screened in the Upper Sand Aquifer (Surovchak 2011).

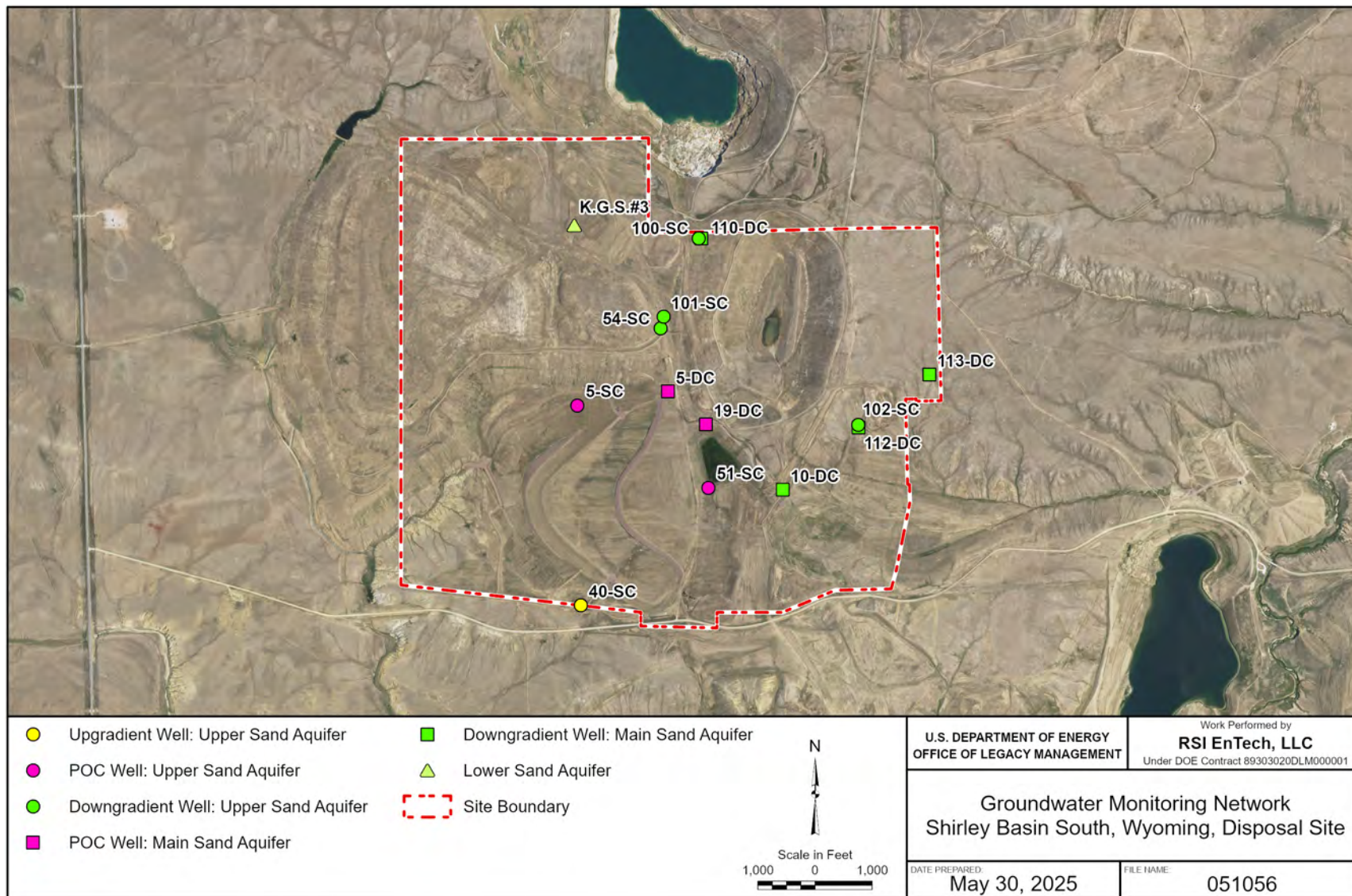


Figure 6-2. Groundwater Monitoring Network at Shirley Basin South, Wyoming, Disposal Site

Water level, pH, and specific conductance are measured at the time of sampling, and samples are analyzed for cadmium, chloride, chromium, lead, nickel, nitrate (+ nitrite as nitrogen [N]), radium-226 (^{226}Ra), ^{228}Ra , selenium, sulfate, thorium-230 (^{230}Th), TDS, and uranium. Analytical results are compared to the ACLs and Wyoming Class III groundwater protection standards listed in Table 6-3. Water level elevations are measured at the monitoring wells to evaluate flow direction as the Upper Sand and Main Sand Aquifers recover from mining and reclamation activities.

*Table 6-3. ACLs and Groundwater Protection Standards
for the Shirley Basin South, Wyoming, Disposal Site*

Analyte	ACL	Groundwater Protection Standard ^a
Cadmium	0.079 mg/L	0.05 mg/L
Chloride	NA	2000 mg/L
Chromium	1.83 mg/L	0.05 mg/L
Lead	0.05 mg/L	0.1 mg/L
Nickel	6.15 mg/L	NA
Nitrate (+ Nitrite as N)	NA	100 mg/L
^{226}Ra	91.3 pCi/L	5 pCi/L (combined total ^{226}Ra and ^{228}Ra)
^{228}Ra	25.7 pCi/L	
Selenium	0.12 mg/L	0.05 mg/L
Sulfate	NA	3000 mg/L
^{230}Th	2409 pCi/L	NA
TDS	NA	5000 mg/L
Uranium	9.2 mg/L	NA

Note:

^a This column shows the current Wyoming Class III groundwater protection standard values for livestock use, which apply to groundwater flowing offsite and well K.G.S. #3 (*Wyoming Administrative Rules* Section 020.0011.8.06292018 [WAR 020.0011.8.06292018]).

Abbreviations:

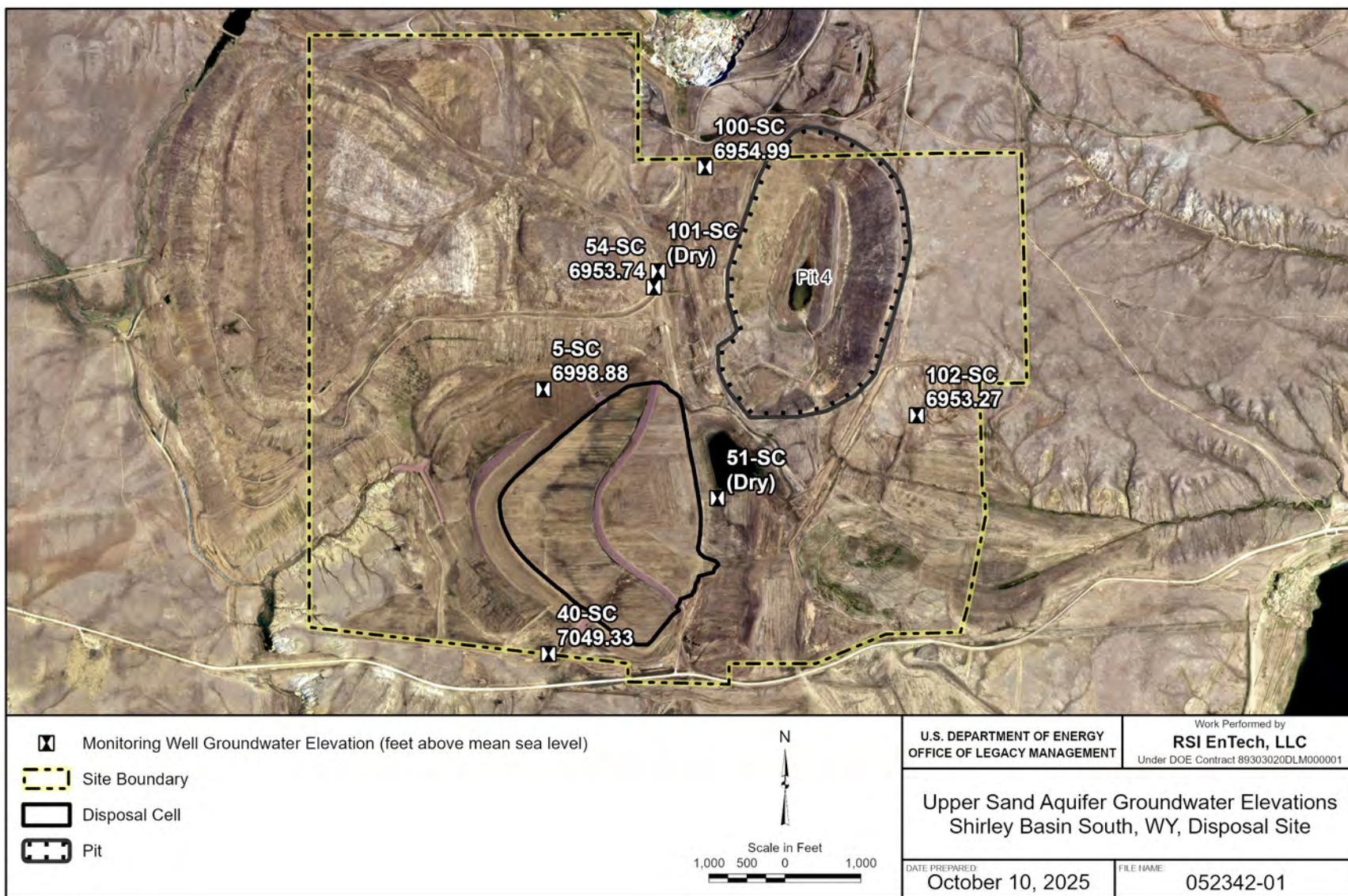
mg/L = milligrams per liter

NA = not applicable

pCi/L = picocuries per liter

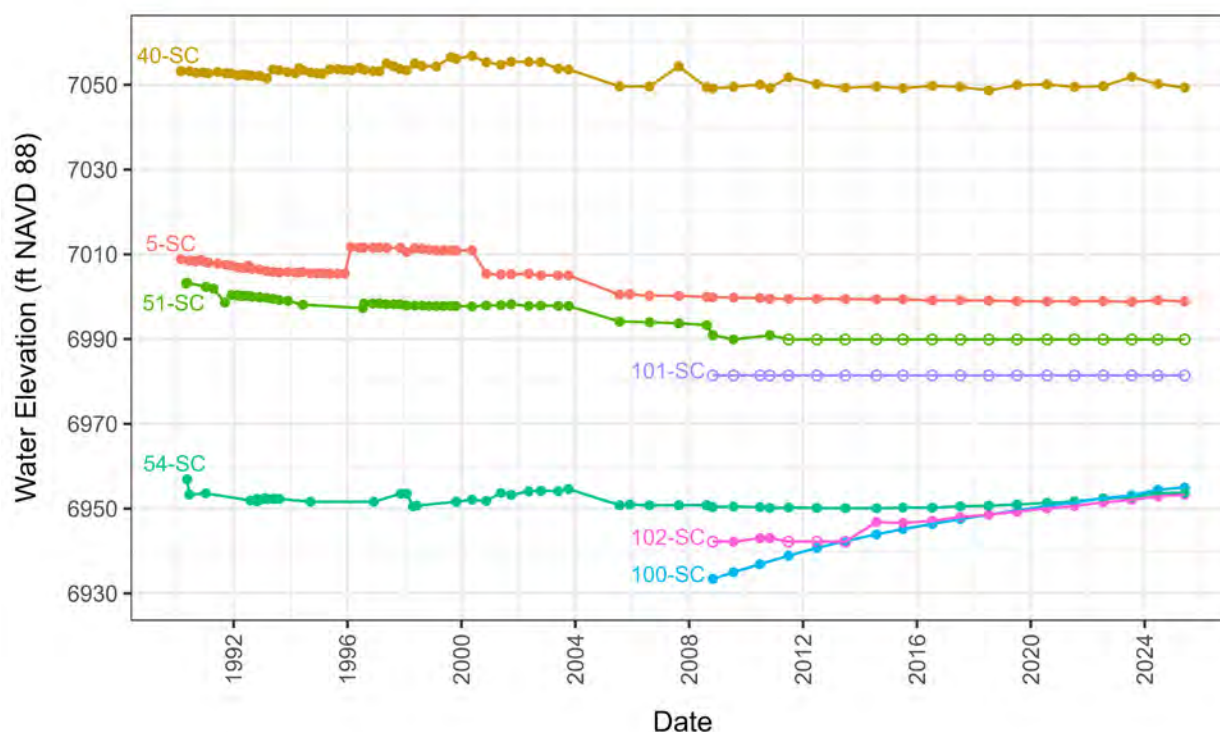
Groundwater flow directions in the Upper Sand and Main Sand Aquifers at the site have been influenced primarily by dewatering and recovery at Ur-Energy Pit Lake north of the site boundary and at Pit 4. The Upper Sand unit and Main Sand unit coalesced and formed the main ore body at Pit 4, which was partially backfilled with overburden materials during reclamation, raising the bottom of the pit to an elevation above the projected recovered phreatic surface of the Upper Sand aquifer. The backfill operation did not recreate the hydrogeologic characteristics of the original formation, and the aquifers are no longer confined at Pit 4.

The site map showing 2025 groundwater level elevations for the Upper Sand Aquifer wells is provided in Figure 6-3. Corresponding water elevations over time are plotted in Figure 6-4. The vertical datum used in these and subsequent water elevation plots is North American Vertical Datum of 1988 (NAVD 88).



A-L 052342-01

Figure 6-3. May 2025 Groundwater Elevations in the Upper Sand Aquifer at the Shirley Basin South, Wyoming, Disposal Site



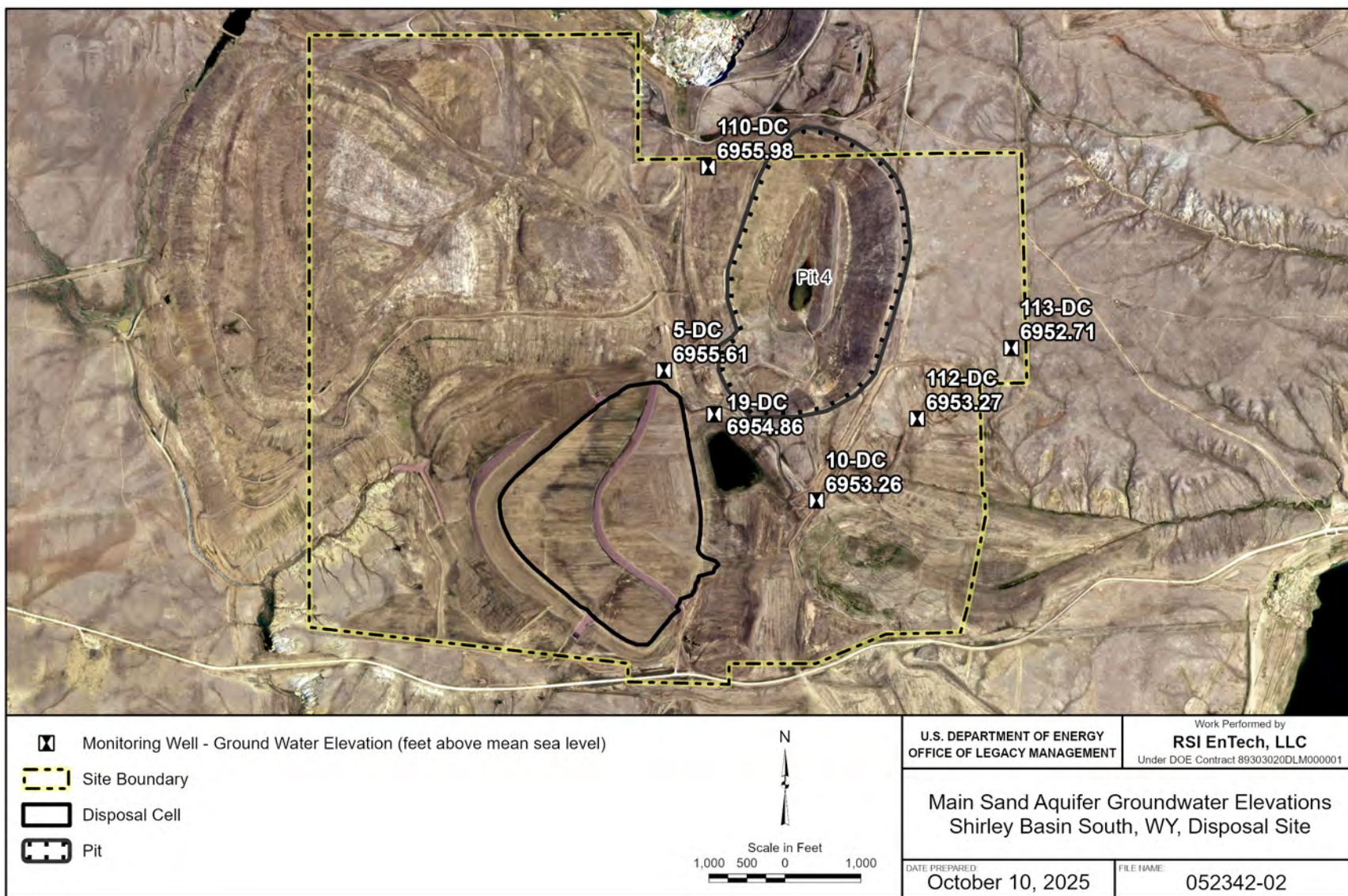
Note: Open symbols indicate that the well was dry or that the water level was below the pump (plotted values are corresponding minimum recorded elevation).

Figure 6-4. Hydrographs for Upper Sand Aquifer Wells at the Shirley Basin South, Wyoming, Disposal Site, 1990–2025

The LTSP (DOE 2004) specifies the inclusion of groundwater contour maps with the annual inspection report. However, as concluded in annual reports since 2005, the well network does not provide a spatial distribution of data points necessary to generate contours without significant uncertainty. Because of these data gaps, all references to flow directions discussed in this report are generalized.

The apparent groundwater flow direction within the Upper Sand Aquifer at the site is in the direction of structural dip and toward the eastern site boundary. Water levels are increasing in wells 100-SC and 102-SC but have been relatively constant in the remaining Upper Sand Aquifer wells (Figure 6-4). Well 51-SC was again dry in 2025 and has not had a recorded water level since November 2010. Well 101-SC has been dry since its installation in 2008.

The map in Figure 6-5 shows the groundwater elevations measured in wells screened in the Main Sand Aquifer in 2025; Figure 6-6 plots corresponding groundwater elevations over time. Piezometric heads have been gradually rising at all wells since 2000, with an average rate of increase of approximately 0.8 foot per year since LM began monitoring (posttransfer) water levels in 2005 (Figure 6-6). The rising levels indicate a gradual recovery of the aquifer. The elapsed time for groundwater levels to reach quasi-steady is estimated to be approximately 50 years, corresponding to year 2075. However, the altered conditions at Pit 4 might prevent a return to premining elevations of the water table because the Upper Sand and Main Sand units now coalesce at this location. As such, the estimated 50-year time frame is uncertain.



