

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 22, 2017. No changes were observed on the disposal cell or in the associated diversion channels. Six riprap test areas on the disposal cell apron and diversion channels were visually inspected and photographed; no rock degradation was noted when compared to 2012 photos. Inspectors identified several routine maintenance needs but found no cause for a follow-up inspection.

The U.S. Department of Energy (DOE) conducts groundwater monitoring every 5 years to demonstrate compliance with U.S. Environmental Protection Agency (EPA) groundwater protection standards and to demonstrate that the disposal cell is performing as designed. The most recent sampling event occurred in July 2016. Groundwater monitoring results were below the site-specific uranium action level in all point of compliance (POC) wells.

8.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the site-specific DOE Long-Term Surveillance Plan (LTSP) (DOE 1997) and in procedures DOE established to comply with the requirements of the U.S. Nuclear Regulatory Commission general license at 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, Colorado, Disposal Site

Requirement	LTSP	This Report	10 CFR 40.27
Annual Inspection and Report	Section 3.0	Section 8.4	(b)(3)
Follow-Up Inspections	Section 3.5	Section 8.5	(b)(4)
Maintenance and Repairs	Section 5.0	Section 8.6	(b)(5)
Groundwater Monitoring	Section 4.0	Section 8.7	(b)(2)
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 general license 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, administrative controls, and the following physical ICs that are inspected annually: the disposal cell and associated diversion channel, entrance gate and sign, perimeter fence and signs, site markers, survey and boundary monuments, and wellhead protectors.

8.4 Inspection Results

The site, 6 miles southeast of Gunnison, Colorado, was inspected on June 22, 2017. The inspection was conducted by R. Johnson, S. Campbell, and C. Boger of the DOE Legacy

Management Support contractor. J. Linard (DOE site manager), P. Robinson and K. Kiilehua (DOE), and M. Cosby and J. Doebele (Colorado Department of Public Health and Environment) 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 conformance with the LTSP, and to determine the need, if any, for maintenance or additional inspection and monitoring.

8.4.1 Site Surveillance Features

Figure 8-1 shows in black the locations of site features, including site surveillance features and inspection areas. Site features that are present but not required to be inspected are shown in italic font. Observations from previous inspections that are currently monitored are shown in blue text, and new observations identified during the 2017 annual inspection are shown in red. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and in Figure 8-1 by photograph location (PL) numbers. The photographs and photograph log are presented in Section 8.10.

8.4.1.1 Site Access, Entrance Gate, and Entrance Sign

Access to the site is from Gunnison County Road 42 onto U.S. Bureau of Land Management (BLM) Road 3068. The road to the site is a gravel road maintained by BLM. Entrance to the site is through a locked gate that is part of the perimeter fence. The entrance gate was locked and functional (PL-1). The entrance sign is bolted to a perimeter fence post next to the entrance gate (PL-2). The entrance sign has bullet damage but remains legible. No maintenance needs were identified.

8.4.1.2 Perimeter Fence and Signs

A three-strand barbed-wire perimeter fence encloses the site; most of it is set along the property boundary. The perimeter fence was intact except for three locations with broken strands that were 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 bolted to the perimeter fence posts. Several perimeter signs (P3, P6, P38, and P43) have bullet damage but remain legible. Perimeter sign P45 was damaged, and perimeter sign P42 was faded; replacement signs were installed during the inspection (PL-4). 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 entrance gate (PL-5), and site marker SMK-2 is on the top slope of the disposal cell (PL-6). No maintenance needs were identified.

8.4.1.4 Survey and Boundary Monuments

Three combined survey and boundary monuments and eight additional boundary monuments delineate the property boundary (PL-7). No maintenance needs were identified.

