4.0 Durango, Colorado, Disposal Site

4.1 Compliance Summary

The Durango, Colorado, Disposal Site, inspected on June 7, 2005, was in good condition. The holding pond northeast of the disposal cell retains transient drainage water from the cell that has been collected and treated with zero-valent iron. Because the water level in the disposal cell has dropped, water currently is not being treated. Breaks in the holding pond drainpipes are not scheduled for repair because no discharges are occurring or are expected to occur from the holding pond in the future, and it is anticipated that the system will be decommissioned in 2007. Vegetation on top of the disposal cell remains healthy. Scattered bushes and trees on the side slopes of the disposal cell continue to encroach and woody plants greater than 3.5 feet in height are removed annually. Infestations of noxious weeds continue to be monitored and controlled with herbicide. Vandalism, such as theft or damage to signs or trash dumping continues at the site. No other maintenance or requirement for a follow-up inspection was identified.

4.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Durango, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Bodo Canyon Disposal Site, Durango, Colorado* (DOE/AL/62350–77, Rev. 2, U.S. Department of Energy [DOE], Albuquerque Operations Office, September 1996) and in procedures established by DOE to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 4–1.

Table 4–1. License Requirements for the Durango, Colorado, 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
Ground Water Monitoring	Section 5.0	Section 4.3.4
Corrective Action	Section 5.0	Section 4.3.5

Institutional Controls—The 121-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission 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 disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, warning/no trespassing signs placed along the property boundary and a locked gate at the entrance to the site. The site is not fenced except along the county road. The site is surrounded by federal property administered by the U.S. Bureau of Land Management and U.S. Bureau of Reclamation. The surrounding land is used primarily for wildlife habitat.

4.3 Compliance Review

4.3.1 Annual Inspection and Report

The site, located southwest of Durango, Colorado, was inspected on June 7, 2005. Results of the inspection are described below. Features and photograph locations (PLs) discussed in this report are shown on Figure 4–1. 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 DOE property. The entrance gate and guardrails along the county road, installed in October 2000, and the original entrance gate closer to the cell were in good condition.

The entrance sign and all perimeter signs except P2 were present and legible. At the time of the annual inspection, the entrance sign was found with additional bullet holes (PL–1). Perimeter
4A sign P2 near the site entrance was replaced. Many of the perimeter signs, particularly those within view of the county road, have bullet holes; perimeter signs P1 and P3 have new shotgun damage.

Trespass and vandalism have been difficult to control at the site. Although DOE has implemented various engineered, institutional, and administrative controls at this site, including increased patrols by County Sheriff officers, vandalism continues to be an ongoing concern and maintenance issue. Impacts resulting from the construction of the nearby Animas-La Plata Project and increased recreational use in the area will be monitored.

Site Markers, Survey and Boundary Monuments—Site markers and survey monuments were in good to excellent condition. The site marker near the entrance gate (SMK–1) was slightly damaged by bullets years ago; however, it is legible and in generally good condition. Boundary monument BM–3 and two of its reference monuments are situated in a small gully and threatened by erosion; however, the monuments are currently stable. One of the reference monuments for BM–4 is bent to the ground and the cap removed, but BM–4 is intact. No repair to any of these features is currently warranted. Boundary monument BM–6, located at the southwest corner of the site, was missing and presumably was destroyed during pipeline construction associated with the reservoir project. The monument will not be replaced because two witness monuments at that property corner are intact. The remaining boundary monuments were intact and generally in good condition.

Monitor Wells—Monitor wells were locked and in excellent condition.