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Figure 6-5. May 2025 Groundwater Elevations in the Main Sand Aquifer Wells at the Shirley Basin South, Wyoming, Disposal Site

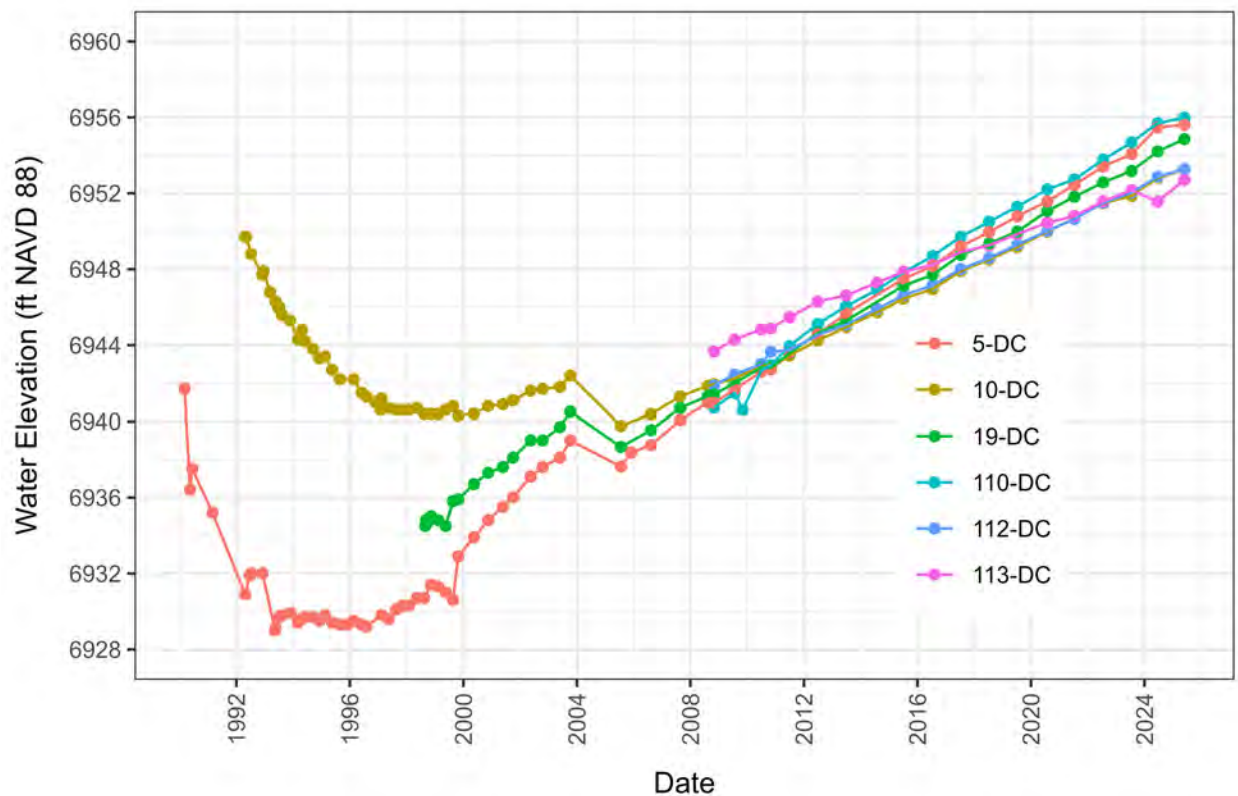


Figure 6-6. Hydrographs for Main Sand Aquifer Wells at the Shirley Basin South, Wyoming, Disposal Site, 1990–2025

To better understand the increasing water level trends in several of the onsite wells, LM will utilize water level data collected by Ur-Energy as part of an in situ recovery mine north of the site boundary when available. Historical static water level and water quality data addressed in this section are available at <https://gems.lm.doe.gov> through the Geospatial Environmental Mapping System (GEMS).

Analytical results from the May 2025 groundwater monitoring event are provided in Table 6-4 for the Upper Sand Aquifer, Table 6-5 for the Main Sand Aquifer, and Table 6-6 for well K.G.S. #3, which is screened in the Lower Sand Aquifer. Samples could not be collected from Upper Sand Aquifer wells 51-SC and 101-SC because they continue to be dry.

Figure 6-7 and Figure 6-8 provide matrices of time-concentration plots for each Shirley Basin South site monitoring well and analyte combination. Figure 6-7 shows time-concentration plots for all analytes with ACLs as listed in Table 6-3. Figure 6-8 shows time-concentration plots of the indicator parameters: chloride, nitrate, pH, sulfate, and TDS. In both figures, all data since 2000 are plotted, including data from Petrotomics for the period 2000–2004.

*Table 6-4. 2025 Groundwater Monitoring Results in the Upper Sand Aquifer Wells
at the Shirley Basin South, Wyoming, Disposal Site*

Analyte	Limit or Standard	Well ^a				
		5-SC (POC)	40-SC	54-SC	100-SC	102-SC
Cadmium	0.079 mg/L 0.05 mg/L ^b	0.033	ND	ND	ND	ND
Chloride	2000 mg/L ^b	295	6.76	367	140	32.2
Chromium	1.83 mg/L 0.05 mg/L ^b	0.31^c	0.0030	0.30^c	0.0036	0.0015
Lead	0.05 mg/L 0.1 mg/L ^b	ND	ND	ND	ND	ND
Nickel	6.15 mg/L	3.2	0.014	0.61	0.0037	ND
Nitrate	100 mg/L ^b	ND	0.95	ND	ND	ND
²²⁶ Ra	91.3 pCi/L	ND	ND	8.31	4.42	2.36
²²⁸ Ra	25.7 pCi/L	5.46	1.46	95.1^d	4.81	2.26
Selenium	0.12 mg/L 0.05 mg/L ^b	0.16^{c,d}	0.00789	0.13^{c,d}	ND	ND
Sulfate	3000 mg/L ^b	13,800^c	1160	11,900^c	1080	564
TDS	5000 mg/L ^b	17,000^c	1890	16,000^c	2100	1060
²³⁰ Th	2409 pCi/L	534	ND	25.3	ND	ND
Uranium	9.2 mg/L	2.2	0.000087	0.047	0.0020	0.00029

Notes:

Results are shown to 2 to 3 significant figures, depending on the magnitude of the result and the number of significant figures in the corresponding limit or standard. Detailed analytical results, including results of (quality assurance) duplicate samples, are available at <https://gems.lm.doe.gov>.

^a **Bold italicized** and shaded results exceed a standard or limit.

^b Wyoming Class III groundwater protection standard (Wyoming Administrative Rules Section 020.0011.8.06292018 [WAR 020.0011.8.06292018]).

^c Result exceeds the corresponding Wyoming Class III groundwater protection standard.

^d Result exceeds an ACL.

Abbreviations:

mg/L = milligrams per liter

ND = not detected (below method detection limit)

pCi/L = picocuries per liter

Table 6-5. 2025 Groundwater Monitoring Results in the Main Sand Aquifer Wells at the Shirley Basin South, Wyoming, Disposal Site

Analyte	Limit or Standard	Well ^a					
		5-DC (POC)	10-DC	19-DC (POC)	110-DC	112-DC	113-DC
Cadmium	0.079 mg/L 0.05 mg/L ^b	ND	ND	ND	ND	ND	ND
Chloride	2000 mg/L ^b	301	64.1	91.2	175	38	6.1
Chromium	1.83 mg/L 0.05 mg/L ^b	0.40^c	0.0017	ND	0.0047	0.0027	0.0017
Lead	0.05 mg/L 0.1 mg/L ^b	ND	0.0008	ND	ND	ND	ND
Nickel	6.15 mg/L	2.93	ND	0.534	0.00545	ND	ND
Nitrate	100 mg/L	1.5	ND	0.093	ND	ND	0.12
²²⁶ Ra	91.3 pCi/L	14.2	24.6	7.7	125^d	9.6	2.7
²²⁸ Ra	25.7 pCi/L	106^d	3.7	6.9	8.2	6.9	2.1
Selenium	0.12 mg/L 0.05 mg/L ^b	0.28^{c,d}	ND	ND	ND	ND	ND
Sulfate	3000 mg/L ^b	18,900^c	1040	2620	1930	1080	585
TDS	5000 mg/L	25,900^c	1830	4250	3470	1920	1100
²³⁰ Th	2409 pCi/L ^b	107	ND	ND	ND	ND	ND
Uranium	9.2 mg/L	0.010	0.013	0.00012	0.015	0.014	0.00095

Notes:

Results are shown to 2 to 3 significant figures, depending on the magnitude of the result and the number of significant figures in the corresponding limit or standard. Detailed analytical results, including results of (quality assurance) duplicate samples, are available at <https://gems.lm.doe.gov>.

^a **Bold italicized** and shaded results exceed a standard or limit.

^b Wyoming Class III groundwater protection standard (Wyoming Administrative Rules Section 020.0011.8.06292018 [WAR 020.0011.8.06292018]).

^c Result exceeds the corresponding Wyoming Class III groundwater protection standard.

^d Result exceeds an ACL.

Abbreviations:

mg/L = milligrams per liter

ND = not detected (below method detection limit)

pCi/L = picocuries per liter

Table 6-6. 2025 Groundwater Monitoring Results for Well K.G.S. #3 in the Lower Sand Aquifer at the Shirley Basin South, Wyoming, Disposal Site

Analyte	Limit or Standard	K.G.S. #3 Result
Cadmium	0.079 mg/L 0.05 mg/L ^a	ND
Chloride	2000 mg/L ^a	3.32
Chromium	1.83 mg/L 0.05 mg/L ^a	ND
Lead	0.05 mg/L 0.1 mg/L ^a	ND
Nickel	6.15 mg/L	ND
Nitrate	100 mg/L ^a	ND
²²⁶ Ra	91.3 pCi/L	ND
²²⁸ Ra	25.7 pCi/L	1.01
Selenium	0.12 mg/L 0.05 mg/L ^a	ND
Sulfate	3000 mg/L ^a	200
TDS	5000 mg/L ^a	442
²³⁰ Th	2409 pCi/L	ND
Uranium	9.2 mg/L	0.00023

Note:

^a Wyoming Class III groundwater protection standard (*Wyoming Administrative Rules* Section 020.0011.8.06292018 [WAR 020.0011.8.06292018]).

Abbreviations:

mg/L = milligrams per liter

ND = not detected (below method detection limit)

pCi/L = picocuries per liter

Mann-Kendall trend analysis was performed for the monitored constituents for the period from 2005, when the site was transferred to LM, to 2025. Mann-Kendall trend analyses characterize the direction of concentration trends using a 0.05 significance level, meaning a calculated p-value of less than 0.05 indicates the null hypothesis is rejected and a significant trend in the time series exists. Table 6-7 identifies the analyte-well combinations with statistically significant increasing (or decreasing) trends based on the detailed Mann-Kendall trend test summary. This table only includes results for the well-analyte combinations with a statistically significant trend.

As shown in Figure 6-7 and (for nitrate) Figure 6-8, the method detection limits (MDLs) on which nondetect values are based show a slightly increasing trend since 2005 for some parameters, most notably for selenium. Because variable detection limit values are accounted for in the trend analysis method used (see notes accompanying Table 6-7), these increases are not likely to account for the increasing trends observed for some analytes (e.g., selenium in wells 5-SC, 54-SC, and 5-DC). Furthermore, no significant increasing trend was found for any well-analyte combination with detection frequencies less than 70%, and in most cases 90–100% (Table 6-7).

Upper Sand Aquifer Wells

Main Sand Aquifer Wells

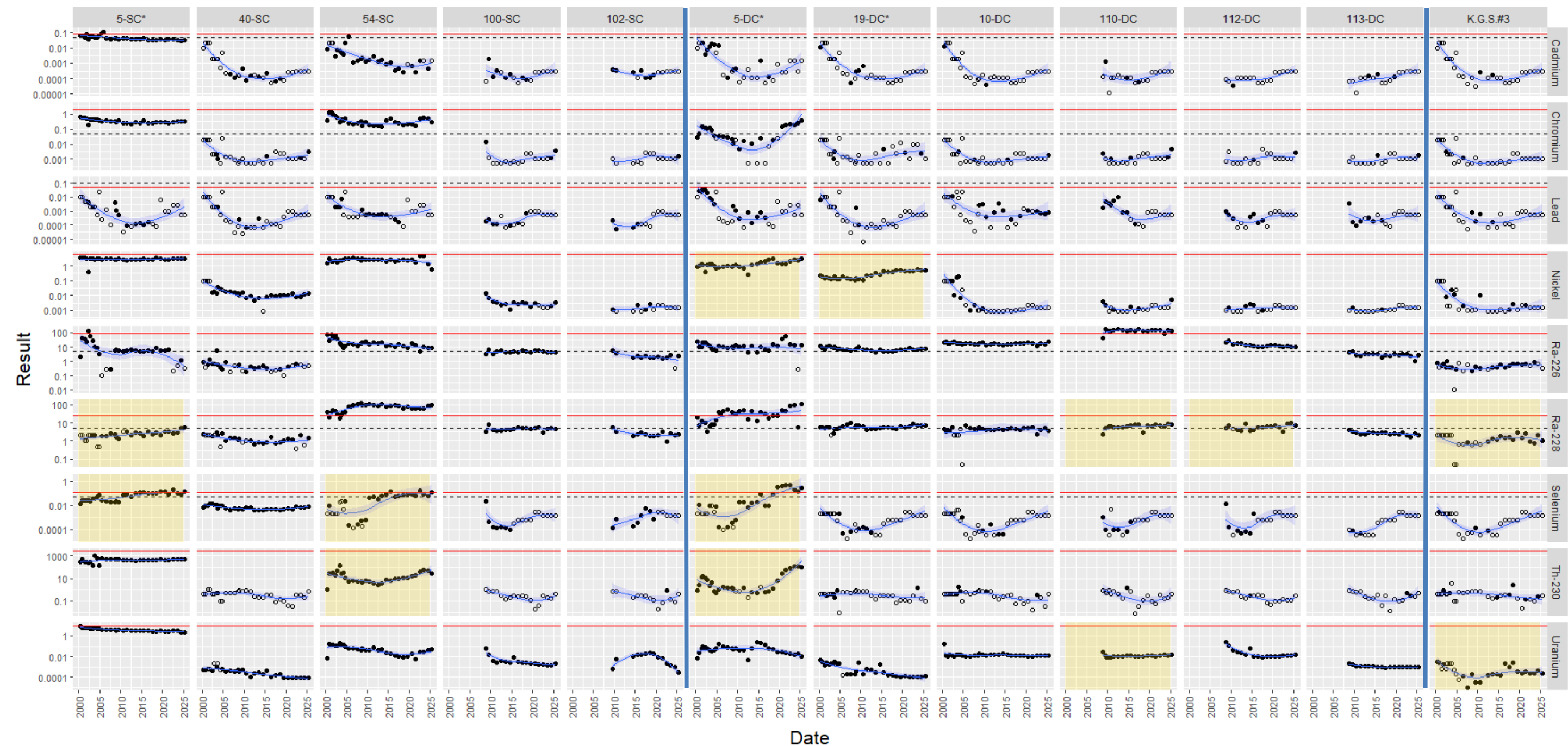
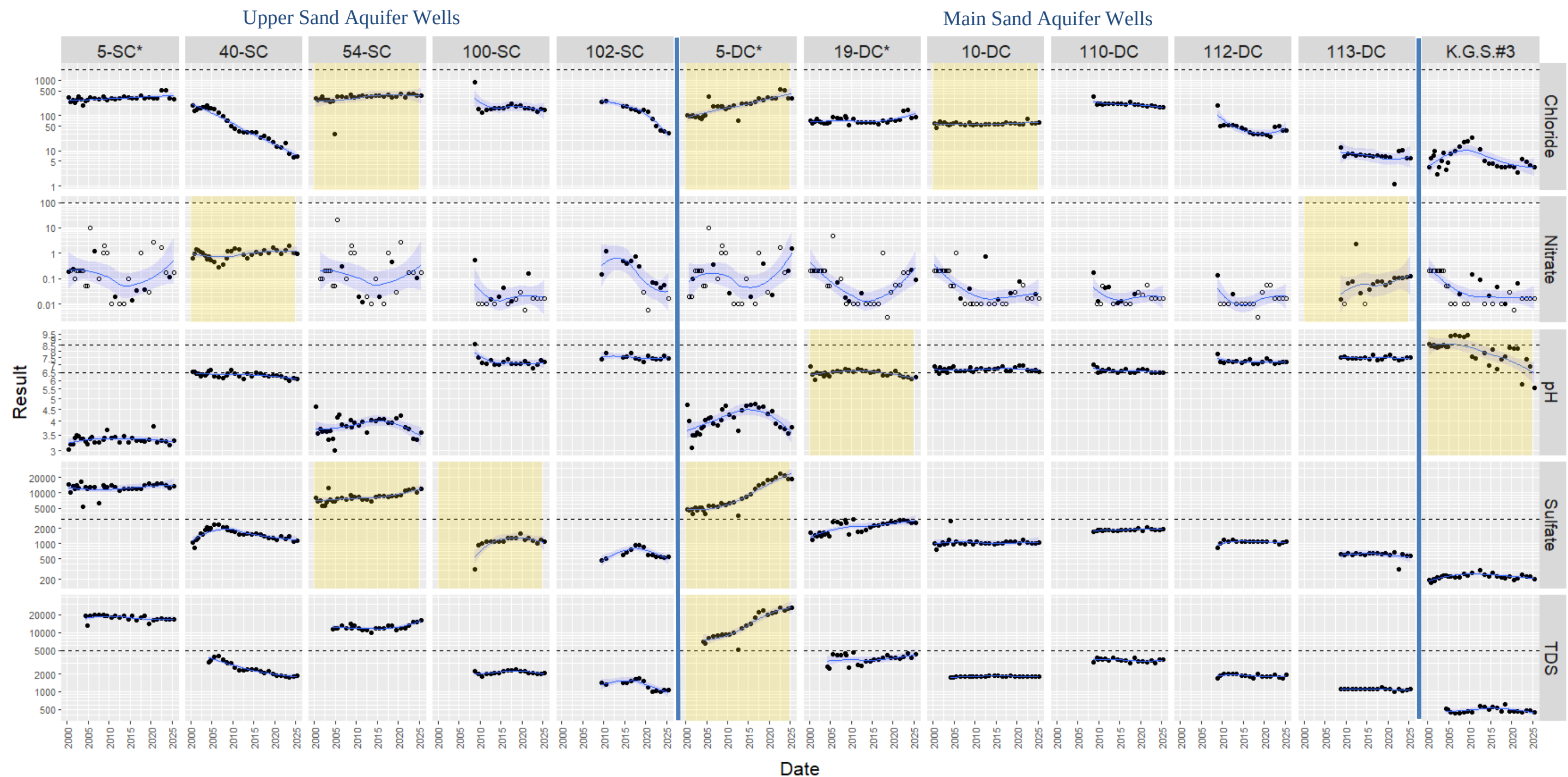


Figure 6-7. Time-Concentration Plots of Analytes with ACLs in Monitoring Wells, Shirley Basin South, Wyoming, Disposal Site: 2000–2025



● Detect ○ Nondetect — LOESS regression line and 95% pointwise confidence interval
 - - - Groundwater protection standard from Figure 6-3, except for pH which, although not an analyte addressed in the LTSP, is an important indicator parameter where the groundwater protection standard is a range (6.5–8.5 standard units).
 Shaded plots denote well-analyte combinations with statistically significant increasing concentration trends since 2005, or—for pH—significant decreasing trends (Table 6-7).
Notes: Units are in milligrams per liter, except for pH (in standard units). Well names followed by an asterisk (*) denote POC wells (shown first for each aquifer). A semilogarithmic scale is used because of the wide range in analyte concentrations across site wells.
Abbreviation: LOESS = locally estimated scatterplot smoothing

Figure 6-8. Time-Concentration Plots of Indicator Parameters in Monitoring Wells, Shirley Basin South, Wyoming, Disposal Site: 2000–2025