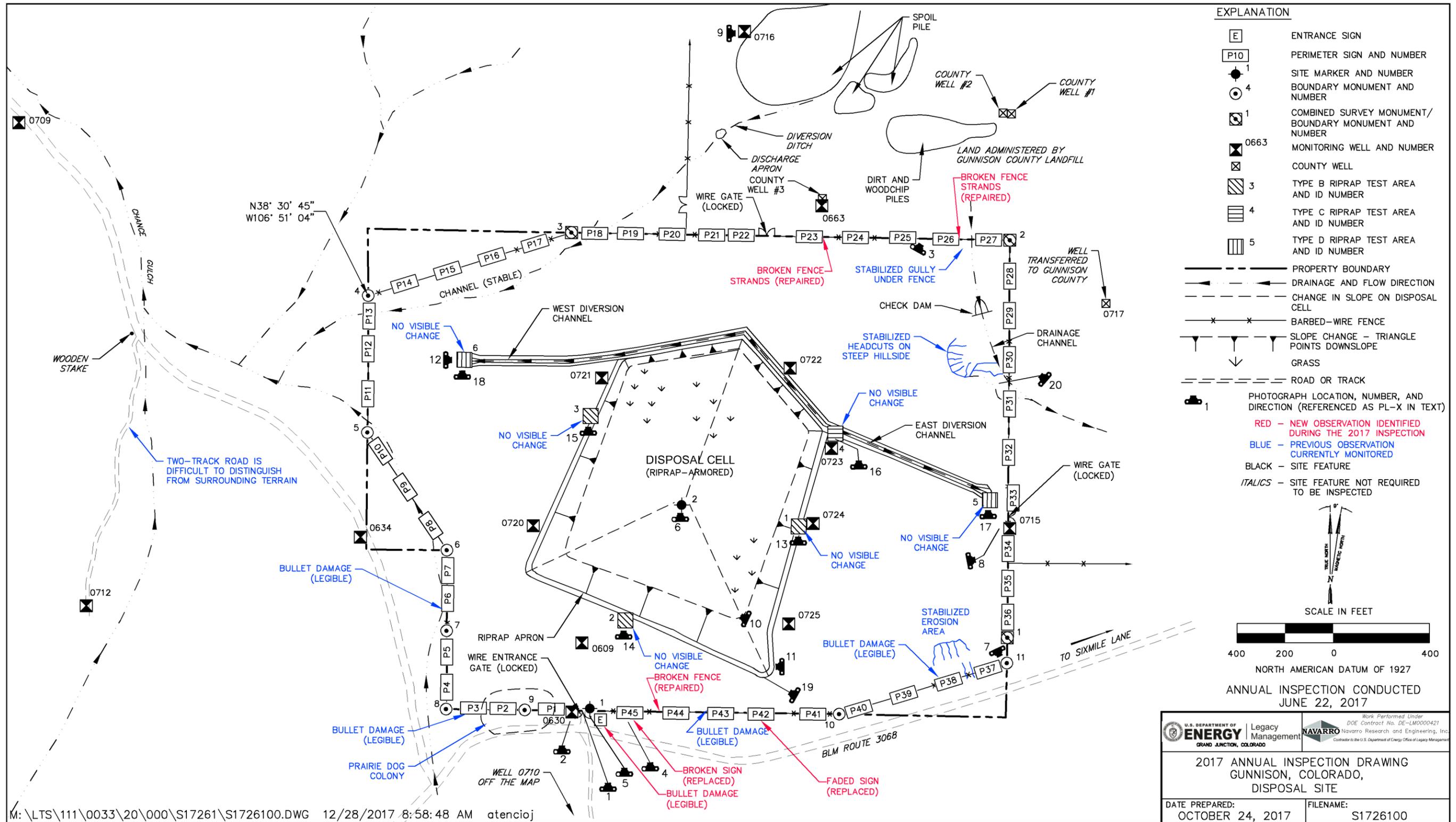


Figure 8-1. 2017 Annual Inspection Drawing for the Gunnison, Colorado, Disposal Site

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8.4.1.5 Monitoring Wells

The site has 16 groundwater monitoring wells. The wellhead protectors were undamaged, properly labeled, and locked (PL-8). The Gunnison County landfill operators have placed concrete barriers to protect monitoring well 0716, which is on landfill property, from landfill activities (PL-9). The edge of an adjacent spoil pile, although close to the concrete barriers, does not impair access to monitoring well 0716. 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 conformance with LTSP requirements.

