

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 (site) was inspected on June 21, 2018. 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 or contingency 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 U.S. Department of Energy (DOE) Office of Legacy Management (LM) Long-Term Surveillance Plan (LTSP) (DOE 1994) and in procedures LM 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 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 general license. DOE and the Navajo Nation executed a Custodial Access Agreement that conveys to 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 general license in 1996. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, 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, 2018. The inspection was conducted by M. Kastens and J. Lobato of the Legacy Management Support (LMS) contractor. M. Kautsky (LM site manager) and E. Holland (LM Real Property organization); D. Atkinson and G. Jay (LMS); and J. Tallbull (Navajo Nation Abandoned Mine Lands [AML] Program) 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 determine the need, if any, for maintenance or additional inspection and monitoring.

16.4.1 Site Surveillance Features

Figure 16-1 shows the locations of site features in black, including site surveillance features and inspection areas. 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 text, and new observations identified during the 2018 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 identified 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 through a 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. No maintenance needs were identified.

16.4.1.2 Perimeter Fence and Signs

A chainlink perimeter fence encloses the disposal cell and drainage features. The perimeter fence adjacent to the Navajo Engineering and Construction Authority (NECA) property shows evidence of previous activity to repair gaps under the fence by placing rock in the gaps (PL-1). During the inspection, an 8-inch gap under the perimeter fence was observed near perimeter sign P15 (PL-2). Maintenance to repair the gap will be conducted in 2019. Near perimeter sign P15, construction materials were observed leaning against the perimeter fence in several locations on the NECA side (PL-3). NECA management will be contacted and requested to remove these materials in 2019.

The perimeter fence fabric between perimeter signs P11 and P12 was bent, but the perimeter fence remains functional. Trash and tumbleweeds continually accumulate in many places along the fence, although regular maintenance in recent years has kept both to a minimum. Inspectors noted an accumulation of tumbleweeds on the northwest side of the perimeter fence within the outflow channel (PL-4). The tumbleweeds were removed following the inspection. Maintenance to keep the perimeter fence lines clean will continue.