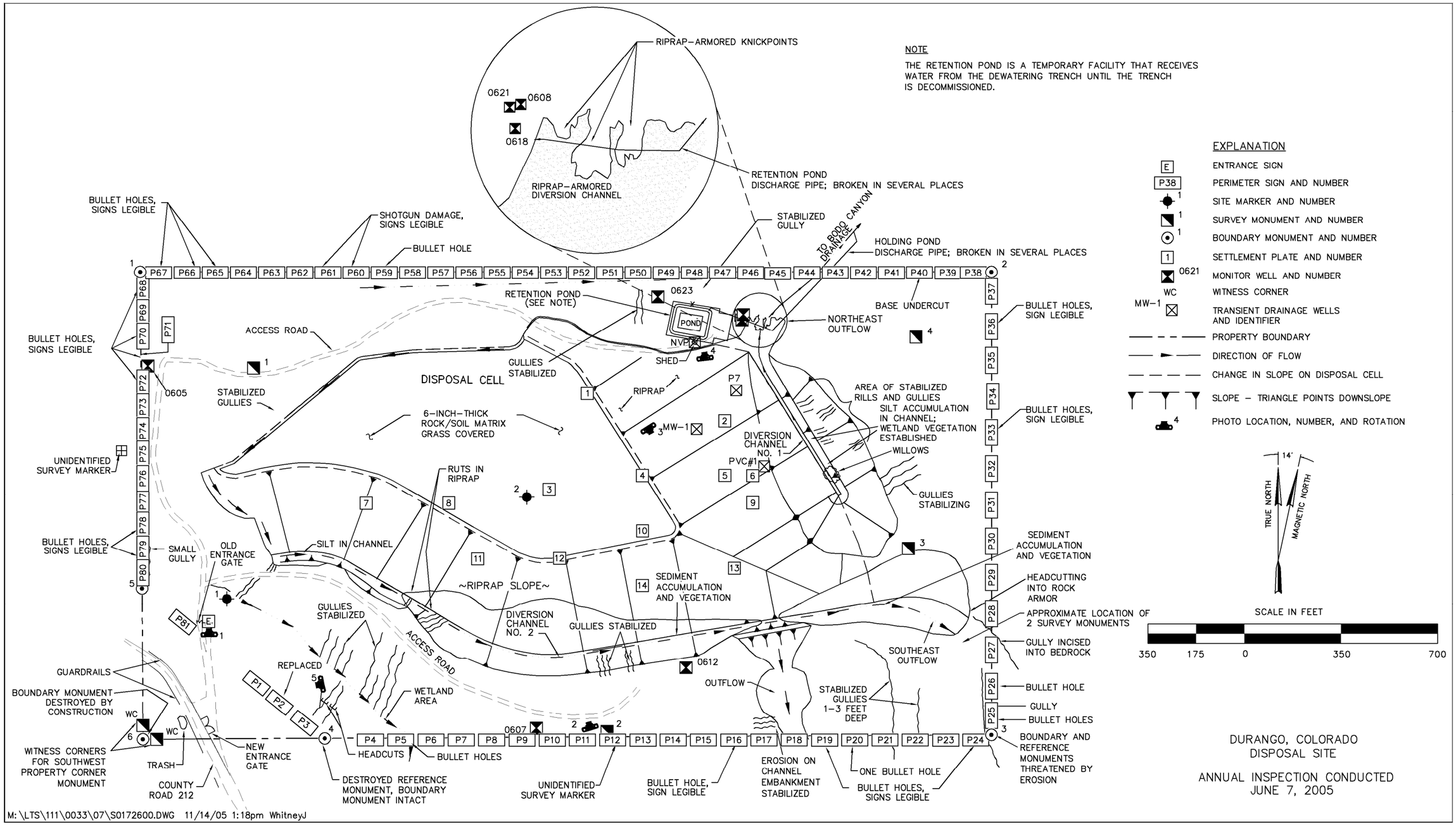

Figure 4–1. 2005 Annual Compliance Drawing for the Durango, Colorado, Disposal Site

This page intentionally left blank

4.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into six areas referred to as 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.

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, vegetation, and other features. Inspectors also looked for evidence of settlement, erosion, or other modifying processes.

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

Vegetation on top of the cell improved from last year, probably in response to a wet season, and is in excellent condition. The vegetation consists of seeded grasses and several volunteer species including deep-rooted woody shrubs. No woody species of trees and shrubs greater than 3 feet tall were found on the cell top during the 2005 inspection; the LTSP requires removal of these plants from the disposal cell (top and side slopes) when they exceed 3.5 feet in height. Noxious weeds were found on the cell top, although reduced population densities were noted as a result of past herbicide applications. Herbicide was again applied during the spring and fall of 2005.

Side Slopes of Disposal Cell—The riprap-covered side slopes of the disposal cell were in excellent condition (PL–2). Disturbances resulting from natural processes, such as subsidence, rock deterioration, or slope failure, were not observed. Minor ruts in the south side slope riprap cover were observed and most likely were caused by the herbicide applicator vehicle. Although not a problem at this time, this damage will be monitored as herbicide applications continue.

