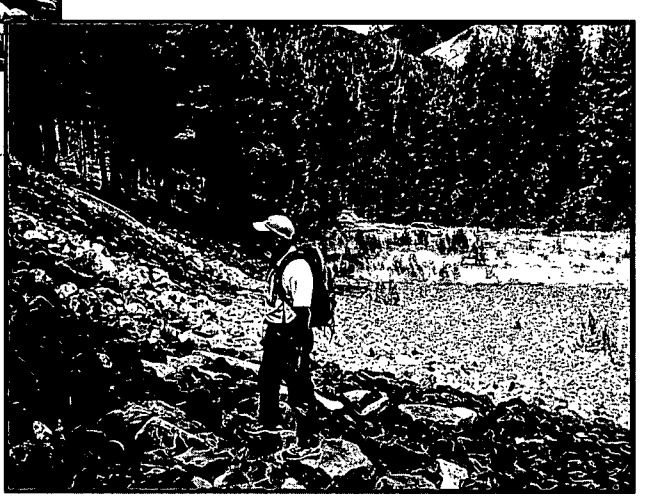
DOE–LM/GJ758–2004

U.S. Department of Energy
Office of Legacy Management

2004 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites

December 2004

Rifle, Colorado,
Disposal Site, 2004



Lowman, Idaho,
Disposal Site, 2004

Work Performed by the S.M. Stoller Corporation under DOE Contract No. DE–AC01–02GJ79491
for the U.S. Department of Energy Office of Legacy Management.
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for the U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado

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Acronyms

BLM	U.S. Bureau of Land Management
CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
GCAP	Ground Water Compliance Action Plan
LTSP	Long-Term Surveillance Plan
MCL	maximum concentration limit
mg/L	milligram(s) per liter
NRC	U.S. Nuclear Regulatory Commission
PL	photo location
TDS	total dissolved solids
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978 (88 USC 7901, *et seq.*)

Executive Summary

This report, in fulfillment of a license requirement, presents the results of long-term surveillance and maintenance activities conducted by the U.S. Department of Energy (DOE) Office of Legacy Management in 2004 at 19 uranium mill tailings disposal sites established under Title I of the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978[1]. These activities verified that the UMTRCA Title I disposal sites remain in compliance with license requirements.

DOE operates 18 UMTRCA Title I sites under a general license granted by the U.S. Nuclear Regulatory Commission in accordance with Title 10 *Code of Federal Regulations* Part 40.27. The Grand Junction, Colorado, Disposal Site, included in the list of 19 Title I sites, will not be included under the general license until an open, operating portion of the cell is filled and closed, which is projected to occur in 2023. This site is inspected in accordance with an interim long-term surveillance plan (LTSP).

Long-term surveillance and maintenance services for these disposal sites include inspecting and maintaining the sites; monitoring environmental media and institutional controls; conducting any necessary corrective action; and performing administrative, records, stakeholder services, and other regulatory functions.

Annual site inspections and monitoring are conducted in accordance with site-specific LTSPs and procedures established by DOE to comply with license requirements. Each site inspection is performed to verify the integrity of visible features at the site; to identify changes or new conditions that may affect the long-term performance of the site; and to determine the need, if any, for maintenance, follow-up or contingency inspections, or corrective action. LTSPs and site compliance reports are available on the Internet at **www.gjo.doe.gov/LM**.

All of the sites require some degree of routine monitoring and maintenance which may include ground water monitoring, minor erosion control, vegetation and noxious weed control, fence repairs, and sign replacement. The following nonroutine activities[2] occurred in 2004:

- Canonsburg, Pennsylvania—conducted a follow-up inspection to assess flood damage to the stream bank and the security fence;
- Grand Junction, Colorado—constructed new drainage ditches and a retention pond to divert runoff and sediment from an access road and a diversion channel;
- Naturita, Colorado—conducted a follow-up inspection after an earthquake was reported in the vicinity of the site;
- Rifle, Colorado—installed additional solar pump to dewater the cell;
- Slick Rock, Colorado—completed radon monitoring that verified the integrity of the radon barrier after removal of standpipes from the cell, and conducted a follow-up inspection after an earthquake was reported in the vicinity of the site.

[1] Congress directed that the Moab, Utah, processing site be remediated under Title I of UMTRCA. This site eventually will become the twentieth Title I disposal site.

[2] Nonroutine activities are activities implemented in response to changes in site conditions, regulatory setting, or management structure following a regulatory compliance review.

Results of the annual site inspection, maintenance, and monitoring activities are reported in the site-specific chapters that follow. Significant actions and issues at each site are summarized in the following table, which includes an index number for each item that can be found in the left margin next to the corresponding text in the respective site chapter.

2004 Summary of UMTRCA Title I Site Issues and Status

Site	Chapter	Page	Index No.	Actions and Issues
Ambrosia Lake, New Mexico	1	1–2	1A	Shallow depression on disposal cell top will be repaired.
		1–5	1B	Ground water monitoring.
Burrell, Pennsylvania	2	2–1	2A	Maintenance: cleared vegetation from the security fence.
		2–2	2B	Maintenance: replaced missing and damaged perimeter signs.
		2–2	2C	Maintenance: replaced pumps in the monitor wells.
		2–5	2D	Maintenance: control of noxious and invasive weeds.
		2–6	2E	Ground water monitoring.
Canonsburg, Pennsylvania	3	3–2	3A	Fence damage due to flooding.
		3–2	3B	Maintenance: replaced missing perimeter signs.
		3–2	3C	Maintenance: replaced damaged monitor well.
		3–5	3D	Maintenance: control of undesirable plants.
		3–6	3E	Stream bank erosion along Area C due to flooding.
		3–6	3F	Follow-up inspection to assess flood damage.
		3–7	3G	Ground water monitoring.
Durango, Colorado	4	4–2	4A	Maintenance: replaced missing perimeter sign.
		4–6	4B	Closure of the cell collection drain.
		4–6	4C	Maintenance: vegetation control.
		4–7	4D	Ground water monitoring.
Falls City, Texas	5	5–2	5A	Maintenance: vegetation control on cell.
		5–5	5B	Ground water monitoring.
		5–6	5C	Evaluating ground water monitoring.
Grand Junction, Colorado	6	6–5	6A	Vegetation encroachment and evaluation.
		6–5	6B	Maintenance: vegetation control.
		6–5	6C	Maintenance: constructed new ditches to redirect runoff.
		6–6	6D	Ground water monitoring.
Green River, Utah	7	7–2	7A	Maintenance: replaced damaged perimeter sign.
		7–2	7B	Shallow depression on the cell cover.
		7–5	7C	Ground water monitoring.
Gunnison, Colorado	8	8–2	8A	Vandalism: missing and damaged perimeter signs.
		8–6	8B	Maintenance: reclaimed haul road reseeded.
		8–6	8C	Ground water monitoring.
Lakeview, Oregon	9	9–2	9A	Maintenance: fence repaired.
		9–2	9B	Investigation on effects of vegetation on cell.
		9–5	9C	Recalculated minimum required riprap size; revised LTSP pending NRC concurrence.
		9–5	9D	Riprap gradation monitoring.
		9–6	9E	Ground water monitoring.
Lowman, Idaho	10	10–2	10A	Maintenance: erosion control.
		10–5	10B	Maintenance: weed control; reseeding.
		10–5	10C	Ground water monitoring.
		10–6	10D	Revised LTSP to request discontinuing ground water monitoring.
Maybell, Colorado	11	11–5	11A	Termination of BLM remedial action agreement pending.
		11–5	11B	State storm water discharge permit terminated.
		11–5	11C	BLM right-of-way reservation terminated.
		11–5	11D	Maintenance: fence repair and vegetation control.
		11–6	11E	Ground water level monitoring requirement fulfilled.
		11–7	11F	Settlement plate survey requirement fulfilled.
Mexican Hat, Utah	12	12–2	12A	Maintenance: fence repaired.
		12–5	12B	Trespass and trash accumulation.
		12–5	12C	Seep monitoring.
Naturita, Colorado	13	13–2	13A	Maintenance: monitor well access road repaired.
		13–5	13B	Follow-up inspection after local earthquake.
		13–6	13C	Ground water monitoring.

Site	Chapter	Page	Index No.	Actions and Issues
Rifle, Colorado	14	14–2	14A	Maintenance: repaired fence.
		14–5	14B	Maintenance: vegetation control around cell.
		14–6	14C	Reclamation: BLM Temporary Withdrawal Permit active until successful revegetation.
		14–6	14D	Disposal cell water level monitoring.
		14–6	14E	Cell dewatering; additional solar pump installed.
Salt Lake City, Utah	15	15–2	15A	Restricted access.
		15–2	15B	Maintenance: replaced two perimeter signs.
Shiprock, New Mexico	16	16–2	16A	Maintenance: repaired fence.
		16–2	16B	Maintenance: removed accumulated weeds and trash.
		16–2	16C	Maintenance: vegetation control on cell.
Slick Rock, Colorado	17	17–2	17A	Maintenance: replaced missing entrance sign.
		17–2	17B	Completed radon monitoring to verify integrity of the radon barrier.
		17–5	17C	Maintenance: repaired erosion damage.
		17–5	17D	Maintenance: vegetation control.
		17–6	17E	Reclamation: BLM right-of-way permit active until successful regetation.
		17–6	17F	Follow-up inspection after local earthquake.
Spook, Wyoming	18	18–5	18A	Maintenance: vegetation control.
Tuba City, Arizona	19	19–2	19A	Maintenance: fence repair.
		19–5	19B	Monitoring vegetation encroachment and sand accretion on cell.
		19–5	19C	Maintenance: removed accumulated weeds.
		19–5	19D	Ground water monitoring.

End of current text

1.0 Ambrosia Lake, New Mexico, Disposal Site

1.1 Compliance Summary

The Ambrosia Lake Disposal Site, inspected on September 21, 2004, was in good condition. A small depression is present on the disposal cell top and is scheduled for repair in 2005. Deep-rooted vegetation observed on and around the cell cover will be cut and treated with herbicide. Inspectors identified no requirement for a follow-up or contingency inspection.

1.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Ambrosia Lake, New Mexico, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Ambrosia Lake, New Mexico, Disposal Site* (DOE/AL/62350–211, Rev. 1, U.S. Department of Energy [DOE], Albuquerque Operations Office, July 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 1–1.

Table 1-1. License Requirements for the Ambrosia Lake, New Mexico, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 1.3.1
Follow-up or Contingency Inspections	Sections 6.0 and 7.0	Section 1.3.2
Routine Maintenance and Repairs	Section 8.0	Section 1.3.3
Ground Water Monitoring	Section 5.0	Section 1.3.4
Corrective Action	Section 9.0	Section 1.3.5

1.3 Compliance Review

1.3.1 Annual Inspection and Report

The disposal site, located north of Grants, New Mexico, was inspected on September 21, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 1–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

1.3.1.1 Specific Site Surveillance Features

Access Road, Entrance Sign, and Perimeter Signs—The disposal site is accessed via a gravel road that leads to the site (and beyond) and is approximately 1 mile from New Mexico State Highway 509. There is a locked gate across this road where it leaves Highway 509 because the road leads to private mining and grazing interests that lie farther to the east. The access road passes through the DOE-owned property along the south boundary of the site.

The entrance and all perimeter signs were in good condition (PL–1). Wind has eroded sandy soil from around the base of perimeter sign P12, but the post is stable. Posts for perimeter signs P1 through P10 include mining restriction warning signs.

Site Markers, Survey and Boundary Monuments—The two granite site markers, three combined survey and boundary monuments, and five additional boundary monuments were all undisturbed and in excellent condition.

Monitor Wells—Two monitor wells (MW–0675 and MW–0678) are present. Both wells were sampled at the time of the inspection (PL–2). Sampling activities indicated that sediment is present in both wells and the above-ground well security vault for MW–0678 was damaged but secure. The wells will be cleaned out and the vault will be replaced prior to the next sampling event.

Mine Vents—Two mine vent shafts, associated with abandoned underground mines, are within the site boundary; a third vent is west of the site within DOE's restrictive easement that prohibits mining. The mine vent north of the disposal cell is the only one that has a spot-welded cover that can be considered a permanent closure. The other two vents have bolted-on covers that do not constitute a permanent closure. All vents were secure at the time of the inspection.

1.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into four areas referred to as transects: (1) the riprap-covered top of the disposal cell; (2) the riprap-covered side slopes and apron of the cell; (3) the graded and revegetated area between the disposal cell and the site perimeter; and (4) the outlying area.

Top of Disposal Cell—The basalt riprap-covered top of the disposal cell generally is in excellent condition (PL–3). With the exception of minor settlement at one displacement monument (i.e., settlement plate), there was no evidence of cracking, settling, slumping, or erosion. A shallow depression around settlement plate SP–4 (PL–4), near the northeast corner of the disposal cell cover, was first noted during the 1997 inspection. There has been no visible indication, such as a water line or evaporite deposits, to suggest the depression holds water. However, comparison of annual inspection photographs indicate that the depression has increased in depth and area and, if settlement continues, the depression could hold water and potentially saturate a portion of the radon barrier. A survey of the depression and settlement plate in June 2004 indicated that settlement or consolidation is occurring in both the tailings that were in place prior to cell construction and in the relocated tailings that were placed over the existing tailings. Repair of the depression is scheduled for 2005.

1A

Plant growth is scattered and insignificant on the disposal cell cover. Scattered annual weeds and clumps of grass and one deep-rooted shrub (four-wing saltbush) were noted during the inspection. The shrub will be cut and treated to prevent root growth into the radon barrier.

No new evidence of trespassing was evident on top of the disposal cell. At the time of the 2003 inspection, it was noted that a small all-terrain vehicle had been driven to the top of the cell and disturbed the cover rock on the north facet by leaving four circles with diameters between 40 and 60 feet. The tracks are very shallow and do not impair the integrity or performance of the cover.

Side Slopes and Apron—The basalt riprap-covered side slopes and apron were in excellent condition and showed no evidence of cracking, settling, slumping, or erosion. Tamarisk, an undesirable deep-rooted shrub, was observed at several locations along the southern edge of the disposal cell. The tamarisk will be cut and treated with herbicide.

Desiccation cracks in the soil parallel the apron along the south side of the cell. They appeared to be old features but had not been noted during previous inspections. The site usually is inspected during spring, and freeze-thaw effects on the soil may mask the cracks at that time of the year. The cracks do not pose a threat to the disposal cell.

Graded and Revegetated Site Area—In general, site vegetation was healthier than vegetation in the surrounding areas. Some areas were windswept with little growth, while other areas had excellent coverage. There was evidence of cattle grazing adjacent to the disposal cell and in the outlying portions of the DOE property. To date, grazing in the revegetated areas of the site has not been a problem.

Rills and gullies within the DOE property north and east of the disposal cell have been monitored for several years. Recent erosion activity was noted in several of the rills and gullies; however, these erosional features do not present a threat to the performance or integrity of the disposal cell. The features are sufficient distances from the disposal cell, headward erosion is away from the cell, and sedimentation has not approached the cell.

The access road and a power line cross the site near and parallel to the southern boundary of the site. In addition, there is a gas pipeline riser in the southeastern part of the site. This riser is associated with a buried gas pipeline along the south edge of the site. No changes or disturbances associated with these features were observed.

Outlying Area—The area within 0.25 mile of the site boundary was inspected and found to be unchanged from the previous inspection. There was no activity that would impact the site.

1.3.2 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

1.3.3 Routine Maintenance and Repairs

No maintenance or repair activities occurred in 2004.

1.3.4 Ground Water Monitoring

The LTSP establishes that ground water monitoring is not required at this site because (1) the ground water is heavily contaminated from underground uranium mining and naturally occurring mineralization, and (2) the uppermost aquifer is of limited use due to low yield. However, at the request of the New Mexico Environment Department, DOE conducts limited monitoring at two locations. Monitor well MW–0675 is completed in the alluvium, and
1B monitor well MW–0678 is completed in the uppermost sandstone unit. DOE will sample these locations once every third year (the initial post-closure sampling event was in 2001), for up to 30 years, and will evaluate the results after every third sampling event. Sampling was conducted in

fall 2004 but the analytical results were not available in time for inclusion into this report. The results will be reported in the 2005 compliance report.

1.3.5 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 2004.

1.3.6 Photographs

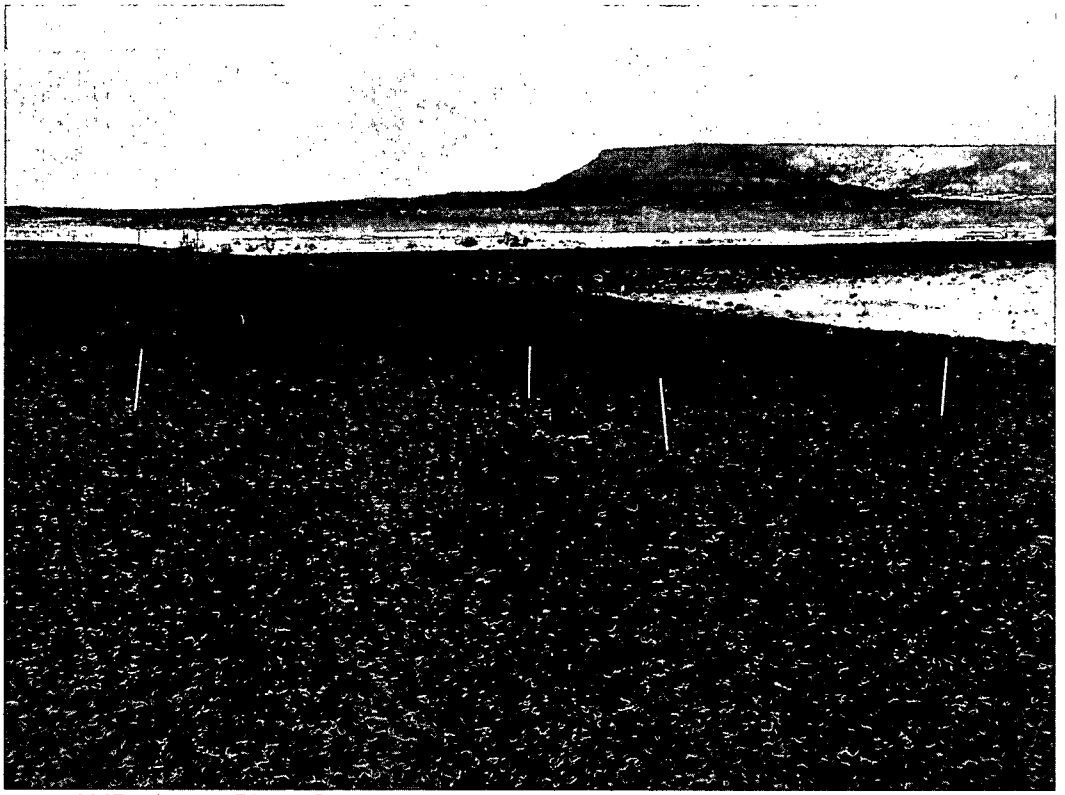
Table 1-2. Photographs Taken at the Ambrosia Lake, New Mexico, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	0	Perimeter sign P56 near the southeast corner of the disposal cell.
PL–2	320	Ground water sampling at monitor well MW–0675.
PL–3	50	View across the disposal cell top. The foreground shows the transition between the smaller top slope riprap and the larger side slope riprap.
PL–4	300	Small depression in the northeast corner of the cell cover at settlement plate SP–4.

AMB 9/2004. PL–1. Perimeter sign P56 near the southeast corner of the disposal cell.

AMB 9/2004. PL–2. Ground water sampling at monitor well MW–0675.

AMB 9/2004. PL–3. View across the disposal cell top. The foreground shows the transition between the smaller top slope riprap and the larger side slope riprap.



AMB 9/2004. PL–4. Small depression in the northeast corner of the cell cover at settlement plate SP–4.

End of current section

2.0 Burrell, Pennsylvania, Disposal Site

2.1 Compliance Summary

The Burrell Disposal Site, inspected on September 21, 2004, was in excellent condition. A weathered perimeter sign was replaced. Two perimeter signs were missing and were replaced after the inspection. The entrance gate and fence have minor damage but remain secure. Weed control activities during spring and summer 2004 significantly reduced invasive weed populations at the site. No requirement for a follow-up or contingency inspection was identified.

2.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Burrell, Pennsylvania, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the U.S. Department of Energy Burrell Vicinity Property, Blairsville, Pennsylvania* (GJO–2002–331–TAR, U.S. Department of Energy [DOE] Grand Junction, Colorado, April 2000) 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 2–1.

Table 2–1. License Requirements for the Burrell, Pennsylvania, Disposal Site

Requirement	Long Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.3	Section 2.3.1
Follow-up or Contingency Inspections	Section 3.5	Section 2.3.2
Routine Maintenance and Repairs	Section 3.6	Section 2.3.3
Ground Water Monitoring	Section 3.7	Section 2.3.4
Corrective Action	Section 3.6.3	Section 2.3.5

2.3 Compliance Review

2.3.1 Annual Inspection and Report

The site, located southeast of Blairsville, Pennsylvania, was inspected on September 21, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 2–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

2.3.1.1 Specific Site Surveillance Features

Site Access, Fence, Gates, and Signs—An access road leads from Strangford Road, along a DOE perpetual right-of-way through private property (Tract 201–E) and across DOE's leased crossing over Norfolk Southern Railroad tracks, to the entrance gate in the east end of the site security fence. The hard-packed, gravel road had potholes that limit site access to high-clearance vehicles. Road damage is apparently due to frequent use by railroad and gas company vehicles and local residents.

The security fence is chain link with three strands of barbed wire on top. The fence is rusty in
2A many places but remains secure. Vegetation had been cleared from accessible portions of the fence a few weeks before the inspection. Small limbs that had fallen across the security fence

were removed at the time of the inspection, and several broken strands of barbed wire were repaired. Three barbed-wire angle brackets that had been damaged by fallen limbs will be repaired.

The sliding vertical bar of the entrance gate was damaged by a bullet indentation that made it difficult to open the gate; the bar will be replaced. The personnel gate on the west end of the fence was locked and in good condition.

The entrance sign has been damaged by gunfire, but remains legible. Perimeter signs attached to the northern perimeter fence (P1 through P8) were replaced in 2002 because they were made illegible due to gunshot damage. Sign P5 was missing and signs P6 and P8 have bullet holes. Public access to the property north of the disposal site essentially is unimpeded and there continues to be a significant amount of activity in this area. Sign P12 also was missing, and
2B perimeter sign P16 was excessively weathered. Perimeter signs P5, P12, and P16 were replaced.

Site Markers and Monuments—The site has one site marker, which is at the east end of the site near the entrance gate. Vegetation around the site marker is cleared annually. Other Title I disposal sites have two site markers. The LTSP recognizes the missing site marker as an acceptable variance from DOE's project design.

The site has seven boundary monuments and three survey monuments. Because of dense vegetation and soil accumulation, several of the monuments typically are difficult to locate. However, all of the monuments except boundary monument BM–1 were found and were in good condition. Monument BM–1 was under water due to recent flooding in the area.

Four pairs of erosion control markers are located in dense stands of Japanese knotweed, where they often are difficult to find. Three of the pairs were found; marker EMC–2 was under water. No stream bank erosion was evident.

Monitor Wells—The site has four pairs of monitor wells, with a shallow completion and deep
2C completion well in each pair. All of the wells were secure. New submersible bladder pumps were installed in all eight wells in November 2004. Corridors to the wells are mowed annually to maintain access to and provide working space around the wells.

2.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into four areas referred to as transects: (1) the disposal cell; (2) the area between the disposal cell and site boundary; (3) the site perimeter; and (4) the outlying area.

Disposal Cell—The top and side slopes of the disposal cell are covered with riprap and were in excellent condition. There was no evidence of settling, slumping, or other indications of instability. Rock quality was excellent; degradation of the limestone riprap was not evident.

Trees and shrubs continue to establish in the riprap (PL–1). In the past, this vegetation was aggressively controlled with massive applications of herbicide. A study that evaluated risks posed by encroachment of plants on the disposal cell demonstrated that the plants will not degrade the long-term performance of the cell and may improve performance by reducing moisture in the cover through evapotranspiration.

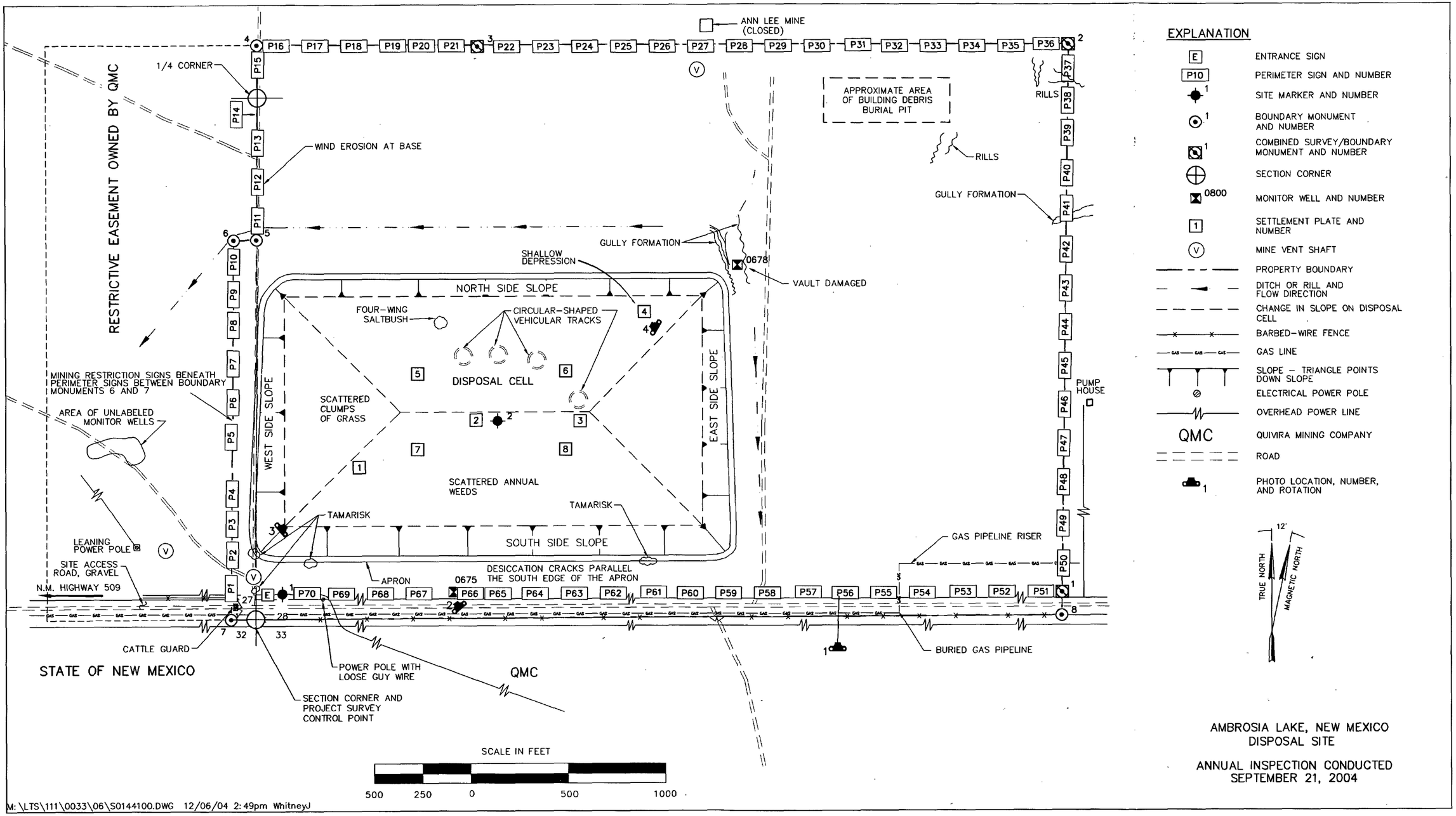


Figure 1–1. 2004 Annual Compliance Drawing for the Ambrosia Lake, New Mexico, Disposal Site

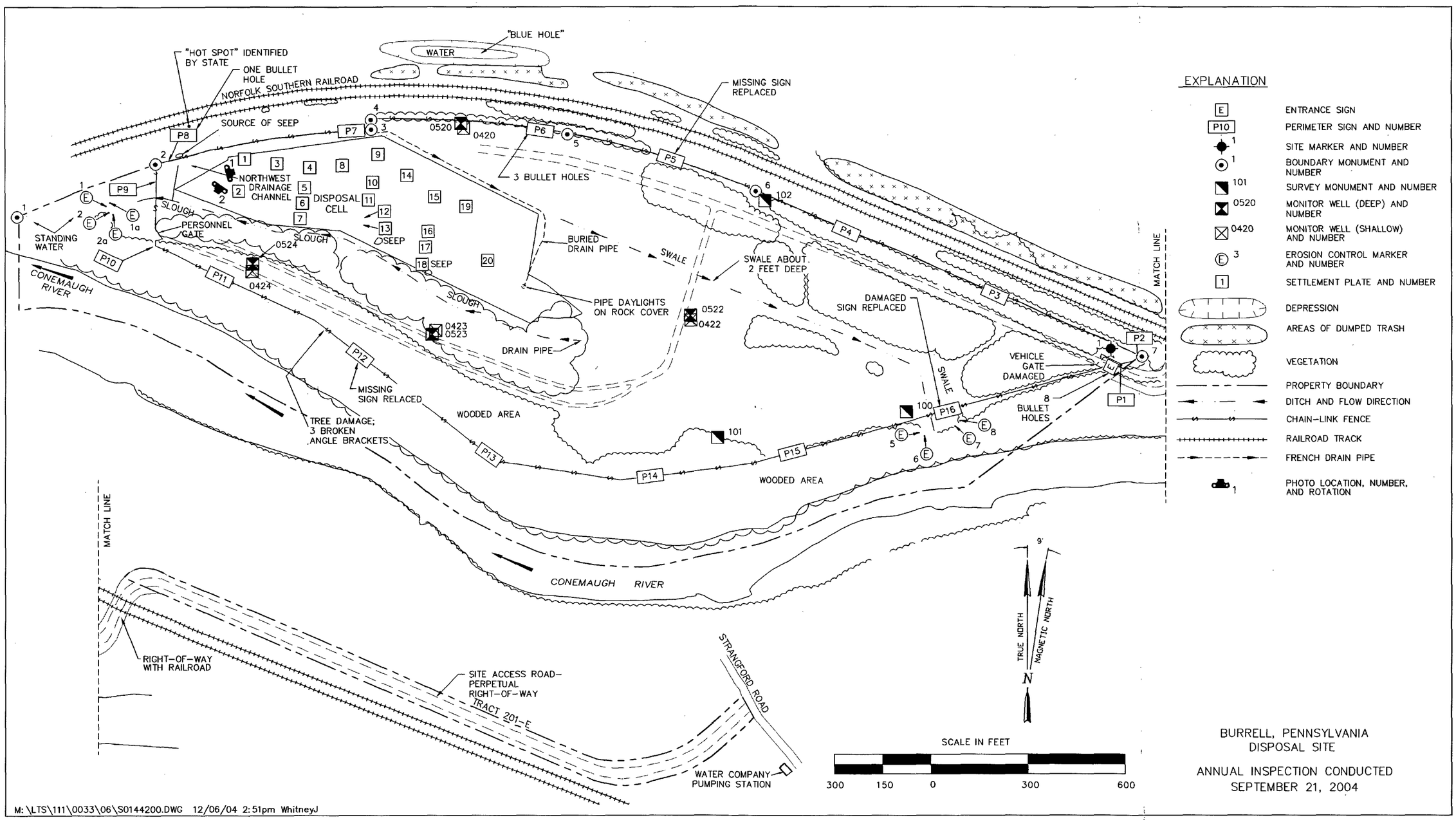


Figure 2–1. 2004 Annual Compliance Drawing for the Burrell, Pennsylvania, Disposal Site

The LTSP allows the vegetation to grow on the disposal cell without further intervention; such growth will not increase risk to public health, safety, or the environment. In their concurrence of the of the LTSP, the U.S. Nuclear Regulatory Commission suggested that DOE reevaluate the effects of vegetation on cover performance in 10 or 20 years to confirm performance parameters and predictions.

A perforated pipe and rock-filled trench drain were installed along the base of the north side slope of the disposal cell in August 1998 to prevent ponding in that area and to intercept water that was suspected to be flowing under to cell and emerging as seeps along the south side of the cell. At the time of the 2004 inspection, the area along the drain was wet, but no water was flowing from the outlet. The wire hardware cloth was intact in the drain outlet. Water never has been observed to be flowing from the outlet since the system was installed, perhaps because the material through which the trench passes absorbs water. Much of the material on this site is imported fill and debris and is expected to be permeable.

The slough along the south side of the disposal cell, fed by ground water, was flowing. Seeps along the base of the south side slope were not inspected, as the higher-than-average water level within the slough along the south side of the cell had inundated these areas. Flooding had occurred in this area and throughout the region as a result of excessive precipitation from hurricanes Frances and Ivan. Watermarks on the riprap and wetland plants in the southwest portion of the cell indicate that water within the slough had risen approximately 6 to10 feet (PL–2). The reduced and usually absent flow at the seeps since the north side drain was installed suggests that the drain is diverting water that otherwise would flow beneath the disposal cell.

Area Between the Disposal Cell and Site Boundary—The area surrounding the disposal cell and inside the security fence is covered by thick grass and thickets of woody plants and Japanese knotweed. In 2003, spotted knapweed and poison hemlock had spread across most of the DOE property and were interspersed with native desirable plants. The knapweed is an undesirable invasive plant that was out-competing desirable species at the site. Poison hemlock poses a safety hazard to personnel who must walk through or work within infested areas, as all plant parts are poisonous. To comply with federal invasive species directives and to maintain plant diversity on the property, DOE began controlling knapweed after the 2001 inspection. After
2D consultation with Pennsylvania State University, DOE initiated an aggressive weed control program of herbicide applications and mowing in spring 2004.

At the time of the September 2004 inspection, a significant decrease in weed populations at the site was apparent. Almost all of the spotted knapweed and poison hemlock plants found on the site were young and had no reproductive parts. One exception was a small population of spotted knapweed on top of the disposal cell, which is not accessible to mowing equipment. DOE will continue to mow infested areas once a month between May and September 2005 to continue the eradication program and will spot-spray the knapweed on the cell cover.

Site Perimeter—Seeps along the security fence, located about 60 feet east of perimeter sign P8 and immediately west of the disposal cell, were flowing. Significant amounts of water were observed in these areas, along with the presence of wetland-type vegetation (e.g., cattails and willows). The seeps will continue to be monitored to ensure they do not pose a threat to the integrity or performance of the disposal cell.

Canada thistle, a state-listed noxious weed, was identified on railroad property near boundary monument BM–2 in 2002. As arranged with the Norfolk Southern Railroad, DOE treated the infestation with herbicide in spring and fall 2004, and will treat it again in 2005.

Outlying Area—The area beyond the site boundary for a distance of 0.25 mile was visually inspected for signs of erosion, development, and other changes that might affect the site. A dirt railroad access road along the north side of the site provides access to a long, narrow wooded area along the tracks that has been used for unpermitted dumping. Although this activity is not a direct threat to the disposal site, the amount of dumping is an indication of the overall level of activity near the disposal site and may be a predictor of vandalism. Other areas around the site remained unchanged.

A representative from the Pennsylvania Department of Environmental Protection, who inspects the exterior of the site once a year, indicated the presence of a "hot spot" (having gamma radiation levels of 5 millirems per hour) at the toe of the railroad track rock ballast near the west end of the site. Site records indicate that this area was addressed under the Uranium Mill Tailings Remedial Action Project. Supplemental standards were applied because the benefit of removal did not justify the cost, and because the contamination did not pose a risk. DOE communicated the results of this records search to the state.

2.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

2.3.3 Routine Maintenance and Repairs

In 2004, DOE replaced one weathered and two missing perimeter signs, cleared vegetation from along the accessible portions of the security fence, and continued noxious and invasive weed control activities.

2.3.4 Ground Water Monitoring

DOE monitors ground water at this site, as a best management practice, to evaluate disposal cell performance. The LTSP stipulates monitoring every 5 years. DOE conducted ground water
2E sampling in November 2004; analytical results will be provided in the 2005 compliance report.

2.3.5 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 2004.

2.3.6 Photographs

Table 2–2. Photographs Taken at the Burrell, Pennsylvania, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	75	Vegetation establishing on top of the disposal cell.
PL–2	215	Standing water and flood watermarks on the plants in the slough.

BUR 9/2004. PL–1. Vegetation establishing on top of the disposal cell.

BUR 9/2004. PL–2. Standing water and flood watermarks on the plants in the slough.

End of current section

3.0 Canonsburg, Pennsylvania, Disposal Site

3.1 Compliance Summary

The Canonsburg Disposal Site was inspected on September 22, 2004. Flooding had occurred at the site due to hurricanes prior to the inspection. The disposal cell and drainage structures were not damaged and were in excellent condition. However, flooding damaged a portion of the security fence, the Area C stream bank, and a portion of the stream bank upstream of the Strabane Avenue Bridge. DOE conducted a follow-up inspection of the damaged areas in October 2004 and will prepare a recommendation for repairs. Three missing perimeter signs were replaced after the inspection. Weed infestations have been reduced through control efforts, and DOE continued control measures in 2004. A damaged monitor well was replaced in October 2004.

3.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Canonsburg, Pennsylvania, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Canonsburg, Pennsylvania, Disposal Site* (DOE/AL/62350–203, Rev. 0, U.S. Department of Energy [DOE], Albuquerque Operations Office, October 1995) and in procedures established by DOE to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Additionally, monitoring requirements established in the Ground Water Compliance Action Plan (GCAP) (DOE, Grand Junction, Colorado, February 2000) are applicable. These requirements are listed in Table 3–1.

Table 3–1. License Requirements for the Canonsburg, Pennsylvania, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Sections 3.1 and 7.0	Section 3.3.1
Follow-up or Contingency Inspections	Sections 3.2 and 6.2, Appendix E.4	Section 3.3.2
Routine Maintenance and Repairs	Section 6.1	Section 3.3.3
Ground Water Monitoring	Section 4.0 and the GCAP	Section 3.3.4
Corrective Action	Section 4.4	Section 3.3.5

3.3 Compliance Review

3.3.1 Annual Inspection and Report

The site, located between the communities of Canonsburg and Houston, Pennsylvania, was inspected on September 22, 2004. Features and photograph locations (PLs) mentioned in this report are shown on Figure 3–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

3.3.1.1 Specific Site Surveillance Features

Access, Gates, Fence, and Signs—Access to the site is directly from Strabane Avenue, a public right-of-way. The entrance gate, located at the southeast corner of the site along Strabane Avenue, was locked and in good condition. A vehicle gate located on the northeast side of the site was closed but inoperable due to a corroded lock; however, the lock will not be replaced because the gate is not used.

The site is surrounded by a chain link security fence with three strands of barbed wire at the top. The fence continues to rust but remains secure. From the far western corner of the fence, north along the top of the bank above Chartiers Creek, to near perimeter sign P5, the concrete boot at the bottom of several fence posts was exposed. During site construction, DOE removed soil from this area to improve site drainage; however, all fence posts were stable.

Floodwater flowed over the top of the stream bank near perimeter sign P6 and washed the soil from around the concrete boots of the fence posts along approximately 160 feet of fence line.
3A Due to the erosion and tension on the fence, a corner post was pulled out of alignment (PL–1). Farther east, a large tree was washed out and the resulting erosion undermined a portion of the fence (PL–2). DOE will make necessary repairs.

The site has an entrance sign at the entrance gate and 11 perimeter signs. Three perimeter signs (P1, P3, and P5) were missing and replaced after the inspection. Also, the fasteners on sign P11
3B were corroded and replaced. The entrance sign and the other perimeter signs were in good condition.

Site Markers and Monuments—The two site markers, three survey monuments, and four boundary monuments were undisturbed and in excellent condition. Boundary monument BM–4 was buried under riprap of the perimeter ditch; some rock was pulled away to reveal the monument.

