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 24, 2016. No changes were observed in the disposal cell or associated diversion channels. The west entrance gate is slowly being covered by windblown sediments, the perimeter fence adjacent to the Navajo Engineering and Construction Authority (NECA) property has been damaged, and boundary monuments BM-2 and BM-3 are buried by sediments and trash from the NECA property. These maintenance and repair items will be completed before the 2017 inspection. Inspectors identified no other maintenance needs or cause for a follow-up or contingency inspection.

Disposal cell–performance groundwater monitoring is not required. However, groundwater restoration is being conducted in accordance with a 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 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 Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 16.4
Follow-Up or Contingency Inspections	Section 7.0	Section 16.5
Maintenance and Repairs	Section 8.0	Section 16.6
Environmental Monitoring	Sections 5.0 and 6.4	Section 16.7
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 to perform remedial actions at the former uranium processing sites. 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 U.S. Nuclear Regulatory Commission 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. Institutional controls (ICs) at the site include federal custody of the disposal cell and its engineered features and the following physical ICs that are inspected annually: the disposal cell

and its engineered features, entrance gates and signs, the perimeter fence and signs, site markers, survey and boundary monuments, and erosion control markers.

16.4 Inspection Results

The site, south of Shiprock, New Mexico, was inspected on May 24, 2016. The inspection was conducted by M. Kastens, L. Sheader, D. Miller, and G. Jay of the DOE Legacy Management Support contractor. The purposes of the inspection were to confirm the integrity of visible features at the site, identify changes in conditions that might affect site integrity, 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 surveillance features. 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.

16.4.1.1 Access Roads, Entrance Gates, and Entrance Signs

All access roads were unobstructed and in an easily drivable condition. 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 gained by traveling through a gravel pit. The three gates were intact and operable, although sediment is beginning to build up beneath the west gate. The sediment will be removed before the 2017 inspection. The wide gap discovered below the north gate during the 2015 inspection had been appropriately reduced by lowering the gate on its posts. 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. All entrance signs were legible, with the exception of faded radiation symbols on the west and north gate textual signs; these were replaced during the inspection. No other maintenance needs were identified.

16.4.1.2 Perimeter Fence and Signs

A chainlink fence encloses the disposal cell and drainage features. As observed in previous years, damage to the perimeter fence was noted in several places, all of which are along the adjacent NECA property. Damage includes: bent posts and bent fence fabric between perimeter signs P11 and P13, dirt pushed through the fence between perimeter signs P11 and P12 (PL-1), dirt mounded against the fence and a section of bent fence near perimeter sign P13, bent posts near perimeter sign P14, a broken fence riser near perimeter sign P15, and fence risers separated from posts between perimeter sign P15 and P16. Damaged fence sections will continue to be monitored and repaired when necessary to maintain site security. DOE has requested that NECA repair those sections damaged by NECA activities.

A relatively long section of fence by perimeter sign P15 has a 3- to 6-inch gap beneath it. At this time, the gap is not a concern, but inspectors will continue to monitor the gap to determine if it widens and needs to be repaired. In several other places along the perimeter fence, inspectors placed rocks in gaps that were potentially large enough to allow site access by animals.

