

1.0 Ambrosia Lake, New Mexico, Disposal Site

1.1 Compliance Summary

The Ambrosia Lake, New Mexico, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on March 18, 2021. No changes were observed on the disposal cell or in the associated drainage features. Inspectors identified no immediate maintenance needs and found no cause for a follow-up or contingency inspection.

Groundwater monitoring is not required at the site. However, the U.S. Department of Energy (DOE) Office of Legacy Management (LM) conducts groundwater monitoring every 3 years at three wells as a best management practice at the request of the New Mexico Environment Department (NMED). The most recent groundwater sampling event occurred in November 2019, and results were reported in the 2019 site inspection report. The next groundwater sampling event will be in November 2022.

1.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the site-specific Long-Term Surveillance Plan (DOE 1996) (LTSP) in accordance with procedures established to comply with the requirements of the U.S. Nuclear Regulatory Commission (NRC) general license at Title 10 *Code of Federal Regulations* Section 40.27 (10 CFR 40.27). Table 1-1 lists these requirements.

Table 1-1. License Requirements for the Ambrosia Lake, New Mexico, Disposal Site

Requirement	LTSP	This Report	10 CFR 40.27
Annual Inspection and Report	Section 6.0	Section 1.4	(b)(3)
Follow-Up or Contingency Inspections	Section 7.0	Section 1.5	(b)(4)
Maintenance and Repairs	Section 8.0	Section 1.6	(b)(5)
Groundwater Monitoring	Section 5.0	Section 1.7	(b)(2)
Corrective Action	Section 9.0	Section 1.8	--

1.3 Institutional Controls

The 288-acre site, identified by the property boundary shown in Figure 1-1, is owned by the United States and was accepted under the NRC general license in 1998. 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 drainage features, entrance sign, perimeter signs, site markers, survey and boundary monuments, and wellhead protectors.

1.4 Inspection Results

Inspection of the site, 25 miles north of Grants, New Mexico, was conducted by J. Cario, D. Ravelojaona, and D. Traub of the Legacy Management Support (LMS) contractor. B. Tsosie (LM site manager), A. Rheubottom (NMED), and J. Bale (LMS contractor) attended the inspection. The purposes of the inspection were to confirm the integrity of visible features at the site, identify changes in conditions that might affect conformance with the LTSP, and evaluate whether maintenance or additional inspection and monitoring are needed.

1.4.1 Site Surveillance Features

Figure 1-1 shows the locations of site features, including site surveillance features and inspection areas, in black and gray font. 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 2021 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 1-1 by photograph location (PL) numbers. The photographs and photograph log are presented in Section 1.10.

1.4.1.1 Access Road, Entrance Gate, and Entrance Sign

Access to the site is from a gravel road that crosses private property and leads to the site approximately 1 mile from New Mexico Highway 509. Entrance to the site is through a locked steel gate at the intersection of the access road and Highway 509. The access road continues east past the site to private mining and grazing interests. The gate and access road are owned by Rio Algom Mining LLC. LM has been granted permanent access to the site but does not maintain the gate or the access road. The entrance sign is near the access road next to site marker SMK-1 (PL-1). The phone number on the entrance sign was updated during the annual site inspection. No maintenance needs were identified.

1.4.1.2 Perimeter Signs

There are 70 perimeter signs, attached to steel posts set in concrete, positioned along the unfenced property boundary (PL-2). Posts for perimeter signs P1 through P15 include additional warning signs about mining restrictions. Many of the perimeter signs were cracked and weathered but remain legible. Erosion has occurred around the base of perimeter sign P12, but the perimeter sign is stable (PL-3). A new prairie dog colony was identified between perimeter signs P17 and P18. It does not threaten the integrity of either perimeter sign, no additional action is needed. No maintenance needs were identified.