Table 6-7. Mann-Kendall Trend Analysis Results for Shirley Basin South Site Monitoring Wells, 2005–2025

Analyte	No. of Samples (No. of Nondetects)	Kendall's tau ^a	Trend ^{a,b}
Upper Sand Aquifer Wells			
5-SC (POC)			
Cadmium	23	−0.66	Decreasing
²²⁸ Ra	22 (1)	0.48	Increasing
Selenium	22	0.59	Increasing
TDS	22	−0.54	Decreasing
Uranium	22	−0.71	Decreasing
40-SC			
Chloride	22	−0.92	Decreasing
Nitrate	22	0.35	Increasing
Sulfate	22	−0.82	Decreasing
TDS	22	−0.86	Decreasing
Uranium	22	−0.65	Decreasing
54-SC			
Cadmium	22 (3)	−0.49	Decreasing
Chloride	22	0.30	Increasing
Nickel	22	−0.33	Decreasing
²²⁶ Ra	22	−0.49	Decreasing
²²⁸ Ra	23	−0.36	Decreasing
Selenium	22 (2)	0.70	Increasing
Sulfate	22	0.58	Increasing
²³⁰ Th	22	0.64	Increasing
Uranium	22	−0.42	Decreasing
100-SC			
Nickel	18 (3)	−0.43	Decreasing
Sulfate	18	0.34	Increasing
Uranium	18	−0.72	Decreasing
102-SC			
Cadmium	14 (7)	−0.38	Decreasing
Chloride	14	−0.92	Decreasing
Nitrate	14 (3)	−0.53	Decreasing

Analyte	No. of Samples (No. of Nondetects)	Kendall's tau ^a	Trend ^{a,b}
Main Sand Aquifer Wells			
5-DC (POC)			
Chloride	22	0.51	Increasing
Nickel	22	0.62	Increasing
Selenium	22 (2)	0.69	Increasing
Sulfate	22	0.80	Increasing
TDS	22	0.84	Increasing
²³⁰ Th	22 (4)	0.42	Increasing
Uranium	22	−0.50	Decreasing
10-DC			
Chloride	22	0.34	Increasing
19-DC			
Nickel	22	0.71	Increasing
Uranium	22 (1)	−0.47	Decreasing
pH	22)	−0.54	Decreasing
110-DC			
Chloride	20	−0.57	Decreasing
Lead	19 (10)	−0.52	Decreasing
²²⁸ Ra	19	0.50	Increasing
Uranium	20	0.40	Increasing
112-DC			
Chloride	18	−0.51	Decreasing
²²⁶ Ra	18	−0.57	Decreasing
²²⁸ Ra	18	0.35	Increasing
113-DC			
Chloride	18	−0.41	Decreasing
Nitrate	18 (2)	0.54	Increasing
²²⁶ Ra	18	−0.37	Decreasing
²²⁸ Ra	18	−0.53	Decreasing
Uranium	18	−0.68	Decreasing
Lower Sand Aquifer Well			
K.G.S. #3			
Chloride	20	−0.52	Decreasing
²²⁸ Ra	20 (6)	0.44	Increasing
Uranium	20	0.50	Increasing
pH	20	−0.50	Decreasing

Notes:

^a Trend tests were performed using the “NADA: Nondetects and Data Analysis for Environmental Data” package in R, version 1.6-1.2 (Lee 2025). The NADA trend test is similar to the traditional Mann-Kendall trend test except that it accounts for the presence of nondetects at multiple detection limits. Trend analyses were conducted at the 0.05 significance (or alpha) level using a two-sided test. The test statistic, Kendall's tau, is a measure of the strength of the association between two variables, with values always falling between −1 and +1.

^b Trend analysis results are only listed for well-analyte combinations with a statistically significant trend ($p < 0.05$). Significant trends are also noted for pH, which, although not an analyte addressed in the LTSP, is an important indicator parameter.

As stipulated in the LTSP (DOE 2004), LM is required to notify NRC and WDEQ if an ACL is exceeded at a POC well, or if trends indicate that a groundwater protection standard may be exceeded at the point of exposure (i.e., the site boundary). Since DOE acquired the site in 2005, exceedances of ACLs have been limited to the following POC wells and parameters:

- Upper Sand Aquifer POC well 5-SC—cadmium (twice, in 2005 only) and selenium (2019–2020, 2022, and 2025)
- Main Sand Aquifer POC well 5-DC— ^{228}Ra (18 of 23 results, including 2025) and selenium (since 2019)

Based on the data shown in Figure 6-7 and Figure 6-8 and trend analysis results (Table 6-7), there is no indication that a groundwater protection standard will be exceeded at the site boundary or in well K.G.S. #3. Concentration trends for constituents with ACLs are discussed in the following paragraphs, along with an updated analysis of the statistically significant trends identified in Table 6-7.

Constituents with ACLs

In LM's initial July 2005 sampling, the results for cadmium in POC well 5-SC exceeded the respective ACL. When compared with historical results provided by the previous site licensee, the results for cadmium in well 5-SC were within the range of historical measurements. Cadmium concentrations in well 5-SC have since declined (significant trend) to below the ACL (most recent result of 0.033 milligrams per liter [mg/L]), and concentrations in most remaining wells have been below the detection limit (Figure 6-7). Along with well 5-SC, statistically significant decreasing trends in cadmium concentrations were also found for wells 54-SC and 102-SC (Table 6-7).

Nickel concentrations in Upper Sand Aquifer wells 5-SC and 54-SC have been below the ACL (Figure 6-7) and trends have been stable (non-trending in 5-SC, decreasing in 54-SC). The most recent (2025) results were 3.2 and 0.61 mg/L, respectively (Table 6-4). Although statistically significant increasing trends were identified for Main Sand Aquifer wells 5-DC and 19-DC, nickel concentrations are below the ACL (most recent results of 2.93 and 0.534 mg/L, respectively).

Radium-226 concentrations in well 110-DC, installed in 2008 near the north site boundary, consistently exceeded the ACL between 2009 and 2022, and again in 2024 and 2025 (Figure 6-7). LM evaluated the cause of these exceedances and determined that the elevated concentrations do not represent a contaminant plume migrating offsite; rather, they are attributed to natural conditions within the ore-bearing sand unit as aquifer recovery continues (DOE 2011a). In 2025, the ^{226}Ra concentration in this well was 125 picocuries per liter (pCi/L), consistent with most historical measurements. Although below the ACL, ^{226}Ra concentrations in several remaining wells, including 54-SC, 5-DC, 10-DC, 19-DC, and 112-DC, typically exceed the 5 pCi/L groundwater protection standard for combined ^{226}Ra and ^{228}Ra .

Since 2005, ^{228}Ra concentrations have consistently exceeded the ACL in well 54-SC (significant decreasing trend) and, with some exceptions (2012, 2014, 2017–2018, and 2024), also in well 5-DC. When compared with historical results provided by the previous site licensee, the results for ^{228}Ra in both wells have been within the range of historical measurements.

Mann-Kendall trend analysis (Table 6-7) indicates statistically significant increasing trends for ^{228}Ra in wells 5-SC (POC), 110-DC, 112-DC and, Lower Sand Aquifer well K.G.S. #3.

Significant decreasing trends were identified for well 54-SC (^{226}Ra and ^{228}Ra), well 112-DC (^{226}Ra), and 113-DC (^{226}Ra and ^{228}Ra). Radium-228 is a decay product of thorium-232 (^{232}Th), which is highly immobile. Petrotomics attributed elevated concentrations at the site to natural thorium in the uranium ore (Petrotomics 1996). Thorium-232 is very immobile, so the source of ^{228}Ra in groundwater must be close to the affected wells. Because the half-life of ^{228}Ra is relatively short, the data suggest the possible presence of ^{232}Th sources near monitoring wells 54-SC and 5-DC. Since 2019, ^{232}Th in well 54-SC increased from 17.6 to 110 pCi/L in 2024 but measured at 44.2 pCi/L in 2025.

Radium-226 and ^{228}Ra concentrations in well K.G.S. #3 are below respective ACLs and are not expected to reach those ACLs in the near future. Under Class III groundwater protection standards, the threshold value of 5 pCi/L represents the sum of ^{226}Ra and ^{228}Ra concentrations (Table 6-3). The summed ^{226}Ra and ^{228}Ra concentrations in well K.G.S. #3 have historically been below the 5 pCi/L threshold and are not expected to exceed it in the near future. LM will continue to monitor this well to ensure that applicable standards are not exceeded and that the well continues to be safe for livestock use.

In response to groundwater concentrations of ^{226}Ra and ^{228}Ra that exceeded the approved ACLs for the site, LM evaluated the groundwater in 2013 (DOE 2013). NRC concluded that the current groundwater monitoring data do not conclusively demonstrate whether the tailings impoundment is leaking (Orlando 2014). However, NRC concluded that, until further notice, no additional evaluation of the cause of the elevated radium concentrations by LM is warranted because there is no risk to human health and the environment. NRC concluded that, for the present time, and until notified otherwise, DOE's ACL evaluation program should be suspended such that DOE does not need to conduct additional evaluations concerning ACL exceedances at the site. Instead, DOE should continue with the monitoring program as currently provided for in the LTSP (Orlando 2014). Groundwater at and in the vicinity of the site is not a source of drinking water due to limited yield and poor ambient conditions resulting from naturally occurring uranium mineralization and human activities related to uranium exploration and mining that occurred in the area from the late 1950s to the early 1990s. Livestock water at the site is drawn from a separate aquifer, the Lower Sand Aquifer, which is not hydraulically connected to the aquifers of concern and is not impacted by former milling operations (DOE 2004; DOE 2011b).

Selenium concentrations have exceeded the ACL and the groundwater protection standard in wells 5-SC, 54-SC, and 5-DC (Figure 6-7). Mann-Kendall trend analysis continues to indicate statistically significant increasing selenium trends in these wells (Table 6-7). LM previously noted that selenium is a relatively poor early indicator constituent for tailings seepage, as selenium concentrations measured in tailings water were relatively low and attenuated easily (DOE 2011b).

Thorium-230 concentrations have been below detection limits in most wells as shown in Figure 6-7. Exceptions are wells 5-SC, 54-SC, and 5-DC, but ^{230}Th levels have been below the corresponding ACL. Although a statistically significant increasing trend is indicated for wells 54-SC and 5-DC based on data since 2005, current levels are sufficiently low such that exceedances are not expected in the foreseeable future (most recent results of 25.3 and

107 pCi/L, respectively). The highest Th-230 activity has been measured in well 5-SC, with an average of approximately 467 pCi/L (most recent result of 534 pCi/L) and a stable trend.

Uranium concentrations have been consistently below the 9.2 mg/L ACL in all wells (Figure 6-7), with statistically significant decreasing trends identified for most wells (Table 6-7). A statistically significant increasing trend was identified for uranium in wells 110-DC and K.G.S. #3. In both wells, uranium concentrations have been well below the ACL. Despite the statistically significant increasing trend, uranium concentrations in well K.G.S. #3 have remained generally stable since 2019 (0.0002–0.0004 mg/L) (Figure 6-7).

Indicator Parameters

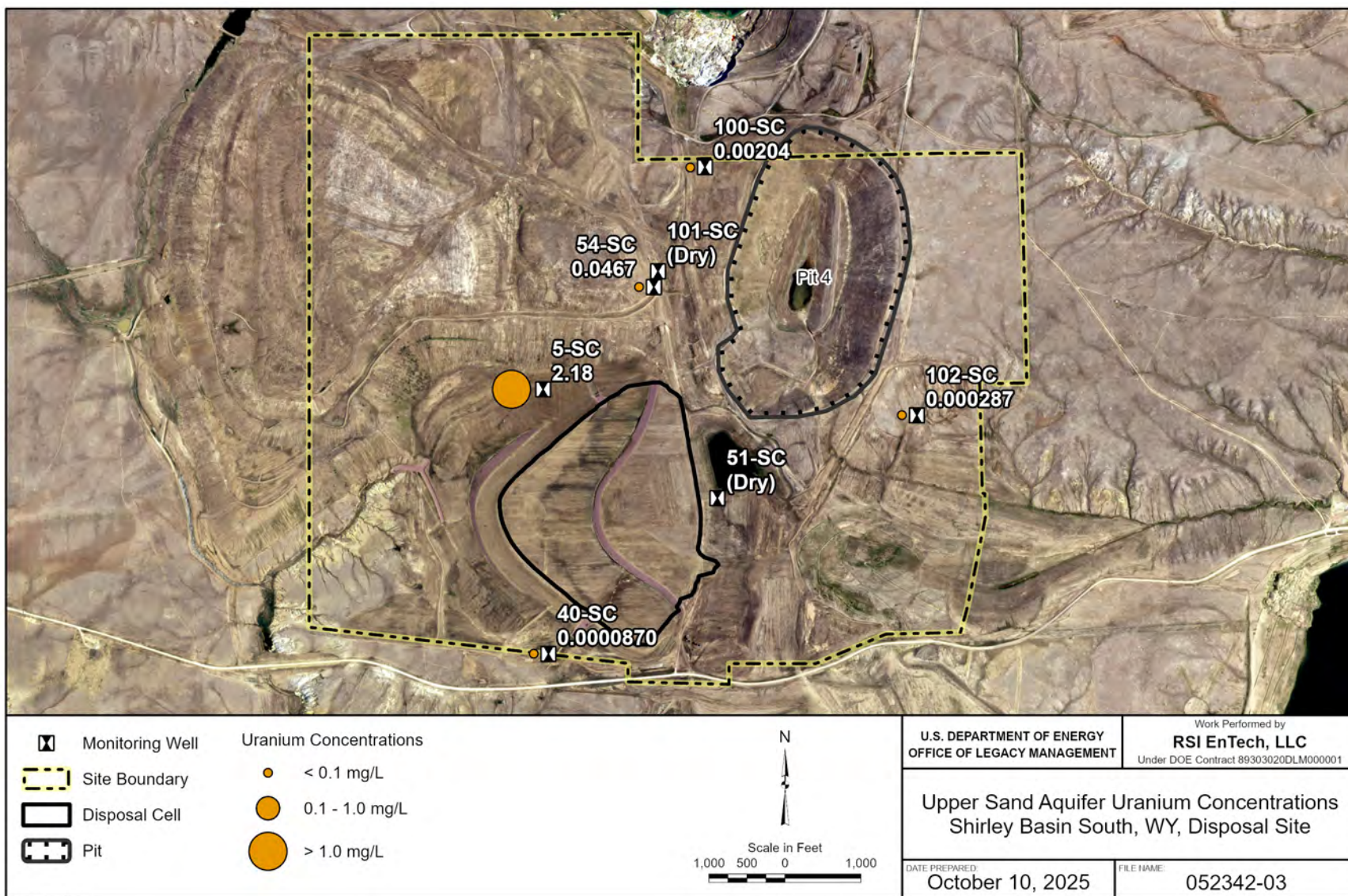
In 2025, Wyoming Class III groundwater protection standards for indicator parameters (chloride, nitrate, sulfate, and TDS) were met at downgradient site boundary wells (40-SC, 100-SC, 102-SC, 110-DC, 112-DC, and 113-DC) as well as 19-DC, but standards continue to be exceeded for sulfate and TDS in wells 5-SC, 54-SC, and 5-DC near the disposal cell. Statistically significant increasing trends were identified for several well-indicator parameter combinations as shown in Table 6-7, most notably well 5-DC, where chloride, sulfate, and TDS have also been significantly increasing since 2005 and pH has been decreasing since approximately 2015 (Figure 6-8).

Consistent with conclusions drawn in the groundwater monitoring evaluation report (DOE 2011b), water quality in well K.G.S. #3 is still considered unaffected by mill-related activity. This conclusion is supported by the lack of tailing-derived indicator contaminants, such as sulfate, chloride, nitrate, and TDS (Figure 6-8). Along with chloride, pH has decreased significantly in this well since 2005 (Table 6-7).

Additional Considerations

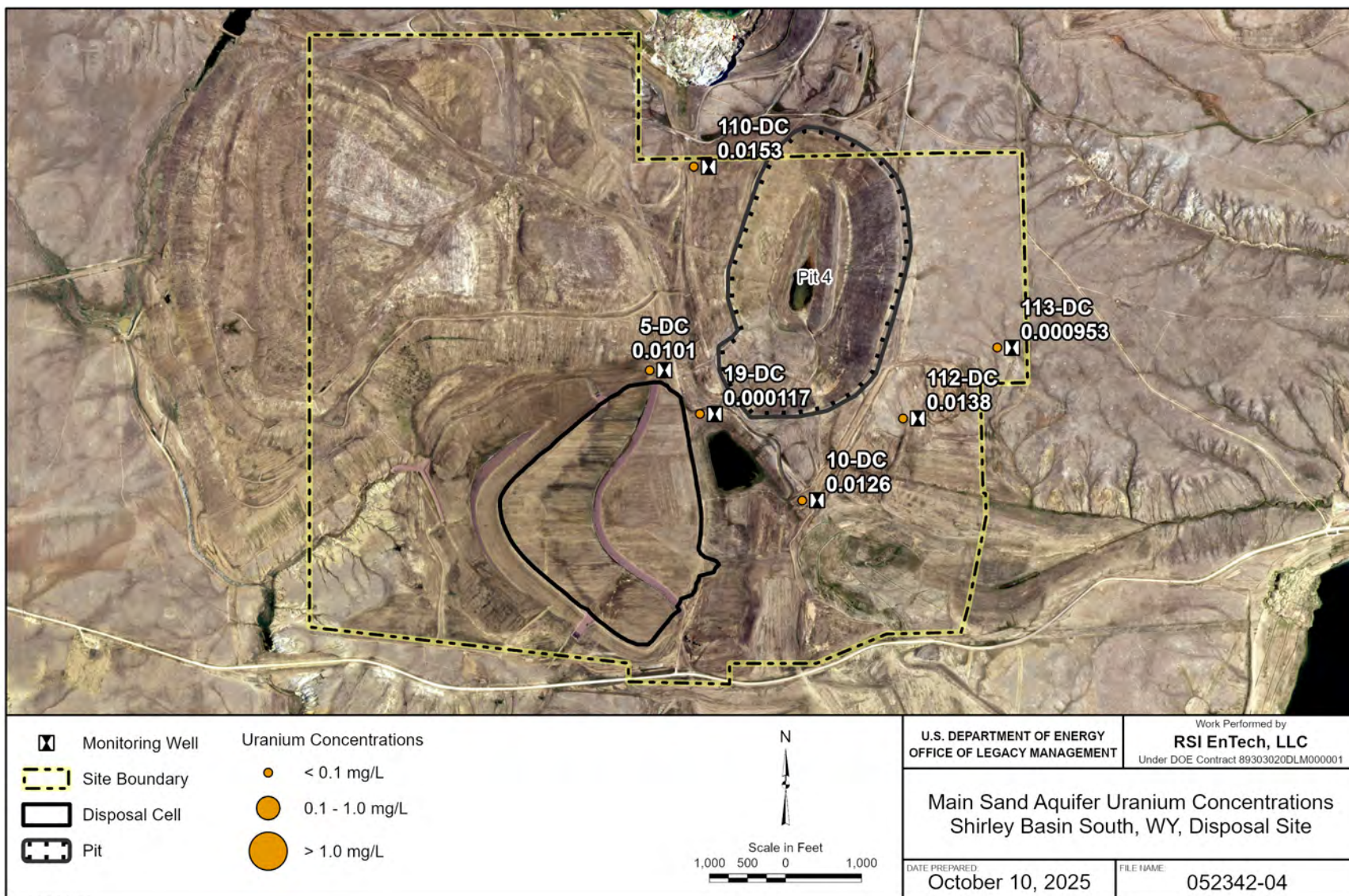
DOE will consider whether it would be appropriate to install an additional well at the southern site boundary to monitor potential seepage of contaminants from the tailings pile into the Main Sand Aquifer. Groundwater levels continue to increase in the Main Sand Aquifer throughout the site (Figure 6-6), indicating that the aquifer has not yet equilibrated from site-related activities. Once the aquifer reaches a quasi-steady state regarding groundwater elevations, that would be the optimal timing for a more comprehensive evaluation of flow directions.

