

8.0 Gunnison, Colorado, Disposal Site

8.1 Compliance Summary

The Gunnison, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site (site) was inspected on June 27, 2016. No changes were observed in the disposal cell or associated diversion channels. Six riprap test areas on the disposal cell apron and diversion channels were visually inspected; no rock degradation was noted when compared to 2012 photos. A broken fence strand was repaired. One perimeter sign was missing and one was damaged; replacement signs were installed. Inspectors identified no other maintenance needs or cause for a follow-up inspection.

Cell performance groundwater monitoring is conducted on a 5-year schedule, and samples were collected in 2016. Uranium concentrations remained below the action level in all wells. All other sample results were consistent with historical results, indicating no significant change in general water chemistry. The next sampling event is planned for 2021.

8.2 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 1997) 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 8-1 lists these requirements.

Table 8-1. License Requirements for the Gunnison Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.0	Section 8.4
Follow-Up Inspections	Section 3.5	Section 8.5
Maintenance and Repairs	Section 5.0	Section 8.6
Groundwater Monitoring	Section 4.0	Section 8.7
Corrective Action	Section 6.0	Section 8.8

8.3 Institutional Controls

The 92-acre site, identified by the property boundary shown in Figure 8-1, is owned by the United States and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1997. 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 ownership of the property and the following physical ICs that are inspected annually: the disposal cell and associated diversion channels, the entrance gate and sign, perimeter fence and signs, site markers, survey and boundary monuments, and monitoring wellhead protection.

8.4 Inspection Results

The site, southeast of Gunnison, Colorado, was inspected on June 27, 2016. The inspection was conducted by R. Johnson and S. Campbell of the DOE Legacy Management Support (LMS)

contractor. M. Cosby (Colorado Department of Public Health and Environment) and A. Kuhlman (LMS) 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 inspection and monitoring.

8.4.1 Site Surveillance Features

Figure 8-1 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 8-1 by photograph location (PL) numbers.

8.4.1.1 Site Access, Entrance Gate, and Entrance Sign

Access to the site is off Gunnison County Road 42 and onto U.S. Bureau of Land Management (BLM) Road 3068 to the site entrance gate. The road to the site is a gravel road maintained by BLM; a high-clearance vehicle is recommended due to rough road conditions. No maintenance needs were identified.

The barbed-wire entrance gate is part of the perimeter fence that encloses the site. The entrance gate, along the south portion of the perimeter fence, was locked and undamaged (PL-1). The entrance sign is bolted to a perimeter fence post next to the entrance gate (PL-2). No maintenance needs were identified.

8.4.1.2 Perimeter Fence and Signs

A three-strand barbed-wire fence encloses the site; most of it is set along the property boundary. The fence was intact except for one broken strand that was repaired during the inspection (PL-3). Two barbed-wire gates—one on the north fence line and the other on the east fence line—provide access to offsite monitoring wells; both gates were locked. There are 45 perimeter signs, which are bolted to perimeter fence posts. Several perimeter signs have bullet holes but were legible. One perimeter sign was missing and one was damaged and could not be properly secured to the fence post; replacement signs were installed during the inspection. No other maintenance needs were identified.

8.4.1.3 Site Markers

The site has two granite site markers. Site marker SMK-1 is just inside the site entrance gate and site marker SMK-2 is on the top slope of the disposal cell (PL-4). No maintenance needs were identified.

8.4.1.4 Survey and Boundary Monuments

There are three combined survey and boundary monuments (SM-1/BM-1, SM-2/BM-2, and SM-3/BM-3) and eight additional boundary monuments (BM-4 through BM-11) along the site perimeter (PL-5). No maintenance needs were identified.

