

4.0 Durango, Colorado, Disposal Site

4.1 Compliance Summary

The Durango, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site (site) was inspected on May 23, 2016. No changes were observed in the disposal cell or associated drainage features. Several perimeter signs have deteriorated and will be replaced before the 2017 inspection. Inspectors continued to monitor areas on top of the disposal cell with minor animal burrows and an area along the north toe of the disposal cell where rock has shifted. Inspectors identified no other maintenance needs or cause for a follow-up inspection.

Groundwater is monitored annually in accordance with the site's Long-Term Surveillance Plan (LTSP). Uranium, molybdenum, and selenium concentrations in the compliance monitoring wells in the uppermost aquifer are below the respective standards with no increasing trends. No risks to human health and the environment were identified.

4.2 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) LTSP (DOE 2015) 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 4-1 lists these requirements.

Table 4-1. License Requirements for the Durango Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.3	Section 4.4
Follow-Up Inspections	Section 3.4	Section 4.5
Maintenance	Section 3.5	Section 4.6
Emergency Measures	Section 3.5	Section 4.7
Environmental Monitoring	Section 3.6	Section 4.8
Corrective Action	Section 3.6	Section 4.9

4.3 Institutional Controls

The 121-acre site, identified by the property boundary shown in Figure 4-1, is owned by the United States and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1996. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls (ICs) at the site include federal ownership of the property and the following physical ICs that are inspected annually: the disposal cell and drainage features, entrance gates, an entrance sign, perimeter signs, site markers, survey and boundary monuments, and monitoring wellhead protectors.

4.4 Inspection Results

The site, southwest of Durango, Colorado, was inspected on May 23, 2016. The inspection was conducted by L. Sheader and M. Kastens of the DOE Legacy Management Support (LMS)

contractor. J. Dayvault (DOE site manager), M. Cosby (Colorado Department of Public Health and Environment), and D. Miller (LMS contractor) 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.

4.4.1 Site Surveillance Features

Figure 4-1 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 4-1 by photograph location (PL) numbers.

4.4.1.1 Site Access, Entrance Gates and Sign

Access to the site is from County Road 212. The entrance gate along County Road 212 and the older, original site entrance gate were locked and undamaged. The entrance sign has bullet holes but was legible (PL-1). No maintenance needs were identified.

4.4.1.2 Perimeter Signs

There are 82 perimeter signs, attached to steel posts set in concrete, positioned along the unfenced site boundary. Two additional perimeter signs (P83 and P84) attached to steel posts set in concrete were installed inside the site boundary in 2015. Four perimeter signs (P40–P43) are not required to be inspected in accordance with the LTSP because of difficult terrain. The concrete bases of several perimeter signs have been undercut by erosion (P28, P35, P38, P42, P45, P56, P61, P62) (PL-2); no significant changes were observed, and all signs were stable. Several perimeter signs have bullet holes or other markings. Ten of the perimeter signs were identified as needing replacement and will be replaced before the next site inspection. No other maintenance needs were identified.

4.4.1.3 Site Markers

The site has two site markers. Site marker SMK-1 is just inside the original entrance gate. SMK-1 had historically been damaged by gunfire and was repaired in 2015 (PL-3). The repairs are intact, and no additional damage was observed. Site marker SMK-2 is on the top slope of the disposal cell; small burrowing animals had disturbed soils surrounding the marker's base (PL-4). The disturbance presents no threat to the integrity of the cover, but inspectors will continue to monitor it. No maintenance needs were identified.

4.4.1.4 Survey and Boundary Monuments

There are four survey monuments positioned around the site. All were present and undamaged. There are six boundary monuments, each with two witness corners, along the site perimeter. Most of the boundary monuments and witness corners were present and stable. One witness corner for boundary monument BM-3 was undercut by erosion (PL-5), and monument BM-3 was also undercut (PL-6). One of the witness corners for boundary monument BM-4 was bent to the ground, and its cap was missing, but BM-4 was stable. Boundary monument BM-6 has been missing for years, but both witness corners were present. Repair or replacement of these features is not warranted at this time. No other maintenance needs were identified.