Four pairs of erosion control markers originally were placed along the bank of Chartiers Creek. One of these markers, ECM–4A, was lost to erosion in 1996. This marker does not need to be replaced because the other marker in the pair, ECM–4, can be used for reference. Marker ECM–1A was not located due to thick vegetation, and marker ECM–2A was not found because it was buried by debris and sediment deposited by flood water.

Monitor Wells—The ground water monitoring network consists of six monitor wells that are sampled annually in accordance with the LTSP and the GCAP. Monitor well MW–0414A was damaged beyond repair prior to the inspection. The well was abandoned in accordance with state
3C requirements and replaced by new monitor well MW-0414B in October 2004. The other wells were secure and in excellent condition.

3.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into five areas referred to as transects: (1) the disposal cell; (2) the diversion channels and perimeter ditch; (3) the other areas on site; (4) the site perimeter; and (5) the outlying area.

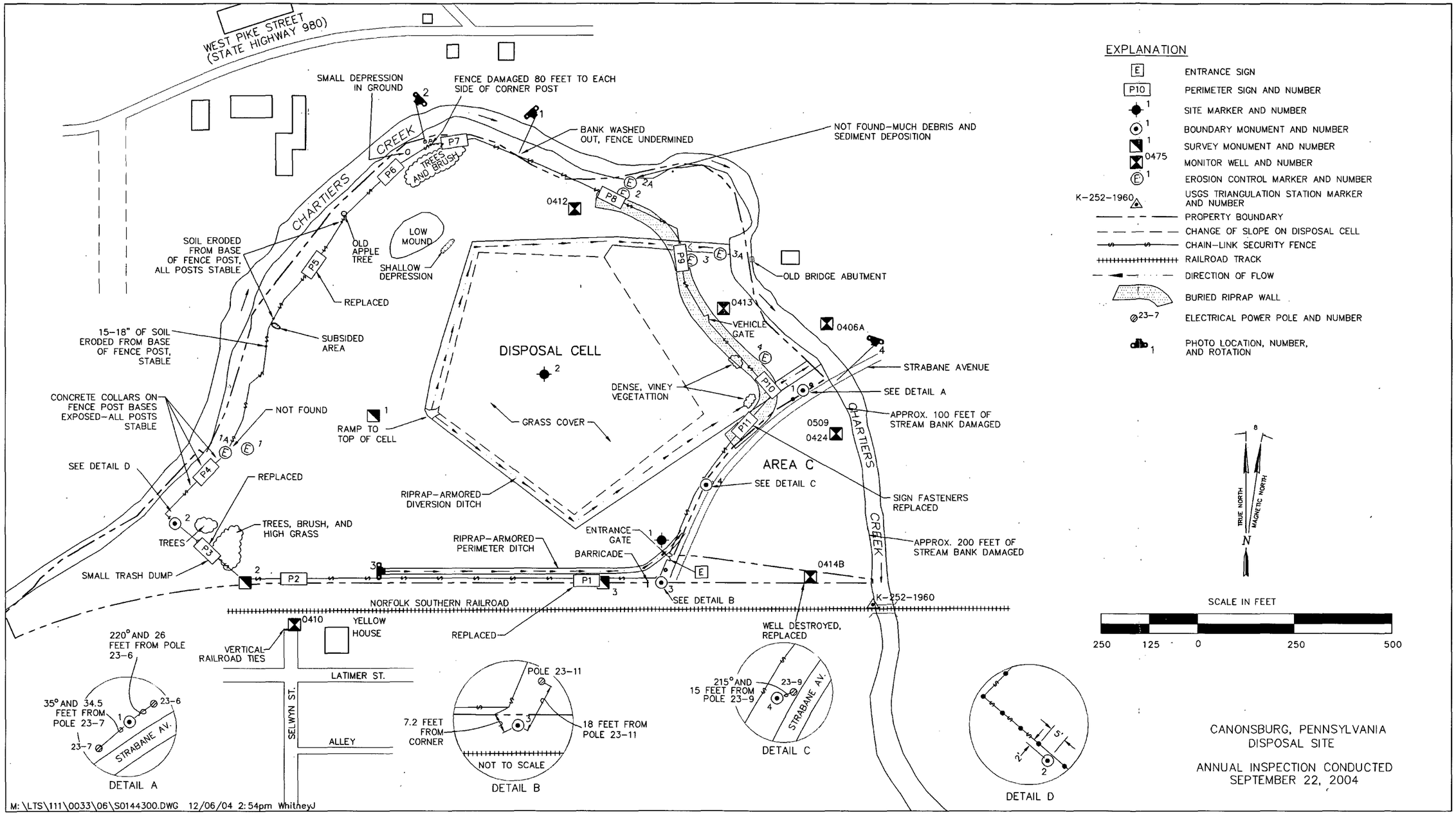


Figure 3–1. 2004 Annual Compliance Drawing for the Canonsburg, Pennsylvania, Disposal Site

Disposal Cell—The hurricane-related storms did not damage the disposal cell. Storm water was conveyed away from the cell as designed without causing erosion.

The grass-covered disposal cell surface was in excellent condition. The grass is mowed and mulched annually. There was no evidence of slumping, settling, erosion, or other modifying process.

Diversion Channels and Perimeter Ditch—Diversion channels around the disposal cell and the perimeter ditch along the south side of the site are armored with riprap and were in good condition. These structures functioned as designed during the hurricane-related storms by diverting storm water away from the cell and the site and preventing erosion.

As noted during previous inspections, individual rocks have deteriorated. Although the occurrences are few and rock deterioration is not considered to be a problem at this time, DOE will continue to monitor the rock condition in the channels and ditch.

Vegetation in the diversion channels and perimeter ditch was treated with herbicide in 2002 and the dead woody plant material was removed in 2003. Although not impairing the function of the channels and ditch, enough perennial vegetation has returned to warrant treatment and removal in 2005 (PL–3).

Other Areas On Site—Thick grass covers the area from the diversion channels around the disposal cell outward to the security fence. This stand of grass extends beyond the security fence to the north and east as far as the bank of Chartiers Creek. The grass inside the site boundary, mowed and mulched at least annually in accordance with the LTSP, was in excellent condition.

Several groves of large trees and bushes are in this transect. Dead trees and branches are removed periodically from these groves. The entire area inside the fence has a park-like appearance.

3D

Poison hemlock was identified on the site in 2003. This biennial weed is not a listed noxious species in Pennsylvania; however, it poses a safety hazard to personnel who must walk through or work within infested areas, as all plant parts are poisonous. Canada thistle, a state-listed noxious weed, had spread into several locations on the site in 2003. DOE mowed the infested areas twice per month during the growing season and applied herbicide to control the weeds. Weed populations were greatly reduced and the grass turf was healthy at the time of the inspection. DOE plans to continue the mowing program in 2005, but application of herbicide may not be necessary if weed infestations continue to decrease.

Site Perimeter—Trees, woody brush, and vines continue to encroach upon the security fence; however, the use of a tractor and brushhog is an effective and low-cost means of controlling vegetation in unwanted areas. Where terrain is too steep for the tractor, the vegetation is cleared by hand. Vegetation intertwined in the fence or weighing it down is also cleared by hand. This activity also includes application of herbicide along the bottom of the fence to retard reappearance of vegetation. Not only does removal of vegetation preserve and maintain the fence, it leaves the site appearing actively cared for and allows a better inspection of the fence

and site perimeter. Erosion caused by flooding of Chartiers Creek damaged a portion of the security fence, as noted previously.

Canada thistle plants were interspersed with healthy vegetation along the outside of the security fence on the north side of the property in 2003. Herbicide was applied to the weeds in 2004 and no Canada thistle was found in this area at the time of the inspection. However, occasional poison hemlock plants were found along the fence. These plants will be monitored in 2005 to determine if control measures are required.

Outlying Area—The site is surrounded by residential and commercial property. The area outward for a distance of approximately 0.25 mile was visually inspected for development or change in land use that might affect the safety or security of the site. No changes were observed.

Area C is a 3-acre, grass-covered parcel across Strabane Avenue east of the site. Area C was remediated as part of the mill site and is owned by the Commonwealth of Pennsylvania. Two thorium anomalies were left in place at a depth of approximately 8 feet. Ground water beneath Area C used to be contaminated but recently has flushed clean.

DOE has an interest in preserving the configuration and integrity of the stream bank along Chartiers Creek to prevent erosion of Area C, and maintaining access to monitoring locations on the parcel. Since 1992, DOE has cut the grass as a courtesy to the commonwealth. Canada thistle and poison hemlock have become established along the shoulder of the bank. The infestations were treated with herbicide in 2004.

Erosion along the stream bank worsened in the years following site remediation. To protect Area C, DOE completed a bank stabilization project in 2001. Floodwater from the hurricane-related storms caused erosion damage to the reconstructed stream bank. Approximately 100 feet
3E of previously reconstructed stream bank was damaged downstream from the Strabane Avenue Bridge (PL–4) and 200 feet was damaged upstream from the railroad bridge. Floodwater cut laterally into the bank as much as 6 feet in places but the structural system extends 30 feet into the bank; the erosion did not threaten the areas of thorium anomalies. Riprap had been keyed into the toe of the slope and placed against filter fabric. Floodwater scoured behind the riprap and fabric in places. DOE notified the U.S. Nuclear Regulatory Commission and performed a follow-up inspection of the damage to develop recommendations for stream bank repair along Area C. Recommendations will also be prepared to repair the stream bank erosion along the north portion of the disposal site.

Pennsylvania solicited bids from the public for purchase of Area C, and the sale is imminent. As stipulated in UMTRCA and the Cooperative Agreement between DOE and Pennsylvania, the transfer of property will carry restrictions to limit excavation in the area, prohibit disturbance of the stream bank, maintain access for monitoring, and prohibit residential use. Upon transfer of property ownership, DOE will no longer maintain the Area C vegetation.

3.3.2 Follow-up or Contingency Inspections

3F A follow-up inspection was performed in October 2004 to assess the flood damage along Chartiers Creek and to develop recommendations for repairing the security fence and stream bank erosion along the north property boundary and along Area C.

3.3.3 Routine Maintenance and Repairs

DOE mowed grass, removed vegetation along the perimeter fence, sprayed noxious weeds, and replaced three perimeter signs and a damaged monitor well during 2004.

3.3.4 Ground Water Monitoring

3G DOE monitors ground water and surface water at the Canonsburg site to comply with requirements in the LTSP and the subsequent GCAP. The purpose of the monitoring is to evaluate contaminant trends in ground water in the shallow unconfined aquifer, which consists of unconsolidated soils, stream deposits, and clean fill.

The monitoring network consists of six wells completed in the shallow unconfined aquifer and three surface water locations in Chartiers Creek (Figure 3–1). The LTSP required sampling for two years after the site was licensed. This requirement was met by sampling in 1996 and 1997. However, because the concentration of uranium in some wells remains above the maximum concentration limit of 0.044 milligrams per liter (mg/L), DOE continues to monitor these locations annually. DOE also has monitoring requirements, including four of the above wells (three of which are considered point-of-compliance wells) and one surface location (point of exposure), for at least 5 years (through 2004), to verify compliance with alternate concentration limits established by the GCAP. The LTSP is being revised to combine these separate requirements into a comprehensive site-wide monitoring program.

Molybdenum and uranium are the target analytes identified in the LTSP. Target analytes under the GCAP are molybdenum, uranium, and manganese. Maximum concentration limits (MCLs) for molybdenum (0.1 mg/L) and uranium (0.044 mg/L) are established in Table 1 to Subpart A of 40 CFR 192. There is no standard for manganese; however, the performance standard adopted by the GCAP for manganese (0.05 mg/L) is the secondary drinking water standard established in 40 CFR 143.3. An alternate concentration limit of 1.0 mg/L was established for uranium in ground water in the GCAP for the point-of-compliance wells. An alternate concentration limit of 0.01 mg/L was established for uranium at the point-of-exposure surface water location.

Uranium is the analyte of primary concern because of the frequency with which it has exceeded its MCL, particularly in two of the downgradient wells (MW–0412 and MW–0413). However, DOE continues to consider the risk associated with uranium in ground water to be negligible because institutional controls, in the form of government ownership of the site, prevent access to the ground water, and because uranium concentrations are below detection limits in Chartiers Creek. Therefore, human health and the environment are adequately protected.

The monitoring locations were sampled in November 2004, and the analytical results were not available for inclusion in this report. The results will be provided in the 2005 compliance report.

3.3.5 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.

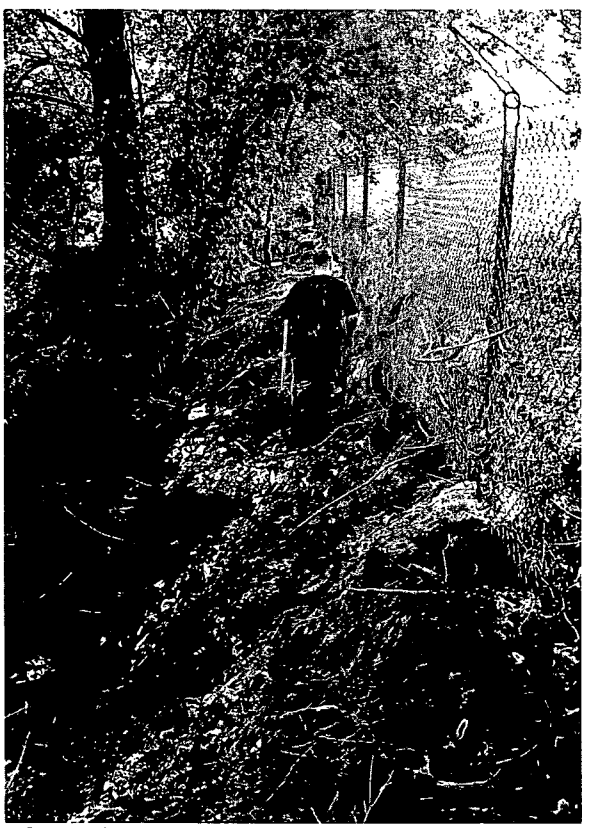
No corrective action was required in 2004.

3.3.6 Photographs

Table 3–2. Photographs Taken at the Canonsburg, Pennsylvania, Disposal Site

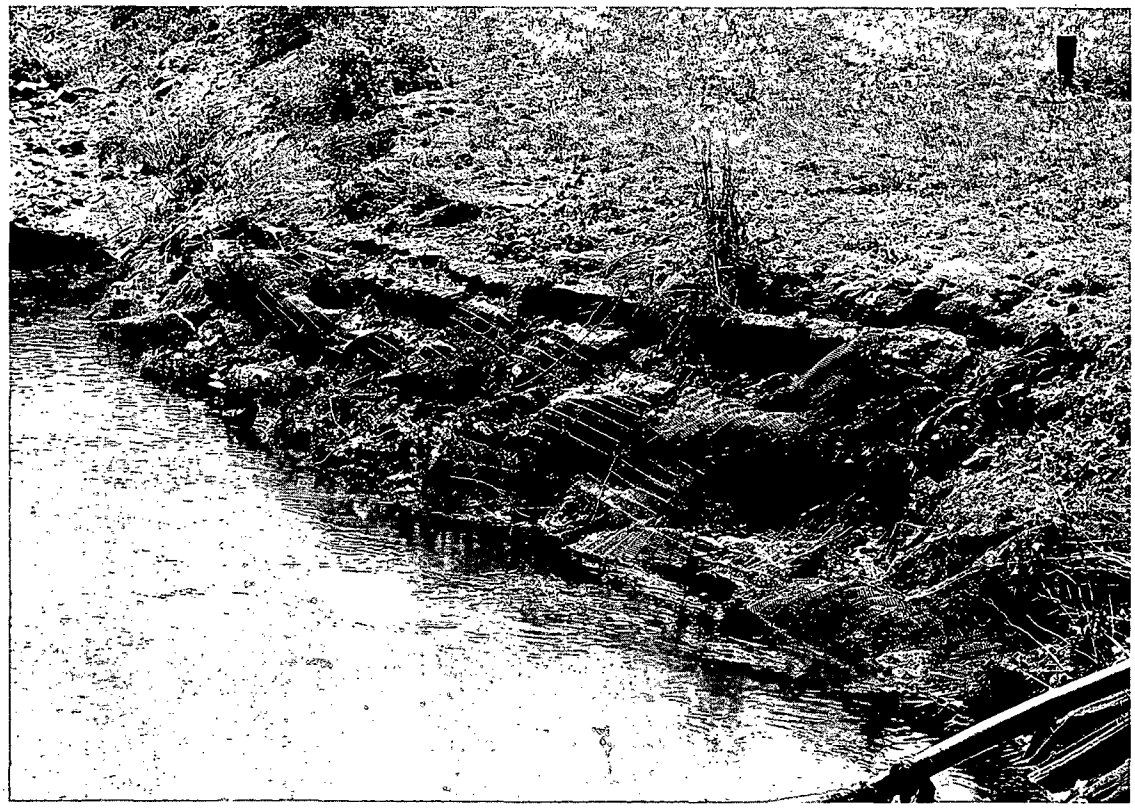
Photograph Location Number	Azimuth	Description
PL–1	240	Damaged fence corner post caused by flooding.
PL–2	120	Stream bank erosion along the north fence line.
PL–3	90	Vegetation encroachment in the perimeter ditch along the south property boundary.
PL–4	170	Stream bank erosion along Area C.

CAN 9/2004. PL–1. Damaged fence corner post caused by flooding.



CAN 9/2004. PL–2. Stream bank erosion along the north fence line.

CAN 9/2004. PL–3. Vegetation encroachment in the perimeter ditch along the south property boundary.



CAN 9/2004. PL–4. Stream bank erosion along Area C.

End of current section

4.0 Durango, Colorado, Disposal Site

4.1 Compliance Summary

The Durango Disposal Site was inspected on June 8, 2004, and was in good condition. A missing perimeter sign was replaced, and a couple of other perimeter signs had new bullet holes. Vegetation on top of the cell, consisting primarily of seeded grass species, was healthy. Scattered woody vegetation (trees and shrubs) continues to encroach on the side slopes and plants greater than 3 feet tall were removed. Infestations of noxious weeds at the site continue to be monitored and controlled with herbicide. No requirement for a follow-up or contingency inspection was identified.

Construction of a new reservoir is occurring south and west of the disposal site. Heavy construction traffic is present on the county road that crosses the southwest corner of the site. A boundary monument was destroyed during pipeline construction activities adjacent to the site. The monument will not be replaced because two witness monuments at that property corner are intact. Recreational use of the area is expected to increase substantially upon completion of the reservoir project, and evidence of trespassing and vandalism will continue to be monitored.

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

4.3 Compliance Review

4.3.1 Annual Inspection and Report

The site, located southwest of Durango, Colorado, was inspected on June 8, 2004. 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—The site is accessed by La Plata County Road 212, which is a dedicated public right-of-way that crosses the southwest corner of DOE property. The new 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.

4A Perimeter sign P1 near the site entrance was missing and was replaced. Numerous perimeter signs have bullet holes but all remain legible; three signs along the north property boundary had new bullet 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) has been slightly damaged by bullets; however, it was legible and in generally good condition. Boundary monument BM–6, located at the southwest corner of the site, was missing and presumably was destroyed during pipline construction associated with the reservoir project (PL–1). 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.

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.

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 was in good condition (PL–2). The vegetation consisted of seeded grasses and several volunteer species including deep-rooted shrubs. No woody species of trees and shrubs were found on the cell top during the 2004 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 and herbicide was applied during the spring, summer, and fall.

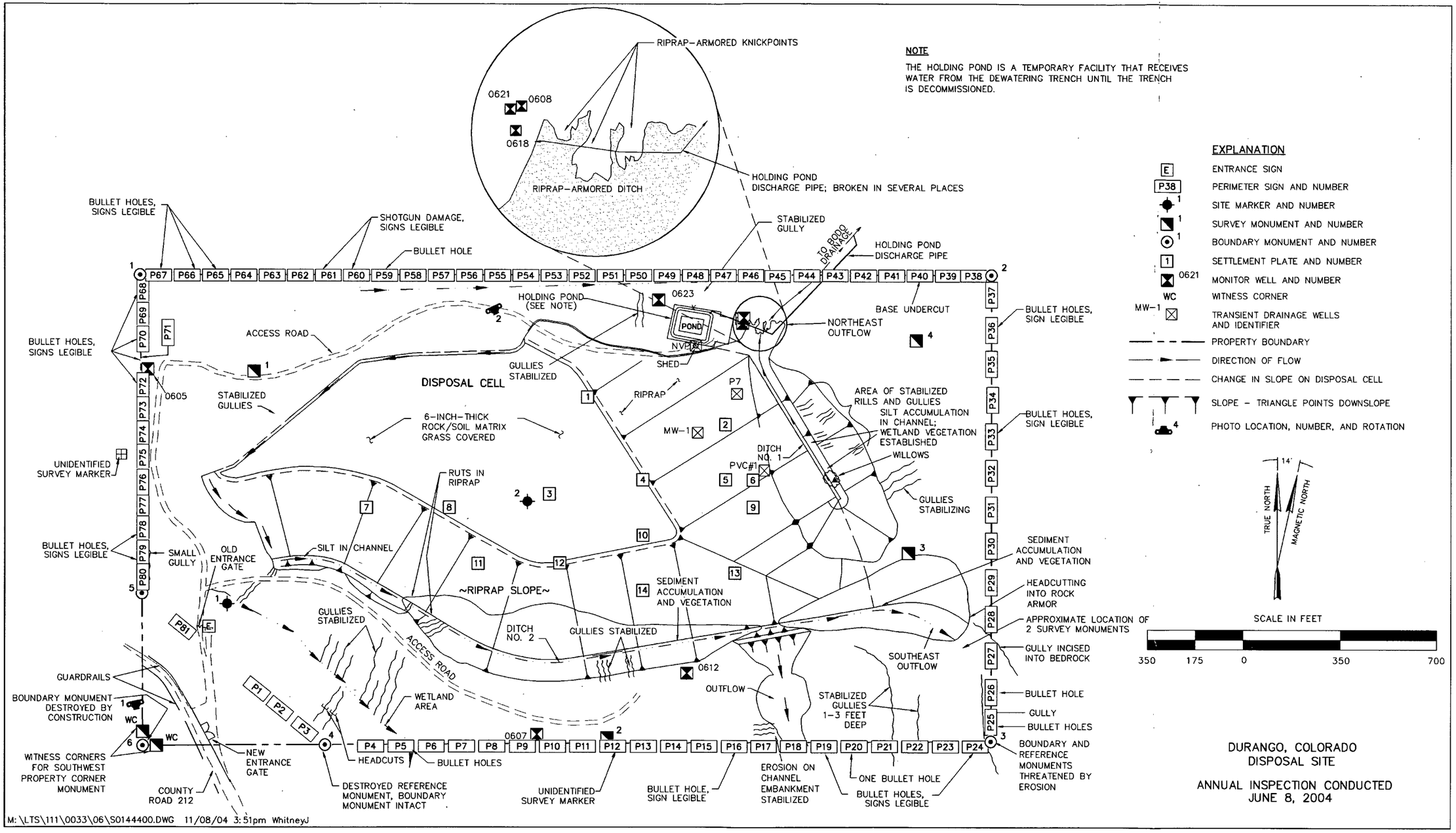


Figure 4–1. 2004 Annual Compliance Drawing for the Durango, Colorado, Disposal Site

Side Slopes of Disposal Cell—The riprap-covered side slopes of the disposal cell were in excellent condition. Disturbances resulting from natural processes, such as subsidence, rock deterioration, or slope failure, were not observed. Minor ruts in the southern 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. 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, summer, and fall.

Drainage Ditches—Rock-armored drainage ditches were constructed along 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. Erosion and sedimentation has occurred at several places along these channels where the slopes above the ditches are steep. There was no evidence of recent slope erosion or accumulations of sloughed material into the drainage ditches in 2004.

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

The riprap-covered outflow of Ditch 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 drainage ditches and surrounding areas continue to be monitored and controlled. The weeds were treated with herbicide in the spring, summer, and fall 2004.

Treatment Cells and Holding 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 holding 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 holding 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 holding pond, permeable reactive barrier facility, and surrounding security fence were in good condition. The water level in the pond was very low and only a small quantity of water was draining into the pond. The holding 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 holding pond.

The LTSP states that the collection drain may be closed after water draining from the cell reaches an equilibrium elevation of 7,055 feet above mean sea level. At the time the system was reopened in spring 2004, the phreatic surface elevation of the pore water within the cell had remained steady at 7,049 feet during the previous 6 months. DOE plans to follow the closure
4B guidance in the LTSP by leaving the collection drain closed for the next 2 years and monitoring the phreatic surface of the cell water using dataloggers. If the water elevation rises above 7,055 feet during any 6-month period, the drain will be reopened. If the steady state water elevation remains below 7,055 feet after 2 years, DOE will prepare plans for decommissioning the collection drain system, the permeable reactive barrier facility, and the holding pond.

Site Boundary—The site is not fenced. Missing and damaged perimeter signs indicate continued trespassing and vandalism. However, the new entrance gate off of the county road has effectively prevented vehicular trespass and the associated damage that had occurred prior to installation of the gate.

Areas of rill and gully erosion on the south-facing slope along the southern boundary of the site were stable. Establishment of vegetation in these areas and exposure of resistant bedrock in the gully are effectively preventing further erosion. Evidence of active gully erosion was noted on a hill slope near the southwest corner of the site; however, this erosion and sedimentation will not impact the disposal cell or its drainage ditches. 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 herbicide during spring, summer, and fall applications.

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. The U.S. Bureau of Reclamation is constructing the Animas-La Plata Project. A water intake and pumping plant structure is being constructed at the Animas River on the site of the former raffinate ponds. The pipeline to the Ridges Basin Reservoir—currently under construction southwest of the disposal site—is adjacent to County Road 211 and passes just south of the cell. Pipelines that were within the footprint of the reservoir were rerouted parallel to County Road 212 on the west side of the disposal site. 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 2004.

4.3.3 Routine Maintenance and Repairs

The missing perimeter sign was replaced. Woody species on the cell side slopes were cut and
4C their stems were treated with herbicide. Noxious weeds identified at the site were treated with herbicide during spring, summer, 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 cell. The monitoring network consists of six wells. 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 because it intercepts the full section of the 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. The MCLs are 0.1 milligrams per liter (mg/L) for molybdenum, 0.01 mg/L for selenium, and 0.044 mg/L for uranium.

4D With the exception of the uranium concentration in MW–0618, the results of monitoring in 2004 were consistent with previous years. Concentrations of all three indicator analytes were below their respective MCLs, and most results were less than detection limits or minimum detectable activity. Time versus concentration plots for selenium and uranium are included as Figures 4–2 and 4–3. Concentrations of molybdenum were less than 0.001 mg/L.

The uranium concentration in monitor well MW–0618 increased substantially in 2004, the second annual sampling event for that well. The concentration in 2004 was 0.043 mg/L, which is just below its MCL. DOE is in the process of evaluating the cause of increasing uranium concentrations in this well. Monitoring frequency has been increased for MW–0618 to determine if there are any trends in uranium concentration in the well that can be correlated with closure of the collection drain system.

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 2004.

4.3.6 Photographs

Table 4–2. Photographs Taken at the Durango, Colorado, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	170	Inspector marks the location of missing boundary monument BM–6; the north witness corner is in the foreground.
PL–2	155	Healthy vegetation on the disposal cell top.

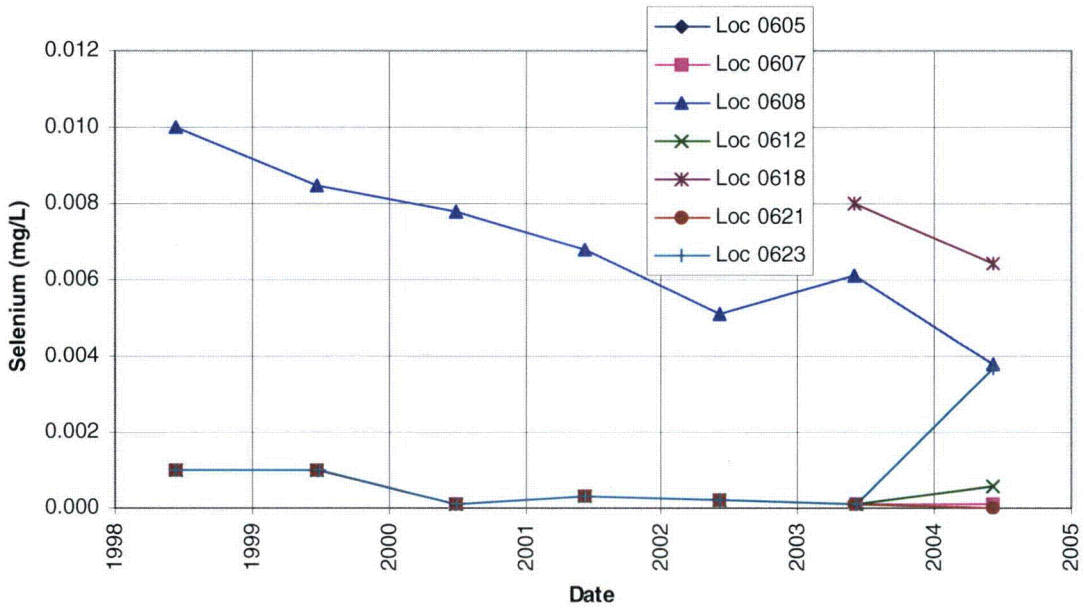


Figure 4–2. Time-Concentration Plots of Selenium in Ground Water at the Durango, Colorado, Disposal Site

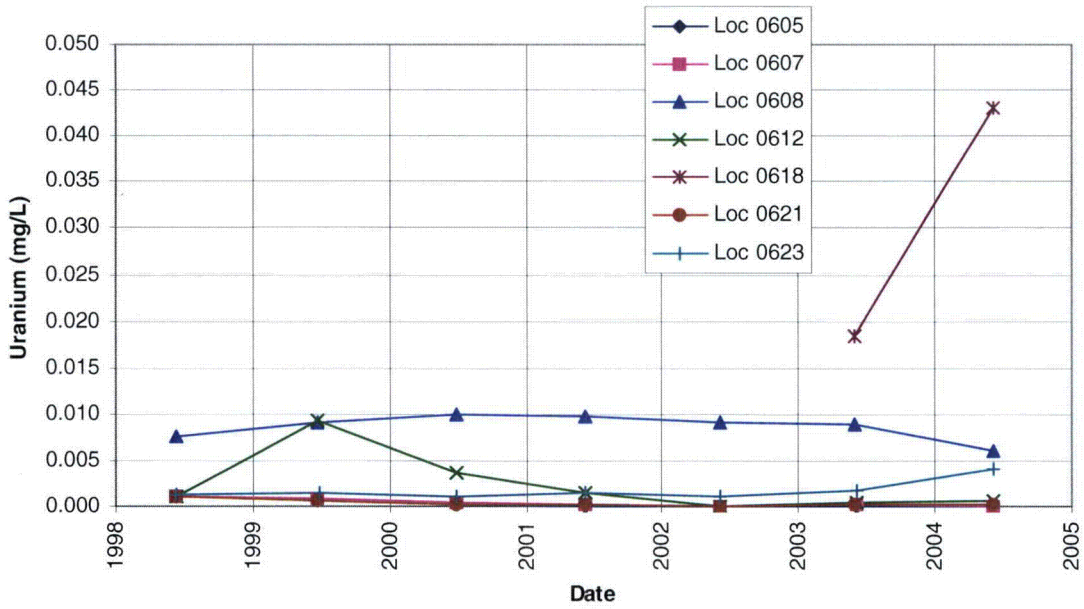
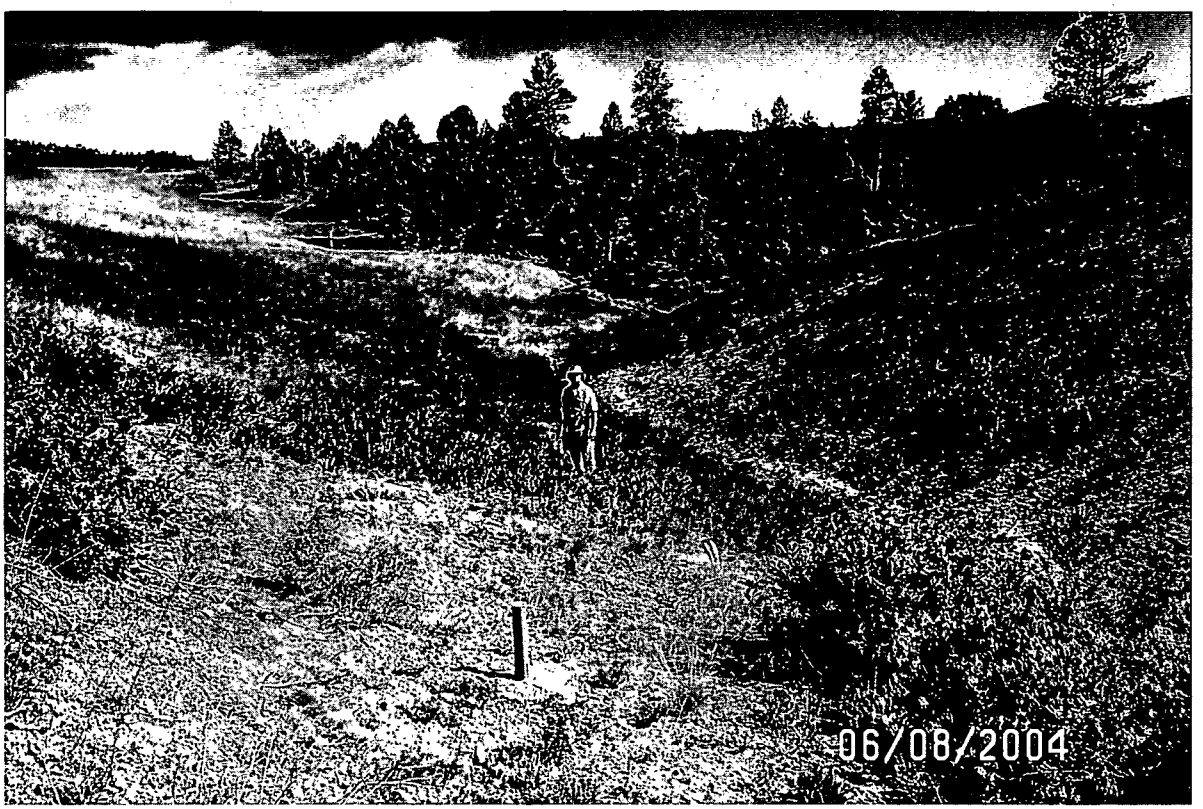


Figure 4–3. Time-Concentration Plots of Uranium in Ground Water at the Durango, Colorado, Disposal Site



DUR 6/2004. PL–1. Inspector marks the location of missing boundary monument BM–6; the north witness corner is in the foreground.

DUR 6/2004. PL–2. Healthy vegetation on the disposal cell top.

End of current section

5.0 Falls City, Texas, Disposal Site

5.1 Compliance Summary

The Falls City Disposal Site, inspected on January 14, 2004, was in good condition. Maintenance items included continued grass management, and control of small trees and shrubs growing in the riprap on the side slopes. Results of ground water monitoring were consistent with results from previous years and indicate essentially steady-state conditions. No cause for a follow-up or contingency inspection was identified.

5.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Falls City, Texas, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Falls City, Texas, Disposal Site* (DOE/AL/62350–187, Rev. 3, U.S. Department of Energy [DOE], Albuquerque Operations Office, July 1997) 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 5–1. Additional ground water monitoring began in accordance with the Ground Water Compliance Action Plan (GCAP), which was submitted to the U.S. Nuclear Regulatory Commission (NRC) on March 19, 1998 and received concurrence on September 18, 1998.

Table 5–1. License Requirements for the Falls City, Texas, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Sections 6.0 and 10.0	Section 5.3.1
Follow-up or Contingency Inspections	Section 7.0	Section 5.3.2
Routine Maintenance and Repairs	Section 8.0	Section 5.3.3
Ground Water Monitoring	Section 5.0 and the GCAP	Section 5.3.4
Corrective Action	Sections 5.0 and 9.0	Section 5.3.5

5.3 Compliance Review

5.3.1 Annual Inspection and Report

The site, located east of Falls City, Texas, was inspected on January 14, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 5–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

5.3.1.1 Specific Site Surveillance Features

Access Road, Entrance Gate, Fence, and Signs—Access to the site is through a vehicle gate directly off of a public right-of-way (Farm-to-Market Road 1344). The main entrance gate and another vehicle gate on the same side of the property were locked and in excellent condition. A barbed-wire fence, set on the property boundary, was in generally good condition. It leans outward above a steep bank along the northwest boundary, but is stable in this position and is

sufficient to keep cattle and casual intruders out (PL–1). The fence predates cell construction and requires occasional repairs of broken strands, and eventually will need to be replaced.

The entrance sign, located at the main entrance gate, was in excellent condition. There are 64 perimeter signs along the site boundary, and all signs were present and in good condition.

Site Markers and Monuments—The two site markers, three survey monuments, and two boundary monuments were undisturbed and in excellent condition.

Monitor Wells—Wells in the monitoring network were inspected and sampled during April and November 2004, at which times all sampled wells were secure and in excellent condition.

5.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the top and side slopes of the disposal cell; (2) the site perimeter; and (3) the outlying area.

Top and Side Slopes of the Disposal Cell—The top of the disposal cell is covered with well-established coastal Bermuda grass and was in good condition. The grass is cut and baled by a local hay farmer, and numerous bales were on top of the cell at the time of the inspection. Grass cutting appears to be an effective control for keeping trees and woody shrubs from establishing on the cell top.

5A

The grass had not been cut since the previous inspection and some trees and woody shrubs had begun to appear on the cell top. The cell top vegetation was cut during summer 2004 and the bales were removed by the farmer. Some woody species were present along the edge of the cell top (transition zone) where the grass is not cut because of close proximity to the side-slope riprap. The shrubs were cut down and herbicide was applied to their stems.

The side slopes are covered with riprap and were in good condition. As noted during previous inspections, small amounts of fractured riprap were observed along the side slopes. The fractured riprap apparently is an artifact of quarrying and placement of the rock and does not appear to be degrading. However, DOE continues to visually monitor the riprap for indications of rock degradation.

Trees and woody shrubs, including deep-rooted greasewood, tend to establish on the side slopes and require periodic removal. Patches of these plants were present at the time of the inspection with some plants measuring 7 feet tall (PL–2). The trees and shrubs were cut down and herbicide was applied to their stems.

Site Perimeter—The area between the fence and the toe of the disposal cell is covered with well-established grass, primarily Kleingrass with some coastal Bermuda grass. Grass is managed by cutting and baling, which also is an effective control against the growth of trees or other woody plants. Grass is left uncut along the fence, along rock drains, and around the site markers.

