

## 4.0 Durango, Colorado, Disposal Site

### 4.1 Compliance Summary

The Durango, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site, inspected on June 3, 2014, was in good condition. Vegetation on top of the disposal cell was healthy, and the top and side slopes were relatively free of deep-rooted species. Perimeter sign P1 was missing and will be replaced. One witness corner monument associated with boundary monument BM-4 was bent, and one witness corner monument associated with boundary monument BM-3 was undercut by storm runoff; both monuments were stable. A small depression was observed on the disposal cell side slope, and it will be monitored. Inspectors identified no other maintenance needs or cause for a follow-up inspection.

Uranium, molybdenum, and selenium concentrations in the compliance monitoring wells in the uppermost aquifer are well below the respective standards with no increasing trends. Therefore, the aquifer is in compliance with the groundwater monitoring requirements.

### 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 Disposal Site, Durango, Colorado* (LTSP) (LMS/DUD/S06297, U.S. Department of Energy [DOE], January 2011) and procedures that DOE established to comply with requirements of Title 10 *Code of Federal Regulations* Part 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 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 3, 2014. The inspection was conducted by D. Miller and L. Sheader of Stoller Newport News Nuclear, Inc. (SN3), a wholly owned subsidiary of Huntington Ingalls Industries, Inc. SN3 is the DOE Legacy Management Support contractor. J. Dayvault (DOE Site Manager) and M. Cosby of the 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 chapter 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. The older, original entrance gate was locked and in good condition, and the entrance sign was present and in good condition.

#### **4.4.1.2 Perimeter Signs**

Eighty-one perimeter signs mark the unfenced site boundary. Numerous perimeter signs have bullet holes or other markings but remain legible. Perimeter signs P1 and P2 are missing. Perimeter Sign P2 has been missing for several years and will not be replaced, as adjacent signs are within sight. Perimeter sign P1 will be replaced. In previous years, inspectors noted that the base of perimeter sign P45 was being undercut by erosion; the sign remains stable (PL-1). Sign P61 is also slightly undercut and will continue to be monitored (PL-2).

All of the perimeter signs were visually located during the inspection. Perimeter signs P40 through P43, located along the north site boundary, are on a steep slope with dense vegetation. They are difficult to locate, and the terrain and vegetation combine to present a safety hazard to the inspectors. Therefore, with approval by NRC, these signs will not be visually inspected unless vegetation is naturally reduced through drought or fire.

#### **4.4.1.3 Site Markers**

Site marker SMK-1 was historically damaged by gunfire and continues to degrade (PL-3). The site marker will be repaired.

