

17.0 Slick Rock, Colorado, Disposal Site

17.1 Compliance Summary

The Slick Rock, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on May 13, 2014. The site was in good condition. A damaged perimeter sign was replaced. Inspectors identified no other maintenance needs or cause for a follow-up inspection.

17.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Burro Canyon Disposal Cell, Slick Rock, Colorado*, (LTSP) (DOE/AL/62350-236, Rev. 0, U.S. Department of Energy [DOE], May 1998) and procedures that DOE established to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 17-1 lists these requirements.

Table 17-1. License Requirements for the Slick Rock Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Sections 3.0 and 6.2	Section 17.4
Follow-Up Inspections	Section 3.4	Section 17.5
Maintenance and Repairs	Section 4.0	Section 17.6
Groundwater Monitoring	Section 2.5	Section 17.7
Corrective Action	Section 5.0	Section 17.8

17.3 Institutional Controls

The 62-acre disposal site (Figure 17-1) is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1998. DOE is the licensee and, in accordance with requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: site markers, boundary and survey monuments, perimeter warning signs, perimeter fence, and a locked gate at the site entrance.

17.4 Inspection Results

The site, northeast of Slick Rock, Colorado, was inspected on May 13, 2014. The inspection was conducted by D. Traub and L. Sheader of Stoller Newport News Nuclear, Inc. (SN3), a wholly owned subsidiary of Huntington Ingalls Industries, Inc. SN3 is the DOE Legacy Management Support contractor. S. Kaufman (SN3) 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 site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring. Numbers in the left margin of this chapter refer to items summarized in Table ES-1 of the "Executive Summary."

17.4.1 Site Surveillance Features

Figure 17-1 shows the locations of site surveillance features. 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 on Figure 17-1 by photograph location (PL) numbers.

17.4.1.1 Entrance Gate and Entrance Sign

The site is accessed from San Miguel County Road T11. The entrance to the site is through a barbed-wire gate that is secured with a DOE lock. The entrance gate and entrance sign were in good condition. Erosion repairs conducted at the entrance area in November 2013 were in good condition.

17.4.1.2 Perimeter Signs

17A

Thirty-two perimeter signs, designated P1 through P32, are spaced at approximately 200-foot intervals around the site. The signs, attached to steel posts set in concrete, are 5 feet inside the site boundary. Most signs were in good condition, although some cracking of the printed overlay is beginning to appear on several signs. Damaged perimeter sign P29 (PL-1) was replaced.

17.4.1.3 Perimeter Fence

A 4-strand stock fence is located between the disposal cell and the site boundary. The top and bottom strands are smooth wire to allow wildlife to pass over and under, and the middle two strands are barbed wire. The fence was in good condition.

17.4.1.4 Site Markers

The two granite site markers, SMK-1 near the entrance gate and SMK-2 (PL-2) on top of the disposal cell, were in excellent condition. Erosion near SMK-1 is being monitored and will be repaired if it impacts the integrity of the site marker.

17.4.1.5 Boundary and Survey Monuments

Six boundary monuments define the corners of the site boundary. Three onsite survey monuments are also monitored (PL-3). All observed boundary and survey monuments were in good condition.

17.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection. The inspection areas are: (1) the disposal cell, including side slopes, key trench, and apron; (2) the area between the disposal cell and the site boundary; and (3) the outlying area.

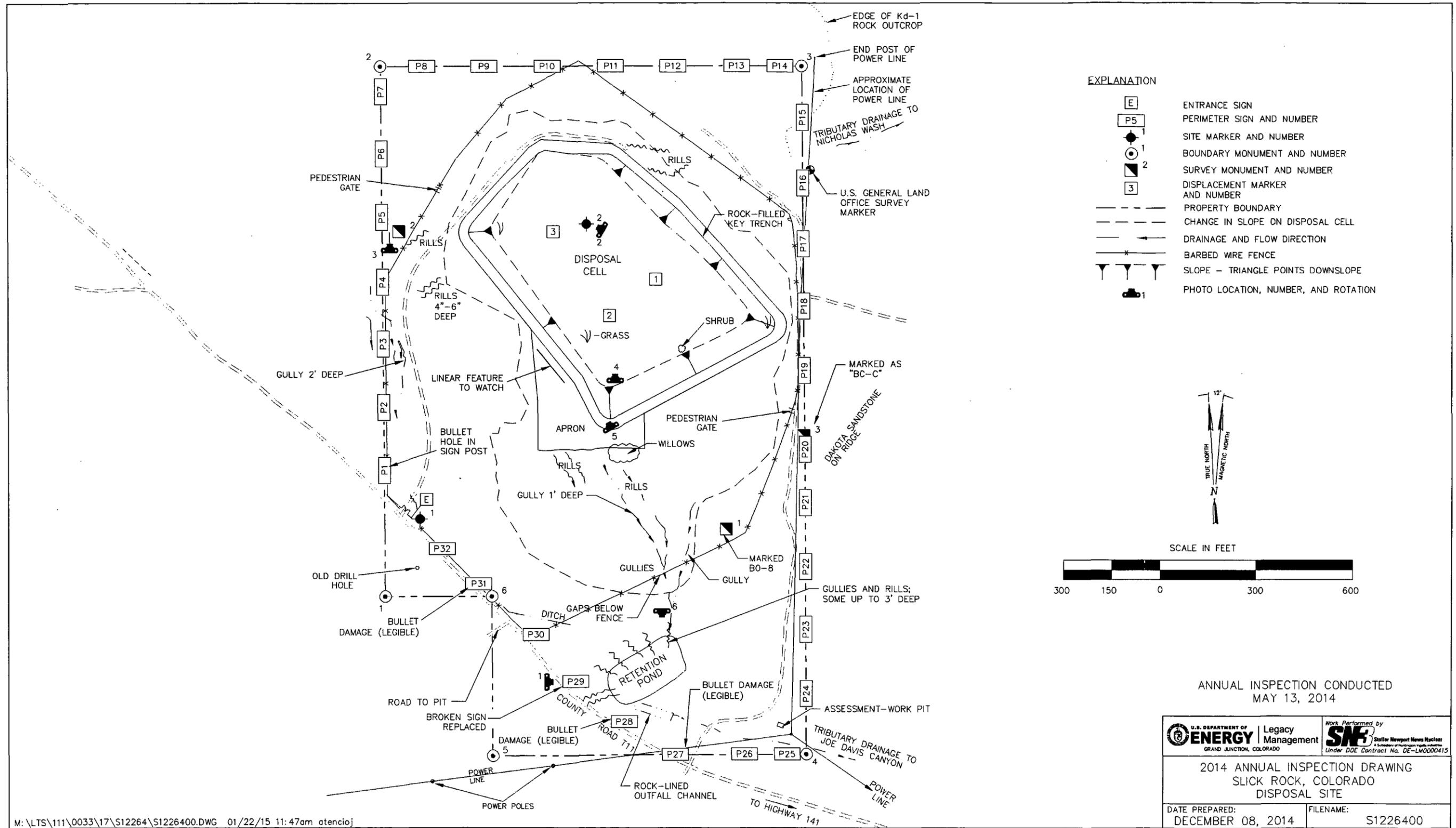


Figure 17-1. 2014 Annual Inspection Drawing for the Slick Rock Disposal Site

This page intentionally left blank

Within each area, inspectors examined specific site surveillance features. Inspectors also observed vegetation conditions and looked for evidence of erosion, settling, slumping, or other disturbance that might affect the site's integrity, protectiveness, or long-term performance.

17.4.2.1 Disposal Cell, Key Trench, and Apron

The top of the disposal cell is roughly pentagonal. Five side slopes descend from the disposal cell top at a maximum grade of 25 percent and are covered with riprap. At the base of the side slopes is a key trench that encircles the disposal cell. The key trench, designed to convey runoff water around the cell, is as much as 5 feet deep and 20 feet wide and filled with riprap. Runoff water from the key trench discharges to a riprap apron at the south (downslope) corner of the disposal cell. The apron extends 50–200 feet beyond the key trench.

Rock covering the disposal cell, key trench, and apron is rounded cobble- and pebble-sized material. The rock was in excellent condition (PL-4). No evidence of settling, slumping, or erosion was seen on any of the rock-covered surfaces of the disposal cell or the key trench. No deep-rooted plant species were observed on the surface of the cell.

The rock apron has a linear disturbance that may indicate possible erosion under the rock. The feature is about 2–3 inches deep, 2 feet wide, and 50 feet in length (PL-5). This feature does not impact the performance of the apron but will continue to be monitored.

17.4.2.2 Area Between the Disposal Cell and the Site Property Boundary

The area around the disposal cell includes the retention pond. Surface drainage from the disposal cell flows south into the retention pond, which is constructed in a channel tributary to Joe Davis Canyon. An outflow channel below the pond is lined with rounded cobblestones for a short distance. The pond, which was holding some water at the time of the inspection, and the outflow channel were in good condition. Some of the gullies on the northwest side of the retention pond are as deep as 3 feet (PL-6), but they do not present a hazard to the disposal cell or to any site features, so repairs are not warranted at this time. These erosional features will continue to be monitored.

Erosion rills and gullies are present in several areas of the site (Figure 17-1) but do not impact the disposal cell or any site features. They appear to be stabilizing but will continue to be monitored. Vegetation in the reclaimed areas was healthy. Noxious weeds are controlled to comply with state and county requirements.

17.4.2.3 Outlying Area

The natural, undisturbed areas outside the disposal site support grass and scattered pinyon and juniper trees. The primary land use is grazing. Steep hillsides north and northeast of the site slope eastward into Nicholas Wash. Areas north and northeast of the site also are routinely used for recreation such as hunting, four-wheeling, and firewood cutting. No disturbances or evidence of land use changes in the outlying areas were noted.

17.5 Follow-Up Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit identifies a condition that requires a return to the site to evaluate the condition, or (2) a citizen or outside agency notifies DOE that conditions at the site or in the vicinity of the site are substantially changed. No need for a follow-up inspection was identified.

