

## 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 8, 2021. 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 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, 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 8, 2021. The inspection was conducted by G. Jay and L. Scott of the Legacy Management Support (LMS) contractor and J. Tallbull of the (Navajo Nation Abandoned Mine Lands [AML] Program). S. Salt (Navajo Nation AML Program) and A. Chambers (LMS contractor) attended the inspection as well. The inspection was not led by the LTSP-required engineer or scientist because of pandemic-related restrictions on travel to the Navajo Nation. Instead, it was led and conducted by local LMS and AML personnel. Grand Junction-based LMS scientists provided the preinspection briefing and postinspection closeout meeting via teleconference with the onsite inspection team. 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 whether maintenance or additional 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. 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 2021 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

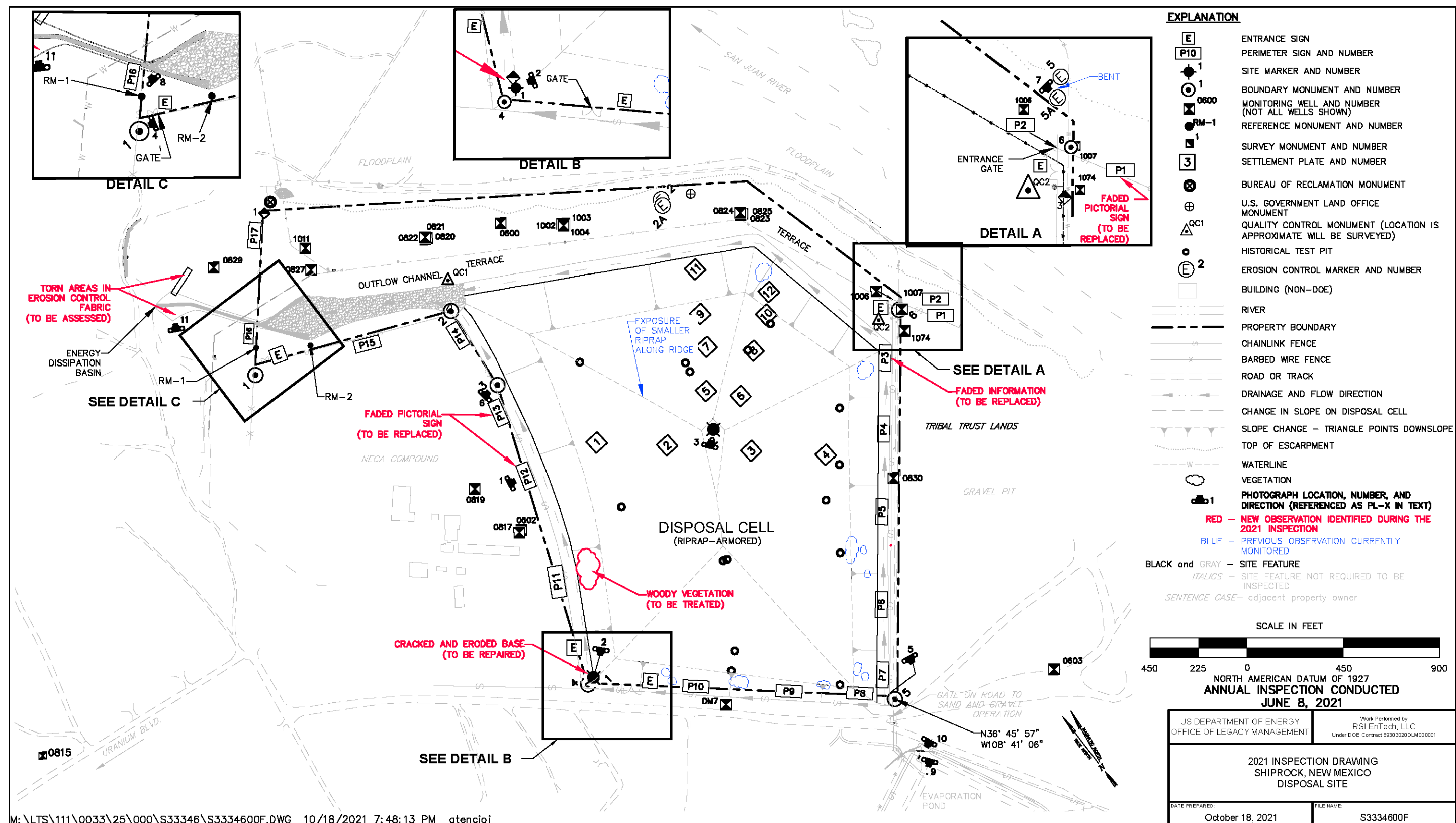
Access to the site is from a gravel road off U.S. Highway 491. Three gates allow access to the site through the perimeter fence: the east gate (the current main entrance gate near the terrace escarpment), the north gate (an auxiliary access gate), and the west gate (the former main entrance gate). Access 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. No 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 fence.<sup>1</sup> Pictorial signs P1, P12, and P13 were faded and in need of replacement (PL-1), the radiation symbols on several signs were faded and the website information on perimeter sign P3 was faded. Faded signs and symbols will be replaced before the next inspection. No other maintenance needs were identified.