1.4.1.3 Site Markers

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

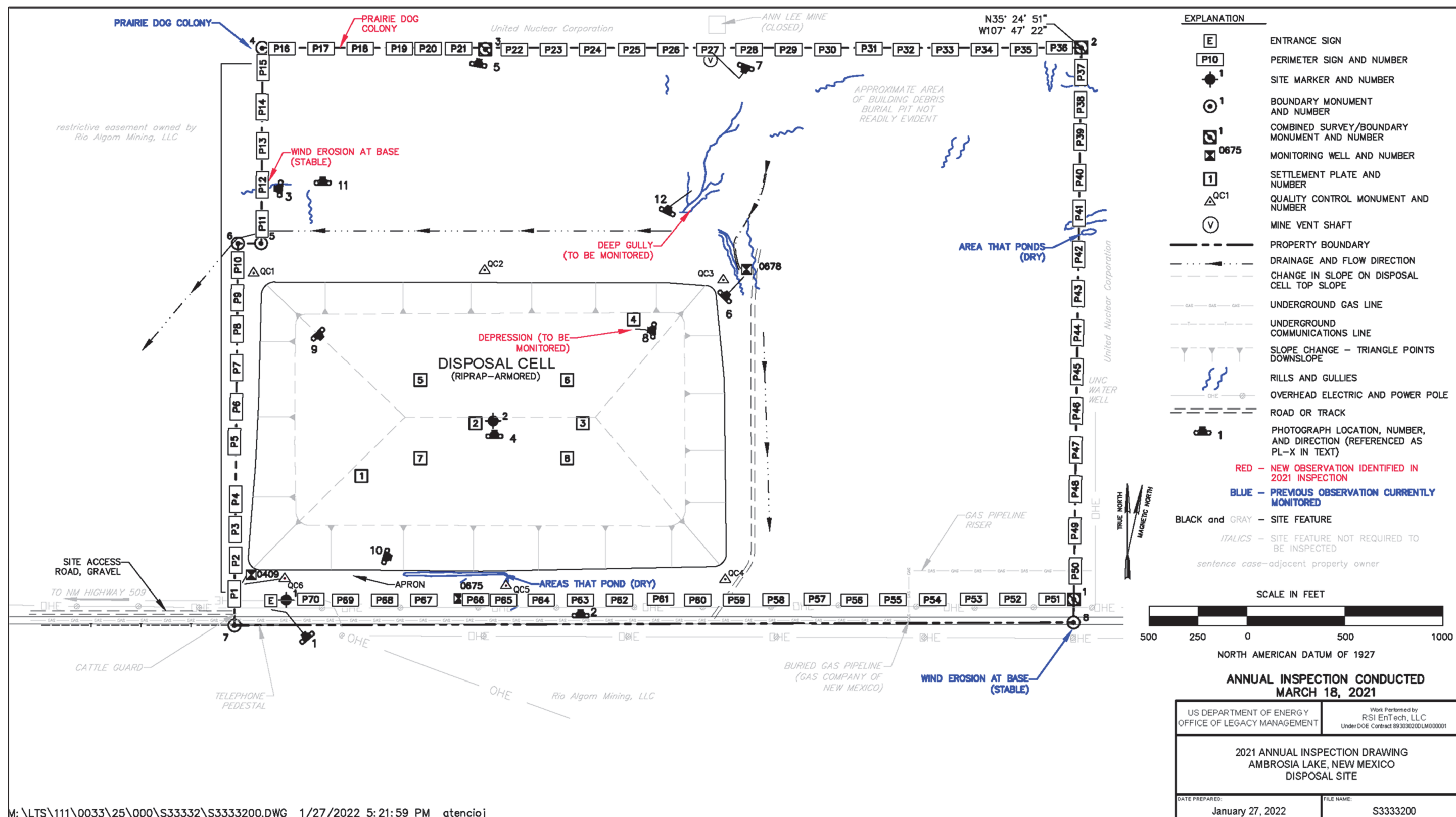


Figure 1-1. 2021 Annual Inspection Drawing for the Ambrosia Lake, New Mexico, Disposal Site

This page intentionally left blank

1.4.1.4 Survey and Boundary Monuments

Three combined survey and boundary monuments and five additional boundary monuments delineate the property corners and boundary (PL-5). Steel T-posts were installed next to boundary monuments to help inspectors locate them. Erosion has occurred around the base of boundary monument BM-8, but the monument is stable. No maintenance needs were identified.