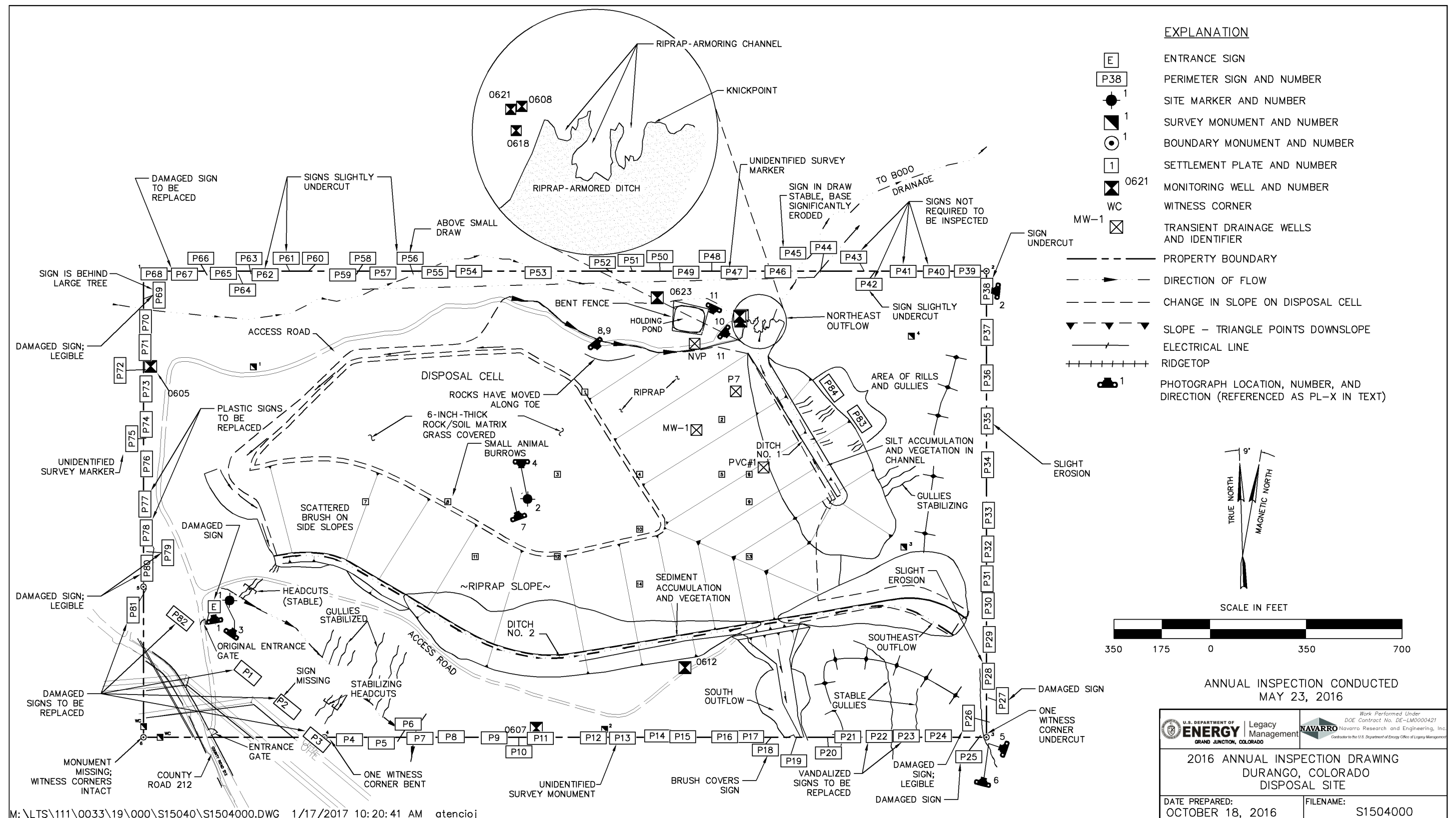


Figure 4-1. 2016 Annual Inspection Drawing for the Durango Disposal Site

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4.4.1.5 Monitoring Wells

The site has seven monitoring wells. The LTSP does not require inspection of monitoring wells during the annual inspection. However, all wellhead protectors that were observed during the annual inspection were undamaged and locked, and no maintenance needs were identified. Monitoring wells were inspected during the annual sampling event. The monitoring well 0607 wellhead protector was noted as bent, as identified during previous sampling events. The well casing is undamaged, and no maintenance needs were required.

4.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into six inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection. The inspection areas are (1) the top of the disposal cell, (2) the side slopes of the disposal cell, (3) the drainage ditches, (4) the holding pond, (5) the site boundary, and (6) the outlying areas. Inspectors examined specific site-surveillance features within each area and looked for evidence of erosion, settling, slumping, or other modifying processes that might affect site’s integrity, protectiveness, or long-term performance.

4.4.2.1 Top of Disposal Cell

The disposal cell, completed in 1990, occupies 60 acres. It has a vegetated cover consisting primarily of perennial grasses and nonweedy broadleaf plants. There was no evidence of erosion, settling, slumping, or other modifying processes on the top of the disposal cell (PL-7). Small animal burrows were observed in some areas. The burrows do not threaten the integrity of the disposal cell. The LTSP requires that deep-rooted vegetation be controlled on the disposal cell top. No deep-rooted vegetation was observed. No maintenance needs were identified.

4.4.2.2 Side Slopes of Disposal Cell

The side slopes of the disposal cell are armored with rock riprap. Along the north toe of the disposal cell, rock has moved, creating a linear depression approximately 18 feet long. The depression was first observed in 2015 (PL-8). No significant change was observed in 2016 (PL-9). Inspectors will continue to monitor and evaluate this area.