8.4.2.1 Top of the Disposal Cell

The disposal cell, completed in 1995, occupies 29 acres. The disposal cell is armored with basalt riprap to control erosion. There was no evidence settling, slumping, erosion, or any other modifying process that might affect the integrity of the top of the disposal cell. 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. No maintenance needs were identified.

8.4.2.2 Disposal Cell Side Slopes, Apron, and Diversion Channels

The disposal cell side slopes (PL-10), an apron to collect and divert precipitation runoff from the disposal cell (PL-11), and two diversion channels to protect the disposal cell from precipitation run-on (PL-12) are all armored with basalt riprap. There was no evidence of settling, slumping, erosion, or any other modifying process 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, with the final set of photographs taken in 2017. The riprap in all of the test areas showed no rock degradation. When the rocks were compared to the photos taken of them in 2012, there was no evidence that individual rocks had split or otherwise been degraded (PL-13 through PL-18A). No rock degradation has been observed in the test areas since monitoring began in 1998; therefore, in accordance with the LTSP, the test areas will no longer be monitored.

Precipitation runoff from the disposal cell occasionally ponds in a low-lying area at the southeast corner of the disposal cell; standing water was not present at the time of the inspection (PL-19). The riparian-type vegetation that has become established there indicates that the area retains moisture. 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 (PL-20). 