

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 May 29, 2008. The disposal cell and all associated surface water diversion and drainage structures remained in good condition and were functioning as designed. Erosion along the southwest bank of the outflow channel was repaired and in good condition. Scattered deep-rooted shrubs on the top and side slopes of the cell, along with tamarisk in the outflow channel, were treated with herbicide. Halogeton, a noxious weed present on the terrace and along site access roads, was also treated. Tumbleweeds and trash continue to accumulate along the perimeter fence and in the outflow channel area; these accumulations were removed in 2008.

Research associated with cell performance, which includes the collection of saturated hydraulic conductivity measurements, continued. DOE also continued to study the effects of deep-rooted vegetation encroachment on the cell to evaluate the need for ongoing control. Two phytoremediation test plots on site continue to be evaluated.

No other maintenance needs or cause for a follow-up or contingency inspection was identified.

16.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Shiprock Disposal Site are specified in the *Long-Term Surveillance Plan [LTSP] for the Shiprock Disposal Site, Shiprock, New Mexico* (DOE/AL/62350–60F, Rev. 1, U.S. Department of Energy [DOE], Albuquerque Operations Office, September 1994) and in procedures established by DOE to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 16–1.

Table 16–1. License Requirements for the Shiprock Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 16.3.1
Follow-Up or Contingency Inspections	Section 7.0	Section 16.3.2
Routine Maintenance and Repairs	Section 8.0	Section 16.3.3
Groundwater Monitoring	Section 5.0	Section 16.3.4
Corrective Action	Section 9.0	Section 16.3.5

Institutional Controls—The 105-acre disposal site is held-in-trust by the United States Bureau of Indian Affairs. The Navajo Nation retains title to the land. The site was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) 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. DOE Order 454.1 defines institutional controls as federal control of the property, site perimeter fencing, warning/no-trespassing signs along the property boundary, and a locked gate at the entrance to the site. Verification of these institutional controls is part of the annual inspection. Inspectors found no evidence that these institutional controls were ineffective or violated.

16.3 Compliance Review

16.3.1 Annual Inspection and Report

The results of the Shiprock Disposal Site inspection, conducted on May 29, 2008, are discussed below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 16–1. Numbers in the left margin refer to items in the “Executive Summary” table.

16.3.1.1 Specific Site-Surveillance Features

Access Road, Gates, Fence, and Signs—Access to the site is via a gravel road off U.S. Highway 491 and through a sand and gravel processing facility, operated by the Navajo Engineering and Construction Authority (NECA), to the main entrance gate. DOE retains perpetual access to the site through a Custody and Access Agreement (CAA) with the Navajo Nation (DE–FC04–83AL16258, October 7, 1983).

All three vehicle access gates—the main entrance gate at the east corner of the site (near the terrace escarpment), the gate providing terrace access at the northwest corner of the site, and the old entrance gate at the west corner of the site—were locked and in good condition.

The security fence along the perimeter was in good condition except for isolated sections between perimeter signs P11 and P13. Past bulldozing activity within the NECA yard resulted in dirt being pushed up against the fence fabric near perimeter sign P13. Also, there are several bent poles and a section of bent fence fabric between perimeter signs P11 and P12. Although damaged, the fence continues to prohibit access into the DOE-controlled area. Inspectors will continue to monitor this area to ensure that the fence remains intact and functional.

16A Tumbleweeds and windblown trash continue to accumulate along the outside and inside of the southwest perimeter fence and along the fence in the outflow channel. These accumulations were removed in 2008, as they could have presented a fire hazard or impeded water flow in the channel. Windblown sand continues to accumulate along the southwest side of the disposal site and, to a lesser extent, in other areas, facilitating the growth of annual weeds and shrubs. DOE will continue to monitor and remove significant tumbleweed, trash, and windblown sand accumulations on site.

Small animals continue to penetrate the fence around the perimeter, as evidenced by several new gaps found beneath the fence. Several of these gaps were filled with rock during the inspection. Inspectors will continue to monitor gaps and fill those that are large enough to allow access by children, who live and play immediately west of the site.