The LTSP requires that deep-rooted vegetation 3.5 feet or greater in height be removed or treated with herbicide. Several areas containing small shrubs and trees were identified during the inspection and were treated with herbicide during a later visit. No other maintenance needs were identified.

4.4.2.3 Drainage Ditches

Rock-armored drainage ditches are constructed beneath the toe of the side slope on the northwest, south, and east sides of the disposal cell. Storm water is directed into these ditches and conveyed away from the site into natural drainages.

Erosion occurs on some of the steep slopes above these channels, depositing sediment in the rock-armored channel; this creates locales favoring plant growth (PL-10). As no excessive sediment deposits or vegetation were observed during the inspection, drainage ditches are expected to perform as designed. Inspectors will continue to monitor the ditches.

The riprap-covered outflows of the ditches were designed to self-armor. These outflows and channels below the outflows are monitored, and no changes to these areas were observed. No maintenance needs were identified.

4.4.2.4 Holding Pond

A holding pond associated with the site's transient drainage system is in the northeast corner of the site. A ditch had been constructed outside the holding pond fence to reduce surface flow into the pond (PL-11). The pond, fence, and associated structures will be removed in 2017.

4.4.2.5 Site Boundary

The site is not fenced. Boundary monuments and perimeter signs delineate the boundary with one exception: the boundary marked by boundary monument BM-6 is not delineated with signs, because the signs cut across the corner of the site (perimeter signs P82, P1, and P3). There was no evidence of vandalism or changes to the area along or within the site boundary.

Gullies on the southeast and southwest portion of the site were generally stable and do not threaten the integrity of the disposal cell or drainage ditches. No maintenance needs were identified.

4.4.2.6 Outlying Areas

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 changes were identified.

Colorado Parks and Wildlife manages land to the north, west, and east of the site, and the U.S. Bureau of Reclamation manages land to the south. The primary land uses are wildlife habitat and recreation. Mountain bikers and other recreationists commonly use County Road 212.

4.5 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.

