

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 12, 2019. 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 (LTSP) (DOE 1994) and 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 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 NRC 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 12, 2019. The inspection was conducted by M. Kastens, K. Whysner, D. Miller, and J. Bailey of the Office of Legacy Management Support (LMS) contractor. M. Kautsky (Office of Legacy Management [LM] site manager), M. Poston-Brown (NRC), 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 the visible features at the site, identify changes in conditions that might affect conformance with the LTSP, and evaluate 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 2019 annual inspection are shown in red. Inspection results and recommended maintenance activities associated with site surveillance features are included 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. The pictorial sign next to the entrance sign was faded and replaced after the inspection. 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. A gap was observed under the fence near perimeter sign P3. The 8-inch gap under the perimeter fence identified in 2018 was still present near perimeter sign P15. Maintenance to repair both gaps was completed in 2019 following the inspection. One perimeter fence post near perimeter sign P15 was disconnected, and a barbed-wire stanchion was damaged. These items were repaired following the inspection in 2019. Near perimeter sign P15, construction materials were again observed leaning against the perimeter fence in several locations on the Navajo Engineering and Construction Authority (NECA) side (PL-1). Dirt accumulation against the perimeter fence has bent the fence fabric between perimeter signs P11 and P12 (PL-2). NECA management was contacted following the inspection and requested to address both these maintenance needs.

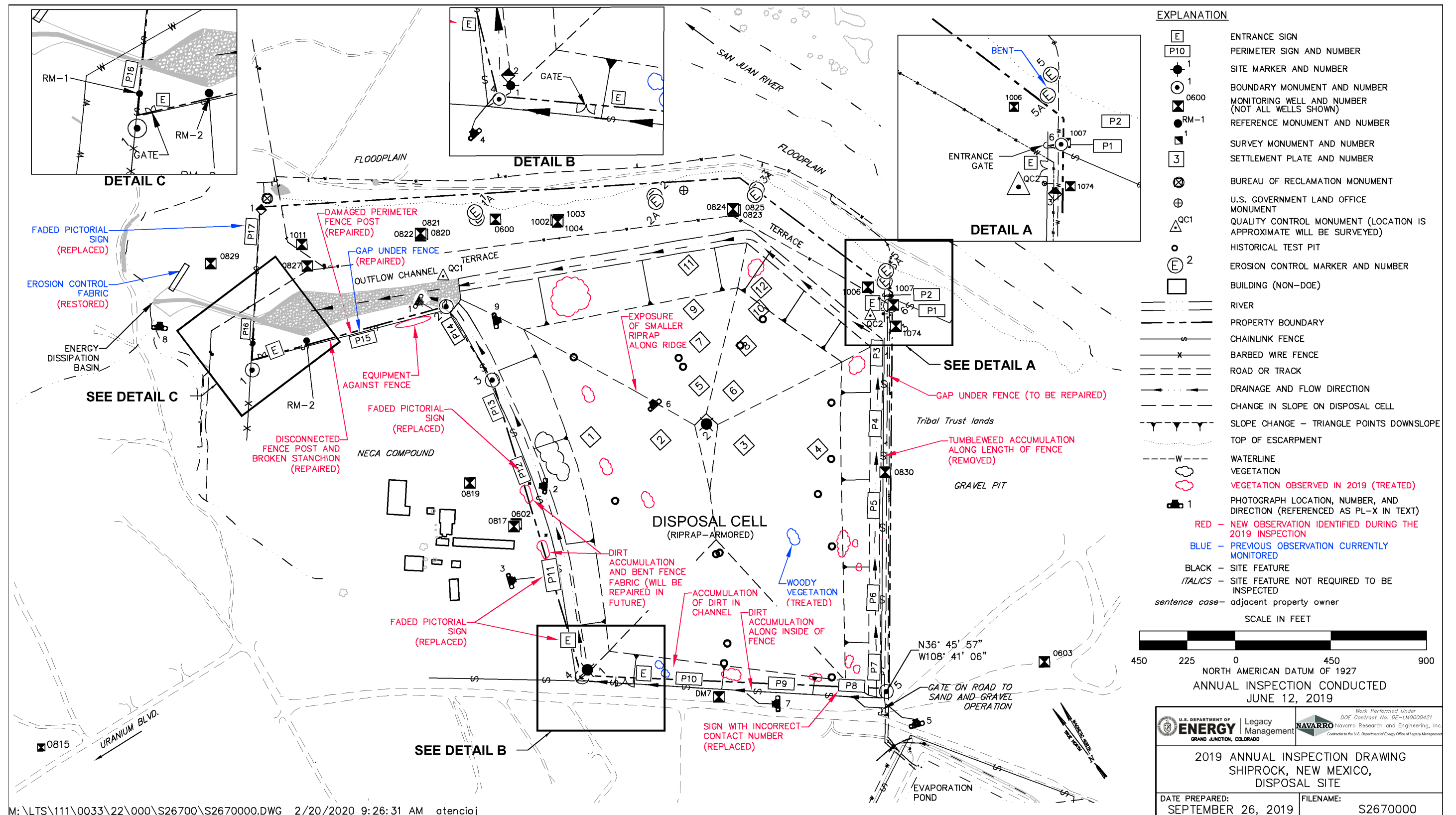


Figure 16-1. 2019 Annual Inspection Drawing for the Shiprock, New Mexico, Disposal Site