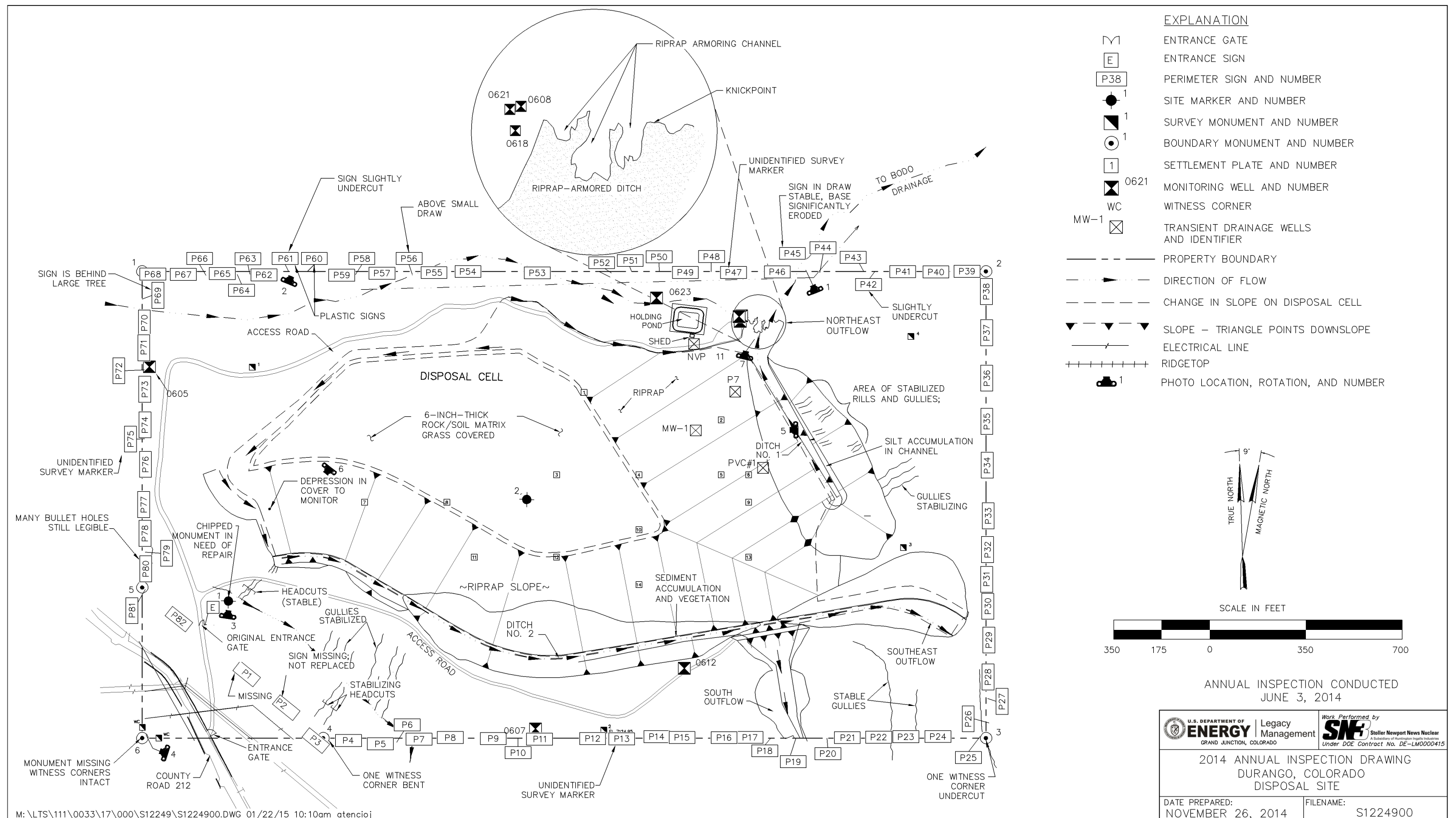


Figure 4-1. 2014 Annual Inspection Drawing for the Durango Disposal Site

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#### **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 slight undercutting of one of the witness corners occurred 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 prior to the 2004 inspection during construction of a pipeline near the site. It will not be replaced because both of its witness corners are present and remain in good condition (PL-4).

#### **4.4.1.5 Monitoring Wells**

The site groundwater monitoring wells (0605, 0607, 0608, 0612, 0618, 0621, and 0623) were locked and in excellent condition.

#### **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. No evidence of settling, slumping, or erosion was observed.

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

The riprap-covered side slopes of the disposal cell are in good condition. Significant disturbances resulting from natural processes, such as subsidence, rock deterioration, or slope failure, were not observed (PL-5).

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. No woody species over 3 feet tall were observed during the inspection.

One small depression was found on the rock slope where large rocks were removed, possibly by an animal (PL-6). The location of the depression was recorded using a GPS unit, and it will be monitored during future inspections for any significant changes that may indicate slope deterioration.

#### **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. These ditches direct runoff into natural drainages that carry storm water away from the disposal site. The ditches have sufficient depth and rock protection to carry runoff from a probable maximum precipitation (PMP) event. Erosion and mass wasting occurred in the past on some of the steep slopes above these channels. The eroded sediment was deposited in the rock-armored channel, creating locales favoring plant growth. The sediment deposits and vegetation will not compromise the drainage ditches' performance in a PMP event. Should sediment deposits or excessive vegetation dam a drainage ditch so as to impound water, the deposits or vegetation will be removed. No excessive sediment deposits or vegetation were observed during the inspection. The ditches will continue to be monitored.

The riprap-covered outflow of Ditch No. 1 was designed to erode back to a rock-filled trench and self-armor in the process. The knickpoint was mapped with GPS equipment in 1999. Significant movement of the knickpoint has not occurred since then, and mapping will not be performed again until a change is noted. This area continues to be stable (PL-7).

The southeast and south outflows spill into steep, natural channels that are also monitored annually. The channels at these locations are armored by riprap and bedrock. Both outflow channels were stable and in good condition at the time of the inspection.