4.6 Maintenance

Ten perimeter signs were identified as needing replacement and will be replaced before the 2017 inspection. Shrubs and small trees growing on the side slopes of the disposal cell were identified during the site inspection and were treated with herbicide during a later visit. No other maintenance needs were identified.

4.7 Emergency Measures

Emergency measures are the actions that DOE will take in response to "unusual damage or disruption" that threatens or compromises site safety, security, or integrity in compliance with 10 CFR 40, Appendix A, Criterion 12. No need for emergency measures was identified.

4.8 Environmental Monitoring

4.8.1 Groundwater Monitoring

In accordance with the LTSP, groundwater is monitored at the site to verify the initial performance of the disposal cell. The monitoring network consists of seven wells (Table 4-2 and Figure 4-2). Four wells are completed in the uppermost aquifer (bedrock of the Cliff House Sandstone and the Menefee Formation), including one upgradient background well (0605) and three downgradient point-of-compliance (POC) wells (0607, 0612, and 0621). Three wells are completed in the alluvium (0608, 0618, and 0623).

The alluvium and the groundwater it contains are of very limited extent, so the alluvium is not considered an aquifer. Also, there are no discharge points of alluvial groundwater to the surface. The alluvium is monitored as a best management practice. The original monitoring network did not include well 0618, but monitoring was initiated in 2002 because the well intercepts the full, saturated thickness of the alluvium.

Table 4-2. Groundwater Monitoring Network at the Durango Disposal Site

Monitoring Well	Well Compliance Type	Hydrologic Relationship
0605	Background	Upgradient (uppermost aquifer)
0607	Point-of-Compliance	Downgradient (uppermost aquifer)
0608	Best Management Practice	Downgradient (alluvium)
0612	Point-of-Compliance	Downgradient (uppermost aquifer)
0618	Best Management Practice	Downgradient (alluvium)
0621	Point-of-Compliance	Downgradient (uppermost aquifer)
0623	Best Management Practice	Upgradient (alluvium)

Groundwater samples are collected annually and analyzed for three indicator parameters: molybdenum, selenium, and uranium. All are measured in milligrams per liter (mg/L). The site-specific standards used for the three indicator parameters are the respective maximum observed background concentrations reported in groundwater samples collected from wells completed in the bedrock aquifer as identified in Table 2-3 of the LTSP. These site-specific standards are provided in Table 4-3.

Table 4-3. Site-Specific Groundwater Standards for the Durango Disposal Site, Based on Background