17.6 Maintenance and Repairs

Damaged perimeter sign P29 was replaced. No other maintenance needs were identified.

17.7 Groundwater Monitoring

Groundwater monitoring is not required by the LTSP. Groundwater in the uppermost aquifer is not a current or potential source of drinking water because of low yield. NRC concurred with DOE's application of supplemental standards.

17.8 Corrective Action

In accordance with the LTSP, corrective action is taken to correct conditions that threaten the integrity of the disposal cell or compliance with 40 CFR 192. No need for corrective action was identified.

17.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	90	Perimeter sign P29 and retention pond.
PL-2	300	Site marker SMK-2 on top of disposal cell.
PL-3	NA	Survey monument SM-2.
PL-4	0	Top of disposal cell.
PL-5	330	Apron; linear disturbance in center.
PL-6	180	Bedrock erosion near northwest corner of retention pond.



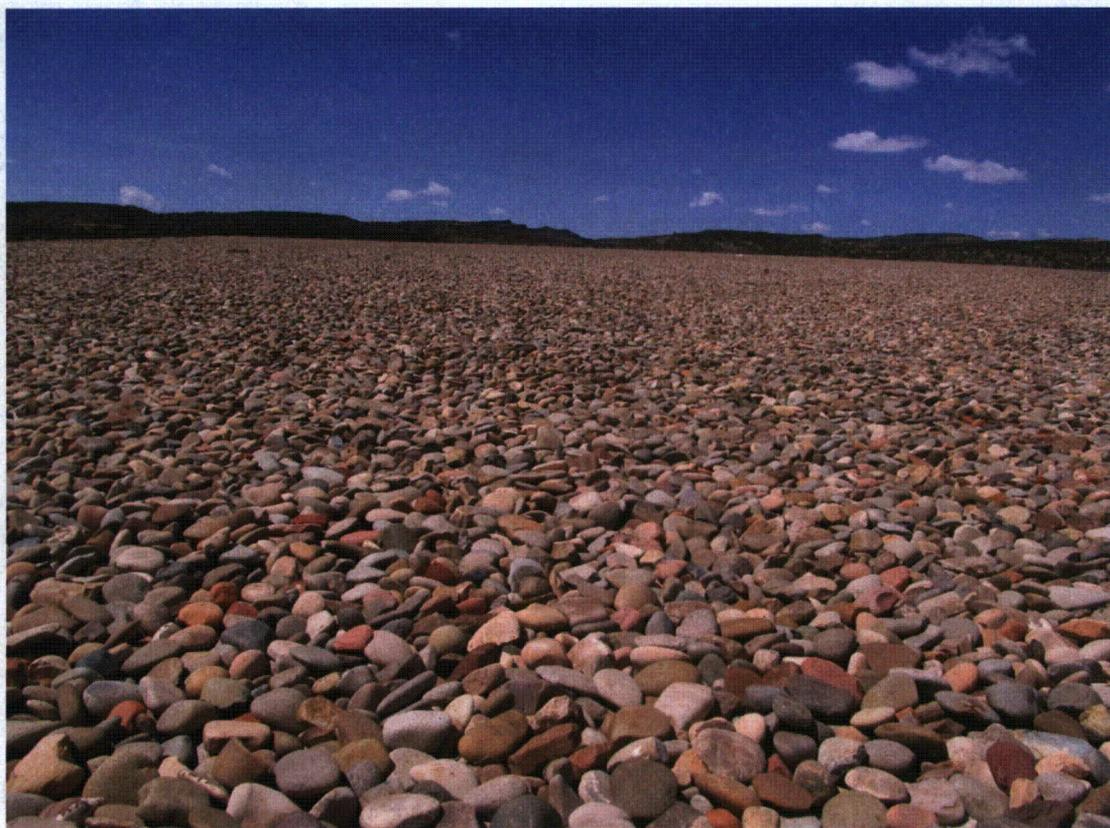
SRK 5/2014. PL-1. Perimeter sign P29 and retention pond.



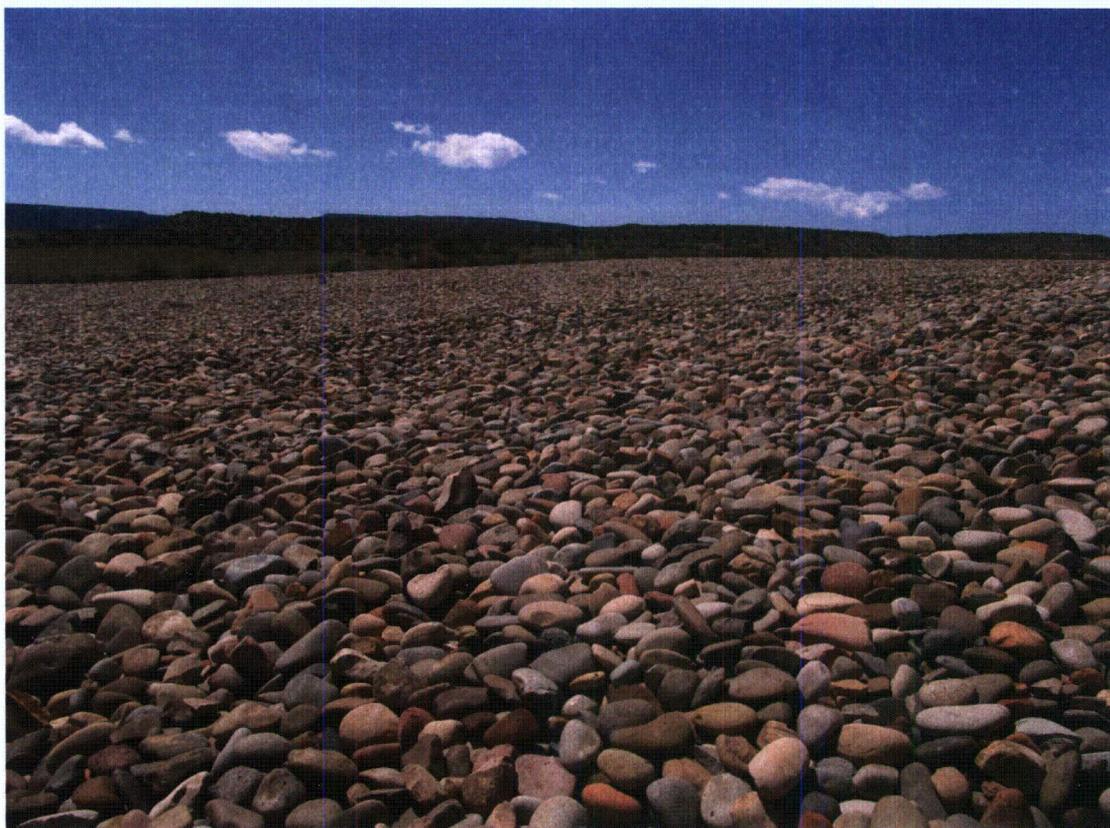
SRK 5/2014. PL-2. Site Marker SMK-2 on top of disposal cell.



SRK 5/2014. PL-3. Survey monument SM-2.



SRK 5/2014. PL-4. Top of disposal cell.



SRK 5/2014. PL-5. Apron; linear disturbance in center.



SRK 5/2014. PL-6. Bedrock erosion near northwest corner of retention pond.

This page intentionally left blank

18.0 Spook, Wyoming, Disposal Site

18.1 Compliance Summary

The Spook, Wyoming, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on June 30, 2014. The site was in excellent condition. Three perimeter signs were delaminated and will be replaced during the next annual inspection. Inspectors identified no other maintenance needs or cause for a follow-up or contingency inspection.

18.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Final Long-Term Surveillance Plan for the Spook, Wyoming, Disposal Site (LTSP)* (DOE/AL/350215.0000, Rev. 0, U.S. Department of Energy [DOE], January 1993) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 18-1 lists these requirements.

Table 18-1. License Requirements for the Spook Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 18.4
Follow-Up or Contingency Inspections	Section 7.0	Section 18.5
Maintenance	Section 8.0	Section 18.6
Groundwater Monitoring	Section 5.0	Section 18.7
Corrective Action	Section 9.0	Section 18.8

18.3 Institutional Controls

The 14-acre site (Figure 18-1) is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1993. 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 at the disposal site include federal ownership of the property and the following features that are inspected annually: perimeter warning signs, site markers, and survey and boundary monuments.

18.4 Inspection Results

The site, northeast of Casper, Wyoming, was inspected on June 30, 2014. The inspection was conducted by D. Traub and R. Johnson of Stoller Newport News Nuclear, Inc. (SN3), a wholly owned subsidiary of Huntington Ingalls Industries, Inc. SN3 is the DOE Legacy Management Support contractor. B. Dam (DOE Site Manager) 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 site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

Figure 18-1 shows the locations of site surveillance features. 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 18-1 by photograph location (PL) numbers.

18.4.1 Site Surveillance Features

Figure 18-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections.

18.4.1.1 Access Road and Entrance Sign

Access to the site is via State Highway 95 from Glenrock or State Highway 93 from Douglas, to County Road 31, and onto the Hornbuckle Ranch road. Site access is maintained through perpetual easements across the Hornbuckle Ranch. The road to the site is graded and hard-packed and is maintained by the ranch. The road was in good condition (PL-1). The entrance sign, on the east side of the road, was in good condition.

18.4.1.2 Perimeter Signs

The site is surrounded by 10 perimeter signs. All of the signs were legible. Perimeter signs P1, P2, and P7 (which are constructed of thin, bonded aluminum sheets) were delaminated and will be replaced during the next annual inspection.

18.4.1.3 Site Markers

Two granite site markers identify the site. Site marker SMK-2 was in excellent condition (PL-2). The concrete base of site marker SMK-1 is damaged due to spalling but is stable (PL-3); there were no apparent changes from the previous year.

