

## 4.0 Durango, Colorado, Disposal Site

### 4.1 Compliance Summary

The Durango, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on June 2, 2015. The disposal cell was in good condition. Vegetation on top of the disposal cell was healthy, and several small shrubs growing on the side slopes will be controlled. A small depression observed in 2014 on the disposal cell side slope was no longer apparent. Inspectors identified no maintenance needs or cause for a follow-up or contingency inspection.

### 4.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Durango, Colorado, Disposal Site* (LTSP) (LMS/DUD/S06297-0.1, U.S. Department of Energy [DOE], April 2015) and procedures that DOE established to comply with 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 disposal site (Figure 4-1) 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 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 at the site include federal ownership of the property and the following physical features that are inspected annually: perimeter warning signs, site markers, survey and boundary monuments, and a locked gate at the site entrance.

### 4.4 Inspection Results

The site, southwest of Durango, Colorado, was inspected on June 2, 2015. The inspection was conducted by L. Sheader and T. Jasso of the DOE Legacy Management Support contractor. D. Miller (DOE Office of Legacy Management Contractor), J. Dayvault (DOE Site Manager), and M. Cosby (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 site integrity, and to determine the need, if any,

for maintenance or additional inspections and monitoring. Numbers in the left margin of this report refer to items summarized in Table ES-1 of the “Executive Summary.”

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

##### **4.4.1.1 Entrance Gates and Entrance Sign**

The entrance gate along County Road 212 was locked and in good condition, and the older, original entrance gate was also locked and in good condition. The entrance sign was damaged by bullets but still legible (PL-1).

##### **4.4.1.2 Perimeter Signs**

Eighty-four perimeter signs mark the unfenced site boundary (PL-2). Two signs (P83 and P84) were installed after the 2014 annual inspection. Numerous perimeter signs have bullet holes or other markings. Although they remain legible, they are beginning to weather and will need to be replaced in the next few years. Damaged signs are shown on Figure 4-1.

Some perimeter signs, slightly undercut by erosion, were monitored. Perimeter sign P2 has been missing for several years and will not be replaced, as adjacent signs are within sight. In accordance with the updated LTSP, signs P40 through P43 were not observed. Due to time constraints, signs P13, P44, P45 (undercut by erosion), and P46 were also not observed in 2015. Sign P1, missing in 2014, has been replaced.

##### **4.4.1.3 Site Markers**

Site marker SMK-1 was historically damaged by gunfire and was repaired (PL-3). Site marker SMK-2 was in good condition.

##### **4.4.1.4 Survey and Boundary Monuments**

All survey and boundary monuments are in good condition except as follows. Boundary monument BM-3 and two of its reference monuments are situated in a small gully and were threatened by erosion in the past; the monuments are now stable, but one of the witness corners was undercut by erosion in 2014. One of the reference monuments for boundary monument BM-4 has been bent to the ground and the cap has been removed, but BM-4 is stable. Repair of any of these features is not warranted at this time. Boundary monument BM-6 was destroyed years ago and will not be replaced because both of its witness corners are present. Boundary monument BM-6 was not visited during the 2015 inspection.

##### **4.4.1.5 Monitoring Wells**

Padlocks on all of the site groundwater monitoring wells encountered during the annual inspection were functional, locked, and in good condition.

