

16.0 Shiprock, New Mexico, Disposal Site

16.1 Compliance Summary

The Shiprock, New Mexico, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on June 21, 2023. No changes were observed on the disposal cell or in the associated diversion channels. Inspectors identified several minor maintenance needs but found no cause for a follow-up inspection. Groundwater monitoring to evaluate disposal cell performance is not required.

16.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the site-specific Long-Term Surveillance Plan (DOE 1994) (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 40.27 (10 CFR 40.27). Table 16-1 lists these requirements.

Table 16-1. License Requirements for the Shiprock, New Mexico, Disposal Site

Requirement	LTSP	This Report	10 CFR 40.27
Annual Inspection and Report	Section 6.0	Section 16.4	(b)(3)
Follow-Up or Contingency Inspections	Section 7.0	Section 16.5	(b)(4)
Maintenance and Repairs	Section 8.0	Section 16.6	(b)(5)
Environmental Monitoring	Sections 5.0 and 6.4	Section 16.7	(b)(2)
Corrective Action	Section 9.0	Section 16.8	–

16.3 Institutional Controls

The 105-acre site, identified by the property boundary shown in Figure 16-1, is held in trust by the U.S. Bureau of Indian Affairs. The Navajo Nation retains title to the land. UMTRCA authorized the U.S. Department of Energy (DOE) to enter into a Cooperative Agreement (DE-FC04-85AL26731) with the Navajo Nation and required it to be in place before bringing the site under the NRC general license. DOE and the Navajo Nation executed a Custodial Access Agreement that conveys the federal government title to the residual radioactive materials stabilized at the repository site and ensures that DOE has perpetual access to the site.

The site was accepted under the NRC general license in 1996. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I 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 custody of the disposal cell and its engineered features, administrative controls, and the following physical ICs that are inspected annually: the disposal cell and associated drainage features, entrance gates and signs, perimeter fence and signs, site markers, survey and boundary monuments, and erosion control markers.

16.4 Inspection Results

The site, 1 mile south of Shiprock, New Mexico, was inspected on June 21, 2023. The inspection was conducted by J. Sullivan and E. Garcia of the Legacy Management Support (LMS) contractor. J. Tallbull (LM) and G. Jay (LMS) 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.

16.4.1 Site Surveillance Features

Figure 16-1 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 2023 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 16-1 by photograph location (PL) numbers. The photographs and photograph log are presented in Section 16.10.

16.4.1.1 Access Roads, Entrance Gates, and Entrance Signs

Access to the site is from a gravel road off U.S. Highway 491. Three gates allow access to the site through the perimeter fence: the east gate (the current main entrance gate near the terrace escarpment), the north gate (an auxiliary access gate), and the west gate (the former main entrance gate). Access to the main entrance gate is on the road to the gravel pit. The three gates were locked and functional. Pairs of entrance signs—one pictorial and one textual—are present near each gate. One pair is present at the east and north gates, and two pairs are present at the west gate. Contact information on the evaporation pond entrance sign was updated. No other maintenance needs were identified.

16.4.1.2 Perimeter Fence and Signs

A chainlink perimeter fence encloses the disposal cell and drainage features. Regular maintenance to keep the perimeter fence free of trash, tumbleweeds, and other debris is ongoing. Seventeen pairs of perimeter signs, designated P1 through P17 (each pair consisting of one pictorial and one textual sign), are positioned along the perimeter fence¹ (PL-1). Perimeter sign P10 was replaced after the inspection. The radiation symbol on perimeter sign P14 needs to be replaced. Cracked signs and signs with faded symbols will be replaced before the next inspection. No other maintenance needs were identified.

¹ Plate 1 of the LTSP shows six sets of perimeter signs on fence fabric along the terrace escarpment. These were not installed because a fence was never installed in this area. Because the escarpment prohibits access to the site, a fence was not needed.