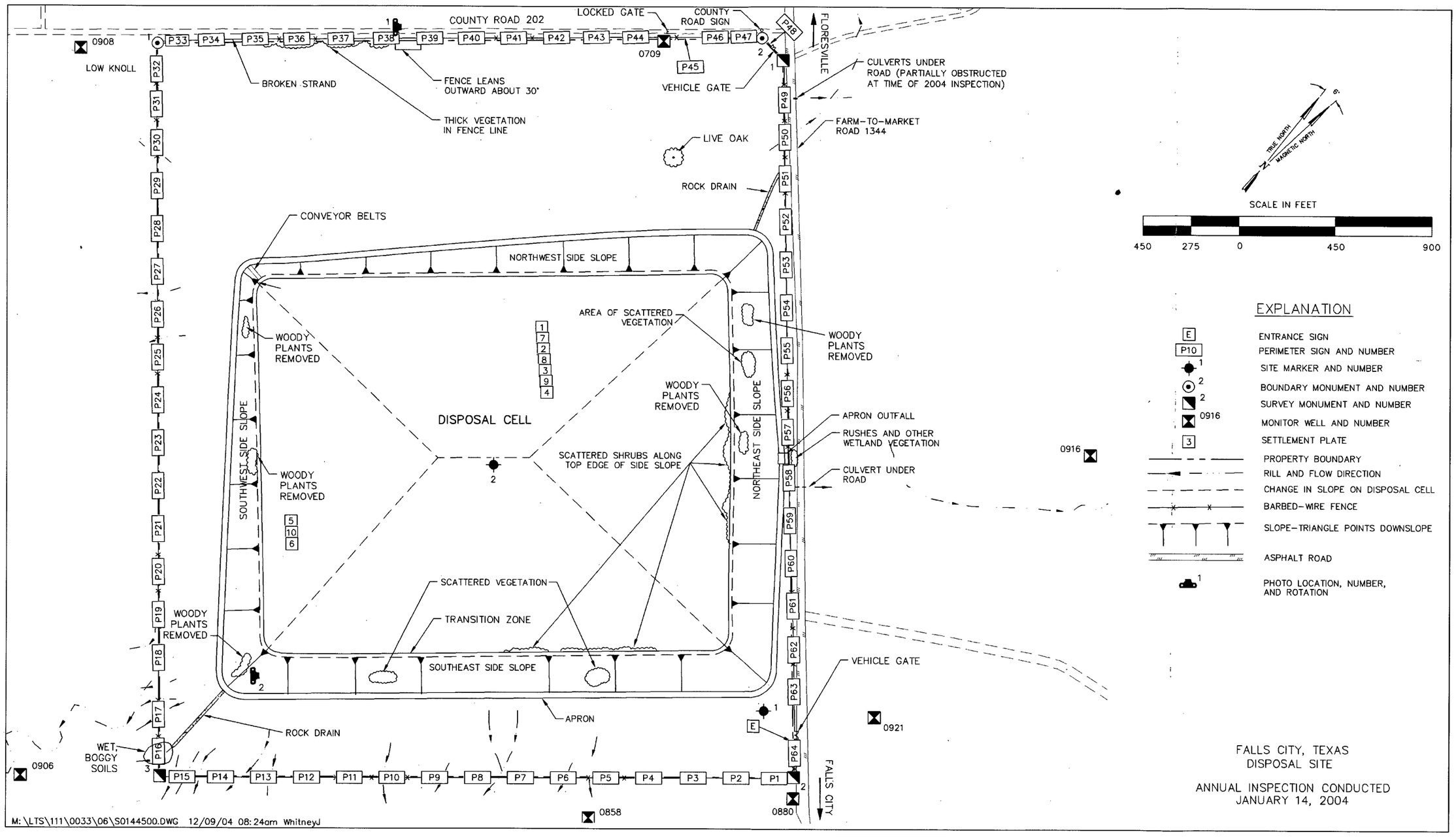


Figure 5–1. 2004 Annual Compliance Drawing for the Falls City, Texas, Disposal Site

No water was observed flowing in either the north or the south rock drains. Although no flow was observed at the time of the inspection, water had recently drained from the south rock drain, as indicated by saturated soils at the drain outfall. Grass growing in both drains has not historically impeded the flow of water draining from the cell. The apron outfall, midway along the northeast side slope, is not yet affected by grass encroachment. Grass in the rock drains may actually assist in dissipating the energy of site runoff, and may, therefore, be a desirable feature.

One of the three large culverts that extend beneath the Farm-to-Market Road 1344 near perimeter sign P49 was partially obstructed with sediment and weed accumulation. Although there is no evidence that runoff water has been blocked or obstructed in the past, this location will continue to be monitored and appropriate maintenance actions will be conducted as necessary to prevent runoff water from backing up and flooding within the site boundary.

Outlying Area—The area outward for a distance of 0.25 mile from the site boundary was visually inspected. No development or disturbance that could affect the site was evident. State-owned land east of the disposal site has been placed on the market for sale. Observers from the Texas Department of Health verified that the property had not yet sold. Potential land use changes by future owners will be monitored.

5.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

5.3.3 Routine Maintenance and Repairs

In 2004, DOE continued grass cutting and bailing on the cell top and between the cell and the site perimeter, and control of trees and woody shrubs growing in the riprap on the side slopes.

5.3.4 Ground Water Monitoring

DOE monitors ground water at the Falls City site as a best management practice to: (1) demonstrate the initial performance of the disposal cell, and (2) ensure that potential users of
5B ground water downgradient from the site are not exposed to processing-related contamination. Ground water samples are collected from the Conquista and Deweesville sandstone units (uppermost aquifer), and from the underlying Dilworth aquifer.

The disposal cell performance monitoring network consists of five monitor wells (MW–0709, MW–0858, MW–0880, MW–0906, and MW–0921) that are sampled semiannually as specified in the LTSP. Two additional cell performance wells (MW–0908 and MW–0916) were designated for water level measurements only. The ground water compliance monitoring network consists of five monitor wells (MW–0862, MW–0886, MW–0891, MW–0924, and MW–0963) that are sampled annually as specified in the GCAP. Ground water samples from the ten monitor wells are analyzed for 33 constituents, including ten which have maximum concentration limits specified in Table 1 to Subpart A of 40 CFR 192. The LTSP identifies pH levels in ground water as the indicator for disposal cell performance on the basis of tailings pore-fluid chemistry. It was anticipated that changes in pH could be used to predict changes in uranium concentrations. The monitor well network is shown on Figure 5–2.

Analytical results from 2004 are generally consistent with previous results and what would be expected of ground water conditions in a naturally mineralized area that has been impacted by uranium exploration and mining activities. Levels of pH have not varied significantly (Figures 5–3 and 5–4). Analyses of all pH and uranium sample results indicate that there is no statistical correlation between changes in pH and changes in uranium in any of the monitor wells.

Uranium concentrations in ground water in the vicinity of the disposal cell are consistent with the previous sampling event. The concentration in monitor well MW–0880 continues to be substantially greater than the other wells and continues to increase (Figure 5–5). The increase may be an indication of seepage from the disposal cell, as expected; there is no risk, however, because ground water is not used in the area. As shown on Figure 5–6, uranium in ground water in the compliance monitoring network has varied substantially in two wells (MW–0891 and MW–0924) since 1997 and exceeded the maximum concentration limit of 0.044 mg/L in four wells (MW–0886, MW–0891, MW–0924, and MW–0963). The increasing trend in uranium concentration in MW–0924 cannot be attributed to degradation of the cell because the wells between it and the cell continue to have low concentrations.

Monitoring for the designated suite of analytes in ground water does not appear to be an effective means to assess the initial performance of the disposal cell because the area is affected by widespread ambient contamination (naturally occurring uranium mineralization) and uranium exploration and mining activities. Ground water in the uppermost aquifer at the site is in contact with the naturally occurring uranium deposits and associated minerals, and water that might leach from the disposal cell, either through transient drainage or percolation of precipitation through the cover, will be chemically similar and perhaps indistinguishable from ambient and otherwise impacted conditions. DOE is evaluating the ground water monitoring program at the site to determine if protectiveness can be demonstrated with reduced monitoring requirements,
5C such as sampling fewer wells, analyzing fewer constituents, and sampling the cell performance wells annually instead of every 6 months. If so, DOE will revise the LTSP for NRC concurrence. The revised plan would also recommend eliminating pH as an indicator for cell performance.

Ground water levels in monitor wells near the disposal cell have declined by several feet since construction, but have been relatively constant for the last several years. Monitor wells MW–0908 and MW–0916, completed in the unsaturated zone of the Conquista Sandstone, have been dry at the time of sampling since 1996. The water level data indicate that the falling water table in the vicinity of the cell was related to dissipation of the processing site-related ground water mound beneath the disposal cell. Ground water levels at the compliance monitoring locations have remained relatively constant since monitoring began. Minor fluctuations in water level are likely caused by seasonal factors affecting recharge rates.

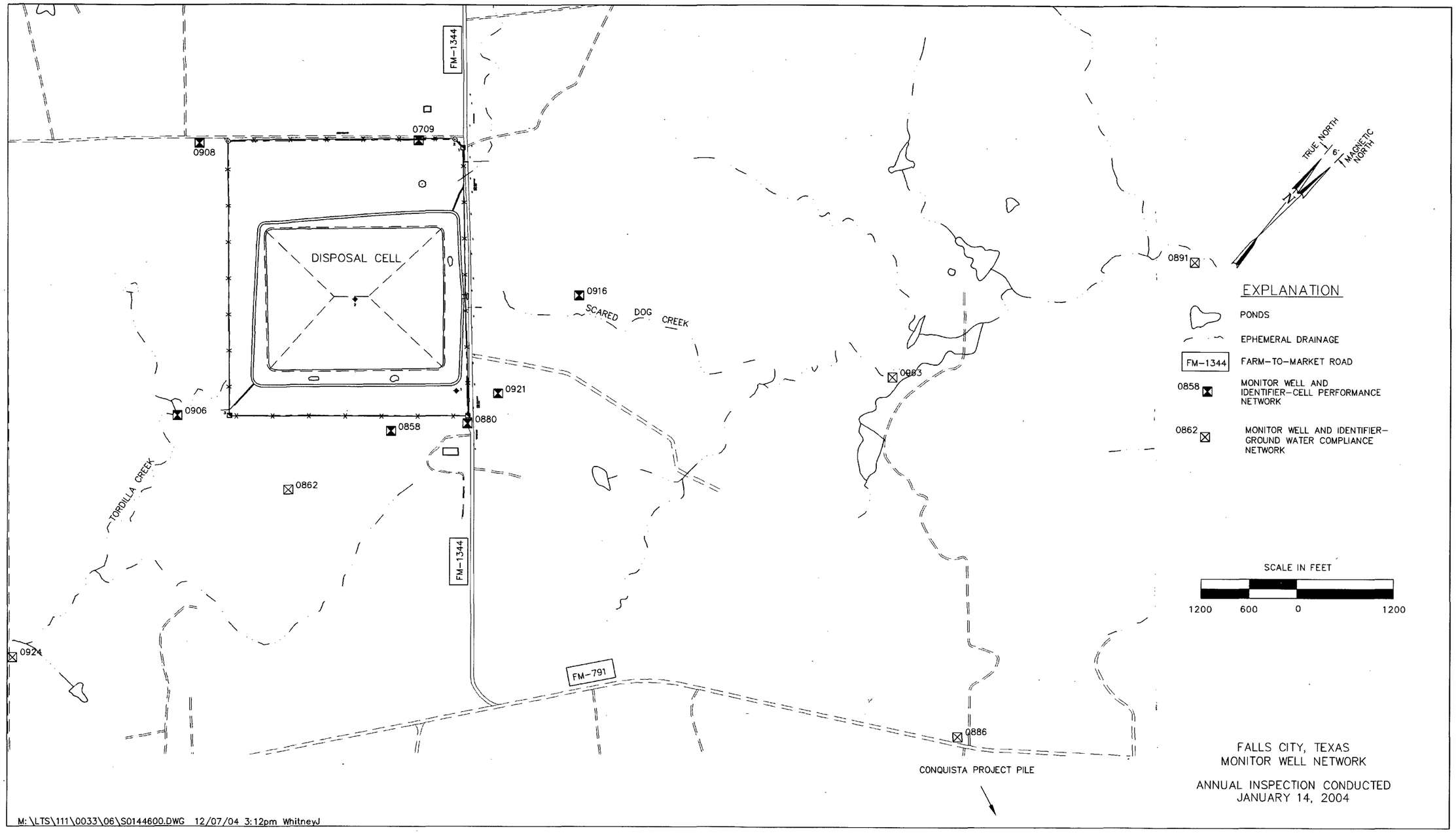


Figure 5–2. Monitor Well Network at the Falls City, Texas, Disposal Site

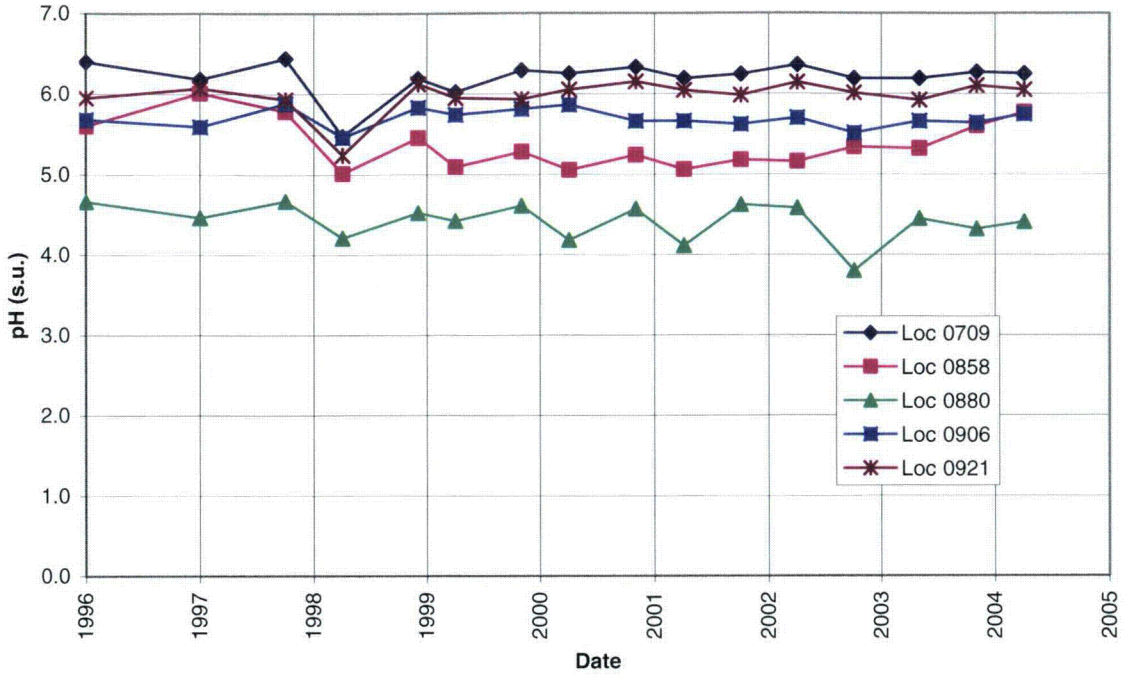


Figure 5–3. pH in Ground Water at Cell Performance Monitoring Locations at the Falls City, Texas, Disposal Site

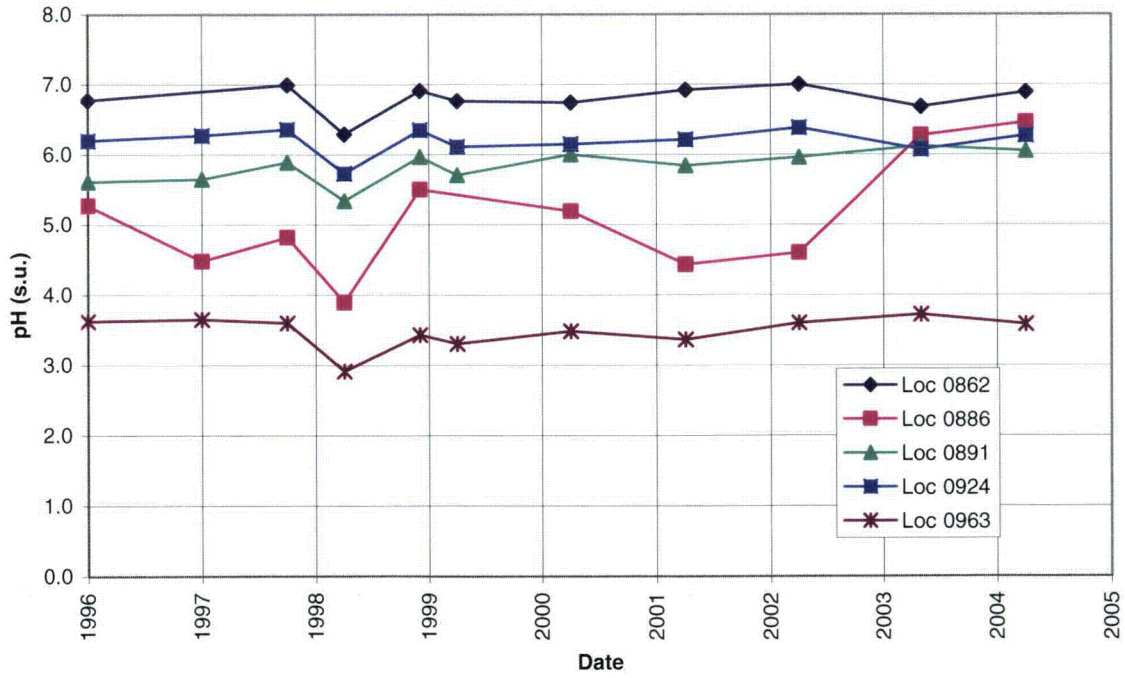


Figure 5–4. pH in Ground Water at Compliance Monitoring Locations at the Falls City, Texas, Disposal Site

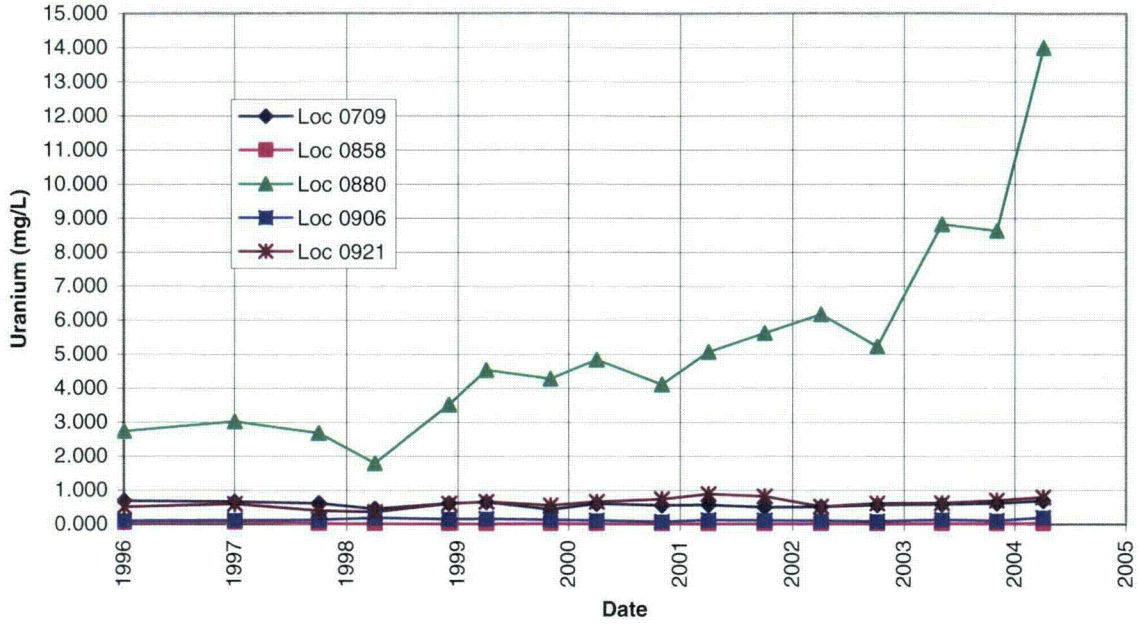


Figure 5–5. Uranium in Ground Water at Cell Performance Monitoring Locations at the Falls City, Texas, Disposal Site

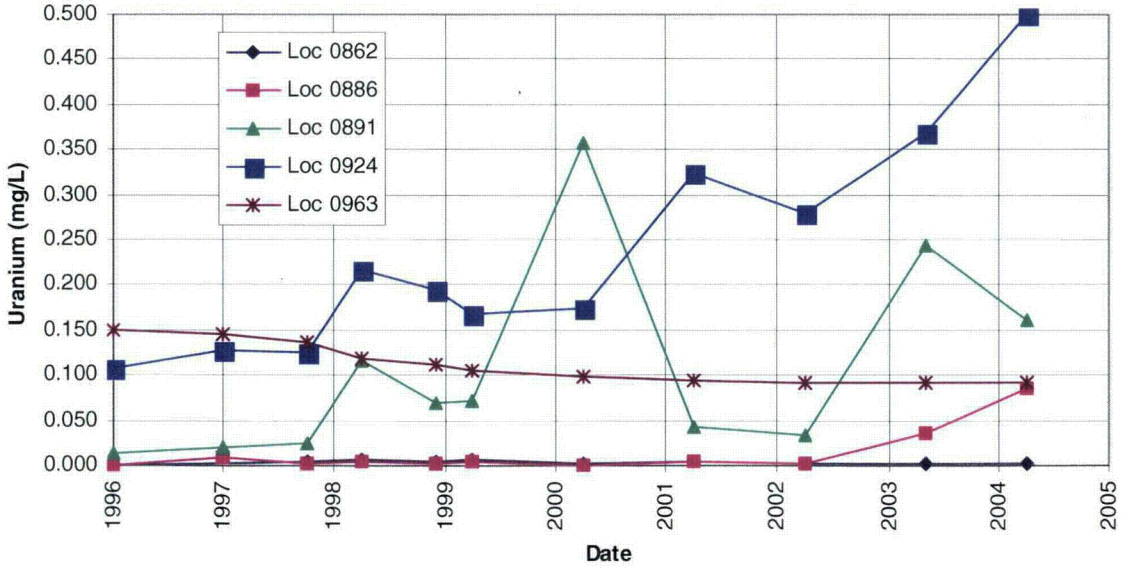


Figure 5–6. Uranium in Ground Water at Compliance Monitoring Locations at the Falls City, Texas, Disposal Site

5.3.5 Corrective Action

Corrective action addresses 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 2004.

5.3.6 Photographs

Table 5–3. Photographs Taken at the Falls City, Texas, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	50	Section of perimeter fence leaning outward, located near perimeter sign P38 along County Road 202.
PL–2	50	Typical vegetation growth found on the side slopes of the disposal cell.

FCT 1/2004. PL–1. Section of perimeter fence leaning outward, located near perimeter sign P38 along County Road 202.

FCT 1/2004. PL–2. Typical vegetation growth found on the side slopes of the disposal cell.

End of current section

6.0 Grand Junction, Colorado, Disposal Site

6.1 Compliance Summary

The Grand Junction Disposal Site, inspected on March 16, 2004, was in good condition. A portion of the disposal cell remains open and is operated by DOE to receive additional low-level radioactive waste materials from various sources. The annual inspection addresses only the closed and completed portion of the disposal cell and surrounding disposal site.

Ditches and a retention pond were constructed east of the disposal cell to divert on-site runoff from a site road and the south diversion channel. DOE began removing tamarisk plants from the site, and continues to evaluate the effects of deep-rooted plants on the disposal cell cover. There was no requirement for a follow-up or contingency inspection.

6.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Grand Junction, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Interim Long-Term Surveillance Plan* [LTSP] *for the Cheney Disposal Site Near Grand Junction, Colorado* (DOE/AL/62350–243, Rev. 1, U.S. Department of Energy [DOE], Albuquerque Operations Office, April 1998), 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 6–1.

Table 6–1. License Requirements for the Grand Junction, Colorado, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.0	Section 6.3.1
Follow-up or Contingency Inspections	Section 3.0	Section 6.3.2
Routine Maintenance and Repairs	Sections 2.7.3 and 4.0	Section 6.3.3
Ground Water Monitoring	Section 2.6	Section 6.3.4
Corrective Action	Section 5.0	Section 6.3.5

6.3 Compliance Review

6.3.1 Annual Inspection and Report

The site, located south of Grand Junction, Colorado, was inspected on March 16, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 6–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

6.3.1.1 Specific Site Surveillance Features

Site Access Gate, Access Road, and Entrance Gate—The site access gate is a steel, double-swing stock gate that is secured by a chain and DOE padlock. The gate, in excellent condition,

controls access to the site from U.S. Highway 50. A paved all-weather access road extends approximately 1.7 miles east along DOE's perpetual right-of-way, through federal land administered by the U.S. Bureau of Land Management (BLM), to the site entrance gate. The road has ruts and potholes at several locations and will require maintenance as needed because disposal operations will continue for many years. The site entrance gate is a double-swing chain link gate in excellent condition, and is secured by a DOE padlock keyed the same as the site access gate.

Entrance and Perimeter Signs—The entrance and 29 perimeter signs, installed on galvanized steel posts set in concrete, were in excellent condition.

Additional warning signs are posted on the wire perimeter fence and are associated with the operation of the open cell. "Controlled Area" signs and "No Trespassing" signs are secured to the fence in pairs. There are 75 warning sign locations, each about 200 feet apart along the site boundary. Some of the "No Trespassing" signs were missing and will be replaced if necessary.

Site Marker and Boundary Monuments—Granite site markers will not be installed at this site until the entire disposal cell is closed.

The site has four permanent boundary monuments, one at each of the four corners. The monuments mark the exact location of the site corners. All were in excellent condition and adequately protected.

Monitor Wells—The ground water monitoring network consists of three monitor wells. All three wells are inside the site boundary. The wells were secure and in excellent condition.

6.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into five areas referred to as transects: (1) the closed portion of the disposal cell; (2) the diversion structures and drainage channels; (3) the area between the disposal cell and the site boundary; (4) the site perimeter; and (5) the outlying area.

Closed Portion of the Disposal Cell—DOE will manage the open portion of the cell at the disposal site to accept waste until 2023 or until the cell is filled to its design capacity. The annual inspection does not include the open cell or the temporary structures or temporary contaminated material stockpile areas associated with the operation of the open cell, except as they may affect the long-term safety and performance of the closed portion of the disposal cell. The open cell occupies approximately 7 acres in the center of the disposal cell. No materials were placed in the cell during 2004, but small quantities were stockpiled inside the open portion of the cell for placement at a later time.

The top and side slopes of the disposal cell are covered with rounded cobbles consisting primarily of durable basalt. A small percentage of sedimentary cobbles are breaking apart; however, the rock on the top and side slopes was in good condition. There was no evidence of settlement or slope instability.

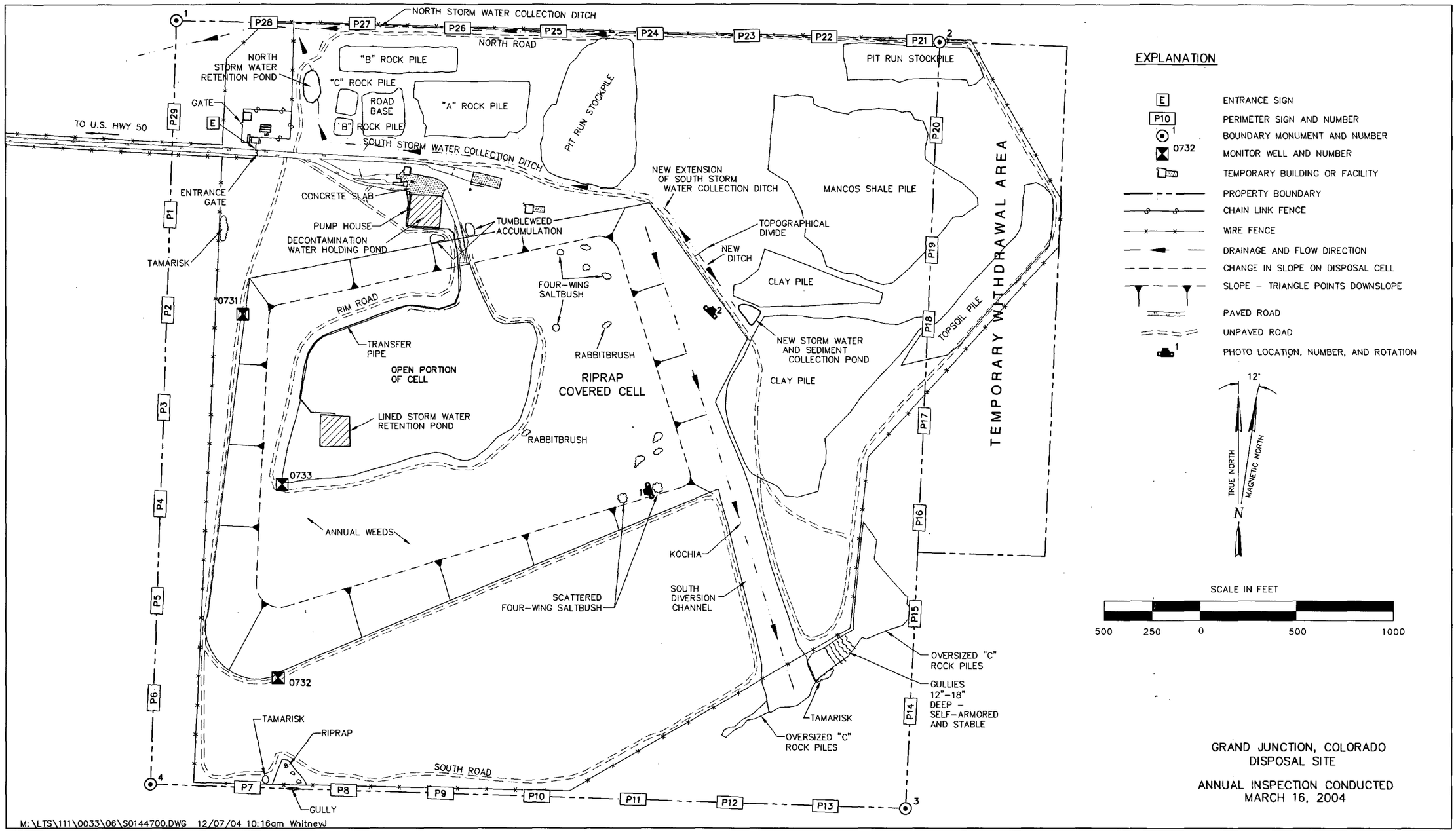


Figure 6–1. 2004 Annual Compliance Drawing for the Grand Junction, Colorado, Disposal Site

Minimal plant encroachment was observed on the side slopes. However, plant encroachment is occurring on the cell top, mostly on the southeastern part of the cell (PL–1). Deep-rooted plants,
6A which were cut back and treated with herbicide in 2001, potentially could change the performance characteristics of the radon/infiltration barrier. An investigation is underway by DOE to evaluate whether or not the deep-rooted vegetation needs to be controlled.

Diversion Structures and Drainage Channels—The south diversion channel, a large riprap-armored structure that conveys storm runoff from the disposal cell southeast into a natural drainage that flows away from the site to the southwest, was in excellent condition. Some minor plant growth, mostly kochia and Russian thistle, exists within the channel; however, there was not enough plant growth to impede water flow within the channel. A stand of tamarisk, a deep-rooted noxious plant, had established at the outlet of the south diversion channel (tamarisk was
6B also found near the northwest corner of the cell and along the south property boundary). DOE began removing the tamarisk in 2004 to prevent it from spreading.

Other drainage features at the site include north and south storm water collection ditches and the north storm water retention pond. The ditches are small and unimproved. Accumulations of sediment and tumbleweeds were observed in both ditches; however, these drainage features are functioning as designed.

The collection ditches control storm water runoff primarily from the various cover materials stockpiled on the northern portion of the disposal site property. The north storm water collection ditch also captures run-on storm water from a large catchment area north and east of the disposal site. Water captured in this ditch discharges into a large natural drainage north and west of the disposal cell. The south storm water collection ditch flows west into the north storm water retention pond.

Snowmelt runoff and heavy storm events result in sheet flow that saturates and erodes segments of the site road that runs along the eastern edge of the south diversion channel (PL–2). This sheet flow has also washed sediment over the road and into the south diversion channel, providing a
6C soil bed for plant growth that could eventually impede the function of the diversion channel. Drainage of this area was improved in 2004 by extending the south storm water collection ditch upstream to a natural divide. A new ditch and retention pond were constructed south of the divide.

Area Between the Disposal Cell and the Site Boundary—In addition to the temporary buildings and structures used for disposal cell operations, 12 discrete stockpiles of rock and soil are located in areas north and east of the disposal cell. These materials eventually will be used by DOE to cover and close the open cell.

Rill erosion is occurring on some of the soil stockpiles, but there was no indication of off-site sediment transport. Natural vegetation is establishing on these stockpiles and eventually will hold the soil in place.

On the south and west sides of the disposal site, between the disposal cell and the perimeter fence, the ground is relatively flat and covered with native vegetation that consists primarily of

perennial grasses and small shrubs. Unlike the areas north and east of the disposal cell, the areas south and west are mostly undisturbed. No erosion was observed south and west of the disposal cell.

Site Perimeter—The perimeter fence surrounding the site consists of a combination of square wire mesh at the bottom and two strands of barbed wire along the top, both supported by steel t-posts. The fence was in good condition and there was no evidence of livestock entering the enclosed area.

The fence runs along or near the property line on the north and south sides of the site, about 200 to 300 feet inside the property line on the west, and as much as 1,000 feet inside at the southeast corner of the site. On the east side, the fence extends beyond the site boundary to enclose part of an adjoining 40-acre temporary withdrawal area that is federal land administered by BLM. The temporary withdrawal area is not included in the interim LTSP and, therefore, is not formally inspected. DOE uses the temporary withdrawal area to stockpile cover materials for the eventual closure of the open cell.

Outlying Area—The area outward from the disposal site for a distance of 0.25 mile was visually inspected. Most of the land surrounding the site is rangeland administered by BLM. The land is covered by native grass and shrubs, and is used primarily for cattle grazing. No development or disturbance that could affect the disposal site was observed.

An overpass formerly crossed U.S. Highway 50 along the old haul road between the railroad off-loading area and the disposal cell. The overpass and access ramps were removed in the spring of 1998, and the area subsequently was regraded and seeded. A reclaimed area south of the access road between the highway and the access gate initially experienced erosion problems; however, this area has been stable in recent years. Grasses and weeds are continuing to establish and are helping to stabilize the soil surface. Successful revegetation is expected to take several years in the arid climate where the disposal cell is situated, and the area will continue to be monitored.

6.3.2 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

6.3.3 Routine Maintenance and Repairs

Maintenance and repair activities in 2004 included construction of new ditches and a retention pond to improve drainage east of the disposal cell and removal of tamarisk from the site.

6.3.4 Ground Water Monitoring

Monitoring of ground water in the uppermost aquifer (Dakota Sandstone) beneath the disposal site is not required because the ground water is of limited use, based on the total dissolved solids (TDS) content exceeding 10,000 milligrams per liter (mg/L) (40 CFR Part 192.21(g)). Confined ground water in the uppermost aquifer lies approximately 750 feet below the existing ground surface and is hydrogeologically isolated from the tailings material by mudstones and shales of the Mancos Shale.

6D In lieu of monitoring ground water in the uppermost aquifer, DOE monitors ground water in two monitor wells in or very near buried alluvial paleochannels adjacent to the disposal cell (MW–0731 and MW–0732) and one monitor well in the disposal cell (MW–0733) to assess performance of the disposal cell and to ensure that any water in the paleochannels is not impacted by seepage (transient drainage) from the disposal cell. The paleochannel wells are along the west (downgradient) edge of the disposal cell and are screened at the interface between the alluvium and shallow Mancos Shale. The third well is in the southwest corner of the open portion of the disposal cell and is used primarily for measurement of water levels in the deepest part of the disposal cell to demonstrate that intracell water will not rise high enough to move laterally into the paleochannels. The water level in the disposal cell well is approximately 35 and 10 feet lower (deeper) than water levels in the paleochannels at MW–0731 and MW–0732, respectively (Figure 6–2). This indicates that ground water cannot seep from the disposal cell to the paleochannels. Information from dataloggers in the wells for the past year showed stable water levels in the well in the disposal cell, and a rapid rise in the water levels in the two paleochannel wells in the spring of 2004. This indicates a significant runoff or precipitation event that recharged the paleochannels but had no effect on the disposal cell well.

Ground water samples are analyzed for standard field parameters and the following indicator analytes: molybdenum, nitrate, selenium, sulfate, TDS, uranium, vanadium, and polychlorinated biphenyls (PCBs). Key indicator analytes with maximum concentration limits (MCLs) established in Table 1 to Subpart A of 40 CFR 192 are molybdenum, nitrate, selenium, and uranium.

Results from sampling in 2004 were consistent with results from the past several years. Molybdenum concentrations in ground water continued to be near or below the required laboratory detection limit and significantly below the MCL of 0.1 mg/L. Nitrate (as NO_3) concentrations exceeded the MCL of 44 mg/L in ground water in monitor wells MW–0732 and MW–0733, but were below the MCL in MW–0731 (Figure 6-3). Selenium levels continued to exceed the MCL of 0.01 mg/L in both paleochannel wells and remained below the standard in MW–0733 in the disposal cell (Figure 6-4). This is to be expected as selenium levels are typically elevated in sediments of the Mancos Shale in the area. Uranium concentrations in ground water were below the MCL of 0.044 mg/L in all three monitor wells (Figure 6-5). Concentrations of other constituents analyzed remained relatively consistent with past results and no PCBs were detected in any of the wells.

Monitoring results indicate ground water in the paleochannels has not been affected by transient drainage from the disposal cell. This is expected because water levels in the paleochannels are higher than in the disposal cell. Elevated levels of nitrate, selenium, and uranium in ground water in the paleochannels are most likely a result of natural soils and weathered shale around the paleochannels. Increased runoff from the cell surface may have increased moisture in the soils, paleochannels, and weathered shale around the disposal cell, which would increase the mobility of naturally occurring concentrations of nitrate, selenium, and uranium in these materials.

