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 May 31, 2011. The disposal cell and all associated surface water diversion and drainage structures were in good condition and functioning as designed. The water level in the disposal cell has dropped, which satisfies criteria for the permanent closure of the transient drainage water collection and treatment system. The retention pond contains precipitation and transient drainage water from the disposal cell; this water is being pumped out and then dispersed, through drip lines, onto the pond side slopes to enhance evaporation. A tear discovered in the pond liner during the inspection was repaired on July 27, 2011. No other maintenance needs or cause for a follow-up or contingency inspection was identified.

Trespassing and vandalism have been difficult to control at the site. Although the U.S. Department of Energy (DOE) has implemented various engineered, institutional, and administrative controls at the site, including increased patrols by county sheriff officers, vandalism continues to be an ongoing concern and maintenance issue. Impacts of the construction of the Animas–La Plata Project nearby and increased recreational use in the area will continue to be monitored.

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 Bodo Canyon Disposal Site, Durango, Colorado* (DOE/AL/62350–77, Rev. 2, DOE, September 1996; LTSP) and in procedures established by DOE to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 4–1 lists these requirements. A revised LTSP was prepared in May 2010 and has been submitted to the U.S. Nuclear Regulatory Commission (NRC) and the Colorado Department of Public Health and Environment for concurrence.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 4.3.1
Follow-Up or Contingency Inspections	Section 7.0	Section 4.3.2
Routine Maintenance and Repairs	Section 8.0	Section 4.3.3
Groundwater Monitoring	Section 5.0	Section 4.3.4
Corrective Action	Section 5.0	Section 4.3.5

Institutional Controls—Institutional controls at the site, as defined by DOE Policy 454.1, consist of federal ownership of the property, warning/no-trespassing signs (entrance and perimeter signs) along the property boundary, and a locked gate at the entrance to the site. The 121-acre site is owned by the United States of America and was accepted under the 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.

Inspectors found no evidence that these institutional controls were ineffective or violated.

4.3 Compliance Review

4.3.1 Annual Inspection and Report

The site, southwest of Durango, Colorado, was inspected on June 10, 2011. The results of the inspection are described below. Figure 4–1 shows features and photograph locations (PLs) discussed in this report. Numbers in the left margin of this report refer to items summarized in the "Executive Summary" table.

4.3.1.1 Specific Site-Surveillance Features

Access Road, Entrance Gates, Entrance Sign, and Perimeter Signs—Access to the site is by La Plata County Road 212, which is a dedicated public right-of-way that crosses the southwest corner of the DOE property. The entrance gate and guardrails along the county road, and the original entrance gate closer to the cell, were in good condition.

Numerous perimeter signs have bullet holes but remain legible. Perimeter sign P2 has been stolen many times, but because adjacent signs are within sight, it is no longer being replaced. The bases of perimeter signs P41 and P44 are being undercut by erosion but currently remain stable.

Many of the perimeter signs are difficult to find amid the pine trees, thick oak brush, and steep drainages. To make identification easier, inspectors recorded the signs' locations with a global-positioning-system unit during the 2010 inspection and placed permanent, adhesive numbers on them during the 2011 inspection.

Site Markers and Monuments—All site markers, survey monuments, and boundary monuments were in excellent condition except for site marker SMK–1 and boundary monuments BM–3, BM–4, and BM–6. Site marker SMK–1, near the entrance gate, is superficially pocked from gunfire but remains legible. Boundary monument BM–3 and two of its reference monuments are in a small gully and are threatened by erosion; however, the monuments are currently stable. Several years ago, one of the reference monuments for boundary monument BM–4 was bent to the ground, and the cap was removed, but BM–4 itself is intact. Before the 2004 inspection, boundary monument BM–6 was destroyed when a pipeline was constructed near the site. A decision was made not to replace it because both of its witness corners remained in good condition.

Monitoring Wells and Other Wells—Monitoring wells were locked and in good condition. The cap on one of the disposal cell's transient drainage collection system vent wells, PVC–1, is cracked but remains functional.