18.4.1.4 Survey Monuments and Boundary Monuments

Eight boundary monuments and three survey monuments are present at the site. Wind erosion has exposed the concrete base for boundary monument BM-6 (PL-4). During this inspection that monument was noted as being bent. It may have been inadvertently damaged by a vehicle when covered by snow. A t-post will be installed to mark its location. Even though bent, it was stable and repair is not warranted. The other monuments were in excellent condition.

The boundary monuments and a survey monument, as well as the perimeter signs, are located outside the property boundary. The owner of the surrounding property (Hornbuckle Ranch) is aware they are on his property but is not concerned; therefore, the monuments and signs will remain at their current locations.

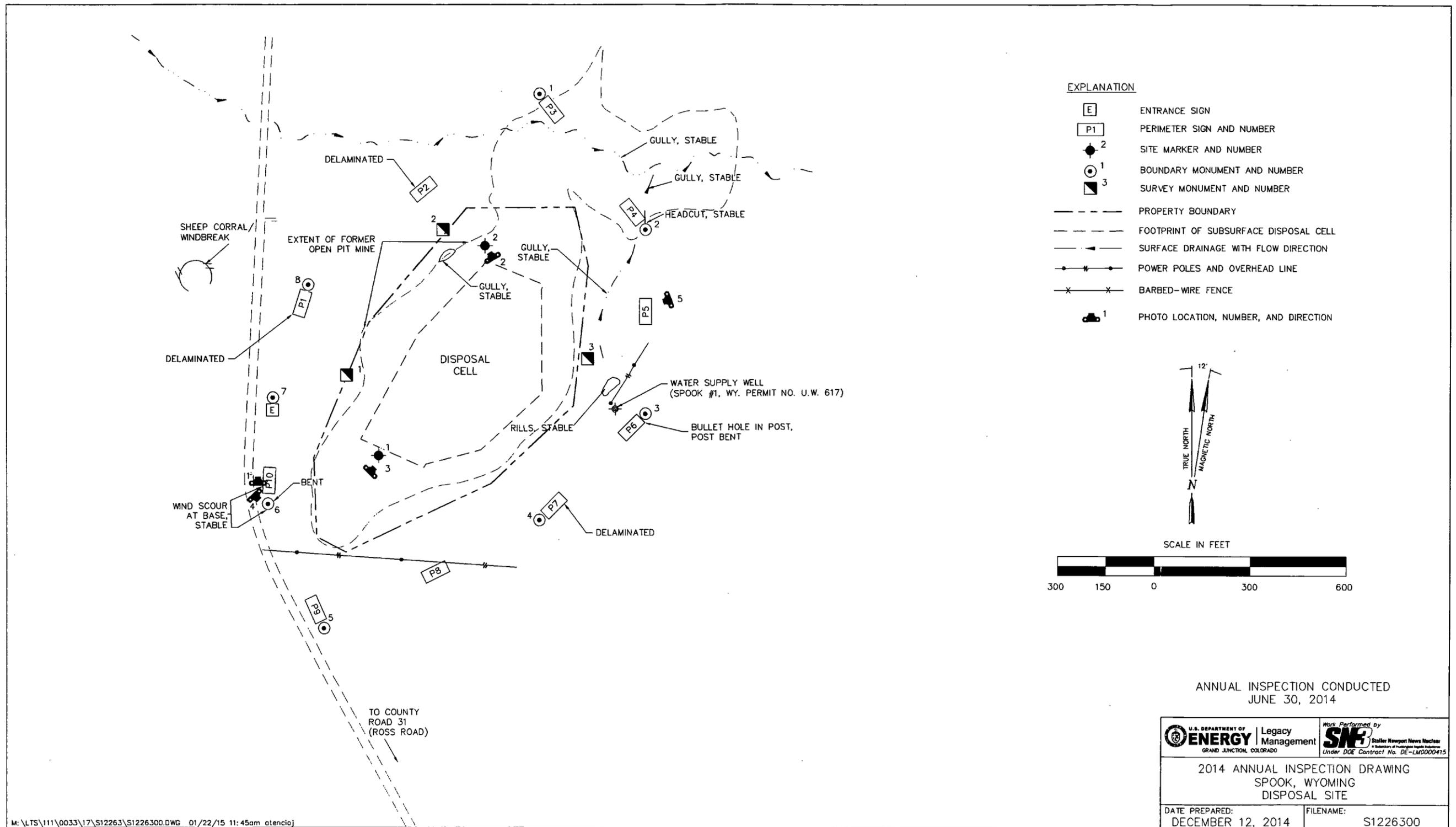


Figure 18-1. 2014 Annual Inspection Drawing for the Spook Disposal Site

This page intentionally left blank

18.4.2 Inspection Areas

The site is divided into three inspection areas to ensure a thorough and efficient inspection. The inspection areas are: (1) the disposal cell, (2) the site perimeter, and (3) the outlying area.

Within each area, the inspectors examined specific site surveillance features. Inspectors observed the condition of site vegetation and looked for evidence of erosion, settling, slumping, or other disturbances that might affect the site's integrity, protectiveness, or long-term performance.

18.4.2.1 Disposal Cell

The site is unique among Title I sites in that tailings were encapsulated in the bottom of an open pit mine and covered with 40–60 feet of clean fill and topsoil. Therefore, many of the observations and concerns routinely associated with above-grade disposal cells—such as the quality of the riprap and the stability of side slopes—do not apply to this site. The surface of the 5-acre disposal cell, completed in 1989, was in excellent condition. No evidence of settling was observed over the former mine pit. Vegetation on the cell cover, consisting of grasses and forbs, was healthy and indistinguishable from that growing on the remainder of the site and on the surrounding ranch land (PL-5).

18.4.2.2 Site Perimeter

There is no perimeter fence at the site. The area between the disposal cell and the perimeter was in excellent condition with no evidence of settling or active erosion.

18.4.2.3 Outlying Area

The area beyond the site boundary for a distance of about 0.25 mile was visually observed for erosion, disturbance, change in land use, or other conditions of possible concern. Several minor rills and gullies are near the site, and they appeared to be stable. The erosion is not harming the function of the cell cover or other site features, and it is not a concern at this time.

The access road has frequent truck traffic to service and maintain the oil wells in the area. Even though oil field activity has greatly increased near the site, no evidence of trespassing or vandalism on the site was observed.

18.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up or contingency inspections if (1) an annual inspection or other site visit identifies a condition that requires a return to the site to evaluate the condition, or (2) a citizen or outside agency notifies DOE that conditions at the site or in the vicinity of the site are substantially changed. No need for a follow-up or contingency inspection was identified.

18.6 Maintenance

Delaminated perimeter signs will be replaced during the next inspection. A t-post will be placed adjacent to bent boundary monument BM-6 to identify its location when buried by snow. No other maintenance needs were identified.

18.7 Groundwater Monitoring

Groundwater monitoring is not required at the site, in accordance with the LTSP. The uppermost aquifer is of limited use because of marginal yield, and the groundwater is contaminated as a result of widespread, naturally occurring uranium mineralization. NRC concurred with DOE's application of supplemental standards.

18.8 Corrective Action

In accordance with the LTSP, corrective action is taken to correct conditions that threaten the integrity of the disposal cell or compliance with 40 CFR 192. No need for corrective action was identified.

18.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	0	Site access road near perimeter sign P10.
PL-2	330	Site marker SMK-2.
PL-3	45	Site marker SMK-1; concrete base spalling but stable.
PL-4	135	Bent boundary monument BM-6.
PL-5	250	Healthy vegetation near perimeter sign P5.



SPK 6/2014. PL-1. Site access road near perimeter sign P10.



SPK 6/2014. PL-2. Site marker SMK-2.



SPK 6/2014. PL-3. Site marker SMK-1; concrete base spalling but stable.



SPK 6/2012. PL-4. Bent boundary monument BM-6.



SPK 6/2014. PL-5. Healthy vegetation near perimeter sign P5.

This page intentionally left blank

19.0 Tuba City, Arizona, Disposal Site

19.1 Compliance Summary

The Tuba City, Arizona, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on April 16, 2014. The disposal cell and all associated surface water diversion and drainage structures were in excellent condition and functioning as designed. Inspectors identified no maintenance needs or cause for a follow-up inspection.

Evaluative groundwater monitoring was conducted in February and August 2014. Groundwater quality immediately downgradient of the former mill site continues to be degraded relative to concentrations of molybdenum, nitrate, selenium, and uranium in the upgradient background well. This is not the case for distal downgradient well 0903, where concentrations of all four analytes continue to be comparable with those measured in the background well.

19.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Tuba City, Arizona, Disposal Site (LTSP)* (DOE/AL/62350-182, Rev. 0, U.S. Department of Energy [DOE], October 1996) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 19-1 lists these requirements.

Table 19-1. License Requirements for the Tuba City Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 19.4
Follow-Up Inspections	Section 7.0	Section 19.5
Maintenance and Repairs	Section 8.0	Section 19.6
Groundwater Monitoring	Section 5.2	Section 19.7
Corrective Action	Section 9.0	Section 19.8

19.3 Institutional Controls

The U.S. Bureau of Indian Affairs holds the 145-acre disposal site (Figure 19-1) in trust. The Navajo Nation retains title to the land. 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. The U.S. Nuclear Regulatory Commission (NRC) required DOE to enter into Cooperative Agreement DE-FC04-85AL26731 with the Navajo Nation to perform remedial actions at the former processing sites 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 NRC general license (10 CFR 40.27) in 1996 for compliance with 40 CFR 192, Subpart A. Institutional controls at the site include federal custody of the disposal cell and its engineered features and the following features that are inspected annually: site markers, survey and boundary monuments, perimeter warning signs, a site perimeter fence, and locked gates at the site entrances.