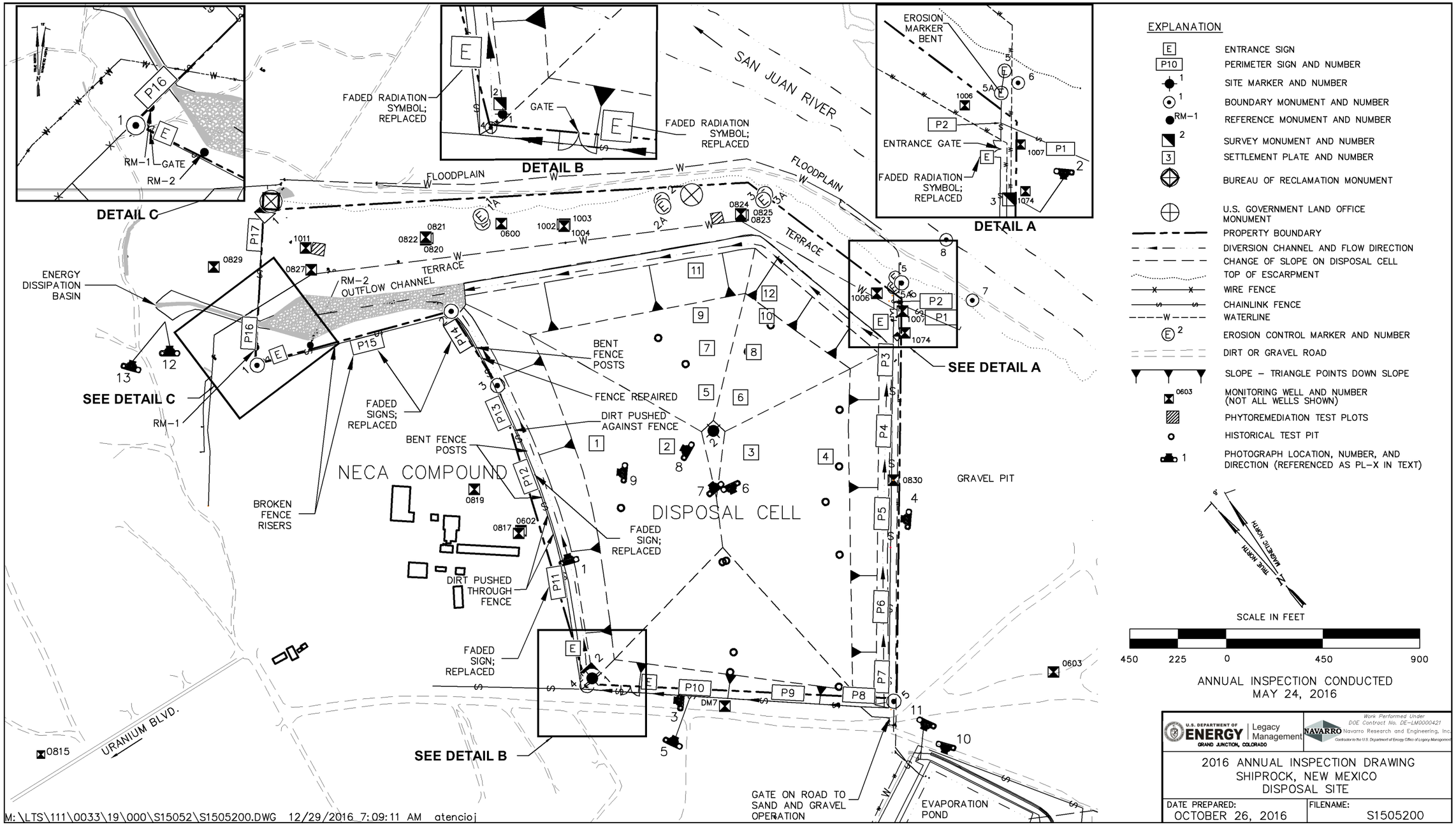

Figure 16-1. 2016 Annual Inspection Drawing for the Shiprock Disposal Site

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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 that all fence lines, with the exception of those along the inside of the NECA yard, were unobstructed and relatively free of trash and tumbleweeds (PL-2 and PL-3). No other maintenance needs were identified.