4.3.1.2 Transects

To ensure a thorough and efficient inspection, inspectors divided the site into six areas called "transects": (1) the top of the disposal cell, (2) the side slopes of the disposal cell, (3) the drainage ditches, (4) the treatment cells and holding pond, (5) the site boundary, and (6) the outlying area.

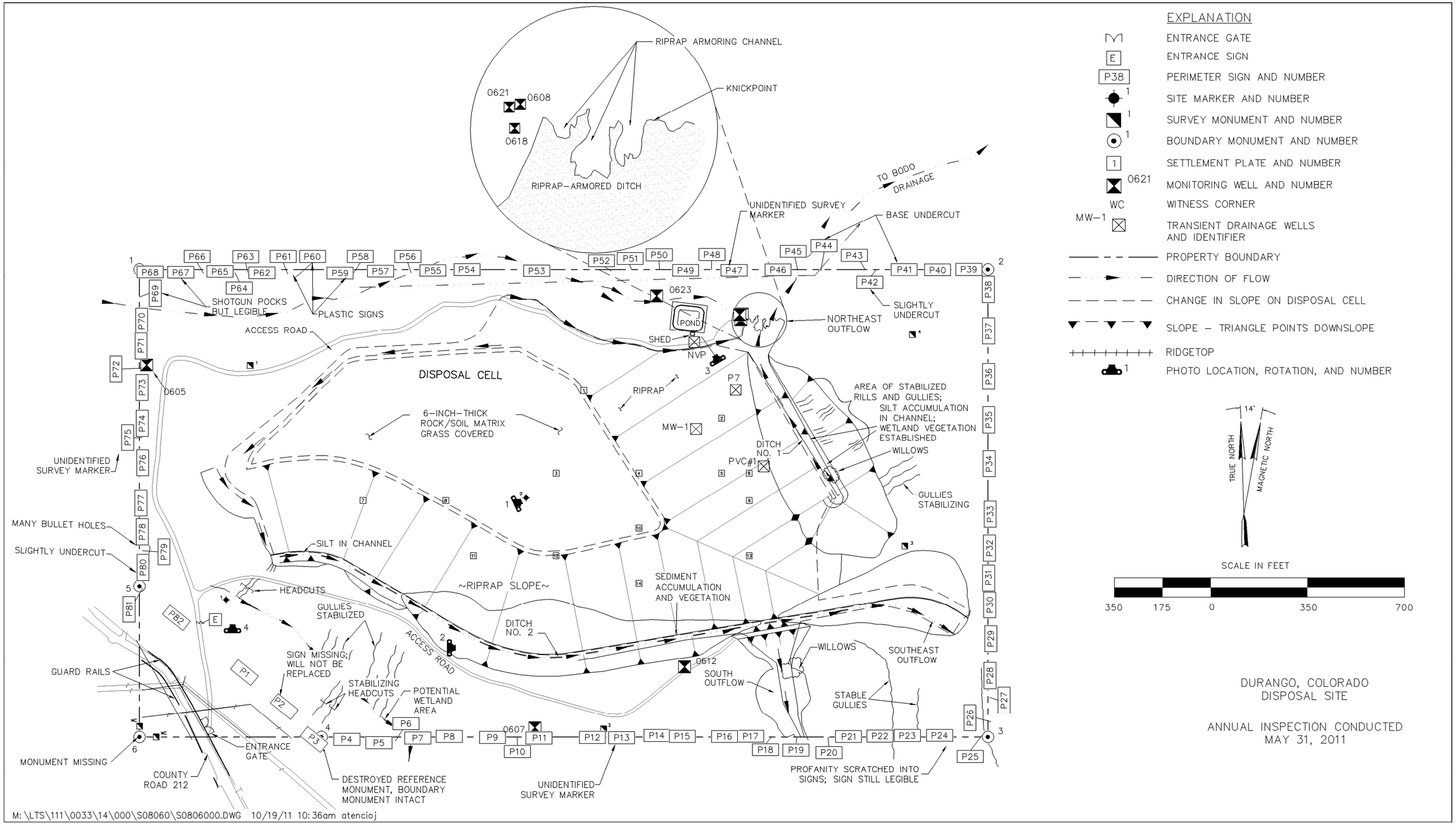

Figure 4–1. 2011 Annual Compliance Drawing for the Durango Disposal Site

This page intentionally left blank

The area inside each transect was inspected by walking a series of traverses. Within each transect, the inspectors examined specific site-surveillance features, drainage structures, and vegetation, along with other features. Inspectors also looked for evidence of settlement, erosion, or other modifying processes.

