

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 May 25, 2017. No changes were observed on the disposal cell or in the associated diversion channels. Inspectors identified several routine maintenance needs but found no cause for a follow-up or contingency inspection. Groundwater monitoring to evaluate disposal cell performance is not required. However, groundwater restoration is being conducted in accordance with the groundwater compliance strategy.

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) Long-Term Surveillance Plan (LTSP) (DOE 1994) and in procedures DOE established to comply with the requirements of the U.S. Nuclear Regulatory Commission 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 May 25, 2017. The inspection was conducted by A. Kuhlman and M. Kastens of the DOE Legacy Management Support (LMS) contractor. M. Kautsky (DOE site manager); D. Miller, G. Jay, and T. Thoele (LMS); and J. Tallbull and C. Corley (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, to identify changes in conditions that might affect conformance with the LTSP, and to determine the need, if any, for maintenance or additional inspection and monitoring.

16.4.1 Site Surveillance Features

Figure 16-1 shows in black the locations of site features, 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 2017 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 east (main) entrance gate is through a gravel pit. The three gates were locked and functional. The sediment beneath the west gate noted during the 2016 annual inspection had been removed. 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. The Office of Legacy Management website address on the entrance sign near the east entrance gate was updated during the inspection by affixing an adhesive label to the sign (PL-1). 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 has been repaired since the 2016 annual inspection (PL-2). As observed in previous years, the perimeter fence near perimeter sign P15 has a 3- to 6-inch gap beneath it (PL-3). Near perimeter sign P15 the perimeter fence was broken at the top and had a 3- to 6-inch gap (PL-4). At this time, the observed perimeter fence gaps are not a concern, but inspectors will continue to monitor these areas to determine if they become worse and require repair.