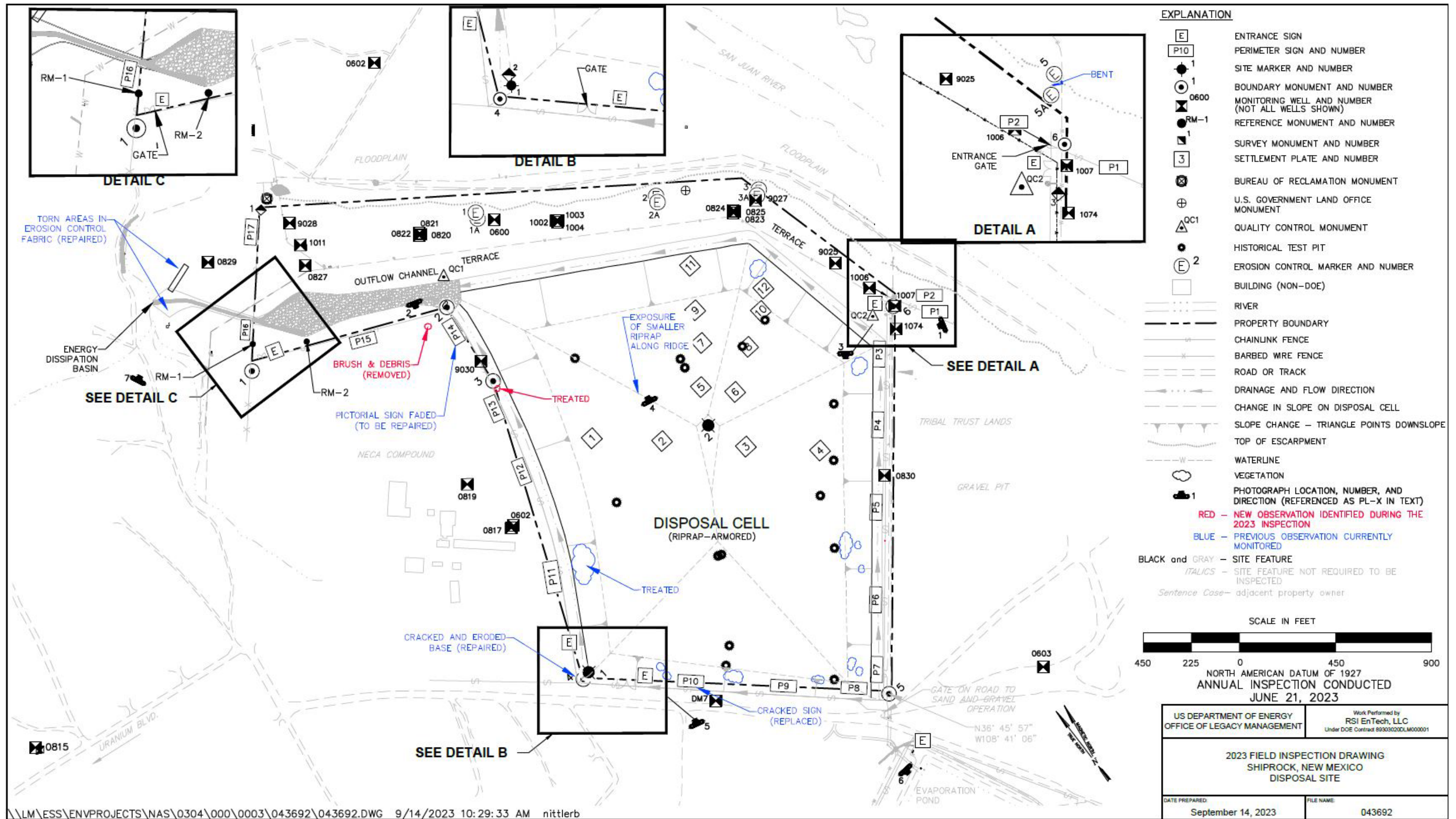


Figure 16-1. 2023 Annual Inspection Drawing for the Shiprock, New Mexico, Disposal Site

16.4.1.3 Site Markers

The site has two granite site markers. Site marker SMK-1 is just inside the west gate and contains minor cracks in its concrete base. SMK-1 cracks were sealed in 2023. Site marker SMK-2 is on the top slope of the disposal cell and is stable and legible. No maintenance needs were identified.