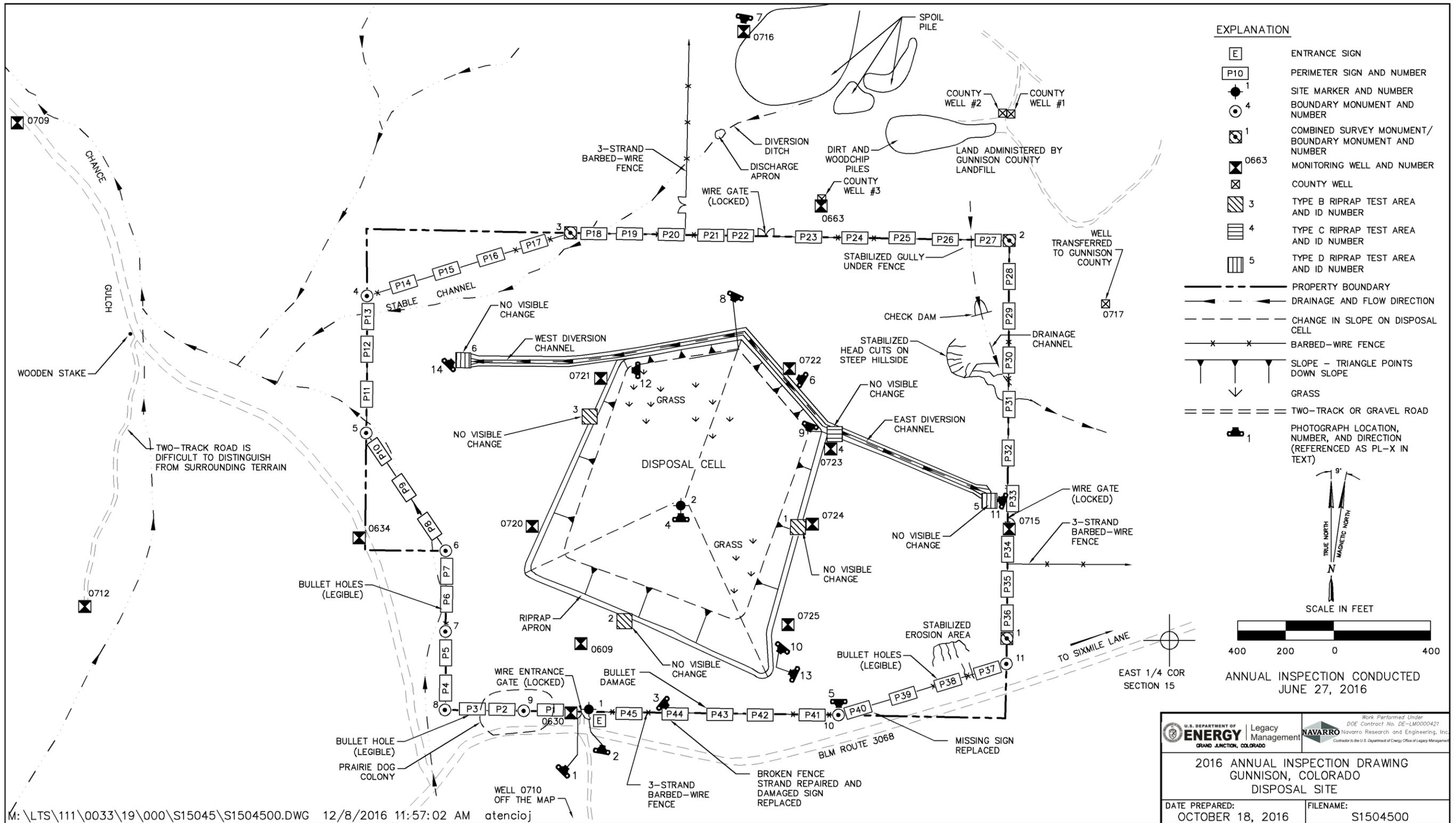


Figure 8-1. 2016 Annual Inspection Drawing for the Gunnison Disposal Site

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8.4.1.5 Monitoring Wells

The site groundwater monitoring network consists of 16 wells. The wellhead protectors were undamaged and locked (PL-6). The Gunnison County landfill operators have placed concrete barriers to protect monitoring well 0716, which is on landfill property, from landfill activities (PL-7). The edge of an adjacent spoil pile, although close to the concrete barriers, does not impair access to the well. No maintenance needs were identified.

8.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into four inspection areas to ensure a thorough and efficient inspection. The inspection areas are (1) the top of the disposal cell; (2) the disposal cell side slopes, apron, and diversion channels; (3) the area between the disposal cell and the site boundary; and (4) the outlying area. 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.