1.4.1.5 Aerial Survey Quality Control Monuments

Six aerial survey quality control monuments, installed in 2019, were inspected during the 2021 annual inspection. No maintenance needs were identified.

1.4.1.6 Monitoring Wells

The site has three monitoring wells. A gully adjacent to well 0678 appears to be stable, and the well is not affected by the erosion (PL-6). All wellhead protectors observed during the inspection were undamaged, locked, and properly labeled. No maintenance needs were identified.

1.4.1.7 Mine Vent

A mine vent shaft associated with an abandoned underground mine is within the site boundary in the northern portion of the site (PL-7). The vent has a spot-welded cover and a casing that rises approximately 3 feet above the ground. The vent was secure at the time of the inspection. Inspectors monitor the condition of the vent to ensure that the closure remains secure. No maintenance needs were identified.

1.4.2 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 side slopes and apron of the cell, (3) the graded and revegetated area between the disposal cell and the site perimeter, 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.

1.4.2.1 Top of Disposal Cell

The disposal cell, completed in 1994, occupies 91 acres and is armored with basalt riprap to control erosion and deter animal and human intrusion. The top slope showed no evidence of cracking, slumping, or erosion, and there was no indication of riprap degradation. A shallow depression around settlement plate SP-4, near the northeast corner of the disposal cell cover, was first noted during the 1997 inspection and continued to grow in depth and area in subsequent years. The depression was repaired in August 2005. Visual observations during the 2017 annual inspection indicated that very minor additional settlement may have occurred since the depression was repaired. The area was inspected during the 2021 annual inspection, and settlement was shallow enough that it was determined not to have changed significantly (PL-8). Inspectors will continue to monitor this area.

Scattered annual weeds and perennial grasses and forbs are growing on the disposal cell top (PL-9). In accordance with the LTSP, deep-rooted shrubs are to be removed from the disposal cell cover. No deep-rooted shrubs were noted during the inspection. No maintenance needs were identified.

1.4.2.2 Side Slopes and Apron

The basalt riprap-covered side slopes and apron showed no evidence of erosion, settling, slumping, or cracking. Standing water is occasionally observed in a portion of the south apron, but the area was dry during the inspection (PL-10). This location is the topographic low spot along the base of the disposal cell, and stormwater runoff collects in this area. No significant changes in the potential desiccation crack and small rills at the base of the disposal cell were observed. Inspectors will continue to monitor this area. No maintenance needs were identified.

1.4.2.3 Graded and Revegetated Area

In general, site vegetation appeared to be healthy. However, some areas are windswept and have little growth, particularly in an area north of the disposal cell where mill tailings had formerly been stockpiled (PL-11). Because the site is not fenced, livestock occasionally enter it. Inspectors did not observe cattle near the disposal cell, but there was evidence of recent grazing on the site. Occasional grazing will not affect the disposal cell protectiveness or long-term performance, because livestock do not walk on riprap-armored surfaces.

Onsite rills and gullies north and east of the disposal cell have been visually monitored for several years. While no new rills and gullies were observed during the 2021 annual inspection, existing rills and gullies continued to develop. One gully, northeast of the disposal cell, has grown to a depth of 6–8 feet and a width of 8–10 feet (PL-12). Inspectors collected GPS locations and measurements of this gully and its location has been updated on the inspection map. These erosional features do not threaten the disposal cell's performance or integrity, because headward erosion is progressing away from the disposal cell, and there is no significant sedimentation near the disposal cell. No maintenance needs were identified.

1.4.2.4 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. No such impacts were identified. Rills and gullies continue to be observed east of perimeter sign P41. These erosional features do not threaten the long-term integrity of the site because headward erosion is progressing away from the site. Inspectors will continue to monitor these features to ensure they do not impact site features.