16.4.1.4 Survey and Boundary Monuments

Three survey monuments and six boundary monuments delineate the property boundary. Two additional boundary monuments are offsite; monitoring of these offsite monuments was discontinued in 2003. In 2002, boundary monument BM-1 was destroyed or removed by an adjacent landowner. It was replaced, and two reference monuments (RM-1 and RM-2) were installed next to it in 2003. Steel T-posts were installed next to all boundary monuments, as well as spray-painted rocks, to make them more visible and help inspectors locate them. The concrete at survey monument SM-1 was repaired. All survey and most boundary monuments were observed to be clear of vegetation and trash. Boundary monument BM-2 was cleared of vegetation and trash following the inspection (PL-2). No other maintenance needs were identified.

16.4.1.5 Aerial Survey Quality Control Monuments

Two aerial survey quality control monuments are present at the site and were inspected during the 2023 annual inspection (PL-3). No maintenance needs were identified.

16.4.1.6 Erosion Control Markers

The site has pairs of erosion control markers (1/1A, 2/2A, 3/3A, and 5/5A) along the edge of the terrace escarpment. Erosion control markers 4/4A are not inspected; they were installed on the terrace east of the site in the gravel pit. Erosion control marker 5A, which is near the east entrance gate, was previously bent by a vehicle, but it is functional and does not require repair. No maintenance needs were identified.

16.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three areas to ensure a thorough and efficient inspection. The inspection areas are (1) the disposal cell, diversion channels at the base of the disposal cell, and the outflow channel; (2) the terrace area north and northeast of the disposal cell; and (3) the outlying area, which includes the fenced evaporation pond south of the disposal cell and the former gravel pit southwest of the disposal cell. Inspectors examined site-specific 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.

16.4.2.1 Disposal Cell, Diversion Channels, and Outflow Channel

The disposal cell, completed in 1986, occupies 77 acres and is armored in riprap to control erosion and deter animal and human intrusion. There was no evidence of erosion, settling,

slumping, rock degradation, or other modifying processes that might affect the integrity of the disposal cell. Piezocones installed on the disposal cell cover that were associated with a research project are no longer in use. Some of the filled piezocone pits have subsided slightly or were never completely backfilled, which resulted in shallow conical depressions in the cover. As reported in previous site inspection reports, the surface of the disposal cell has numerous ruts associated with past vehicle traffic. An area where smaller riprap is exposed along the northern ridge of the disposal cell is monitored each year to detect possible changes that might indicate erosion or degradation of the cover (PL-4). The inspectors observed no changes in this area in 2023. The condition of other depressions and vehicle ruts is monitored annually and has not changed significantly since the 2014 inspection.

Windblown sediment has accumulated in the rock cover in several places. In accordance with the LTSP, woody, deep-rooted shrubs are controlled. Several woody shrubs found on the top and side slopes of the disposal cell were treated (PL-5).

Diversion channels around the base of the disposal cell contained scattered vegetation, including several woody shrubs. The channel along the southwestern side of the disposal cell has accumulated sediment, and a significant amount of vegetation has grown. Inspectors noted that nonwoody plants were growing within the outflow channel, and woody vegetation was growing on the banks of the outflow channel. Vegetation growth does not adversely affect the performance of any of these channels at this time and is not a concern; however, inspectors will continue to monitor this area. No other maintenance needs were identified.

16.4.2.2 Terrace Area

The terrace area is north and northeast of the disposal cell along the top of a steep escarpment. Other than annual weeds, little vegetation grows on the terrace. The edge of the escarpment varies between 175 and 345 feet from the base of the disposal cell and is prone to slumping. No new significant erosion was evident during the 2023 inspection. The LTSP states that the base of the terrace escarpment should be inspected for signs of seepage, and seeps were identified during previous site inspections. However, this is no longer part of the annual inspection, as the seeps are now monitored as part of the groundwater compliance program for the site. No maintenance needs were identified.