Top of the Disposal Cell—The top of the disposal cell (PL–1) was in excellent condition. No evidence of settling, slumping, or erosion was observed.

Vegetation on the rock/soil matrix cover remains healthy. Plant cover consists primarily of seeded grass species and several "volunteer" species, including deep-rooted woody shrubs (e.g., dryland alfalfa).

In accordance with the LTSP, deep-rooted woody plants must be removed from the disposal cell when the plant's shoot height equals or exceeds 3.5 feet (1.1 meters) from the base; this height criterion is based on an assumed root-to-shoot ratio of 1 to 1. Although the aboveground height of the dryland alfalfa growing on the cell top will never exceed the 3.5-foot criterion listed in the LTSP for woody species, it is known to be a deep-rooted plant. This species is now being controlled with herbicide on the disposal cell cover. At the time of the 2011 inspection, no alfalfa plants were identified.

Side Slopes of the Disposal Cell—The riprap-covered side slopes of the disposal cell were in good condition. There was no evidence of subsidence, rock deterioration, or slope failure.

Deep-rooted woody shrubs and trees have, in the past, become established on the cell's side slopes. Once they reach 3 feet in height, they are removed or treated with herbicide. At the time of the 2011 inspection, no woody species over 3 feet in height were observed. Past herbicide treatment has eliminated noxious weeds from the side slopes. The side slopes will continue to be monitored for the presence of noxious weeds and woody species.

Drainage Ditches—Rock-armored drainage ditches beneath the toe of the side slope on the northwest, south, and east sides of the disposal cell direct runoff into natural drainages that carry storm water away from the disposal site. Past erosion and sloughing in Ditch No. 1 have allowed wetland vegetation, including willows, to take root in areas where moist sediments have accumulated. In other places, trees as tall as 15 feet grow in the drainage ditches. The sediment deposits and vegetation currently will not compromise the drainage ditches' performance in a large storm. Should colluvial deposits or excessive vegetation dam a drainage ditch so as to impound water, the deposits or vegetation will be removed. Inspectors saw no evidence of recent accumulations of sloughed material in the ditches (PL–2).

The riprap-covered outflow of Ditch No. 1 was designed to erode back to a rock-filled trench and self-armor in the process. No significant erosion has occurred in Ditch No. 1 since it was last surveyed in 1999.

The southeast and south outflows spill into steep, natural channels and 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 2011 inspection.

Retention Pond—The retention pond northeast of the disposal cell collects pore water that drains from the wet tailings encapsulated within the disposal cell (i.e., transient drainage). A solar-powered water management system installed in 2007 distributes water collected in the
4A retention pond through drip lines and onto the lined pond side slopes to enhance evaporation. A tear discovered in the pond liner during the inspection was repaired on July 27, 2011.

A security fence surrounds the retention pond, and a shed contains instrumentation to measure the transient drainage flow from the collection gallery. Both the fence and the shed were secure
4B at the time of the inspection (PL–3). Inspectors noted that the shed door needed repairs, and repairs were made on September 21, 2011.

In June 2006, the criteria for the permanent closure of the toe drain and the water collection and treatment system, as described in the LTSP, were met. The treatment cells were removed in October 2010; the pond and evaporation system remain in use.

Site Boundary—The site is not fenced. Missing and damaged perimeter signs indicate continued trespassing and vandalism. However, before the guardrail and gate along County Road 212 were installed in 2000, the public used the area between the county road and the original entrance gate quite heavily. Since the installation of the guardrail, use of this area has been minimal except for the destruction and theft of perimeter signs.