8.4.2.1 Top of the Disposal Cell

The disposal cell, completed in 1995, occupies 29 acres. It is covered with basalt rock to protect the disposal cell materials from erosion. Several isolated patches of grass have established on the top slope; however, these shallow-rooted plants do not degrade the performance of the radon barrier. There were no indications of erosion, settling, slumping, rock degradation, or other modifying processes that might affect the integrity of the disposal cell (PL-8). No maintenance needs were identified.

8.4.2.2 Disposal Cell Side Slopes, Apron, and Diversion Channels

The disposal cell side slopes (PL-9), an apron to collect and divert precipitation runoff from the disposal cell (PL-10), and two diversion channels to protect the disposal cell from precipitation run-on (PL-11 and PL-12), are all protected by basalt riprap. There were no indications of erosion, settling, slumping, rock degradation, or other modifying processes that might affect the integrity of the disposal cell side slopes, apron, or diversion channels.

Six rock-monitoring test areas, each approximately 1 square meter in area (the corners are marked with orange paint), are in critical flow path locations in the apron and diversion channels. Annual photographing and comparing of these test areas was performed through 2002 in accordance with the LTSP; after that, the LTSP requires the test areas to be photographed every 5 years through 2017. The next and final set of photos will be taken in 2017. The test areas were visually inspected and there was no evidence that any rocks had split or otherwise been degraded when compared to 2012 photos.

Precipitation runoff from the disposal cell occasionally ponds in a low-lying area at the southeast corner of the disposal cell; standing water was present at the time of the inspection (PL-13). The riparian-type vegetation that has become established there indicates that the area retains moisture much of the time. Water collection in this area does not pose a problem because the disposal cell is designed to drain to the southeast and any water that ponds there is below the elevation of the encapsulated tailings material. No maintenance needs were identified.

8.4.2.3 Area Between the Disposal Cell and the Site Boundary

Reclaimed and undisturbed areas comprise the area between the disposal cell and the site boundary. In general, the vegetation in the reseeded, reclaimed areas consists of well-established grass; native plants are much less abundant and less diverse in reclaimed areas than they are in undisturbed areas. Former erosion areas continue to be stable and are naturally revegetating with native plant species. No maintenance needs were identified.

8.4.2.4 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. Gunnison County owns the land that adjoins the site boundary to the north and east and uses the land for a municipal landfill. The nearest landfill operations continue to be approximately 400 feet north of the site (PL-14). Although landfill activities do not impact the site, inspectors will continue to monitor the level of activity occurring near the site boundary and surveillance features (e.g., fences and monitoring wells). The proximity of the spoils pile to monitoring well 0716 was the only current concern for activities that could impact a site asset. Inspectors will continue to monitor this area.