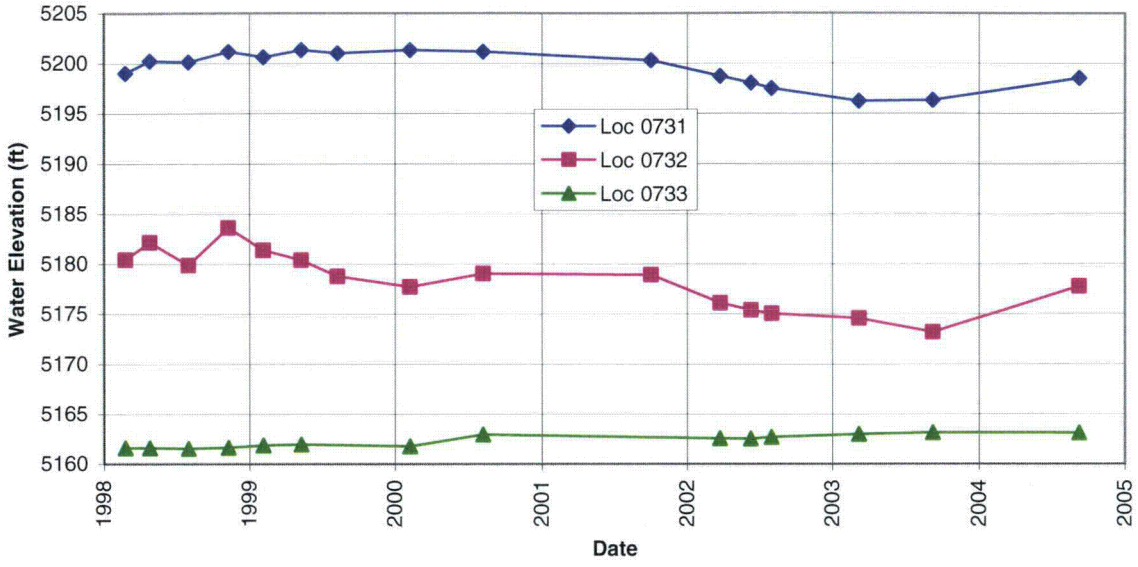


Figure 6–2. Water Level Measurements at the Grand Junction, Colorado, Disposal Site

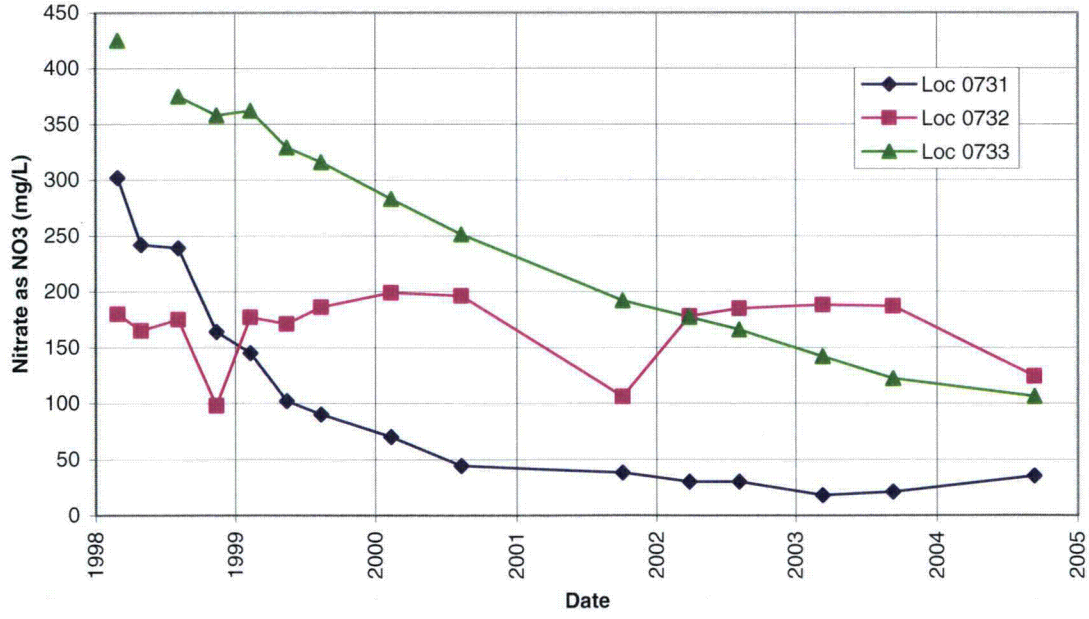


Figure 6–3. Time-Concentration Plots of Nitrate (as NO_3) in Ground Water at the Grand Junction, Colorado, Disposal Site

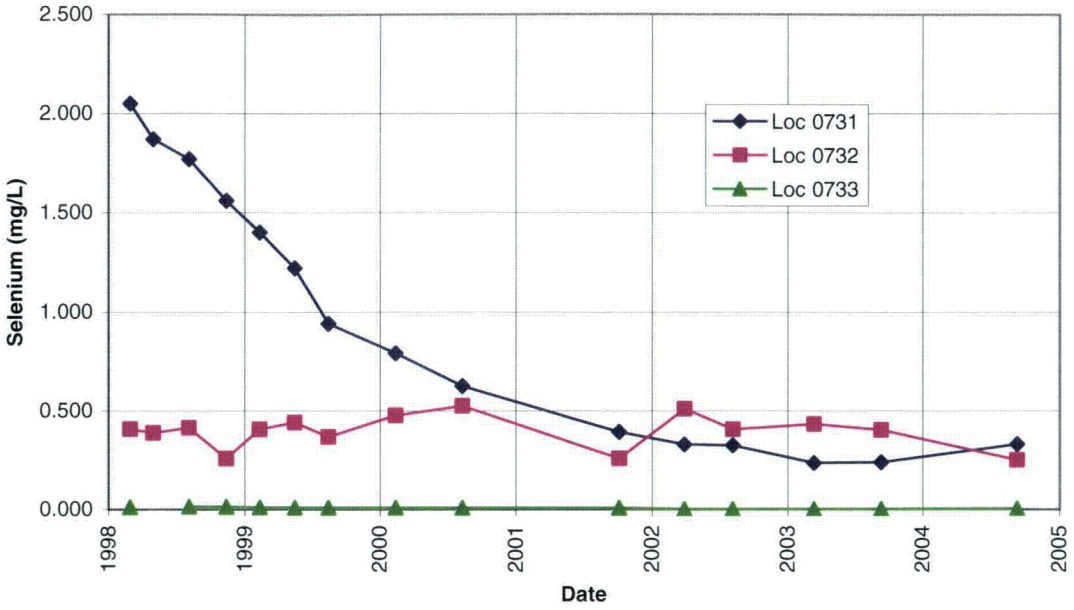


Figure 6–4. Time-Concentration Plots of Selenium in Ground Water at the Grand Junction, Colorado, Disposal Site

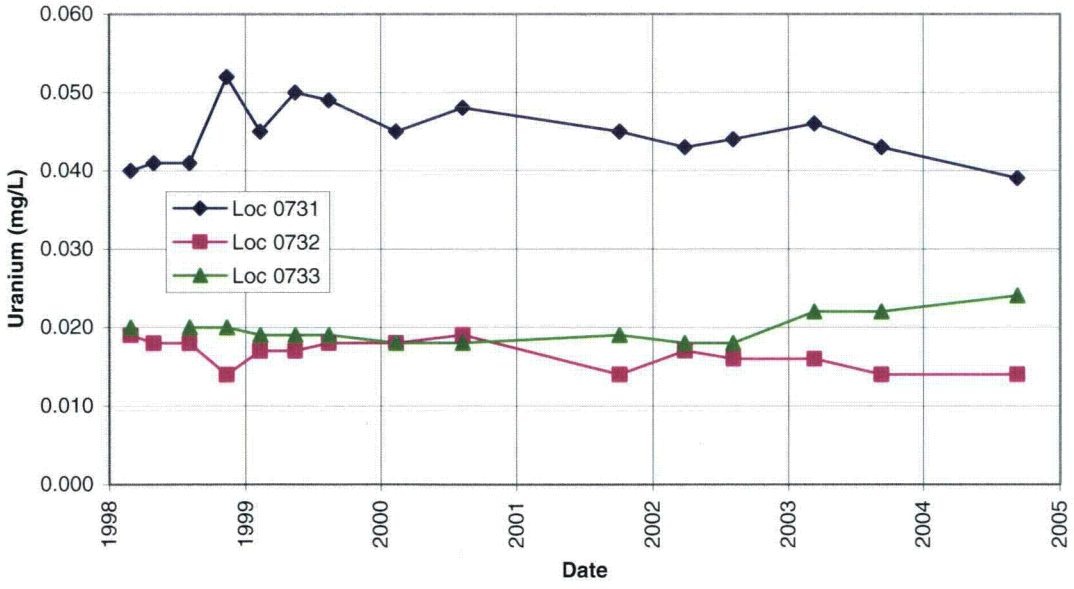


Figure 6–5. Time-Concentration Plots of Uranium in Ground Water at the Grand Junction, Colorado, Disposal Site

6.3.5 Corrective Action

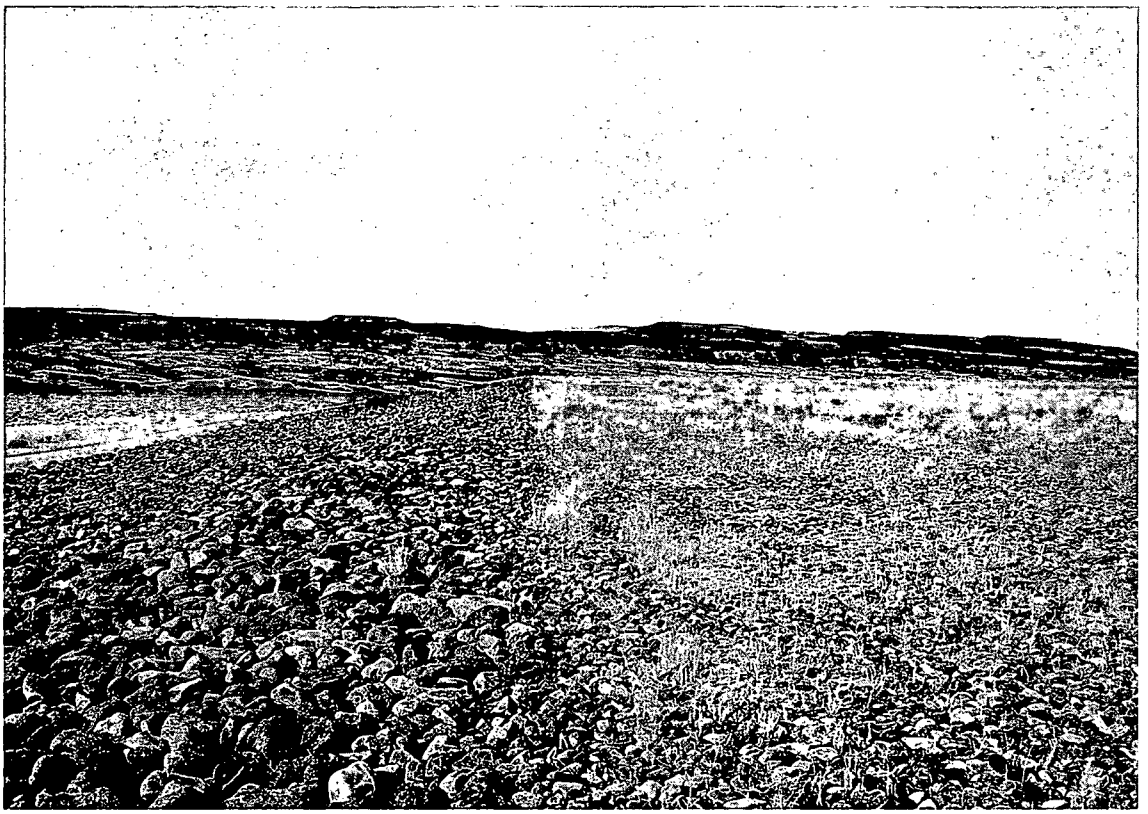
Corrective action addresses out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2004.

6.3.6 Photographs

Table 9–2. Photographs Taken at the Grand Junction, Colorado, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	250	Southern edge of the disposal cell cover and the south side slope showing the excellent condition of the rock cover and the distribution of vegetation.
PL–2	45	An area where sediment-laden sheet flow crossed a site road and discharged into the adjacent south diversion channel.



GRJ 3/2004. PL–1. Southern edge of the disposal cell cover and the south side slope showing the excellent condition of the rock cover and the distribution of vegetation.

GRJ 3/2004. PL–2. An area where sediment-laden sheet flow crossed a site road and discharged into the adjacent south diversion channel.

End of current section

7.0 Green River, Utah, Disposal Site

7.1 Compliance Summary

The Green River Disposal Site, inspected on March 18, 2004, was in good condition. Erosion repairs were made after the 2003 inspection and the locations were in excellent condition. A slight depression noted on the southeast facet of the cell apparently is a remnant of past standpipe removal activities and does not compromise the integrity of the cell. A damaged perimeter sign near the site entrance was replaced. Ground water monitoring continued in 2004 for the purpose of evaluating cell performance, trends in contaminant levels, and the relationship between local precipitation and ground water elevations. No need was identified for a follow-up or contingency inspection.

7.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Green River, Utah, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Green River, Utah, Disposal Site* (DOE/AL/62350–89, Rev. 2, U.S. Department of Energy [DOE], Albuquerque Operations Office, July 1998) 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 7–1.

Table 7–1. License Requirements for the Green River, Utah, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 7.3.1
Follow-up or Contingency Inspections	Section 7.0	Section 7.3.2
Routine Maintenance and Repairs	Section 8.0	Section 7.3.3
Ground Water Monitoring	Section 5.2	Section 7.3.4
Corrective Action	Section 9.0	Section 7.3.5

7.3 Compliance Review

7.3.1 Annual Inspection and Report

The site, located southeast of Green River, Utah, was inspected on March 18, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 7–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

7.3.1.1 Specific Site Surveillance Features

Access Road, Entrance Gate, Fence, and Signs—Access to the site is from a paved road that leads south from Green River across state land and U.S. Army property or north from U.S. Interstate Highway 70 across Army property. Entrance to the site is through a tubular steel gate in the stock fence along the paved road. Past this gate, a short track leads across state land to the disposal cell, which is enclosed within a chain link security fence. The chain link fence is set back 50 to 250 feet from the site boundary. Two vehicle access gates are installed in this fence at

the south and east corners of the fence line. A personnel gate is at the north corner of the fence line. The security fence and gates were in excellent condition.

The site has one entrance sign and 17 perimeter signs. The signs are on posts set along the
7A unfenced site boundary. Perimeter sign P1, located near the site entrance, was damage by shotgun blasts and was replaced. The entrance sign and remaining perimeter signs were in excellent condition.

Site Markers and Monuments—The two granite site markers, 11 boundary monuments, and three survey monuments were in excellent condition.

Monitor Wells—The ground water monitoring network consists of four point-of-compliance wells northwest of the disposal cell. An additional well offsite is used for monitoring aquifer water level. These wells were in excellent condition. DOE owns additional wells in the site vicinity (not shown on Figure 7–1) that are used for developing a ground water compliance strategy.

7.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the disposal cell and adjacent area inside the security fence; (2) the site perimeter between the security fence and the site boundary; and (3) the outlying area.

Disposal Cell and Adjacent Area Inside the Security Fence—The side and top slopes of the disposal cell are armored with riprap. The riprap was in excellent condition. A shallow
7B depression (approximately 2-3 inches deep) was observed in the lower portion of the facet, and a slight ridge was observed below the depression (PL–1). This feature, apparently a remnant of past standpipe removal activities, is not impacting the integrity of the cell; however, it will be monitored and evaluated during future inspections to ensure that this area of the cell cover remains stable. No plant growth was observed on the cell.

The riprap-filled diversion channel (apron) along the base of the disposal cell on all sides was in excellent condition. Erosion repairs along the apron conducted in late 2003 were successful and no new erosion was evident.

DOE installed a precipitation monitoring station in the west corner of the secured portion of the site in September 2001 to evaluate the relationship between site precipitation and ground water elevations. The data storage module was exchanged at the time of the inspection (PL–2). The station was in excellent condition.

Site Perimeter Between the Security Fence and the Site Boundary—Graded areas were reseeded with grasses soon after construction was completed. Establishment of seeded and natural vegetation has been a slow process. Vegetation in these areas continues to be sparse, especially in the graded areas northeast and southwest of the disposal cell. However, natural and seeded plants appear to have reached abundances comparable to the sparsely vegetated surrounding areas and revegetation is considered to be successful.

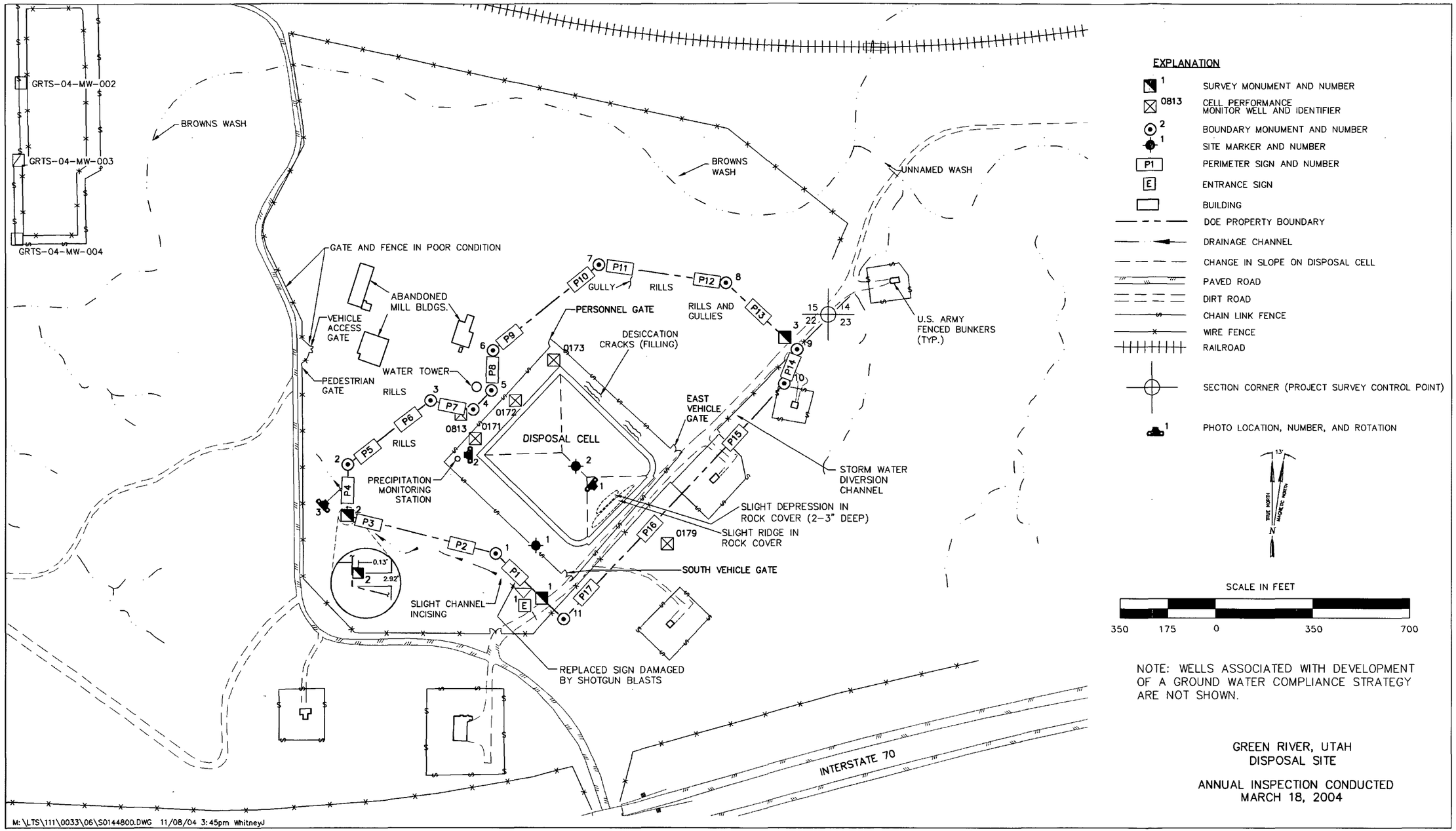


Figure 7–1. 2004 Annual Compliance Drawing for the Green River, Utah, Disposal Site

Rill erosion has occurred on the west side of the property but no new erosion was noted during the inspection. Site grading was performed in December 2003 to repair erosion damage and to divert runoff away from perimeter sign P4 (PL–3) and boundary monument BM–3.

Rill and gully erosion noted during previous inspections on the hillside northeast of the disposal cell in the area between boundary monument BM–7 and survey monument SM–3 was unchanged from 2003. Maximum gully depth in this area is approximately 3 feet. The rill and gully erosion poses no threat to the integrity of the disposal cell but eventually could damage perimeter signs and boundary monuments; therefore, monitoring of erosion in this area will continue.

The damage to perimeter sign P1 (shotgun shell casings were found near the sign) and the presence of motorcycle tracks are evidence of trespass on DOE property; however, there was no evidence of trespass inside the chain link security fence surrounding the disposal cell. The barbed-wire stock fence on the surrounding state-owned property provides only minimal security, and the fence and gates west of the site are in poor condition. Inspectors will continue to monitor and record incidents of trespass on the site.

Outlying Area—The area extending outward from the site for a distance of 0.25 mile was checked for signs of erosion, development, or other disturbance that might affect site security or integrity. Areas of erosion noted during this and previous inspections include the natural drainage southwest of the site and rills and gullies northwest of the water tower. These erosional features pose no threat to the integrity of the disposal cell. However, these areas will be monitored because continued erosion could threaten the stability of perimeter signs or boundary monuments.

Abandoned buildings associated with milling activities at the Green River processing site are located northwest of the DOE property. The buildings are in a severe state of disrepair. Accumulation of building materials blown onto DOE property (e.g., roofing materials, siding, trash) was not significant, but will continue to be monitored and debris will be removed as necessary.

7.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

7.3.3 Routine Maintenance and Repairs

In 2004, DOE replaced a damaged perimeter sign.

7.3.4 Ground Water Monitoring

DOE currently is monitoring ground water in four point-of-compliance wells in the uppermost aquifer downgradient from the disposal cell. The purpose of the monitoring is to evaluate the 7C initial performance of the disposal cell. Ground water samples are collected quarterly and analyzed for nitrate, sulfate, and uranium. Proposed concentration limits for these constituents were established in the LTSP and are indicated in Table 7–2. Water levels are measured in the point-of-compliance wells and in offsite monitor well MW–0179.

Table 7–2. Proposed Concentration Limits for Point-of-Compliance Wells at the Green River, Utah, Disposal Site

Monitor Well	Nitrate (as NO_3) (mg/L)	Uranium (mg/L)	Sulfate (mg/L)
MW–0171	44	0.044	3,334
MW–0172	102	0.067	4,985
MW–0173	44	0.044	4,000
MW–0813	44	0.069	4,440

Note: Maximum concentration limits from Table 1 to Subpart A of 40 CFR 192 are 44 milligrams per liter (mg/L) for nitrate (as NO_3) and 0.044 mg/L for uranium. Other proposed concentration limits were determined from background levels for specific monitor wells.

Samples were collected quarterly for 3 years beginning in 1998 with the provision that monitoring requirements would be reevaluated in 2001. The evaluation report concluded that concentrations were within a reasonable range of compliance relative to the proposed concentration limits. Uranium processing-related ground water contamination at the site is being investigated, and it was agreed that monitoring of the four point-of- compliance wells would continue on a quarterly basis until a site-wide compliance strategy and monitoring program is proposed and approved. In the interim, it has been determined there is no potential impact to human health and the environment as a result of site-related contamination in ground water in the vicinity of the Green River site.

Ground Water Quality Monitoring—Concentrations of nitrate in ground water continued above the proposed concentration limits (Table 7–2) except in well MW–0813, where values were very near the laboratory detection limit (Figure 7–2). Nitrate concentrations fluctuated slightly in well MW–0171, and there was considerable variation in the values for wells MW–0172 and MW–0173.

Sulfate concentrations in ground water have remained relatively constant in wells MW–0171 and MW–0813 since the disposal cell was constructed (Figure 7–3). Concentrations in wells MW–0172 and MW–0173 have fluctuated substantially since 1998. Concentrations in 2004 continued above the proposed concentration limits (Table 7–2) in wells MW–0171, MW–0172, and MW–0173. Sulfate concentration was below the proposed limit in well MW–0813.

Uranium concentrations in ground water were below the proposed concentration limits (Table 7–2) in all four point-of-compliance wells from 1995 until 2002, when levels exceeded the maximum concentration limit in well MW–0171 (Figure 7–4). The increasing uranium concentration in MW–0171 may be an indication of seepage from the disposal cell, as expected on the basis of the cell design and construction. Concentrations in the other monitor wells remain fairly constant and at or below 0.010 milligrams per liter.

Ground Water Level Monitoring—Ground water levels in several monitor wells adjacent to the disposal cell have been measured manually since 1991, and continually with down-hole dataloggers since 1999. Well hydrographs indicate an overall decrease in the ground water elevation of approximately 2 feet since 1999 (Figure 7–5).

Precipitation at the site has been monitored since 2001. There has been no correlation between precipitation and ground water elevations in the monitor wells adjacent to the disposal cell.

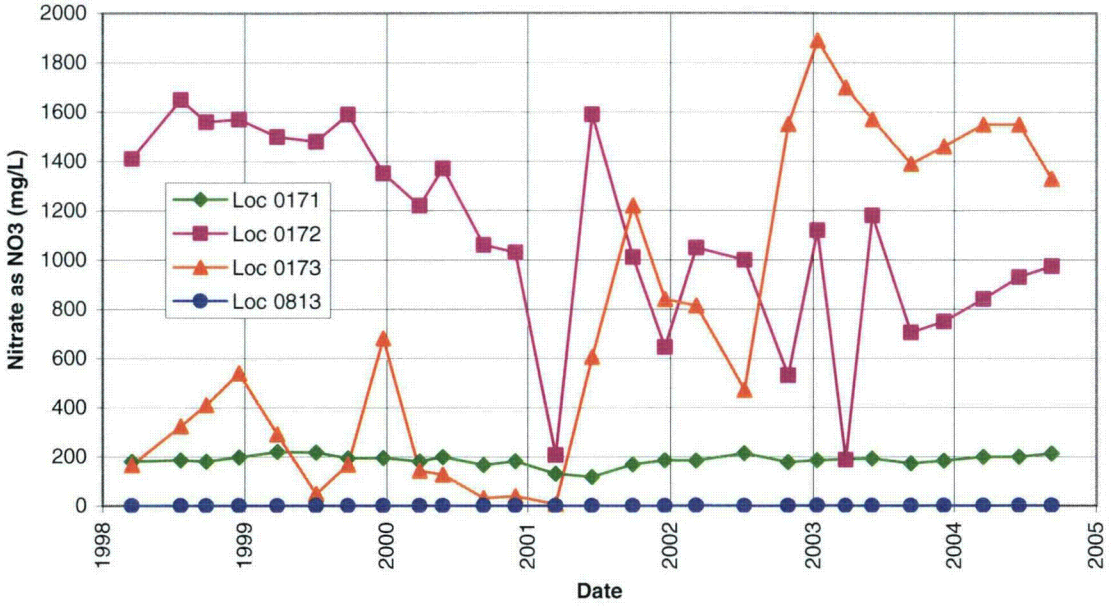


Figure 7–2. Time-Concentration Plots of Nitrate (as NO_3) in Ground Water at the Green River, Utah, Disposal Site

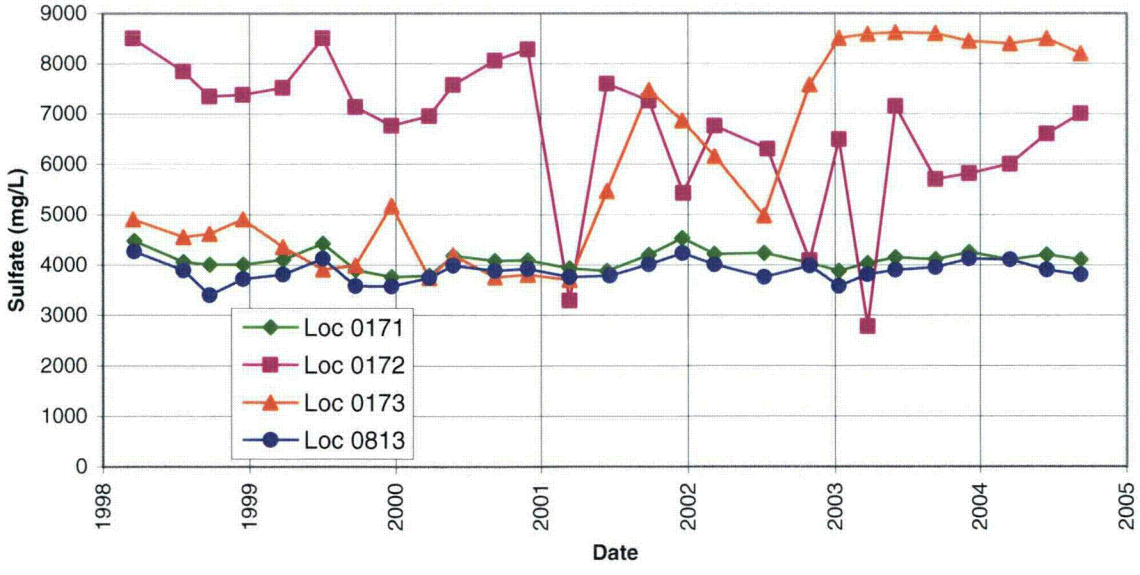


Figure 7–3. Time-Concentration Plots of Sulfate in Ground Water at the Green River, Utah, Disposal Site

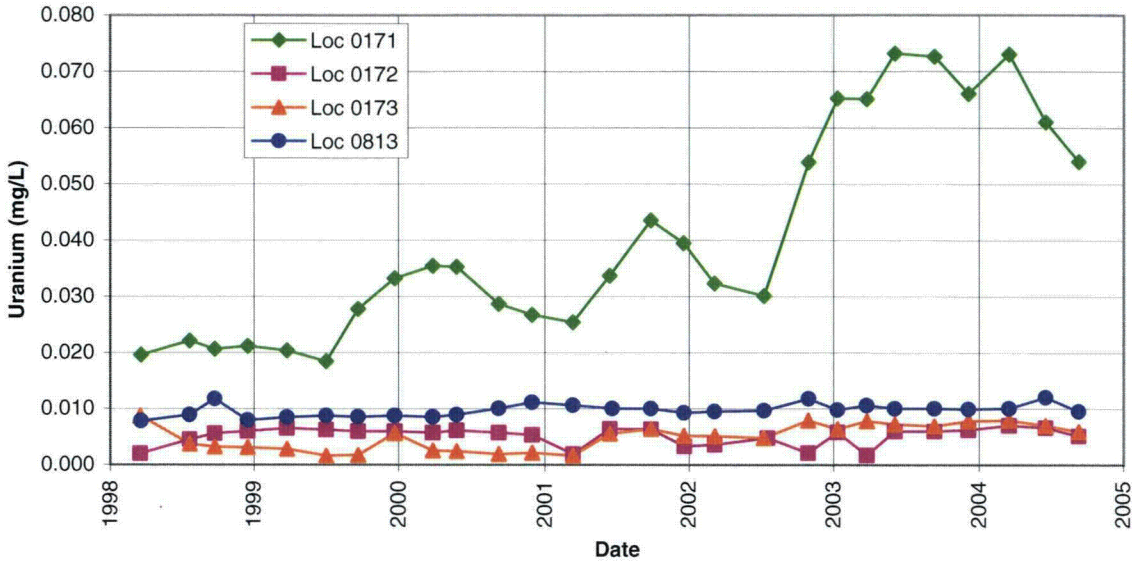


Figure 7–4.Time-Concentration Plots of Uranium in Ground Water at the Green River, Utah, Disposal Site

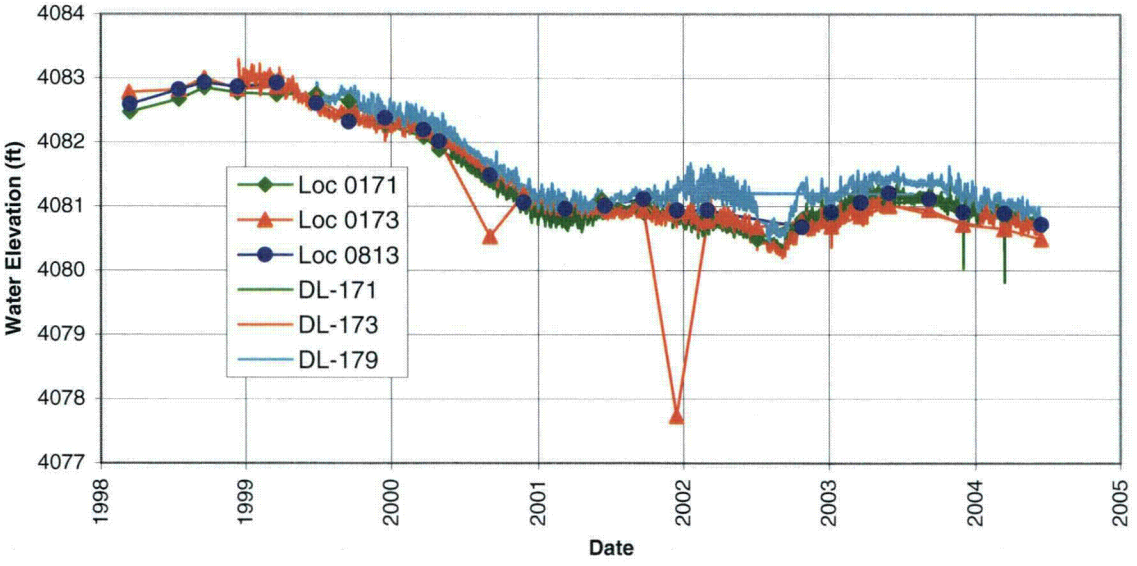


Figure 7–5. Ground Water Elevations at the Green River, Utah, Disposal Site

7.3.5 Corrective Action

Corrective action addresses 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.

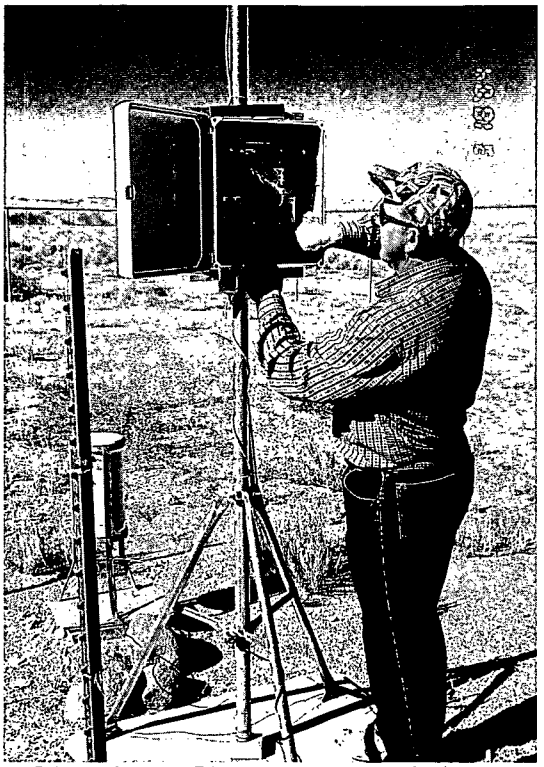
No corrective action was required in 2004.

7.3.6 Photographs

Table 7–3. Photographs Taken at the Green River, Utah, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	130	Inspectors standing in a slight depression area near the base of the southeast side slope of the disposal cell.
PL–2	250	Exchange of the data storage module at the disposal site precipitation gage.
PL–3	45	Repairs made to erosional rills at perimeter sign P4.

GRN 3/2004. PL–1. Inspectors standing in a slight depression area near the base of the southeast side slope of the disposal cell.



GRN 3/2004. PL–2. Exchange of the data storage module at the disposal site precipitation gage.

GRN 3/2004. PL–3. Repairs made to erosional rills at perimeter sign P4.

End of current section

8.0 Gunnison, Colorado, Disposal Site

8.1 Compliance Summary

The Gunnison Disposal Site was inspected on May 27, 2004, and was in excellent condition. One perimeter sign was missing and another has heavily damaged by bullets. Several areas along the reclaimed former Chance Gulch haul road had not yet successfully revegetated at the time of the inspection. These areas were reseeded in fall 2004. No cause for a follow-up or contingency inspection was identified.

8.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Gunnison, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Gunnison, Colorado, Disposal Site* (DOE/AL/62350–222, Rev. 2, U.S. Department of Energy [DOE], Albuquerque Operations Office, April 1997) 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 8–1.

Table 8–1. License Requirements for the Gunnison, Colorado, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.1	Section 8.3.1
Follow-up or Contingency Inspections	Section 3.5	Section 8.3.2
Routine Maintenance and Repairs	Section 5.0	Section 8.3.3
Ground Water Monitoring	Section 4.1	Section 8.3.4
Corrective Action	Section 6.0	Section 8.3.5

8.3 Compliance Review

8.3.1 Annual Inspection and Report

The site, located southeast of Gunnison, Colorado, was inspected on May 27, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 8–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

8.3.1.1 Specific Site Surveillance Features

Access Road, Entrance Gate, Signs, and Fence—The road to the site is an all-weather gravel road maintained by the U.S. Bureau of Land Management (BLM) and was in good condition. The south entrance gate is a simple barbed-wire gate in the stock fence that surrounds the site. The gate, secured by a padlock and chain to the adjoining post, was in good condition.

An entrance sign and 45 perimeter signs are attached to the posts of the perimeter fence. The
8A entrance sign was in excellent condition. Perimeter sign P3 was missing and P41 was heavily damaged with bullet holes (PL–1); these signs will be replaced during the next inspection. Several other perimeter signs have bullet holes but all were legible. Perimeter sign P37 is bent and has cracked paint, but was still legible. The other perimeter signs were in excellent condition.

A 3-strand barbed-wire fence delineates the site perimeter. Two barbed-wire gates—one on the north fence line, the other on the east fence line—provide monitor well access. The fence and gates were in excellent condition.

Site Markers, Survey Monuments, and Boundary Monuments—The two site markers, three combination survey/boundary monuments, and eight boundary monuments were in excellent condition.

Monitor Wells—The ground water monitoring network at the Gunnison disposal site consists of 16 wells. All monitor wells were secure and in excellent condition.

8.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into four areas referred to as transects: (1) the riprap-covered disposal cell; (2) the riprap-covered side slopes, apron, and diversion ditches; (3) the area between the disposal cell and the site boundary; and (4) the outlying area. Transect four included an inspection of several reseeded areas on reclaimed former haul roads.

Top of Disposal Cell—The top of the disposal cell was in excellent condition. There was no evidence of erosion, settling, or slumping. Several isolated patches of grass were observed on the disposal cell cover; however, these plants do not impact the performance of the cover.

Side Slopes, Apron, and Diversion Ditches—The riprap-covered side slopes (PL–2), apron, and diversion ditches were in excellent condition. No evidence of slumping, settling, or significant encroachment of vegetation was observed.

At the southeast corner of the cell apron, water draining from the cell occasionally ponds in a low-lying area along the edge of the riprap. The riparian-type vegetation that has established indicates this area retains moisture much of the time. Water collection in this area does not pose a problem because the cell is designed to drain to the southeast, and any water that ponds is below the elevation of the tailings. This area was dry at the time of the inspection.

The condition of the riprap in six test squares was inspected. Each test square, roughly 1 square meter, is in a "critical flow path" location in the diversion channels. No degradation of the rock was noted when visual comparisons were made with the 2002 inspection photographs of the test squares. As outlined in the LTSP, annual photographing and comparing of these test plots occurred through the 2002 inspection, and the test plots will be photographed every 5 years until 2017. DOE will re-photograph the test squares in 2007.

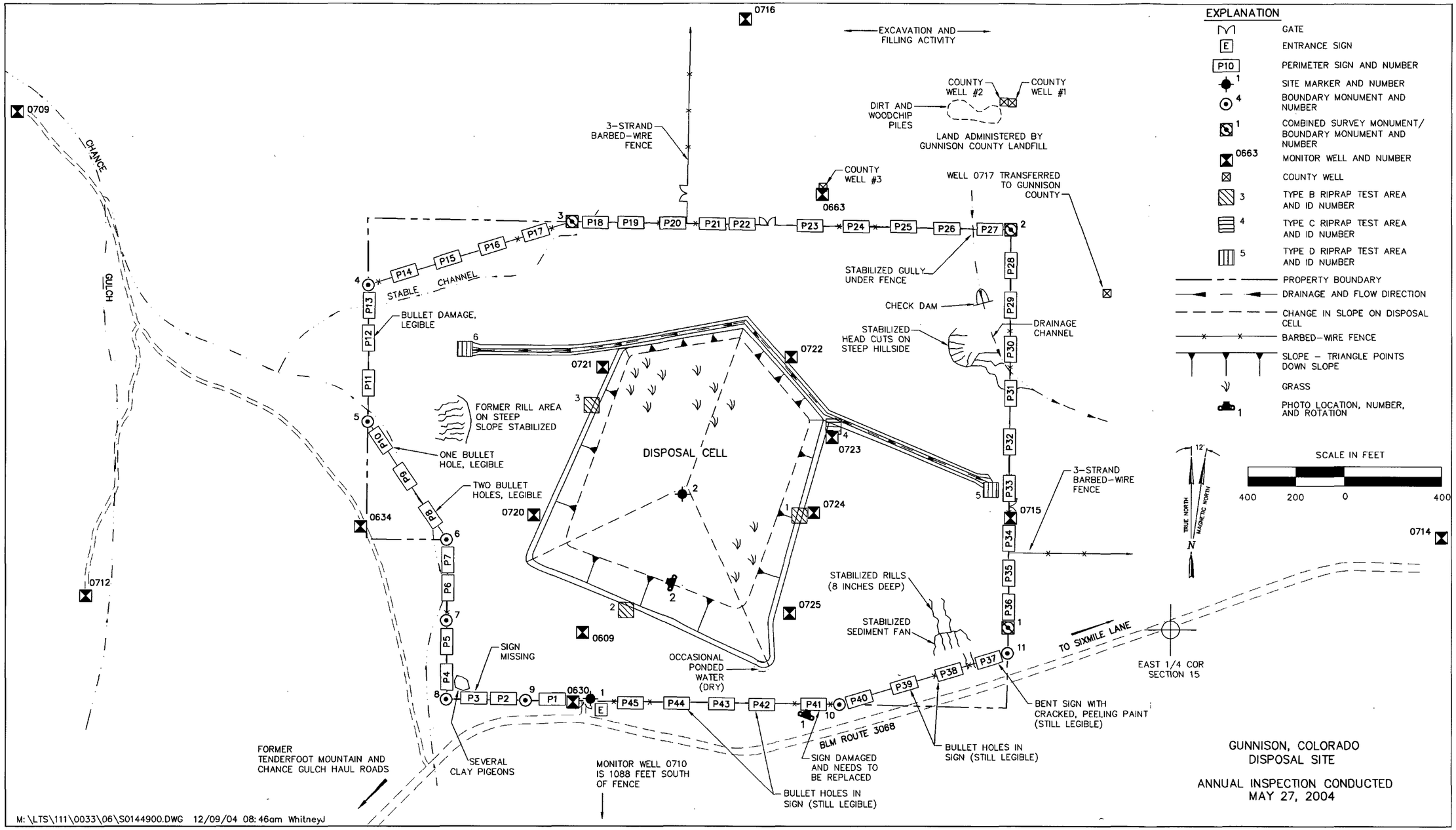


Figure 8–1. 2004 Annual Compliance Drawing for the Gunnison, Colorado, Disposal Site

Area Between the Disposal Cell and the Site Boundary—Reclaimed and undisturbed areas occur between the disposal cell and the site perimeter. Areas disturbed during cell construction were regraded and then reclaimed by planting a seed mix. At the time of the 2004 inspection, the seeded areas were in excellent condition.