Historical rill and gully erosion has occurred at various locations on site, but most rills and gullies are stabilizing, and none are currently threatening the performance of the disposal cell or its associated surface water diversion structures. The establishment of vegetation and the exposure of resistant bedrock in the gullies are preventing further erosion in most of the gullies. No new headcutting was observed in 2011 (PL–4). DOE will continue to monitor the site for active erosion.

Numerous areas along the site boundary are infested with State-listed noxious weeds. These areas have been treated with herbicide since 2002 and now contain few weeds. They will continue to be monitored and treated as needed.

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 disturbances that might impact the integrity of the site. The land surrounding the site is primarily used for recreation and wildlife habitat. The U.S. Bureau of Reclamation continues to construct the Animas–La Plata Project, a surface water diversion system. The site is immediately adjacent to the northern Ridges Basin Reservoir area boundary. Recreational use of the outlying area is expected to increase substantially upon completion of the reservoir project. Currently, there is no concern regarding the outlying area.

4.3.2 Follow-Up or Contingency 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 follow-up or contingency inspections were required in 2011.

4.3.3 Routine Maintenance and Repairs

The pond liner was repaired on July 27, 2011.

The shed door was repaired on September 21, 2011.

Noxious weeds were treated in the spring and the fall.

4.3.4 Groundwater Monitoring

4C

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, one upgradient (0623) and one downgradient (0608) of the disposal cell. The third alluvial well, monitoring well 0618 (screened to the bottom of the alluvial aquifer), was installed adjacent to well 0608 (screened to 10 feet above the base of the alluvial aquifer) and added to the monitoring network in 2002, as a best management practice, because it intercepts the full saturated zone of the alluvial aquifer.

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)
0623	Background	Upgradient (alluvial aquifer)
0608	Best Management Practice	Downgradient (alluvial aquifer)
0618	Best Management Practice	Downgradient (alluvial aquifer)

Groundwater samples are collected annually and analyzed for three indicator parameters: molybdenum, selenium, and uranium. To monitor the increased uranium observed in well 0618, wells 0608, 0618, and 0621 have been increased to monthly sampling as weather permits. 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 5−4 of the LTSP. These site-specific standards are provided below in Table 4−3. Time-concentration plots for uranium, selenium, and molybdenum monitoring results are included as Figures 4–2, 4–3, and 4–4, respectively.

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

mg/L = milligrams per liter
Note: Site-specific groundwater standards represent the maximum observed background concentrations reported in samples collected from wells completed in the bedrock aquifer (LTSP, Table 5–4).

Uranium concentrations in monitoring well 0618 had decreased since 2009 and were below the standard until an increase observed during the June 2011 sampling event. Concentrations in well 0608 have decreased slightly. Selenium concentrations decreased slightly in both of these wells, and molybdenum remained steady. Analytical results from all other locations are on trend with previous results.

In 2009, the most significant groundwater monitoring result reported was the uranium concentration in well 0618. The uranium concentration of 0.11 milligram per liter (mg/L) reported in this well in November 2009 is consistent with the increasing trend that began in 2005, and exceeded the site-specific standard of 0.077 mg/L. In fall 2009, well 0618 was redeveloped, and the purging method and pump materials were evaluated. The uranium levels had decreased below the standard in 2010. The 2011 results show an increase in uranium back above the standard as well as above levels observed in 2009 (0.12 mg/L). All other concentrations of uranium, along with all concentrations of both selenium and molybdenum, remain on trend and well below their respective standards.