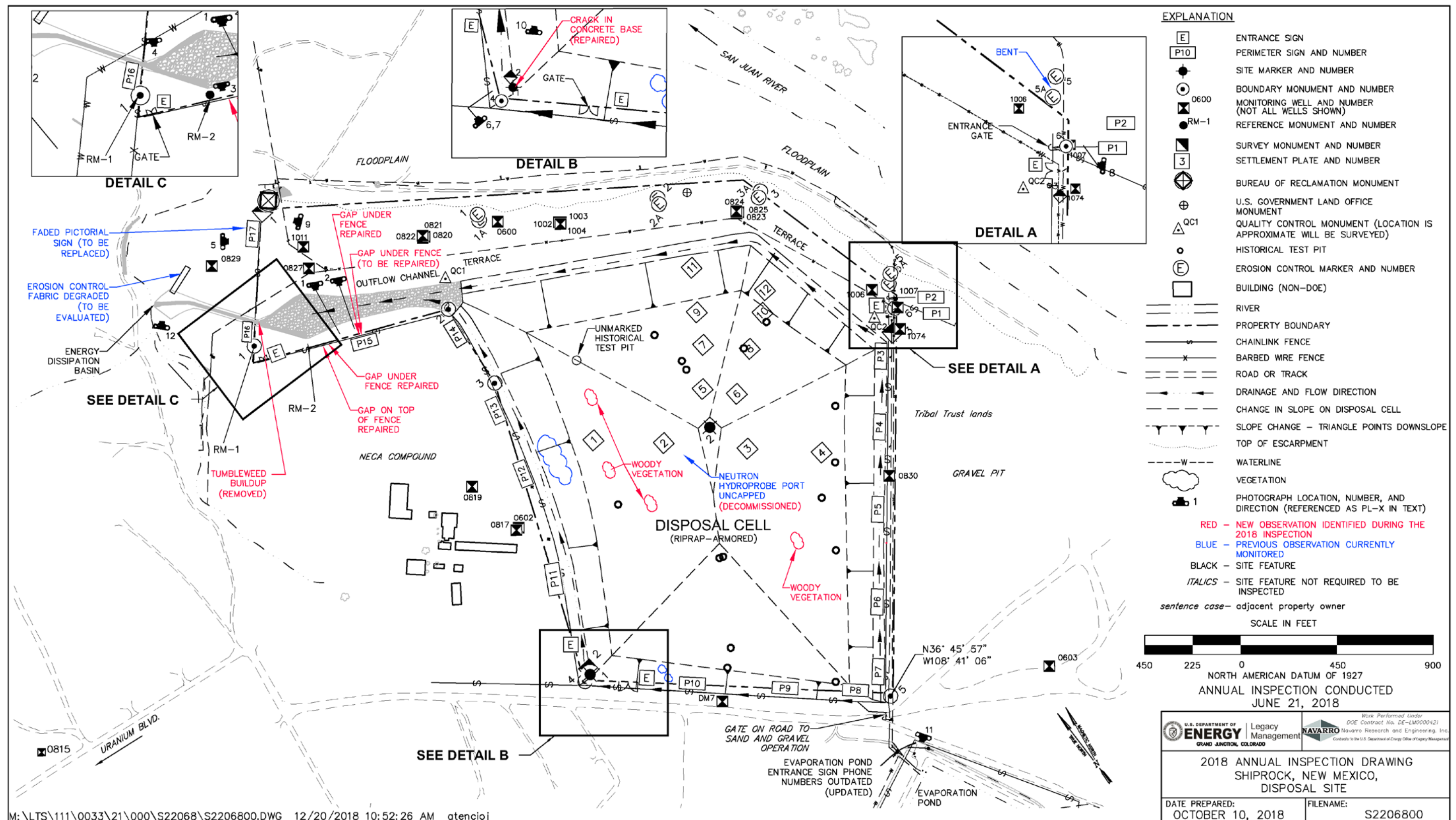


Figure 16-1. 2018 Annual Inspection Drawing for the Shiprock, New Mexico, Disposal Site

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There are 17 pairs of perimeter signs, designated P1 through P17 (each pair consisting of one pictorial and one textual sign), positioned along the perimeter fence.¹ The pictorial sign at P17 and radiological symbol on the textual sign were faded (PL-5) and were replaced following the inspection. No other maintenance needs were identified.

16.4.1.3 Site Markers

The site has two granite site markers. Site marker SMK-1 is just inside the west gate; minor cracks in its concrete base were sealed in May 2003. The 2003 seal has weathered (PL-6 and PL-7) and was repaired following the inspection. Site marker SMK-2 is on the top slope of the disposal cell. 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 monuments was discontinued in 1999 and 2003. Steel T-posts were installed next to all boundary monuments to help inspectors locate the monuments. Boundary marker BM-6 was resurveyed to obtain new GPS coordinates (PL-8). The site map was updated with the more recent coordinates for boundary marker BM-6 following the inspection. The concrete at survey monument SM-1 is cracked, but the crack does not threaten the integrity of the marker (PL-9). All boundary monuments were observed to be clear of vegetation and visible during the inspection. No other maintenance needs were identified.

16.4.1.5 Erosion Control Markers

The site has four pairs of erosion control markers along the edge of the terrace escarpment (1/1A; 2/2A; 3/3A; and 5/5A). 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, near the east entrance gate, was previously bent by a vehicle, but it is still 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.

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

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 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 associated with a research project were installed on the disposal cell cover in the past and 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 contains numerous ruts associated with past vehicle traffic. The condition of the 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, affecting approximately 1% to 5% of the total cover and enhancing vegetation establishment. In accordance with the LTSP, woody, deep-rooted shrubs are controlled. Only a few woody shrubs were growing on the northwest and southwest side slopes of the disposal cell (PL-10); these will be treated in 2019.