During the 2004 inspection, four areas of the site containing erosional features were investigated: rills in the southeast corner, north of perimeter sign P38; gullied areas in the northeast; a drainage channel in the northwest; and rills on a steep west-facing slope on the west side.

- In the southeast erosional area, several 8-inch-deep rills had formed in the steeper portion of the slope, and a fan-like accumulation of eroded sediments had formed just below the rills. The area was found to be in stable condition. Vegetation is well established on the steeper portions of the eroded slopes.

- In the northeast portion of the property, a series of deep gullies and headcuts had formed at a natural slope break in the terrain. No new erosion was noted, and the gullies continue to stabilize with the successful establishment of sagebrush and various grasses. No evidence of new erosion or sediment transport off site was observed at the drainage channel between perimeter signs P30 and P31.

- In the northwest portion of the property, a drainage channel tributary to Chance Gulch was investigated. This area was stable and in good condition.

- On the west side of the property, rills had been noted on the steep west-facing slope during previous inspections. Surface rock fragments and vegetation have stabilized the slope.

Although these areas currently are stable and none of them encroach on the cell or diversion ditches, the steep topography makes them susceptible to erosion. Monitoring will continue for signs of increased erosion or any other indications of slope instability.

Vandalism at the site continues. One perimeter sign was missing and several others had been damaged since the 2003 inspection. Several broken and intact clay pigeons in the southwest corner of the property indicated skeet shooting activities in the same area as the missing sign.

Outlying Area—Gunnison County owns the land that adjoins the disposal site boundary to the north and east, and uses the land for a municipal landfill. In 2001, the county installed several fences and monitor wells in these areas. The monitor wells are identified as County Wells 1, 2, and 3 on Figure 8–1. DOE transferred former monitor well MW–0717 to the county in 2001. The county installed unlocked wire gates to allow DOE access to their monitor wells.

Landfill operations have encroached to within approximately 400 feet of the northeast corner of the DOE property boundary. Although landfill activities do not appear to pose a threat to the disposal site, DOE will continue to monitor the level of activity occurring near the site property boundaries and its outlying monitor wells.

Inspectors met with a BLM representative to assess revegetation progress at several sites along the reclaimed former Chance Gulch and Tenderfoot Mountain haul roads. The former Chance Gulch haul road is approximately 0.25 mile west of the disposal cell, and the former Tenderfoot Mountain haul road extends from the disposal cell westward to the former processing site. A BLM right-of-way permit requires successful revegetation of both haul roads, and the requirements of a Wildlife Mitigation Plan must be satisfied for the Chance Gulch haul road. Although most of the reclaimed areas have successfully revegetated, several isolated areas along the haul roads were reseeded in October 2000 to meet BLM's vegetation success criteria for species diversity.

At the time of the 2004 inspection, it was apparent that revegetation of reseeded areas on Chance Gulch haul road had been unsuccessful, primarily because of continued drought conditions, and
8B that further action was necessary. The Wildlife Mitigation Plan requires the establishment of forbs (e.g., alfalfa, buckwheat, vetch, and wild flowers) to improve habitat for sage grouse and pronghorn antelope. DOE reseeded several areas totaling 2.8 acres in October 2004 in accordance with a BLM-approved plan. These areas will continue to be monitored until revegetation is successful.

Inspectors noted that vegetative cover within the reseeded areas on Tenderfoot Mountain haul road continues to improve. In general, the percentage of weedy plant cover had decreased, and the percentage of desirable plant cover had increased substantially from the previous year. These areas will continue to be monitored, but reseeding is not expected to be necessary to meet permit requirements.

8.3.2 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

8.3.3 Routine Maintenance and Repairs

No maintenance or repairs were conducted at the disposal site during 2004. Several areas of the former Chance Gulch haul road were reseeded.

8.3.4 Ground Water Monitoring

DOE monitors ground water at the Gunnison disposal site to demonstrate compliance with U.S. Environmental Protection Agency ground water protection standards in 40 CFR 192, and to
8C demonstrate that the disposal cell is performing as designed. The monitoring network consists of 16 wells, including six point-of-compliance wells to determine cell performance, two background wells, and eight wells for water level measurements (Table 8–2). Ground water was sampled and water levels were measured annually from 1998 through 2001; samples and measurements will be collected once every 5 years thereafter. No ground water sampling or measurements were required in 2004; the next sampling and measurement event is scheduled for 2006. The indicator analyte for cell performance is uranium. Analytical results obtained thus far have been consistent, with concentrations of uranium at or below background levels, indicating that the disposal cell is performing as designed.

Table 8–2. Active Monitor Wells at the Gunnison, Colorado, Disposal Site

Compliance and Background Wells	Water Level Wells
MW–0720 (compliance)	MW–0630
MW–0721 (compliance)	MW–0634
MW–0722 (compliance)	MW–0663
MW–0723 (compliance)	MW–0709
MW–0724 (compliance)	MW–0710
MW–0725 (compliance)	MW–0712
MW–0609 (background)	MW–0714
MW–0716 (background)	MW–0715

8.3.5 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 2004.

8.3.6 Photographs

Table 8–3. Photographs Taken at the Gunnison, Colorado, Disposal Site

Photograph Location Number	Azimuth	Description of Photograph
PL–1	20	Damaged perimeter sign P41 near the site access road.
PL–2	290	Southwest portion of the cell showing the excellent condition of the cell top and the southwest side slope.

GUN 5/2004. PL–1. Damaged perimeter sign P41 near the site access road.

GUN 5/2004. PL–2. Southwest portion of the cell showing the excellent condition of the cell top and the southwest side slope.

End of current section

9.0 Lakeview, Oregon, Disposal Site

9.1 Compliance Summary

The Lakeview Disposal Site, inspected on July 13 and 14, 2004, was in good condition. Repairs were made to broken strands and loose sections of the perimeter fence. A revised Long-Term Surveillance Plan (LTSP), which includes a recalculated median diameter of the side slope riprap (the minimum size required to protect the cell from erosion by storm runoff), is pending U.S. Nuclear Regulatory Commission (NRC) concurrence. Results of the 2004 gradation test on the west side slope indicate that the median diameter of the riprap remains substantially above the recalculated minimum size. Field investigations and modeling of the movement of water through the radon barrier of the cell cover continue. The cell performance ground water monitor wells were sampled in 2004. Concentrations of the analyzed constituents were well below their respective limits and were consistent with results from the previous sampling event in 1999. No need was identified for a follow-up or contingency inspection.

9.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Lakeview, Oregon, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan for the Collins Ranch Disposal Site, Lakeview, Oregon* (DOE/AL/62350–19F, Rev. 3, U.S. Department of Energy [DOE], Albuquerque Operations Office, August 1994) 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 9–1. A revised LTSP for the site, prepared in August 2002, is pending NRC concurrence.

Table 9–1. License Requirements for the Lakeview, Oregon, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.1	Section 9.3.1
Follow-up or Contingency Inspections	Section 7.0	Section 9.3.2
Routine Maintenance and Repairs	Section 8.0	Section 9.3.3
Ground Water Monitoring	Section 5.3	Section 9.3.4
Corrective Action	Section 9.0	Section 9.3.5

9.3 Compliance Review

9.3.1 Annual Inspection and Report

The site, northwest of Lakeview, Oregon, was inspected on July 13 and 14, 2004. Results of the inspection are described below. Features and the photograph locations (PLs) mentioned in this report are shown on Figure 9–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

9.3.1.1 Specific Site Surveillance Features

Access Road, Entrance Gate, Fence, and Signs—Access to the site is gained by traveling a gravel road that heads west off County Road 2–16B. The 1.2-mile access road between the county road and the DOE property boundary has a perpetual easement across private property (Collins Ranch). A DOE lock is on a cable gate across the access road at a cattle guard approximately 0.5 mile east of the site.

A barbed-wire boundary fence encompasses the site. Repairs were made to broken strands of
9A barbed wire on the north boundary fence. A lower strand of wire was strung on sections of the 4-strand fence along the west boundary to keep calves out. The lower part of the east boundary fence is strung with wire mesh, and a loose section required tightening.

The entrance sign was in good condition. Ten of the twelve perimeter signs were in good condition. Perimeter signs P9 and P12 have bullet damage but were legible.

Site Markers and Monuments—The two site markers, three survey monuments, and three boundary monuments were in excellent condition.

Monitor Wells—Nine monitor wells are in the ground water monitoring network. All of the wells were inspected and found to be locked and in good condition.

9.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the top of disposal cell; (2) the side slopes of the disposal cell and adjacent drainage channel, aprons, and trench drains; and (3) the site perimeter and outlying area.

Top of the Disposal Cell—The design for the top of the disposal cell has produced conditions that favor the growth of deep-rooted plants. The top slope was seeded with grasses, but the low water-storage capacity of the thin (nominal 4-inch-thick) topsoil layer has limited grass growth to scattered patches of deeper-rooted wheat grasses. Movement of precipitation through the riprap and bedding layers and into the radon barrier favors the growth of shrubs. Shrub density currently exceeds that of the native plant community adjacent to the site.

Field investigations at the Lakeview site indicate that a combination of soil development and root intrusion by the deep-rooted shrubs have increased the hydraulic conductivity of the compacted soil layer (radon barrier) in the cell cover, possibly allowing meteoric water to percolate into and
9B leach contaminants from the underlying tailings. DOE, in collaboration with Sandia National Laboratory and Pacific Northwest National Laboratory, is demonstrating a performance evaluation model of the effects of root intrusion on the hydrology of the cell cover, and on the likelihood and risks of contaminant leaching.

Because of uncertainties involved in modeling unsaturated flow, DOE is planning to install instrumentation in 2005 to directly measure percolation rates through the cover and into the tailings. A small wicking lysimeter (water flux meter) recently was developed that is capable of directly monitoring unsaturated water fluxes ranging from less than 10 millimeters per year to more than 1,000 millimeters per year. Several water flux meters will be installed within or directly below the Lakeview cover. Percolation flux will be monitored for three to five years.

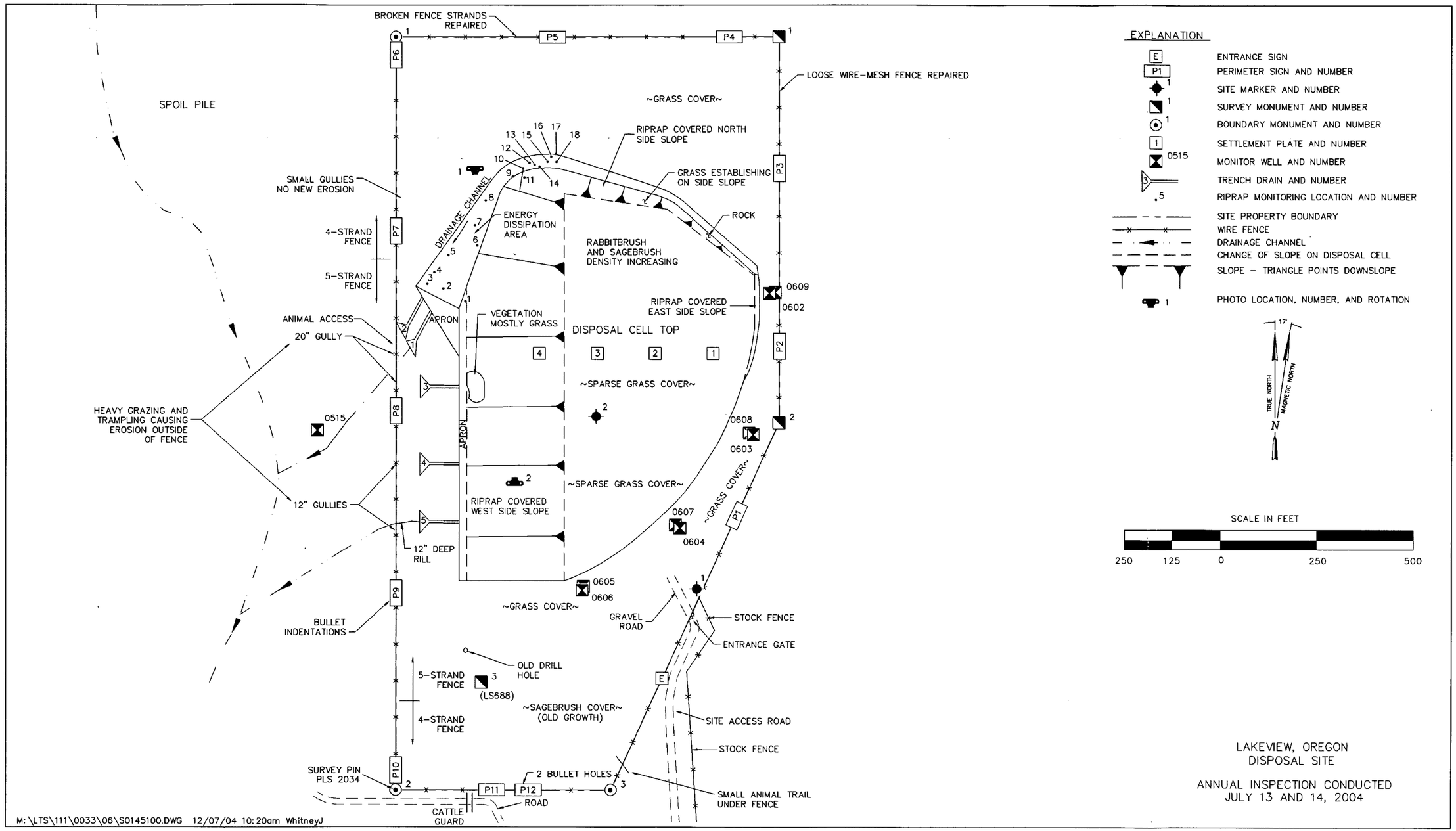


Figure 9–1. 2004 Annual Compliance Drawing for the Lakeview, Oregon, Disposal Site

Side Slopes of the Disposal Cell and Adjacent Drainage Channel, Aprons, and Trench Drains—The general appearance of the riprap-covered features is good (PL–1). The grooves left by construction equipment during installation of the west side slope cover are still parallel and show no sign of slumping or movement (PL–2).

Riprap for the Lakeview disposal cell was sized to withstand the erosive energy of a probable maximum precipitation event—a conservative, worst-case scenario in which the most severe meteorological conditions possible combine and occur at the same time. The original design specified a minimum side slope riprap median rock diameter (D_{50}) of 2.7 inches. Deterioration of riprap on the west and north side slopes and in the energy dissipation area at the lower end of the drainage channel is an ongoing concern because the percentage of crumbling rocks on the surface has noticeably increased since the riprap was placed in 1989. Observations indicated that the riprap could degrade to a value less than the designed D_{50}.

To determine if the riprap degradation posed a risk for cell erosion, DOE recalculated the minimum D_{50} using the U.S. Army Corps of Engineers Hydrologic Modeling System computer
9C model currently accepted by NRC. The recalculated minimum D_{50} necessary to protect the disposal cell is 1.8 inches. DOE submitted a revised LTSP in 2002 addressing the recalculated D_{50}; the plan is pending NRC concurrence.

The annual side slope riprap field gradation test was performed during the 2004 inspection. Particle size distribution (weight percent) by count data was collected at 20 locations. The results indicate an average D_{50} of 2.48 inches. Particle size distribution analyses were initiated in 1997, and the results indicated a rapid decrease in D_{50} until 1999 from 2.88 inches to 2.60 inches. The trend from 1999 to the present shows little decrease in rock size with an average D_{50} of 2.54 inches. This decreasing trend may be because the basaltic rocks used on the side slope were
9D predisposed to chemical or physical weathering and reacted quickly to newly imposed surface conditions during the first decade (1989-1999) after cell completion. Therefore, the first decade of rock weathering may have seen the greatest and most rapid loss of rock integrity. Because the size distribution is measured from surface rocks, the smaller fragments from the rocks that had crumbled would have fallen into the interstices of the cover and, therefore, were lost to future measurements. This process could produce a biased sample, but one that also reflects a decreasing rate of rock weathering and a stabilizing rock surface.

DOE will continue annual gradation tests at the Lakeview disposal cell to ensure that the side slopes of the cell are protected from erosion. If it becomes apparent that the riprap is continuing to deteriorate and that the measured D_{50} will eventually fall below 1.8 inches, DOE, in consultation with NRC, will evaluate alternatives and take corrective action, as necessary.

Eighteen photograph points for long-term rock monitoring of riprap in the energy dissipation area were re-photographed. No discernable rock degradation has been observed since monitoring began at the original ten locations established in 1997 or at the eight additional locations established in 2000.

Grass encroachment has increased in the riprap on the north side slope, in the upper (eastern) part of the drainage channel, and in the energy dissipation area at the lower end of the drainage

channel. Plant growth in the drainage channel is not significant and does not degrade the function of the channel.

Standing water observed during past inspections was absent from the large depression in the lower end of the drainage channel. Water is a concern because inundation may accelerate deterioration of the large riprap due to freeze-thaw processes and secondary mineralization or alteration.

Site Perimeter and Outlying Area—Gullies that formed in seeded areas extending west of Trench Drains 1, 2, 3, 4, and 5 were filled with rock in 2000. The rock has arrested the headcutting that was proceeding from the Collins Ranch property onto the DOE property. The native grass and shrub communities within 0.25 mile of the site boundary were unchanged.

9.3.2 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

9.3.3 Routine Maintenance and Repairs

DOE performed minor fence repairs in 2004.

9.3.4 Ground Water Monitoring

DOE monitors the uppermost aquifer at this site once every 5 years, with the most recent sampling event in 2004. Eight point-of-compliance monitor wells are located east of the disposal cell (located in four pairs with two different screened intervals), and an upgradient well is located west of the cell. The upgradient well (MW–0515) and the four point-of-compliance wells with
9E the deeper screened interval (MW–0606 through MW–0609) were sampled in 2004; the shallow-screened wells (MW–0602 through MW–0605) were dry. Constituents with maximum concentration limits (MCLs) established by the U.S. Environmental Protection Agency in Table 1 to Subpart A of 40 CFR 192 to be analyzed in ground water include arsenic, cadmium, and uranium. Their respective MCLs are 0.05 milligrams per liter (mg/L), 0.01 mg/L, and 0.044 mg/L. Concentrations of these constituents were well below their respective limits during the 2004 sampling event and were consistent with sampling results from 1999. Time versus concentrations plots for arsenic and uranium are included as Figures 9-2 and 9-3. Concentrations for cadmium were below detection limits. Based on the sampling results, there is no indication of any degradation of the disposal cell system.

9.3.5 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 2004.

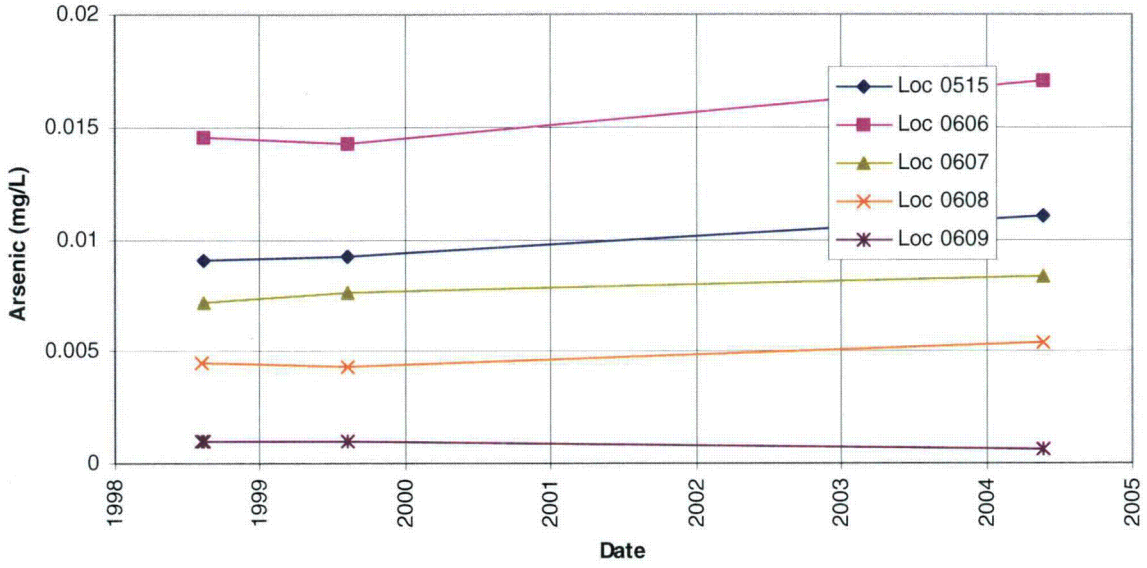


Figure 9–2. Time-Concentration Plots of Arsenic in Ground Water at the Lakeview, Oregon, Disposal Site

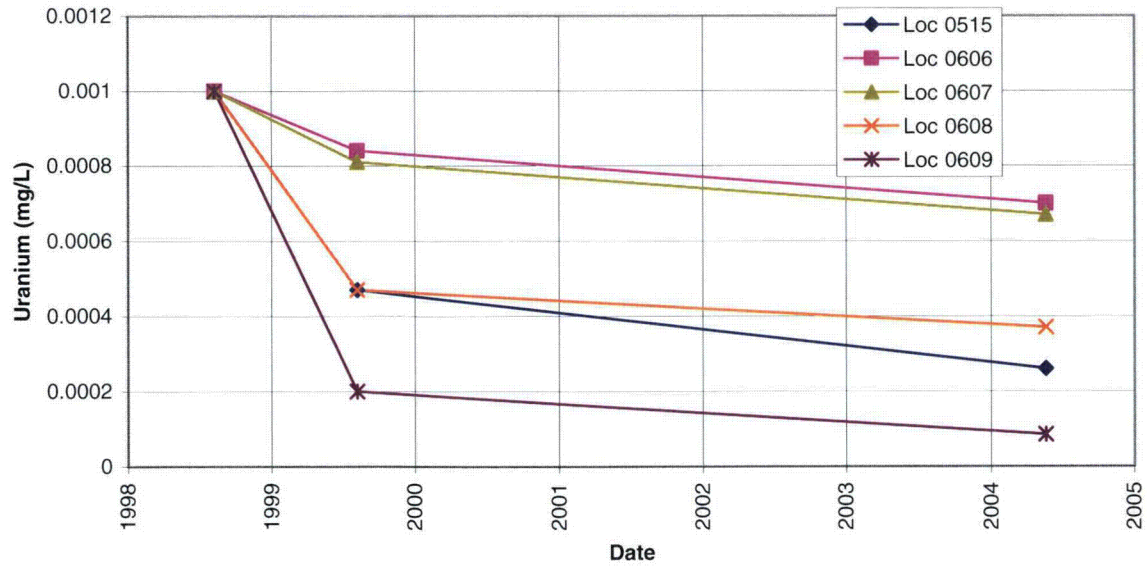


Figure 9–3. Time-Concentration Plots of Uranium in Ground Water at the Lakeview, Oregon, Disposal Site

9.3.6 Photographs

Table 9–2. Photographs Taken at the Lakeview, Oregon, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	180	View of the west side slope and apron. The energy dissipation area of the drainage channel is in the foreground.
PL–2	0	Original construction textures on the west side slope are still parallel, indicating no slumping along the slope.

LKV 7/2004. PL–1. View of the west side slope and apron. The energy dissipation area of the drainage channel is in the foreground.

LKV 7/2004. PL–2. Original construction textures on the west side slope are still parallel, indicating no slumping along the slope.

End of current section

10.0 Lowman, Idaho, Disposal Site

10.1 Compliance Summary

The Lowman Disposal Site, inspected on June 29, 2004, was in excellent condition. Rock was placed in an actively eroding rill along the north property boundary to inhibit further erosion. Herbicide was applied twice during 2004 to control noxious weeds at the site. A small barren area near the southwest corner of the site was reseeded. Inspectors identified no cause for a follow-up or contingency inspection.

10.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Lowman, Idaho, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Lowman, Idaho, Disposal Site* (DOE/AL/62350–36, Rev. 1, U.S. Department of Energy [DOE], Albuquerque Operations Office, April 1994) 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 10–1.

Table 10–1. License Requirements for the Lowman, Idaho, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 10.3.1
Follow-up or Contingency Inspections	Section 7.0	Section 10.3.2
Routine Maintenance and Repairs	Section 8.0	Section 10.3.3
Ground Water Monitoring	Section 5.3	Section 10.3.4
Corrective Action	Section 9.0	Section 10.3.5

10.3 Compliance Review

10.3.1 Annual Inspection and Report

The site, located northeast of Lowman, Idaho, was inspected on June 29, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 10–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

10.3.1.1 Specific Site Surveillance Features

Access Road, Entrance Gate, and Signs—The site is at the end of a hard-packed gravel road north of Idaho State Highway 21. The 650-foot long access road between the highway and the DOE property is along a perpetual easement granted by the U.S. Forest Service. The road was in excellent condition. A locked gate spans the road about 150 feet from the state highway and was in excellent condition.

One entrance sign and 18 perimeter signs delineate the unfenced site boundary. The entrance sign is just inside the site boundary near monitor well MW–0580. Although the sign had two bullet holes, it was still legible and does not need replacing. The 18 perimeter signs are on posts along the site boundary. Three signs have bullet holes or dents, but were legible and do not need to be replaced. The other perimeter signs were in excellent condition.

Site Markers and Monuments—There are two site markers, four boundary monuments, and three combination survey/boundary monuments. All were in excellent condition.

Monitor Wells—The monitoring network at the site consists of six monitor wells and one spring. Four of the wells are on site and two are just outside the site boundary. The spring also is outside the site boundary near the southwest corner of the site. The wells have cap-and-pin locking systems and were in excellent condition. A seventh well (LOW–01–029), southeast of the cell but not part of the monitoring network, was secure.

10.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the top and side slope of the disposal cell; (2) the area between the disposal cell and the site boundary; and (3) the outlying area.

Top and Side Slope of the Disposal Cell—Basalt riprap armors the top and west-facing side slope of the disposal cell, which conforms to the east-to-west sloping topography of the site. An apron of larger riprap surrounds the disposal cell on all sides. The riprap was in excellent condition, and no evidence of subsidence, cracking, or differential settlement on the disposal cell was observed (PL–1).

Encroachment of vegetation continues on the top and side slope of the disposal cell (PL–2). Based on the results of column leach studies conducted by DOE, the natural plant community succession can be allowed to proceed without increased risk to human health, safety, or the environment. A representative of the State of Idaho attended the inspection and recommended that the surrounding ponderosa pine forest be allowed to encroach and establish on the disposal cell with no requirement or plan for future logging because logging activities would damage the cell cover. As subsequently confirmed by a plant specialist, ponderosa pine trees have deep root systems and do not tend to be blown down, so there is minimal risk of exposing the encapsulated materials due to uprooting of the trees. The recommendation to allow continued encroachment of the native plant community will be included in the revised LTSP that DOE will submit to NRC for concurrence.

Area Between the Disposal Cell and the Site Boundary—The steep slopes east and south of the site were stable with well-established ponderosa pine and grasses. One active erosion rill no more than 8 inches in depth was discovered along the north boundary of the site near perimeter signs P5 and P6. The rill had cut across the berms of the lower two interceptor benches. Once
10A runoff flow within the rill reaches the granodiorite outcrop west of the site, it is dispersed and causes no further downcutting. Rock was placed in the rill in October 2004 to retard erosion. DOE will continue to monitor this area for erosion.

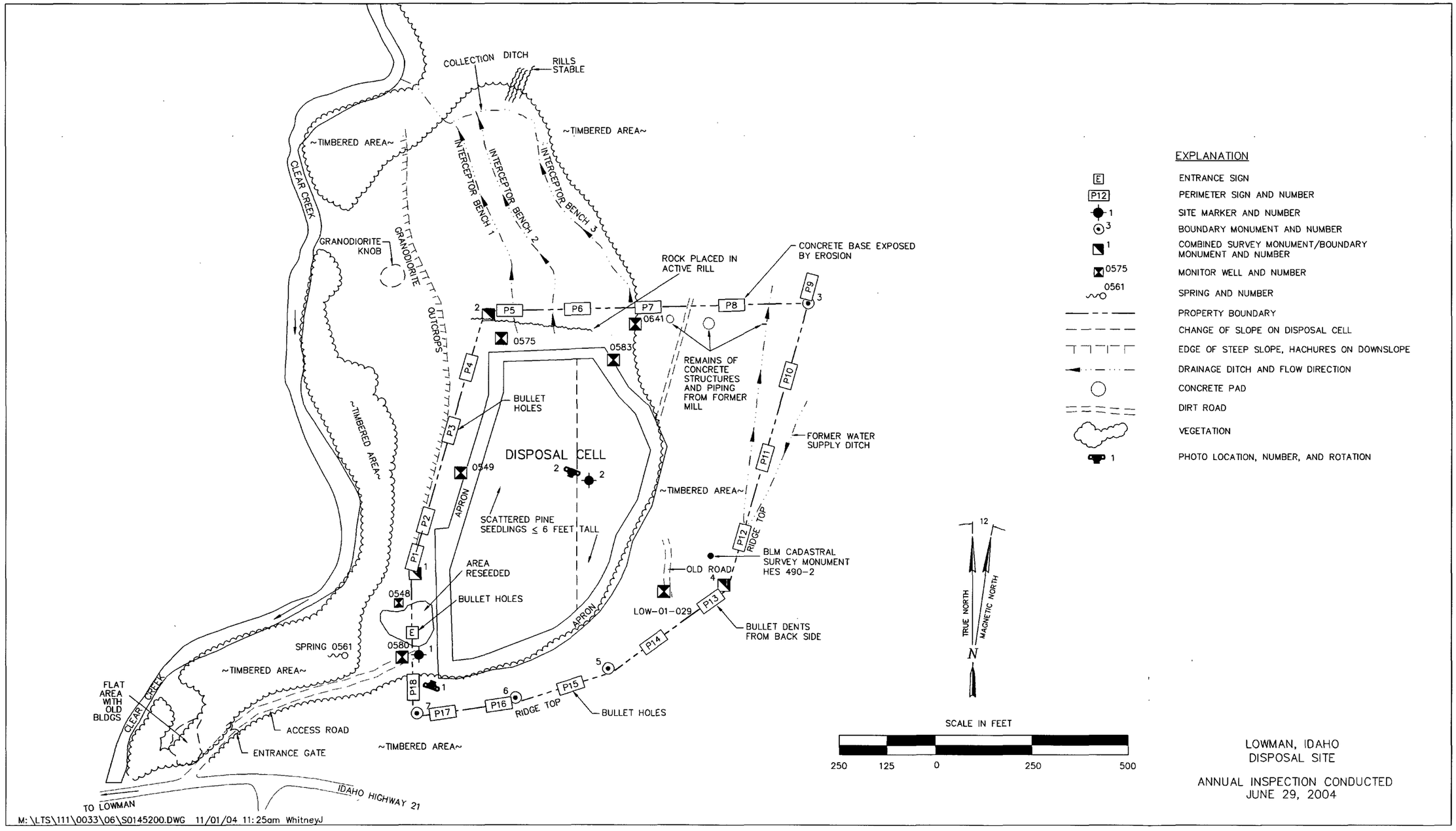


Figure 10–1. 2004 Annual Compliance Drawing for the Lowman, Idaho, Disposal Site

Infestations of several species of noxious weeds continue to be a concern for DOE on and
10B adjacent to the site. Two applications of herbicide in 2003 significantly reduced the weed population, but two more applications were needed in 2004 in a continuing effort to control the weeds. An area approximately 1 acre in size in the southwest corner of the site had become barren as a result of herbicide applications. This area was reseeded with desirable perennial species in October 2004 to help prevent future infestations by noxious weeds.

Outlying Area—An area within 0.25 mile around the site was visually inspected for evidence of construction, development, logging, or change in land use that might affect site integrity. No changes were noted to the area across Clear Creek to the west, where several summer cabins are located. The land around the rest of the site is U.S. Forest Service land and was unchanged.

The interceptor benches, collection ditch, and vegetation were effectively controlling soil erosion in the revegetated area north and west of the site. Overall, the benches and collection ditch were in good condition and there was no evidence of new erosion. The revegetation effort on the slopes north and west of the disposal cell has been successful. DOE will continue to monitor the revegetated area for erosion.

10.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

10.3.3 Routine Maintenance and Repairs

In 2004, rock was placed in a rill along the north property boundary to prevent erosion, herbicide was applied to control infestations of noxious weeds, and a small area was reseeded.

10.3.4 Ground Water Monitoring

10C DOE monitors ground water at this site annually to verify the initial performance of the disposal cell. Sampling locations are shown on Figure 10–1 and provided in Table 10–2.

Table 10–2. Ground Water Sampling Locations at the Lowman, Idaho, Disposal Site

Monitor Well Location		Spring Location	
MW–0583	Upgradient, north of cell	SP–0561	Downgradient, southwest of cell
MW–0641	Upgradient, north of cell		
MW–0548	Downgradient, west of cell		
MW–0549	Downgradient, west of cell		
MW–0575	Downgradient, northwest of cell		
MW–0580	Downgradient, southwest of cell		

Initial performance of the disposal cell is verified by monitoring for antimony. The mean concentration of antimony in tailings pore fluids was slightly above the maximum detected background ground water concentration of 0.007 milligrams per liter (mg/L).

July 2004 sampling results indicate that antimony concentrations in all downgradient wells were either below the laboratory detection limit or within the range of upgradient (background) concentrations. The maximum downgradient concentration of antimony observed in ground

water in 2004 was 0.00016 mg/L in MW–0548 (the average concentration in the upgradient wells was 0.00013 mg/L).

The Lowman site is unique among UMTRCA sites in that the mill process was mechanical instead of chemical. Consequently, there were no process-related chemicals to contaminate the underlying soils and ground water. Radioactive sands encapsulated in the disposal cell are highly resistant to weathering and chemical alteration and have very low leachability characteristics. There is no credible scenario by which these sands could contribute antimony to ground water at the site. Based on sampling results to date, there is no technical rationale to continue ground
10D water monitoring. Consequently, the LTSP is being revised with the recommendation that all ground water monitoring at the Lowman site be discontinued.

10.3.5 Corrective Action

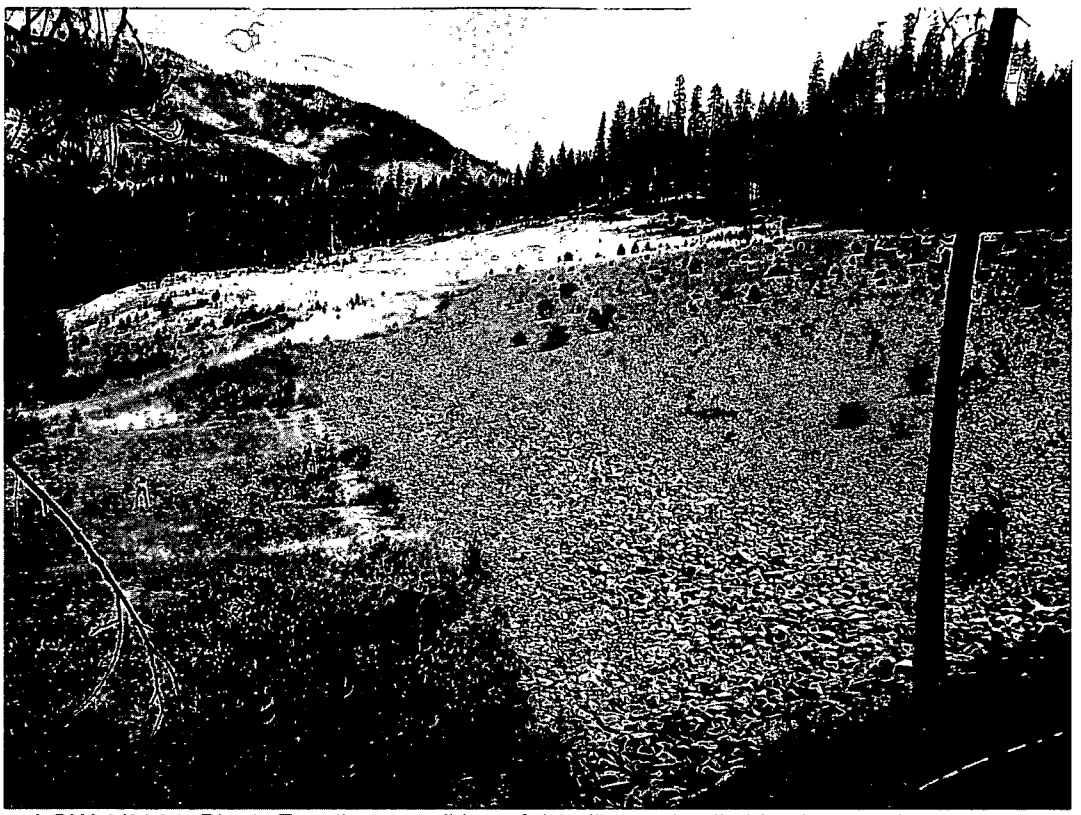
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2004.

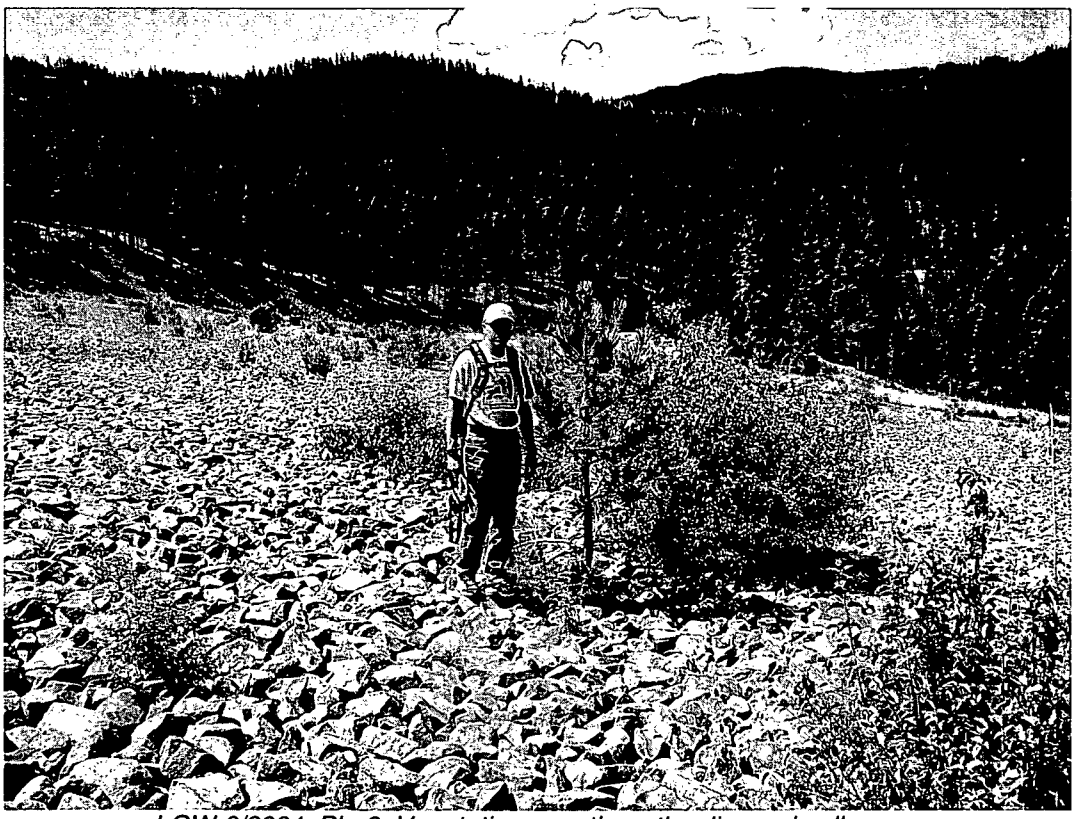
10.3.6 Photographs

Table 10–3. Photographs Taken at the Lowman, Idaho, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	15	Excellent condition of the disposal cell side slope and west apron.
PL–2	200	Vegetation growth on the disposal cell cover.