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. 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 spoil pile to monitoring well 0716 is the only current concern for activities that could impact a site asset. Inspectors will continue to monitor this area.

8.5 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 need for a follow-up inspection was identified.

8.6 Maintenance and Repairs

Three perimeter fence locations with broken strands were repaired, and two perimeter signs were replaced during the inspection; no other maintenance needs were identified.

8.7 Groundwater Monitoring

In accordance with the LTSP, DOE conducts groundwater monitoring every 5 years to demonstrate compliance with EPA groundwater protection standards in 40 CFR 192.03 and to demonstrate that the disposal cell is performing as designed. 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. The most recent sampling event occurred in July 2016.

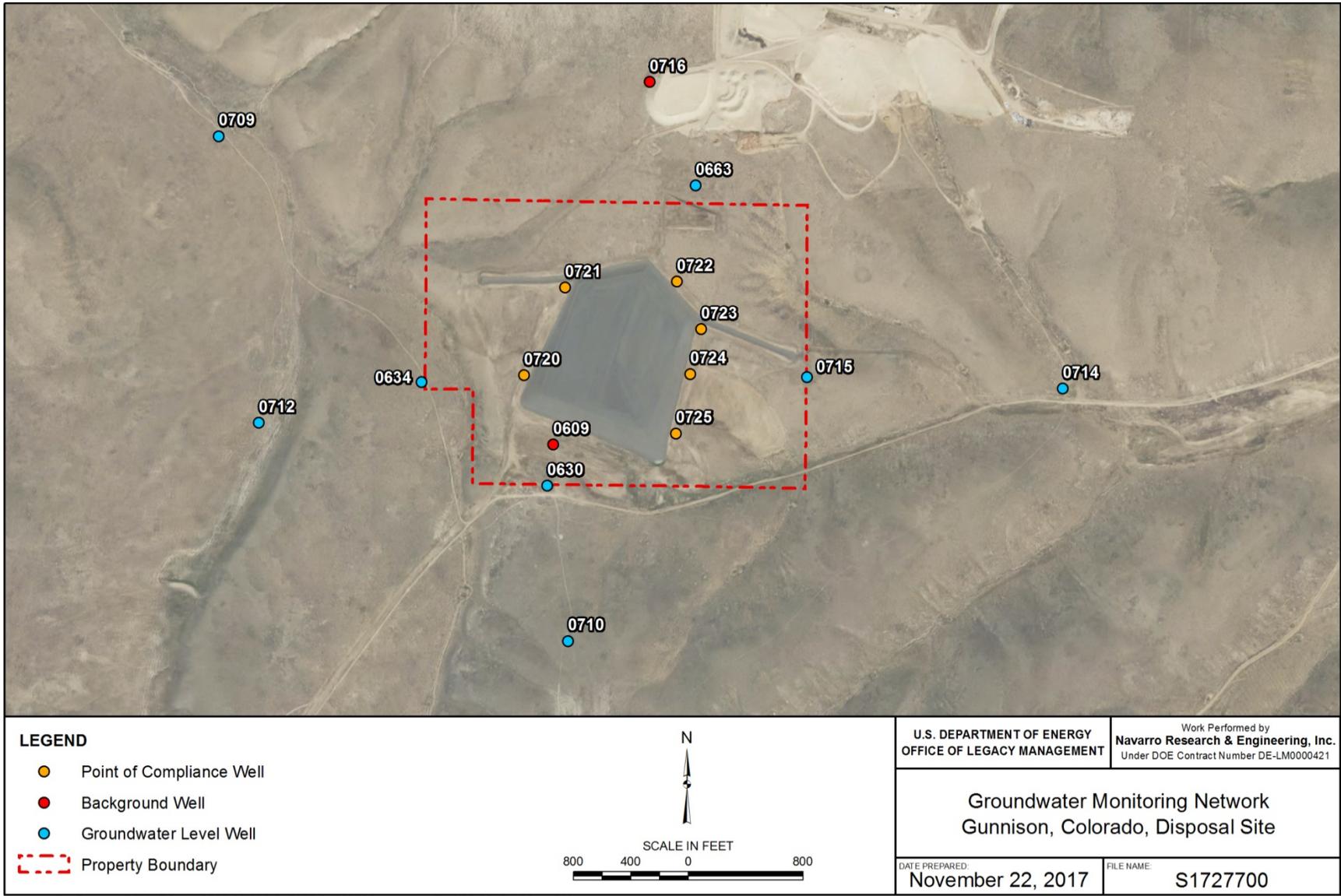
The groundwater monitoring network consists of 16 monitoring wells, including six POC wells to monitor disposal cell performance, two monitoring wells to monitor background groundwater quality, and eight wells to monitor groundwater levels (Table 8-2 and Figure 8-2). The indicator analyte for disposal cell performance is uranium, which was selected because of its presence in tailings pore fluid, its relatively high mobility in groundwater, and its low concentration in upgradient (background) groundwater. The site-specific 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 EPA established a maximum concentration limit for uranium of 0.044 mg/L in groundwater (40 CFR 192, Subpart A, Table 1).