Vegetation continues to encroach on the side slopes of the cell, particularly on the east and southeast sides. The species included deep-rooted shrubs and trees and several noxious weeds
4B that require control by the state or La Plata County. The woody trees and shrubs greater than 3 feet tall were cut and herbicide was applied to their stalks (PL–3). Herbicide was applied to the noxious weeds during the spring and fall of 2005.

Drainage Diversion Channels—Rock-armored drainage diversion channels were constructed beneath the toe of the side slope along the northwest, south, and east sides of the disposal cell. These diversion channels direct runoff into natural drainages that carry storm water away from the disposal site. Erosion and sedimentation has occurred at several places along these channels where the slopes above the channels are steep. There was no evidence of recent slope erosion or accumulations of sloughed material into the diversion channels in 2005.

Moist sediments support wetlands vegetation and willows at places in Diversion Channel No. 1 along on the east side of the cell. The sediment deposits and plant growth will not compromise the performance of the drainage channels in the event of a large storm. Should water be impounded in the channels, it would drain away from the disposal cell along bedding planes and permeable zones in the bedrock. However, if there is evidence of impounded water, maintenance will be conducted to remove the obstruction and restore flow out of the diversion channels.

The riprap-covered outflow of Diversion Channel No. 1 was designed to erode back to a rock-filled trench and self-armor in the process. Significant movement of the knickpoint has not occurred since it was surveyed in 1999.

Infestations of noxious weeds in the diversion channels and surrounding areas continue to be monitored and controlled. The weeds were treated with herbicide in the spring and fall of 2005.

Treatment Cells and Retention Pond—Contaminated seeps developed along the downgradient slope of the disposal cell shortly after construction. Beginning in 1989, the seep water was intercepted by a collection drain and piped by gravity flow to a retention pond, where it was regularly treated with the application of lime and then discharged to a nearby wash. A permeable reactive barrier facility was constructed adjacent to the retention pond in 1995 and has been operating since 1996. The treatment cells of the barrier contain zero-valent iron to remove metals from transient drainage water after it exits the collection drain and before it enters the pond. The system is shut down and winterized each fall due to difficult access and to avoid freeze damage to the system's valves.

At the time of the inspection, the retention pond, permeable reactive barrier facility, and surrounding security fence were in good condition. The water level in the pond was approximately three feet below the top and a patch of rushes continues to grow in the southwest corner of the pond (PL–4). The retention pond discharge pipe is broken at several locations but does not require repair because no discharges are occurring or are expected to occur from the retention pond.

4C The LTSP states that the collection drain may be closed after pore water draining from the disposal cell reaches a phreatic surface equilibrium elevation of no greater than 7,055 feet above mean sea level (MSL). A 6-month waiting period after the initial closing of the drain is needed to confirm that the steady-state phreatic surface of the pore water within the cell is below the elevation of 7055 feet. If the phreatic surface rises above this level within the 6-month waiting period or has not achieved a steady-state condition at or below this level, the drain will be reopened and the drainage/treatment cycle will continue until the closure criteria are met (maximum steady-state conditions of no greater than 7,055 feet above MSL). The last time the system was reopened in April 2004, the phreatic surface elevation of the pore water within the cell had remained steady at 7,049 feet during the previous 6 months. The collection drain was closed in June 2004 to start a 2-year observation period and has remained closed to date, with the pore water elevation having increased back to 7,049 feet as of August 2005.

Criteria for permanent closure of the collection drain as presented in Attachment 3 of the LTSP, requires that once a cell pore water phreatic surface equilibrium elevation of no greater than 7,055 feet above MSL is achieved, the collection drain is to be closed and following a 6-month waiting period the phreatic surface be checked again (using dataloggers with measurements collected at 6 hour intervals). As long as extrapolation of data continues to show the water level stays below the critical level (7,055 feet above MSL), the toe drain should be left closed and checked at 6-month intervals for a minimum 2-year period. If the pore water elevation rises above 7,055 feet during any 6-month period, the drain will be reopened. If the steady state pore water elevation remains below 7,055 feet for the 2-year period, DOE will prepare plans for

decommissioning the collection drain system, the permeable reactive barrier facility, and the retention pond.

The 2-year observation period currently under way will be complete in June 2006, provided the pore water elevation does not exceed the critical level of 7,055 feet above MSL and trigger the reopening of the drain and the start of a new 2-year observation period.