19.4 Inspection Results

The site, located east of Tuba City, Arizona, was inspected on April 16, 2014. The inspection was conducted by J. Gillespie and R. Cyr of Stoller Newport News Nuclear, Inc. (SN3), a wholly owned subsidiary of Huntington Ingalls Industries, Inc. SN3 is the DOE Legacy Management Support contractor.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that might affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring. Numbers in the left margin of this chapter refer to items summarized in Table ES-1 of the “Executive Summary.”

19.4.1 Site Surveillance Features

Figure 19-1 shows the locations of site surveillance features. 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 19-1 by photograph location (PL) numbers.

Many structures and features at the site—including an office building; a water treatment plant; a solar water-heating system; a solar photovoltaic system; evaporation ponds; an extensive network of extraction, injection, and monitoring wells; and a treated water infiltration system—are associated with active treatment of contaminated groundwater that began in 2002. The purpose of the active groundwater remediation is to mitigate contamination resulting from former uranium-ore processing that occurred at the site. These activities are not addressed in the LTSP, however, because they are not related to the long-term disposal and stabilization of encapsulated contaminated materials. Therefore, those associated features are not included in the annual inspection and are only addressed herein as they relate to site integrity or safety concerns.

19.4.1.1 Access Road, Entrance Gates, and Entrance Signs

The site is accessed directly from U.S. Highway 160. Perpetual access to the site is granted by the Custodial Access Agreement. A gate in a fence on the highway right-of-way allows access to the site along a gravel access road; the site entrance gate is at the perimeter security fence. The access gate, road, and entrance gate to the site were in good condition. The gates were open at the time of the inspection because of ongoing groundwater remediation operations at the site. The entrance signs posted on both gates were in good condition.

19.4.1.2 Perimeter Fence and Perimeter Signs

A chain-link security fence is located on the site boundary. This perimeter fence was in good condition.

Perimeter signs are posted in pairs at regular intervals around the site perimeter. Each sign pair, secured to a metal post, consists of a “No Trespassing” sign with a radioactive materials trefoil symbol and a schematic sign with a diagram of the disposal cell (also identified by the radioactive materials trefoil symbol) and the site boundary. All of the signs were in good condition.

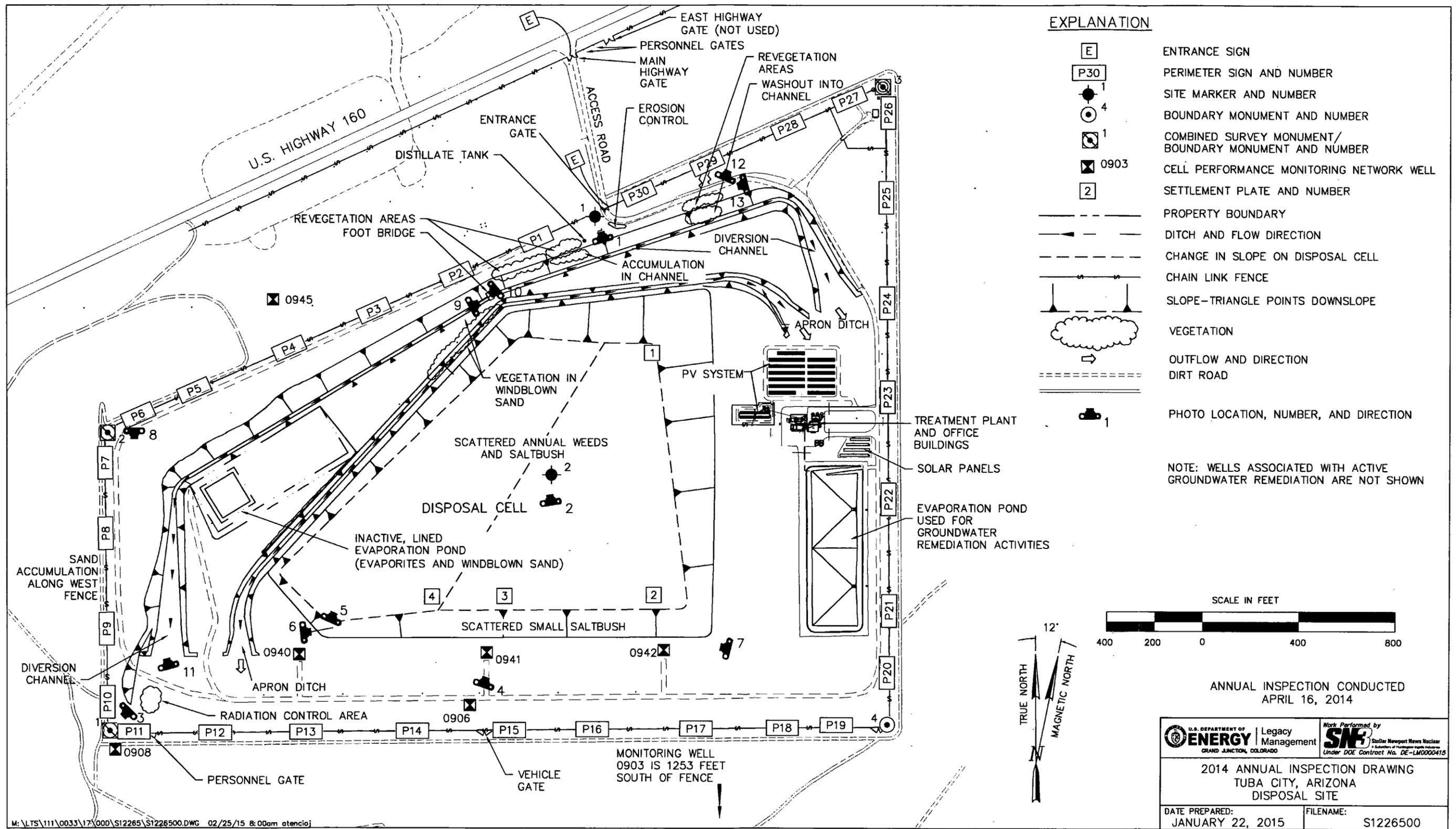


Figure 19-1. 2014 Annual Inspection Drawing for the Tuba City Disposal Site

This page intentionally left blank

19.4.1.3 Site Markers

The two granite site markers, one just inside the site entrance gate (PL-1) and the other on top of the disposal cell (PL-2), were in good condition.

19.4.1.4 Survey Monuments and Boundary Monuments

The survey and boundary monuments that were observed were in good condition. Boundary monument BM-1, at the southwest corner of the site, was buried by windblown sand (PL-3).

19.4.1.5 Monitoring Wells

Seven wells constitute the cell performance monitoring network: 0903, 0906, 0908, 0940, 0941, 0942, and 0945. Five wells inside and immediately adjacent to the site were in good condition and locked (PL-4). Upgradient background well 0945 and distal downgradient well 0903 were inspected during semiannual groundwater sampling events and were in good condition.

19.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three inspection areas to ensure a thorough and efficient inspection. The inspection areas are: (1) the disposal cell, (2) the area between the disposal cell and the site boundary, and (3) the outlying area.

Within each inspection area, inspectors examined specific site surveillance features. Inspectors also looked for evidence of erosion, settling, slumping, or other disturbances that might affect the site's integrity, protectiveness, or long-term performance.

19.4.2.1 Disposal Cell

The disposal cell is covered with riprap to control erosion. The rock cover material was in excellent condition and showed no signs of deterioration. No evidence of differential settlement or slumping was observed, and all visible components of the disposal cell and cover were in excellent condition (PL-5 and PL-6).

In accordance with the LTSP, deep-rooted vegetation, primarily saltbush, is removed from the cell cover or controlled to prevent potential penetration of the radon barrier. Periodic application of herbicide has been very effective in controlling deep-rooted vegetation growth on the cell cover. Only a few small shrubs were noted during the 2014 inspection. Scattered patches of grass and annual weeds also grow on the cell top and side slopes; however, these shallow-rooted plants are not a concern. Windblown sand continues to accumulate on the rock-covered surfaces, providing a favorable environment for plant growth (PL-7).

19.4.2.2 Area Between the Disposal Cell and the Site Boundary

The apron drainage ditch at the base of the disposal cell and the diversion channel, both located along the north and northwest sides of the cell, were in good condition. Windblown sand deposition continues to be monitored at the site because unstable dunes in outlying areas can contribute to sand accumulation along fence lines (PL-8), in the diversion channel, and in the rock cover of the disposal cell.

Sand accretion and vegetation encroachment have been checked annually since 2001 in the diversion channel and apron drainage ditch on the north and northwest sides of the cell (PL-9 and PL-10). The sand tends to periodically accumulate and scour. The accumulations are not adversely affecting the performance of these drainage features (PL-11).

Erosion along the site access road north of the diversion channel appears to have stabilized (PL-12). Erosion repairs in the same area also were in good condition (PL-13).

Two of the three evaporation ponds located near the northwest side of the disposal cell were removed in 2007, and the area was reclaimed and seeded with a native vegetation seed mix. Although the area is scoured by wind, perennial vegetation continues to establish. The remaining pond is retained as a backup for the main evaporation pond located on the east side of the site.

19.4.2.3 Outlying Area

The area beyond the site boundary for a distance of about 0.25 mile was examined for erosion, disturbance, change in land use, and other features of possible concern. No changes were observed.

19.5 Follow-Up Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed. No need for a follow-up inspection was identified during the inspection.

19.6 Maintenance and Repairs

No maintenance needs were identified during the inspection.

19.7 Groundwater Monitoring

- 19A In accordance with the LTSP, DOE monitors groundwater to compare current conditions to baseline post-construction (disposal cell) groundwater quality at the site. Groundwater quality beneath and downgradient of the disposal cell has been degraded by contamination from former uranium-processing activities. This preexisting milling-related groundwater contamination might mask any contamination leaching from the disposal cell and limits the effectiveness of normal point-of-compliance groundwater monitoring as a reliable indicator of cell performance (40 CFR 192, Subpart A).