8.5 Follow-Up 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 need for a follow-up inspection was identified.

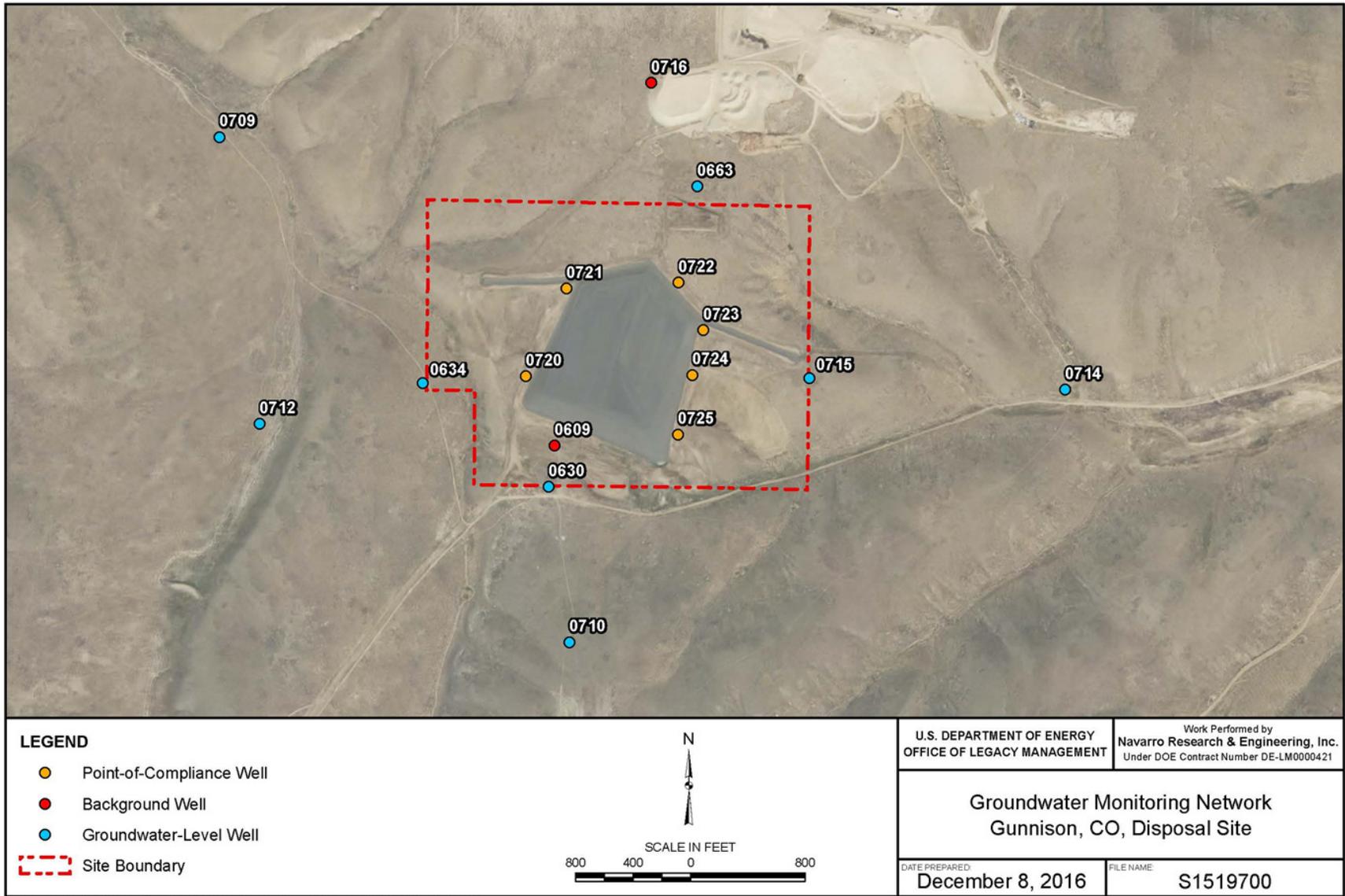
8.6 Maintenance and Repairs

A broken fence strand was repaired and two perimeter signs were replaced during the inspection. No other maintenance needs were identified.

8.7 Groundwater Monitoring

DOE monitors groundwater at the site to demonstrate compliance with U.S. Environmental Protection Agency (EPA) groundwater protection standards in 40 CFR 192.03 and to demonstrate that the disposal cell is performing as designed. The monitoring network consists of 16 wells, including 6 point-of-compliance (POC) wells to monitor disposal cell performance, 2 wells to monitor background groundwater quality, and 8 wells to monitor groundwater levels (Table 8-2 and Figure 8-2).

In accordance with the LTSP, groundwater was sampled and groundwater levels were measured annually from 1998 through 2001. Following the 2001 sampling event, the monitoring frequency changed to once every 5 years. Sampling and groundwater-level measurements were collected in 2016.



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Figure 8-2. Groundwater Monitoring Network at the Gunnison Disposal Site

Table 8-2. Monitoring Network at the Gunnison Disposal Site

Point-of-Compliance (POC) and Background Wells	Groundwater Level Wells
0720 (POC)	0630
0721 (POC)	0634
0722 (POC)	0663
0723 (POC)	0709
0724 (POC)	0710
0725 (POC)	0712
0609 (background)	0714
0716 (background)	0715

The indicator analyte for disposal cell performance at the site is uranium. Uranium was selected because of its presence in tailings pore fluid, its relatively high mobility in groundwater, and its low concentration in upgradient (background) groundwater (DOE 1997). The screening monitoring action level (action level) concentration for uranium is 0.013 milligram per liter (mg/L). The basis for this action level is the maximum observed concentration of uranium in background samples determined before long-term surveillance and maintenance activities began. The maximum concentration limit for uranium that EPA established in Table 1 to Subpart A of 40 CFR 192 is 0.044 mg/L.