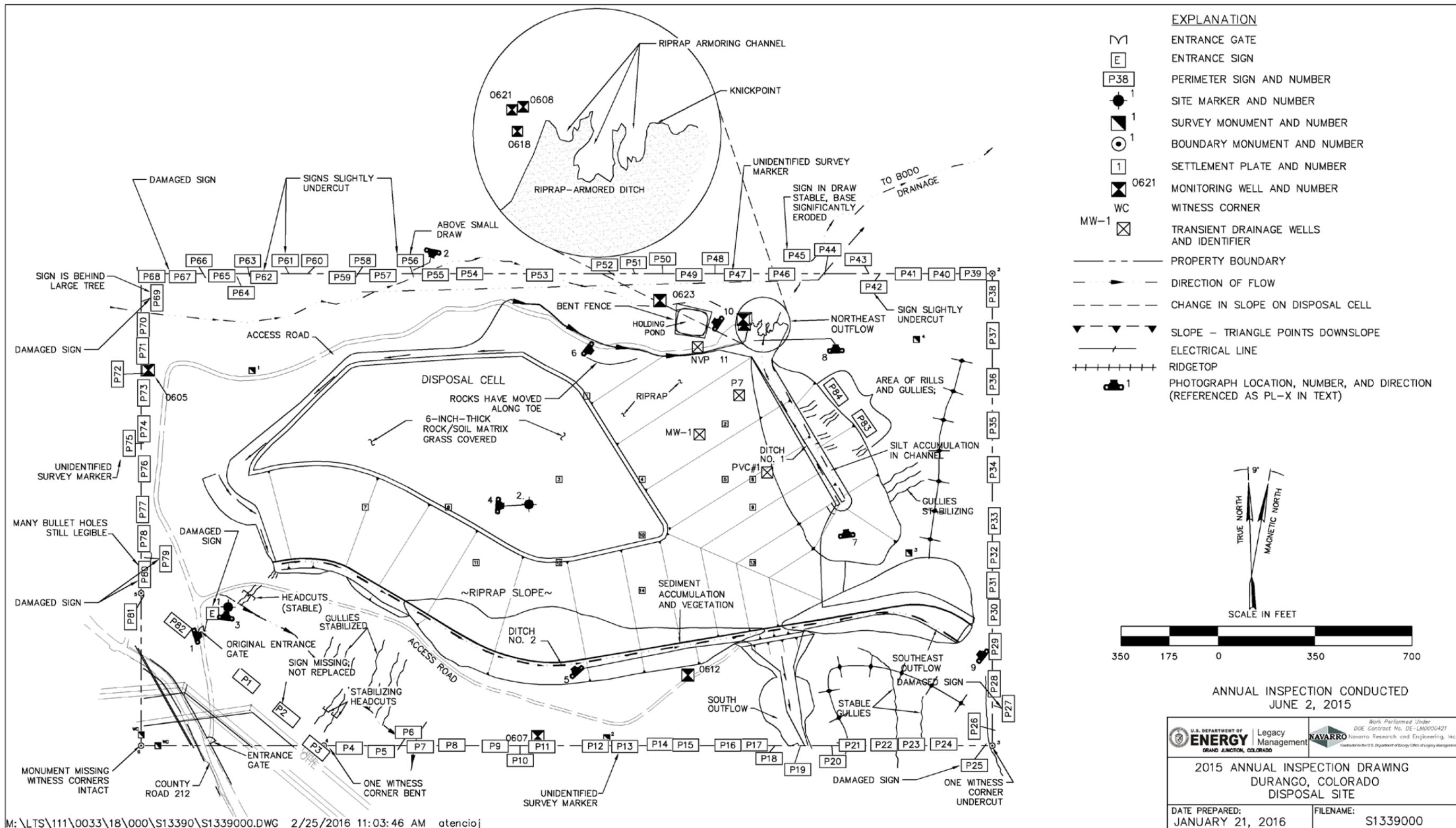


Figure 4-1. 2015 Annual Inspection Drawing for the Durango Disposal Site

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## **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 area.

Within each area, inspectors examined specific site surveillance features. Inspectors also looked for evidence of settlement, erosion, or other modifying processes that might affect site integrity or long-term performance.

### **4.4.2.1 Top of Disposal Cell**

The top of the disposal cell has a vegetated cover and is in excellent condition (PL-4). No evidence of settling, slumping, erosion, or deep rooted vegetation was observed.

### **4.4.2.2 Side Slopes of Disposal Cell**

The riprap-covered side slopes of the disposal cell are in good condition (PL-5). Significant disturbances resulting from natural processes, such as subsidence, rock deterioration, or slope failure, were not observed. Some rocks have moved at the toe of the slope on the north side of the cell, creating a linear depression approximately 18 feet long and 2.5 feet deep (PL-6). This area will continue to be monitored.