1.5 Follow-Up or Contingency Inspections

LM 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) LM 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.

1.6 Maintenance and Repairs

No maintenance needs were identified.

1.7 Groundwater Monitoring

In accordance with the LTSP, groundwater monitoring is not required at this site because (1) the groundwater is heavily contaminated from underground uranium mining and naturally occurring mineralization and (2) the uppermost aquifer is of limited use due to its low yield. Consequently, NRC concurred with the application of supplemental standards at the site and the exemption of both compliance and performance groundwater monitoring. However, LM conducts groundwater monitoring at wells 0409, 0675, and 0678 as a best management practice at the request of NMED (Table 1-2 and Figure 1-2) (Kleinrath 2001). LM originally agreed to sample these locations once every 3 years for 30 years; however, LM sampled annually from November 2010 to November 2016 at the request of NMED. After the November 2016 sampling event, sampling returned to a triennial schedule. The most recent sampling event occurred in November 2019.

Table 1-2. Groundwater Monitoring Network at the Ambrosia Lake, New Mexico, Disposal Site

Monitoring Well	Hydrologic Relationship
0409	Contact between alluvium and Tres Hermanos C unit, downgradient
0675	Weathered Mancos Shale, downgradient
0678	Tres Hermanos B unit, downgradient

Well 0675 is completed in weathered Mancos Shale just below its contact with the overlying alluvium, and well 0678 is completed in the Tres Hermanos B Sandstone unit of the Mancos Shale. LM installed well 0409 in May 2011 in support of a regional groundwater investigation being conducted by NMED. Well 0409, on DOE property adjacent to the southwest corner of the disposal cell, is completed in an alluvium-filled paleochannel. The bottom of the well screen is at the contact between the alluvium and the sandstone of Unit C of the Tres Hermanos member of the Mancos Shale Formation. Well 0409 is dry, which suggests that groundwater is not leaving the southwest portion of the site via alluvium.

All groundwater monitoring results for the site are reported and published on the LM Geospatial Environmental Mapping System (GEMS) website (<https://gems.lm.doe.gov/#site=AMB>). The *2019 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites* (DOE 2020) reports the most recent monitoring results. Consistent with previous sampling events, well 0409 was dry. Monitoring results for molybdenum, nitrate, selenium, sulfate, and uranium for wells 0675 and 0678 were consistent with historical monitoring results. In accordance with its agreement with NMED, LM will continue to monitor groundwater at the Ambrosia Lake site every 3 years until 2031. The next sampling event will be in November 2022.