Groundwater Quality Monitoring—Groundwater at the site was sampled in July 2016. The concentrations of uranium in samples collected from POC wells ranged from 0.001 mg/L to 0.006 mg/L as shown in the time-versus-concentration graph (Table 8-3 and Figure 8-3). Uranium concentrations were consistent with historical results in wells 0722, 0723, 0724, and 0725, but slightly exceeded historical maximums in wells 0720 and 0721. Uranium results from the POC wells were below the action level of 0.013 mg/L.

Table 8-3. Uranium Concentrations in POC Wells

Analyte	Action Level (mg/L)	Location	Concentration (mg/L)
Uranium	0.013	0609	0.004
		0716	0.005
		0720	0.006
		0721	0.001
		0722	0.002
		0723	0.003
		0724	0.001
		0725	0.003

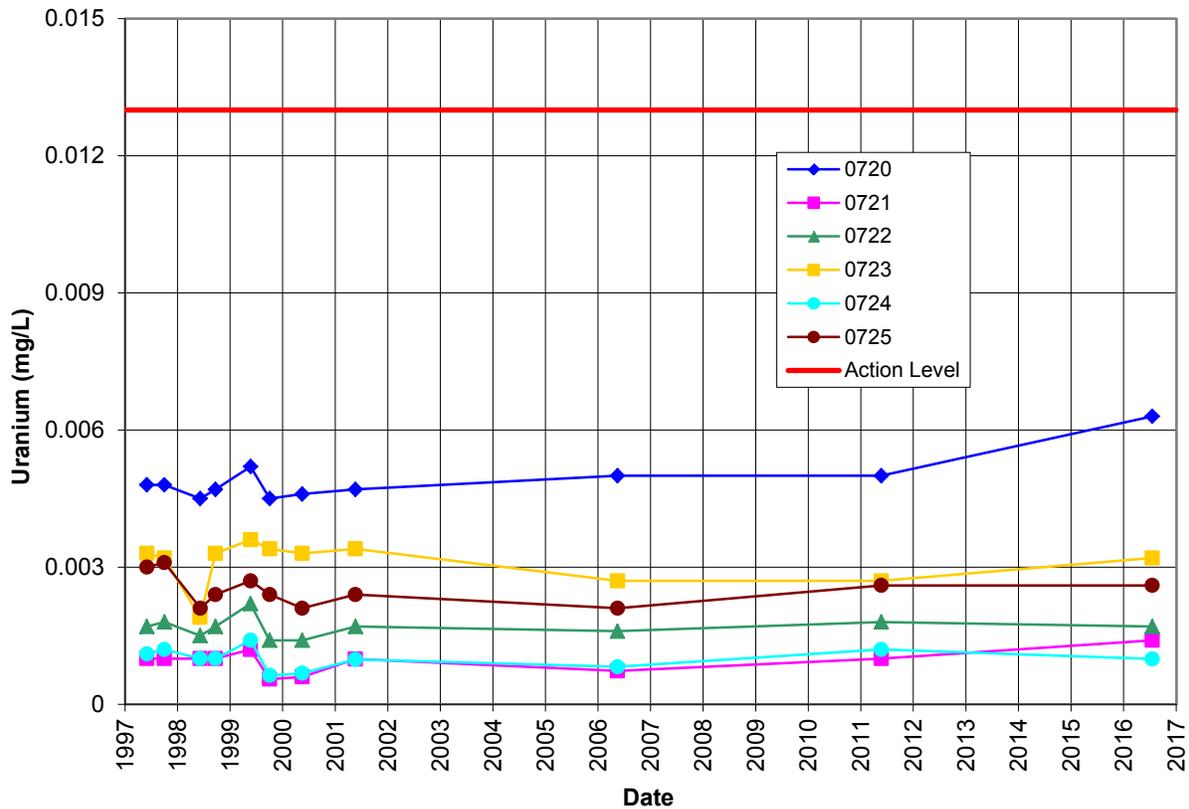


Figure 8-3. Time-Concentration Plots of Uranium in Groundwater at the Gunnison Disposal Site