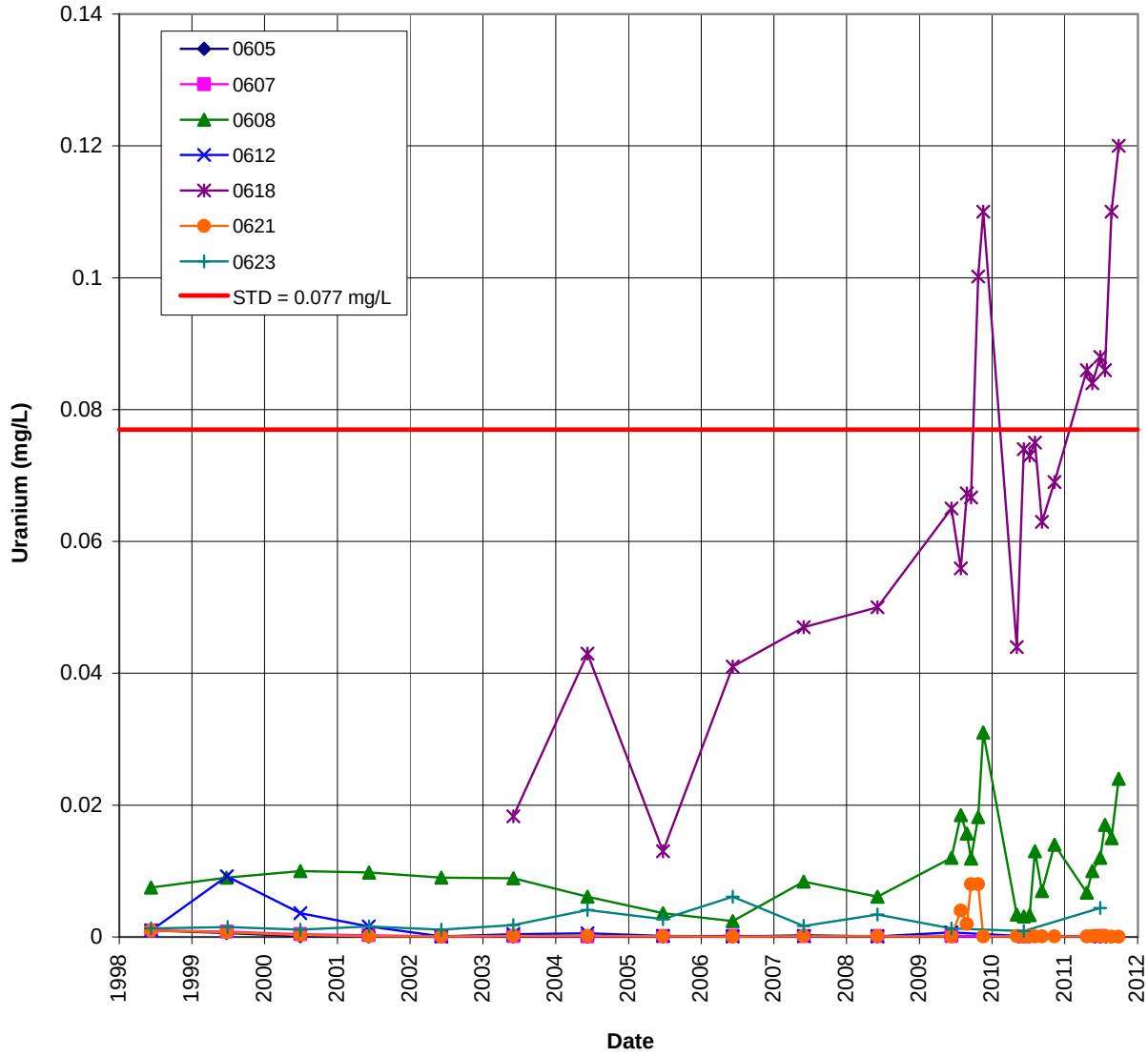

Figure 4–2. Time-Concentration Plot of Uranium in Groundwater at the Durango Disposal Site