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<sup>1</sup> 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.



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### ***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 start to deteriorate (PL-2). Inspectors also noted that a minor amount of soil had eroded from the north side of the concrete base. Both of these items will be repaired before the next inspection. Site marker SMK-2 is on the top slope of the disposal cell and is stable and legible (PL-3).

### ***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 to make them more visible and help inspectors locate them. The concrete at survey monument SM-1 is cracked, but the crack does not threaten the integrity of the marker. All survey and boundary monuments were observed to be clear of vegetation and were either visible (PL-4) or uncovered with a shovel (PL-5 and PL-6) during the 2021 inspection. No maintenance needs were identified.

### ***16.4.1.5 Aerial Survey Quality Control Monuments***

Two aerial survey quality control monuments installed in early 2020 were inspected during the 2021 annual inspection. No maintenance needs were identified.

### ***16.4.1.6 Erosion Control Markers***

The site has four pairs of erosion control markers (1/1A, 2/2A, 3/3A, and 5/5A) (PL-4) 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, near the east entrance gate, was previously bent by a vehicle (PL-7), 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. Piezocones associated with a research project that were installed on the disposal cell cover in the past 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 was identified along the northern ridge of the disposal cell in 2019. This area 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 2021. 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.

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-8). 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 2021. 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, 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 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 during the 2021 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. Both the security fence and pond were intact and functional at the time of the inspection (PL-9). The informational sign at the pond contained outdated information. Updates to the sign will be made before the next inspection.

Inspectors noted three new torn areas in the erosion control fabric on the banks of the lower outflow channel, one of which was considered significant (PL-10). The tears will be assessed in 2022 once travel restrictions are lifted.

Fences and warning signs posted in Bob Lee Wash are maintained under the groundwater compliance program and were not examined during the 2021 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**

The minor maintenance needs that have been identified will be completed when travel restrictions to the Navajo Nation are lifted, include:

- Replacing faded pictorial and 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 erosion control fabric on the northwest end of the outflow channel

## **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 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 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 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 Navajo Nation (primarily *Halogeton glomeratus*) in accordance with applicable laws and would treat deep-rooted woody species in accordance with the LTSP. Vegetation will continue to be monitored 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, U.S. Department of Energy Office of Legacy Management, letter (regarding 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, U.S. Department of Energy Office of Legacy Management, letter (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	120	Faded Pictorial Sign and Radiation Symbol on Perimeter Sign P12
PL-2	250	Cracks and Erosion in Concrete Base of Site Marker SMK-1
PL-3	65	Site Marker SMK-2 on Cell Top
PL-4	265	Boundary Monument BM-1
PL-5	180	Boundary Monument BM-5
PL-6	0	Boundary Monument BM-3
PL-7	180	Erosion Control Marker 5A
PL-8	350	Outflow Channel at North Perimeter Fence
PL-9	245	Evaporation Pond
PL-10	40	Torn Areas in Erosion Control Fabric on Northwest End of Outflow Channel





*PL-1. Faded Pictorial Sign and Radiation Symbol on Perimeter Sign P12*



*PL-2. Cracks and Erosion in Concrete Base of Site Marker SMK-1*





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



*PL-4. Boundary Monument BM-1*





*PL-5. Boundary Monument BM-5*



*PL-6. Boundary Monument BM-3*





*PL-7. Erosion Control Marker 5A*



*PL-8. Outflow Channel at North Perimeter Fence*





*PL-9. Evaporation Pond*



*PL-10. Torn Areas in Erosion Control Fabric on Northwest End of Outflow Channel*

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