In lieu of point-of-compliance monitoring, for this annual report, groundwater monitoring is performed in accordance with Section 5.2.2 of the LTSP and is defined as "evaluative monitoring." The purpose of this evaluative monitoring is to (1) assess trends in groundwater quality in the uppermost aquifer, (2) monitor the downgradient extent of contamination in groundwater, and (3) analyze the impacts of transient drainage and surface runoff. Preexisting milling-related groundwater contamination at the site is currently undergoing active remediation

(40 CFR 192, Subpart B). The progress of groundwater remediation is evaluated annually, separately from this compliance evaluation.

In accordance with the LTSP, seven compliance wells (Figure 19-1 and Table 19-2) are monitored for four target analytes: molybdenum, nitrate (nitrate + nitrite, reported as nitrogen), selenium, and uranium. The seven wells used for evaluative monitoring of cell performance are a subset of the larger groundwater remediation monitoring well network. Because of the preexisting groundwater contamination, provisional upper baseline limits (UBLs) are used as the main criteria for assessing the results of evaluative monitoring. As shown in Table 19-3, these UBLs are higher than corresponding UMTRCA maximum concentration limits (MCLs), as MCLs are not considered appropriate for evaluating disposal cell performance.

Table 19-2. Groundwater Monitoring Network at the Tuba City Disposal Site

Monitoring Well	Hydrologic Relationship	Monitoring Frequency
0903	Downgradient (Offsite)	Annually
0906	Downgradient	Semiannually
0908	Downgradient	Semiannually
0940 ^a	Downgradient	Semiannually
0941	Downgradient	Semiannually
0942	Downgradient	Semiannually
0945	Upgradient (Background)	Annually

^a Between August 2004 and February 2010, samples from well 0940 could not be obtained because of an insufficient volume of water. This accounts for the data gaps in Figures 19-2 through 19-5.

Table 19-3. Provisional Upper Baseline Limits for Groundwater at the Tuba City Disposal Site

Constituent	Provisional UBL (mg/L) ^a	MCL (mg/L)
Molybdenum	0.14	0.10
Nitrate (as Nitrogen)	311 ^b	10 ^c
Selenium	0.05	0.01
Uranium	1.17	0.044

mg/L = milligrams per liter

^a As documented in the 1996 LTSP.

^b 311 mg/L (for nitrate as nitrogen) was calculated based on the 1,379 mg/L UBL for nitrate as NO₃.

^c 10 mg/L (for nitrate as nitrogen) is equivalent to the 44 mg/L MCL for nitrate (as NO₃) cited in the LTSP.

Evaluative groundwater monitoring in 2014 was conducted in February and in August. Figures 19-2 through 19-5 show the time-concentration plots for the four target analytes, along with corresponding UBLs and MCLs.

Figure 19-2 shows the time-concentration plot for molybdenum. As has been the case since 2004, molybdenum concentrations in groundwater were below both the 0.10 milligram per liter (mg/L) MCL and the 0.14 mg/L UBL in all wells (Figure 19-2). Molybdenum concentrations in westernmost downgradient well 0908 and in distal downgradient well 0903 (approximately 1,250 feet south of the site perimeter) continue to be comparable to concentrations in background well 0945.

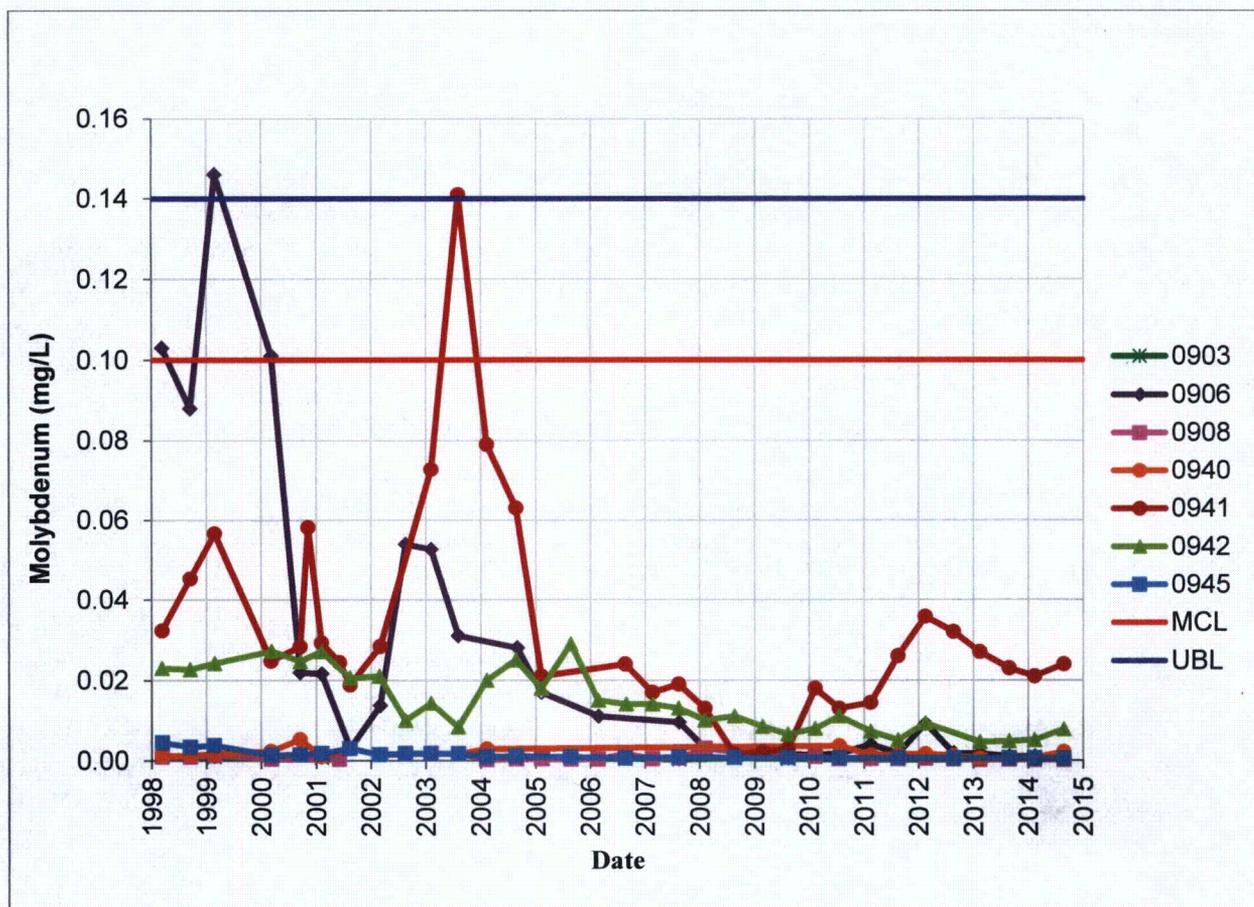


Figure 19-2. Time-Concentration Plots of Molybdenum in Groundwater at the Tuba City Disposal Site

Since 1998, nitrate concentrations in all evaluative monitoring wells except background well 0945 and distal well 0903 have significantly exceeded the 10 mg/L MCL (Figure 19-3). Exceedances of the 311 mg/L UBL have only been observed at wells 0906 (currently 370 mg/L), 0940 (currently 340 mg/L), and 0942 (last exceedance in August 2008). Nitrate concentrations in well 0941 have increased fairly steadily from 47 mg/L in March 1998 to 290 mg/L in August 2014. Well 0941 is centrally located within a dense extraction well network (PL-4), so historical pumping in this area may account for some (or all) of this observed increase. Nitrate concentrations have exhibited a downward trend in well 0942 since 1998. There are no apparent trends in the remaining wells. Nitrate concentrations in distal downgradient well 0903, although slightly above background and frequently exceeding the MCL (14 mg/L in August 2014), remain significantly below the UBL.