Constituent	Standard (mg/L)
Molybdenum	0.22
Selenium	0.042
Uranium	0.077

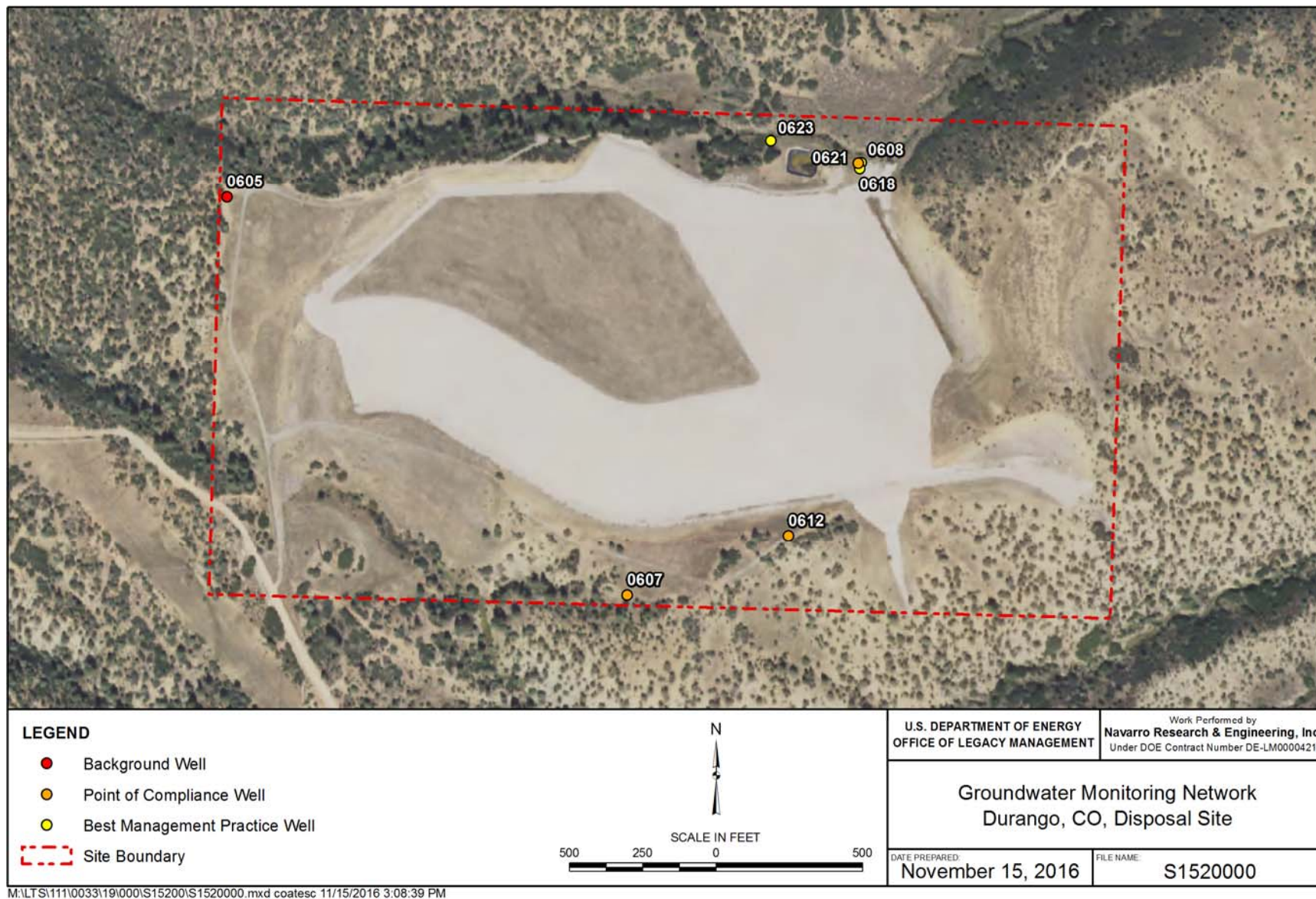


Figure 4-2. Groundwater Monitoring Network for the Durango Disposal Site

Beginning in 2014, POC wells 0607 and 0612 have shown a slight increase in selenium concentrations (Figure 4-3). In the May 2016 sampling event, the selenium concentration continued to increase in well 0607 and it decreased in well 0612. Even so, selenium, molybdenum, and uranium concentrations in the POC wells in the uppermost aquifer are well below the respective standards (Figure 4-3 through Figure 4-5). Therefore, the aquifer is in compliance with the LTSP groundwater monitoring requirements.

Though not required for compliance, wells completed in the alluvium are monitored as a best management practice. Uranium concentrations in well 0618 have consistently been higher than concentrations in the other wells onsite. To monitor the increased uranium observed in well 0618, wells 0608, 0618, and 0621 are sampled monthly as weather permits. Figure 4-5 shows an overall decreasing trend in uranium concentrations in well 0618 since 2014, with concentrations below the standard on multiple occasions between 2015 and 2016. However periodic increases in uranium concentrations continue to occur in well 0618. Because well 0618 is not a POC well and not screened in the uppermost aquifer, the concentrations in this well do not affect compliance with the LTSP and do not pose a risk to human health and the environment. The potential cause of variability in this well continues to be investigated.