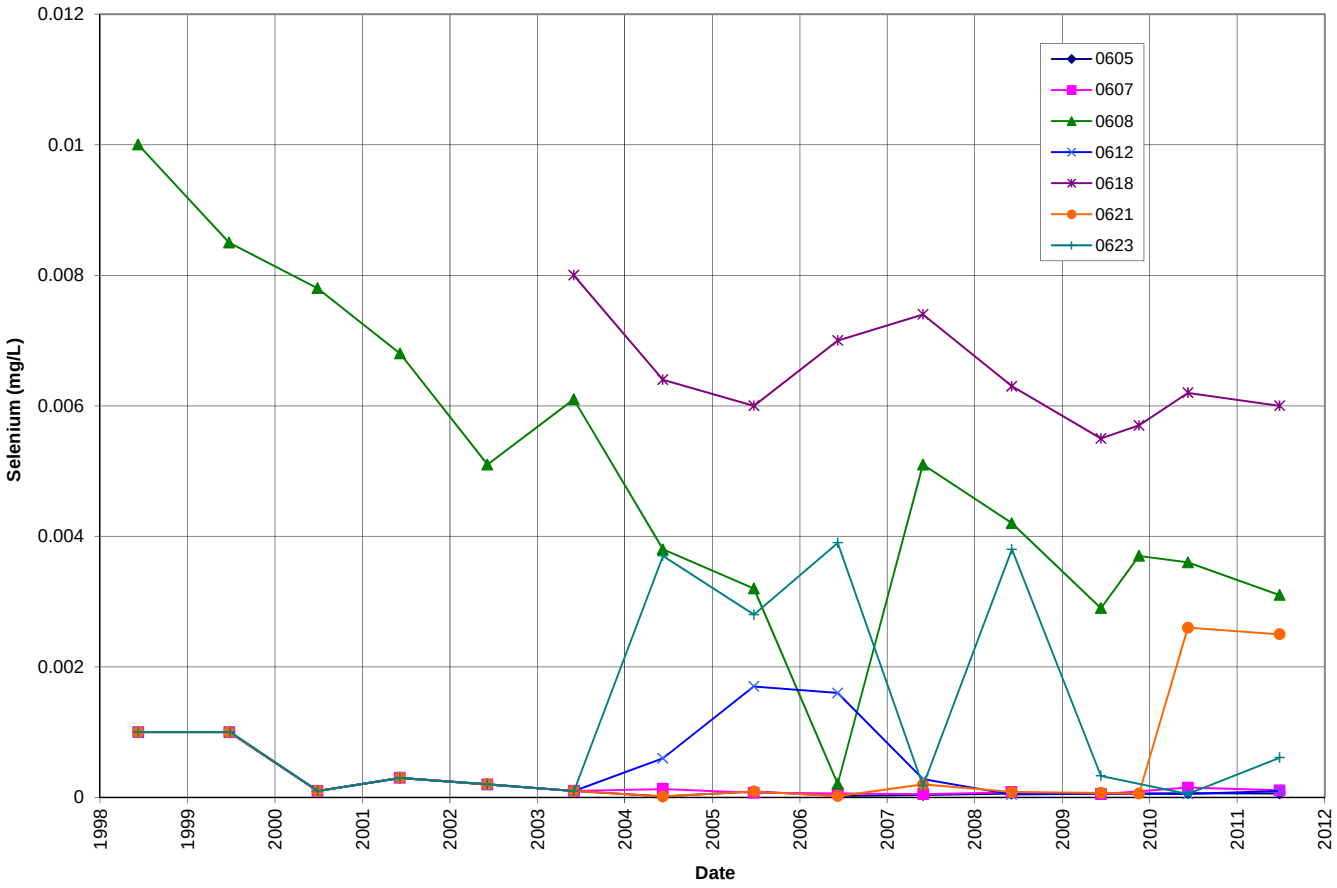

Figure 4–3. Time-Concentration Plot of Selenium in Groundwater at the Durango Disposal Site

