

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 22, 2022. 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 22, 2022. The inspection was conducted by D. Marshall and J. Sullivan 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 2022 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.

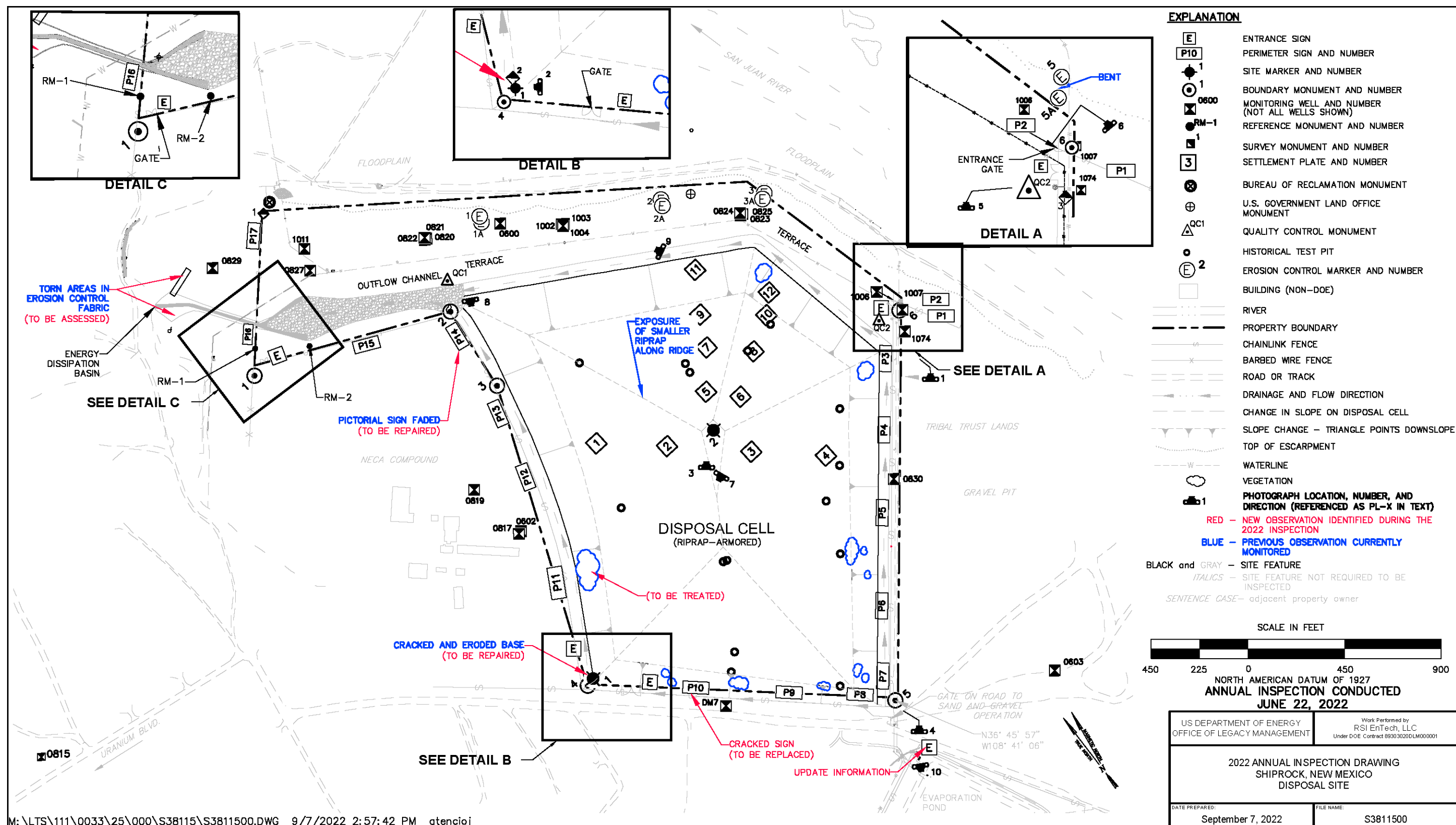
16.4.1.1 Access Roads, Entrance Gates, and Entrance Signs

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 needs to be 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 is beginning to crack and perimeter sign P14's radiation symbol is faded. 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.



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. Although the cracks were sealed in 2018, they are beginning to open and will be repaired before the next inspection (PL-2). Site marker SMK-2 is on the top slope of the disposal cell and is stable and legible (PL-3). No other 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 is cracked, and the sides eroded. This will be repaired before the next inspection. All survey and boundary monuments were observed to be clear of vegetation and were either visible or uncovered with a shovel (PL-4) during the 2022 inspection. 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 2022 annual inspection (PL-5). 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) (PL-6) along the edge of the terrace escarpment. Erosion control markers 4 and 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 gravel pit southeast of the disposal cell. Inspectors examined specific 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.

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 (PL-7). 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. The inspectors observed no changes in this area in 2022. 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 were found on the top and side slopes of the disposal cell and will be treated before the next inspection (PL-8).