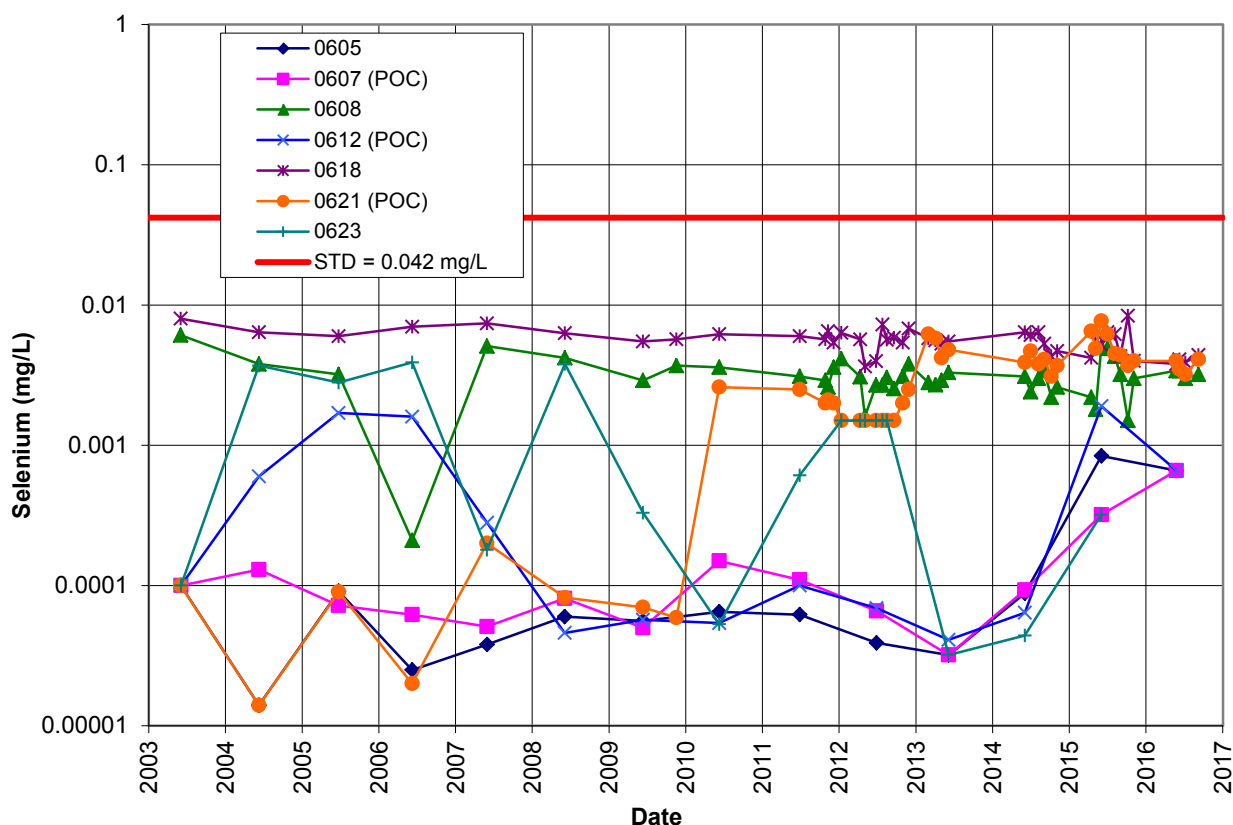


Figure 4-3. Time-Concentration Plot of Selenium in Groundwater at the Durango Disposal Site