Four entrance signs and 17 pairs of numbered perimeter signs (one standard warning sign with text and one Navajo danger-pictorial sign) are attached to the security fence. Three of the four entrance signs were present and in good condition. One pictorial entrance sign (E1) in the southwestern corner of the site was missing and will be replaced.

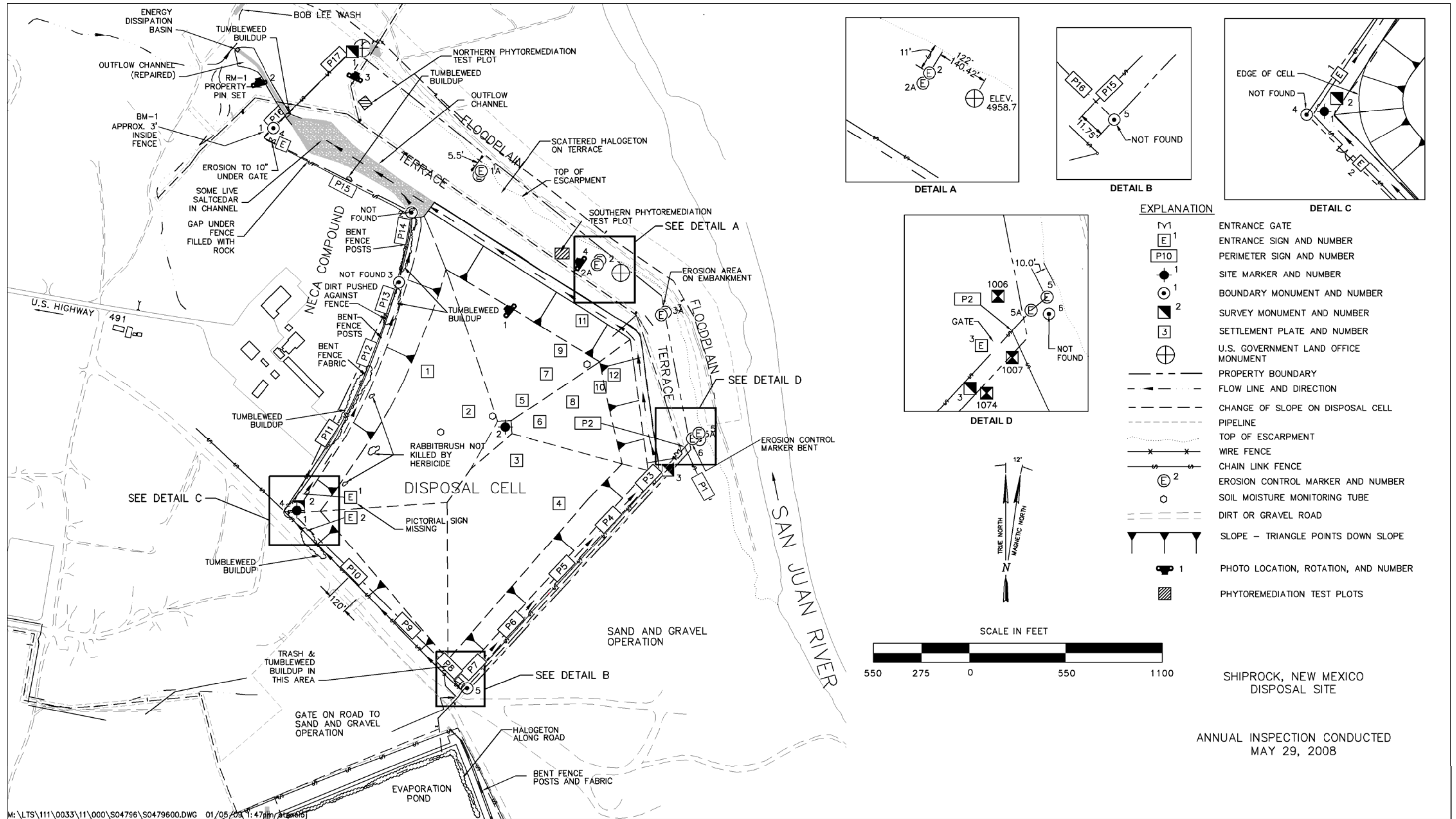


Figure 16-1. 2008 Annual Compliance Drawing for the Shiprock Disposal Site

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Site Markers and Monuments—Two site markers are placed at the site: site marker SMK–1 is just inside the former main entrance gate, and site marker SMK–2 is on top of the disposal cell. Both markers were in good condition at the time of the inspection.