LOW 6/2004. PL–1. Excellent condition of the disposal cell side slope and west apron.



LOW 6/2004. PL–2. Vegetation growth on the disposal cell cover.

End of current section

11.0 Maybell, Colorado, Disposal Site

11.1 Compliance Summary

The Maybell Disposal Site was inspected on August 4, 2004, and was in excellent condition. All erosion control features were in excellent condition and there was no evidence of sediment moving off site. Reclaimed areas had healthy vegetation. Deep-rooted plants found on the cell top were cut and treated with herbicide. Requirements for ground water level monitoring at the site have been met and monitoring was discontinued in 2004. The fifth and final annual survey of the cell settlement plates indicates no significant settlement has occurred since surveys were initiated in 2000. Inspectors identified no cause for a follow-up or contingency inspection.

11.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Maybell, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Maybell, Colorado, Disposal Site* (DOE/AL/62350–247, Rev. 2, U.S. Department of Energy [DOE], Albuquerque Operations Office, July 1999) 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 11–1.

Table 11–1. License Requirements for the Maybell, Colorado, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.0	Section 11.3.1
Follow-up or Contingency Inspections	Section 5.0	Section 11.3.2
Routine Maintenance and Repairs	Section 4.0	Section 11.3.3
Ground Water Monitoring	Section 2.6	Section 11.3.4
Corrective Action	Section 5.0	Section 11.3.5
Settlement Plate Monitoring	Section 3.5.2	Section 11.3.6

11.3 Compliance Review

11.3.1 Annual Inspection and Report

The site, located northeast of Maybell, Colorado, was inspected on August 4, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 11–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

11.3.1.1 Specific Site Surveillance Features

Access, Gates, Fence, and Signs—Access to the site is via County Road 53. The gravel road was in good condition. A drainage swale (Swale No. 1) crosses the access road between the entrance gate and perimeter sign P26. The bottom of the swale at the road crossing is filled with rock for erosion control and is passable.

Two DOE gates cross the county road along the northern boundary of the site. These gates keep cattle out of revegetated areas. Neither gate is locked. A third unlocked gate crosses the road that leads to a monitor well northeast of the site. A fourth gate is the locked entrance gate in the perimeter fence at the north end of the site. All the gates are standard tubular metal stock gates and were in good condition.

A standard stock fence that surrounds the disposal cell and drainage structures was in good condition. Broken wires were noted at two locations and subsequently were repaired. Evidence of deer, elk, and pronghorn is abundant on the site, and these big game animals probably are the cause of loose and broken wires commonly found at the site.

The entrance sign, mounted on a t-post in the fence line, is next the entrance gate. The sign was in good condition.

A total of 27 perimeter signs are at the site. On the north, west, and south sides of the site, perimeter signs are on t-posts in the fence line. On the east side of the site, perimeter signs are on the bench about midway between the disposal cell and Johnson Wash where they are mounted on steel posts set in concrete. Three signs have bullet holes but were legible. The remaining signs were in good condition.

Site Markers and Monuments—The site has two site markers, 27 boundary monuments, and two survey monuments. All markers and monuments were in excellent condition.

Settlement Plates—There are nine settlement plates on top of the disposal cell. All were secure and in good condition. Elevations of the settlement plates were surveyed in July 2004.

Monitor Wells—Four monitor wells are used for water level measurements. The wells were secure and in good condition. Water level measurements were concluded in 2004 as described in Section 11.3.4 below. DOE intends to decommission the wells upon concurrence from the Colorado Department of Public Health and Environment.

11.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the disposal cell; (2) the other areas on site; and (3) the outlying area.

Disposal Cell—The disposal cell is armored with rock for erosion protection and was in excellent condition (PL–1). No evidence of slumping, settling, erosion, or rock degradation was noted.

Patches of plants consisting of deep-rooted species, grasses, and annual weeds were observed on the cell top and side slopes (PL–2). Deep-rooted woody plants were cut and their stems were treated with herbicide, and patches of unidentified thistle were sprayed with herbicide. Previously treated areas showed no evidence of new growth.

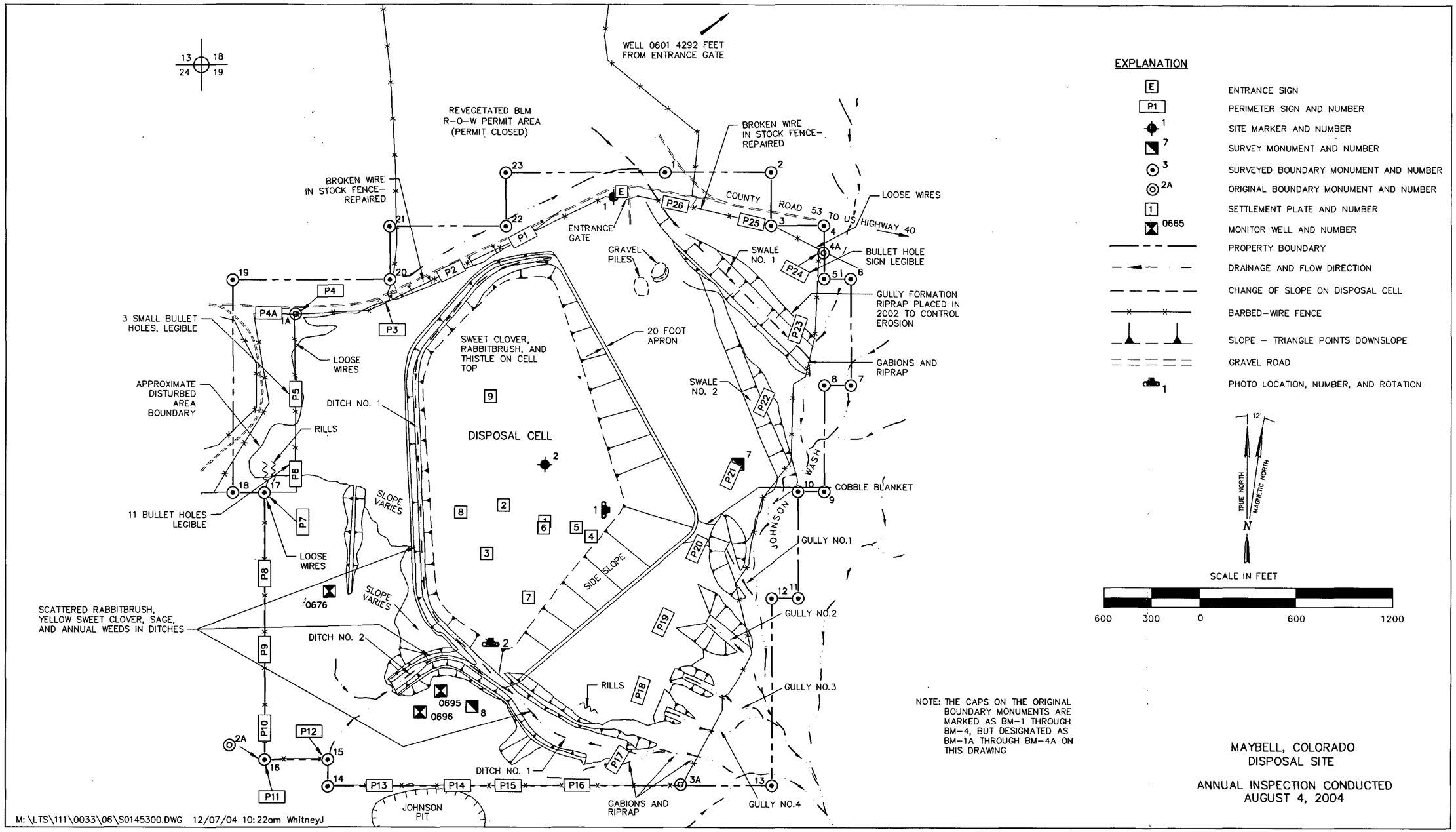


Figure 11–1. 2004 Annual Compliance Drawing for the Maybell, Colorado, Disposal Site

In accordance with the LTSP, inspectors looked for seeps on the east corner and southeast side slopes because large quantities of slimes were encapsulated in this portion of the cell. The east corner of the cell is a topographic low point for draining a portion of runoff from the cell. No moisture was evident on the surfaces of the side slopes, but runoff water often is present in the apron at this location. The cobble blanket at the toe of the east corner supports wetland vegetation and other annual and perennial plants.

Other Areas On Site—The rock-armored ditches, swales, and gullies were in good condition. There was no evidence of sediment moving offsite into Johnson Wash, and formerly active rills and gullies are stabilizing due to self-armoring and increased vegetation.

Vegetation in the reclaimed areas on the site was diverse and healthy. DOE requested
11A termination of a remedial action agreement with the U.S. Bureau of Land Management (BLM) based on the successful reclamation; termination is pending.

Monthly site inspections conducted in accordance with a Colorado Department of Public Health
11B and Environment storm water discharge permit were concluded in May 2004. The state terminated the permit in June 2004 upon agreement with DOE that erosion control and revegetation efforts have successfully stabilized the site. Evidence of erosion will continue to be monitored during annual site inspections.

Outlying Area—The area outside the site boundary for 0.25 mile was visually inspected. There was no evidence of erosion, development, change in land use, or other phenomenon that might affect the long-term performance of the site.

The large revegetated area on BLM land north of the site was inspected from a distance.
11C Vegetation is well established and there was no evidence of livestock grazing. A survey conducted in May 2004 indicated that the vegetation diversity and density in the BLM permit area have met the requirements of a right-of-way reservation. At the request of DOE, BLM terminated the right-of-way reservation in September 2004.

11.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

11.3.3 Routine Maintenance and Repairs

The fence was repaired at two locations, and deep-rooted woody plants on the cell top were cut
11D and treated with herbicide. Patches of thistle found on the cell top also were sprayed with herbicide.

11.3.4 Ground Water Monitoring

Ground water at this site is contaminated as a result of widespread, naturally occurring uranium mineralization and mining activities not related to on-site uranium milling operations. The ground water is of limited use and cannot be cleaned up by methods reasonably employed in public water systems. Supplemental standards have been applied, and ground water monitoring is not required.

As a best management practice, DOE performed continuous ground water level monitoring downgradient from the disposal cell for the purpose of measuring changes in ground water levels that may be related to transient drainage from the disposal cell. Evaluation of datalogger information from monitor wells MW–0695 (downgradient control well), MW–0676 (crossgradient well), and MW–0601 (upgradient/background well) from November 1995 through March 2004 (in excess of the required 5-year period) shows a slight increasing trend of ground water levels since mid-1997 (Figure 11–2). Because the ground water level in the upgradient well increased at approximately the same rate as that in the downgradient wells, the change in water level is attributed to regional causes rather than being directly related to disposal cell performance. Based on these water level monitoring results, there is no evidence of any transient drainage interaction with the ground water system near the disposal cell. This observation confirms earlier qualitative assumptions that the potential water level increase resulting from transient drainage would be masked by the predicted water level decrease from dissipation of the ground water mound under the cell which, in turn, would be affected by the natural fluctuation of ground water levels in the area.

DOE has met the water level monitoring criteria specified in the LTSP and submitted a Notice of Intent to the U.S. Nuclear Regulatory Commission in June 2004 to discontinue monitoring. The notice serves as a modification to the LTSP, eliminating ground water level monitoring as a license requirement for long-term management of the Maybell disposal site.

11E

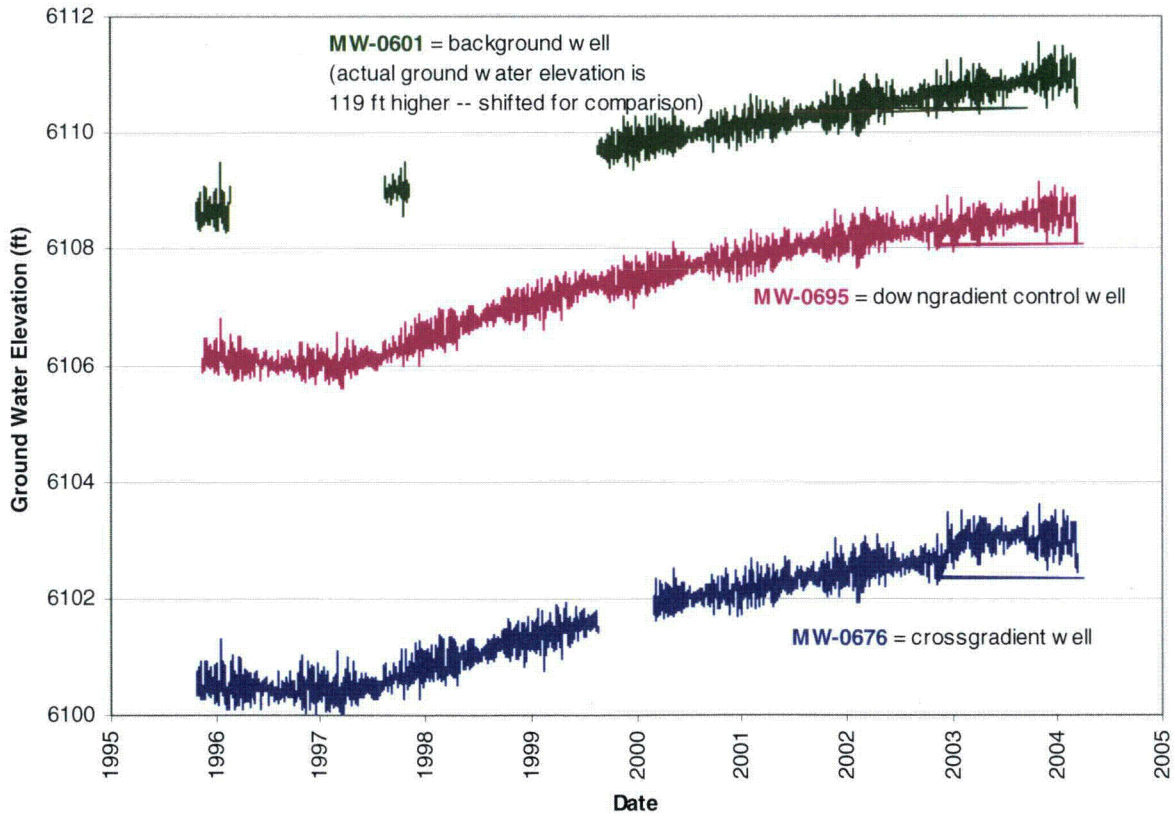


Figure 11–2. Water Level Measurements at the Maybell, Colorado, Disposal Site

11.3.5 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 2004.

11.3.6 Settlement Plate Monitoring

Slimes from the former Maybell mill were placed in the south central part of the disposal cell. The slimes were compacted before the radon barrier was completed; however, further consolidation was possible. Therefore, nine settlement plates were installed on the top of the disposal cell, primarily over the portion in which the slimes were placed, to detect any significant settlement due to consolidation.

Annual surveys have been conducted since the cell was completed. Results of the August 2000 baseline survey and the July 2004 survey are provided in Table 11–2. Elevation changes between 2000 and 2004 were minor. Total settlement ranged from 0.04 to 0.19 feet (0.5 to 2.5 inches), with the maximum change occurring in the area of greatest expected settlement. The annual surveys supported the conclusions of visual inspections by verifying that no significant
11F settlement has occurred on the cell top. Therefore, DOE met the 5-year postconstruction settlement survey requirement stipulated in the site LTSP and concluded the annual settlement plate surveys.

Table 11–2. Results of the 2004 Settlement Plate Survey at the Maybell, Colorado, Disposal Site (elevation in feet above mean sea level)

Settlement Plate Location	Surveyed Elevation July 1, 2004	Baseline Elevation August 31, 2000	Difference in Elevation (feet)
SP–1	6,243.46	6,243.65	-0.19
SP–2	6,236.88	6,237.03	-0.15
SP–3	6,231.43	6,231.58	-0.15
SP–4	6,251.40	6,251.52	-0.12
SP–5	6,249.08	6,249.22	-0.14
SP–6	6,243.05	6,243.23	-0.18
SP–7	6,236.82	6,236.89	-0.07
SP–8	6,229.51	6,229.60	-0.09
SP–9	6,241.13	6,241.17	-0.04

11.3.7 Photographs

Table 11–3. Photographs Taken at the Maybell, Colorado, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	90	Rock-armored side slope at the east corner of the disposal cell.
PL–2	0	Typical distribution of vegetation found growing on top of the disposal cell.

MAY 8/2004. PL–1. Rock-armored side slope at the east corner of the disposal cell.

MAY 8/2004. PL–2. Typical distribution of vegetation found growing on top of the disposal cell.

End of current section

12.0 Mexican Hat, Utah, Disposal Site

12.1 Compliance Summary

The Mexican Hat Disposal Site, inspected on September 15, 2004, was in excellent condition. A segment of perimeter fence was damaged by storm runoff, and temporary repairs were made to maintain site security. Trash continues to accumulate and trespassing continues to occur between the perimeter fence and the site boundary, but these conditions do not affect the security or integrity of the site. No cause for a follow-up or contingency inspection was identified.

12.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Mexican Hat, Utah, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Mexican Hat Disposal Site, Mexican Hat, Utah* (DOE/AL/62350–207, Rev. 2, U.S. Department of Energy [DOE], Albuquerque Operations Office, June 1997) 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 12–1.

Table 12–1. License Requirements for the Mexican Hat, Utah, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.1	Section 12.3.1
Follow-up or Contingency Inspections	Section 3.4	Section 12.3.2
Routine Maintenance and Repairs	Section 5.0	Section 12.3.3
Ground Water Monitoring	Section 4.3	Section 12.3.4
Corrective Action	Section 6.0	Section 12.3.5

12.3 Compliance Review

12.3.1 Annual Inspection and Report

The site, located south of Mexican Hat, Utah, was inspected on September 15, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 12–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

12.3.1.1 Specific Site Surveillance Features

Access, Fence, Gate, and Signs—The site is accessed via a short unmarked dirt road off of U.S. Highway 163 that ends at a graded parking area. Vehicular access from the parking area to the entrance gate is restricted by an eroded channel. DOE has perpetual access to the site through a Custody and Access Agreement with the Navajo Nation.

The site is enclosed by a barbed-wire fence set inside the property boundary, with a chain-link gate at the site entrance. The gate was in excellent condition; the perimeter fence, however, was damaged by recent storm events. A fence post was broken off and several barbed-wire strands were broken where the fence crosses the terminus of the West Ditch storm water diversion
12A channel (PL–1). Temporary repairs were made to the broken strands to secure the site; permanent repairs, including replacement of the fence post, will be performed later.

An entrance sign is located at the gate and was in excellent condition. There are 43 perimeter sign locations along the property boundary and each location has a pair of signs: an upper property ownership sign and a lower radioactive materials disposal site warning sign. Some perimeter signs have bullet holes or were dented but were legible. The remaining signs were in excellent condition.

Site Markers and Monuments—The two site markers, four survey monuments, and 12 boundary monuments were inspected and found to be in good condition.

Monitor Wells—Sampling of monitor wells is not required by the LTSP.

12.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into four areas referred to as transects: (1) the riprap-covered disposal cell top slope; (2) the riprap-covered side slopes and diversion ditches; (3) the area between the disposal cell and the site boundary; and (4) the outlying area.

Top of Disposal Cell—The top of the riprap-armored disposal cell was in excellent condition. There was no evidence of differential settling, cracking, burrowing, or other modifying process that could affect the integrity of the cell. No vegetation was observed to be growing on top of the disposal cell.

Side Slopes and Diversion Ditches—Inspectors saw no evidence of differential settling, slumping, or other evidence of instability on the side slopes of the disposal cell.

A section along the south apron has been closely monitored for several years because rock and soil have sloughed off the adjacent steep hill slope onto the apron. Based on comparisons with photographs from the previous inspection, there was no apparent increase in accumulation of the red sandstone and soil along the south apron (PL–2). There was no evidence of channel erosion in this area, and the sloughed material has not filled the void spaces in the apron riprap beyond the toe of the hill slope. It is anticipated that a minor amount of unstable rock from the hill slope will, over time, continue to fall onto the apron; however, the amount of material that will eventually accumulate on the edge of the apron in this area will have no detrimental impact on the performance of the apron or the disposal cell.

Off-site upgradient areas continue to erode and transport sediment onto the site and into the channels of West Ditch and Southwest Ditch. Plant growth, primarily annual weeds, is establishing where the sediment has accumulated in West Ditch (PL–3). The sediment

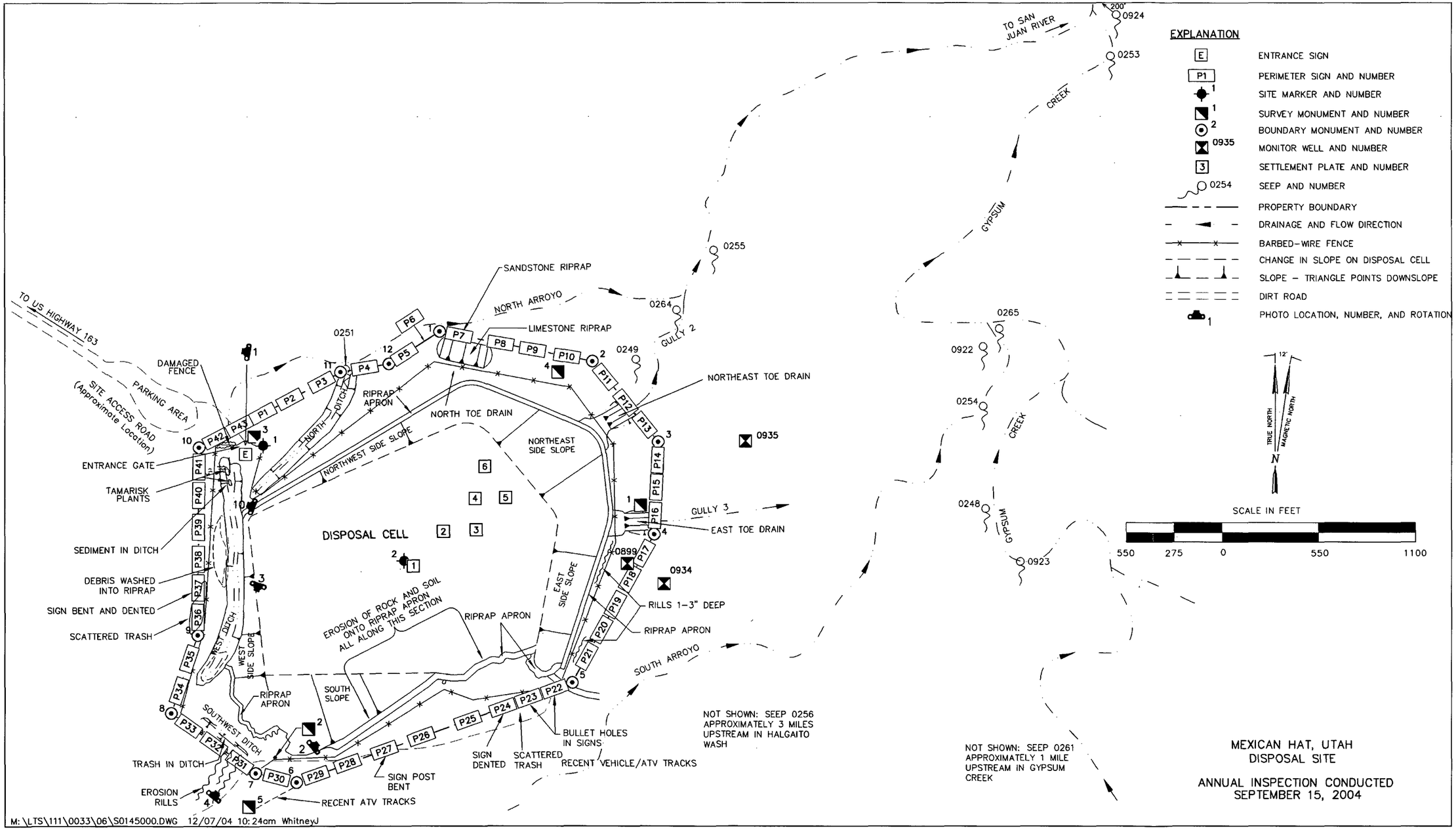


Figure 12–1. 2004 Annual Compliance Drawing for the Mexican Hat, Utah, Disposal Site

accumulation and plant growth have not affected the performance of these diversion structures, and the rate of sedimentation is expected to diminish as the upgradient landscape stabilizes. Tamarisk, a deep-rooted noxious plant, is growing at the outlet of West Ditch. These plants will be removed.

Area Between the Disposal Cell and the Site Boundary—Minor rills and gullies are present upstream of West Ditch and Southwest Ditch (PL–4), and along the east side slope of the cell. Though some sediment is entering the diversion ditches, these erosion features are not a problem and are expected to stabilize. Hill slopes around the disposal cell remain stable with only minor accumulations of loose material at the toe of the slopes.

An increased amount of trash (e.g., beer bottles, automotive wastes, discarded tires, etc.) has washed adjacent to or onto perimeter areas along the west, southwest, and south sides of the site. Although most of the trash remains offsite, removal may be necessary if accumulation increases on DOE property or if hazardous waste (e.g., lead-acid batteries, used oils) is present. Vehicle tracks were observed in these areas between the perimeter fence and the site boundary, indicating occasional trespass onto the disposal site property. The amount and type of trash accumulating adjacent to the site property boundary, and the frequency and degree of trespass and vandalism that is occurring, will continue to be monitored.

12B

Outlying Area—The area surrounding the site was visually inspected for signs of erosion, development, or other disturbance that might affect site integrity or security. Sediment erosion and deposition and trash accumulation continues adjacent to the site, and evidence of off-road vehicle activity has increased. However, the site remains secure and these off-site conditions are not affecting the integrity of the site or the performance of the diversion ditches.

12.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

12.3.3 Routine Maintenance and Repairs

Temporary fence repairs were performed in 2004.

12.3.4 Ground Water Monitoring

Ground water in the uppermost aquifer is not affected by the disposal cell or by historical processing activities because of an effective aquitard and an upward hydraulic gradient. Both of these characteristics prevent downward migration of water into the aquifer; therefore, monitoring of this aquifer is not required by the LTSP.

Shallow ground water recharged by local precipitation is perched on top of the aquitard and emerges as seeps at several locations. Seep volume is low and does not constitute a water resource. The LTSP requires annual monitoring of six seeps to assess disposal cell performance (seeps 0251 and 0264 along North Arroyo, and seeps 0248, 0254, 0261 (background), and 0922 along Gypsum Creek). Due to ice or insufficient water, DOE was able to sample only three seeps in February 2004.

12C

Sample results for three target analytes—nitrate, sulfate, and uranium—are shown on Figures 12–2 through 12–4. The target analytes are monitored for an indication of degradation of seepage water quality.

Concentrations of nitrate continue to decrease, with 110 mg/L in the North Arroyo seep and 100 mg/L in the Gypsum Creek seep (Figure 12–2). Concentrations in the background seep remain below 1 mg/L.

Sulfate concentrations similarly have decreased in the North Arroyo seep and in the Gypsum Creek seep to less than 2,000 mg/L (Figure 12–3). Concentrations in the background seep remained relatively steady at 3,000 mg/L.

Concentrations of uranium in the North Arroyo seep decreased to 0.120 mg/L, and in the Gypsum Creek seep to 0.380 mg/L (Figure 12–4). Background levels at seep 0261 have remained relatively constant at approximately 0.025 mg/L for the past several years.

Results of monitoring in 2004 show that concentrations of all target constituents are generally decreasing in the North Arroyo and Gypsum Creek seeps. No trends of increase in concentrations are evident that would suggest degradation of the disposal cell cover.

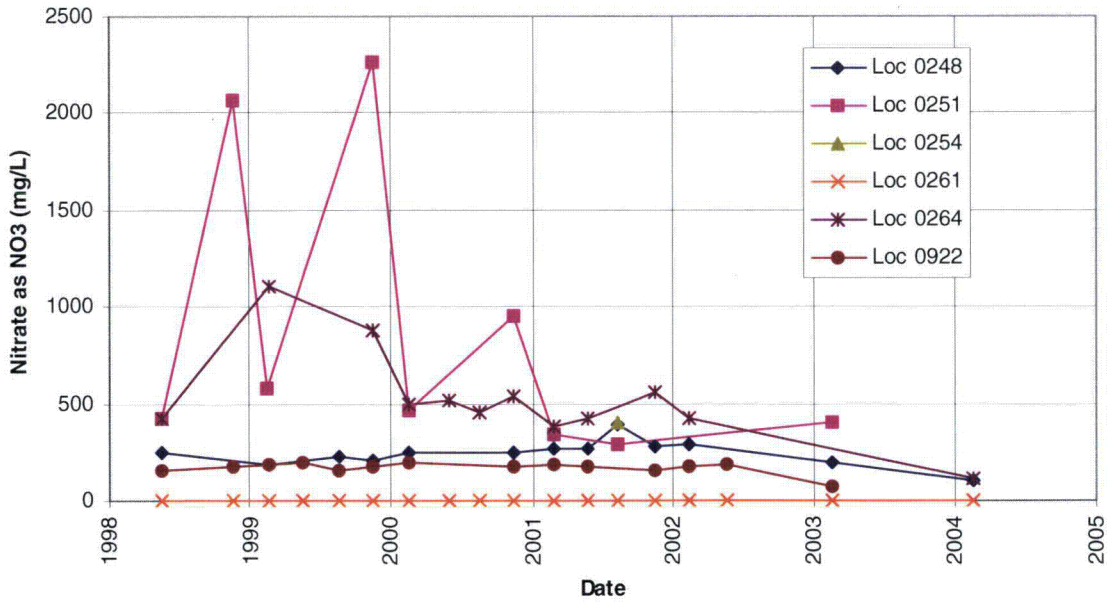


Figure 12–2. Time-Concentration Plots of Nitrate (as NO_3) in Seep Water at the Mexican Hat, Utah, Disposal Site

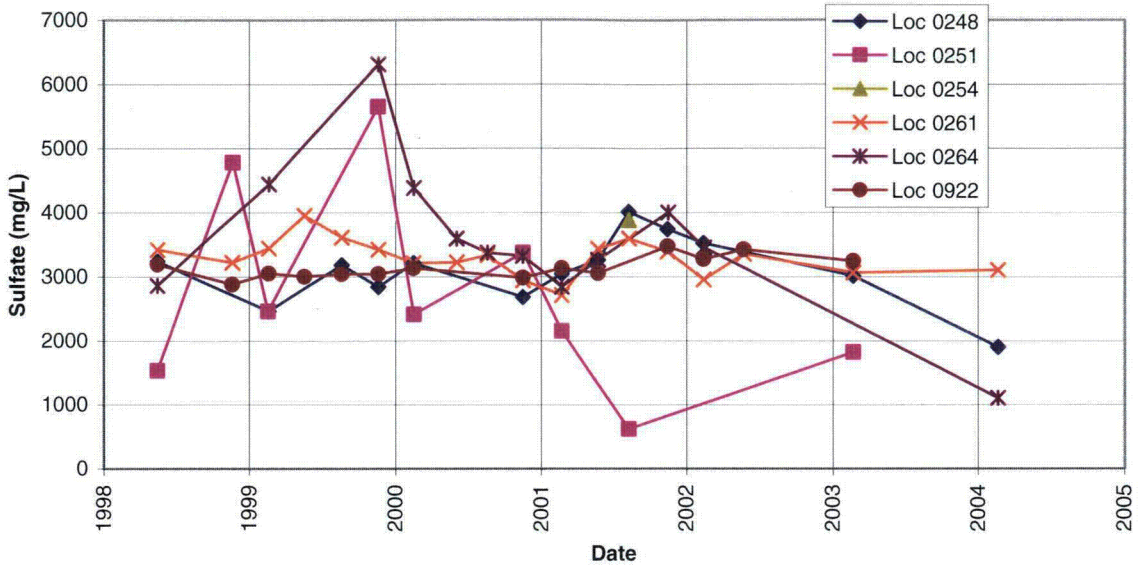


Figure 12–3. Time-Concentration Plots of Sulfate in Seep Water at the Mexican Hat, Utah, Disposal Site

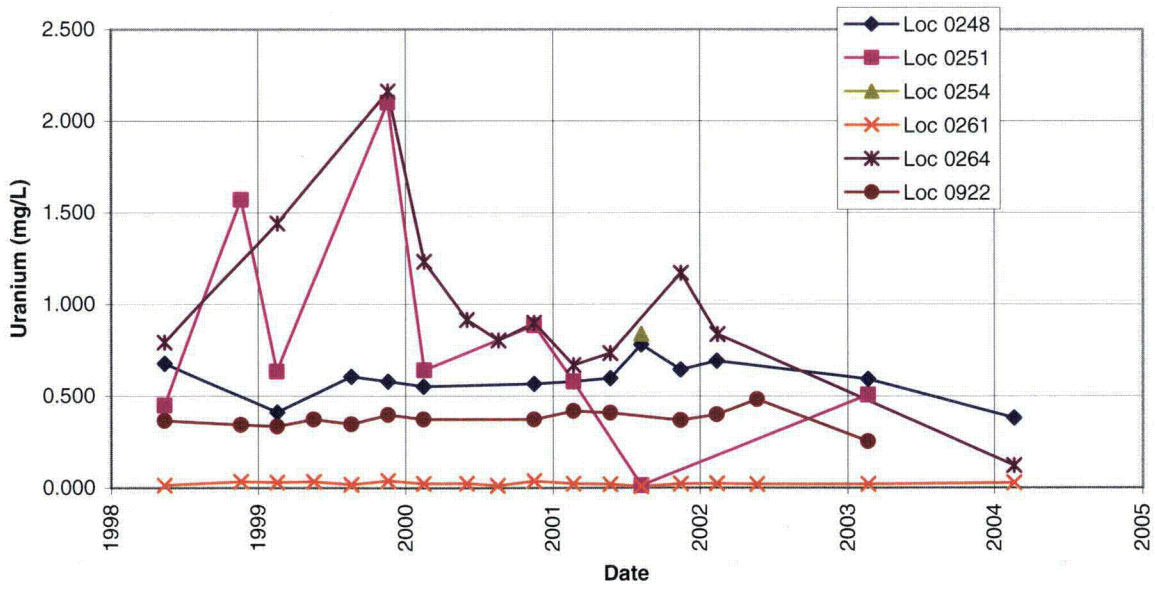


Figure 12–4. Time-Concentration Plots of Uranium in Seep Water at the Mexican Hat, Utah, Disposal Site

12.3.5 Corrective Action

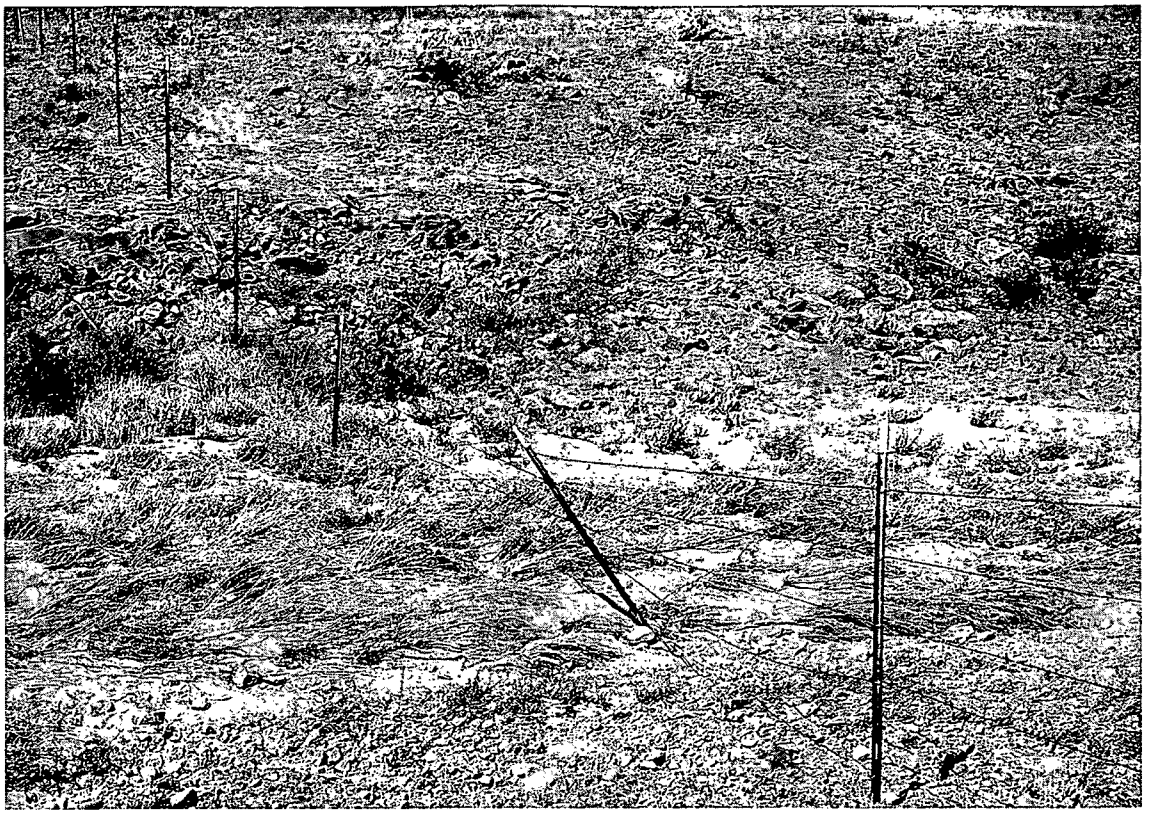
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2004.

