

4.0 Durango, Colorado, Disposal Site

4.1 Compliance Summary

The Durango, Colorado, Disposal Site, inspected on June 7, 2006, was in good condition. The retention pond northeast of the disposal cell was designed to retain transient drainage water from the cell that has been collected and treated with zero-valent iron. Because the pore water level in the disposal cell has dropped and remained below the required elevation, water has not been treated since 2004. In June 2006, the criteria for permanent closure of the collection and treatment system, as presented in the LTSP, were met. Decommissioning of the collection drain, the permeable reactive barrier, and the retention pond are currently being prepared and anticipated to be complete in 2008. Monitoring results show that ground water compliance goals continue to be met at the site. 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, primarily theft and damage to signs, continues at the site. The entrance sign was no longer legible and was replaced. 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 (referred to as perimeter 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. Verification of these institutional controls is part of the annual inspection.

4.3 Compliance Review

4.3.1 Annual Inspection and Report

The site, located southwest of Durango, Colorado, was inspected on June 7, 2006. 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 2000, and the original entrance gate closer to the cell were in good condition.

4A At the time of the annual inspection, the entrance sign was found with additional bullet holes and illegible; it was replaced in the fall 2006. Perimeter sign P2 near the site entrance again was found missing; it was last replaced in the summer of 2005. This sign will not be replaced, as the site remains well delineated by the 80 other perimeter signs. All other perimeter signs were present and legible, although many of the perimeter signs, particularly those within view of the county road, have bullet holes.

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 boundary monument 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 and Other Wells—Monitor wells were locked and in good condition. The cap on a drainage system vent well, PVC #1, is cracked but remains functional.