Samples also were analyzed for major anions (chloride and sulfate) and cations (calcium, magnesium, potassium, and sodium), metals (iron and manganese), and total dissolved solids as indicators of general water-quality. These results were consistent with historical results, indicating no significant change in general water chemistry. The consistent general water quality, along with uranium concentrations below the action level, indicates that the disposal cell continues to perform as an efficient containment system.

Groundwater-Level Monitoring—Groundwater levels from the entire monitoring network were measured in July 2016. The measurements in general showed a gradual decrease in groundwater elevations since completion of the disposal cell in 1995; hydrographs from selected wells across the site illustrate this decrease in groundwater levels (Figure 8-4). Well 0715 is the exception as the groundwater level has risen approximately 11 feet since 1995.

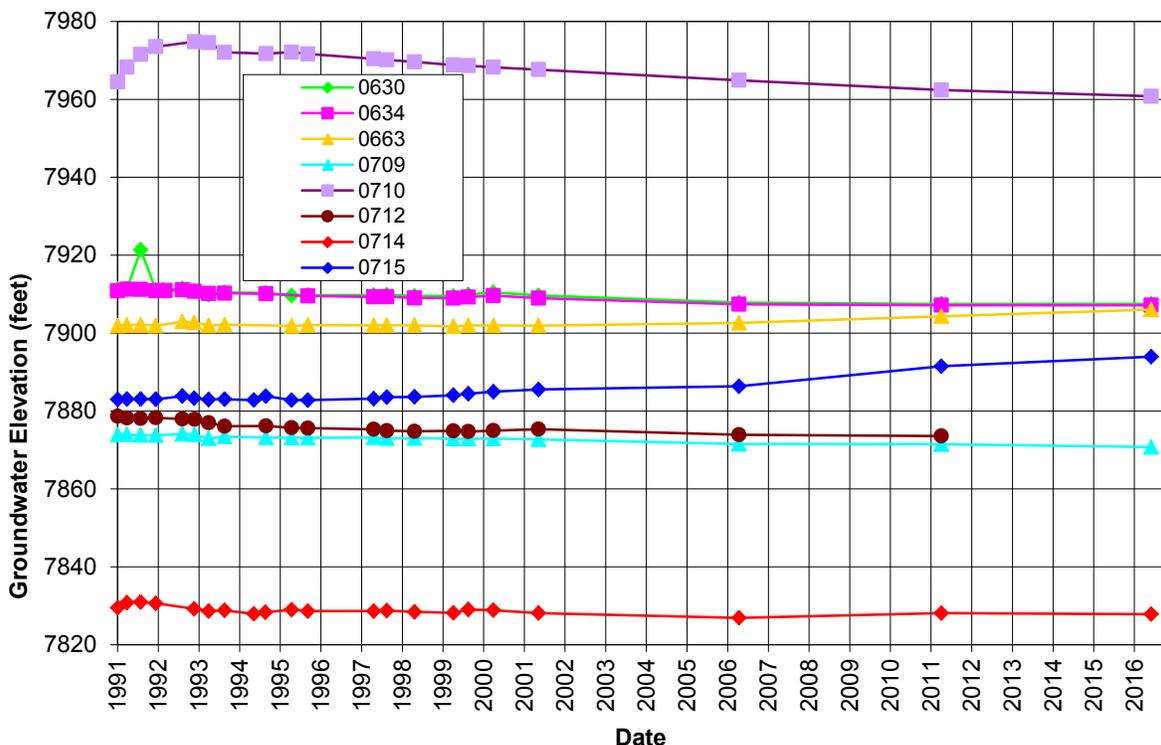


Figure 8-4. Groundwater Elevations at Selected Monitoring Wells at the Gunnison Disposal Site

8.8 Corrective Action

In accordance with the LTSP, 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.