#### **4.4.2.4 Holding Pond**

A holding pond is present near the northeast corner of the disposal cell. It was designed to collect transient drainage water from the disposal cell drainage collection system. Because the water level in the disposal cell has dropped, transient drainage water is no longer being delivered to the holding pond. The drain valve has remained closed since November 2011. However, the holding pond contains precipitation and residual drainage water contaminants. The water in the pond currently is at a low level and is not being pumped out and recirculated through drip lines onto the pond interior side slopes to enhance evaporation. If precipitation increases the water level, the pump will be turned on. The holding pond and pump system were planned to be decommissioned in 2008, but decommissioning has been delayed until the source of elevated uranium concentrations in downgradient well 0618 can be determined.

Animal burrows noted in 2013 near the shed that houses the transient drainage system pump and instrumentation were repaired. A gap under the holding pond fence reported in 2013 was also repaired.

#### **4.4.2.5 Site Boundary**

The site is not fenced. Boundary monuments and perimeter signs delineate the boundary, with one exception. In the southwest corner of the site, perimeter signs "shortcut" the corner because DOE had originally intended to transfer the corner land parcel to Colorado Parks and Wildlife (formerly Colorado Division of Wildlife). Because the parcel was not transferred, the actual boundary of the site is southwest of the perimeter signs on the opposite side of the county road.

Historical rill and gully erosion on the south-facing slope along the southern boundary of the site, on the north-facing slope just north of perimeter sign P3, and in the southeast corner of the site is generally stable and does not threaten the integrity of the disposal cell. Establishment of vegetation and exposure of resistant bedrock in the gullies are effectively preventing further significant erosion in most of the gullies. These erosional features will continue to be inspected.

#### **4.4.2.6 Outlying Area**

The area beyond the site boundary for a distance of 0.25 mile was visually inspected for signs of erosion, development, or other disturbance. Adjacent land uses primarily are wildlife habitat and recreation. 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. Mountain bikers and other recreationists commonly use County Road 212.

### **4.5 Follow-Up Inspections**

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed. No need for a follow-up or contingency inspection was identified during the inspection.

### **4.6 Maintenance**

Alfalfa plants on the disposal cell cover were sprayed with herbicide. Missing perimeter sign P1 will be replaced and damaged site marker SMK-1 will be repaired.

### **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**

- 4A 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

Uranium, molybdenum, and selenium concentrations in the POC wells in the uppermost aquifer are well below the respective standards with no increasing trends (Figures 4-2 through 4-4). 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, and uranium concentrations have increased slightly in well 0608 over the same time period. Because well 0618 is not a POC well and is 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.