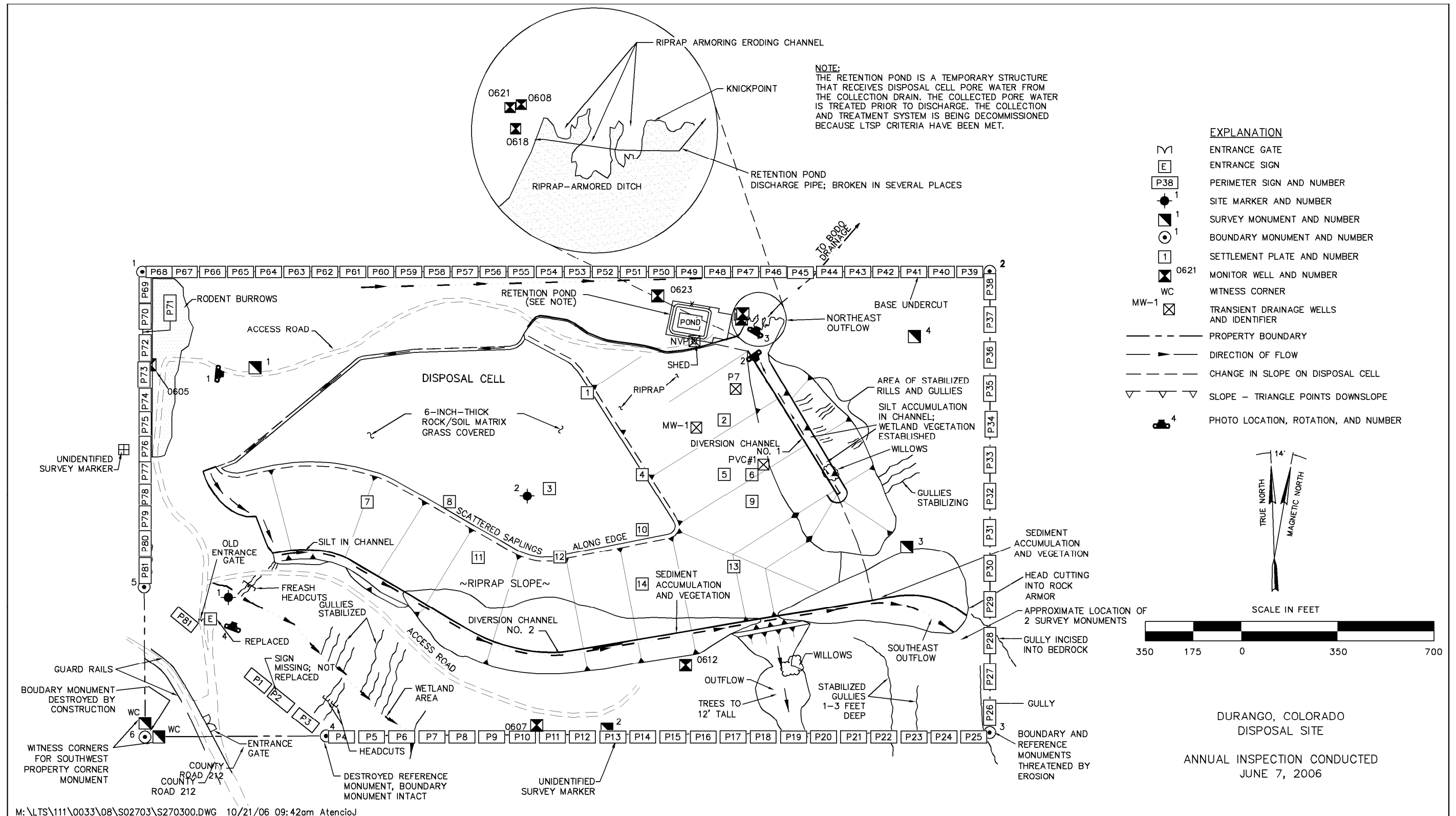


Figure 4-1. 2006 Annual Compliance Drawing for the Durango, Colorado, Disposal Site

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 (PL-1). No evidence of settling, slumping, or erosion was observed.

Vegetation on top of the cell remains healthy, although a dry spring season had left many of the plants somewhat drought-stressed at the time of the inspection. 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 2006 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 2006.

Small rodents have dug burrows in the top of the disposal cell near site marker SMK-2. Burrow holes potentially could compromise the integrity of the cell cover, and therefore, will continue to be monitored; but do not appear to be a problem at this time.

Side Slopes of Disposal Cell—The riprap-covered side slopes of the disposal cell were in good condition. Disturbances resulting from natural processes, such as subsidence, rock deterioration, or slope failure, were not observed. In 2005, minor ruts were observed in the south side slope riprap cover; most likely caused by the herbicide applicator vehicle. These ruts were not noted during the 2006 inspection, and have likely stabilized.

4B 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 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. Herbicide was applied to the noxious weeds during the spring and fall of 2006.

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. Side-slope erosion has resulted in sedimentation within the channels at several locations where the slopes above the channels are steep (PL-2). There was no evidence of recent slope erosion or accumulations of sloughed material into the diversion channels in 2006.

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, referred to as the Northeast Outflow, 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 (PL-3).

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 2006.

Treatment Cells and Retention Pond—Contaminated seeps, resulting from transient drainage from the cell, developed along the downgradient slope of the disposal cell shortly after construction. Beginning in 1989, the seep water was intercepted by a collection drain at the toe of the cell 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. In 1995, a permeable reactive barrier was constructed adjacent to the retention pond to treat the contaminated water; it has been operational since 1996. The treatment cells of the barrier contain zero-valent iron to remove metals from the contaminated water after it exits the collection drain and before it enters the pond.

At the time of the inspection, the retention pond, permeable reactive barrier, and surrounding security fence were in good condition. 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 Criteria for permanent closure of the collection and treatment system as presented in Attachment 3 of the LTSP, required that once a cell pore water phreatic surface equilibrium elevation of no greater than 7,055 feet above mean sea level (MSL) was achieved, the collection drain was 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 continued to show the water level stayed below the critical level (7,055 feet above MSL), the collection drain should be left closed and checked at 6-month intervals for a minimum 2-year period. If the pore water elevation increased above 7,055 feet during any 6-month period, the drain would be reopened and the drainage/treatment cycle continued until the closure criteria was met (maximum steady-state conditions of no greater than 7,055 feet above MSL for a minimum 2-year period). If the steady state pore water elevation remained below 7,055 feet for the 2-year period, DOE would then prepare plans for decommissioning the collection drain, the permeable reactive barrier, and the retention pond.

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. All subsequent 6-month waiting periods reported the phreatic surface equilibrium elevation to be within the criteria (e.g.; no greater than 7,055 feet above MSL). Pore water phreatic surface elevation was last reported at 7,049 feet in August 2006. The required 2-year observation period was completed in June 2006 and the LTSP criteria for closure was met. DOE has completed a draft plan for

decommissioning the collection drain, the permeable reactive barrier, and the retention pond. Completion of the treatment system decommissioning is dependent on regulatory and stakeholder approval, and is anticipated for the 2008/2009 timeframe.

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, installed in 2000, have effectively prevented vehicular trespass and the associated damage that had occurred prior to their installation.

The majority of rill and gully erosion on the south and north-facing slopes in the southwest portion of the site were stable. Establishment of vegetation in these areas, previous placement of rock, and exposure of resistant bedrock in the gullies are effectively preventing further erosion. However, fresh headcuts were noted in two gullies in the southwest portion of the site (PL-4). This erosion will not impact the disposal cell or its drainage channels and will continue to be monitored. No other areas of recent erosion were observed on or around the site.

4D 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 2006.

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 outlying area is expected to increase substantially upon completion of the reservoir project.

4.3.2 Follow-up or Contingency 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 follow-up or contingency inspections were required in 2006.