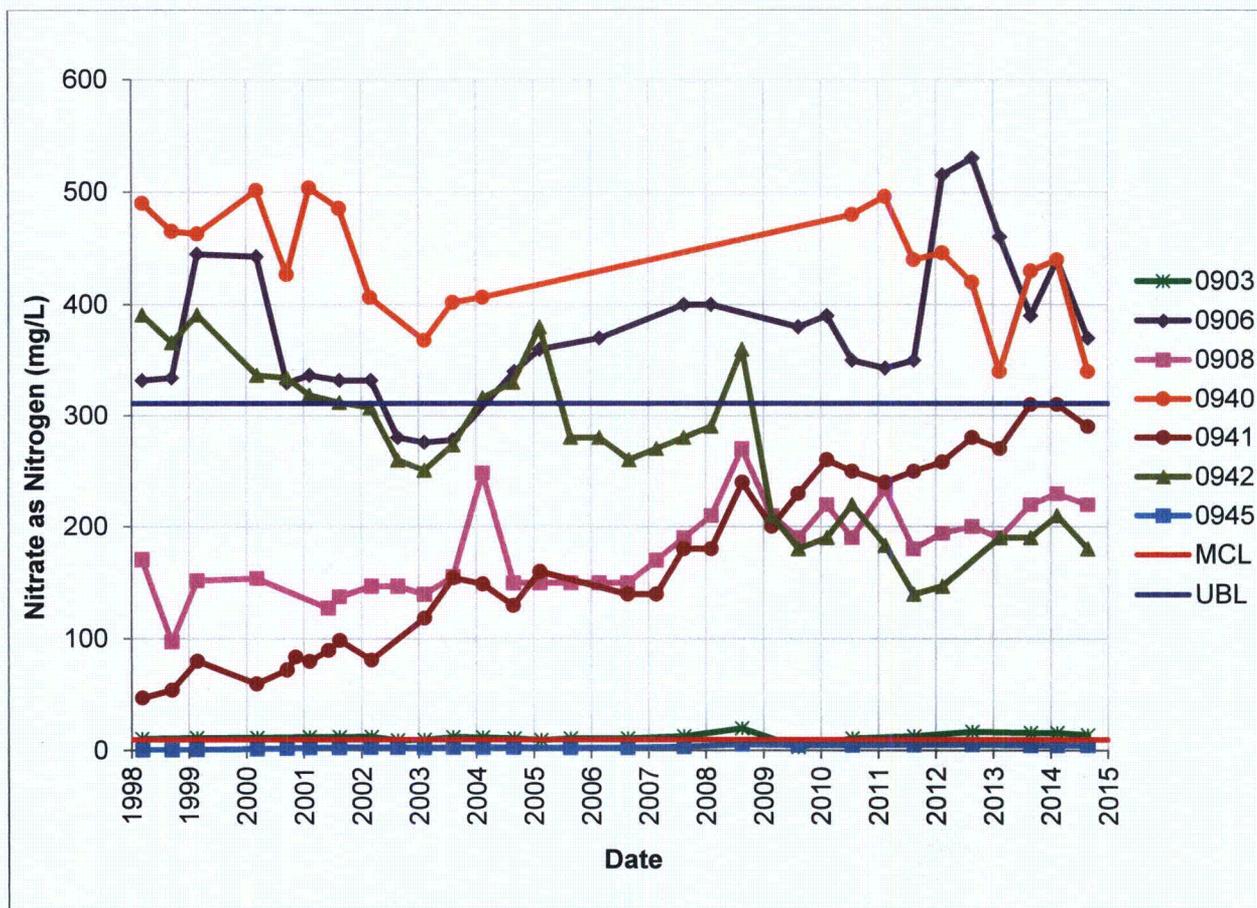


Figure 19-3. Time-Concentration Plots of Nitrate in Groundwater at the Tuba City Disposal Site

Selenium concentrations have historically exceeded the 0.01 mg/L MCL in all wells except background well 0945 and distal well 0903 (Figure 19-4). Concentrations have exceeded the 0.05 mg/L UBL only in wells 0906, 0940, 0941, and 0942, immediately downgradient of the disposal cell. As observed for nitrate, selenium concentrations have increased in well 0941 from 0.018 mg/L in 1998 to 0.09–0.13 mg/L in recent years. Selenium concentrations in distal well 0903 have consistently been below both the UBL and the MCL and, since late 2004, below levels measured in background well 0945.

In 2014, uranium concentrations in groundwater exceeded the 0.044 mg/L MCL but remained below the 1.17 mg/L UBL in all downgradient wells (except for distal well 0903, which was below the MCL). This has been the case historically, as shown in Figure 19-5. Concentrations in background well 0945 and distal well 0903 are comparable and remain below the MCL. As observed for nitrate and selenium, uranium concentrations in central downgradient well 0941 have increased gradually since 2005 (from about 0.05 mg/L to 0.29 mg/L). Uranium concentrations in wells 0906 and 0942 have fluctuated greatly at times, perhaps due to pumping of the extraction wells.

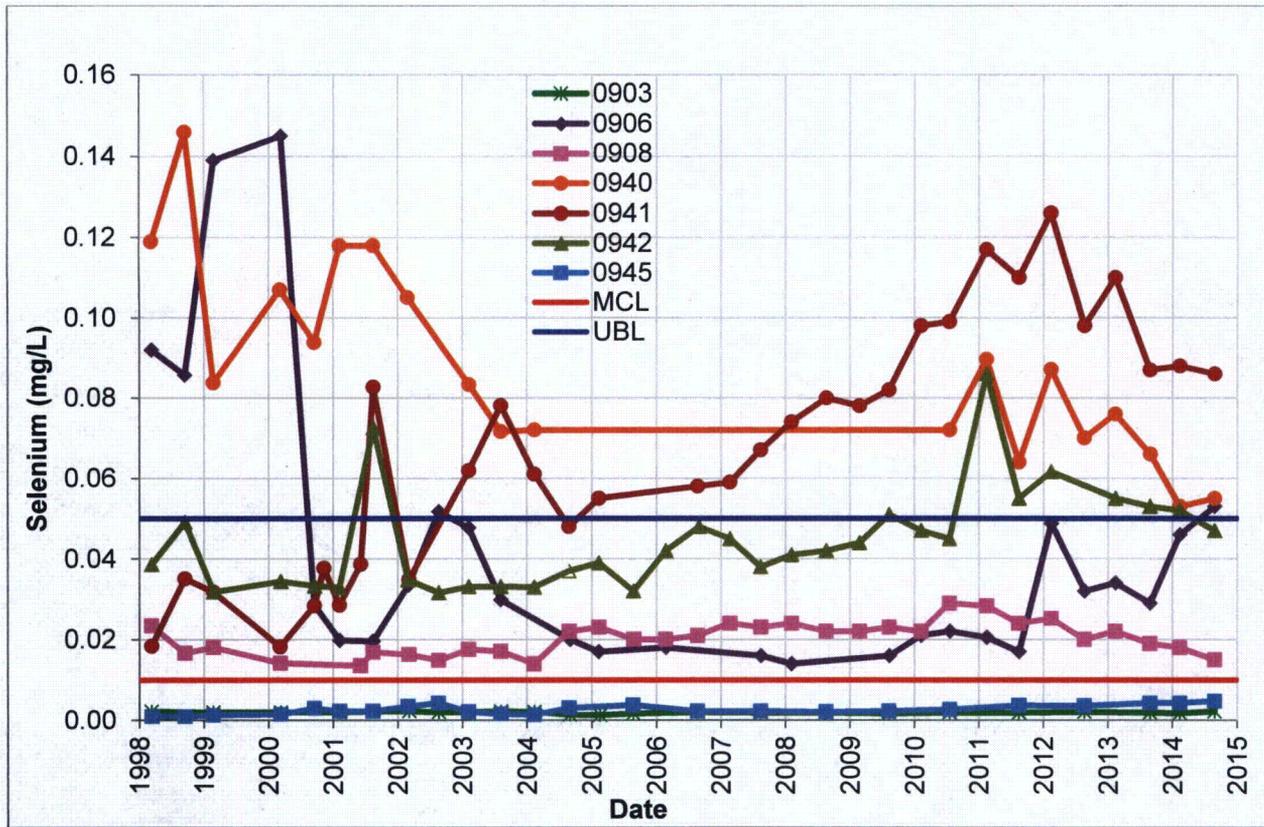


Figure 19-4. Time-Concentration Plots of Selenium in Groundwater at the Tuba City Disposal Site

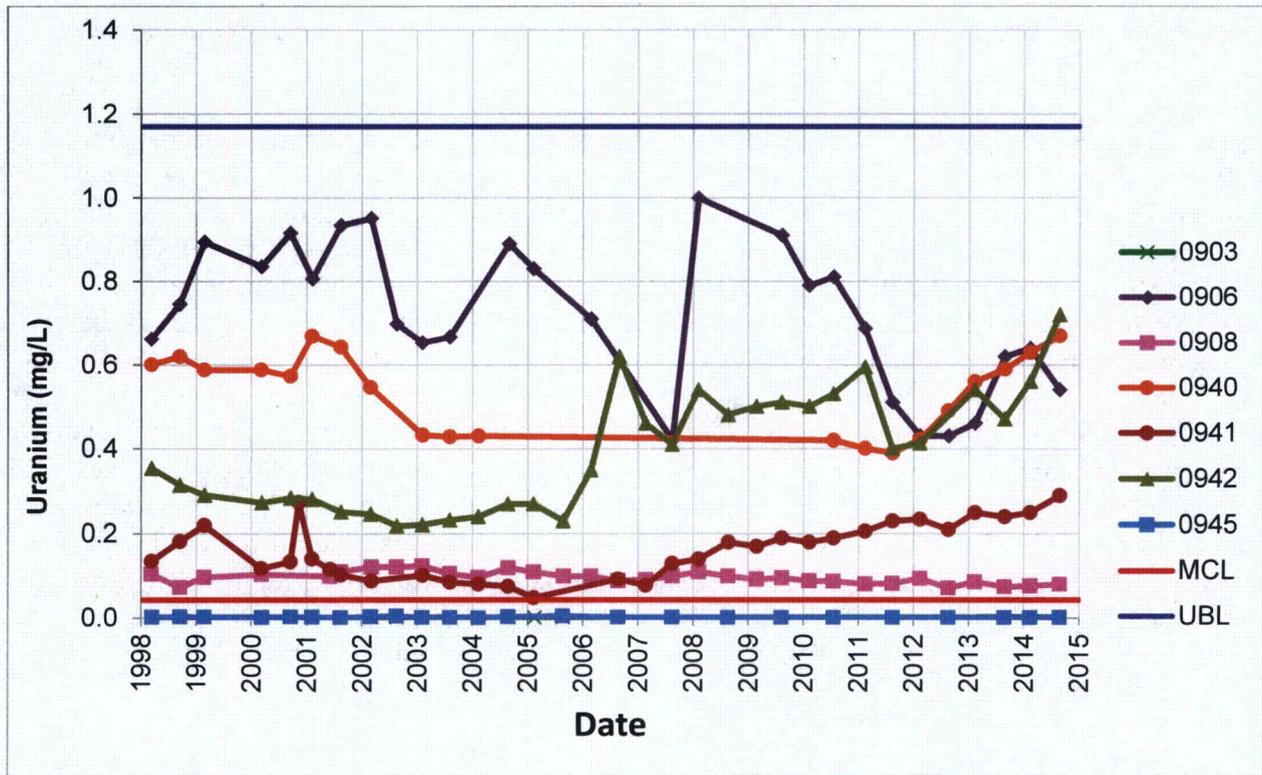


Figure 19-5. Time-Concentration Plots of Uranium in Groundwater at the Tuba City Disposal Site