16.4.2.3 Outlying Area

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. No such impacts were observed. A former gravel pit that is no longer actively extracting aggregate is immediately southeast of the disposal cell. Inspectors identified no significant changes in land use associated with the gravel pit or with other outlying areas near the disposal cell during the 2023 inspection.

In 2002, LM constructed an 11-acre lined evaporation pond near the disposal cell as part of the groundwater compliance strategy. The pond, surrounded by a chainlink security fence, is maintained under the groundwater compliance program. The security fence was intact and functional at the time of the inspection. A quarterly inspection of the pond liner is conducted by a geotechnical engineer to identify any other potential issues that may arise. Water levels are monitored during the workweek to determine whether any actions need to be taken (PL-6). Torn

areas in the erosion control fabric on the banks of the lower outflow channel were repaired prior to the inspection (PL-7).

Fences and warning signs posted in Bob Lee Wash are maintained under the groundwater compliance program and were not examined during the 2023 annual inspection. No maintenance needs were identified.

16.5 Follow-Up or Contingency Inspections

LM will conduct follow-up or contingency 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 or contingency inspection was identified.

16.6 Maintenance and Repairs

Previous inspections have identified the following minor maintenance need that was not completed because of prior travel restrictions but will be conducted before the next inspection:

- Replacing faded pictorial signs and updating information on perimeter signs

Previous inspections have identified the following minor maintenance needs that were addressed following the 2023 inspection:

- Continuing to remove trash and debris (including tumbleweeds) along the perimeter fence
- Treating deep-rooted woody shrubs on the top and side slopes of the disposal cell

Inspectors noted the following additional maintenance need during the 2023 inspection and it was completed following the 2023 inspection:

- Boundary monument BM-2 cleared of vegetation and trash

16.7 Environmental Monitoring

16.7.1 Groundwater Monitoring

In accordance with the LTSP, groundwater monitoring to evaluate disposal cell performance is not required. However, groundwater monitoring is conducted in accordance with a groundwater compliance strategy. The monitoring wells associated with the groundwater compliance strategy (i.e., along the terrace and at offsite locations) are not included in the annual inspection process. All wells observed during the inspection were locked, and no maintenance needs were identified.

16.7.2 Vegetation Monitoring

In a 1999 letter to the Navajo Nation Abandoned Mine Lands (AML) Reclamation/Uraniun Mill Tailings Remedial Action department (Bergman-Tabbert 1999), LM committed to spraying annual weeds on the disposal cell top slope. Annual weeds typically have grown on less than 1% of the top slope. After discussion among LM, Navajo Nation AML, and LMS ecologists in 2019, LM recommended that it cease treatment of nonnoxious weeds on the cell and allow natural

plant succession to progress. In 2019, LM wrote to Navajo Nation AML outlining its proposed vegetation management plan (Kautsky 2019). Under the plan, LM will continue to treat weeds listed as noxious by the State of New Mexico and the Navajo Nation (primarily *Halogeton glomeratus*) in accordance with applicable laws. Deep-rooted woody species will be treated in accordance with the LTSP. Vegetation will continue to be monitored and treated accordingly to inform future management decisions.

16.8 Corrective Action

Corrective action is taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192. No need for corrective action was identified.

16.9 References

10 CFR 40.27. 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*.

Bergman-Tabbert, 1999. D. Bergman-Tabbert, site manager, Office of Legacy Management, U.S. Department of Energy, letter (about the Shiprock Uranium Mill Tailings Remedial Action Site) to Madeline Roanhorse, director, Navajo Nation UMTRA Program Division of Natural Resources, May 13.

DOE (U.S. Department of Energy), 1994. *Long-Term Surveillance Plan for the Shiprock Disposal Site, Shiprock, New Mexico*, DOE/AL/62350-60F, Rev. 1, September.