4.3.3 Routine Maintenance and Repairs

In 2006, the entrance sign 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

4E In accordance with the LTSP, ground water is monitored at the Durango site to verify the initial performance of the disposal 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 background well (MW–0605) and three downgradient point of compliance wells (MW–0607, MW–0612, and MW–0621). Three wells are completed in the alluvium: one upgradient (MW–0623) and one downgradient (MW–0608) from the disposal cell. The third alluvial well, monitor well MW–0618 (screened to the bottom of the alluvial aquifer), was installed adjacent to well MW–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. Ground Water Monitoring Network at the Durango, Colorado, Disposal Site

Monitor Well	Well Compliance Type	Hydrologic Relationship
MW–0605	Background	Upgradient (uppermost aquifer)
MW–0607	Point of Compliance	Downgradient (uppermost aquifer)
MW–0612	Point of Compliance	Downgradient (uppermost aquifer)
MW–0621	Point of Compliance	Downgradient (uppermost aquifer)
MW–0623	Background	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 2006 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 0.041 mg/L, selenium less than 0.007 mg/L, and molybdenum less than 0.001 mg/L. 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 highest uranium concentrations occur in monitor well MW–0618; which continue to oscillate, but remain below the MCL. DOE had considered the concentration in 2004 to be anomalous and suspected the cause of the anomaly to be correlated with the closure

of the collection drain system. However, the uranium concentration of 0.041 mg/L reported in 2006 increased as compared with the previous year and is consistent with the 2004 result. Because only four data points are available for this well, trend analysis is inconclusive for this constituent and additional monitoring is needed.

The 2006 monitoring results show that ground water compliance goals continue to be met at the site.

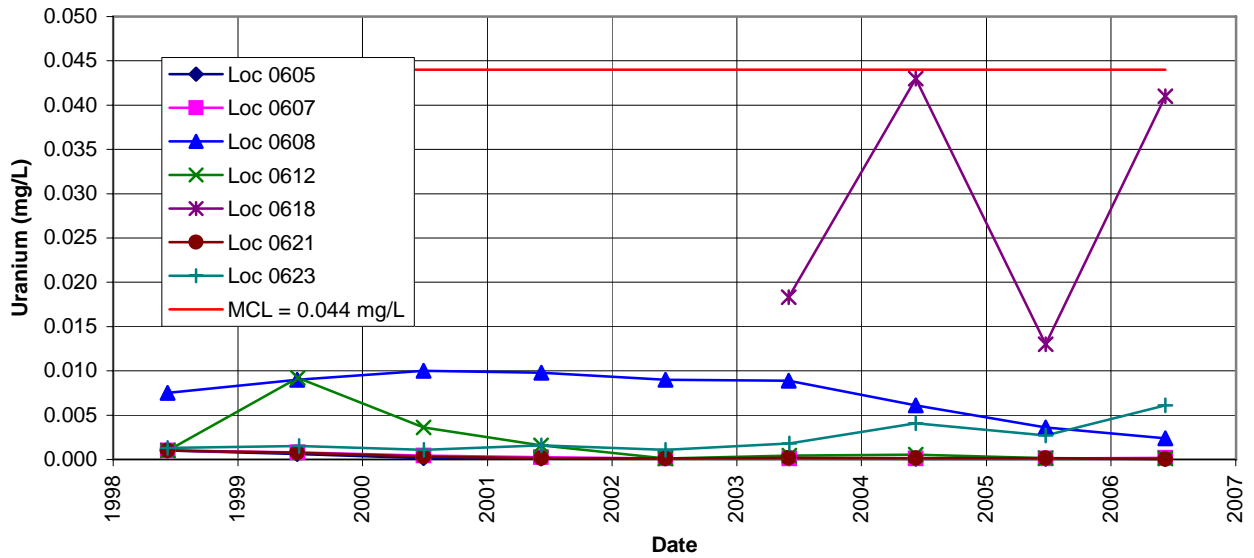


Figure 4-2. Time-Concentration Plots of Uranium in Ground Water at the Durango, Colorado, Disposal Site