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 (PL-9). 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 inspection in 2022. The LTSP states that the base of the terrace escarpment should be inspected for signs of seepage, and seeps were identified during early 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 miles 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 2022 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 pond liner leak test showed that the liner has five locations where liner performance has been compromised due to the age of the liner, resulting in breaches from pin sized holes to ½". To mitigate seepage from the pond at these locations LM

place five water-filled hydrologic barriers over the areas in question. The hydrologic barriers function as pressure patches to eliminate unplanned seepage. A quarterly pond liner inspection is conducted by a geotechnical engineer to identify any other potential issues that may arise. Water levels are monitored during the work week to determine whether any actions need to be taken (PL-10).

Inspectors noted that torn areas in the erosion control fabric on the banks of the lower outflow channel are still present. The tears will be assessed before the next annual inspection.

Fences and warning signs posted in Bob Lee Wash are maintained under the groundwater compliance program and were not examined during the 2022 annual inspection.

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 needs that were 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
- Continuing to remove trash and debris (including tumbleweeds) along the perimeter fence
- Sealing the cracks and repairing erosion at the base of site marker SMK-1
- Treating deep-rooted woody shrubs on the top and side slopes of the disposal cell
- Assessing torn areas in the erosion control fabric on the northwest end of the outflow channel

Inspectors noted additional maintenance needs during the 2022 inspection that will be completed before the next inspection. These include the following:

- Replacing cracked and faded perimeter signs P10 and P14
- Updating contact information on the evaporation pond entrance sign

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/Uranium 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, M., 2019. Mark Kautsky, 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	340	Perimeter Sign P3
PL-2	180	Site Marker SMK-1
PL-3	15	Site Marker SMK-2 on Cell Top
PL-4	—	Boundary Monument BM-5
PL-5	200	Aerial Survey Quality Control Monument QC-2
PL-6	—	Erosion Control Marker ECM-5
PL-7	210	Top Slope of Disposal Cell
PL-8	170	West Side Slope of Disposal Cell
PL-9	295	Northwest Drainage Channel
PL-10	170	Evaporation Pond with Hydrologic Barriers Deployed to Mitigate Seepage

Note:

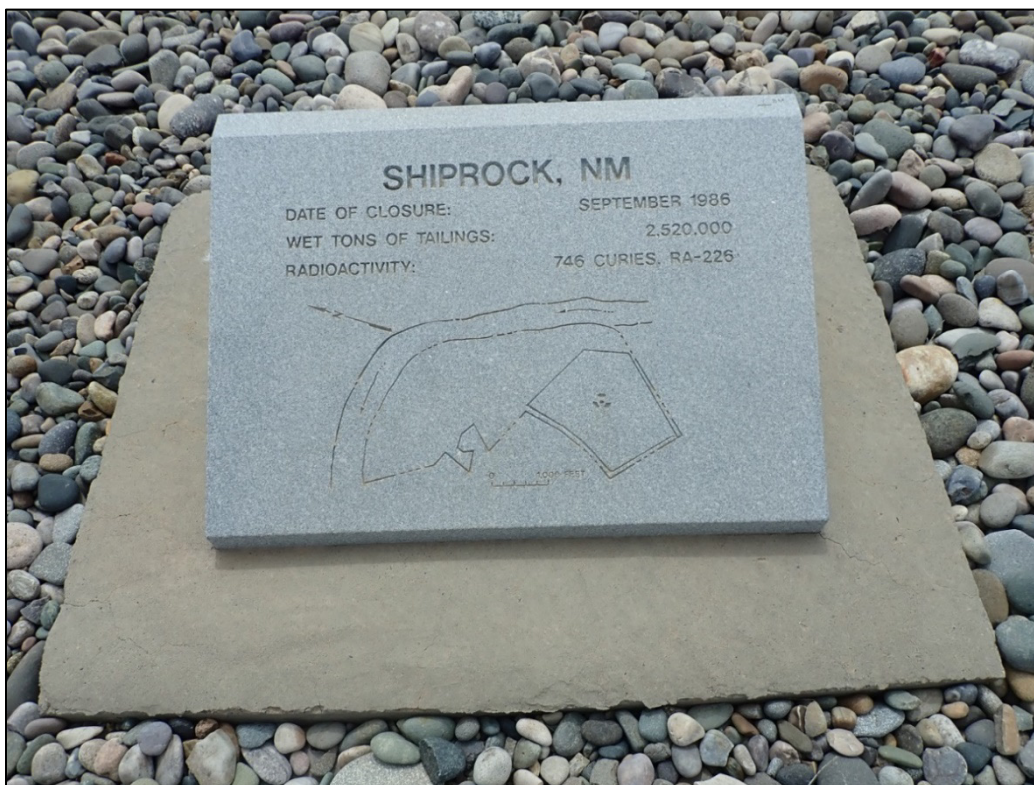
— = Photograph taken vertically from above.



PL-1. Perimeter Sign P3



PL-2. Site Marker SMK-1



PL-3. Site Marker SMK-2 on Cell Top



PL-4. Boundary Monument BM-5



PL-5. Aerial Survey Quality Control Monument QC-2



PL-6. Erosion Control Marker ECM-5



PL-7. Top Slope of Disposal Cell



PL-8. West Side Slope of Disposal Cell



PL-9. Northwest Drainage Channel



PL-10. Evaporation Pond with Hydrologic Barriers Deployed to Mitigate Seepage