Diversion channels around the base of the disposal cell contained scattered vegetation, including several woody shrubs. These shrubs do not adversely affect the performance of the diversion channel at this time and are not a concern. Nonwoody plants were growing within the outflow channel, and woody vegetation was growing on the banks of the channel.

In May 2018, before the inspection, five permanent quality-control monuments were installed at the site in preparation for a baseline aerial survey of the disposal cell. The quality control monument locations are shown in Figure 16-1. No 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 in 2018. 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 annual inspection procedures because the seeps are now being monitored as part of the groundwater compliance strategy for the site. No maintenance needs were identified.

16.4.2.3 Outlying Area

The area beyond the site boundary for a distance of 0.25 mile 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.

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 strategy. Both the security fence and pond were

intact and functional at the time of the inspection. Phone numbers on the evaporation pond entrance sign were outdated (PL-11) and were updated following the inspection. Inspectors noted that the offsite portion of the outflow channel was functional and clear of debris. A portion of the erosion control fabric on the south-facing bank of the energy dissipation basin is damaged (PL-12). LMS engineering will be consulted to evaluate the need for repair of the erosion control fabric.

Fences and warning signs posted in Bob Lee Wash are maintained under the groundwater compliance strategy and are not examined during the annual inspection. No other 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

Ongoing maintenance is conducted at the site to remove trash and debris along the perimeter fence. In May 2018, before the inspection, five permanent quality-control monuments were installed at the site in preparation for a baseline aerial survey of the disposal cell.

Inspectors documented minor maintenance needs that were addressed following the inspection, including:

- Removing the accumulation of tumbleweeds on the northwest side of the perimeter fence within the outflow channel
- Replacing the perimeter sign P17 pictorial sign and radiation symbol decal on the textual sign
- Resealing the crack in the concrete base of site marker SMK-1
- Updating the phone number on the evaporation pond entrance sign
- Decommission site features on the disposal cell top slope no longer determined to be necessary (all but the settlement plates) in accordance with the decommissioning plan

Inspectors also documented minor maintenance needs that have not been addressed but will be in 2019, including:

- Repairing the gap under the perimeter fence near perimeter sign P15
- Treating woody vegetation on the disposal cell top and side slopes
- Consulting LMS engineering to evaluate the need for repair of the erosion control fabric on the south-facing bank of the energy dissipation basin
- Contacting NECA management to request construction materials leaning against the fence near perimeter sign P15 be moved

In September 2018, following the inspection, site features on the top slope of disposal cell were abandoned. During the 2017 annual inspection, the LM site manager recommended that all site features on the disposal cell top slope be inventoried and reviewed for their continued relevance. During 2018, the LMS contractor completed an inventory and condition assessment of all disposal cell top and side slope features. A decommissioning plan for the removal of features that were no longer needed was developed, and all site features other than settlement plates were abandoned. No other maintenance needs were identified.

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 (along the terrace and at offsite locations) are not included in the annual inspection. All wells encountered during the inspection were locked, and no maintenance needs were observed.

16.7.2 Vegetation Monitoring

In a 1999 letter to the Navajo AML Reclamation/Uranium Mill Tailings Remedial Action Department (Bergman-Tabbert 1999), LM committed to spraying annual weeds on the disposal cell top slope. During the inspection, annual weeds were observed growing on the disposal cell top slope. LMS personnel recommend reevaluating treatment of annual weeds on the top slope of the disposal cell.

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, U.S. Department of Energy Office of Legacy Management, letter (about Shiprock Uranium Mill Tailings Remedial Action site) to M. Roanhorse, Division of Natural Resources, Navajo Uranium Mill Tailings Remedial Action Program, 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.