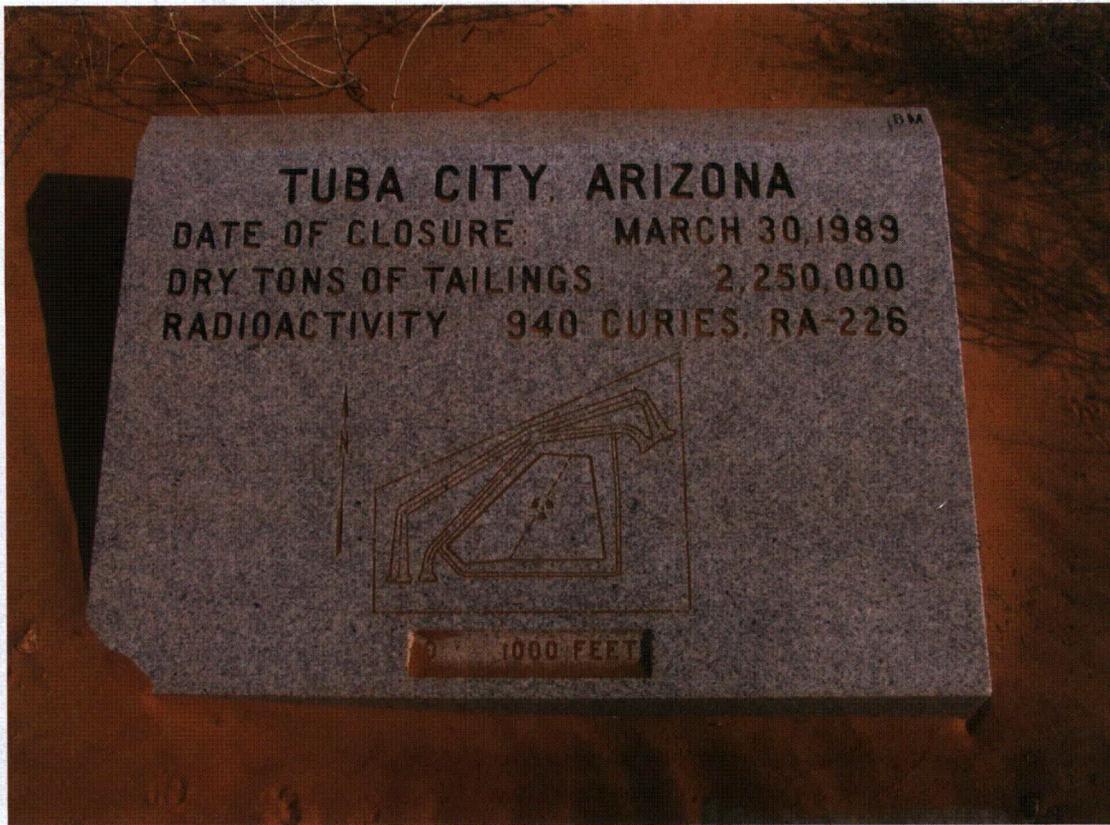
Sample results from the 2014 evaluative monitoring indicate that groundwater quality immediately downgradient of the former mill site (in wells 0940, 0941, 0942, 0906, and 0908) is still degraded relative to concentrations of molybdenum, nitrate, selenium, and uranium in the background well (0945). This is not the case for distal downgradient well 0903. Concentrations of all four analytes in well 0903 are comparable with those measured in the upgradient (background) well 0945 and below corresponding UBLs (and, except for nitrate, below the corresponding MCLs).

19.8 Corrective Action

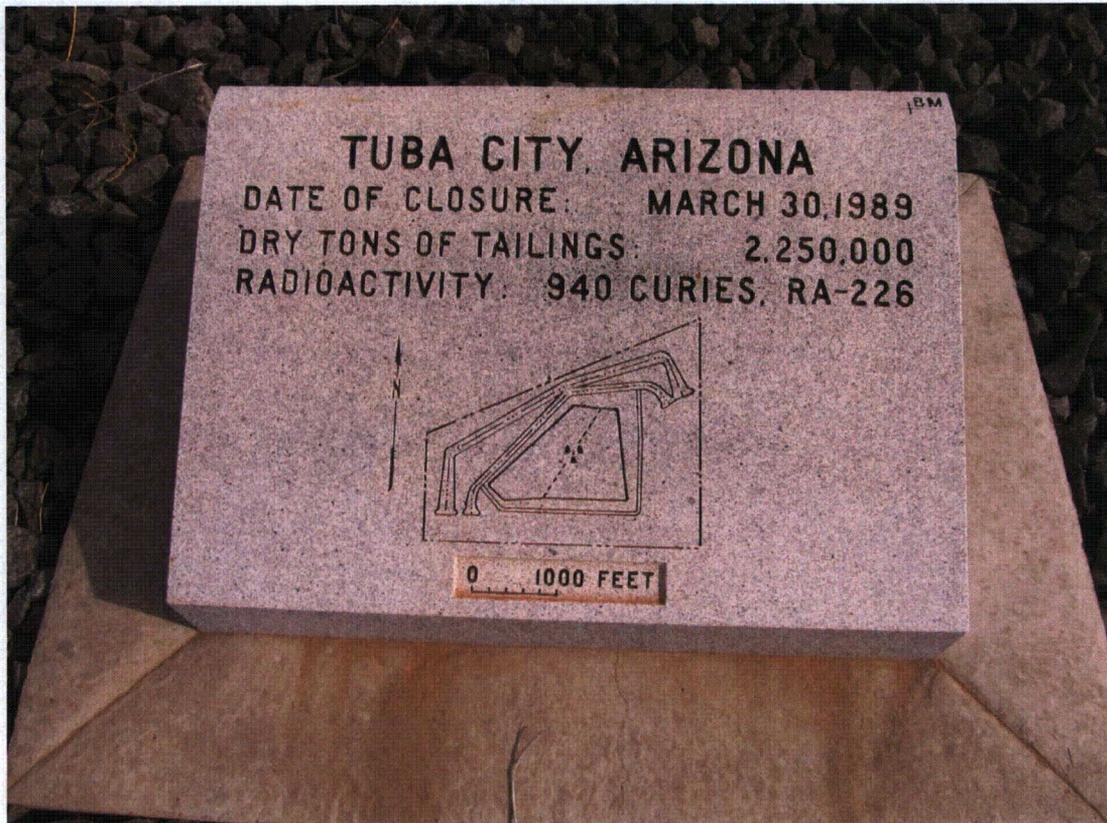
Corrective action is taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192. No need for corrective action was identified.

19.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	0	Site marker SMK-1.
PL-2	0	Site marker SMK-2.
PL-3	220	Uncovered boundary monument BM-1.
PL-4	19	Well cluster at downgradient well 0941.
PL-5	24	Disposal cell top slope.
PL-6	85	Disposal cell top and south side slopes.
PL-7	285	Vegetation on south side slope of disposal cell.
PL-8	180	Sand accumulation along west perimeter fence line.
PL-9	60	Windblown sand in diversion channel near flow divide.
PL-10	230	Windblown sand in diversion channel.
PL-11	345	Upgradient view of diversion channel from southwest outlet.
PL-12	24	Stabilized erosion upgradient of site access road.
PL-13	255	Erosion repair area.



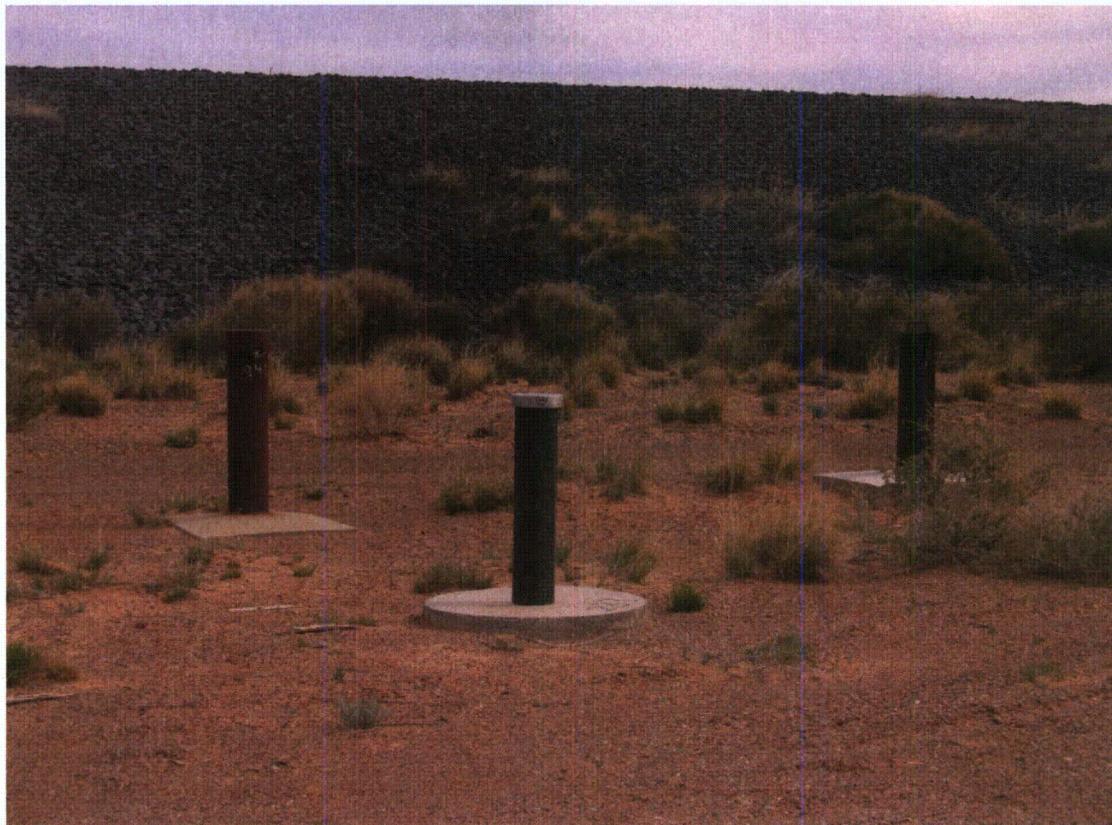
TUB 4/2014. PL-1. Site marker SMK-1.