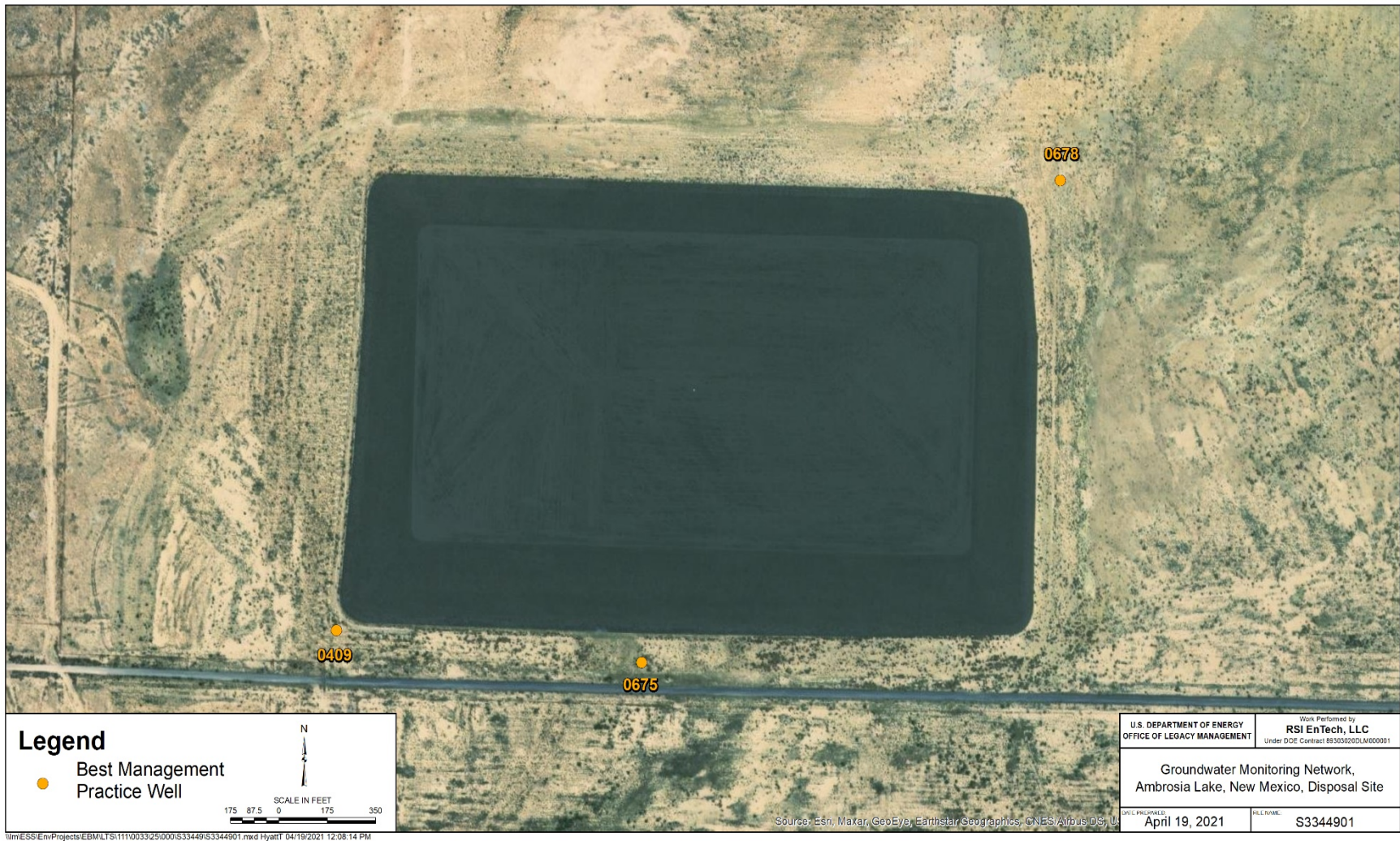


Figure 1-2. Ambrosia Lake, New Mexico, Groundwater Best Practice Monitoring Locations

1.8 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.

1.9 References

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. U.S. Environmental Protection Agency, “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings,” *Code of Federal Regulations*.

DOE (U.S. Department of Energy), 1996. *Long-Term Surveillance Plan for the Ambrosia Lake, New Mexico, Disposal Site*, DOE/AL/62350-211, Rev. 1, July.

DOE (U.S. Department of Energy), 2020. *2019 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites*, LMS/S26685, March.

Kleinrath, 2001. Art Kleinrath, program manager, Office of Legacy Management, U.S. Department of Energy, letter (about Contract No. DE-AC13-96GJ87335, “Response to New Mexico Environment Department Regarding Monitor Well Decommissioning and Ongoing Groundwater Monitoring at the Ambrosia Lake UMTRCA Title I Disposal Site”) to Marcy Leavitt, branch chief, New Mexico Environment Department, Groundwater Quality Bureau, August 29.