In the past, woody species have become established on the cell’s side slopes. Once they reach 3 feet in height, they are removed or treated with herbicide in accordance with the LTSP. Several shrubs approaching 3 feet tall were observed during the inspection. They were treated with herbicide during a separate visit.

In 2014, a small depression was found on the rock slope where large rocks were removed, possibly by an animal. The depression was no longer evident in 2015.

### **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 disposal site into natural drainages. The ditches have sufficient depth and rock protection to carry runoff from a probable maximum precipitation (PMP) event. Erosion and mass wasting occurs on some of the steep slopes above these channels. These gullies occasionally become active during large storms, but they do not threaten the integrity of the disposal cell. The eroded sediment is deposited in the rock-armored channel, creating locales favoring plant growth (PL-7). As no excessive sediment deposits or vegetation were observed during the inspection, the performance of the drainage ditches would not be compromised in a PMP event. The ditches will continue to be monitored.

The riprap-covered outflows of the ditches were designed to self-armor, and no significant changes to these areas were observed in 2015 (PL-8). Channels below the outflows are also monitored, and they were stable and in good condition (PL-9).

#### **4.4.2.4 Holding Pond**

The holding pond in the northeast corner of the disposal cell was in good condition (PL-10). The fence was bent in one place, but no sign of access was evident. A shed that previously housed the pond's pump and instruments had been demolished, but the cases enclosing the instruments were in good condition. The holding pond system is scheduled to be removed in 2016.

#### **4.4.2.5 Site Boundary**

The site is not fenced. Boundary monuments and perimeter signs delineate the boundary except as follows. The boundary of the site marked by boundary monument BM-6 is not delineated with signs, because the signs cut across the corner of the site (signs P82, P1, and P3 in Figure 4-1).

#### **4.4.2.6 Outlying Area**

The area beyond the site boundary for a distance of 0.25 mile was visually observed for signs of erosion, development, or other phenomena that might affect the long-term integrity of the site. No such impacts were observed. 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. A water intake and pumping plant structure are located at the Animas River on the site of the former raffinate ponds. A pipeline associated with the project is adjacent to County Road 212 and passes just south of the disposal site. 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 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.

### **4.6 Maintenance**

- 4A No maintenance issues were identified, although some perimeter signs will need to be replaced in the next few years. A separate event was completed following the inspection to treat the noxious weeds and shrubs growing on the side slopes of the cell with herbicides.

### **4.7 Emergency Measures**

An emergency measure is action DOE will take in response to "unusual damage or disruption" that threatens or compromises site safety, security, or integrity (10 CFR 40, Appendix A, Criterion 12). No need for an emergency measure was identified.

## 4.8 Environmental Monitoring

### 4.8.1 Groundwater Monitoring

4B 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 4-1). 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 to be an aquifer. Also, there are no discharge points of alluvial groundwater to the surface. The alluvium is monitored as a best management practice, however, because it is possible that some alluvial groundwater may infiltrate into the bedrock aquifer. 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)
0612	Point-of-Compliance	Downgradient (uppermost aquifer)
0621	Point-of-Compliance	Downgradient (uppermost aquifer)
0608	Best Management Practice	Downgradient (alluvium)
0618	Best Management Practice	Downgradient (alluvium)
0623	Best Management Practice	Upgradient (alluvium)

Groundwater samples are collected annually and analyzed for three indicator parameters: molybdenum, selenium, and uranium, all 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 below 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

Beginning in 2014, POC wells 0607 and 0612 have shown a slight increase in selenium concentrations (Figures 4-2 through 4-4). Even so, uranium, molybdenum, and selenium concentrations in the POC wells in the uppermost aquifer are well below the respective standards. Therefore, the aquifer is in compliance with the LTSP groundwater monitoring requirements.

Though not required for compliance, wells completed in the alluvium are also monitored. 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 4-2 shows an overall increasing trend in uranium concentrations in well 0618 since 2008. Uranium concentrations had been increasing slightly in well 0608, but returned to average concentrations in 2015. 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. However, the potential cause of this increase continues to be investigated.