Site Boundary—The site is not fenced. Missing and damaged perimeter signs indicate continued trespassing and vandalism. However, the guardrail and entrance gate off of the county road have effectively prevented vehicular trespass and the associated damage that had occurred prior to their installation. Trash, including an old couch, was found dumped on the west side of County Road 212 during the inspection; however, this material was cleaned up following the inspection.

Areas of rill and gully erosion on the south-facing slope along the southern boundary of the site were stable (PL–5). Establishment of vegetation in these areas and exposure of resistant bedrock in the gully are effectively preventing further erosion. The two piles of rock placed at the headcut of the western-most gully, which was approximately 2.5 feet deep at the time of the 2004 visit, was checked during the 2005 inspection and no new headcutting was noted. This erosion and sedimentation will not impact the disposal cell or its drainage channels. No other areas of recent erosion were observed on or around the site.

Significant infestations of noxious weeds are present in the areas between the cell and the property boundary. These areas were sprayed with applications of herbicide during the spring and fall of 2005.

4D

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 during the inspection. Previously, land uses were wildlife habitat and recreation. However, the U.S. Bureau of Reclamation currently is constructing the Animas-La Plata Project. As a result of this project, boundary monument BM–6 was destroyed. A water intake and pumping plant structure is under construction at the Animas River on the site of the former raffinate ponds. The pipeline between the pumping plant and the Ridges Basin Reservoir—currently under construction—is adjacent to County Road 211 and passes just south of the disposal site. Pipelines that were within the footprint of the reservoir were rerouted parallel to County Road 212 on the west side of the disposal site. The U.S. Bureau of Reclamation erected a sign adjacent to the disposal site entrance that contains a map of the project and a Notice of Closure for the Ridges Basin area. The DOE disposal site is immediately adjacent to the northern Ridges Basin area boundary. Recreational use of the area is expected to increase substantially upon completion of the reservoir project.

4.3.2 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2005.

4.3.3 Routine Maintenance and Repairs

In 2005, perimeter sign P2 was replaced, woody species on the cell side slopes were cut and treated with herbicide, and noxious weeds were treated with herbicide during spring and fall applications.

4.3.4 Ground Water Monitoring

Ground water is monitored at the Durango site to verify the initial performance of the disposal
4E cell. The monitoring network consists of seven wells (Table 4–2). Four wells are completed in the uppermost aquifer (bedrock of the Cliff House Sandstone and the Menefee Formation), including one upgradient well (MW–0605) and three downgradient point of compliance wells (MW–0607, MW–0612, and MW–0621). Two wells are completed in the alluvium upgradient (MW–0623) and downgradient (MW–0608) from the disposal cell. Monitor well MW–0618 (screened to the bottom of the alluvial aquifer) near companion well MW–0608 (screened to 10 feet above the base of the alluvial aquifer) was added to the monitoring network in 2002, as a best management practice, because it intercepts the full section of the alluvial aquifer.

Table 4–2. Ground Water Monitoring Network at the Durango, Colorado, Disposal Site

Monitor Well	Hydrologic Relationship
MW−0605	Upgradient (uppermost aquifer)
MW−0607	Downgradient (uppermost aquifer)
MW−0612	Downgradient (uppermost aquifer)
MW−0621	Downgradient (uppermost aquifer)
MW−0623	Upgradient (alluvial aquifer)
MW−0608	Downgradient (alluvial aquifer)
MW−0618	Downgradient (alluvial aquifer)

Ground water samples are collected annually and analyzed for three indicator parameters: molybdenum, selenium, and uranium. The standards for the three indicator parameters are the respective maximum concentration limits (MCL) established by the U.S. Environmental Protection Agency in Table 1 to Subpart A of 40 CFR 192 (Table 4–3).

Table 4–3. Maximum Concentration Limits for Ground Water at the Durango, Colorado, Disposal Site

Constituent	MCL (mg/L)
Molybdenum	0.1
Selenium	0.01
Uranium	0.044

Key: MCL = maximum concentration limit
Note: EPA MCLs as listed in 40 CFR 192 Table 1, Subpart A.

With the exception of the uranium concentration in MW–0618, the results of monitoring in 2005 were consistent with previous years. Concentrations of all three indicator analytes were below their respective MCLs, and many results were less than detection limits. Concentrations of uranium were all less than 0.015 mg/L, selenium less than 0.005 mg/L, and molybdenum less than 0.001 mg/L. Trends for all three indicator analytes appear to be decreasing since 1998.