TUB 4/2014. PL-2. Site marker SMK-2.



TUB 4/2014. PL-3. Uncovered boundary monument BM-1.



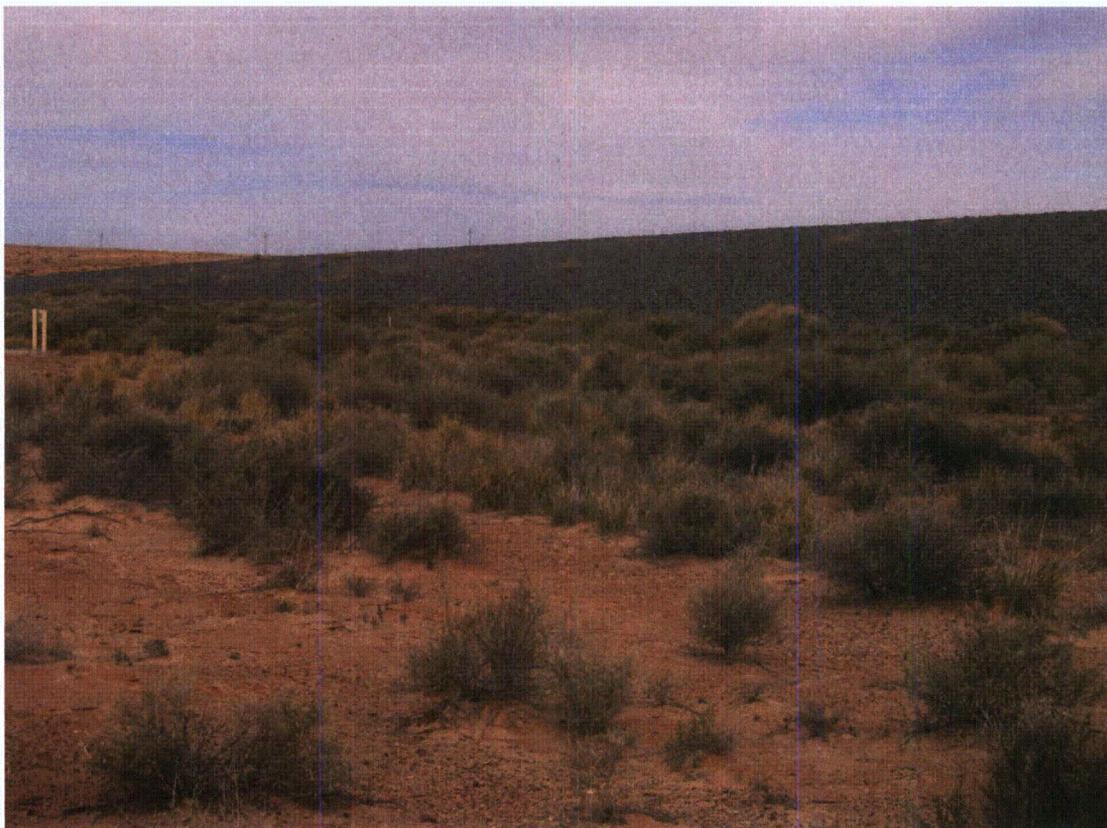
TUB 4/2014. PL-4. Well cluster at downgradient well 0941.



TUB 4/2014. PL-5. Disposal cell top slope.



TUB 4/2014. PL-6. Disposal cell top and south side slopes.



TUB 4/2014. PL-7. Vegetation on south side slope of disposal cell.



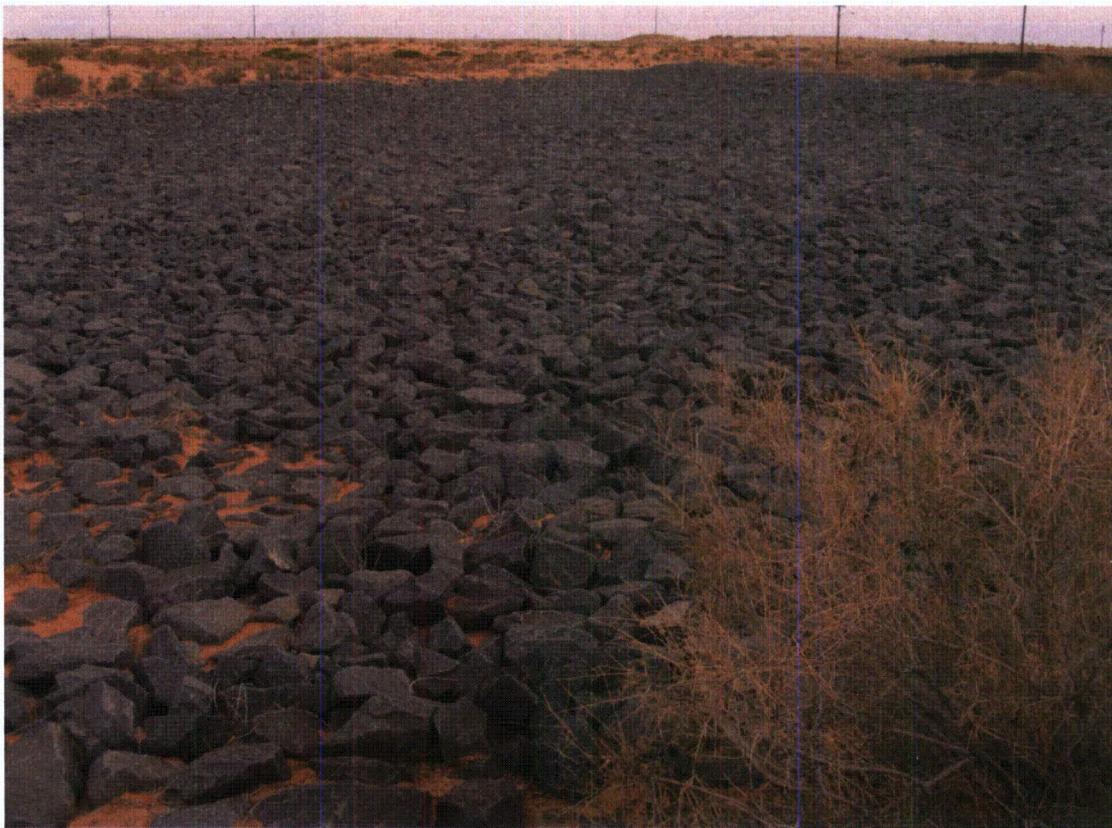
TUB 4/2014. PL-8. Sand accumulation along west perimeter fence line.



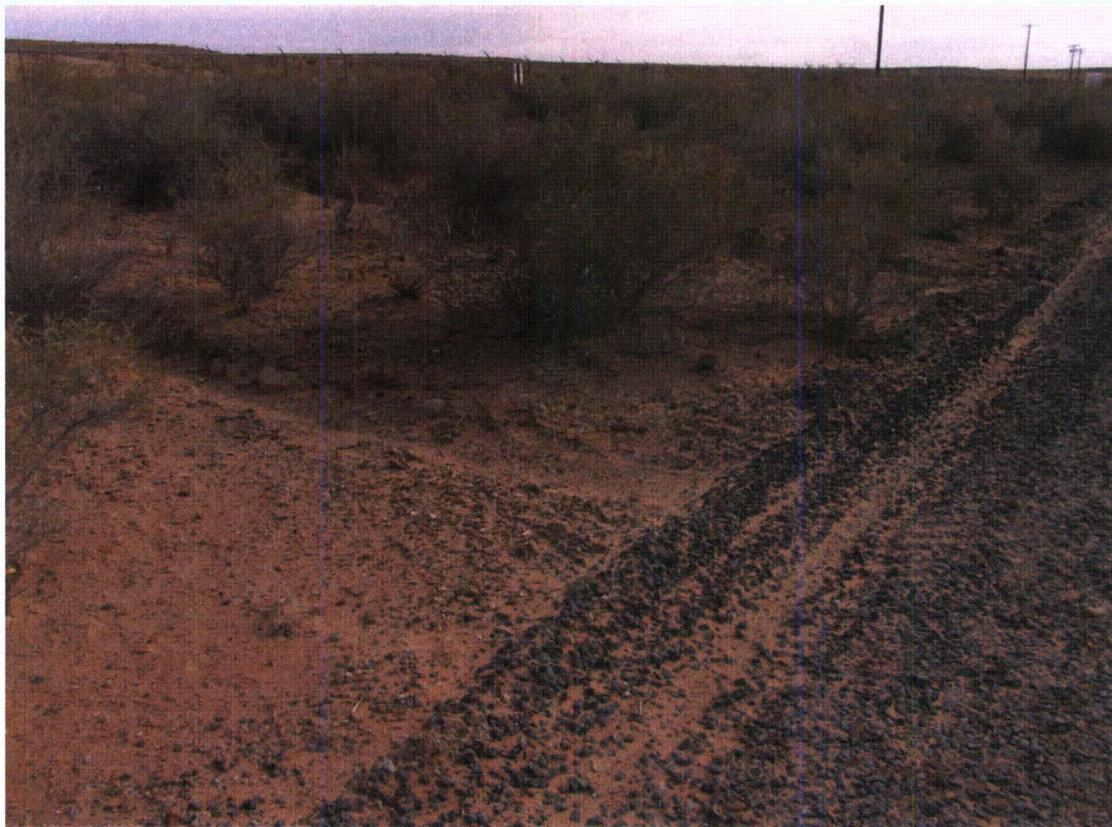
TUB 4/2014. PL-9. Windblown sand in diversion channel near flow divide.



TUB 4/2014. PL-10. Windblown sand in diversion channel.



TUB 4/2014. PL-11. Upgradient view of diversion channel from southwest outlet.



TUB 4/2014. PL-12. Stabilized erosion upgradient of site access road.



TUB 4/2014. PL-13. Erosion repair area.