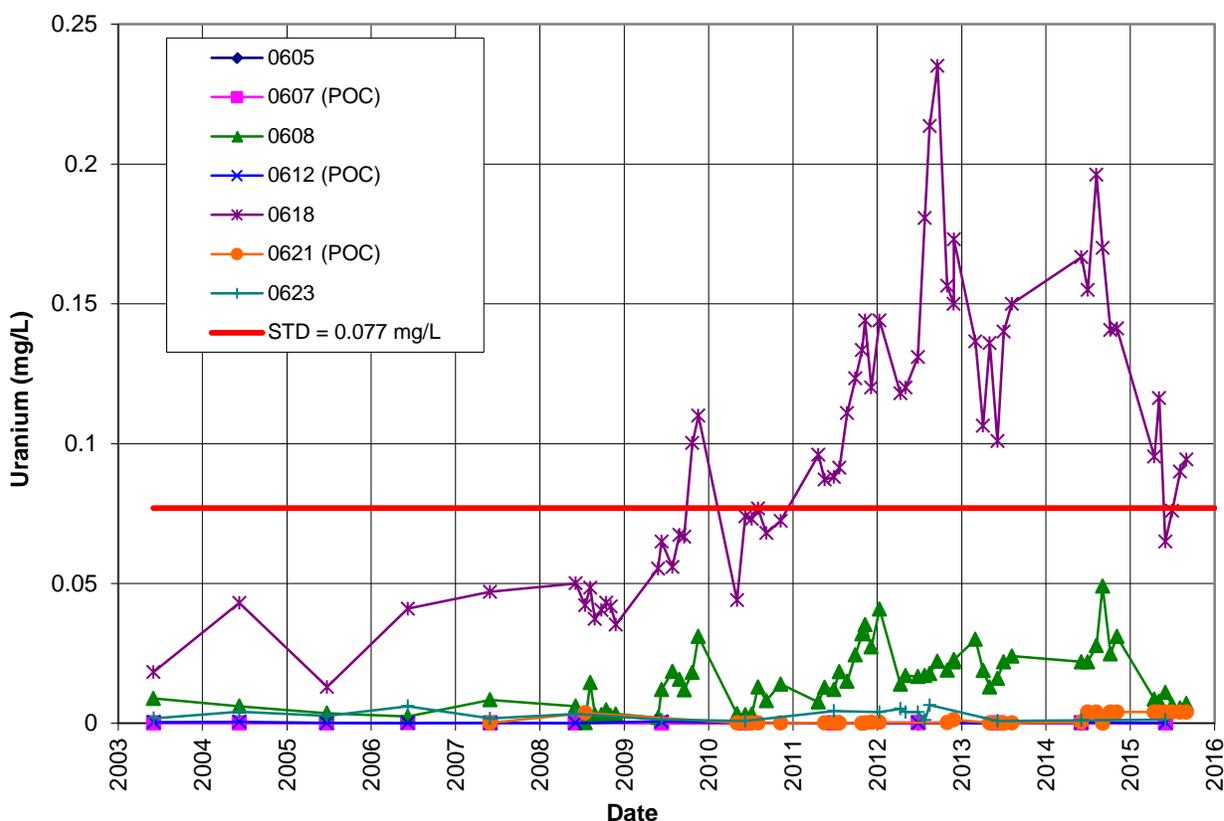


Figure 4-2. Time-Concentration Plot of Uranium in Groundwater at the Durango Disposal Site