8.9 Reference

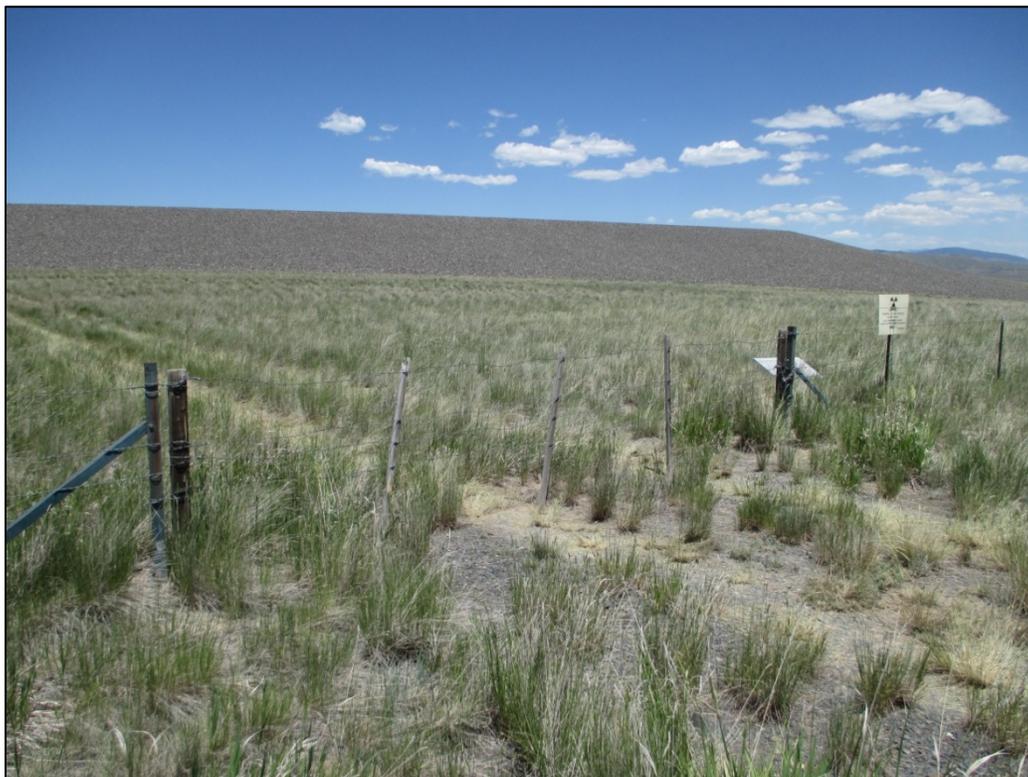
DOE (U.S. Department of Energy), 1997. *Long-Term Surveillance Plan for the Gunnison, Colorado, Disposal Site*, DOE/AL/62350-222, Rev. 2, April.

8.10 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	45	Entrance Gate
PL-2	10	Entrance Sign and Site Marker SMK-1
PL-3	130	Broken Fence Strand; Subsequently Repaired
PL-4	0	Site Marker SMK-2
PL-5	NA	Boundary Monument BM-10
PL-6	300	Monitoring Well 0722
PL-7	190	Monitoring Well 0716 on County Landfill Property
PL-8	205	Disposal Cell Top Slope
PL-9	200	Southeast Side of Disposal Cell
PL-10	220	Apron at Southeast Corner of Disposal Cell
PL-11	290	East Diversion Channel
PL-12	270	West Diversion Channel
PL-13	295	Southeast Corner of Disposal Cell
PL-14	45	Landfill Features North of Site

Abbreviation:

NA = not applicable



PL-1. Entrance Gate



PL-2. Entrance Sign and Site Marker SMK-1



PL-3. Broken Fence Strand; Subsequently Repaired



PL-4. Site Marker SMK-2



PL-5. Boundary Monument BM-10



PL-6. Monitoring Well 0722



PL-7. Monitoring Well 0716 on County Landfill Property



PL-8. Disposal Cell Top Slope



PL-9. Southeast Side of Disposal Cell



PL-10. Apron at Southeast Corner of Disposal Cell



PL-11. East Diversion Channel



PL-12. West Diversion Channel



PL-13. Southeast Corner of Disposal Cell



PL-14. Landfill Features North of Site