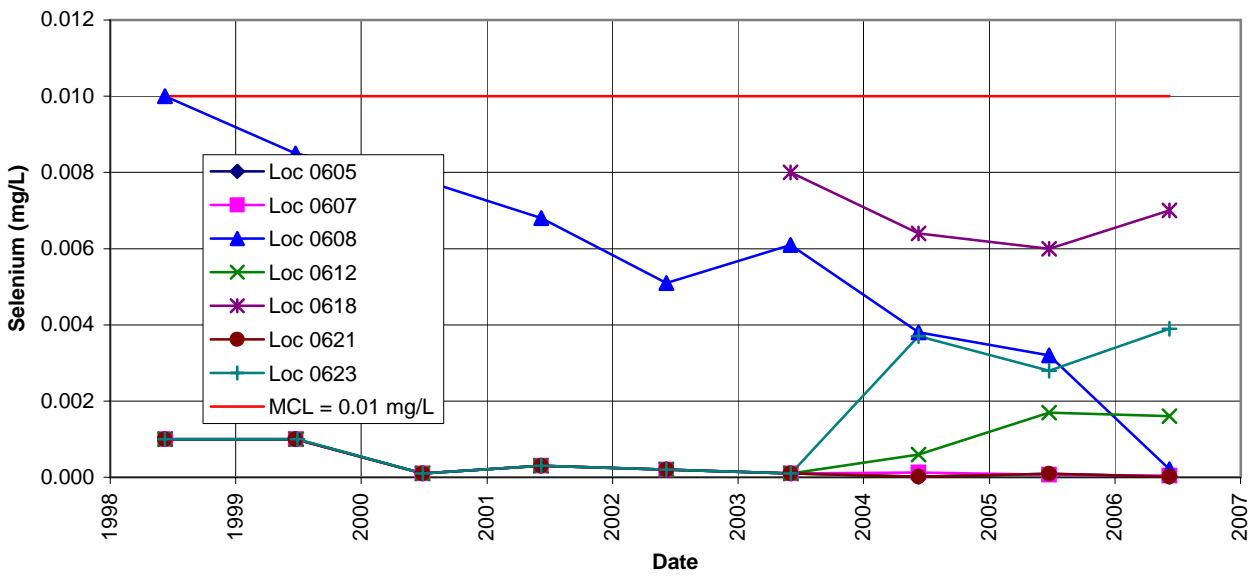


Figure 4-3. Time-Concentration Plots of Selenium in Ground Water at the Durango, Colorado, Disposal Site

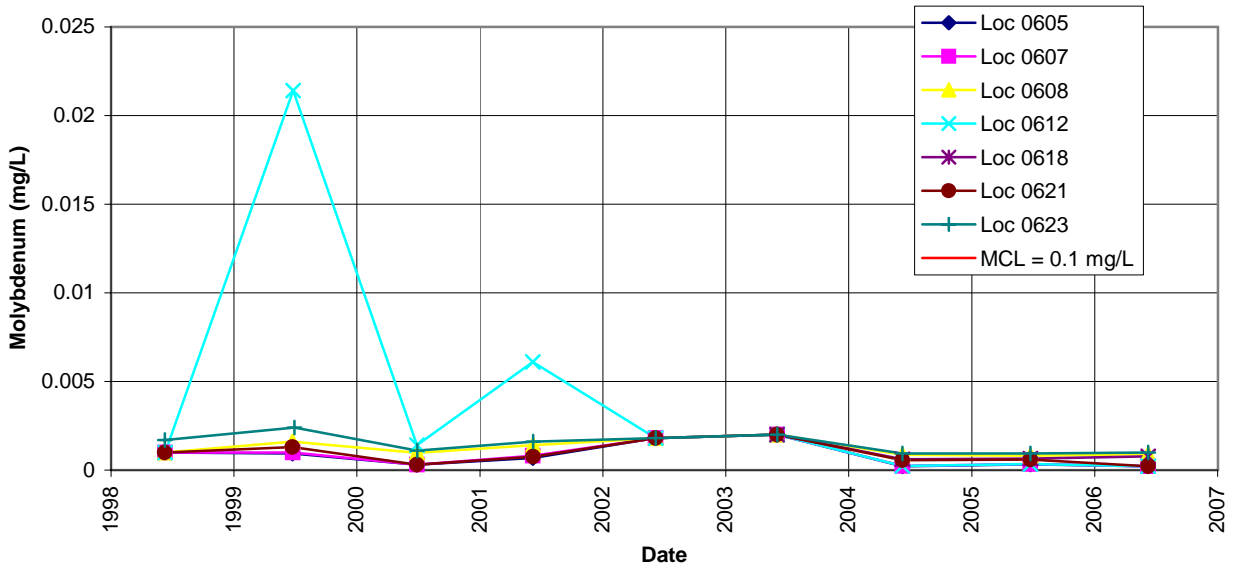


Figure 4-4. Time-Concentration Plots of Molybdenum in Ground Water at the Durango, Colorado, Disposal Site

4.3.5 Corrective Action

Corrective action is 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 2006.

4.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL-1	95	Disposal cell top.
PL-2	150	Sediment deposition in Diversion Channel No. 1.
PL-3	330	Northeast Outflow; no new erosion.
PL-4	20	Fresh headcuts in gullies in the southwest portion of the site.



DUR 6/2006. PL-1. Disposal cell top.



DUR 6/2006. PL-2. Sediment deposition in Diversion Channel No. 1.



DUR 6/2006. PL-3. Northeast Outflow; no new erosion.



DUR 6/2006. PL-4. Fresh headcuts in gullies in the southwest portion of the site.

End of current section.