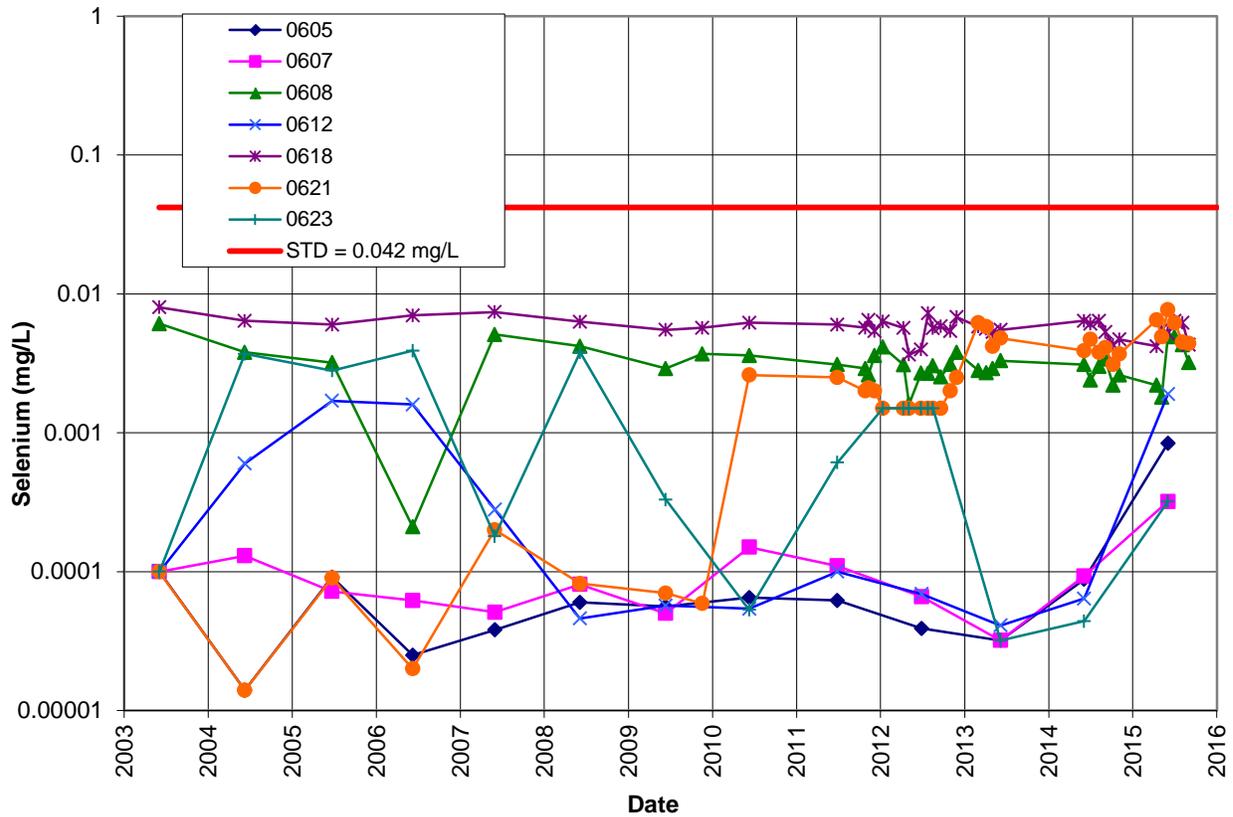


Figure 4-3. Time-Concentration Plot of Selenium in Groundwater at the Durango Disposal Site