All three survey monuments were inspected and in good condition. In 2008 (as in 2007), only boundary monument BM–1 was located. The five remaining boundary monuments were buried by windblown sand or inadvertently removed by past construction activities. The land is not owned by DOE, but held in trust by the U.S. Bureau of Indian Affairs for the Navajo Nation. The CAA authorizes DOE access to land to inspect and maintain the disposal cell. Therefore, the boundary monuments should be maintained. DOE will subcontract a licensed surveyor to find or reestablish the monuments. The perimeter fence also defines the site boundary along all sides except the east and northeast, where the edge of the terrace escarpment serves as a boundary.

Erosion Control Markers—The four sets of erosion control markers along the edge of the terrace escarpment were in good condition and were not threatened by erosion. The only exception was apparent vehicle damage to a marker (ECM–5A) located near the east entrance gate. However, the damage was slight, and the marker is still functional and does not require repair at this time.

Monitor Wells—Groundwater monitoring for cell performance is not required by the LTSP for this site. Ground Water Compliance Action Plan (GCAP) monitor wells, in and around the site, are not included in the annual inspection because the groundwater restoration staff maintains the wells during the frequent sampling events.

16.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three transects: (1) the disposal cell (including the riprap-covered top and side slopes, diversion channels, and outflow channel), (2) the terrace area north and northeast of the disposal cell, and (3) the outlying area.

The area inside each transect was inspected by walking a series of traverses. Within each transect, the inspectors examined specific site-surveillance features, drainage structures, vegetation, and other features. Inspectors also looked for evidence of settlement, erosion, or other modifying processes that might affect site integrity or the long-term performance of the site.

Disposal Cell, Diversion Channels, and Outflow Channel—The riprap-covered top and side slopes of the cell are in good condition. No evidence of settling or slumping was found.

16B Most of the vegetation on the cell is composed of shallow-rooted plants. However, a few deep-rooted woody shrubs were noted on the top and side slopes of the cell during the inspection. These areas were subsequently treated with herbicide in July and September 2008.

16C DOE is continuing to study the effects of plant encroachment on the disposal cell to evaluate the need for ongoing vegetation control. Saturated hydraulic conductivity measurements continue to be collected at five locations on the cell to evaluate cover performance. Shallow pits exposing the freeze-protection layer at these five locations have been left uncovered for additional measurements and do not affect the performance of the cell cover. These research pits, along

with nearby depressions caused by vehicle access to the research area, are filling with vegetation (PL-1). These areas will continue to be monitored to ensure that cover performance is not affected.

Diversions channels around the base of the disposal cell were in good condition. The tire track ruts noted in the 2007 annual compliance report have been filled in to ensure that the riprap thickness meets design specifications.

16D Site drainage is ultimately directed toward the outflow channel at the northwest corner of the site. The outflow channel was reconstructed in 2003 to repair damage caused by severe storms in 2001 and 2002, and an energy dissipation basin was constructed immediately above Bob Lee Wash. An erosion area along the southwest bank of the off-site portion of the outflow channel was repaired and in good condition (PL-2). The lower, steeper portion of the outflow channel and the energy dissipation structure remained in excellent condition. Rock cover in the outflow channel was also in good condition.

16E In general, shallow-rooted vegetation growing in the diversion and outflow channels (e.g., cheatgrass, Russian thistle, Indian ricegrass) does not impede the flow of water and, therefore, is not removed. However, woody vegetation in the outflow channel does require periodic removal. Therefore, scattered tamarisk plants noted during the May 2008 inspection were cut and treated with herbicide in July and September 2008.