There are 17 pairs of perimeter signs, designated P1 through P17 (each pair consisting of one pictorial and one textual sign), installed along the perimeter fence.[1] Perimeter signs P1 through P10, previously noted to have faded radiation symbols and cracked surfaces, were all repaired or replaced before the 2016 inspection (PL-4 and PL-5). Perimeter signs P11 through P15, on the side of the fence within the NECA yard, still had faded radiation symbols on the textual signs and cracked surfaces on the pictorial signs; these symbols and pictorial signs were replaced in a later visit. Some of the perimeter signs (perimeter signs P1 through P5 [PL-4]) have the DOE phone number listed on them, some have no phone number (perimeter signs P6, P7, P10 [PL-5]), and a few have the Navajo Nation phone number (perimeter signs P9, P14). Sign specifications in the LTSP indicate that the Navajo Nation phone number is not required, but the LTSP does indicate a requirement for the DOE phone number. The DOE phone number is present on many of the perimeter and all of the entrance signs, which adequately addresses the LTSP specification. 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, and site marker SMK-2 is on the top slope of the disposal cell. Minor cracks in the concrete base of SMK-1 were sealed in May 2003 and have not changed significantly. No maintenance needs were identified.

16.4.1.4 Survey and Boundary Monuments

There are three survey monuments located on the north, west, and east corners of the site. The concrete at SM-1 was cracked, but the crack does not threaten the integrity of the marker. No maintenance needs were identified.

There were eight boundary monuments originally installed at the site. Inspection of boundary monument BM-7 was discontinued in 1999 because it is offsite, on the unsafe, steep embankment below the terrace. Inspection of boundary monument BM-8, also beyond the site's boundary, was discontinued in 2003. Because they are offsite, these boundary monuments will not be inspected. The remaining boundary monuments, marked with reference posts to help inspectors find them, were inspected. Boundary monuments BM-2, BM-3, and BM-4 were covered with sediment and trash. Inspectors removed debris from the top of BM-4 during the inspection. Sediment and trash will be removed from BM-2 and BM-3 before the 2017 inspection. No other 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.

16.4.1.5 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). Marker 5A, near the east entrance gate, was previously bent by a vehicle, but it is still functional and does not require repair. (Erosion control markers 4 and 4A are not inspected; they were installed on the terrace east of the site, in the gravel pit. Markers 5 and 5A replaced markers 4 and 4A.) No maintenance issues 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 (including the riprap-covered top and side slopes), 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 integrity, protectiveness, or long-term performance.

16.4.2.1 Disposal Cell, Diversion Channels, and Outflow Channel

The disposal cell, completed in 1986, occupies 77 acres. The top and side slopes of the disposal cell are covered in riprap and were intact and functional. No evidence of slumping, erosion, animal intrusion, or riprap deterioration was found. Piezocones associated with a research project were installed on the disposal cell cover in the past. Some of the filled piezocone pits have subsided slightly, forming shallow conical depressions in the cover. As previously reported, the surface of the disposal cell is covered with vehicle ruts. 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 1% to 5% of the total cover and enhancing vegetation establishment (PL-7). Woody, deep-rooted shrubs are controlled because they potentially could damage the radon barrier. Only a few woody shrubs were growing on the northwest side of the disposal cell. These plants were treated with herbicide in a later visit.

Inspectors discovered two old buried pipe features on the disposal cell top that were covered by larger-diameter, rusted metal pipes (PL-8 and PL-9). These are historical neutron hydroprobe ports that were installed in the 1980s to measure soil moisture in the cover. The one uncovered port will be capped before the 2017 inspection to prevent precipitation from entering the port.

Diversion channels around the base of the disposal cell were in a functioning condition and contained scattered vegetation, including several woody shrubs. These shrubs do not affect the integrity of the channel at this time and are not a concern. In the outflow channel, non-woody plants were growing within the channel, and woody vegetation was growing on the banks of the channel. The channel itself was 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 escarpment, which varies between 175 and 345 feet from the eastern base of the disposal cell, is prone to slumping. No new significant erosion was evident in 2016. 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.