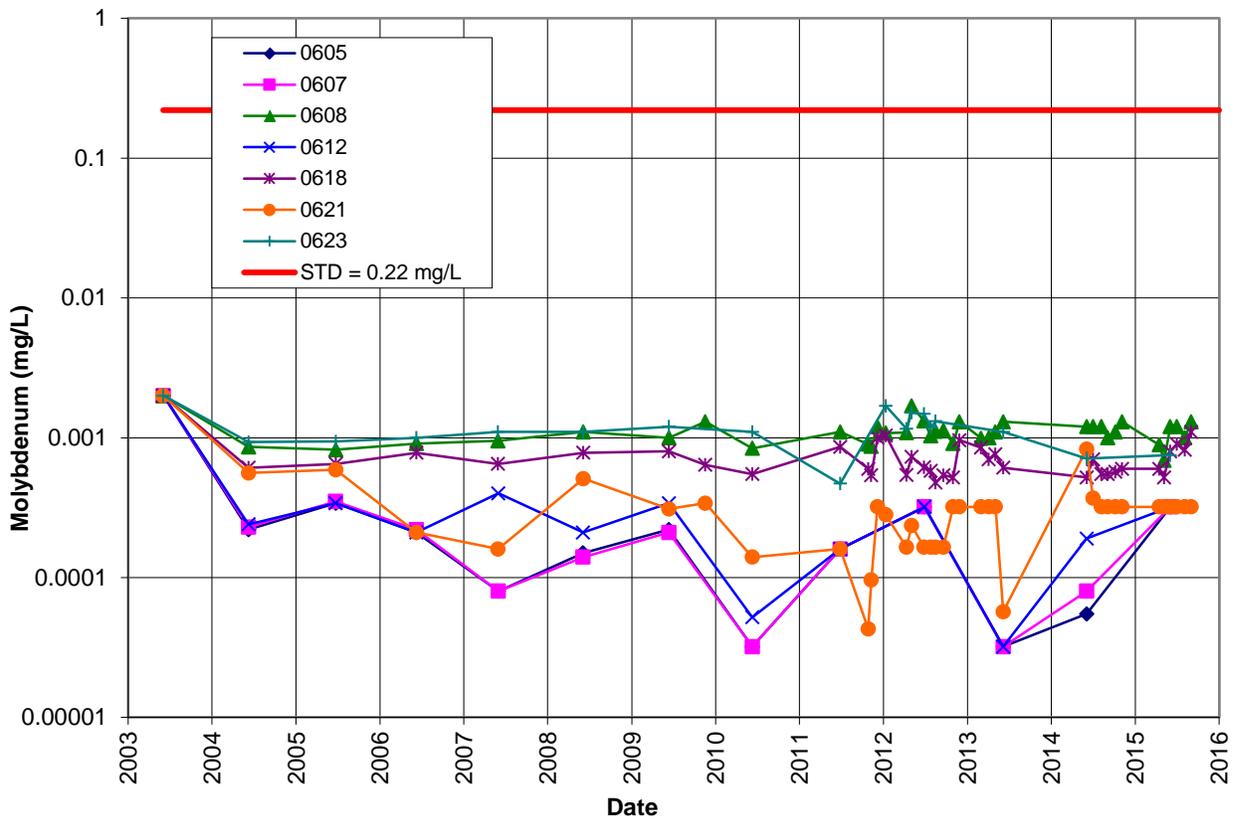


Figure 4-4. Time-Concentration Plot of Molybdenum in Groundwater at the Durango Disposal Site

## 4.8.2 Vegetation Monitoring

Vegetation on top of the cell remains healthy. The LTSP requires that unwanted plants on the 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. Scattered alfalfa plants were found on the cover during the inspection and were sprayed with herbicide.

Several shrubs approaching 3 feet in height were found on the 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 2015.

## 4.9 Corrective Action

In accordance with the LTSP, corrective action will be taken when an established concentration limit is verified to have been exceeded for one or more constituents in a POC well. No need for corrective action was identified.

## 4.10 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	75	Entrance sign, damaged by bullets.
PL-2	195	Perimeter sign P56, slightly undercut.
PL-3	10	Site marker SMK-1, repaired in 2015.
PL-4	95	Vegetation on disposal cell cover.
PL-5	320	Side slope of the cell.
PL-6	130	Rock displacement on cell.
PL-7	355	Ditch No. 1.
PL-8	360	Self-armoring outlet of Ditch No. 1.
PL-9	310	Outlet of southeast outflow.
PL-10	305	Holding pond and fence.



*DUD 6/2015. PL-1. Entrance sign, damaged by bullets.*



*DUD 6/2015. PL-2. Perimeter Sign P56, slightly undercut.*



*DUD 6/2015. PL-3. Site marker SMK-1, repaired in 2015.*



*DUD 6/2015. PL-4. Vegetation on disposal cell cover.*



*DUD 6/2015. PL-5. Side slope of the cell.*



*DUD 6/2015. PL-6. Rock displacement on cell.*



*DUD 6/2015. PL-7.Ditch No. 1.*



*DUD 6/2015. PL-8. Self-armoring outlet of Ditch No. 1.*



*DUD 6/2015. PL-9. Outlet of southeast outflow.*



*DUD 6/2015. PL-10. Holding pond and fence.*

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