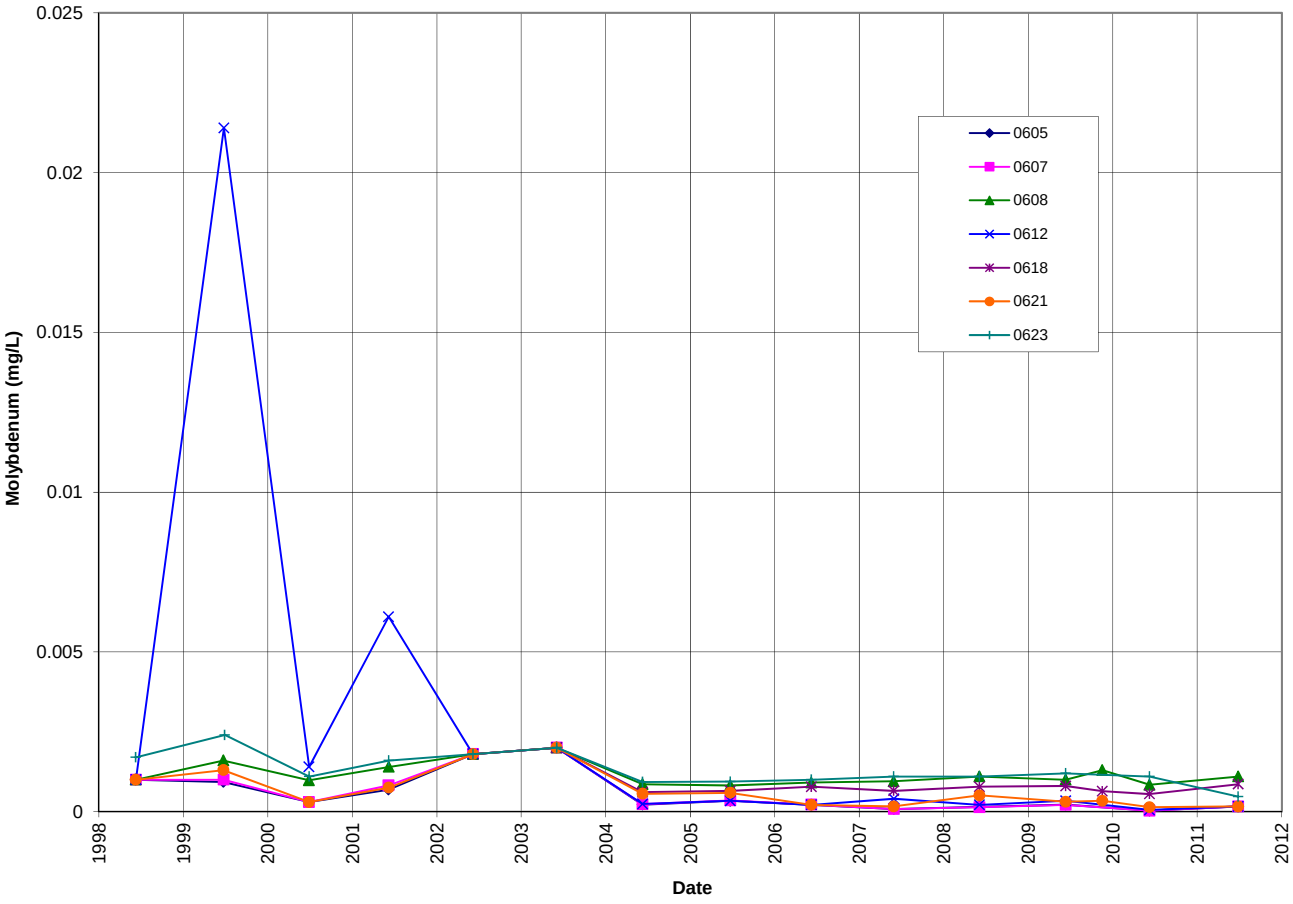

Figure 4–4. Time-Concentration Plot of Molybdenum in Groundwater at the Durango Disposal Site

4.3.5 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 corrective action was required in 2011.

4.3.6 Photographs

Table 4–4. Photographs Taken at the Durango Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	65	Site marker SMK–2 and cell top.
PL–2	90	Ditch No. 2.
PL–3	330	New fence around east side of retention pond area.
PL–4	360	Headcuts of gullies below southwest corner of disposal cell; no change from 2009.

DUR 5/2011. PL–1. Site marker SMK–2 and cell top.

DUR 5/2011. PL–2. Ditch No. 2.

DUR 5/2011. PL–3. New fence around east side of retention pond area.

DUR 5/2011. PL–4. Headcuts of gullies below southwest corner of disposal cell; no change from 2009.