The LTSP (DOE 2004) specifies that this report will include isoconcentration maps for uranium and sulfate in each aquifer; however, the monitoring well network LM inherits from the former licensee does not provide sufficient data points to interpolate a statistically defensible contaminant plume. Uranium concentrations from 2025 are shown in Figure 6-9 and Figure 6-10 for the Upper Sand and Main Sand Aquifers, respectively. Corresponding sulfate concentration data are plotted in Figure 6-11 and Figure 6-12. Uranium concentrations remain below the ACL; however, as stated above, sulfate concentrations exceeded the State of Wyoming groundwater protection standard in Upper Sand Aquifer wells 5-SC and 54-SC and Main Sand Aquifer well 5-DC but not in livestock well K.G.S. #3 or in wells near the boundary.



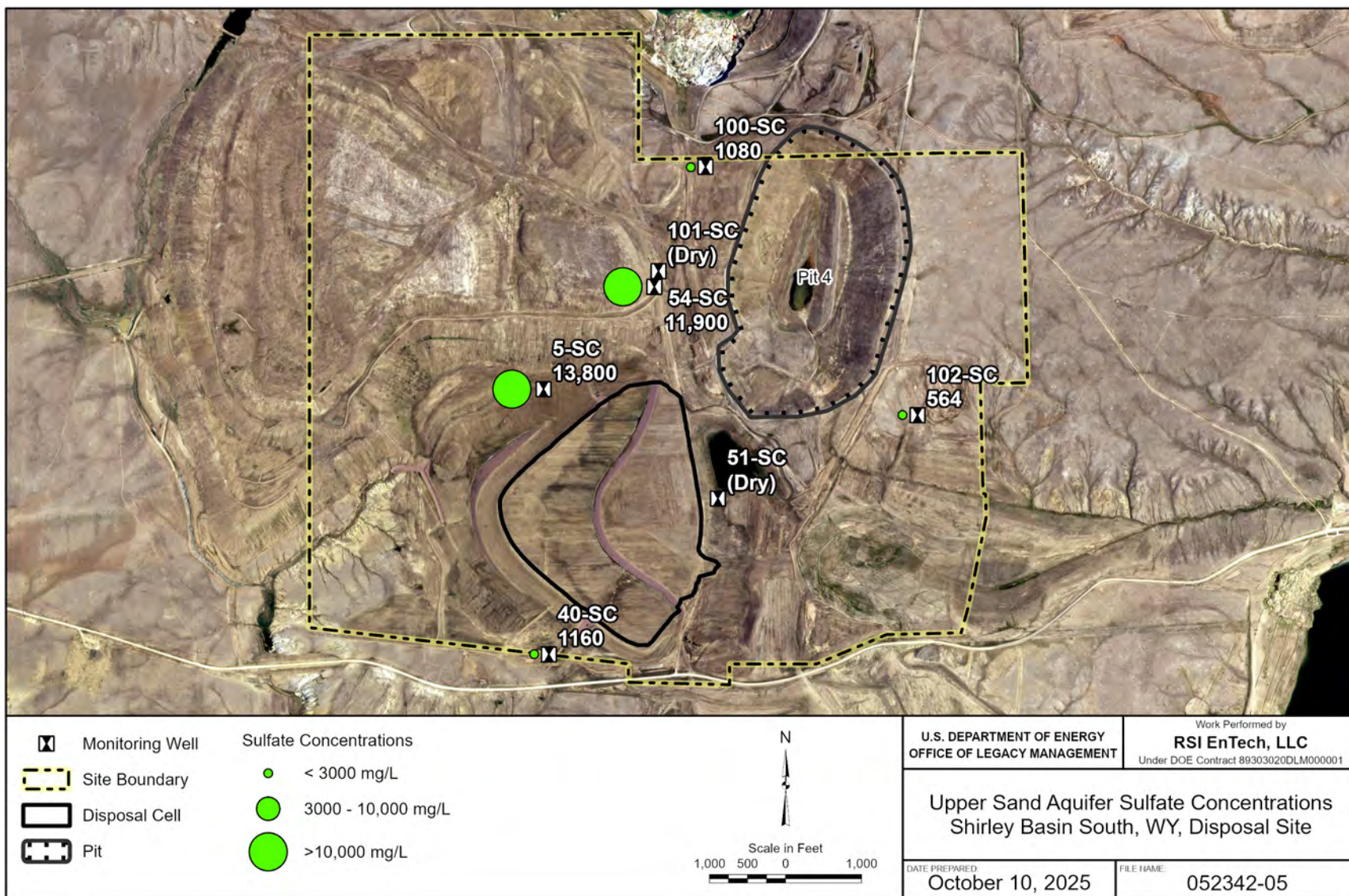
A-L 052342-03

Figure 6-9. June 2025 Uranium Concentrations in the Upper Sand Aquifer at the Shirley Basin South, Wyoming, Disposal Site



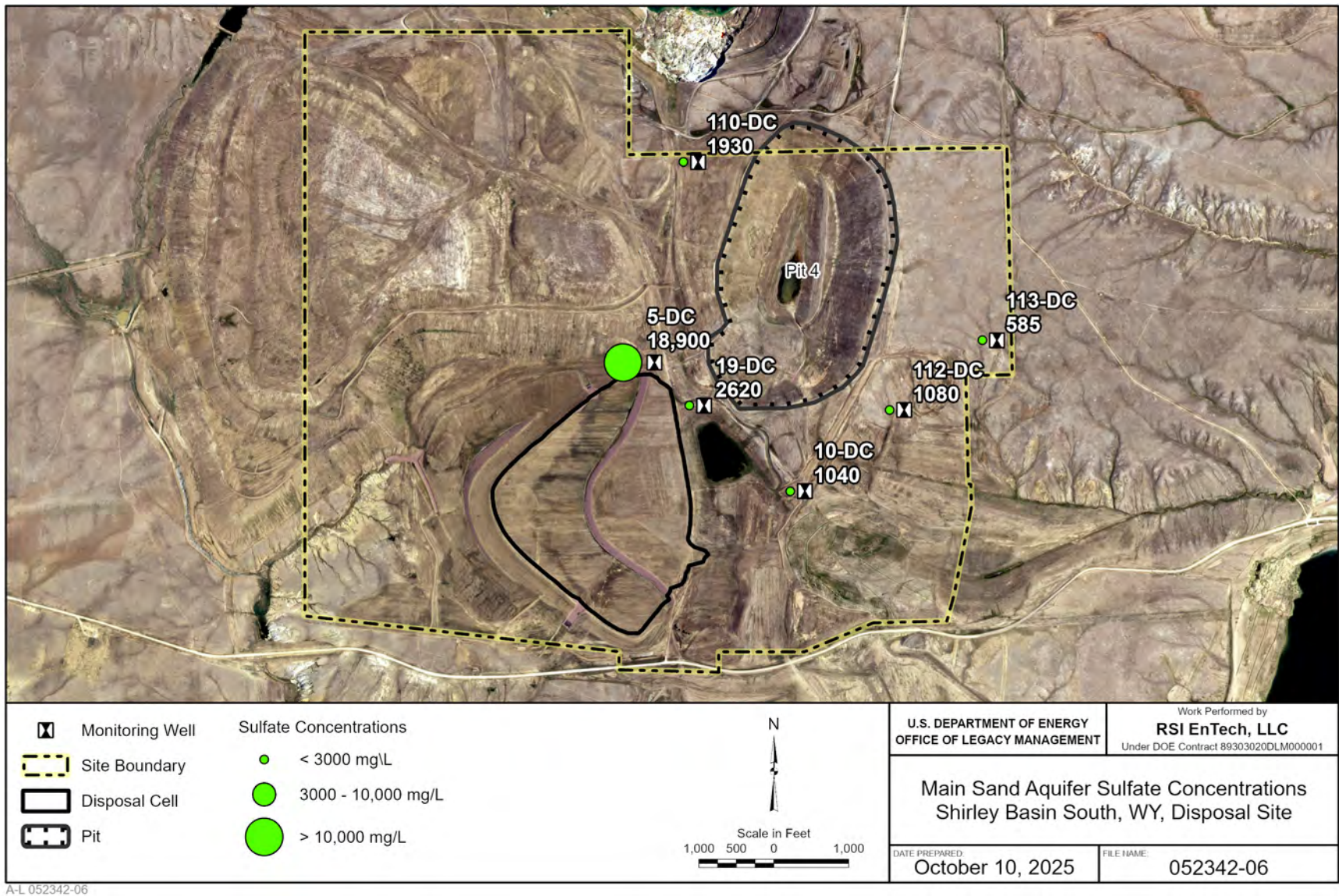
A-L 052342-04

Figure 6-10. June 2025 Uranium Concentrations in the Main Sand Aquifer at the Shirley Basin South, Wyoming, Disposal Site



A-L 052342-05

Figure 6-11. June 2025 Sulfate Concentrations in the Upper Sand Aquifer at the Shirley Basin South, Wyoming, Disposal Site



A-L 052342-06

Figure 6-12. June 2025 Sulfate Concentrations in the Main Sand Aquifer at the Shirley Basin South, Wyoming, Disposal Site

6.8 References



Note

Site-related documents are available on the LM public webpages at <https://lmpublicsearch.lm.doe.gov/SitePages>.

10 CFR 40.28. U.S. Nuclear Regulatory Commission, “General License for Custody and Long-Term Care of Residual Radioactive Material Disposal Sites,” *Code of Federal Regulations*.

40 CFR 192. U.S. Environmental Protection Agency, “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings,” *Code of Federal Regulations*.

DOE (U.S. Department of Energy), 2004. *Long-Term Surveillance Plan for the U.S. Department of Energy Shirley Basin South (UMTRCA Title II) Disposal Site, Carbon County, Wyoming*, DOE-LM/GJ766–2004, December.

DOE (U.S. Department of Energy), 2011a. *Evaluation of Elevated Radium-226 and Radium-228 Concentrations at the Shirley Basin South, Wyoming, UMTRCA Title II Disposal Site*, LMS/SBS/S07587, Office of Legacy Management, March.

DOE (U.S. Department of Energy), 2011b. *Groundwater Monitoring Evaluation for the Shirley Basin South, Wyoming, UMTRCA Title II Disposal Site*, LMS/SBS/S07784, Office of Legacy Management, June.

DOE (U.S. Department of Energy), 2013. *Groundwater Evaluation and Recommended Monitoring for the Shirley Basin South, Wyoming, UMTRCA Title II Disposal Site*, LMS/SBS/S10313, Office of Legacy Management, August.

Lee, L., 2025. “NADA: Nondetects and Data Analysis for Environmental Data,” R package, version 1.6-1.2, <https://CRAN.R-project.org/package=NADA>, accessed October 8, 2025.

Orlando, D., 2014. D. Orlando, senior project manager, Special Projects Branch, Decommissioning and Uranium Recovery Licensing Directorate, Division of Waste Management and Environmental Protection, Office of Federal and State Materials and Environmental Management Programs, U.S. Nuclear Regulatory Commission, letter about U.S. Nuclear Regulatory Commission Staff Review of U.S. Department of Energy Report Titled “Groundwater Evaluation and Recommended Monitoring for the Shirley Basin South, Wyoming, UMTRCA Title II Disposal Site”) to S. Surovchak, site manager, Office of Legacy Management, U.S. Department of Energy, March 25.

Petrotomics (Petrotomics Company), 1996. *Petrotomics Tailings Facility Application for Alternate Concentration Limits to Amend USNRC Source Material License SUA-551*, prepared by Shepherd Miller Inc., September.

Surovchak, S., 2011. S. Surovchak, site manager, Office of Legacy Management, U.S. Department of Energy, letter (about Actions Related to the Shirley Basin South, Wyoming, UMTRCA Title II Disposal Site) to deputy director, U.S. Nuclear Regulatory Commission, September 29.

WAR 020.0011.8.06292018. “Quality Standards for Wyoming Groundwaters,” *Wyoming Administrative Rules*.

6.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	270	Erosion Gully Under Fence Line
PL-2	0	Sediment Deposition Along Western Boundary
PL-3	270	Perimeter Sign P33 Showing Bullet Holes
PL-4	0	Site Marker
PL-5	337	Animal Burrows Below Well 40-SC
PL-6	22	Erosion Cause by Cattle on Edge of South Swale Discharge Point
PL-7	315	Pit 4 Area Lower Riprap-Armored Drainage Channel Erosion
PL-8	247	Erosion Parallel to Riprap in Pit 4 Area
PL-9	270	Exposed Wire at Top of Erosion Gully
PL-10	337	Old Phone Box with Exposed Wires
PL-11	0	K.G.S #3 Pump Well and Solar Panel
PL-12	22	Office Construction for In Situ Recovery North of Site

Note:

— = Photograph taken vertically from above.



PL-1. Erosion Gully Under Fence Line



PL-2. Sediment Deposition Along Western Boundary



PL-3. Perimeter Sign P33 Showing Bullet Holes



PL-4. Site Marker



PL-5. Animal Burrows Below Well 40-SC



PL-6. Erosion Caused by Cattle on Edge of South Swale Discharge Point



PL-7. Pit 4 Lower Riprap-Armored Drainage Channel Erosion



PL-8. Erosion Parallel to Riprap in Pit 4 Area



PL-9. Exposed Wire at Top of Erosion Gully



PL-10. Old Phone Box with Exposed Wires



PL-11. K.G.S #3 Pump Well and Solar Panel



PL-12. Office Construction for In Situ Recovery North of Site

7.0 Split Rock, Wyoming, Disposal Site

7.1 Compliance Summary

The Split Rock, Wyoming, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title II Disposal Site was inspected on August 5–6, 2025. This was the second annual inspection for this site and the first observational site visit by the U.S. Nuclear Regulatory Commission (NRC). Inspectors identified minor fence damage, deep-rooted vegetation on the disposal cell, and rills in the tertiary road. Ten new perimeter signs were installed, which are outlined in red on the annual inspection drawing (Figure 7-1). These minor maintenance items were completed during the August 2025 maintenance trip. No follow-up inspection was warranted.

The site-specific *Long-Term Surveillance Plan for the Split Rock, Wyoming, UMTRCA Title II Disposal Site, Jeffrey City, Wyoming* (DOE 2023) (LTSP) requires annual sampling of groundwater and surface water for four constituents of concern (COCs): nitrate (total as nitrogen [N]), selenium, sulfate, and uranium. Since the site transitioned to the U.S. Department of Energy (DOE) Office of Legacy Management (LM) in November 2023, two sampling events were conducted: the first in early August 2024, and the second on August 21, 2025. Because of the timing of sampling and laboratory analysis relative to submission of this annual site inspection and monitoring report (including the time required for data validation), there is a 1-year lag in reporting. As such, this report presents analytical data from the initial (August 5–7, 2024) sampling event. Data from the most recent (2025) sampling event will be documented in the next (2026) version of this report.

Alternate concentration limits (ACLs) established in the LTSP for nitrate, selenium, and uranium were not exceeded in any point of compliance (POC) wells during the August 2024 sampling event. A combination of groundwater protection standards based on drinking water standards and background values is applied to five boundary wells (WN-41B, SWAB-4, SWAB-12R, SWAB-22, and SWAB-32) for all COCs. The LTSP specifically states that if a drinking water standard is exceeded at a boundary well, DOE must notify NRC and the Wyoming Department of Environmental Quality (SWAB-4). No exceedances of drinking water standards were measured at the boundary wells in 2024, with three exceptions: SWAB-4 (uranium and nitrate) and SWAB-12R (uranium). LM notified NRC of these exceedances by letter on November 19, 2025 (DOE 2025) and issued the following caveats. Although SWAB-4 is classified as a boundary well, the LTSP also describes it as being within the uranium and nitrate plumes, with historical (pretransition) results exceeding corresponding drinking water standards of 0.03 milligrams per liter (mg/L) and 10 mg/L, respectively. In SWAB-12R, the 2024 uranium result (0.036 mg/L) slightly exceeds the drinking water standard, but is below the LTSP-established background (trigger) value of 0.087 mg/L and also well within the range of historical measurements. These three exceedances do not indicate any potential risk to human health or the environment. No surface water protection standard exceedances were measured in any of the Sweetwater River surface samples.

7.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the site-specific LTSP (DOE 2023) in accordance with procedures established to comply with the requirements of the NRC general license at Title 10 *Code of Federal Regulations* Section 40.28 (10 CFR 40.28). Table 7-1 lists these requirements.

Table 7-1. License Requirements for the Split Rock, Wyoming, Disposal Site

Requirement	LTSP	This Report	10 CFR 40.28
Annual Inspection and Report	Sections 3.3 and 3.4	Section 7.4	(b)(3)
Follow-Up Inspections	Section 3.5	Section 7.5	(b)(4)
Routine Maintenance and Emergency Measures	Section 3.6	Section 7.6	(b)(5)
Environmental Monitoring	Section 3.7	Section 7.7	(b)(3)

7.3 Institutional Controls

The 5431-acre site, of which 1049 acres is privately owned, is identified by the property boundary shown in Figure 7-1. The site is owned both privately and by the United States and was accepted under the NRC general license in 2023. DOE is the licensee and, in accordance with the requirements for UMTRCA Title II sites, LM is responsible for the custody and long-term care of the site.

Institutional controls (ICs) at the site include federal ownership of the property, administrative controls, and groundwater use restrictions to prevent direct human exposure to site-derived contaminants. ICs are in place to ensure long-term protectiveness at the site. IC monitoring will be performed during the annual inspection. Inspectors will check the site for unauthorized entry, surrounding land use, and disturbance of site features. Every 5 years, beginning in 2025, records in the Wyoming State Engineer’s Office will be reviewed to determine if there were significant changes in water demand near the site and confirm that no new drinking wells have been established. During the 2025 review, no new demands or construction activities were identified. The next review will be completed in 2030 before the annual inspection.

7.4 Inspection Results

The site, approximately 97 miles southwest of Casper, Wyoming, and 67 miles northwest of Rawlins was inspected on August 5–6, 2025. The inspection was conducted by T. Santonastaso, C. Wentz, and A. Soares of the Legacy Management Support (LMS) contractor. J. Chavez, N. Olin, C. Long, and P. Schwarz (LM) attended the inspection. L. Gersey and C. Dennes from NRC also attended and conducted an observational site visit, which it does every 10 years. The purposes of the inspection were to confirm the integrity of visible features at the site, identify changes in conditions that might affect conformance with the LTSP, and evaluate whether maintenance or follow-up inspection and monitoring are needed.