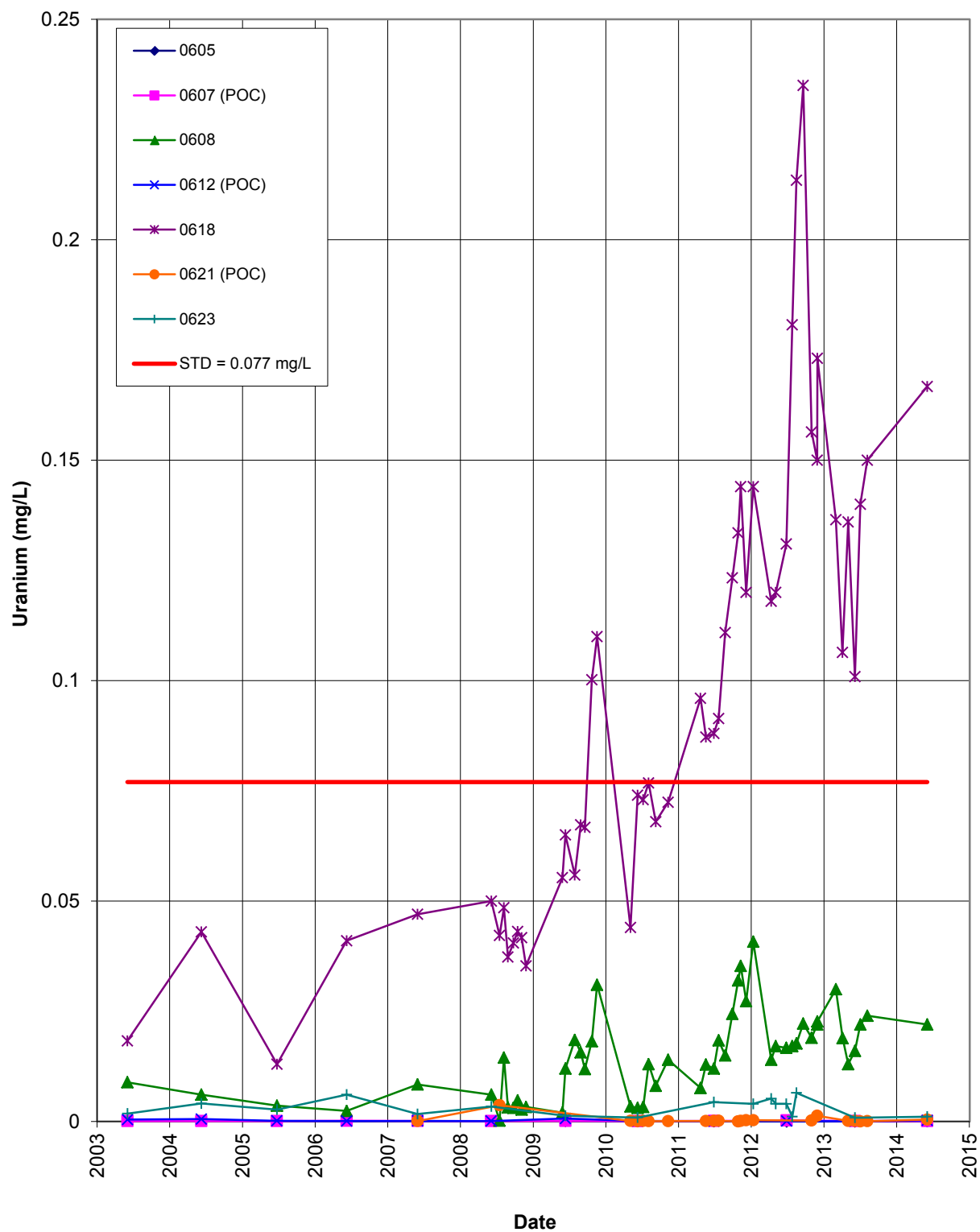


Figure 4-2. Time-Concentration Plot of Uranium in Groundwater at the Durango Disposal Site