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 fence and pond were intact and functional at the time of the 2016 inspection. New warning signs had been affixed to the fence fabric (PL-10), but the entrance sign contained old and outdated information (PL-11). This plywood sign, 4 × 8 feet in size, will be completely replaced before the 2017 inspection and include, at a minimum, the following information:

- U.S. Department of Energy, Office of Legacy Management, Grand Junction, CO
- Uranium Mill Tailings Remedial Action (UMTRA) Groundwater Remedial Action Project, Shiprock, NM
- Work supported by Navajo Nation Abandoned Mine Lands (AML)/UMTRA Office

In 2015, inspectors discovered that side slope erosion in the outlying area near perimeter sign P6 had uncovered a buried water pipeline used to transport contaminated water from the floodplain to the evaporation pond. This erosional feature was repaired in 2015, and the waterline was reburied.

A gravel pit 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.

Inspectors noted that the offsite portion of the outflow channel was functional and clear of debris. Several portions of erosion control fabric had previously come loose from one of the side slopes of the channel and were repaired in 2014. By the time of the 2016 inspection, the replacement fabric had become shredded and ineffective (PL-12 and PL-13). It will be removed and replaced with a longer-lived, plastic-based, erosion control fabric before the 2017 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

Faded radiation symbols on the entrance signs and faded and cracked perimeter signs were replaced, and woody vegetation on the disposal cell was sprayed with herbicide. Windblown sediments will be removed from the west entrance gate to allow it to be opened fully. Accumulations of tumbleweeds and trash along the site perimeter fence will continue to be removed regularly. Sediment and trash will be removed from boundary monuments BM-2 and BM-3. A new cover for the one uncovered neutron hydroprobe port will be fabricated and installed. At the evaporation pond, the out-of-date and peeling information sign will be replaced, and the shredded erosion control fabric will be replaced with sturdier fabric at the lower end of the outflow channel. All maintenance items and repairs will be completed before the 2017 inspection. The perimeter fence adjacent to the NECA property has been damaged; NECA has been asked to repair the perimeter fence. No other maintenance needs were identified.

16.7 Environmental Monitoring

16.7.1 Groundwater Monitoring

Disposal cell–performance groundwater monitoring is not required by the LTSP. However, groundwater restoration is being conducted in accordance with a groundwater compliance strategy. The wells associated with the compliance strategy (along the terrace and at offsite locations) are not included in the annual inspection.

16.7.2 Vegetation Monitoring

In a 1999 letter to the Navajo AML/UMTRA Department (Bergman-Tabbert, 1999), DOE committed to spraying annual weeds on the disposal cell top. Patches of annual weeds observed growing on the disposal cell top were treated with herbicide following the inspection.

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

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.

Bergman-Tabbert, 1999. Donna Bergman-Tabbert, manager, U.S. Department of Energy, letter (subject: Shiprock UMTRA Site) to Madeline Roanhorse, Division of Natural Resources, Navajo UMTRA Program, May 13.

16.10 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	25	West Perimeter Fence Along NECA Yard; Note Historical Damage to Fence Fabric
PL-2	225	Southeast Perimeter Fence
PL-3	315	Southwest Perimeter Fence and Outlying Area
PL-4	315	Newly Replaced P5 Perimeter Signs
PL-5	65	Newly Replaced Radiation Symbol on P10 Perimeter Sign
PL-6	195	Numerous Tracks on Disposal Cell Top, Made by a Full-Sized Vehicle
PL-7	NA	Typical Annual Weed Cover on Disposal Cell Top Slope
PL-8	340	Historical Neutron Hydroprobe Port on Disposal Cell Top Slope
PL-9	315	A Second Neutron Hydroprobe Port on Disposal Cell Top Slope
PL-10	235	Newly Replaced Warning Signs on Evaporation Pond Fence
PL-11	245	Old, Out-of-Date Information Sign at Evaporation Pond
PL-12	40	Damaged Erosion Control Fabric on Lower Part of Outflow Channel Side Slope
PL-13	55	Damaged Erosion Control Fabric on Upper Part of Outflow Channel Side Slope