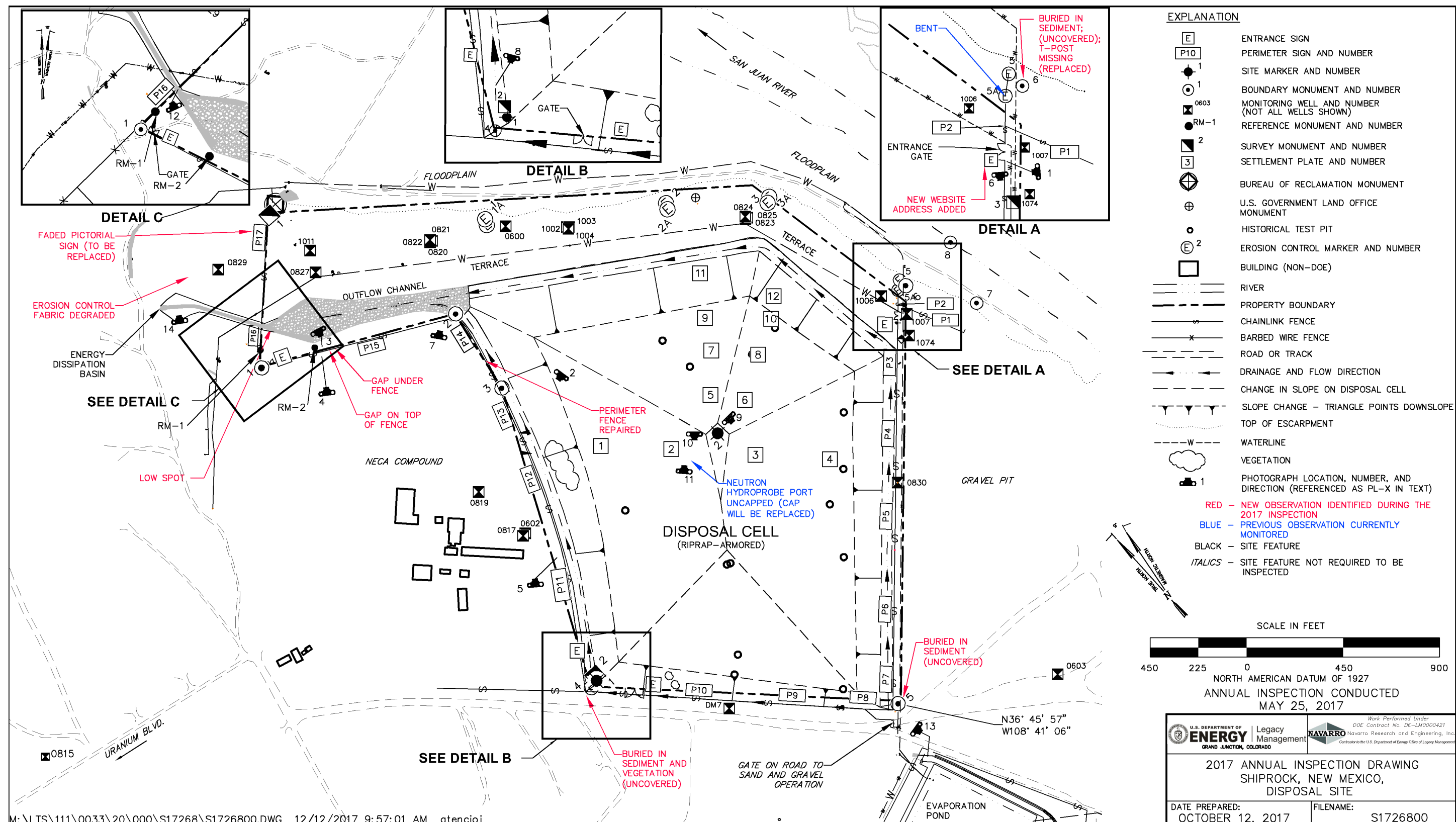


Figure 16-1. 2017 Annual Inspection Drawing for the Shiprock, New Mexico, Disposal Site

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The perimeter fence fabric between perimeter signs P11 and P12 was bent, but the perimeter fence remains functional (PL-5). Trash and tumbleweeds continually accumulate in many places along the perimeter fence, although regular maintenance in recent years has kept both to a minimum. Inspectors noted a buildup of tumbleweeds along the southeast perimeter fence (PL-6) and in the outflow channel perimeter fence. A buildup of trash was also observed in the northeast corner of the NECA yard perimeter fence (PL-7). Maintenance to keep the perimeter fence lines clean will continue.

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 was faded and will be replaced before the 2018 inspection. New adhesive sign identification labels were applied to all perimeter signs; 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 and have not changed significantly. Site marker SMK-2 is on the top slope of the disposal cell. 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 (BM-7 and BM-8) are offsite; monitoring of these monuments was discontinued in 1999 and 2003 because they are offsite. The concrete at survey monument SM-1 is cracked, but the crack does not threaten the integrity of the marker. Steel T-posts are installed next to boundary monuments to help inspectors locate the monuments. Boundary monuments BM-4, BM-5, and BM-6 were covered with sediment and vegetation and could not be located (PL-8). The T-posts were present at boundary monuments BM-4 and BM-5; however, the T-post at boundary monument BM-6 had been removed. Following the inspection, sediment and vegetation were removed; boundary monuments BM-4, BM-5, and BM-6 were located; and a new T-post was installed by boundary monument BM-6. LMS also installed a protective casing around boundary monument BM-6 to assist in locating it during future inspections; 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.

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 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. The disposal cell is armored in riprap to control erosion. 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, forming 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 (PL-9).

Windblown sediment has accumulated in the rock cover in several places, affecting approximately 1% to 5% of the total cover and enhancing vegetation establishment (PL-10). Woody, deep-rooted shrubs are controlled because they potentially could damage the radon barrier. Only a few woody shrubs were growing on the northwest and southwest side slopes of the disposal cell; these will be treated before the 2018 annual inspection.

One of the two historical neutron hydroprobe ports identified during the 2016 inspection was uncapped (PL-11). In a previous visit, LMS personnel attempted to install a cap on the neutron hydroprobe port but were unsuccessful due to the presence of ponded water on the disposal cell top slope from heavy rains the day before. No ponded water was observed on the disposal cell top slope during the 2017 annual inspection. The DOE site manager recommended that all site features on the disposal cell top slope be inventoried and reviewed for their continued relevance. Site features no longer necessary will be abandoned, and remaining site features will be labeled before the 2018 annual inspection. A replacement cap will be placed on the neutron hydroprobe port at that time.

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. Sediment buildup and a low spot were observed in the outflow channel near the perimeter fence (PL-12), but the channel remains functional. 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 in 2017. 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, DOE 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. A new entrance sign with updated site information was installed before the inspection (PL-13).