Time-concentration plots for uranium, selenium, and molybdenum are included as Figures 4–2, 4–3, and 4–4, respectively.

As shown on Figure 4–2, the uranium concentration of 0.043 mg/L in monitor well MW–0618 had increased substantially in 2004, the second annual sampling event for that well, from the initial 0.018 mg/L concentration reported in 2003. In 2005, however, the concentration of 0.013 mg/L was consistent with the 2003 result. The 2004 concentration of 0.043 mg/L, although still below the MCL, is considered anomalous. DOE suspects the cause of this anomaly can be correlated with closure of the collection drain system.

The 2005 monitoring results show that ground water compliance goals continue to be met at the site.

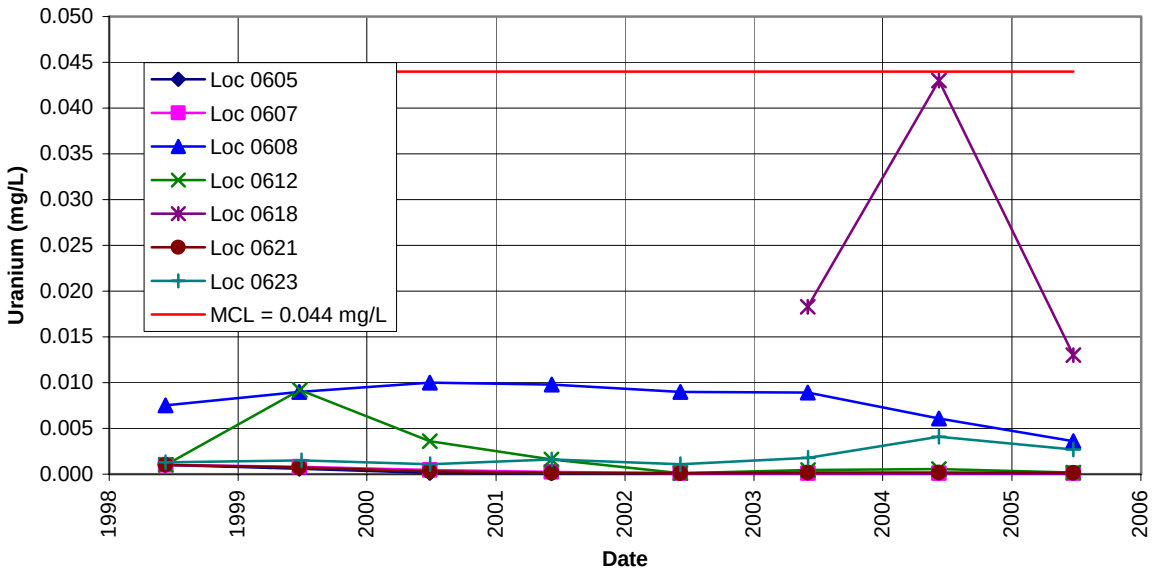

Figure 4–2. Time-Concentration Plots of Uranium in Ground Water at the Durango, Colorado, Disposal Site