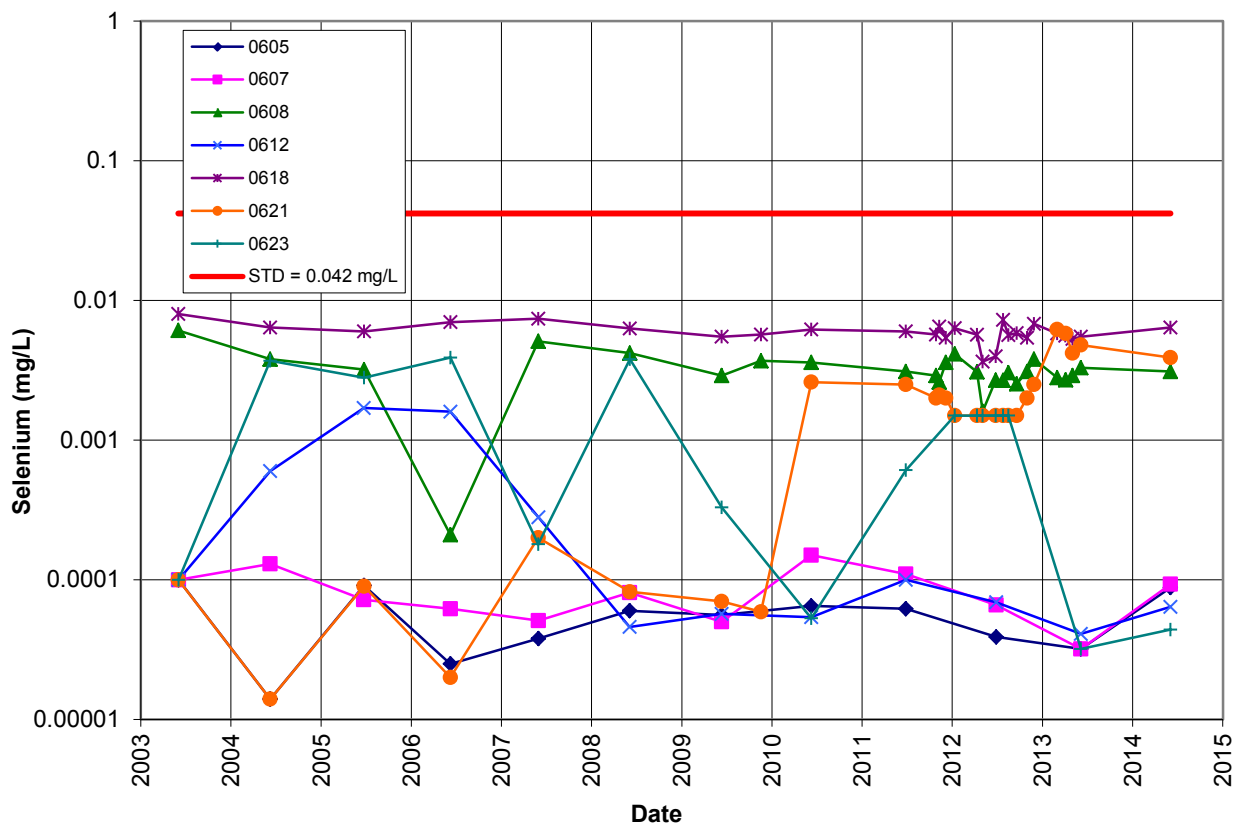


Figure 4-3. Time-Concentration Plot of Selenium in Groundwater at the Durango Disposal Site

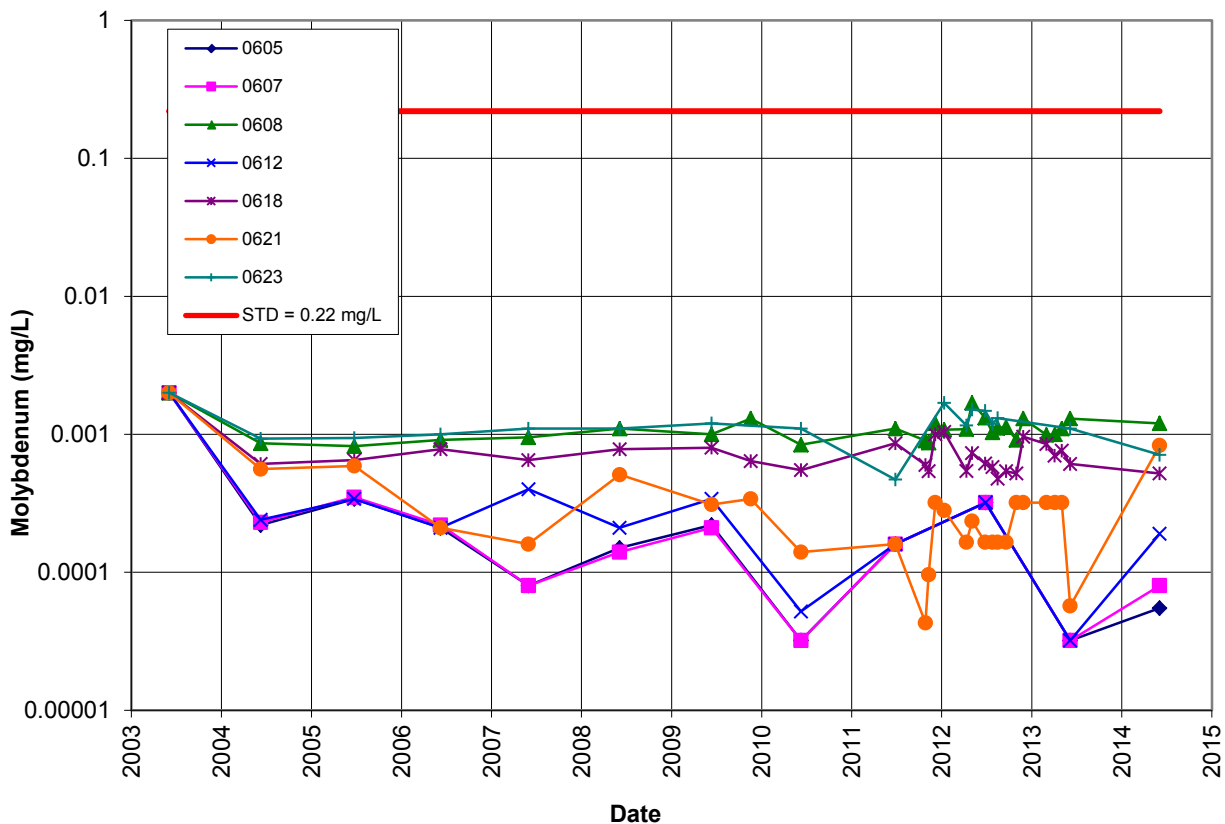


Figure 4-4. Time-Concentration Plot of Molybdenum in Groundwater at the Durango Disposal Site

#### 4.8.2 Vegetation Monitoring

- 4B 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. No unwanted plants meeting that criterion were observed. 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.