1.10 Photographs

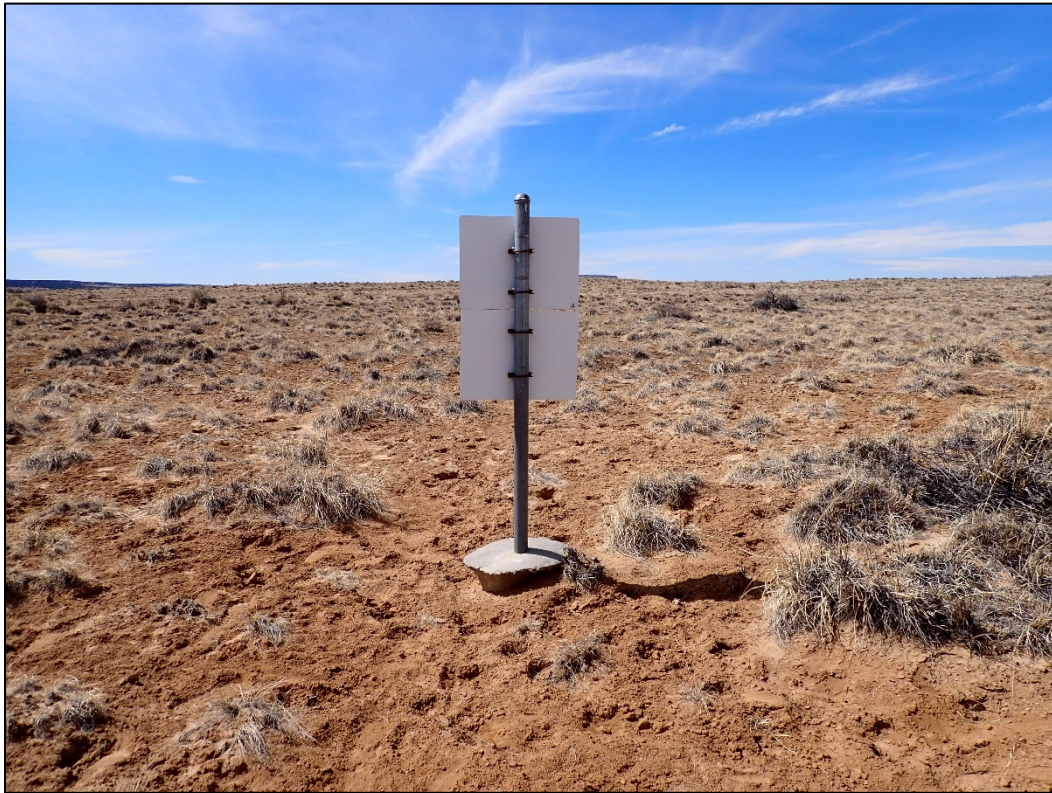
Photograph Location Number	Azimuth (degrees)	Photograph Description
PL-1	320	Entrance Sign
PL-2	0	Perimeter Sign P63
PL-3	275	Erosion Around Base of Perimeter Sign P12 (Stable)
PL-4	0	Site Marker SMK-2
PL-5	10	Survey/Boundary Monument SM/BM-3
PL-6	45	Erosional Rills Around Monitoring Well 0678
PL-7	200	Mine Vent Shaft
PL-8	275	Settlement Plate SP-4 on Disposal Cell Top
PL-9	135	Top Slope of Disposal Cell
PL-10	105	Ponding Area Along South Side Slope of Disposal Cell (Dry)
PL-11	0	Old Stockpile Area Northwest of Disposal Cell
PL-12	25	Erosional Gully Northeast of Disposal Cell



PL-1. Entrance Sign



PL-2. Perimeter Sign P63



PL-3. Erosion Around Base of Perimeter Sign P12 (Stable)



PL-4. Site Marker SMK-2



PL-5. Survey/Boundary Monument SM/BM-3



PL-6. Erosional Rills Around Monitoring Well 0678



PL-7. Mine Vent Shaft



PL-8. Settlement Plate SP-4 on Disposal Cell Top



PL-9. Top Slope of Disposal Cell



PL-10. Ponding Areas Along South Side Slope of Disposal Cell (Dry)



PL-11. Old Stockpile Area Northwest of Disposal Cell



PL-12. Erosional Gully Northeast of Disposal Cell

This page intentionally left blank