Inspectors noted that the offsite portion of the outflow channel was functional and clear of debris. The erosion control fabric, observed in 2016 to be shredded and ineffective, had been replaced. However new areas of degradation in the erosion control fabric were observed (PL-14). These areas will be repaired before the 2018 annual inspection.

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

16.5 Follow-Up or Contingency Inspections

DOE 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) DOE 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

Before the inspection, the sediment buildup underneath the west gate had been removed, the perimeter fence along the NECA compound was repaired, a new entrance sign with updated information was installed at the evaporation pond, and new erosion control fabric was installed at the offsite portion of the outflow channel.

During the inspection, new adhesive sign identification labels were applied to all perimeter signs. Tumbleweed buildup was observed along the southeast perimeter fence and outflow channel fence. Trash buildup was observed in the northeast corner of the NECA yard perimeter fence. Maintenance to keep the perimeter fence lines clean will continue. Boundary monuments BM-4, BM-5, and BM-6 were covered with sediment and vegetation and could not be located during the inspection; following the inspection, the sediment and vegetation were removed. The reference post at boundary monument BM-6 was missing and was replaced following the inspection; a protective casing was also installed around boundary monument BM-6. Site features on the disposal cell top slope will be inventoried and reviewed for their continued relevance. Site features no longer necessary will be abandoned, and remaining site features will be labeled before the 2018 annual site inspection. The missing neutron hydroprobe port cap will be replaced at that time. Several woody shrubs were growing on the disposal cell side slopes; these will be treated before the 2018 annual inspection. 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 restoration is being 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/Uraniun Mill Tailings Remedial Action Department (Bergman-Tabbert 1999), DOE 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 treating 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. Nuclear Regulatory Commission, “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 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	310	Entrance Sign Showing New Legacy Management Website Address
PL-2	260	Perimeter Fence Along NECA Yard
PL-3	220	North Perimeter Fence Along NECA Yard Near Perimeter Sign P15 with Gap Underneath
PL-4	40	North Perimeter Fence Along NECA Yard Near Perimeter Sign P15 with Gap on Top
PL-5	45	Bent Fence Fabric on West Perimeter Fence Along NECA Yard Between Perimeter Signs P11 and P12
PL-6	215	Tumbleweed Buildup Along Southeast Perimeter Fence
PL-7	50	Trash Buildup Along Northwest Perimeter Fence
PL-8	230	Boundary Monument BM-4 Covered by Vegetation and Sediment (Later Uncovered)
PL-9	180	Settlement Plate and Vehicle Tracks on Disposal Cell Top Slope
PL-10	225	Scattered Vegetation on Disposal Cell Top Slope
PL-11	45	Neutron Hydroprobe Port on Disposal Cell Top Slope Where Dug-Out Hole Previously Was Filled with Water
PL-12	15	Sediment Buildup and Low Spot in Outlet Channel Before Perimeter Fence
PL-13	170	New Evaporation Pond Entrance Sign
PL-14	30	Replaced Erosion Control Fabric with New Areas Needing Repair



PL-1. Entrance Sign Showing New Legacy Management Website Address



PL-2. Perimeter Fence Along NECA Yard



PL-3. North Perimeter Fence Along NECA Yard Near Perimeter Sign P15 with Gap Underneath



PL-4. North Perimeter Fence Along NECA Yard Near Perimeter Sign P15 with Gap on Top



PL-5. Bent Fence Fabric on West Perimeter Fence Along NECA Yard Between Perimeter Signs P11 and P12



PL-6. Tumbleweed Buildup Along Southeast Perimeter Fence



PL-7. Trash Buildup Along Northwest Perimeter Fence



PL-8. Boundary Monument BM-4 Covered by Vegetation and Sediment (Later Uncovered)



PL-9. Settlement Plate and Vehicle Tracks on Disposal Cell Top Slope



PL-10. Scattered Vegetation on Disposal Cell Top Slope



PL-11. Neutron Hydroprobe Port on Disposal Cell Top Slope Where Dug-Out Hole Previously Was Filled with Water



PL-12. Sediment Buildup and Low Spot in Outlet Channel Before Perimeter Fence



PL-13. New Evaporation Pond Entrance Sign



PL-14. Replaced Erosion Control Fabric with New Areas Needing Repair