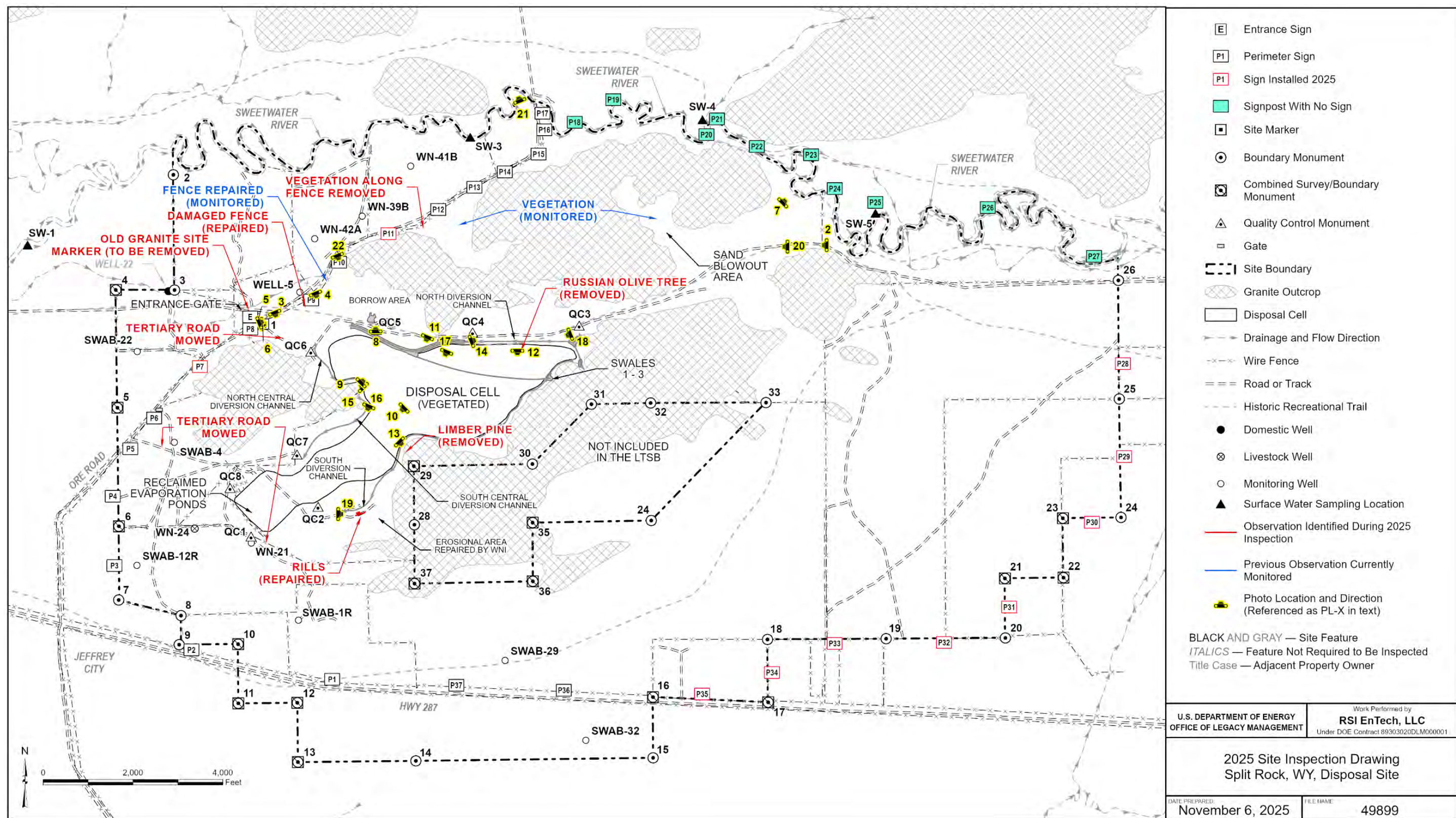


Figure 7-1. 2025 Annual Inspection Drawing for the Split Rock, Wyoming, Disposal Site

7.4.1 Site Surveillance Features

Figure 7-1 shows the locations of site features, including site surveillance features and inspection areas, in black and gray font. Some site features that are present but not required to be inspected are shown in italic font. New observations identified during the 2025 annual inspection are shown in red. Inspection results and recommended maintenance activities associated with site surveillance features are described in the following subsections. Photographs to support specific observations are noted in the text and in Figure 7-1 by photograph location (PL) numbers. The photographs and photograph log are presented in Section 7.9.

7.4.1.1 Site Access and Entrance Gate

Access to the site is directly from Fremont County Ore Road. The main entrance gate is a tubular steel double swing gate in the disposal cell fence that provides access to the northern portion of the disposal cell. This gate, in the western portion of the disposal cell area fence, was secured by a lock and chain (PL-1). Two, 10-foot tubular steel double swing gates create another access point south of the site entrance on Ore Road along the perimeter fence. Tertiary roads were mowed during the 2025 maintenance trip. No other maintenance needs were identified.

7.4.1.2 Perimeter Fence and Signs

A barbed-wire stock fence and granite outcrops enclose the site disposal cell and reclaimed evaporation pond and restrict livestock access. LM grants grazing licenses to local ranchers that allows livestock grazing outside of the disposal cell area and engineered structures in exchange for maintenance on the perimeter and stock fence. Fences around the disposal cell area were inspected to ensure that they are intact (PL-2). Before the site transitioned to LM, plans were made to repair 10% of the fence every year starting in 2024. The fence along Ore Road was identified as being in immediate need of repair to keep livestock off the disposal cell, engineered structures, and the reclaimed evaporation pond; this plan would satisfy the 10% fence repair requirement in 2024. The repair was completed in August 2024. During the 2025 inspection, other segments of the fence along Ore Road that were previously repaired in 2024, were identified as needing repair again (PL-3). During the 2025 maintenance trip, the fence along Ore Road was repaired and portions of the fence line were mowed. Talks with the grazing licensee indicated that wildlife continuously use and travel through this segment of fence along Ore Road. Traffic along Ore Road, combined with the vegetation that grows between the road and the fence (PL-4), causes wildlife to become disorientated and panicked and run into the fence. Mowing the fence line would help wildlife identify the fence and make it easier for them to cross it, which would reduce the amount of damage to the fence, according to LMS ecologists. In addition to mending the fence, mowing was completed as part of the fence maintenance along Ore Road. The maintenance along Ore Road completed in 2025 satisfies the plan to repair 10% of the fence that is required annually. Because this section of fence along Ore Road is not part of the grazing agreement, it will be monitored every year to ensure that it is keeping livestock off the engineered structures of the site. Additionally, LM will work with the grazing licensees to ensure that the stock fence is maintained according to the grazing agreement. No other maintenance needs were identified.

The entrance sign, identified in Figure 7-1, is on the main site access road near the site marker (PL-5). Before the site transitioned to LM, 40 additional steel signposts were placed around the

perimeter of the site and the tailings impoundment at locations where access to the site is most likely to occur. During the 2024 inspection, 15 signs were installed along Ore Road and Highway 287 on the previously installed signposts. Ten new perimeter signs were installed during the 2025 maintenance trip, which are outlined in red on the site inspection drawing. Signs will continue to be added in 2026 at the most likely access points, including along Ore Road, adjacent to Highway 287, along the Sweetwater River, and near the disposal cell area fence. Some of the original signpost locations may eventually be abandoned or relocated due to practicality, such as along the riverbank where vegetation is taller than the signposts and access would be difficult. No other maintenance needs were identified.

7.4.1.3 Site Marker

The site has one granite site marker near the main entrance gate (PL-6). The original site marker has been left by the previous licensee and will be removed in the future. No other maintenance needs were identified.

7.4.1.4 Boundary Monuments

There are 37 boundary monuments delineating the site boundary, as well as the Sweetwater River (PL-7). Not all boundary monuments were visited during this inspection. In 2026, all remaining boundary monuments will be inspected. No maintenance needs were identified.

7.4.1.5 Aerial Survey Quality Control Monuments

In August 2024, eight permanent quality control monuments were installed at the site in preparation for a September 2024 baseline aerial survey of the disposal cell (PL-8). Only five quality control monuments were visited during the 2025 inspection. The quality control monument locations are shown in Figure 7-1. No maintenance needs were identified.

7.4.1.6 Monitoring Wells

The site's groundwater monitoring network consists of 12 monitoring wells (Figure 7-1; DOE 2023) and one livestock well (WN-24) that were previously used in Western Nuclear Inc.'s (WNI) licensed monitoring program and continued to be used for DOE's annual sampling event. Well WELL-22 is within the property boundary but is not being used for monitoring. Stock watering well WN-24 is not part of the monitoring plan but is sampled during the annual sampling event. The groundwater use restriction for stock watering well WN-24 allows for livestock use only. Stock watering well WN-24 was not being used at the time of inspection. The monitoring well network wellhead protectors visited during the 2025 inspection were undamaged and locked. Wells that were not visited during the inspection were visited by the sampling crew on August 18, 2025; inspectors verified that the wellhead protectors were undamaged and locked. No maintenance needs were identified.

7.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into four inspection areas to ensure a thorough and efficient inspection. The inspection areas are (1) the tailings impoundment on the top slope and side slopes; (2) the tailings impoundment drainage, diversion channels, toe drains, and

apron; (3) the site perimeter and balance of site; and (4) the outlying area. Inspectors examined site surveillance features within each area and looked for evidence of erosion, settling, slumping, or other modifying processes that might affect the site's conformance with LTSP requirements.

7.4.2.1 Tailings Impoundment Top Slope and Side Slopes

The tailings impoundment, completed in 1996, occupies 265 acres and protrudes between granite outcrops. The outcrops split the tailings impoundment into two lobes in the northwest valley (NWV) (PL-9) and the southwest valley (SWV) (PL-10). The cover in the NWV consists of a rock layer overlain by a revegetated soil and rock mulch matrix, whereas the remaining cover consists of only a rock layer for erosion protection. The NWV lobe also includes a system of three swales that run east and west. There were no signs of erosion, settlement, or other modifying processes on the tailings impoundment cover that might affect its integrity.

Since construction of the final reclamation cover and before the site transitioned to LM, shrubs and grasses had established on the tailings impoundment and side slopes (PL-11) (DOE 2010). During the 2025 inspection, two deep-rooted plants, a Russian olive on the north side of the disposal cell (PL-12) and a limber pine between the edge of the disposal cell and side slope (PL-13), were identified and were removed during the 2025 maintenance trip. No negative performance impacts of established vegetation on the disposal cell have been identified (DOE 2023). No other maintenance needs were identified.

7.4.2.2 Tailings Impoundment Drainage and Diversion Channels, Toe Drains, and Apron

The site stormwater diversion system was designed to control surface water flows from impacting the disposal area by conveying surface water away from the reclaimed tailings impoundment. The site stormwater diversion system consists of four diversion ditches: the North Diversion Channel (PL-14), the South Diversion Channel, the North-Central Diversion Channel (PL-15), and the South-Central Diversion Channel (PL-16). In addition, three riprap-lined swales (P-17) are constructed on top of the reclaimed tailings impoundment to direct flood flows into the North Diversion Channel. Riprap erosion aprons and scour trenches were constructed at the outlets of all the diversion ditches to prevent headcutting and long-term erosion.

The site stormwater diversion system was designed to accommodate runoff from probable maximum precipitation water volumes. The North-Central and South-Central Diversion Channels protect the impoundment and drain water that flows off the impoundment cover. The North Diversion Channel intercepts flows from the higher terrain north and east of the tailings impoundment and conveys them to the west. The South Diversion Channel intercepts flow from the higher terrain south of the tailings impoundment and conveys them to the southwest. No maintenance needs were identified.

Since construction and before the site transitioned to LM, deep-rooted vegetation has established in the stormwater diversion system (DOE 2023). Inspectors noted volunteer growth of deep-rooted species within the stormwater diversion system; however, no negative performance impacts have been identified from their presence (PL-18). No maintenance needs were identified.

7.4.2.3 Site Perimeter and Balance of Site

Before the site transitioned to LM, erosion was repaired on the south side slope of the granite outcrop that has deposited sediment in the South Diversion Channel. Further repair of the erosion is not anticipated because potential erosion in that portion of the site is not expected to significantly impact the function of the channel or any other engineered structure. The tertiary road leading to the erosional repair area has some minor rills (PL-19). Riprap material was added during the 2025 maintenance trip to help mitigate the rills. This area will continue to be monitored during future inspections. No additional maintenance needs were identified.

Private land is inside and surrounds the site boundary. The balance of the site includes granite outcrops, riparian areas along the Sweetwater River, a former borrow area, revegetated slopes and flats, and native rangelands. Inspectors looked for changes in development in the surrounding areas, which could be development or expansion of human habitation, erosion, road building, oil and gas development, or other changes in land use. No signs of intrusion or other activities were identified on these properties during the 2025 inspection that may affect site protectiveness. Vegetation is well-established with few exceptions within the long-term surveillance boundary (LTSB), which are continually monitored during observational site visits. There is a sand blowout area (PL-20) in reclaimed areas between rock outcrops in the interior of the Split Rock site. In these areas, pretransition grass reseeding efforts have failed, and plant cover has been very sparse in the past. During the 2025 inspection, it was noted that there seemed to be more vegetation growing in the blowout area than in the past. The blowout area is near Ore Road and previously was a grazing area but was closed off to livestock because the vegetation was so sparse. The vegetation in this area seemed to be about the same as the following year. No adverse effects of vegetation establishment were identified. No maintenance needs were identified.

Use of livestock well WN-24 was established between WNI, the former site licensee, and the same rancher who is currently grazing at the site with an LM grazing license. There was no evidence before the site transitioned to LM that the well had been affected by processing-related groundwater contamination. The grazing license allows the rancher to pump water for livestock watering purposes and to use the watering facility. During the 2025 inspection, approximately 10 head of bulls were in this area. No maintenance needs were identified.

Flood irrigation practices are used for hay production in accordance with a grazing license with a local rancher that were in place before the site transitioned. As a result, between May and August, portions of the site northwest of Ore Road were flooded and inaccessible. The hay field had dried up and no water was present. A small feature near the Sweetwater River and west of Ore Road in the hay appeared to be disturbed and had no vegetation (PL-21). Continued monitoring of this location will be done. The hay had been cut, baled, and removed from the hay fields before the 2025 inspection. No maintenance needs were identified.

7.4.2.4 Outlying Areas

The surrounding land is primarily used for livestock grazing and recreation. The area beyond the site boundary for 0.25 mile was visually observed for changes in land use, developments, or other phenomena that might affect the long-term integrity of the site. No changes were identified.

7.5 Follow-Up Inspections

LM will conduct follow-up inspections if (1) a condition is identified during the annual inspection or other site visit that requires a return to the site to evaluate the condition or (2) LM is notified by a citizen or outside agency that conditions at the site are substantially changed. No need for a follow-up inspection was identified during the inspection.

7.6 Routine Maintenance and Emergency Measures

In accordance with the LTSP (DOE 2023), routine site maintenance will be performed by LM as needed. Maintenance to the tailings impoundment fence is anticipated to occur annually. Following the August 2025 inspection, the maintenance crew performed the following maintenance items:

- Repaired the fence along Ore Road
- Mowed along the fence on Ore Road and along the tertiary roads
- Installed 10 new perimeter signs
- Removed deep-rooted vegetation from the disposal cell
- Top-dressed the rills on the tertiary road with gravel

Inspectors and the maintenance crew documented the following minor maintenance items during the 2025 field activities to be addressed in the future:

- Remove the old granite site marker
- Spray vegetation along the fence line on Ore Road
- Finish placing signs on signposts

Emergency measures are corrective actions that LM will take in response to unusual damage or disruption that threatens or compromises site health and safety, security, integrity, or compliance with 40 CFR 192. No emergency measures were identified.

7.7 Environmental Monitoring

In accordance with the LTSP (DOE 2023), groundwater and surface water monitoring are required at the site to ensure that (1) site-related contamination does not adversely impact groundwater or surface water use outside of the LTSB and (2) the disposal cell performs as expected. The long-term monitoring program will also be used to confirm that no unexpected changes in site conditions occur (including changes in the behavior of the legacy plume), downward contaminant trends continue, and the protectiveness at the point of exposure (POE) is maintained under long-term management. In accordance with the LTSP (DOE 2023), DOE will conduct annual groundwater and surface water monitoring until at least 2029 (for the first 5 years following transition). The four COCs identified for long-term monitoring are nitrate as N, selenium, sulfate, and uranium (DOE 2023).

The long-term monitoring network at the site includes 12 monitoring wells and four surface water monitoring locations along the Sweetwater River. These locations, shown in Figure 7-2 and described in Table 7-2, are divided into two flow regimes: the NWV flow regime and the SWV flow regime.

Each flow regime has a designated POC well, to which ACLs are applied. ACLs will be used under long-term management for comparison to measured results as a possible indication of cell performance and compliance with protective standards applicable at the POE. POC wells WELL-5 and WN-21 are the designated POCs for the NWV and SWV flow regimes, respectively. The river coincides with the northern boundary of the site and represents the most likely POE for site-related contamination.

The NWV monitoring program consists of four groundwater wells between the disposal cell and the Sweetwater River. It also includes four surface water monitoring points along the river: one upstream of the site, two points on the northern LTSB to monitor contaminant levels of discharge from the NWV groundwater contaminant plume, and a downstream sampling location. The SWV groundwater monitoring network consists of eight groundwater wells between the disposal cell and the two potential points of exposure: the Sweetwater River and groundwater supply wells near Jeffrey City. LM monitors the Sweetwater River locations but not the Jeffrey City supply well.¹

¹ As documented in the LTSP (DOE 2023), the Jeffrey City supply well is in an area upgradient of the site that is unaffected by site-related contamination and is likely to be in the future. Modeling completed by Shepherd Miller Inc. for WNI (WNI 2000) showed that constant and prolonged pumping of an extraction well at rates much higher than currently in use would take hundreds of years to draw site-related contamination to the Jeffrey City area.