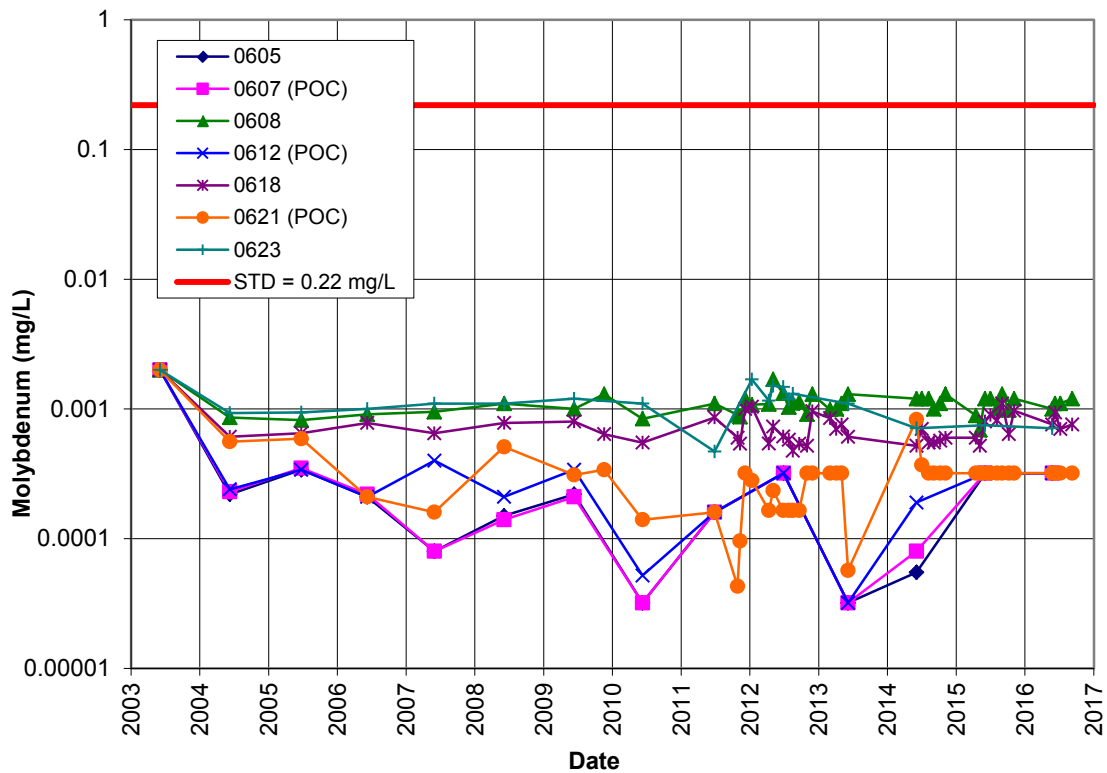


Figure 4-4. Time-Concentration Plot of Molybdenum in Groundwater at the Durango Disposal Site