16.10 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	210	Repair of Gap Under Fence
PL-2	210	Gap Under Fence Needing Repair
PL-3	210	NECA Hardware Leaning Against Fence
PL-4	235	Tumbleweeds in Outflow Channel at Perimeter Fence
PL-5	130	Faded Pictorial Perimeter Sign P17 (Replaced Following Inspection)
PL-6	0	Site Marker SMK-1
PL-7	0	Crack on Site Marker SMK-1 (Repaired Following Inspection)
PL-8	320	Boundary Monument BM-6 near Site Entrance
PL-9	345	Crack in Base of Survey Monument SM-1
PL-10	40	Vegetation on Northwest Side Slope
PL-11	240	Evaporation Pond Entrance Sign Containing Outdated Phone Numbers (Updated Following Inspection)
PL-12	50	Damaged Erosion Control Fabric (Need for Repair to Be Evaluated)



PL-1. Repair of Gap Under Fence



PL-2. Gap Under Fence Needing Repair



PL-3. NECA Hardware Leaning Against Fence



PL-4. Tumbleweeds in Outflow Channel at Perimeter Fence



PL-5. Faded Pictorial Perimeter Sign P17 (Replaced Following Inspection)



PL-6. Site Marker SMK-1



PL-7. Crack on Site Marker SMK-1 Concrete Base (Repaired Following Inspection)



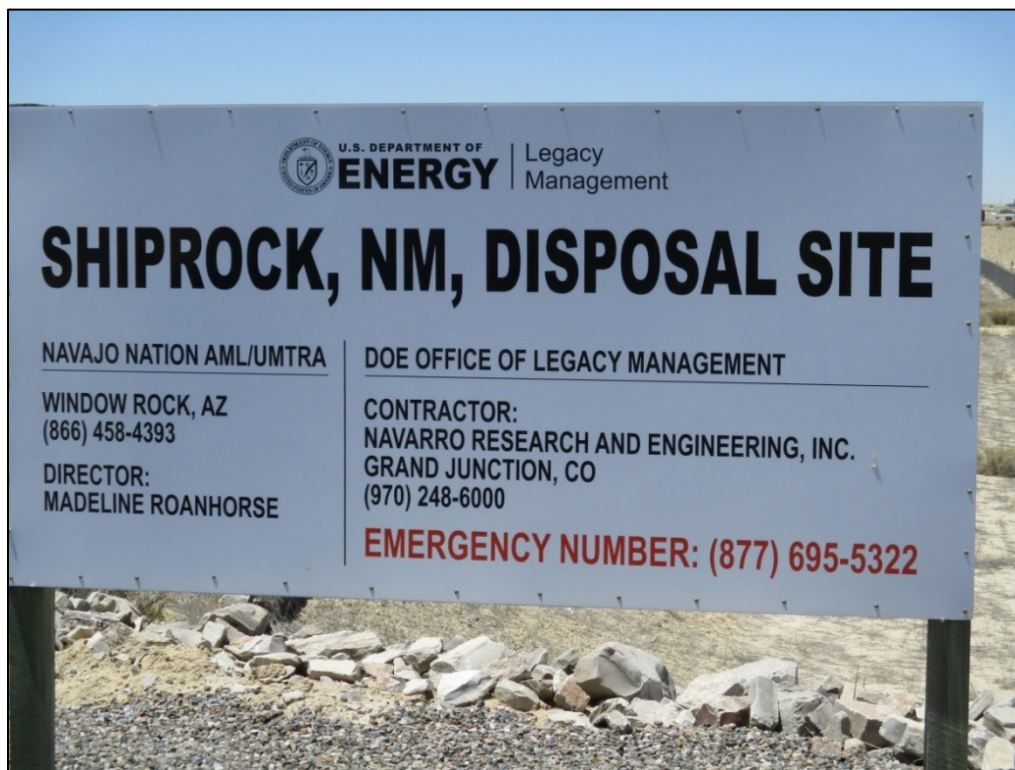
PL-8. Boundary Monument BM-6 near Site Entrance



PL-9. Crack in Base of Survey Monument SM-1



PL-10. Vegetation on Northwest Side Slope



*PL-11. Evaporation Pond Entrance Sign Containing Outdated Phone Numbers
(Updated Following Inspection)*



PL-12. Damaged Erosion Control Fabric (Need for Repair to Be Evaluated)

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