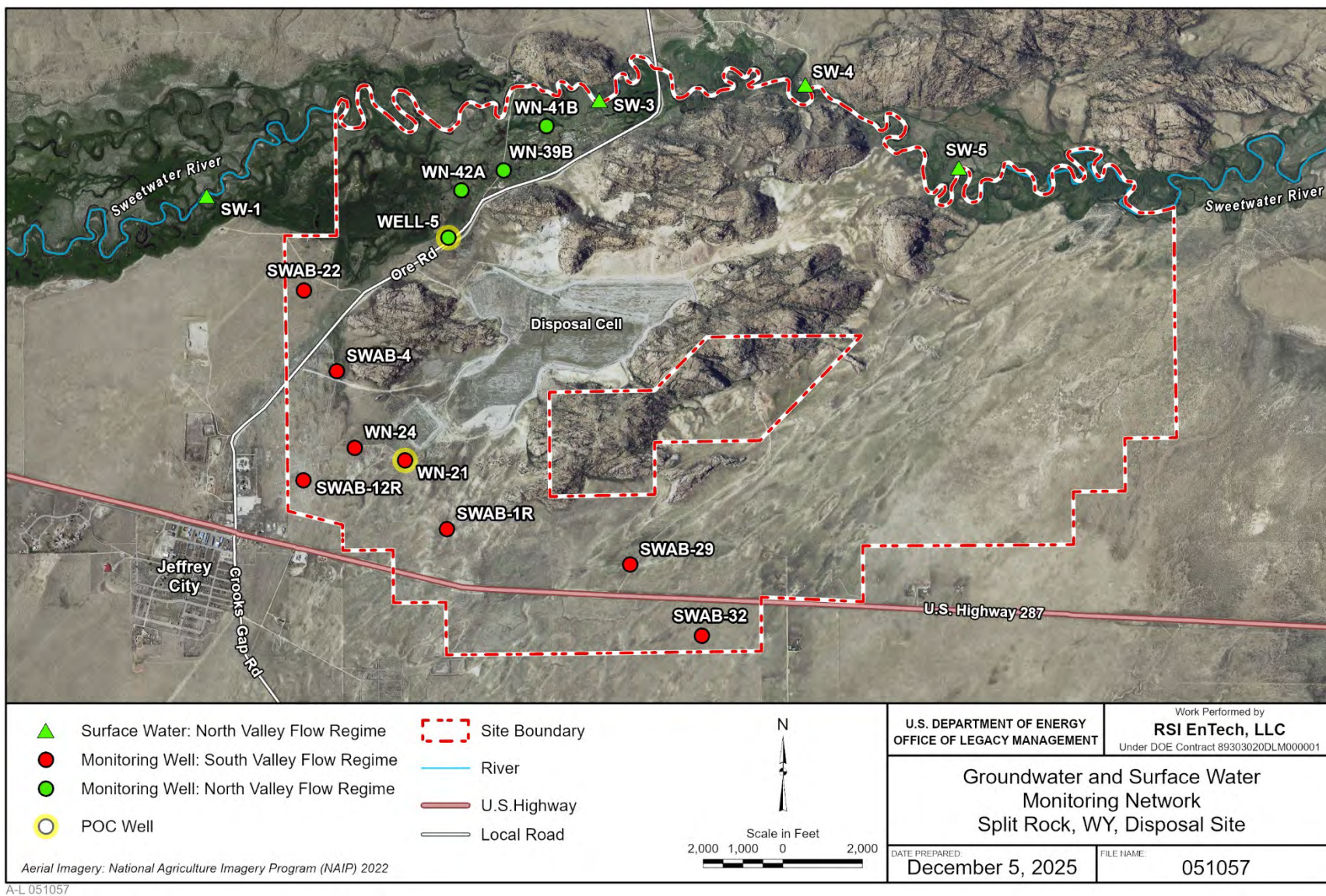


Figure 7-2. Groundwater and Surface Water Monitoring Network at Split Rock, Wyoming, Disposal Site

*Table 7-2. Groundwater and Surface Water Monitoring Network
at the Split Rock, Wyoming, Disposal Site*

Monitoring Location	Description and Network Application
NWV Flow Regime	
WELL-5	POC well.
WN-42A	Well where seepage from tailings meets the floodplain alluvial aquifer.
WN-39B	Downgradient of well WN-42A in the floodplain alluvial aquifer flow path.
WN-41B	Well location closest to the river; best available location remaining to indicate concentrations discharging to river (designated boundary well).
SW-1	Historical upstream and background surface water location (offsite).
SW-3	Surface water POE location at predicted NWV plume discharge point.
SW-4	
SW-5	Historical downstream-most surface water location.
SWV Flow Regime	
WN-21	POC well.
SWAB-12R	Well at southwest corner of site installed in 2009, between the site and Jeffrey City. Represents groundwater quality for groundwater flowing offsite in the Split Rock Formation regional aquifer (designated boundary well).
SWAB-1R	Also installed in 2009, pretransition, this well had the highest uranium and nitrate concentrations, with both exceeding applicable standards.
SWAB-29	Downgradient-most location in the SWV flow regime; location intended to track plume movement.
SWAB-32	Well at southern border of site (designated boundary well).
SWAB-4	Ongoing plume monitoring but also referred to as a boundary well in the LTSP.
WN-24	Well used for stock watering.
SWAB-22	SWV flow regime sentinel well (designated boundary well).

Notes:

Table adapted from Table 7 of the LTSP (DOE 2023).

Table 8 of the LTSP describes the corresponding analytes and how the monitoring frequency will be evaluated periodically (annual to triennial evolution).

Table 7-3 documents the ACLs and State of Wyoming groundwater and surface water protection standards as listed in Table 9 of the LTSP (DOE 2023).

Table 7-3. ACLs and Groundwater and Surface Water Protection Standards for Long-Term Monitoring at the Split Rock, Wyoming, Disposal Site

Analyte	ACLs ^a (mg/L)		State of Wyoming Groundwater Standard (mg/L)		Surface Water Standard (mg/L) ^d
	NWV POC WELL-5	SWV POC WN-21	Domestic Use ^b	Livestock Use ^c	
Uranium ^e	4.8	3.4	NA ^e	NA	0.03
Nitrate	317	500	10	NA	10
Selenium	0.3	0.05	0.05	0.05	0.005
Sulfate	NA	NA	250	3000	NA

Source: Table 9 of the LTSP (DOE 2023)

Notes:

^a ACLs were initially established for ammonia, manganese, molybdenum, radium-226, and radium-228 (see Table 3 of the LTSP), but these analytes were not retained as indicator constituents in the long-term monitoring program (DOE 2023).

^b Standards are Wyoming Class I Groundwater Protection Standards for domestic use and applicable at the POE.

^c Standards are Wyoming Class III Groundwater Protection Standards for livestock use and applicable at the POE.

^d Standards are Human Health Values for Fish and Drinking Water that are applicable to Wyoming Class 2AB surface waters. This designation applies to the portion of the Sweetwater River that defines the site's northern boundary (and POE). Compliance with the chronic selenium standard is required.

^e State of Wyoming Groundwater Protection standards do not specify standards for uranium. In these cases (lack of a state standard), standards typically default to the federal drinking water standard (0.03 mg/L for uranium). However, because background uranium concentrations established for both the floodplain alluvial and Split Rock aquifers (0.044 and 0.087 mg/L, respectively [DOE 2023, Table E-1]) exceed the federal standard, the trigger values in Table 4 of the LTSP are also used for comparison (see Table 7-4).

Abbreviation:

NA = not applicable (shaded cells)

According to the LTSP, ACLs, established by WNI and approved by NRC before site transition to LM, apply only “during operations and prior to the end of closure” (10 CFR 40, Appendix A, Criterion 5). Therefore, they are not considered enforceable groundwater protection standards under LM long-term management. These ACLs will be used for comparison to measured results as a possible indication of cell performance and compliance with protection standards applicable at the POE (DOE 2023). State of Wyoming surface water protection standards are enforceable at the POE, the Sweetwater River. The Sweetwater River is the predicted discharge point of site-related contamination, and Wyoming Class 2AB standards are applicable. Wyoming Class III agricultural Groundwater Protection Standards for livestock use are applicable at the livestock well WN-24.

Wyoming Class I domestic use groundwater protection standards are applicable at the LTSP, including five designated boundary wells: WN-41B in the NWV flow regime, and SWAB-32, SWAB-12R, SWAB-4, and SWAB-22 in the SWV flow regime. Because the LTSP includes some special provisions for these “boundary” wells, including the application of trigger levels, Table 7-4 is provided to clarify the differing applications of limits and standards in the LTSP and to facilitate the interpretation of results in Section 7.7.1.2.

Table 7-4. Summary of Standards and Trigger Levels Applicable to Individual Wells at the Split Rock, Wyoming, Disposal Site

Monitoring Location ^a	Purpose ^b	Applicable Standard or Trigger Value			
		Uranium	Nitrate as N	Selenium	Sulfate
NWV Flow Regime Wells					
WELL-5	POC	4.8 ^c	317 ^c	0.3 ^c	NA
WN-42A	NA	No Applicable Standard			
WN-39B	NA				
WN-41B	Boundary	0.03 ^e /0.044 ^d	10 ^{d,e}	0.05 ^e	250 ^e
SWV Flow Regime Wells					
WN-21	POC	3.4 ^c	500 ^c	0.05 ^c	NA
SWAB-1R	NA	No Applicable Standard			
SWAB-29	NA				
SWAB-32	Boundary	0.3 ^f	10 ^{e,f}	0.05 ^e	250 ^e
WN-24	Livestock Well	NA ^g	NA ^g	0.05 ^g	3000 ^g
SWAB-12R	Boundary	0.03 ^e /0.087 ^f	10 ^{e,f}	0.05 ^e	250 ^e
SWAB-4 ^h	Boundary ^h	0.03 ^e /0.044 ^d	10 ^{d,e}	0.05 ^e	250 ^e
SWAB-22	Boundary	0.03 ^e /0.044 ^d	10 ^{d,e}	0.05 ^e	250 ^e

Notes:

All units are in milligrams per liter or mg/L.

^a Wells are ordered by flow regime, in an order generally consistent with flow direction and, for the SWV wells, overall location. SWV east wells are listed first, followed by remaining SWV wells (to the west and north).

^b Purpose is listed only for wells identified as POC or boundary wells in the LTSP to which water quality standards or trigger levels apply. Shaded rows denote wells that have no applicable standards.

^c The ACL is from Table 7-3.

^d Floodplain alluvium trigger value from Table 4 of the LTSP. The trigger value for uranium exceeds the federal drinking water standard of 0.03 mg/L because background groundwater quality (Table E-1 of the LTSP) exceeds this standard.

^e Federal drinking water standard in accordance with the LTSP (DOE 2023).

^f Split Rock site aquifer trigger value from Table 4 of the LTSP. The higher value for uranium for SWAB-32 reflects naturally occurring elevated concentrations at that location (DOE 2023).

^g Livestock use standard from Table 7-3; there are no state livestock standards for nitrate or uranium.

^h Although SWAB-4 is classified as a boundary well, Table 7 of the LTSP identifies SWAB-4 as being within the contaminant plume and acknowledges that contaminant concentrations at this location are consistently higher than those at the nearest downgradient well, boundary well SWAB-22 (DOE 2023).

Abbreviation:

NA = not applicable (no applicable standard or trigger level)

As discussed in Section 7.1, two sampling events have been conducted since the site transitioned to DOE in November 2023: the first in early August 2024, and the second on August 21, 2025. Groundwater elevation data presented in the following section are current through August 2025. However, because of the timing of the annual sampling events, there is a 1-year lag in reporting for water quality data. As such, with respect to groundwater and surface water quality, this report documents the results of the first posttransition annual sampling event. Water quality data from the 2025 sampling event will be documented in the next (2026) version of this report. In both 2024 and 2025, field measurements and water quality samples were collected at each of the 16 locations shown in Figure 7-2. Historical water quality data and groundwater elevation data are available at <https://gems.lm.doe.gov> through the Geospatial Environmental Mapping System (GEMS).

7.7.1 Groundwater Monitoring

7.7.1.1 Water Level Monitoring

In accordance with Section 3.7.1 of the LTSP, Figure 7-3 posts the most recent (2025) groundwater elevation data along with generalized flow directions based on characterizations in the LTSP (DOE 2023).² Corresponding hydrographs for all locations are shown in Figure 7-4. In this figure, and in the subsequent time-concentration plots for individual COCs provided in Section 7.7.1.2, plots for individual wells are ordered by flow regime. NWV wells are in the top row, SWV east wells are in the second row, and data for the remaining SWV wells (to the west and north) are shown in the bottom row. For both NWV and SWV flow regimes, the POC wells are listed first in these figures.

Figure 7-4 shows overall declining groundwater elevation trends in most wells, with the declines likely attributed to declines in precipitation. Although not apparent in the figures, groundwater elevations in the NWV wells are more variable given proximity to the Sweetwater River and influences from high flow (snowmelt) periods. Tailings drainage and pumping are other possible factors accounting for the groundwater elevation declines, but neither factor is likely at this site. As noted in the LTSP, since tailings and water disposal in the impoundments ceased in 1986, drainage into the underlying system has greatly diminished, and the groundwater mound in the immediate area of the impoundment has largely dissipated (DOE 2023). Pumping in the region is minimal.

² Although chemical data from the 2025 sampling event were not available at the time this report was developed (the data had not been validated), water level data from that event are available and are reflected here.

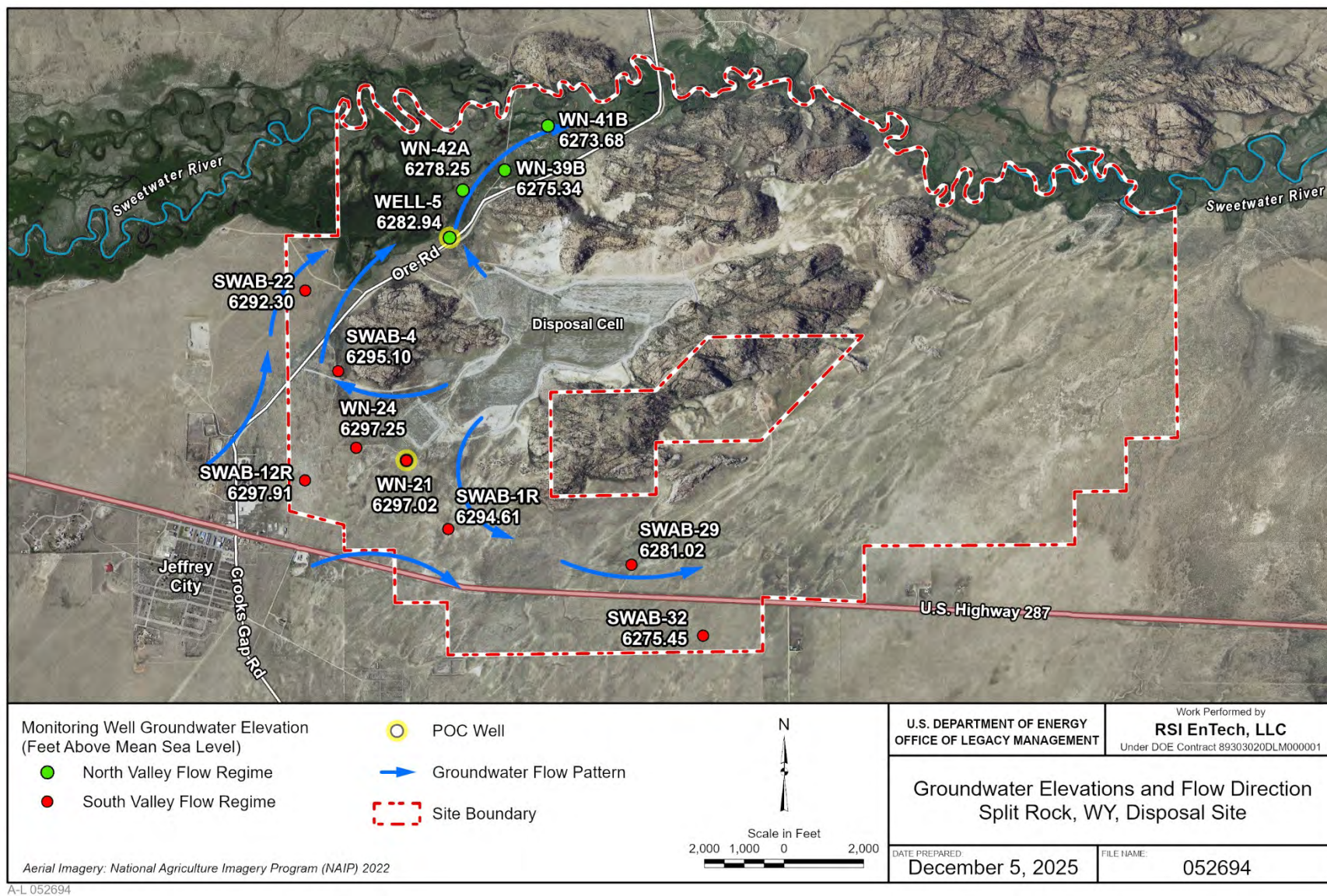
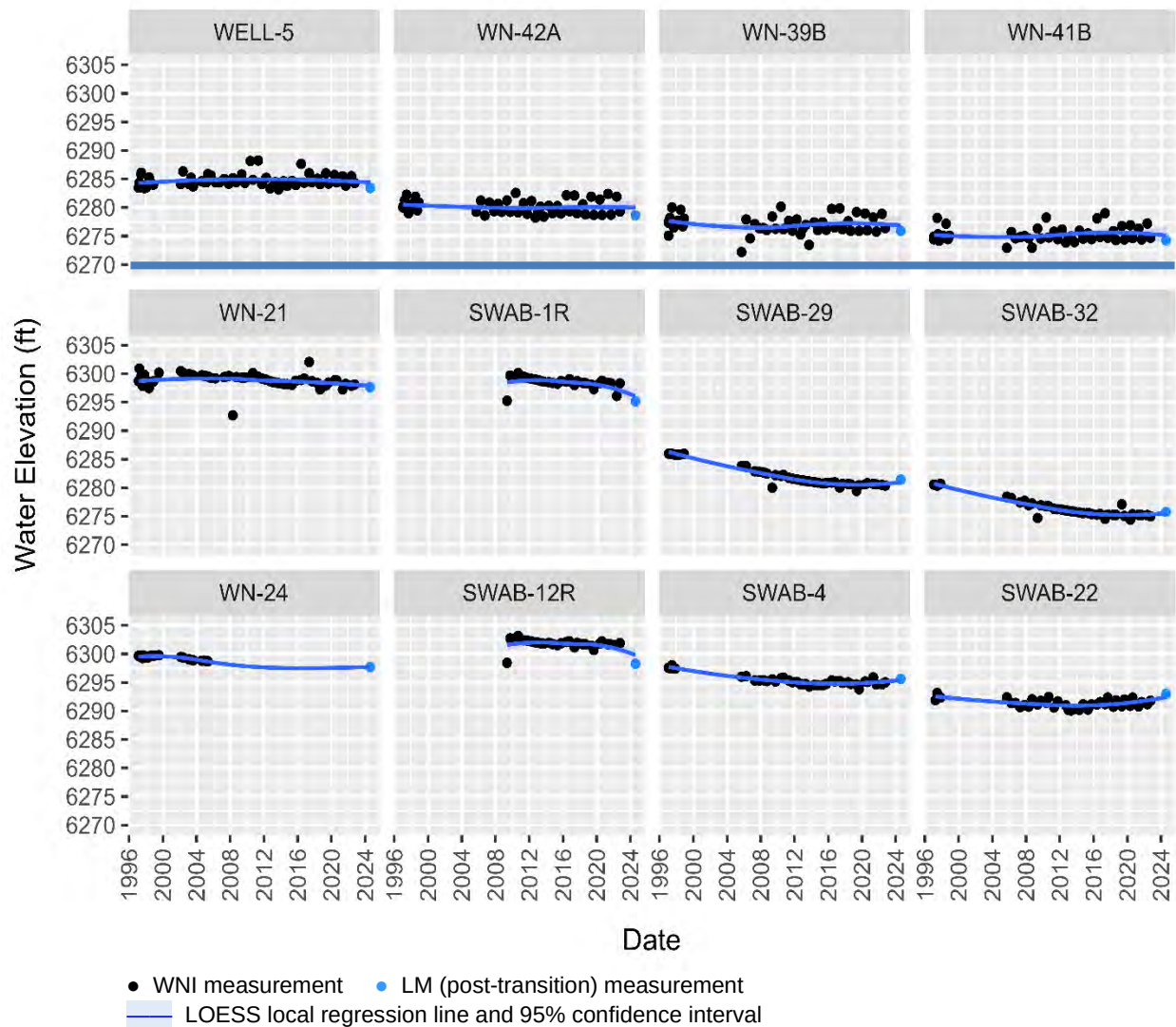


Figure 7-3. Groundwater Elevations at the Split Rock, Wyoming, Disposal Site



Note: Wells are ordered by flow regime, with NWV wells in the top row, SWV east wells in the second row, and remaining SWV wells (to the west and north) in the bottom row.

Figure 7-4. Groundwater Elevations in All Split Rock Site Wells, 1996–2025

7.7.1.2 Groundwater Quality Monitoring

In accordance with Section 3.7.1 of the LTSP, this section provides concentration versus time graphs for the four COCs for all groundwater monitoring locations. Analytical results are compared with the ACLs and State of Wyoming water quality standards listed in Table 7-3. Uranium results are also compared to the federal drinking water standard referenced in the LTSP (0.03 mg/L) as shown in Table 7-4. Groundwater monitoring results from the first posttransition (August 2024) sampling event are listed in Table 7-5.