Terrace Area and Site Perimeter—The terrace area is north and east of the disposal cell between the cell and the escarpment. The escarpment, more than 300 feet from the eastern edge of the disposal cell, is prone to slumping. Four sets of erosion control markers are placed along the terrace escarpment. Fractures and incipient slumps commonly occur in the Mancos Shale bedrock along the escarpment northwest of erosion control marker ECM-1A. The erosional “pillar” that had separated from the edge of the escarpment, located near survey monument SM-1 and documented previously, showed no new movement in 2008. Erosion in this area continued to remain unchanged (PL-3). Inspectors will continue to monitor the stability of the escarpment.

16F As observed in 2007, scattered occurrences of the noxious weed halogeton were found on the terrace in 2008. These weeds were treated with herbicide in July 2008. Some tamarisk and halogeton were observed on the steep slopes of the escarpment, but control of these plants is not recommended due to their inaccessibility and also because they serve to stabilize the slope.

16G Two phytoremediation test plots—the northern and the southern (PL-4) test plots—have been maintained on the northeast side of the terrace since 2006. The purpose of the testing is to demonstrate the effectiveness of using phreatophytes for removing former processing-site legacy groundwater contamination from the terrace. The experiments are projected to continue for another 1 to 3 years.

Outlying Area—A sand and gravel pit operated by NECA is located immediately southeast of the disposal cell. Gravel operations continued in 2008, and heavy equipment was operating in the pit during the inspection. All gravel operation activities take place well away from the disposal site perimeter, and historically they have had no effect on the integrity of the site. Inspectors will

continue to monitor sand and gravel operations to ensure that gravel pit activities do not encroach upon or adversely impact the disposal site and perimeter area.

In 2002, DOE constructed an 11-acre lined evaporation pond (across the public access road) as part of the ongoing groundwater treatment program. A chain-link security fence encloses the area. Although the activities associated with the treatment of contaminated groundwater at this site are not within the scope of the LTSP, the pond is monitored for general condition and security as part of the annual inspections. At the time of the 2008 site inspection, there were no major concerns or issues noted within this area. A short section of fence and several fence poles were bent near the entrance gate, but the fence was still operational. Also, infestations of the noxious weed halogeton noted on both sides of the access road along the pond's perimeter were treated with herbicide in July 2008.

16.3.2 Follow-Up or Contingency Inspections

DOE will conduct follow-up 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 follow-up or contingency inspections were required in 2008.

16.3.3 Routine Maintenance and Repairs

In 2008, several gaps found at the base of the perimeter fence were filled with rock, erosion along the southwest bank of the off-site portion of the outflow channel was repaired, deep-rooted plants on the cell top were controlled, and noxious and undesirable plants were treated with herbicide. No other maintenance or repairs occurred at the site in 2008.

16.3.4 Groundwater Monitoring

The LTSP does not require groundwater monitoring at the site due to the hydrogeologic conditions that are present: an upward hydraulic gradient within the uppermost aquifer and an effective confining layer on which the cell was constructed (i.e., the low permeability of the unweathered Mancos Shale) provide protection to the uppermost aquifer. These hydrogeologic conditions preclude the movement of legacy site-related contamination within the artificial groundwater system beneath the former tailings pile (current location of the disposal cell) into the deeper aquifers.

16.3.5 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 corrective action was required in 2008.

16.3.6 Photographs

Table 16–2. Photographs Taken at the Shiprock Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	310	Depressions in cell side slope rock cover that contain vegetation.
PL–2	345	Repaired area of outflow channel.
PL–3	25	View from top of escarpment of erosion area below berm near SM–1; no new erosion is evident.
PL–4	305	Southern phytoremediation test plot.



SHP 5/08. PL-1. Depressions in cell side slope rock cover that contain vegetation.



SHP 5/08. PL-2. Repaired area of outflow channel.



SHP 5/08. PL-3. View from top of escarpment of erosion area below berm near SM-1; no new erosion is evident.



SHP 5/08. PL-4. Southern phytoremediation test plot.