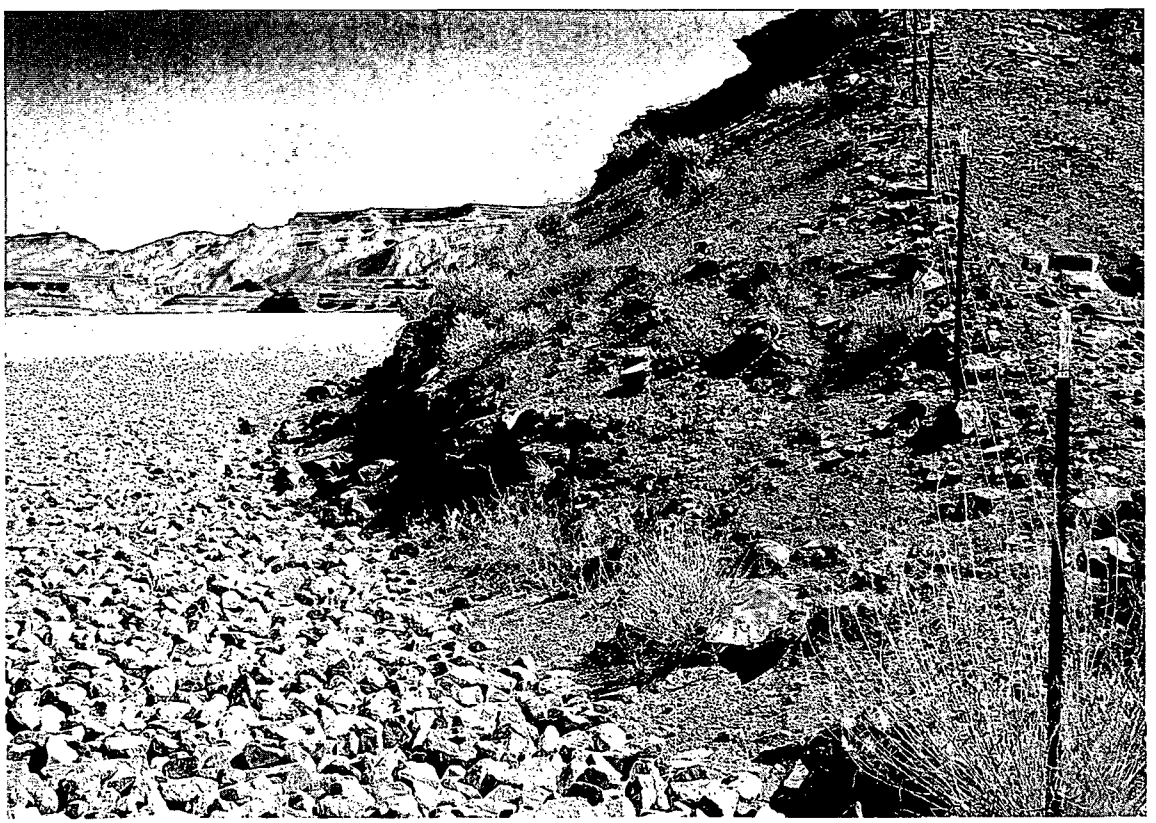
12.3.6 Photographs

Table 12–2. Photographs Taken at the Mexican Hat, Utah, Disposal Site

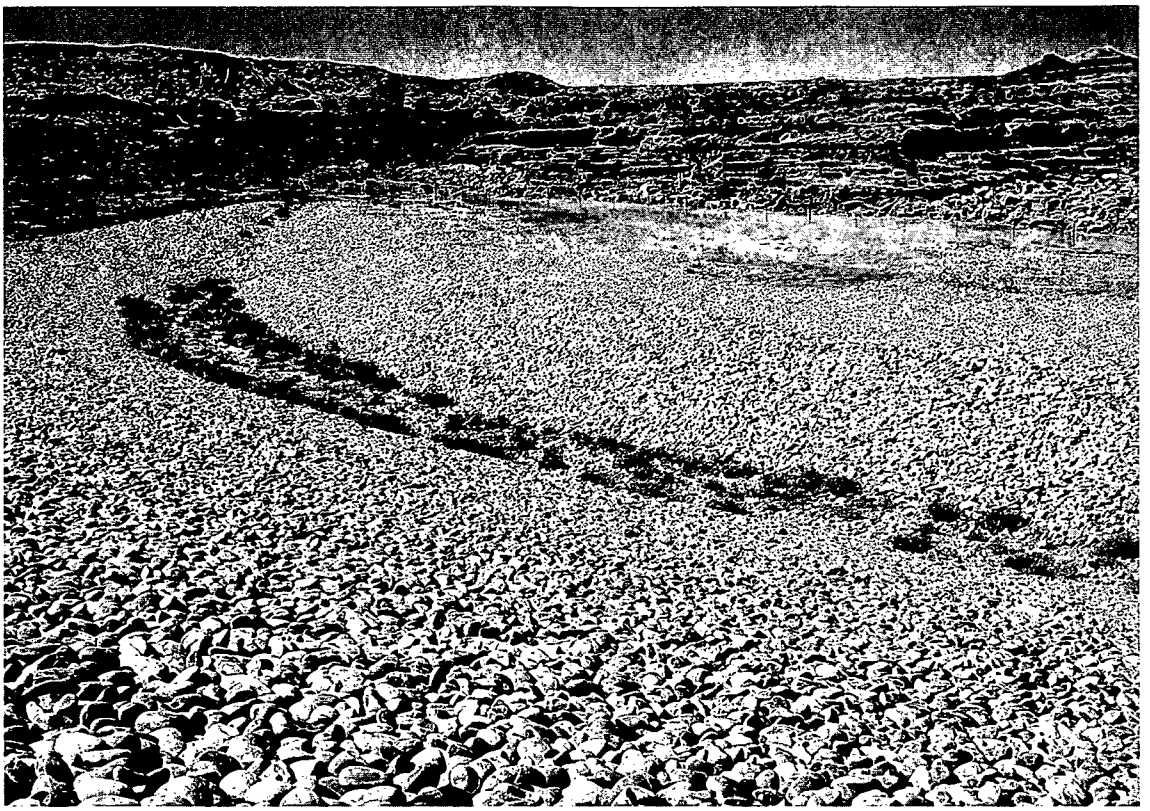
Photograph Location Number	Azimuth	Description
PL–1	280	Perimeter fence damage at the outfall of West Ditch.
PL–2	50	Rock debris along the edge of the south apron.
PL–3	200	Minor sediment accumulation and associated plant growth in West Ditch.
PL–4	40	Stabilizing rills and gullies upstream of Southwest Ditch.



HAT 9/2004. PL–1. Perimeter fence damage at the outfall of West Ditch.



HAT 9/2004. PL–2. Rock debris along the edge of the south apron.



HAT 9/2004. PL–3. Minor sediment accumulation and associated plant growth in West Ditch.

HAT 9/2004. PL–4. Stabilizing rills and gullies upstream of Southwest Ditch.

End of current section

13.0 Naturita, Colorado, Disposal Site

13.1 Compliance Summary

The Naturita Disposal Site, inspected on April 13, 2004, was in excellent condition. Rock rubble was removed and gullies were filled along a portion of the onsite monitor well access road. Noxious weeds persist at the site and require ongoing control. A follow-up inspection was conducted on November 17, 2004, after an earthquake occurred near the site; no disturbances were observed and the disposal cell was in excellent condition.

13.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Naturita, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Upper Burbank Disposal Cell, Uravan, Colorado* (DOE/AL/62350–250, Rev. 1, U.S. Department of Energy [DOE], Albuquerque Operations Office, July 1999) 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 13–1.

Table 13–1. License Requirements for the Naturita, Colorado, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.1 and 6.2	Section 13.3.1
Follow-up or Contingency Inspections	Section 3.4	Section 13.3.2
Routine Maintenance and Repairs	Section 4.0	Section 13.3.3
Ground Water Monitoring	Section 2.6.2	Section 13.3.4
Corrective Action	Section 5.0	Section 13.3.5

13.3 Compliance Review

13.3.1 Annual Inspection and Report

The site, located west of the former community of Uravan, Colorado, was inspected on April 13, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 13–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

13.3.1.1 Specific Site Surveillance Features

Access Road, Fence, Entrance Gates, and Signs—Access to the Naturita Disposal Site is from Montrose County Road EE22 that intersects State Highway 141 at Uravan, Colorado. Road EE22 approaches the site from the northwest and continues (offsite) along the northeast side of the disposal cell. The graveled county road was in good condition.

The entrance gate, located northwest of the disposal cell off of Road EE22, consists of a locked pair of tubular metal gates suspended from galvanized steel gateposts. A chain and padlock

secures the gate. Two other metal gates on site allow access to monitor wells adjacent to the west side of the cell. All the gates were in good condition.

Gullies had formed along the monitor well access road on the northwest side of the site, and a
13A minor amount of rock rubble also had fallen onto the middle to upper sections of the access road. Rubble was removed from the road and the gullies were filled in fall 2004.

A barbed-wire stock fence encloses the site. The fence was in excellent condition. Cattle were grazing outside the property but should be of little concern because forage within the site or in the immediate area is minimal.

The site has 25 perimeter signs and one entrance sign. Perimeter signs, mounted on steel posts, are set approximately 5 feet inside the perimeter fence. One sign (P2) had bullet holes but was legible. The other 24 perimeter signs and the entrance sign were in good condition.

Site Markers and Monuments—The two granite site markers, SMK–1 and SMK–2, were undisturbed and in excellent condition.

The site property boundary has 17 corners, which are marked by either boundary monuments or survey monuments. Boundary monuments are designated BM–1 through BM–17. Three survey monuments SM–3, SM–4, and SM–11 are used in lieu of boundary monuments BM–3, BM–4, and BM–11. Survey monuments were installed during site construction for survey control; boundary monuments were installed after completion of construction to delineate the final property boundary. Both types of monuments are located with the same precision. All boundary and survey monuments were undisturbed and in excellent condition.

Monitor Wells—The ground water monitoring network has five wells. All monitor wells were secure and in good condition.

13.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into five areas referred to as transects: (1) the riprap-covered top slope and side slopes of the disposal cell; (2) the riprap-covered toe drains and toe drain outlets; (3) the riprap-covered interceptor channel; (4) the reclaimed areas surrounding the disposal cell; and (5) the outlying area.

Within each transect, inspectors examined specific site surveillance features, such as monitor wells, survey and boundary monuments, signs, and site markers. Inspectors examined each transect for evidence of erosion, settling, slumping, or other disturbance that might affect site integrity or the long-term performance of the site.

Top of Disposal Cell and Side Slopes—Rock covers the 2-acre top of the disposal cell and the approximate 8 acres of side slopes (PL-1). The rock is rounded, with larger rock on the side slopes than on the top. The cell top and side slopes of the disposal cell were in excellent condition. No evidence of subsidence, differential settlement, slumping, or other modifying process was noted, and no vegetation was present.

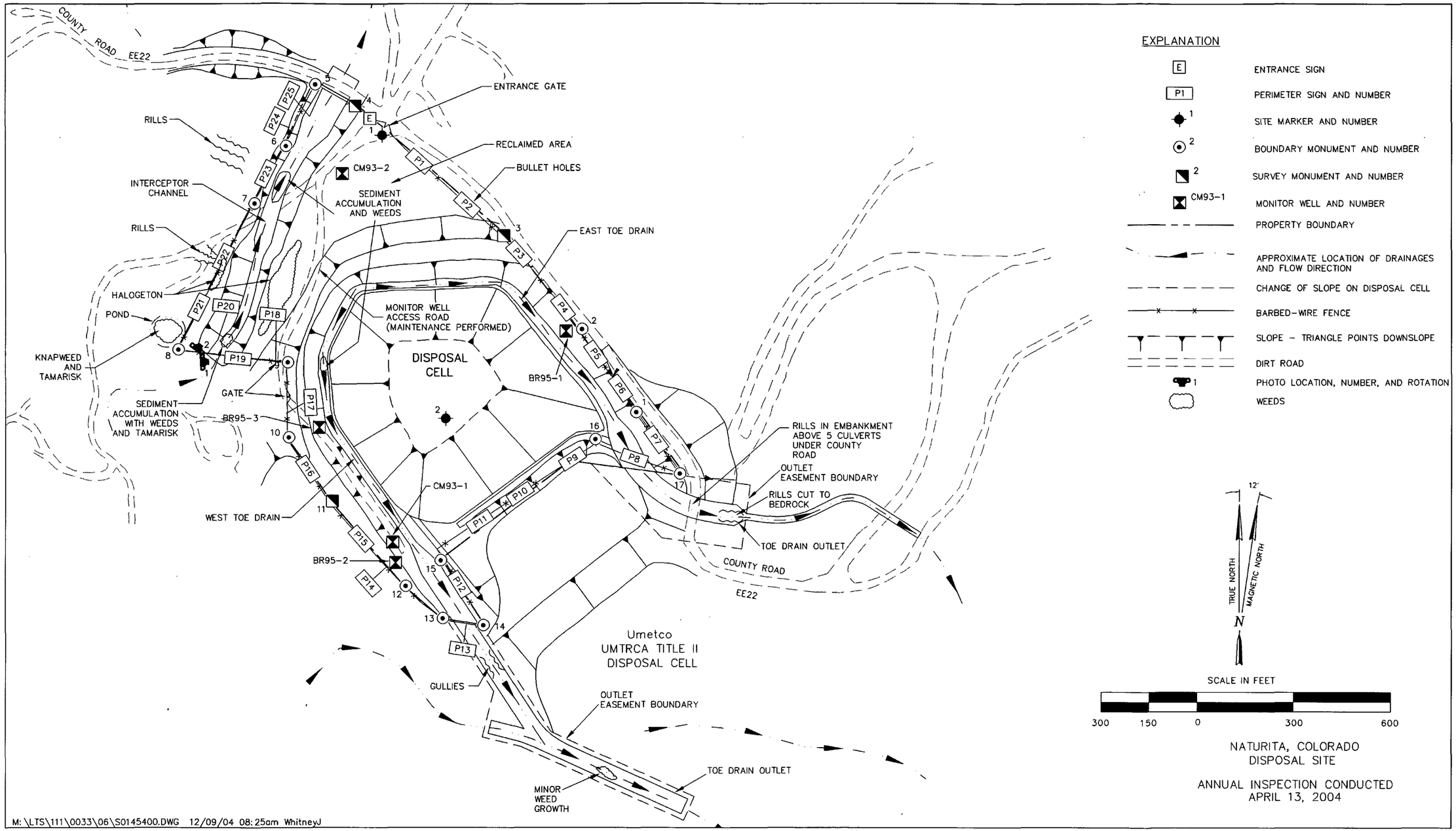


Figure 13–1. 2004 Annual Compliance Drawing for the Naturita, Colorado, Disposal Site

Toe Drains and Outlets—Two riprap-filled toe drains collect water from the cell side slopes and divert it to the southeast. The toe drain on the west side of the cell exits through a channel quarried through the sandstone wall of the Burbank Pit and into a deep canyon leading to the San Miguel River. Some sediment has accumulated in the upper end of the west toe drain allowing weeds to grow. The east toe drain extends through the adjacent Umetco UMTRCA Title II disposal site and crosses beneath County Road EE22 through five culverts. Minor erosion of loose material has occurred in the drains, but the underlying sandstone bedrock limits further erosion. A small volume of water was flowing in this toe drain, probably due to recent rains and snowmelt. Noxious weeds observed in 2003 adjacent to the east toe drain (halogeton) and adjacent to the west toe drain (Russian knapweed) were not evident in 2004.

Interceptor Channel—A riprap-armored interceptor channel, upslope and northwest of the disposal cell, diverts storm water and snowmelt run-on to the east across County Road EE22. Some erosion has occurred outside the property uphill from the channel resulting in minor deposition of sediment in the channel (PL–2). A small amount of a noxious weed (halogeton) and some tamarisk was observed at the southwest, upstream end of the channel (PL–2). Treatment with herbicide was not performed in 2004, but is scheduled to occur in 2005. Otherwise, the channel is in excellent condition. The accumulated sediment and plant growth does not impair the function of the channel.

Reclaimed Areas—The disturbed area north of the disposal cell and south of the interceptor channel was seeded at construction completion. Vegetation cover consists of grasses, shrubs, and annual weeds. A storm water discharge permit, which addressed this area and the restored Club Mesa borrow area to the north of the site (not shown on Figure 13-1), has been closed with regulator concurrence.

Outlying Area—The site boundary and the area within 0.25 mile of the site boundary have been highly disturbed by mining, quarrying, and road building activities. Umetco is continuing to work on their tailings pile across County Road EE22 east of the site. Umetco's completed UMTRCA Title II disposal cell abuts the Naturita disposal cell on the southeast.

Minor erosion has occurred in an area uphill from perimeter sign P23 due to runoff from areas disturbed by Umetco activities.

Russian knapweed and mature tamarisk are growing in a sedimentation pond above the interceptor channel adjacent to the property boundary near boundary monument BM–8.

13.3.2 Follow-Up or Contingency Inspections

13B On November 7, 2004, an earthquake registering 4.1 on the Richter scale was recorded in Paradox Valley, about 8 miles northwest of the disposal site. In accordance with the LTSP, a follow-up inspection was performed on November 17 to document any effects that the earthquake might have had on the disposal cell. No disturbances were observed at or adjacent to the site, and the disposal cell was in excellent condition.

13.3.3 Routine Maintenance and Repairs

In 2004, DOE removed rubble and filled gullies along the monitor well access road.

13.3.4 Ground Water Monitoring

Monitor Wells—DOE monitors ground water at the site as a best management practice to demonstrate the initial performance of the disposal cell. The compliance strategy is to not exceed
13C maximum concentration limits established in Table 1 to Subpart A of 40 CFR 192 or background levels in a point-of-compliance well (CM93–2) in the uppermost aquifer (Wingate Sandstone) downgradient from the disposal cell. The Wingate Sandstone lies approximately 600 feet beneath the disposal cell and is hydrologically isolated from the surface by unsaturated sandstone and relatively impermeable shale layers (aquitard) of the Salt Wash Member of the Morrison Formation and the Summerville Formation, respectively.

Ground water monitoring is performed in three shallower monitor wells (BR95–1, BR95–2, and BR95–3), completed at the contact between the Salt Wash Member and the Summerville Formation, to provide early warning of possible migration of contaminants. If contamination suspected to be related to the disposal cell is observed at this horizon, DOE will sample two additional wells (CM93–1 and CM93–2) screened in the uppermost aquifer (Wingate Formation). Indicator analytes are arsenic, molybdenum, and uranium.

In accordance with the LTSP, monitor wells are to be sampled every other year, beginning in 2000, after licensing of the site was completed (1999). Because the wells were last sampled in 2002, sampling was again performed in fall 2004. Results, however, were not available in time for inclusion into the 2004 annual report and will be reported in the 2005 annual report. In accordance with the LTSP, the need for continued monitoring will be evaluated following the 2004 (or fifth year) sampling event.

13.3.5 Corrective Action

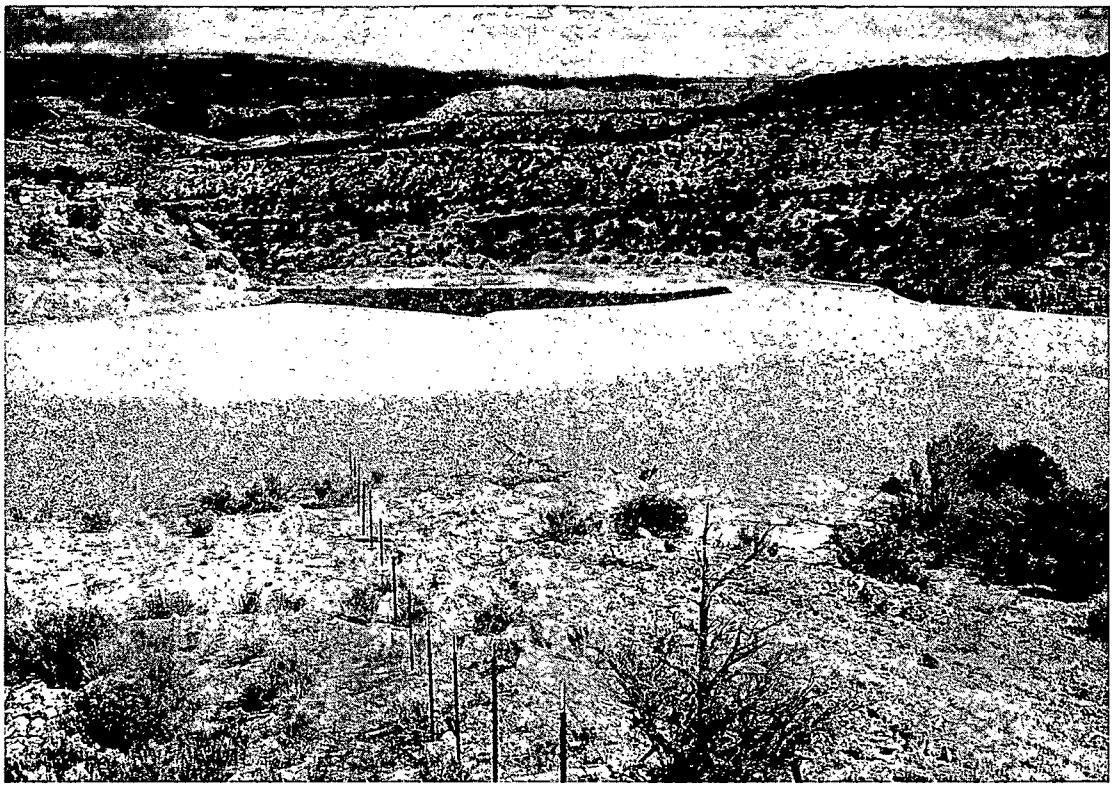
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2004.

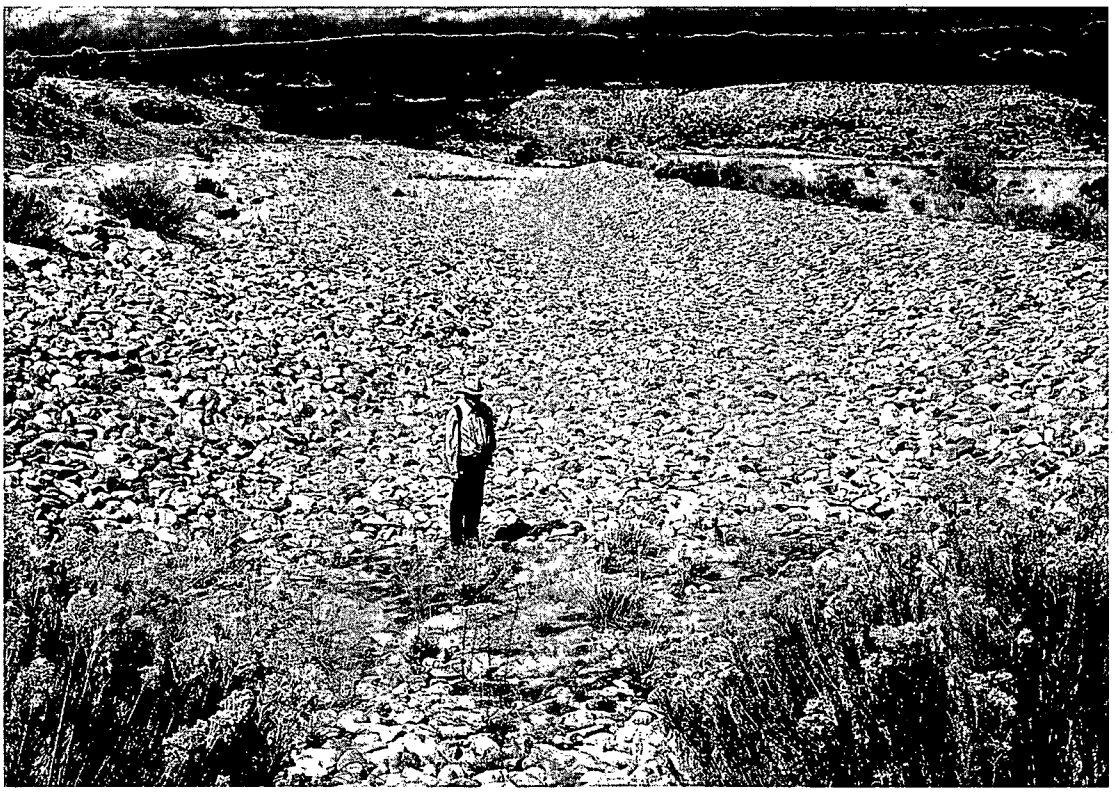
13.3.6 Photographs

Table 13–2. Photographs Taken at the Naturita, Colorado, Disposal Site

Photograph Location Number	Azimuth	Description of Photograph
PL–1	90	East view of the disposal cell.
PL–2	40	Minor sedimentation and plant growth in the upstream end of the interceptor channel.



NAT 4/2004. PL–1. East view of the disposal cell.



NAT 4/2004. PL–2. Minor sedimentation and plant growth in the upstream end of the interceptor channel.

End of current section

14.0 Rifle, Colorado, Disposal Site

14.1 Compliance Summary

The Rifle Disposal Site was inspected on August 11, 2004, and was in good condition. The perimeter fence near the southwest corner of the site was damaged and subsequently repaired. A 6-acre reclaimed permit area south of the site was successfully treated to control annual weeds earlier in the year, but had not revegetated with desirable species. The water level elevation in the cell is being lowered as required by the Long-Term Surveillance Plan (LTSP) by pumping water from two extraction wells. There was no requirement for a follow-up or contingency inspection.

14.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Rifle, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Estes Gulch Disposal Site near Rifle, Colorado* (DOE/AL/62350–235, Rev. 1, U.S. Department of Energy [DOE], Albuquerque Operations Office, November 1997) 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 14–1.

Table 14–1. License Requirements for the Rifle, Colorado, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.0	Section 14.3.1
Follow-up or Contingency Inspections	Section 3.4	Section 14.3.2
Routine Maintenance and Repairs	Section 4.0	Section 14.3.3
Ground Water Monitoring	Section 2.6 and Appendix	Section 14.3.4
Corrective Action	Section 5.0	Section 14.3.5

14.3 Compliance Review

14.3.1 Annual Inspection and Report

The site, located north of Rifle, Colorado, was inspected on August 11, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 14–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

14.3.1.1 Specific Site Surveillance Features

Access Road, Gates, Fence, and Signs—The site is reached by driving north on a gravel road from State Highway 13. In 2002, a steel fence and swinging gate were installed where the access road passes through a road cut to limit access to the site and prevent vandalism to the cell dewatering pumping system and evaporation pond. The gate was locked and in excellent condition. There was no evidence of trespassing on the site.

The site entrance gate, located in a barbed-wire stock fence that is situated about half way between the southern edge of the toe ditch and the southern boundary of the site, consists of a pair of tubular metal gates hinged to galvanized steel posts. A chain and padlock secures the two gates. The gate was locked and in excellent condition.

The fence, which extends to the edge of steep-sided arroyos that bound the site on the east and west, continues to prevent cattle from entering and grazing near the cell. However; there was evidence of wildlife (elk and deer) crossing the fence and grazing in the revegetated areas adjacent to the disposal cell. A portion of the west end of the fence was knocked down by
14A wildlife and later repaired.

The entrance sign was in excellent condition. Two perimeter signs have bullet damage but were legible. The remaining 24 perimeter signs were in excellent condition.

Markers and Monuments—Two granite site markers, one just inside and left of the entrance gate and the other on the disposal cell, were undisturbed and in good condition.

There are three survey monuments and 15 boundary monuments at this site. Boundary monuments are set at corners along an irregular site boundary. The site boundary has 20 corners; however, monuments were not set at 5 of the corners because of the rough terrain. Consequently, boundary monument locations BM–8, BM–9, BM–13, BM–17, and BM–20 were only marked with wooden lath, and are not included as part of the annual inspection. All of the survey and boundary monuments except BM–18 (located in rough terrain) were inspected and were in good condition.

Standpipes—Three standpipes, MW–01, MW–02, and MW–03, are located on the south sideslope of the disposal cell. They were undisturbed and in excellent condition. Dataloggers are installed in MW–02 and MW–03 to measure water level fluctuations. These two standpipes also have solar-powered pumps that discharge water through small-diameter aboveground plastic pipelines to a lined evaporation pond. The solar collectors, which automatically follow the position of the sun, were oriented in the correct positions and were in good condition. The plastic pipelines also were in good condition. There is no datalogger in MW–01 because it is too shallow and usually dry.

Evaporation Pond—An evaporation pond was constructed in 2001 to receive water pumped from the standpipes. The lined pond, its surrounding security fence, and the locked fence gate were in excellent condition (PL–1). Evaporation rates have kept up with the influent rates, and the water level remained well below the design capacity of the pond.

14.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into four areas referred to as transects: (1) the top of the disposal cell and interceptor trench; (2) the toe ditch and toe ditch outlet; (3) reclaimed areas; and (4) the outlying area.

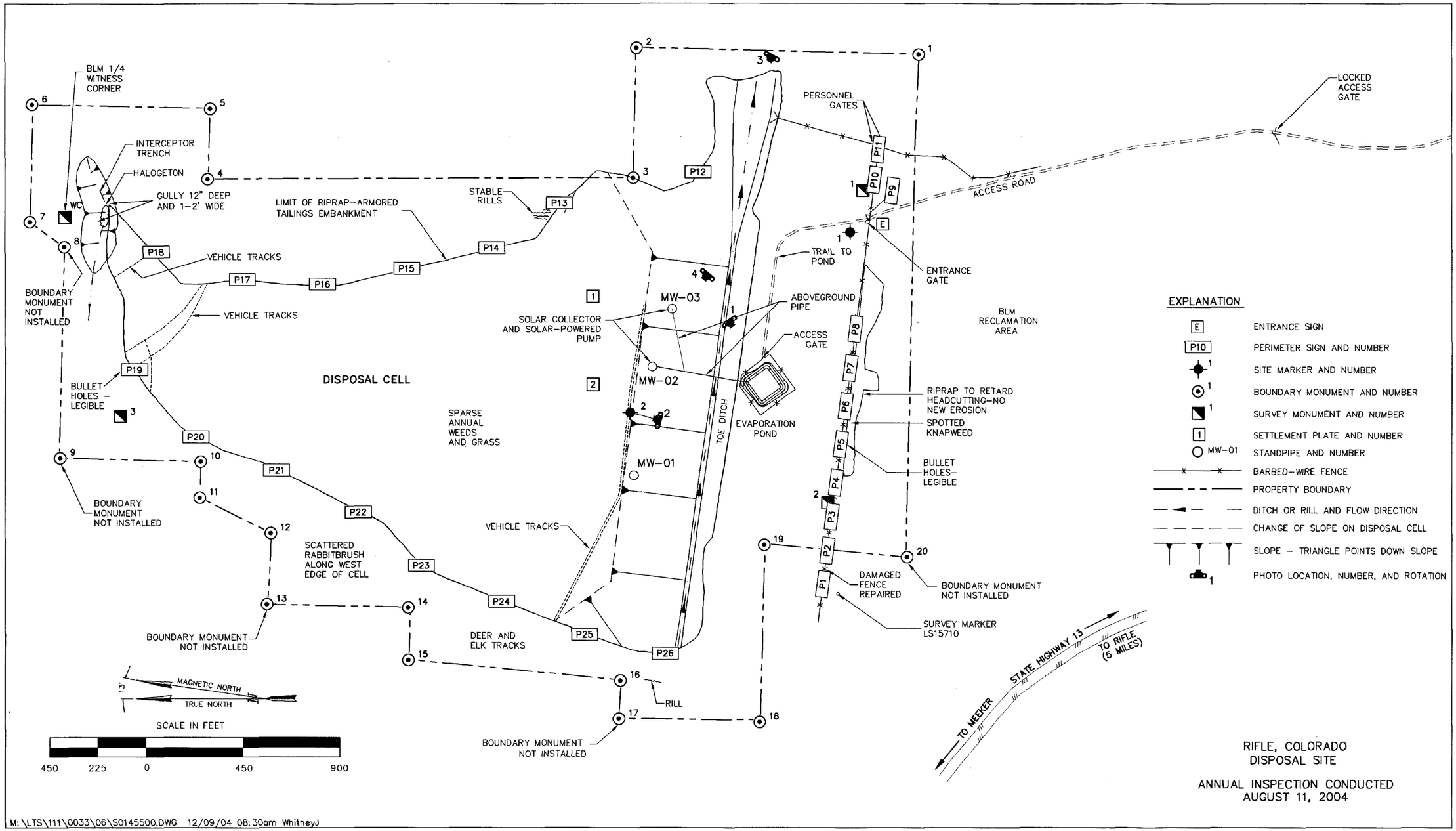


Figure 14–1. 2004 Annual Compliance Drawing for the Rifle, Colorado, Disposal Site

Disposal Cell and Interceptor Trench—Rock armor covering the 71-acre disposal cell was in excellent condition (PL–2). No evidence of subsidence, differential settlement, or slumping was noted. Only isolated clumps of grass and annual weeds were growing on the cell top.

An interceptor trench, constructed upslope of the disposal cell to protect the cell from storm-water and snowmelt runoff, was in excellent condition. The trench diverts water to the arroyo west of the site and was designed so erosion below the outfall of the trench would be halted by bedrock. Erosion in the trench is minor and is limited to the colluvial materials above the bedrock.

Halogeton, a noxious weed, has established on the south slope of the interceptor trench. This infestation will be treated with herbicide.

Toe Ditch and Toe Ditch Outlet—A toe ditch runs along the downslope (south) edge of the disposal cell and is armored with the same rock that protects the disposal cell. The toe ditch diverts surface runoff from the disposal cell off site to the east. Plant encroachment is sparse and is not impairing the function of the toe ditch.

Minor erosion, anticipated in the design, has occurred in the channel at the outlet below the toe ditch (PL–3). Bedrock is now exposed at the outlet and rock placed at the bottom of toe ditch outlet is dropping into the eroding channel to protect it from further erosion. Comparison with a photograph taken at the same location during the 2003 inspection indicates that no new erosion had occurred.

Reclaimed Areas—Disturbed areas around the edges and south of the disposal cell were reseeded in 1996. The vegetation, primarily grasses, continues to be stressed due to local drought conditions. There was no evidence of cattle grazing within the site boundaries during the past year.

Three arroyos are present in the reclaimed area south of the disposal cell. A rock apron was placed between the stock fence and the head-cuts in these arroyos to prevent headward migration toward the disposal cell. As erosion has migrated into the rock apron, the rock has dropped into the arroyos to armor them from further erosion.

The reclaimed area south of the disposal cell was disturbed by the construction of the evaporation pond. This area will be reclaimed again after the evaporation pond is decommissioned.

14B Herbicide applications in 2003 eliminated several infestations of noxious weeds in the reclaimed areas. Some spotted knapweed plants were growing along the southeast side of the site; these weeds will be sprayed.

Outlying Area—The area beyond the site for a distance of 0.25 mile was visually inspected for signs of erosion, development, or other disturbance. The primary land use in the area is grazing and wildlife habitat. No activity or development was observed that might affect site integrity or the long-term performance of the disposal cell.

The area directly south of the disposal cell on U.S. Bureau of Land Management (BLM)-managed land was inspected. During construction of the cell, DOE was granted a Temporary Withdrawal Permit by BLM to use this area for topsoil storage. This area was seeded at the same time as the disturbed areas adjacent to the cell on DOE-owned land. Approximately 6 acres of the area did not successfully revegetate and, late in 1999, BLM requested that DOE reseed this portion of the site. DOE disked and reseeded the 6 acres in October 2000. Due to drought conditions, desirable plant species were dormant or sparse during the 2002 and 2003 inspections. In spring 2004, DOE sprayed the undesirable plants (cheat grass and peppergrass) that dominated the reseeded area. At the time of the inspection, the coverage of these plants was greatly
14C diminished, but the continued drought had not allowed desirable vegetation to reestablish. DOE will disk the area to destroy the remaining undesirable plants and seed it with desirable species. It is unlikely that BLM will close the Temporary Withdrawal permit until revegetation of this area with desirable species is successful.

14.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

14.3.3 Routine Maintenance and Repairs

In 2004, DOE repaired a damaged fence and sprayed noxious weeds and undesirable plants with herbicide.

14.3.4 Ground Water Monitoring

Monitoring of ground water quality is not required at this site because ground water in the uppermost aquifer is of limited use and the disposal cell is geologically isolated from the first
14D useable aquifer by approximately 3,800 feet of low-permeability siltstones, shales, and sandstones. However, DOE monitors water levels in the disposal cell at standpipes MW–02 and MW–03 to ensure that water within the cell does not rise above an elevation of 6,018 feet.

The disposal cell was constructed against a berm or earthen embankment at the southern (downslope) end, with a liner that extends part way up on the inside of the berm to an elevation of 6,020 feet. If water in the disposal cell were to rise above this elevation, it would overflow the liner and saturate the berm. Therefore, an action level for pumping when water levels reached an elevation of 6,016 feet was established in the LTSP.

When the water levels in MW–02 and MW–03 approached the action level for pumping, DOE initiated a procedure to lower the water level in the cell as specified in the LTSP. An evaporation pond for this purpose was constructed in 2001 and a solar-powered pump was installed in MW–02 with a small-diameter aboveground plastic pipeline delivering water to the evaporation pond. Although water was being removed from the disposal cell, the water level in the cell had not decreased by the end of 2003 and the volume of water being extracted from MW–02 had
14E begun to decrease. In December 2003, a solar-powered pump (similar to the one in MW–02) was installed in MW–03 and a plastic aboveground pipeline was plumbed into the existing pipeline to increase the amount of water being removed from the disposal cell (PL–4).

At the time of the inspection, the pump in MW–02 was operating at about 1 gallon per minute (gpm) and the pump in MW–03 was operating at about 4 gpm. As shown by datalogger measurements (Figure 14–2), water levels steadily decreased in the past year, and the water level elevation has remained below 6,015 feet in both standpipes since June 2004. Fluctuations in the water levels represent drawdown and recovery during pumping cycles. The pumps are shut off for the winter because of reduced evaporation rates during that time.

DOE intends to remove enough water from the disposal cell to lower water levels in the standpipes to below the 6,014-foot elevation. At that time, pumping will be stopped, and water levels will be monitored to ensure they remain at or below that elevation. If water levels again rise, pumping will resume.

14.3.5 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.

The LTSP establishes that corrective action will be taken if the water level in the disposal cell reaches 6,016 feet in elevation. Corrective action was initiated late in 2001 with the installation of the evaporation pond and dewatering of the cell. This action has lowered the water level to an acceptable elevation and prevents water from overtopping the disposal cell liner. Dewatering of the cell continues.

14.3.6 Photographs

Table 14–2. Photographs Taken at the Rifle, Colorado, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	235	The evaporation pond viewed from the toe ditch.
PL–2	15	Site marker SMK–2 and the disposal cell cover.
PL–3	300	Self-armoring at the toe ditch outlet.
PL–4	310	Solar collectors at standpipes MW–02 (left) and MW–03 (right).