Table 7-5. August 2024 Groundwater Monitoring Results, Split Rock, Wyoming, Disposal Site

Monitoring Location	Purpose	Uranium	Nitrate as N	Selenium	Sulfate ^a
NWV Flow Regime Wells					
WELL-5	POC	1.34	98.8	0.017	1280
WN-42A	NA	0.72	ND	0.062	1810
WN-39B	NA	0.40	29.9	0.0082	372
WN-41B	Boundary	0.0091	0.15	ND	367 ^a
SWV Flow Regime Wells					
WN-21	POC	2.1	90.4	0.017	1160
SWAB-1R	NA	1.3	103	0.002	722
SWAB-29	NA	0.013	0.097	ND	39.7
SWAB-32	Boundary	0.12	1.6	0.0097	44.9
WN-24	Livestock Well	0.039	10.5	0.0023	81.8
SWAB-12R	Boundary	0.036 ^b	0.54	0.0057	76
SWAB-4	Boundary	0.91 ^c	19.1 ^c	0.011	456 ^a
SWAB-22	Boundary	0.024	1.0	ND	44.4

Notes:

Analytical results are rounded to 2 to 3 significant figures, depending on the magnitude of the result or the number of significant digits in the corresponding applicable standard. Detailed results are reported in GEMS and can be accessed at <https://gems.lm.doe.gov>.

Corresponding ACLs or standards are listed in Table 7-4. Results listed in red denote exceedances of the corresponding federal drinking water standard warranting notification to NRC and WDEQ in accordance with the LTSP (DOE 2023). LM issued this letter on November 19, 2025 (DOE 2025); this letter included explanations of the discrepancies discussed in Notes “b” and “c”.

^a Sulfate is included as an analyte in the LTSP due to its use in flow and transport modeling in support of the ACL application but is not considered a hazardous constituent and exceedances are not required to be reported (DOE 2023).

^b Uranium concentrations at SWAB-12R have historically exceeded the federal standard. However, 2024 results do not exceed the corresponding trigger (background) value for the Split Rock aquifer (0.087 mg/L) listed in Table 7-4 and in Table 4 of the LTSP (DOE 2023).

^c While SWAB-4 is classified as a boundary well in the LTSP, Table 7 of the LTSP identifies SWAB-4 as being within the contaminant plume and acknowledges that contaminant concentrations at this location are consistently higher than those at the nearest downgradient well, boundary well SWAB-22 (DOE 2023).

Abbreviation:

ND = not detected (<0.017 and 0.0015 mg/L for nitrate and selenium, respectively)

Figure 7-5 through Figure 7-8 provide time-concentration plots for each Split Rock site monitoring well and COC combination. The most recent (August 2024) results are labeled in the lower right corner of each plot; all figures show the applicable ACLs or groundwater standards listed in Table 7-3. In these figures, all data since 1977 are plotted, including data from WNI, before transfer to DOE. Given the recent site transition, LM considered plotting data for a shorter time frame (e.g., starting in 2009, when wells SWAB-1R and SWAB-12R were installed). However, doing so would exclude earlier data that provide a context for evaluating current (posttransition) results, most notably at well WN-21, as discussed below.

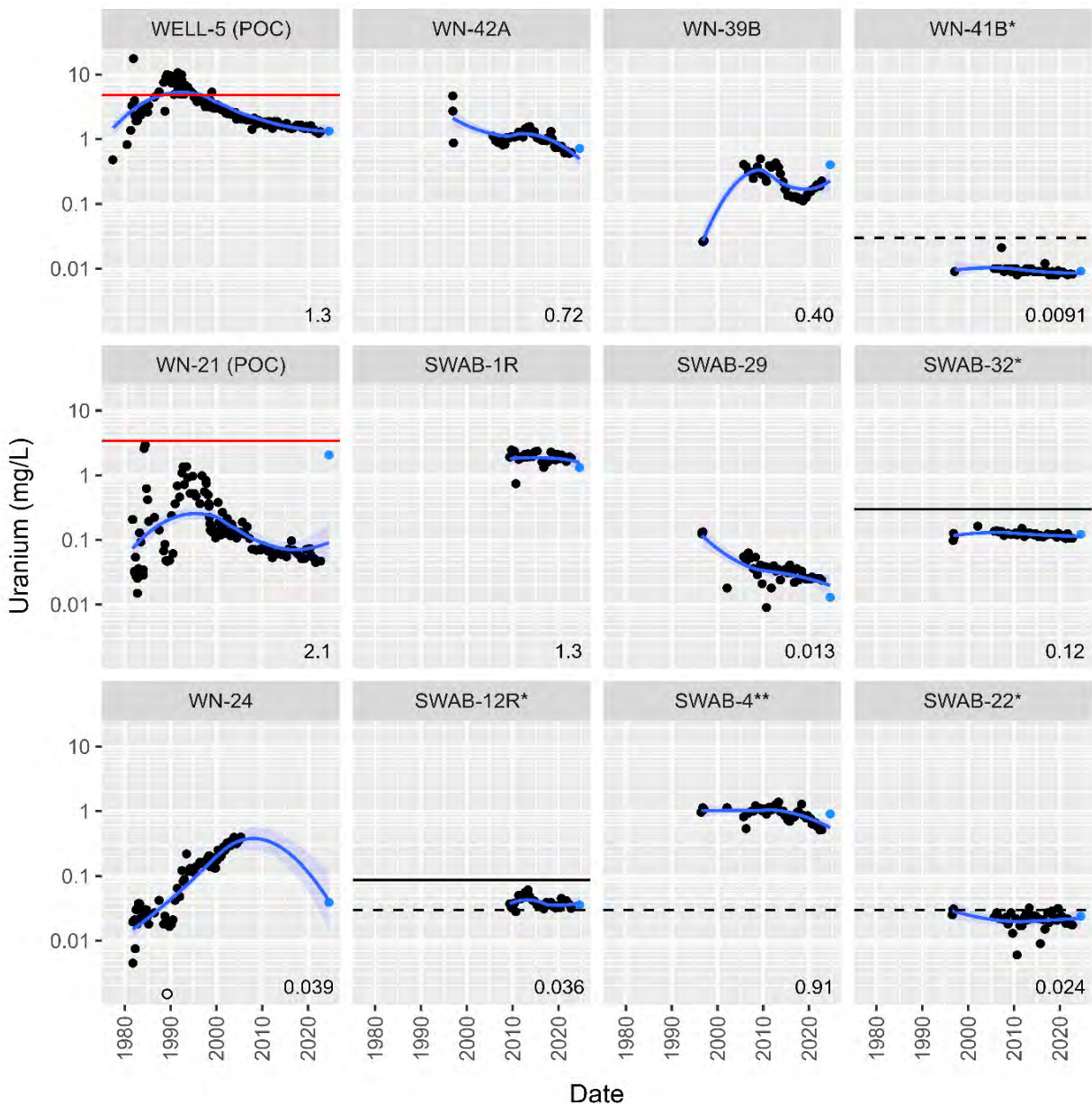
Before proceeding with the discussion of the groundwater monitoring results shown in Figure 7-5 through Figure 7-8, it is important to identify the discrepancies in the LTSP that account for the three exceedances identified in Table 7-5. Section 3.7.1 of the LTSP states that if a drinking water standard for nitrate (as N), selenium, and uranium—10 mg/L, 0.05 mg/L, and 0.03 mg/L, respectively—is exceeded at a boundary well (or if a livestock standard is exceeded at stock watering well WN-24), DOE will notify both NRC and WDEQ. The exception is that SWAB-32 would need to exceed 0.3 mg/L for uranium for notification to occur (DOE 2023). Several clarifications are warranted regarding this provision, with respect to (1) the specific wells that qualify as “boundary” wells and (2) the appropriate standards to be applied to those wells, in particular wells SWAB-4 and SWAB-12R.

The LTSP identifies SWAB-4 as a boundary well in two instances, but only parenthetically (in Section 3.7.1, repeating language from Appendix E) (DOE 2023). This characterization conflicts with more clarifying language provided in Table 7 of the LTSP, which identifies SWAB-4 as being within the uranium and nitrate plumes, with concentrations consistently higher than those at the nearest downgradient well, boundary well SWAB-22. This finding is evident in Figure 7-5 through Figure 7-8, which also illustrate that, with few exceptions, drinking water standards for uranium, nitrate, and sulfate have always been exceeded at this location. The August 2024 exceedances—0.91 and 19.1 mg/L uranium and nitrate, respectively (Table 7-5)—are consistent with historical pretransition measurements, nearly all of which have exceeded corresponding groundwater protection standards of 0.03 and 10 mg/L (Figure 7-5 and Figure 7-6).

The 2024 uranium result for well SWAB-12R (0.036 mg/L) also exceeds the 0.03 mg/L drinking water standard, as do all but one of the historical measurements. For this reason, a trigger value of 0.087 mg/L was assigned in the LTSP to account for elevated background levels of uranium.

In accordance with the LTSP, LM notified NRC of these exceedances on November 19, 2025 (DOE 2025). In this letter, LM requested that NRC waive the notification requirement for these well-analyte combinations—uranium in well SWAB-12R and uranium and nitrate in SWAB-4—given the discrepancies in the LTSP discussed above.

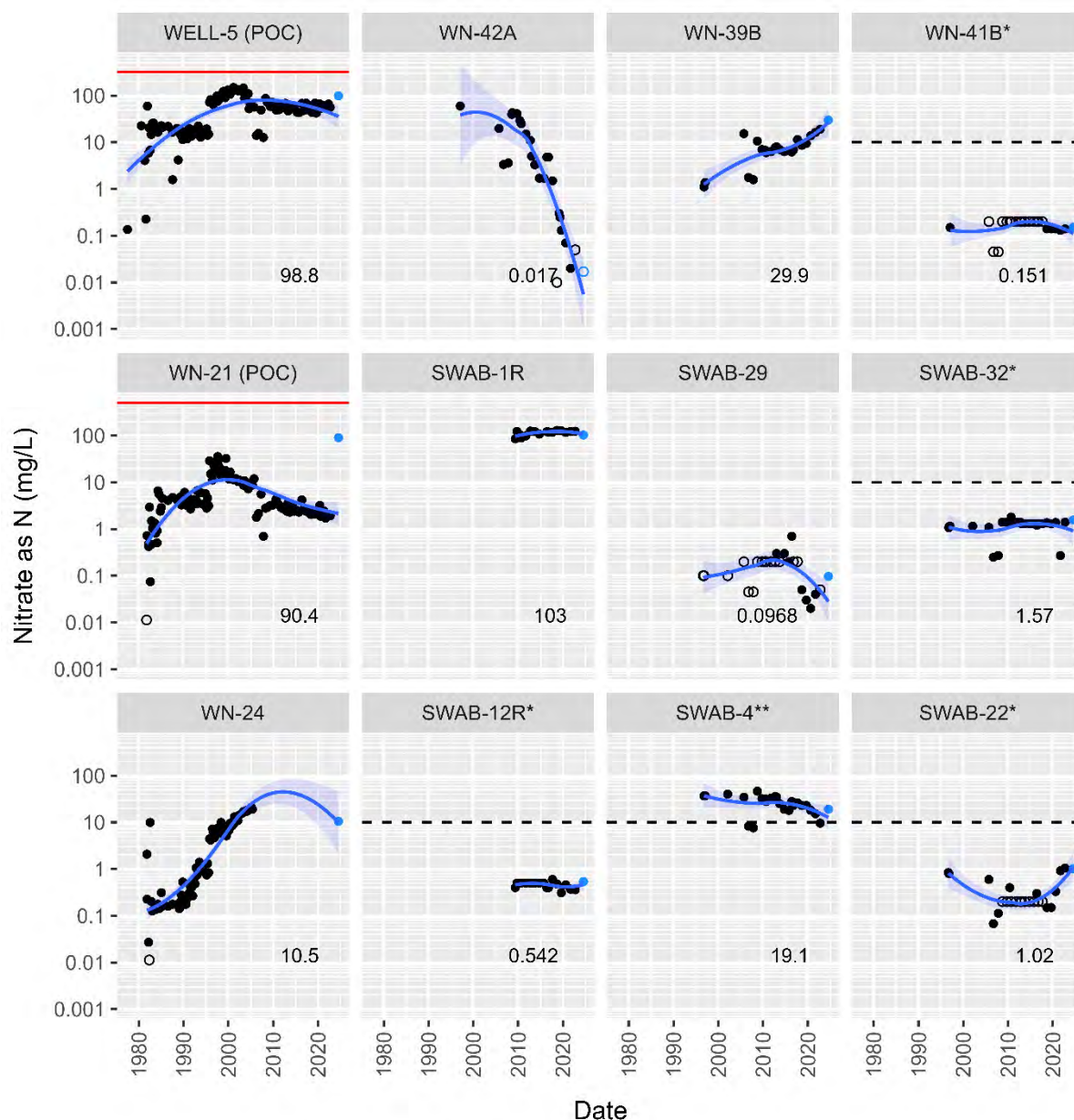
Uranium concentrations (Figure 7-5) in the POC well for the NWV flow regime, WELL-5, continue to decline from peak concentrations in the early 1990s. Concentrations appear stable during recent years. The 2024 sample concentration is below the accepted ACL of 4.8 milligrams per liter (mg/L) and appear consistent with previous trends. In well WN-21, the POC well for the SWV flow regime, an increase in uranium concentration to 2.1 mg/L is not consistent with recent trends, exceeding even early-mid 1990s values but remaining within the total historical range for uranium concentrations at this well.



- Detect-WNI ○ Nondetect-WNI ● Detect-DOE ○ Nondetect-DOE
- LOESS local regression line and 95% confidence interval
- ACL
 - 4.8 mg/L applied to POC well WELL-5, NWV flow regime
 - 3.4 mg/L applied to POC well WN-21, SWV flow regime
- - - 0.03 mg/L federal drinking water standard applied to all boundary wells except SWAB-32
- Split Rock site aquifer trigger values from Table 4 of the LTSP
 - 0.3 mg/L applied to SWAB-32
 - 0.087 mg/L applied to well SWAB-12R

Notes: The most recent (August 2024) results are labeled in the lower right corner of each plot. Well names followed by an asterisk (*) denote boundary wells identified in the LTSP (DOE 2023). SWAB-4 is followed by a double asterisk (**) denoting that while it is classified as a boundary well, Table 7 of the LTSP identifies SWAB-4 as being within the contaminant plume and acknowledges that contaminant concentrations at this location are consistently higher than those at the nearest downgradient well, boundary well SWAB-22 (DOE 2023).

Figure 7-5. Uranium Concentrations in Split Rock Site Wells, 1977–2024



● Detect-WNI ○ Nondetect-WNI ● Detect-DOE ○ Nondetect-DOE

— LOESS local regression line and 95% confidence interval

— ACL

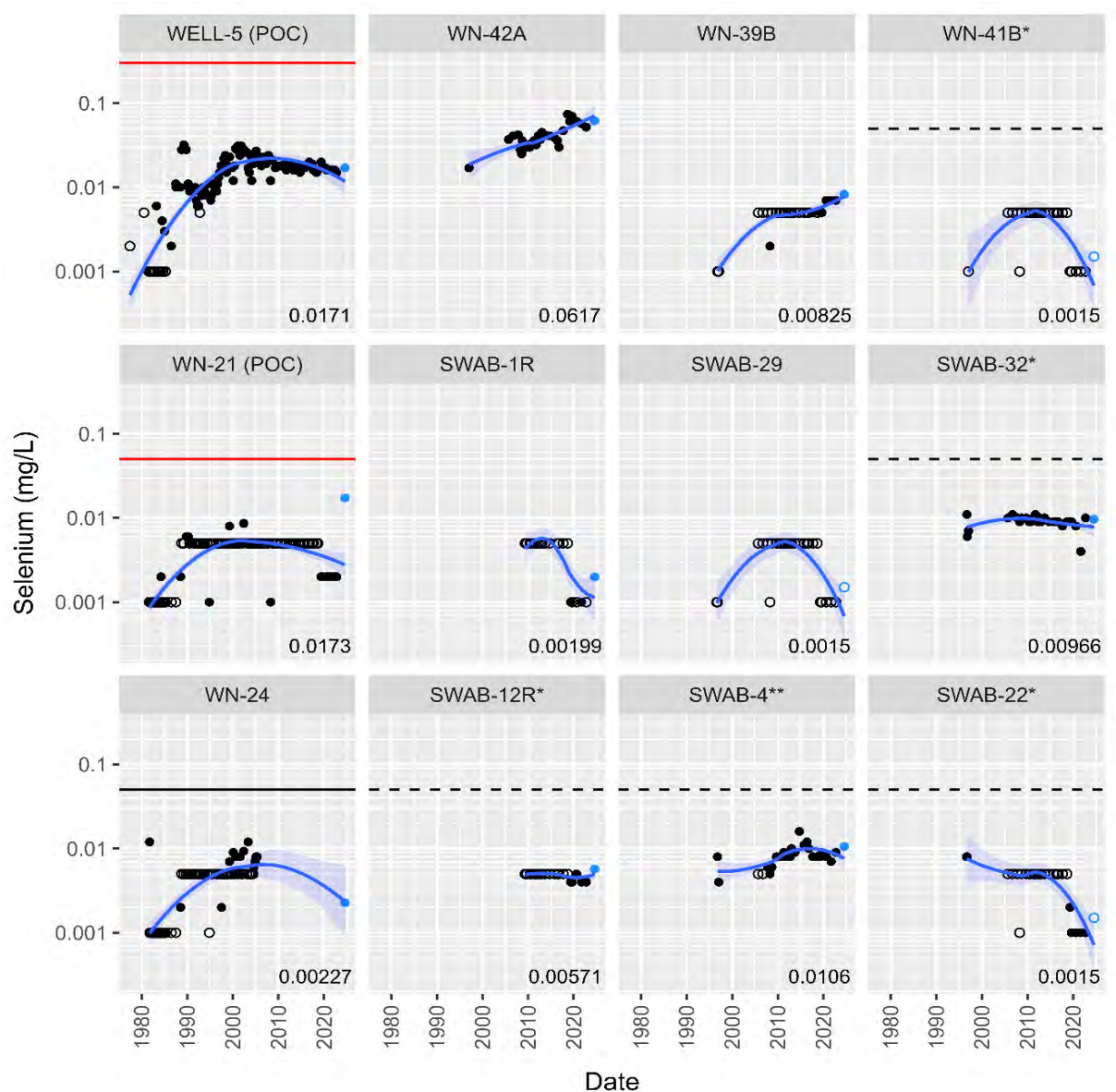
317 mg/L applied to POC well WELL-5, NWV flow regime

500 mg/L applied to POC well WN-21, SWV flow regime

--- State of Wyoming groundwater standard for domestic use (= UMTRCA MCL): 10 mg/L applied to boundary wells (SWAB-12R, SWAB-4, SWAB-22, SWAB-32, and WN-41B)

Notes: The most recent (August 2024) results are labeled in the lower right corner of each plot. Well names followed by an asterisk (*) denote boundary wells identified in the LTSP (DOE 2023). SWAB-4 is followed by a double asterisk (**) denoting that while it is classified as a boundary well, Table 7 of the LTSP identifies SWAB-4 as being within the contaminant plume and acknowledges that contaminant concentrations at this location are consistently higher than those at the nearest downgradient well, boundary well SWAB-22 (DOE 2023).