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Dirt accumulation was also observed along the inside of the perimeter fence between perimeter signs P9 and P10. No maintenance is needed at this time. Inspectors will continue to monitor these areas. Regular maintenance continues to mitigate the accumulation of trash and tumbleweeds along the fence, although some minor tumbleweed accumulation was observed along the southeastern perimeter fence between perimeter signs P3 and P7. Maintenance to keep the perimeter fence lines free of debris 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 signs near the southwestern entrance sign and perimeter signs P11, P12, and P17 were faded (PL-3) and were replaced following the inspection. The phone number on perimeter sign P8 was updated 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 resealed in 2018 (PL-4). 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 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. The site map was updated with the more recent coordinates for boundary marker BM-6, as resurveyed in 2018. Boundary marker BM-1 was identified within the NECA yard, and the location was added to the site map following the inspection. The GPS coordinates were resurveyed in 2019 following the inspection. The concrete at survey monument SM-1 is cracked, but the crack does not threaten the integrity of the marker. All boundary monuments were observed to be clear of vegetation and visible during the inspection. No 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

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.

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 (PL-5). 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. An area where smaller riprap has been exposed was identified along the northern ridge of the disposal cell (PL-6). This area will be monitored for further changes that might indicate erosion or degradation of the cover. 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. Numerous woody shrubs were growing on the top and side slopes of the disposal cell; these were treated in 2019 following the inspection.

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 (PL-7). It is possible that the sediment was generated from the maintenance of the road adjacent to the perimeter fence and has settled in the bottom of the channel. These shrubs do not adversely affect the performance of the diversion channel at this time and are not a concern, but they will continue to be monitored. Nonwoody plants were growing within the outflow channel, and woody vegetation was growing on the banks of the channel. 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 2019. 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. Inspectors noted that the offsite portion of the outflow channel was functional and clear of debris. The degraded portion of the erosion control fabric on the south-facing bank of the energy dissipation basin identified during the 2018 inspection has been repaired and is functioning as intended (PL-8).

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

Minor maintenance needs identified by the inspectors during the 2018 annual inspection and completed in 2019, include the following:

- Replacing the pictorial perimeter sign P17
- Repairing the gap under the perimeter fence near perimeter sign P15
- Treating woody vegetation on the disposal cell top and side slopes
- Repairing the degraded portion of the erosion control fabric on the south-facing bank of the energy dissipation basin

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

- Replacing the faded pictorial sign next to the entrance sign
- Repairing a fence post and stanchion near perimeter sign P15
- Contacting NECA management to request removal of construction material leaning against the perimeter fence near perimeter sign P15, repair of the fence fabric between perimeter signs P11 and P12, and assistance in fence repairs along the common fence
- Removing accumulating tumbleweeds on the southeast side of the perimeter fence
- Replacing the pictorial signs next to the southwest entrance sign and perimeter signs P11 and P12
- Treating new woody vegetation on the disposal cell top and side slopes

Ongoing maintenance conducted at the site includes removal of trash and debris (including tumbleweeds) along the perimeter fence.

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 process. 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 less than 1% of the top slope. After discussion among LM, Navajo AML, and LMS ecologists, LM recommended that it cease treatment of nonnoxious weeds on the cell and allow natural plant succession to progress. LM wrote a new letter to Navajo AML outlining its proposed vegetation management plan. Under the plan, LM would continue to treat State of New Mexico– and Navajo Nation–listed noxious weeds (primarily *Halogeton glomeratus*) in accordance with applicable laws and deep-rooted woody species in accordance with the LTSP (Kautsky 2019). Vegetation will continue to be monitored to inform future management decisions (PL-9).

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.

Kautsky, M., 2019. Mark Kautsky, Title I Manager, U.S. Department of Energy Office of Legacy Management, letter (on Proposed Revision to Vegetation Control on the Shiprock Disposal Cell) to Madeline Roanhorse, Director Navajo Nation UMTRA Program Division of Natural Resources, October 10, 2019.

16.10 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	160	NECA Equipment Against Perimeter Fence Between Perimeter Signs P14 and P15
PL-2	315	Dirt Accumulation Against Perimeter Fence Between Perimeter Signs P11 and P12
PL-3	115	Faded Pictorial Perimeter Sign P11 at NECA Yard
PL-4	—	Site Marker SMK-1
PL-5	25	Perimeter Fence and Southern Corner of Disposal Cell
PL-6	—	Exposure of Smaller Cobbles and Gravels Along Ridge of Disposal Cell
PL-7	310	Sediment Accumulation in Diversion Channel Along Southwest Slope of Disposal Cell
PL-8	45	Revegetated Slopes at Energy Dissipation Basin
PL-9	120	Vegetation on Northeast Side Slope of Disposal Cell (Treated)

Note:

— = Photograph taken vertically from above.



PL-1. NECA Equipment Against Perimeter Fence Between Perimeter Signs P14 and P15



PL-2. Dirt Accumulation Against Perimeter Fence Between Perimeter Signs P11 and P12



PL-3. Faded Pictorial Perimeter Sign P11 at NECA Yard



PL-4. Site Marker SMK-1



PL-5. Perimeter Fence and Southern Corner of Disposal Cell



PL-6. Exposure of Smaller Cobbles and Gravels Along Ridge of Disposal Cell



PL-7. Sediment Accumulation in Diversion Channel Along Southwest Slope of Disposal Cell



PL-8. Revegetated Slopes at Energy Dissipation Basin



PL-9. Vegetation on Northeast Side Slope of Disposal Cell (Treated)