Table 8-2. Groundwater Monitoring Network for the Gunnison, Colorado, 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

As reported in the *2016 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites* (DOE 2016), the 2016 monitoring results were consistent with historical results, indicating no significant change in general water chemistry. The uranium concentration was below the action level (0.013 mg/L) in all POC wells. 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. The consistent general water quality, along with uranium concentrations below the action level, indicates that the disposal cell continues to perform as an effective containment system.



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

8.8 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 192.04. No need for corrective action was identified.

8.9 References

10 CFR 40, Appendix A. U.S. Nuclear Regulatory Commission, "Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content," *Code of Federal Regulations*.

10 CFR 40.27. U.S. Nuclear Regulatory Commission, "General License for Custody and Long-Term Care of Residual Radioactive Material Disposal Sites," *Code of Federal Regulations*.

40 CFR 192.03. U.S. Nuclear Regulatory Commission, "Monitoring," *Code of Federal Regulations*.

40 CFR 192.04. U.S. Nuclear Regulatory Commission, "Corrective Action," *Code of Federal Regulations*.

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

DOE (U.S. Department of Energy), 2016. *2016 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites*, LMS/S15036, March.

8.10 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	0	Entrance Gate
PL-2	0	Entrance Sign
PL-3	30	Broken Perimeter Fence Strands; Subsequently Repaired
PL-4	0	New Perimeter Sign P45
PL-5	0	Site Marker SMK-1
PL-6	0	Site Marker SMK-2
PL-7	155	Boundary Monument BM-11
PL-8	80	Monitoring Well 0715
PL-9	90	Monitoring Well 0716 on County Landfill Property
PL-10	295	Disposal Cell Top and Southwest Side Slope
PL-11	270	Apron at Southeast Corner of Disposal Cell
PL-12	90	West Diversion Channel
PL-13	0	(a) Riprap Test Area No. 1 (Type B Riprap) on the Disposal Cell's East Apron—June 22, 2017 (b) Riprap Test Area No. 1 (Type B Riprap) on the Disposal Cell's East Apron—June 4, 2012, Photo for Comparison
PL-14	0	(a) Riprap Test Area No. 2 (Type B Riprap) on the Disposal Cell's South Apron—June 22, 2017 (b) Riprap Test Area No. 2 (Type B Riprap) on the Disposal Cell's South Apron—June 4, 2012, Photo for Comparison
PL-15	0	(a) Riprap Test Area No. 3 (Type B Riprap) on the Disposal Cell's Northwest Apron—June 22, 2017 (b) Riprap Test Area No. 3 (Type B Riprap) on the Disposal Cell's Northwest Apron—June 4, 2012, Photo for Comparison
PL-16	0	(a) Riprap Test Area No.4 (Type C Riprap) in the East Diversion Channel—June 22, 2017 (b) Riprap Test Area No. 4 (Type C Riprap) in the East Diversion Channel—June 4, 2012, Photo for Comparison
PL-17	0	(a) Riprap Test Area No. 5 (Type D Riprap) at the East Diversion Channel Outlet—June 22, 2017 (b) Riprap Test Area No. 5 (Type D Riprap) at the East Diversion Channel Outlet—June 4, 2012, Photo for Comparison
PL-18	0	(a) Riprap Test Area No. 6 (Type D Riprap) at the West Diversion Channel Outlet—June 22, 2017 (b) Riprap Test Area No. 6 (Type D Riprap) at the West Diversion Channel —June 4, 2012, Photo for Comparison
PL-19	300	Apron at Southeast Corner of Disposal Cell
PL-20	310	Stabilized Headcuts on Steep Hillside



PL-1. Entrance Gate



PL-2. Entrance Sign



PL-3. Broken Perimeter Fence Strands; Subsequently Repaired



PL-4. New Perimeter Sign P45



PL-5. Site Marker SMK-1



PL-6. Site Marker SMK-2



PL-7. Boundary Monument BM-11



PL-8. Monitoring Well 0715



PL-9. Monitoring Well 0716 on County Landfill Property



PL-10. Disposal Cell Top and Southwest Side Slope



PL-11. Apron at Southeast Corner of Disposal Cell



PL-12. West Diversion Channel



PL-13. (a) Riprap Test Area No. 1 (Type B Riprap) on the Disposal Cell's East Apron—June 22, 2017



PL-13. (b) Riprap Test Area No. 1 (Type B Riprap) on the Disposal Cell's East Apron—June 4, 2012, Photo for Comparison



PL-14. (a) Riprap Test Area No. 2 (Type B Riprap) on the Disposal Cell's South Apron—June 22, 2017



PL-14. (b) Riprap Test Area No. 2 (Type B Riprap) on the Disposal Cell's South Apron—June 4, 2012, Photo for Comparison



*PL-15. (a) Riprap Test Area No. 3 (Type B Riprap) on the Disposal Cell's Northwest Apron—
June 22, 2017*



*PL-15. (b) Riprap Test Area No. 3 (Type B Riprap) on the Disposal Cell's Northwest Apron—
June 4, 2012, Photo for Comparison*



PL-16. (a) Riprap Test Area No.4 (Type C Riprap) in the East Diversion Channel–June 22, 2017



*PL-16. (b) Riprap Test Area No. 4 (Type C Riprap) in the East Diversion Channel–
June 4, 2012, Photo for Comparison*



PL-17. (a) Riprap Test Area No. 5 (Type D Riprap) at the East Diversion Channel Outlet–June 22, 2017



*PL-17. (b) Riprap Test Area No. 5 (Type D Riprap) at the East Diversion Channel Outlet–
June 4, 2012, Photo for Comparison*



PL-18. (a) Riprap Test Area No. 6 (Type D Riprap) at the West Diversion Channel Outlet–June 22, 2017



PL-18. (b) Riprap Test Area No. 6 (Type D Riprap) at the West Diversion Channel Outlet–June 4, 2012, Photo for Comparison



PL-19. Apron at Southeast Corner of Disposal Cell



PL-20. Stabilized Headcuts on Steep Hillside

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