Kautsky, 2019. Mark Kautsky, UMTRCA Title I manager, Office of Legacy Management, U.S. Department of Energy, letter (about Updated Agreement for Vegetation Control on the Shiprock Disposal Cell) to Madeline Roanhorse, director, Navajo Nation UMTRA Program Division of Natural Resources, October 10.

16.10 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	290	Perimeter Sign P1
PL-2	219	Boundary Monument BM-2 with Vegetation and Trash
PL-3	219	Quality Control Monument QC-2
PL-4	15	Smaller Riprap Exposed Along Northern Ridge of Disposal Cell Top Slope
PL-5	17	Treated Vegetation on Side Slope
PL-6	180	Evaporation Pond Liner
PL-7	70	Repaired Erosion Control Fabric



PL-1. Perimeter Sign P1



PL-2. Boundary Monument BM-2 with Vegetation and Trash



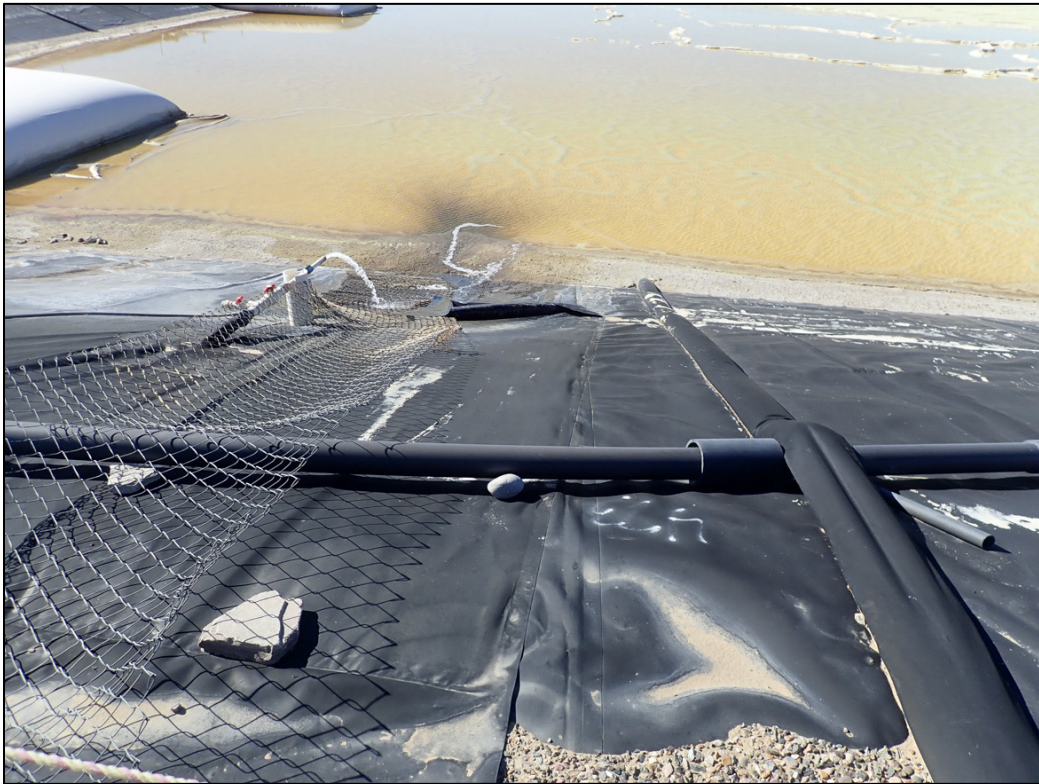
PL-3. Quality Control Monument QC-2



PL-4. Smaller Riprap Exposed Along Northern Ridge of Disposal Cell Top Slope



PL-5. Treated Vegetation on Side Slope



PL-6. Evaporation Pond Liner



PL-7. Repaired Erosion Control Fabric