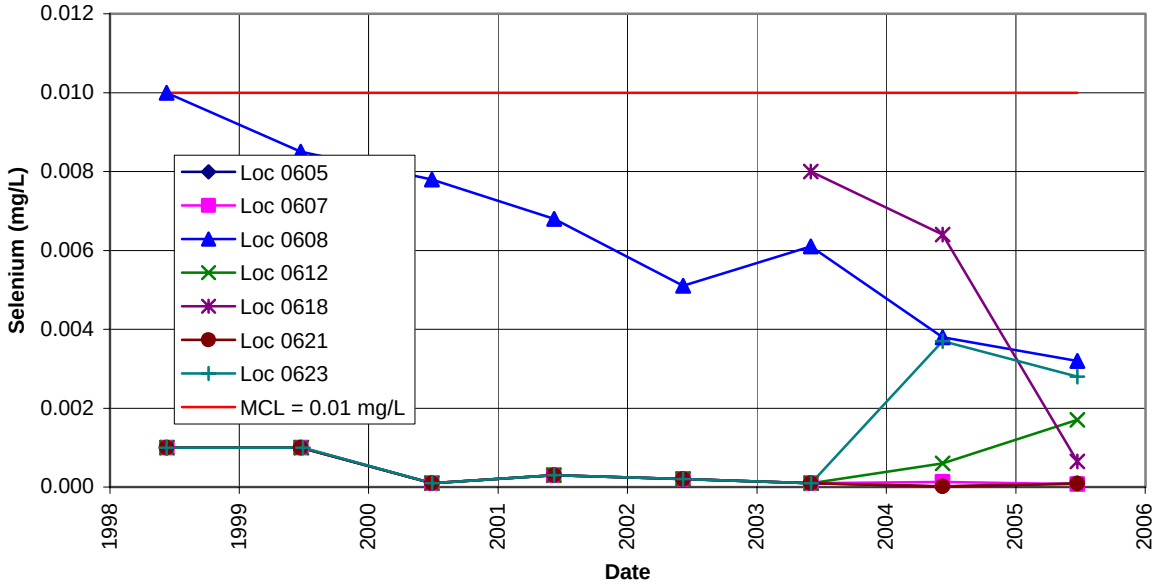

Figure 4–3. Time-Concentration Plots of Selenium in Ground Water at the Durango, Colorado, Disposal Site

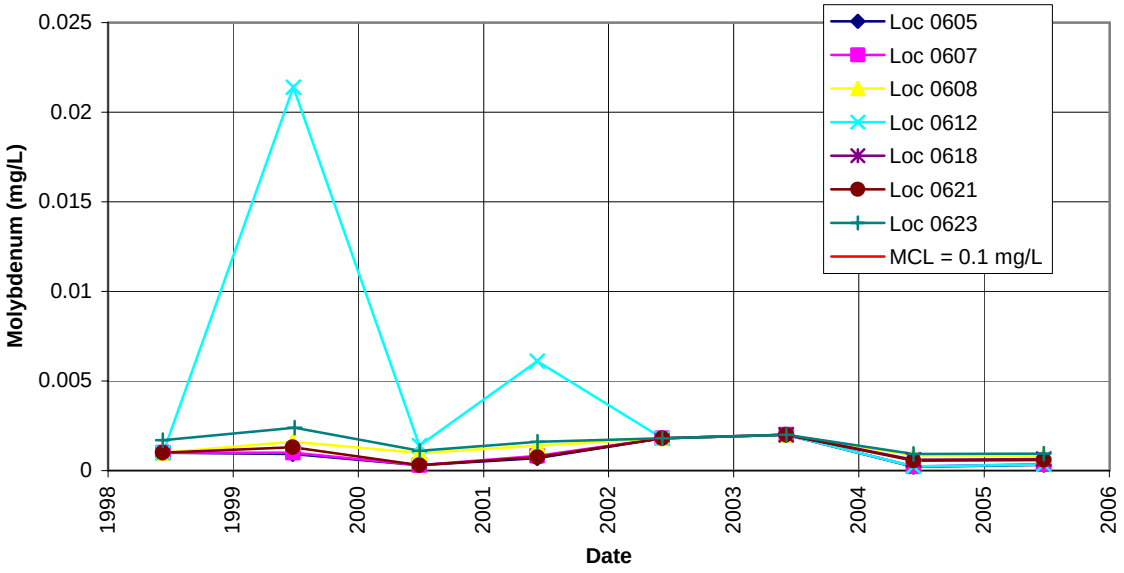

Figure 4–4. Time-Concentration Plots of Molybdenum in Ground Water at the Durango, Colorado, Disposal Site

4.3.5 Corrective Action

Corrective action is action 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 2005.

4.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	360	Entrance sign damaged by gunshots but still legible.
PL–2	345	Riprap-covered side slope.
PL–3	150	Inspectors cutting deep-rooted species on western rip rap covered side slope.
PL–4	355	Rushes growing in the disposal cell's transient drainage retention pond.
PL–5	260	Head cutting stabilized along southwest side of site.

DUR 6/2005. PL–1. Entrance sign damaged by gunshots but still legible

DUR 6/2005. PL–2. Riprap-covered side slope.

DUR 6/2005. PL–3. Inspectors cutting deep-rooted species on western rip rap covered side slope.

DUR 6/2005. PL–4. Rushes growing in the disposal cell's transient drainage retention pond.

DUR 6/2005. PL–5. Head cutting stabilized along southwest side of site.