Abbreviation:
NA = not applicable

PL-1. West Perimeter Fence Along NECA Yard; Note Historical Damage to Fence Fabric

PL-2. Southeast Perimeter Fence

PL-3. Southwest Perimeter Fence and Outlying Area

PL-4. Newly Replaced P5 Perimeter Signs

PL-5. Newly Replaced Radiation Symbol on P10 Perimeter Sign

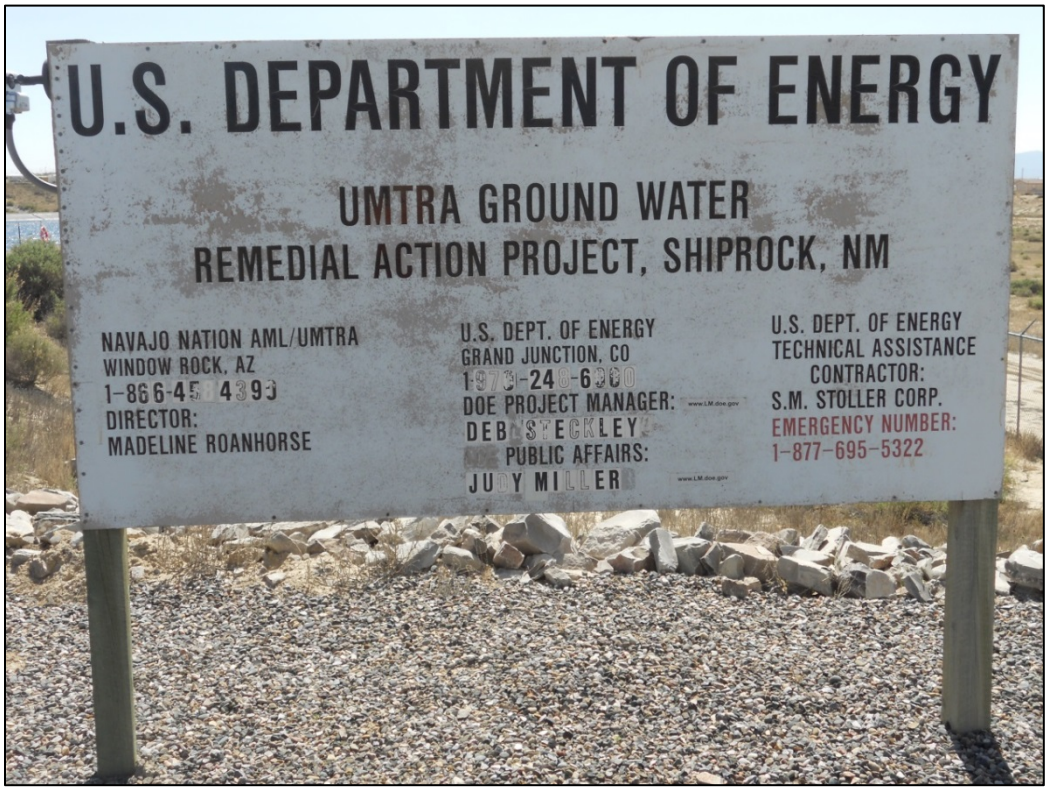
PL-6. Numerous Tracks on Disposal Cell Top, Made by a Full-Sized Vehicle

PL-7. Typical Annual Weed Cover on Disposal Cell Top Slope

PL-8. Historical Neutron Hydroprobe Port on Disposal Cell Top Slope

PL-9. A Second Neutron Hydroprobe Port on Disposal Cell Top Slope

PL-10. Newly Replaced Warning Signs on Evaporation Pond Fence



PL-11. Old, Out-of-Date Information Sign at Evaporation Pond

PL-12. Damaged Erosion Control Fabric on Lower Part of Outflow Channel Side Slope

PL-13. Damaged Erosion Control Fabric on Upper Part of Outflow Channel Side Slope