#### 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	340	Perimeter sign P45 with significant undercutting.
PL-2	25	Perimeter sign P61 showing minor undercutting.
PL-3	10	Site marker SMK-1 in need of repair.
PL-4	290	Witness corner for boundary monument BM-6.
PL-5	270	Inspection team at toe of disposal cell.
PL-6	220	Large rocks moved, possibly by an animal, on cell slope.
PL-7	15	Northeast outflow channel.



*DUD 6/2014. PL-1. Perimeter sign P45 with significant undercutting.*



*DUD 6/2014. PL-2. Perimeter sign P61 showing minor undercutting.*



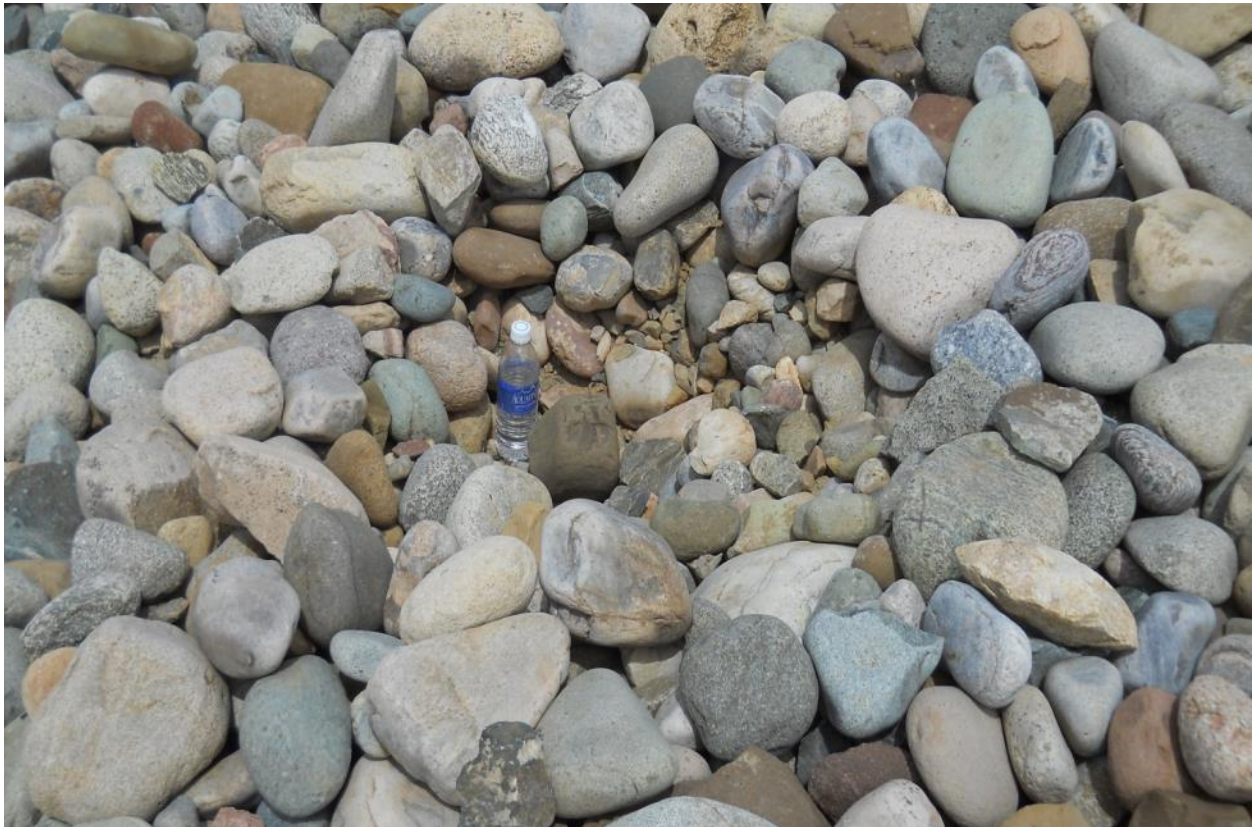
*DUD 6/2014. PL-3. Site marker SMK-1 in need of repair.*



*DUD 6/2014. PL-4. Witness corner for boundary monument BM-6.*



*DUD 6/2014. PL-5. Inspection team at toe of disposal cell.*



*DUD 6/2014. PL-6. Large rocks moved, possibly by an animal, on cell slope.*



*DUD 6/2014. PL-7. Northeast outflow channel.*

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