Figure 7-6. Nitrate Concentrations in Split Rock Site Wells, 1977–2024



● Detect-WNI ○ Nondetect-WNI ● Detect-DOE ○ Nondetect-DOE

— LOESS local regression line and 95% confidence interval

— ACL

0.3 mg/L applied to POC well WELL-5, NWV flow regime

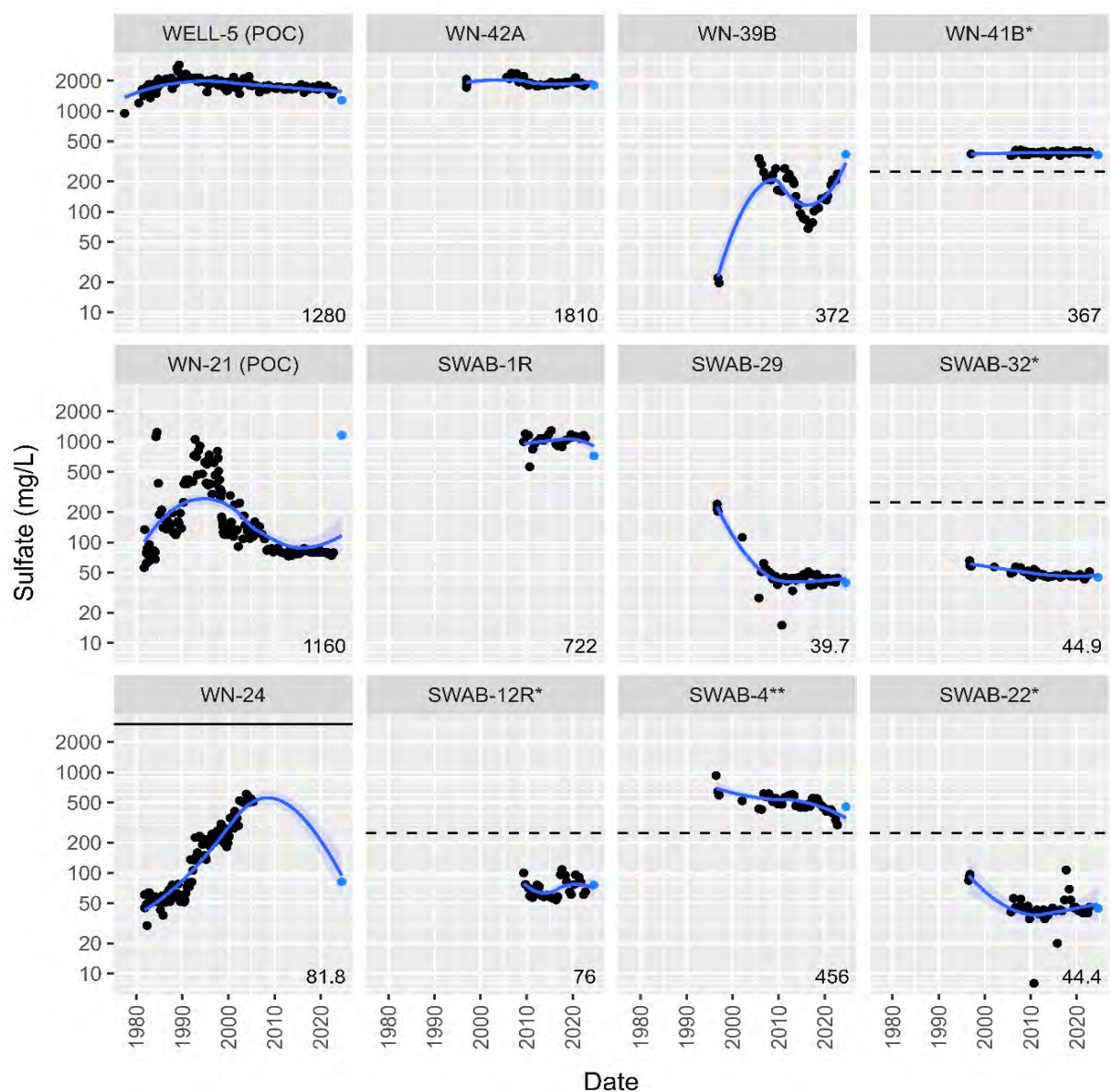
0.05 mg/L applied to POC well WN-21, SWV flow regime

--- State of Wyoming groundwater standard for domestic use (= UMRCA MCL): 0.05 mg/L applied to boundary wells (SWAB-12R, SWAB-4, SWAB-22, SWAB-32, and WN-41B)

— 0.05 mg/L State of Wyoming livestock standard – applied to WN-24 only

Notes: The most recent (August 2024) results are labeled in the lower right corner of each plot. Well names followed by an asterisk (*) denote boundary wells identified in the LTSP (DOE 2023). SWAB-4 is followed by a double asterisk (**) denoting that while it is classified as a boundary well, Table 7 of the LTSP identifies SWAB-4 as being within the (uranium and nitrate) contaminant plumes (DOE 2023).

Figure 7-7. Selenium Concentrations in Split Rock Site Wells, 1977–2024



• Detect-WNI ○ Nondetect-WNI ● Detect-DOE ○ Nondetect-DOE
 — LOESS local regression line and 95% confidence interval
 - - - State of Wyoming groundwater standard for domestic use (= UMTRCA MCL): 250 mg/L applied to boundary wells (SWAB-12R, SWAB-4, SWAB-22, SWAB-32, and WN-41B)
 — 3000 mg/L State of Wyoming livestock standard – applied to WN-24 only

Notes: The most recent (August 2024) results are labeled in the lower right corner of each plot. Well names followed by an asterisk (*) denote boundary wells identified in the LTSP (DOE 2023). SWAB-4 is followed by a double asterisk (**) denoting that while it is classified as a boundary well, Table 7 of the LTSP identifies SWAB-4 as being within the contaminant plume and acknowledges that contaminant concentrations at this location are consistently higher than those at the nearest downgradient well, boundary well SWAB-22 (DOE 2023).

Figure 7-8. Sulfate Concentrations in Split Rock Site Wells, 1977–2024

WN-21 is just downgradient of the tailings, so this increase is not entirely unexpected based on its proximity to the tailings, and may represent a slight shift in groundwater flow patterns. The ACL at this location is 3.4 mg/L, thus, the remedy is still considered protective.

The nitrate concentration (Figure 7-6) at WELL-5 (98.8 mg/L) was similar to recent pretransition concentrations and is below the ACL for this POC well (317 mg/L). This well exhibited less overall decline compared to uranium, likely explained by higher nitrate mobility combined with the degradation of ammonia to nitrate. The nitrate concentration in POC well WN-21 followed a similar trend as the uranium concentration at this well. While the measured concentration of 90.4 mg/L in 2024 is elevated relative to previous results, it remains below the corresponding ACL of 500 mg/L, indicating the remedy is considered protective. No exceedances of Wyoming Class I Groundwater Protection Standards (domestic use) (10 mg/L) were measured at boundary wells, with the exception of well SWAB-4, as discussed above.

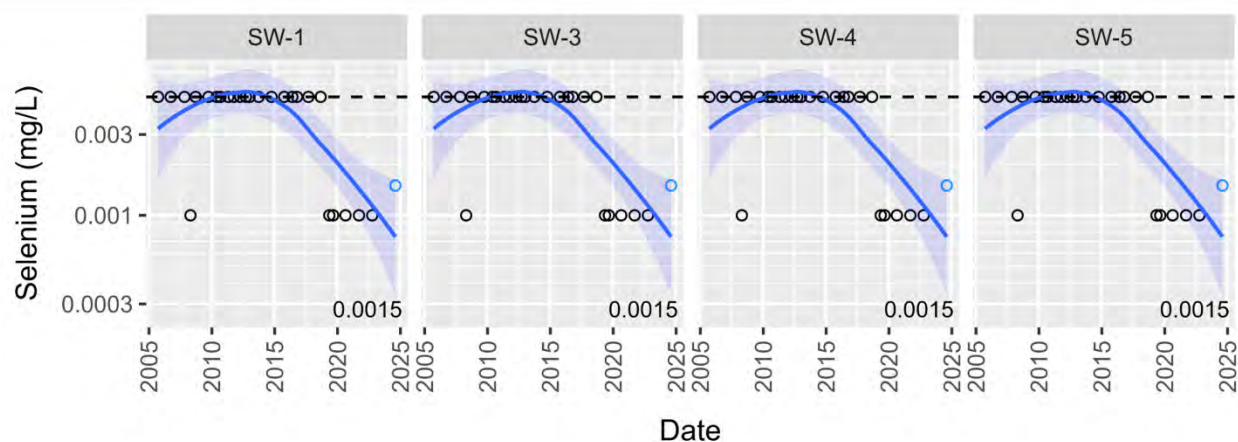
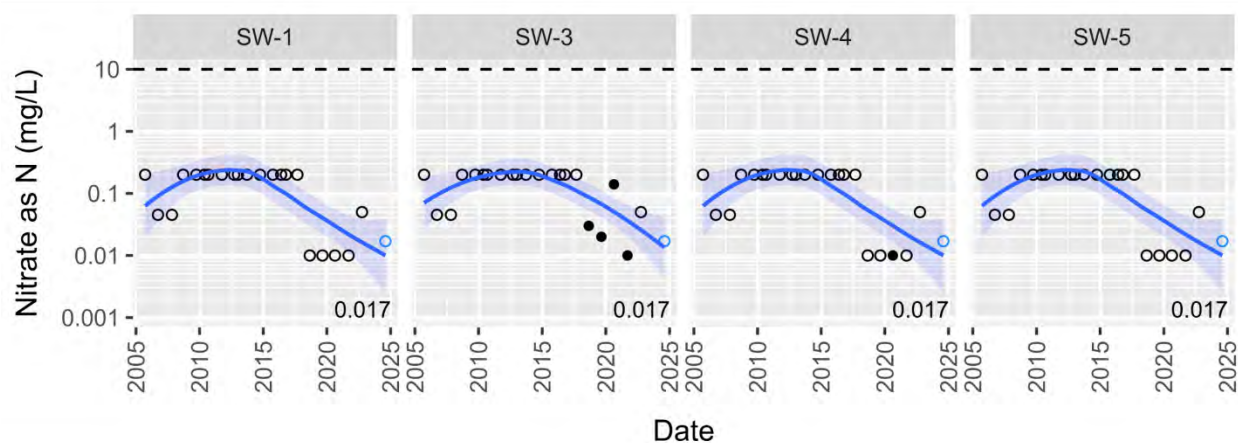
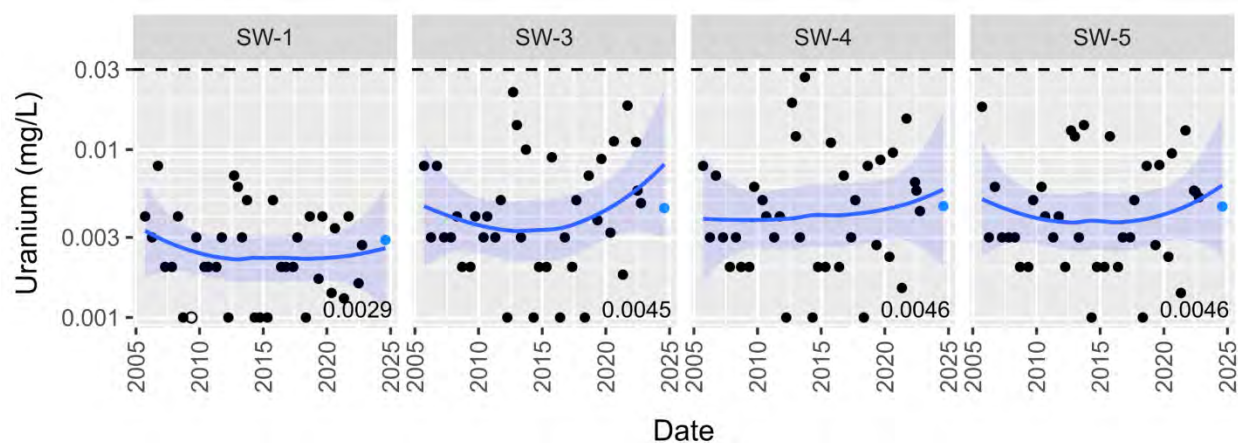
The selenium concentration (Figure 7-7) in POC well WELL-5 in 2024 was 0.017mg/L, which was consistent with previous trends and below both the ACL of 0.3 mg/L for this well and the Wyoming state drinking water standard of 0.05 mg/L. The selenium concentration in POC well WN-21 was 0.0173 mg/L, also consistent with uranium, nitrate, and sulfate concentrations showing an increase from previous trends, though the value remains below both the ACL for this well, which is equal to the Wyoming state drinking water standard of 0.05 mg/L. The Wyoming state drinking water standard was not exceeded at any boundary wells. The selenium increase at WN-42A was not seen in sulfate concentrations. This may be due to groundwater transport of selenium being different from sulfate, as selenium could be more strongly sorbed to the aquifer sediments.

The LTSP states that sulfate is not considered a hazardous constituent. The decision to include it as a constituent in the long-term monitoring program is due to its use in flow and transport models to support ACL application and as an indicator of cell performance and natural attenuation of the legacy plume (DOE 2023). No ACLs were set for sulfate. The 2024 sulfate concentrations (Figure 7-8) in POC wells (WELL-5 and WN-21) follow similar trends as uranium and nitrate with a concentration (1280 mg/L) similar to pretransition levels in WELL-5 and an elevated concentration (1160 mg/L) in WN-21 compared to recent trends. Both of these exceed the Wyoming state standard for drinking water of 250 mg/L, which is not unexpected based on historical measurements. The drinking water standard is also exceeded in boundary well WN-41B and has been so historically. Because sulfate is not considered a hazardous constituent, no report is required at this time.

7.7.2 Surface Water Monitoring

Figure 7-9 provides time-concentration plots of COCs, uranium, nitrate, and selenium in surface waters from 2005 to present. All Wyoming Class 2AB Surface Water Standards are shown and all COC concentrations were below that standard.

Uranium concentrations in surface water samples have been highly variable, likely resulting from variable flow rates and seasonal influences. At the upstream sampling location (SW-1), uranium concentrations have always been less than 0.01 mg/L. The uranium plume discharges to the Sweetwater River near location SW-3.



- Detect-WNI ○ Nondetect-WNI ● Detect-DOE ○ Nondetect-DOE
- LOESS local regression line and 95% confidence interval
- - - State of Wyoming surface water standard: 0.03 mg/L uranium; 10 mg/L nitrate; 0.005 mg/L selenium

Notes: The most recent (August 2024) results are labeled in the lower right corner of each plot. All results for nitrate and selenium correspond to the detection limit value.

Figure 7-9. COC Concentrations in Split Rock Site Surface Water Locations

While no uranium concentration in the Sweetwater River at downgradient sampling locations (SW-3, SW-4, and SW-5) have exceeded the Wyoming surface water standard, concentrations have approached that limit in the past during low river flow conditions. Overall, a slight increase in uranium concentrations in the Sweetwater River are seen starting at location SW-3, which is maintained in locations SW-4 and SW-5. In 2024, the uranium increase from locations SW-1 to SW-3 was 0.0029 mg/L to 0.0035 mg/L. While not a large amount, this difference is greater than a 10% allowance for analytical error.

Consistent with historical observations, neither nitrate nor selenium was present above detection limits during the 2024 sampling event. While not confirmed, it is likely that the organic carbon in the river sediments creates redox conditions that remove nitrate (denitrification) and could precipitate selenium before the groundwater reaches the river. Based on other LM sites, these are typical reactions but are not reducing enough for uranium to precipitate. Thus, uranium appears to remain mobile in the groundwater and is discharged into surface water.

7.8 References



Note

Site-related documents are available on the LM public webpages at <https://lmpublicsearch.lm.doe.gov/SitePages>.

10 CFR 40. U.S. Nuclear Regulatory Commission, “Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material From Ores Processed Primarily for Their Source Material Content,” *Code of Federal Regulations*.

10 CFR 40.28. U.S. Nuclear Regulatory Commission, “General License for Custody and Long-Term Care of Uranium or Thorium Byproduct Materials Disposal Sites,” *Code of Federal Regulations*.

40 CFR 192. U.S. Environmental Protection Agency, “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings,” *Code of Federal Regulations*.

DOE (U.S. Department of Energy), 2010. *Baseline Soil and Characterization of the Split Rock, Wyoming, Disposal Site*, LMS/SPR/S06927, Office of Legacy Management, October.

DOE (U.S. Department of Energy), 2023. *Long-Term Surveillance Plan for the Split Rock, Wyoming, UMTRCA Title II Disposal Site, Jeffrey City, Wyoming*, LMS/SPR/S02613-0.0, Office of Legacy Management, August.

DOE (U.S. Department of Energy), 2025. J. Chavez, site manager, U.S. Department of Energy, letter (about “U.S Department of Energy Office of Legacy Management Letter of Notification of Exceedance of Groundwater Protection Standards for Monitoring Wells SWAB-4 and SWAB-12R at the Split Rock, Wyoming, Disposal Site”) to D. Mandeville, project manager, U.S. Nuclear Regulatory Commission, November 19.

WNI (Western Nuclear Inc.), 2000. *Supplement to October 29, 1999 Split Rock Site Closure Report*, prepared by Shepherd Miller Inc. for Western Nuclear Inc., January 14.

7.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	113	Entrance Gate
PL-2	270	Fence and Gate Maintained by Grazing Licensee
PL-3	158	Damaged Fence Along Ore Road
PL-4	158	Vegetation Along Fence Line Off Ore Road
PL-5	68	Entrance Sign
PL-6	90	Site Marker near Entrance Gate
PL-7	45	Sweetwater River as Northern Site Boundary
PL-8	—	Quality Control Monument QC-5
PL-9	45	Northwest Valley Disposal Cell
PL-10	225	Southwest Valley Disposal Cell
PL-11	203	Brush and Shrubs on Disposal Cell Side Slopes
PL-12	180	Russian Olive on Disposal Cell (Removed)
PL-13	135	Limber Pine Tree on Disposal Cell (Removed)
PL-14	68	North Diversion Channel
PL-15	315	North-Central Diversion Channel
PL-16	203	South-Central Diversion Channel
PL-17	203	Westernmost Swale
PL-18	248	Deep-Rooted Vegetation in Diversion Channel
PL-19	90	Rills in Tertiary Road
PL-20	270	Sand Blowout Area
PL-21	338	Signs of Disturbance in Northern Hay Field
PL-22	158	Damaged Fence Along Ore Road

Note:

— = Photograph taken vertically from above.



PL-1. Entrance Gate



PL-2. Fence and Gate Maintained by Grazing Licensee



PL-3. Damaged Fence Along Ore Road



PL-4. Vegetation Along Fence Line Off Ore Road



PL-5. Entrance Sign



PL-6. Site Marker near Entrance Gate



PL-7. Sweetwater River as Northern Site Boundary



PL-8. Quality Control Monument QC-5



PL-9. Northwest Valley Disposal Cell



PL-10. Southwest Valley Disposal Cell



PL-11. Brush and Shrubs on Disposal Cell Side Slopes



PL-12. Russian Olive on Disposal Cell (Removed)



PL-13. Limber Pine Tree on Disposal Cell (Removed)



PL-14. North Diversion Channel



PL-15. North-Central Diversion Channel



PL-16. South-Central Diversion Channel



PL-17. Westernmost Swale



PL-18. Deep-Rooted Vegetation in Diversion Channel



PL-19. Rills in Tertiary Road



PL-20. Sand Blowout Area



PL-21. Signs of Disturbance in Northern Hay Field



PL-22. Damaged Fence Along Ore Road