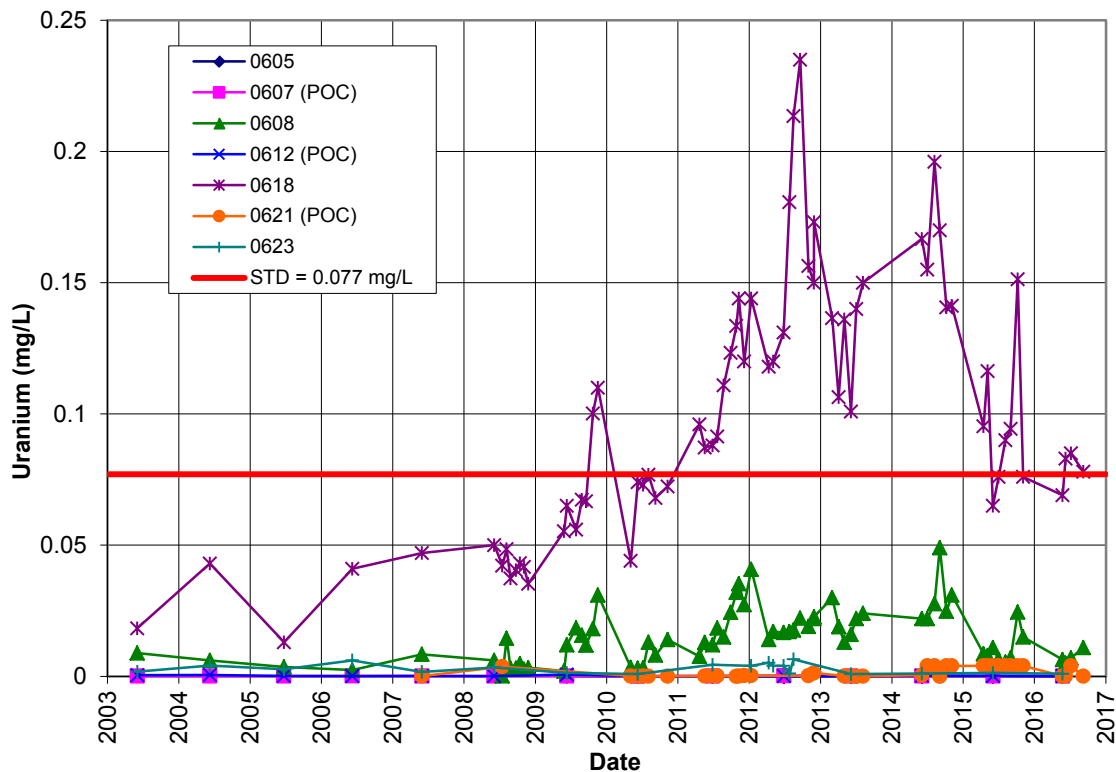


Figure 4-5. Time-Concentration Plot of Uranium in Groundwater at the Durango Disposal Site

4.8.2 Vegetation Monitoring

Vegetation on top of the disposal cell remains healthy. The LTSP requires that plants on the disposal cell cover are to be removed by either selective spraying or mechanical removal when their shoot height equals or exceeds 3.5 feet. Although the aboveground height of dryland alfalfa will never exceed the height criterion, it is known to be a deep-rooted plant; therefore, this species is also controlled on the disposal cell cover. Several shrubs approaching 3 feet in height were found on the disposal cell side slopes and were treated with herbicide during a separate visit. Federal law requires noxious weed control at the site. Although weed control is not included in the annual inspection, inspectors make note of any large infestations of noxious weeds. Only scattered weeds were observed in 2016.

4.9 Corrective Action

In accordance with the LTSP, implementation of a corrective action program will be taken within 18 months of verification of an established exceedance of a concentration limit for one or more constituents in a POC well. No need for corrective action was identified.

4.10 Reference

DOE (U.S. Department of Energy), 2015. *Long-Term Surveillance Plan for the Durango, Colorado, Disposal Site*, LMS/DUD/S06297, April.

4.11 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	350	Entrance Sign
PL-2	275	Base of Perimeter Sign P38, With 3–4 Inches of Erosion on Downslope Side
PL-3	35	Site Marker SMK-1 Along Site Access Road
PL-4	180	Site Marker SMK-2 on Top of Disposal Cell
PL-5	290	Witness Corner of Boundary Monument BM-3
PL-6	15	Boundary Monument BM-3
PL-7	340	Vegetated Top of Disposal Cell
PL-8	130	Area of Disposal Cell Toe Where Rock Movement Has Occurred, 2015
PL-9	140	Area of Disposal Cell Toe Where Rock Movement Has Occurred, 2016
PL-10	130	Ditch No. 1 Showing Sediment Deposition and Vegetation Growth
PL-11	205	Ditch Installed Around Evaporation Pond to Reduce Inflow Before Pond Removal



PL-1. Entrance Sign



PL-2. Base of Perimeter Sign P38, With 3–4 Inches of Erosion on Downslope Side



PL-3. Site Marker SMK-1 Along Site Access Road



PL-4. Site Marker SMK-2 on Top of Disposal Cell



PL-5. Witness Corner of Boundary Monument BM-3



PL-6. Boundary Monument BM-3



PL-7. Vegetated Top of Disposal Cell



PL-8. Area of Disposal Cell Toe Where Rock Movement Has Occurred, 2015



PL-9. Area of Disposal Cell Toe Where Rock Movement Has Occurred, 2016



PL-10. Ditch No. 1 Showing Sediment Deposition and Vegetation Growth



PL-11. Ditch Installed Around Evaporation Pond to Reduce Inflow Before Pond Removal

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