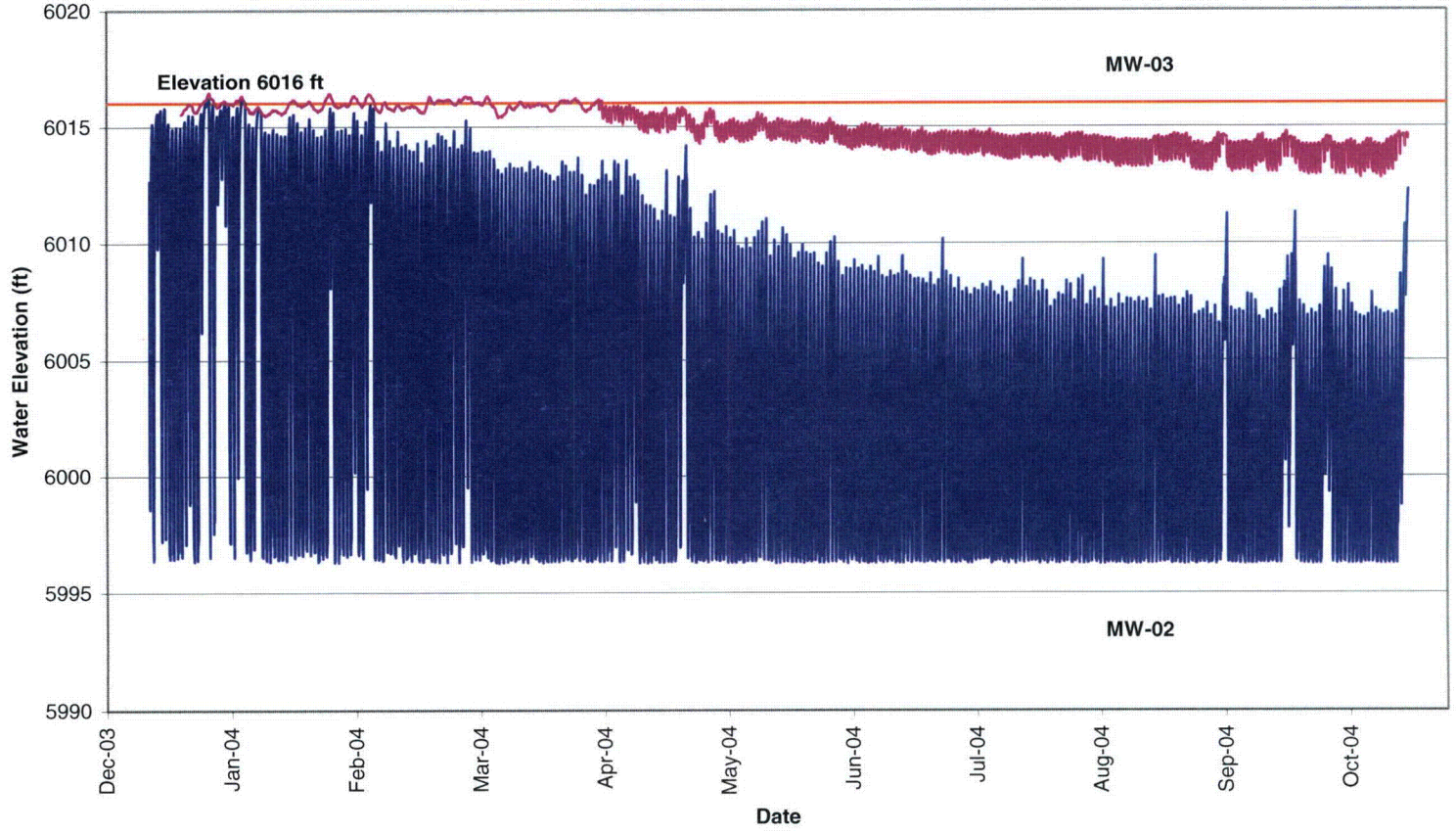
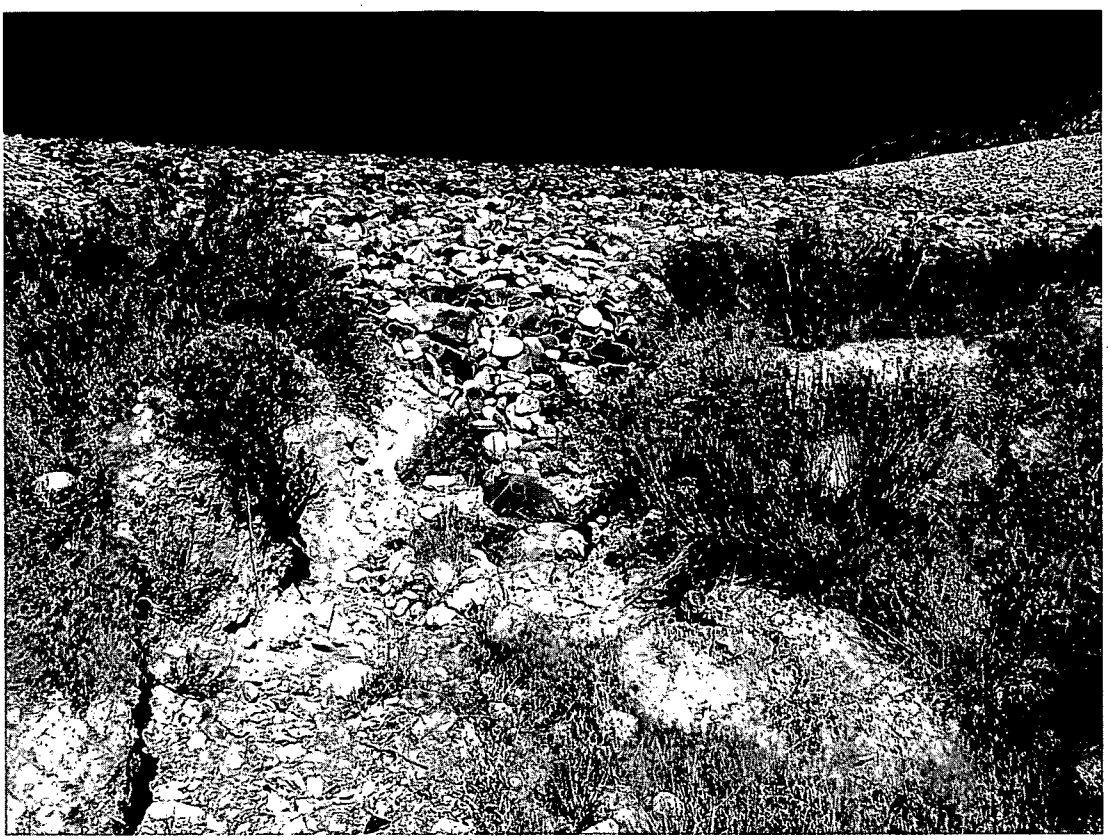


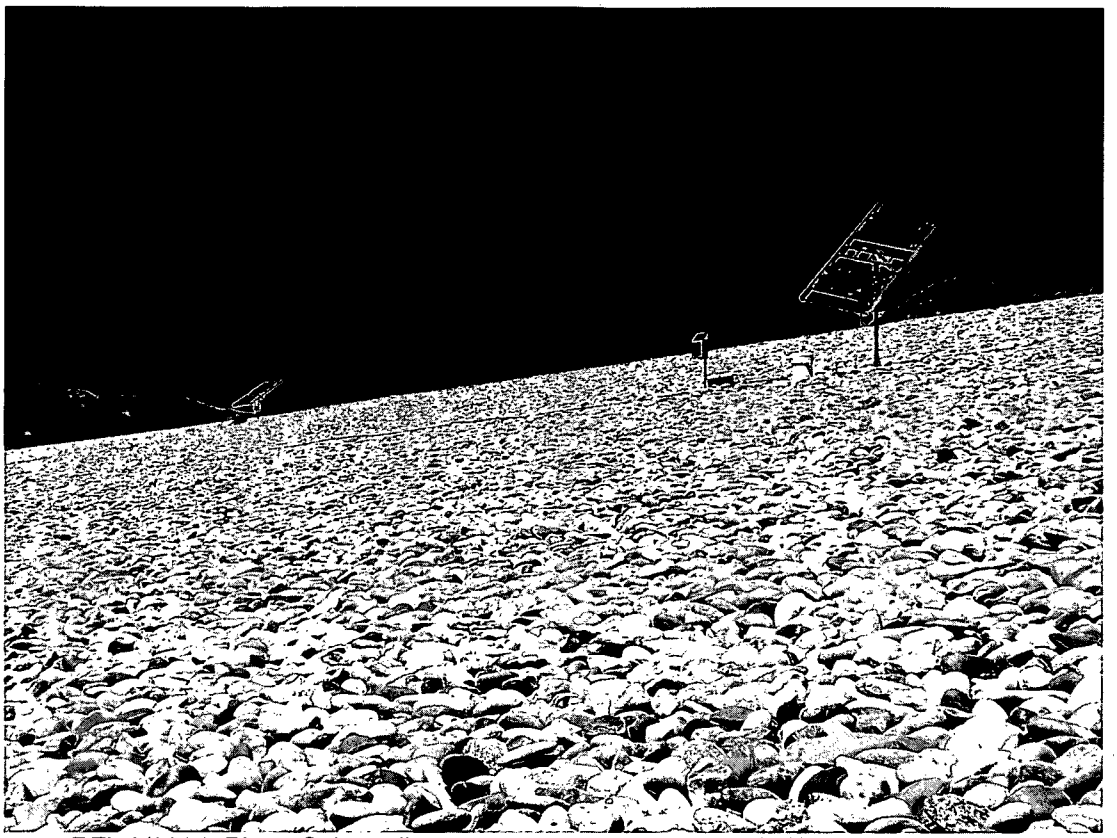
Figure 14–2. Water Levels in Standpipes MW–02 and MW–03 at the Rifle, Colorado, Disposal Site

RFL 8/2004. PL–1. The evaporation pond viewed from the toe ditch.

RFL 8/2004. PL–2. Site marker SMK–2 and the disposal cell cover.



RFL 8/2004. PL–3. Self-armoring at the toe ditch outlet.



RFL 8/2004. PL–4. Solar collectors at standpipes MW–02 (left) and MW–03 (right).

End of current section

15.0 Salt Lake City, Utah, Disposal Site

15.1 Compliance Summary

The Salt Lake City Disposal Site, inspected on March 8, 2004, was in good condition. Because of continuing activities on the adjacent Envirocare of Utah, Inc., (Envirocare) property, access to the disposal site is impeded. Due to restricted areas around the site, inspectors must be escorted by Envirocare personnel to gain access to the site. At the request of the inspectors, Envirocare replaced two perimeter signs and uncovered two buried boundary monuments. Ground water monitoring is not required at this site. There was no requirement for a follow-up or contingency inspection.

15.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Salt Lake City, Utah, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the South Clive Disposal Site, Clive, Utah* (DOE/AL/62350–228, Rev. 2, U.S. Department of Energy [DOE], Albuquerque Operations Office, September 1997) 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 15–1.

Table 15–1. License Requirements for the Salt Lake City, Utah, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.0	Section 15.3.1
Follow-up or Contingency Inspections	Section 3.4	Section 15.3.2
Routine Maintenance and Repairs	Section 5.0	Section 15.3.3
Ground Water Monitoring	Section 4.0	Section 15.3.4
Corrective Action	Section 6.0	Section 15.3.5

15.3 Compliance Review

15.3.1 Annual Inspection and Report

The site, located 85 miles west of Salt Lake City, Utah, was inspected on March 8, 2004. Results of the inspection are described below. Features and the photograph locations (PL) mentioned in this report are shown on Figure 15–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

15.3.1.1 Specific Site Surveillance Features

Access Road, Fences, Gates, and Signs—Access to the Salt Lake City site is attained by following paved and graded roads to the Envirocare facility. All traffic entering the Envirocare facility is stopped at a security gate approximately 0.25 mile west of the DOE disposal site. Inspectors pass through this gate and must then sign in with Envirocare's security guard in a building near the northwest corner of the disposal cell.

DOE has a perpetual easement across Envirocare property, but no longer has direct access to the
15A northwest entrance of the site because Envirocare's haul road around DOE property is designated as a Restricted Area. After signing a Radiological Work Permit and acquiring an Envirocare escort, inspectors now access the site along a new route to the southwest corner of the property.

DOE's chain-link security fence, set inside the property boundary by distances of 13 to 114 feet, was in good condition. Envirocare has a chain-link fence on or just outside the site property boundary, and an additional fence on the other side of their haul road along the north and west sides of the site.

Envirocare installed new entrance gates through their fence and DOE's fence at the southwest corner of the site in 2002. The DOE entrance gate was locked and in excellent condition. The former entrance gate at the northwest corner of the site was locked and in good condition.

15B The entrance sign, located on the current entrance gate, was is excellent condition. All perimeter signs were present and in good condition except for signs P4 and P5 which were faded and illegible. These signs were replaced by Envirocare personnel at the time of the inspection with new signs provided by DOE (PL–1).

Site Markers and Monuments—Both granite site markers were in excellent condition. All four boundary monuments were in good condition. Boundary monuments BM–2 and BM–3 had been buried by several feet of fill due to Envirocare's site activities, and both were uncovered by Envirocare personnel in order to be inspected.

Monitor Wells—Ground water monitor wells are present within the site security fence, between the site security fence and the Envirocare property boundary fence, and on adjacent Envirocare property. All monitor wells on DOE property belong to Envirocare. In late 2000, Envirocare informed DOE that all monitor wells on the DOE property were to be abandoned. However, none of the wells had been abandoned but were properly secured at the time of the inspection.

15.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the top and side slopes of the disposal cell; (2) the area between the disposal cell and the site boundary; and (3) the outlying area.

Top and Side Slopes of the Disposal Cell—The top and side slopes of the disposal cell are armored with riprap and were in excellent condition. Inspectors found no evidence of settling, slumping, or instability on the side slopes. Sparse vegetation was present on the side slopes but currently does not pose a problem.

Area Between the Disposal Cell and the Site Boundary—The area between the toe of the disposal cell and the security fence was inspected. Water was present in the toe drain along the southeast corner of the cell. All perimeter ditches were in good condition. Minor plant encroachment has occurred in the northern and southern ditches, however these plants do not degrade the function of the ditches (PL–2).

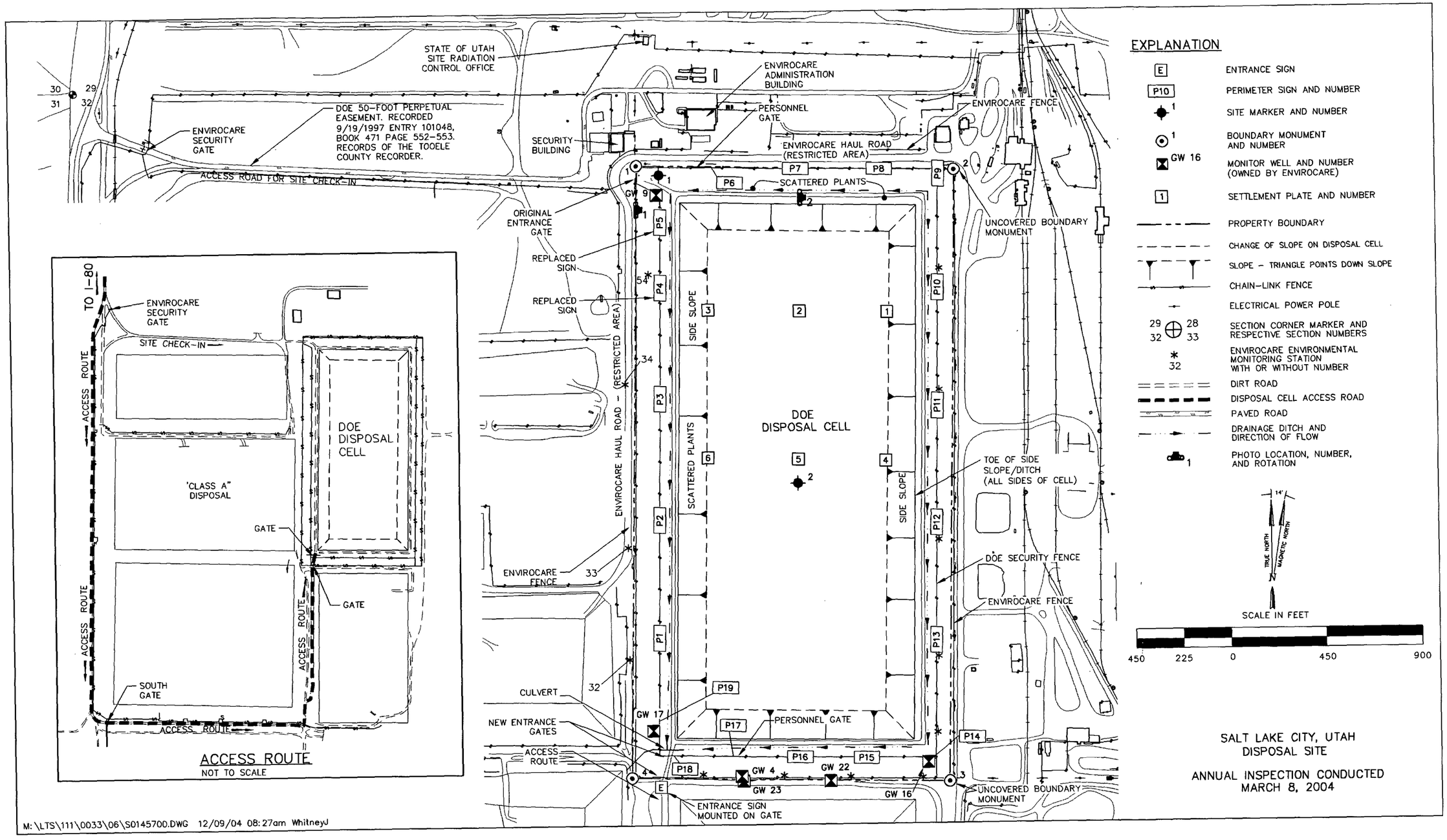


Figure 15–1. 2004 Annual Compliance Drawing for the Salt Lake (South Clive), Utah, Disposal Site

Outlying Area—This transect extends from the Envirocare fence to 0.25 mile beyond the site boundary. Outside the site boundary are a variety of features and activities managed by Envirocare. On the east side of the site, incoming wastes are unloaded from rail cars and transferred to haul trucks. Disposal cells are in the process of being built or closed on the south and west sides of the site. Directly to the south is a low-level radioactive waste disposal cell; to the southwest is a waste disposal cell containing 11e.(2) material regulated under the Atomic Energy Act of 1954; and directly to the west, Envirocare is continuing to fill a Class A low-level radioactive waste disposal cell. With the exception of a corridor at the southwest corner of DOE's disposal site where the site access has been relocated, all areas surrounding DOE's property are restricted due to radiological hazards.

15.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

15.3.3 Routine Maintenance and Repairs

Boundary monuments were uncovered and two perimeter signs were replaced in 2004.

15.3.4 Ground Water Monitoring

The ground water under the site was determined to be of limited use because of excessive total dissolved solids concentrations in the uppermost aquifer. Consequently, the LTSP does not require ground water monitoring.

15.3.5 Corrective Action

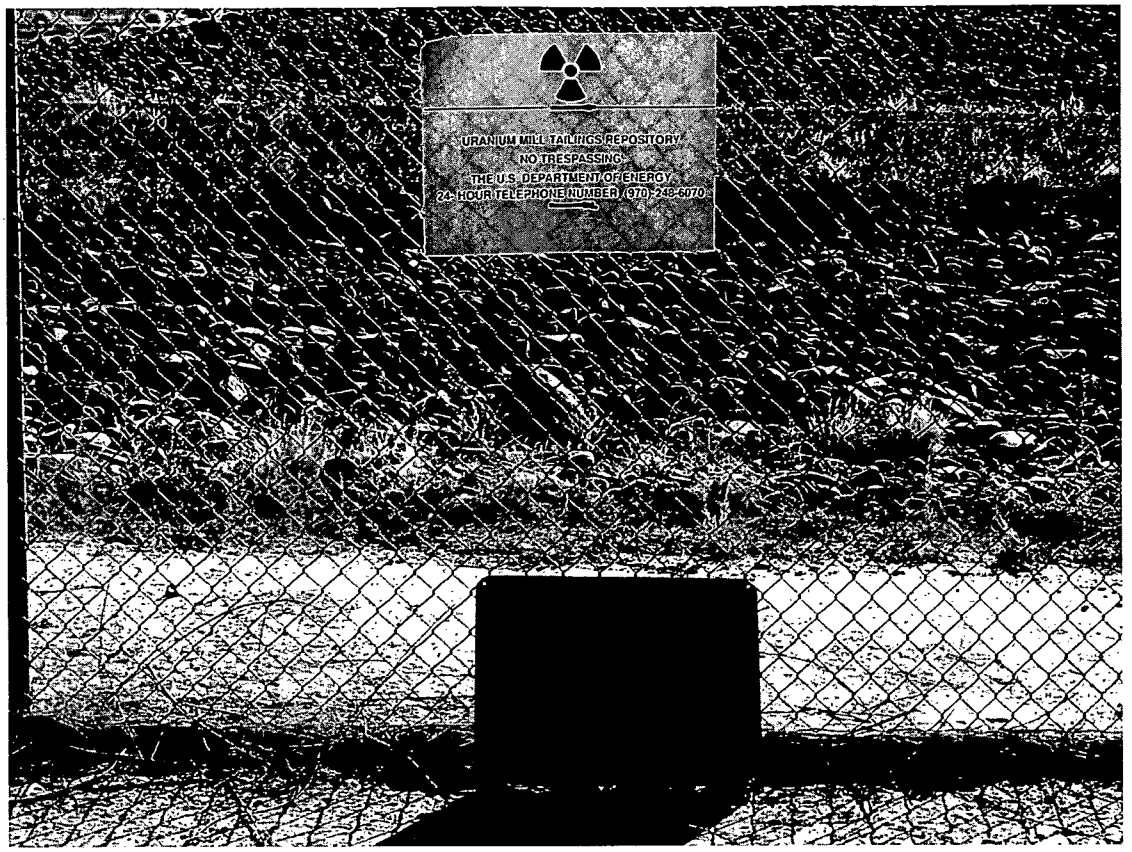
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2004.

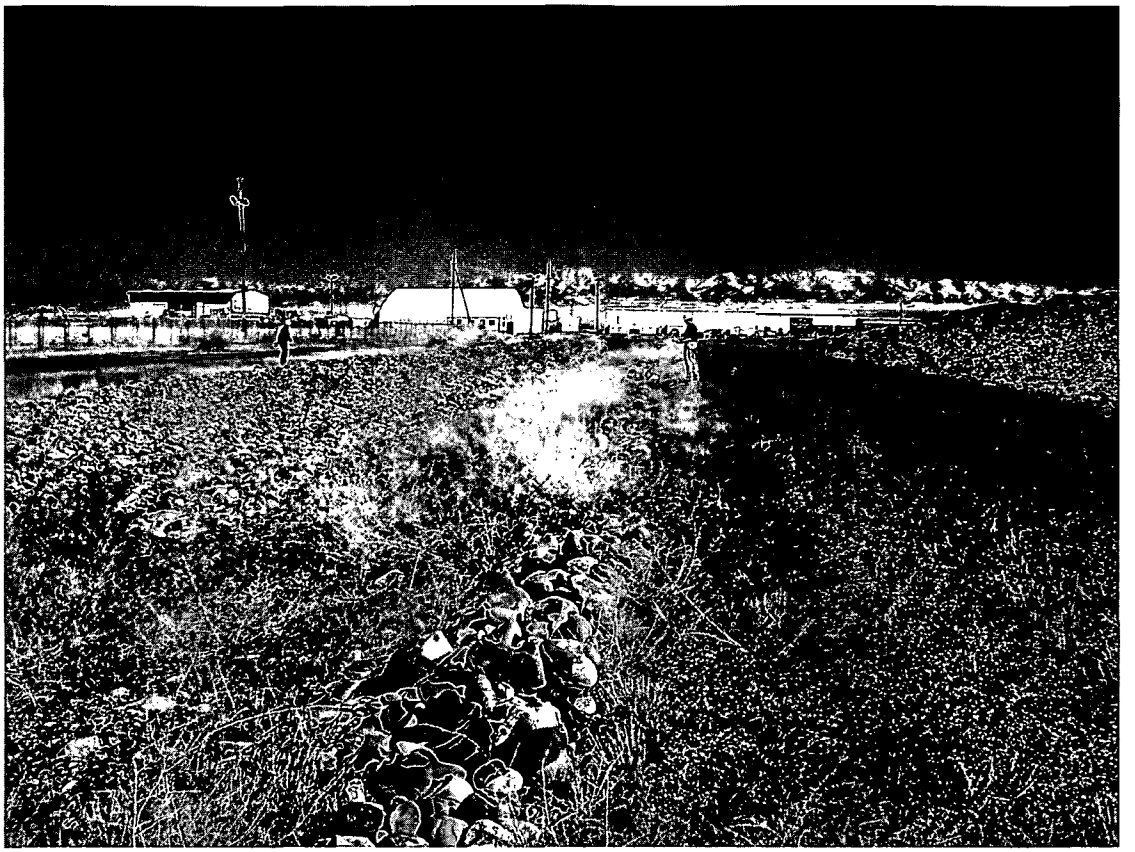
15.3.6 Photographs

Table 15–2. Photographs Taken at the Salt Lake City, Utah, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	90	New perimeter sign P5.
PL–2	90	North perimeter diversion ditch.



SLC 3/2004. PL–1. New perimeter sign P5.



SLC 3/2004. PL–2. North perimeter diversion ditch.

End of current section

16.0 Shiprock, New Mexico, Disposal Site

16.1 Compliance Summary

The Shiprock Disposal Site, inspected on June 9, 2004, was in excellent condition. The security fence was cut at one location and was repaired later in the summer. Vegetation on the disposal cell was sprayed with herbicide. Woody vegetation continues to grow in the diversion channels; however, it is not degrading the performance of these structures. The reconstructed drainage channel outlet was in excellent condition and functioning as designed. No requirement for a follow-up or contingency inspection was identified.

16.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Shiprock, New Mexico, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Shiprock Disposal Site, Shiprock, New Mexico* (DOE/AL/62350–60F, Rev. 1, U.S. Department of Energy [DOE], Albuquerque Operations Office, September 1994) 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 16–1.

Table 16–1. License Requirements for the Shiprock, New Mexico, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 16.3.1
Follow-up or Contingency Inspections	Section 7.0	Section 16.3.2
Routine Maintenance and Repairs	Section 8.0	Section 16.3.3
Ground Water Monitoring	Section 5.0	Section 16.3.4
Corrective Action	Section 9.0	Section 16.3.5

16.3 Compliance Review

16.3.1 Annual Inspection and Report

The site, located south of Shiprock, New Mexico, was inspected on June 9, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 16–1. Numbers in the left margin refer to items in the Executive Summary table.

16.3.1.1 Specific Site Surveillance Features

Access Road, Fence, Gates, and Signs—Access to the main entrance gate is gained by traveling through a gravel pit facility operated by the Navajo Engineering and Construction Authority. DOE secured perpetual access to the site through a Custody and Access Agreement with the Navajo Nation.

The chain-link security fence along the perimeter was in good condition except where it had been cut near perimeter sign P4. Strands of the chain-link security fence near an upright pole

were cut and bent away from the pole. The fence was repaired later in the summer to restore site
16A security. A gap under the fence near boundary monument BM–4 was filled with rocks at the time of the inspection. Tumbleweeds and windblown trash tend to accumulate along the perimeter fence on the southwest and southeast sides of the property. Periodic removal actions are necessary to mitigate potential fire hazards associated with the weeds and to ensure the site
16B appears maintained. Accumulated weeds and trash noted during the inspection were removed later in the year. Windblown sand deposits, removed from along the southwest section of the fence in 2003, continue to accumulate along the southwest side of the disposal site and, to a lesser extent, in other areas, but removal was not warranted in 2004. DOE will continue to monitor and remove significant tumbleweed, trash, and windblown sand accumulations.

All three vehicle gates—the main entrance gate at the east corner of the site (near the terrace escarpment), the gate providing terrace access at the northwest corner of the site, and the old entrance gate at the west corner of the site—were locked and in good condition.

Four entrance signs and 16 pairs of perimeter signs (one standard perimeter sign with text; one pictorial sign showing the disposal cell and displaying the Navajo symbol for danger) are attached to the security fence. All signs were intact and in good condition.

Site Markers and Monuments—The two site markers were in good condition.

Three survey monuments and eight boundary monuments mark the site boundary. The three survey monuments were in good condition.

Boundary monument BM–7 was not inspected because it is on a steep slope along the escarpment, and BM–8 was not inspected because it is on the floodplain outside of the property. Monuments BM–3, BM–4, and BM–5 were buried by windblown sand and only BM–3 was uncovered and inspected. The remaining boundary monuments were in good condition.

Monitor Wells—Ground water monitoring is not required by the LTSP for this site. Monitor wells for ongoing ground water remediation activities, in and around the site, are not included in the annual inspection.

16.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the disposal cell (including the riprap-covered top and side slopes, diversion channels, and outflow channel); (2) the terrace area north and northeast of the disposal cell; and (3) the outlying area.

Disposal Cell, Diversion Channels, and Outflow Channel—The top and side slopes of the cell, covered with rock riprap, were in good condition. No evidence of settling, erosion, or animal burrowing was found.

Significant vegetation growth has been noted during past inspections on the cell top and the east,
16C northeast, and northwest side slopes. These areas were sprayed in June 2004 in a continuing effort to reduce the seed source and control future plant encroachment on the disposal cell. Numerous patches of annual grasses and weeds were present on the cell top and the side slopes,

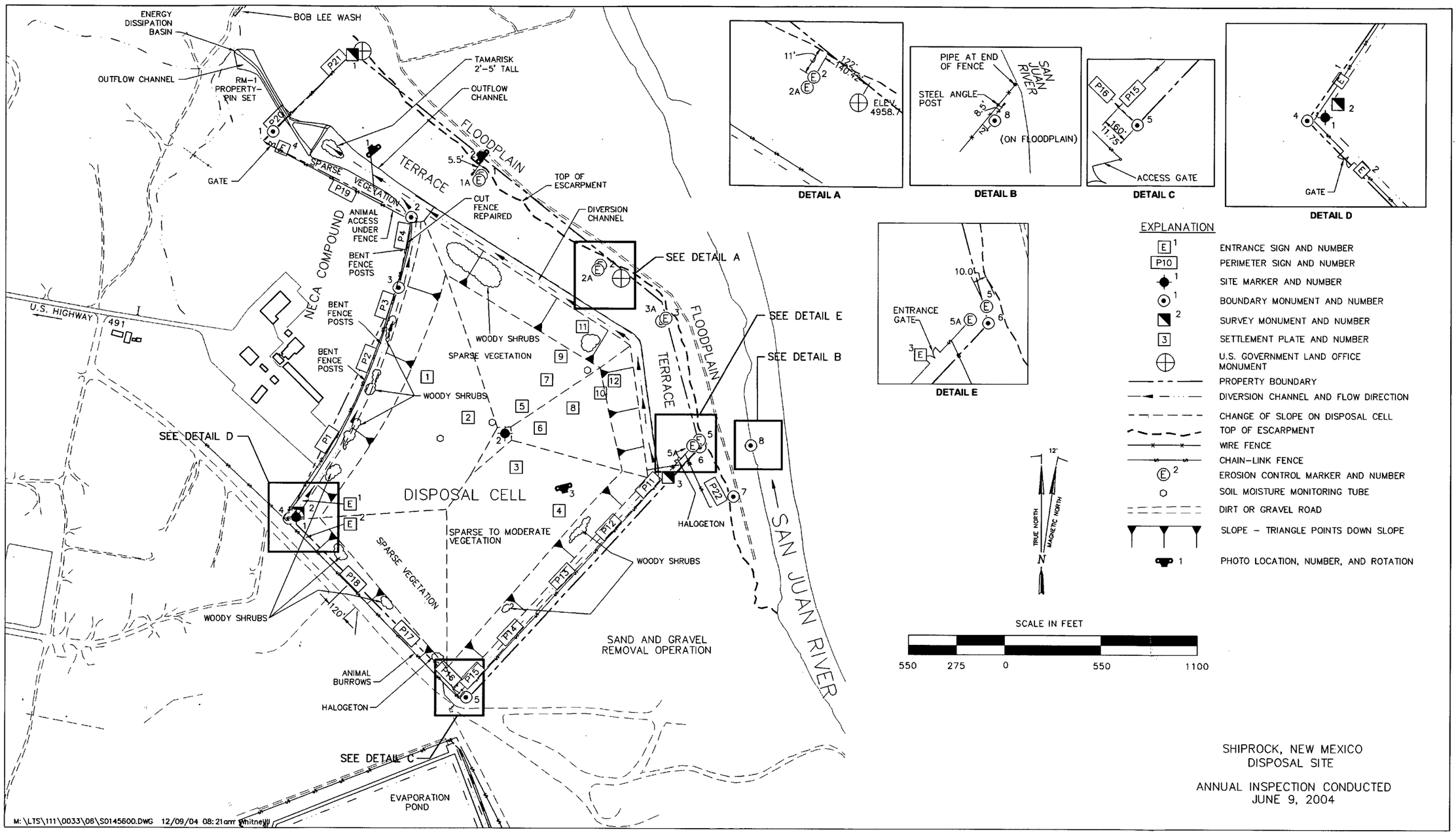


Figure 16–1. 2004 Annual Compliance Drawing for the Shiprock, New Mexico, Disposal Site

and the population of woody shrubs growing on the cell side slopes continues to increase. DOE is currently studying the effect of plant encroachment on the cell to evaluate the need for vegetation control.

Diversion channels around the base of the disposal cell were in good condition. Site drainage is ultimately directed toward the outflow channel at the northwest corner of the site. Rock cover in the outflow channel was in good condition. Vegetation is increasing in the diversion channels (PL–1); however, the performance of the channels is not impaired.

The outflow channel, reconstructed in 2003 after significant erosion damage, was in good condition. Woody vegetation continues to increase in the upstream (unreconstructed) end of the channel but it does not interfere with the performance of the channel at this time.

Terrace and Site Perimeter—The terrace is the area north and northeast of the disposal cell between the cell and the escarpment, excluding the outflow channel. Four sets of erosion control markers are in place along the terrace escarpment. All markers were in good condition. Sloughing of the escarpment face, noted near erosion control marker E1 (PL–2), is a natural but infrequent occurrence. The escarpment is more than 300 feet from the edge of the cell and the erosion poses no threat to the integrity of the cell.

Outlying Area—A Navajo Engineering and Construction Authority sand and gravel pit is located immediately southeast of the disposal cell (PL–3). Gravel operations have had no apparent affect on disposal site security or integrity, and there were no indications of recent activity at the pit.

As part of on-going ground water remediation efforts at the Shiprock disposal site, DOE constructed an 11-acre lined evaporation pond in a former borrow area across the access road southwest of the disposal cell. A chain-link security fence encloses the area. Although the activities associated with the treatment of contaminated ground water at this site are not within the scope of the LTSP, the pond will be monitored for general condition and security during future inspections. At the time of the 2004 site inspection, there were no concerns or issues noted with this area.

16.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

16.3.3 Routine Maintenance and Repairs

In 2004, DOE repaired a cut in the perimeter fence, removed accumulated weeds and trash, and sprayed the vegetation on the cell.

16.3.4 Ground Water Monitoring

Ground water monitoring is not required at this site because of poor water quality and low yield in the uppermost aquifer beneath the disposal cell.

16.3.5 Corrective Action

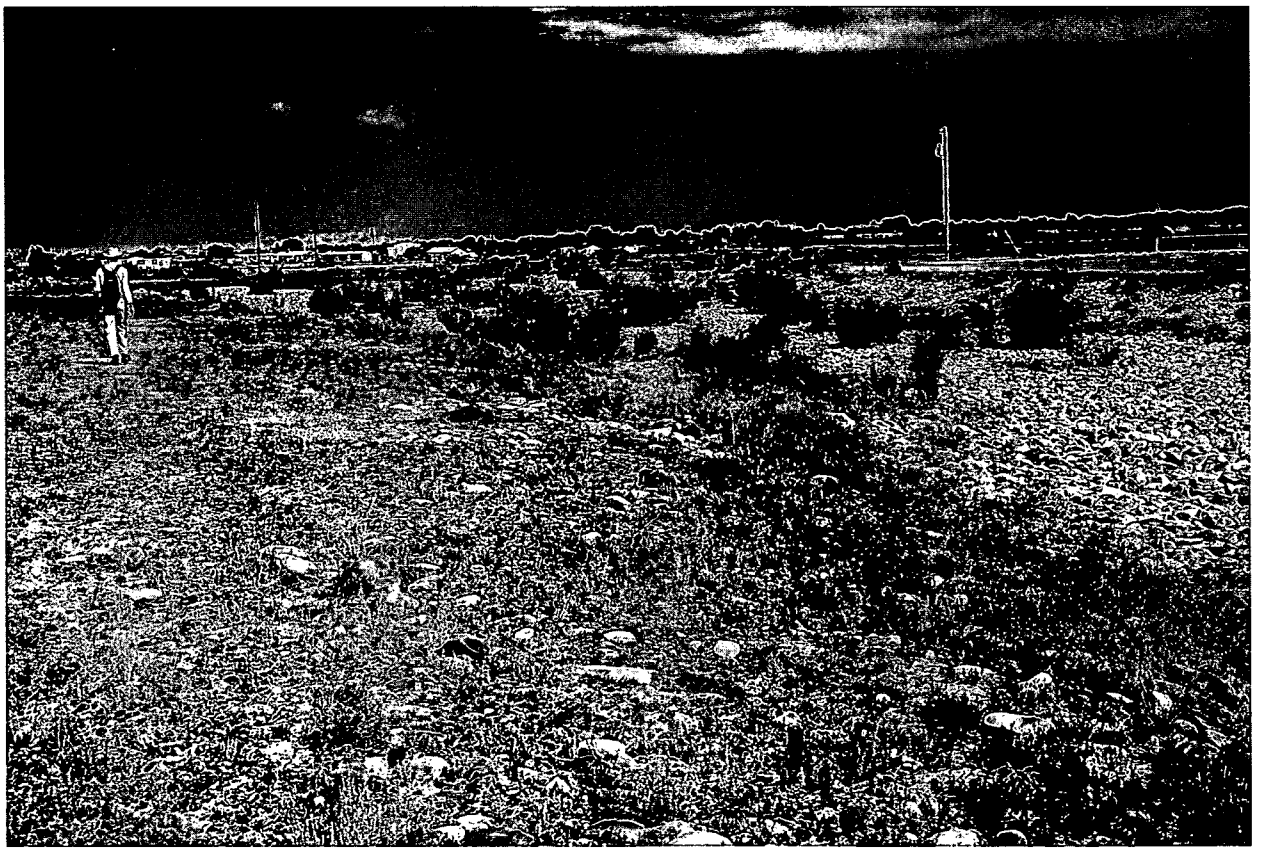
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2004.

16.3.6 Photographs

Table 16–2. Photographs Taken at the Shiprock, New Mexico, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	320	Woody vegetation in the upstream end of the outflow channel.
PL–2	310	Natural sloughing of material along the terrace escarpment.
PL–3	165	View of the idle Navajo Engineering and Construction Authority gravel pit along the southeast side of the disposal site.



SHP 6/2004. PL–1. Woody vegetation in the upstream end of the outflow channel.

SHP 6/2004. PL–2. Natural sloughing of material along the terrace escarpment.

SHP 6/2004. PL–3. View of the idle Navajo Engineering and Construction Authority gravel pit along the southeast side of the disposal site.

End of current section

17.0 Slick Rock, Colorado, Disposal Site

17.1 Compliance Summary

The Slick Rock Disposal Site, inspected on April 13, 2004, was in excellent condition. Erosion damage to the site caused by a severe rainstorm in fall 2003 was repaired in 2004. Results from a 1-year period of radon monitoring performed following the removal of the standpipes from the cell in fall 2002 confirmed that removal activities did not compromise the integrity of the radon barrier. The entrance sign was missing and was replaced. Tamarisk plants found adjacent to the cell apron were cut and treated with herbicide. Noxious weeds at the site were sprayed with herbicide. Vegetation on reclaimed right-of-way permit areas continues to be sparse but grasses are beginning to establish. A follow-up inspection was conducted on December 1, 2004, after an earthquake occurred near the site; no disturbances were observed and the disposal cell was in excellent condition.

17.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Slick Rock, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Burro Canyon Disposal Cell, Slick Rock, Colorado* (DOE/AL/62350–236, Rev. 0, U.S. Department of Energy [DOE], Albuquerque Operations Office, May 1998) 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 17–1.

Table 17–1. License Requirements for the Slick Rock, Colorado, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Sections 3.0 and 6.2	Section 17.3.1
Follow-up or Contingency Inspections	Section 3.4	Section 17.3.2
Routine Maintenance and Repairs	Section 4.0	Section 17.3.3
Ground Water Monitoring	Sections 2.5 and 2.6	Section 17.3.4
Corrective Action	Section 5.0	Section 17.3.5

17.3 Compliance Review

17.3.1 Annual Inspection and Report

The site, northeast of Slick Rock, Colorado, was inspected on April 13, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 17–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

17.3.1.1 Specific Site Surveillance Features

Access Road, Fence, Gate, and Signs—Site access is by an improved gravel and dirt road maintained by San Miguel County. The road was in excellent condition at the time of the inspection.

The wire entrance gate is secured with a DOE lock. A wire stock fence surrounds the site and a reclaimed spoils pile area west of the site; it does not follow the DOE property boundary. The top and bottom strands are smooth wire to allow wildlife to pass over and under, and the middle two strands are barbed wire. Both the entrance gate and the stock fence were in excellent condition.

17A The entrance sign inside the stock fence just east of the entrance gate was missing and was replaced. Thirty-two perimeter signs, designated P1 through P32, are spaced at approximately 200-foot intervals around the site. The signs, attached to steel posts set in concrete, are 5 feet inside the site boundary. The signpost at P1 has a bullet hole, and the sign at P32 has a bullet hole and is bent; however, both signs remain legible. All other perimeter signs were in excellent condition.

Site Markers and Monuments—The two granite site markers, SMK–1 near the entrance gate and SMK–2 on the north-central part of the disposal cell, were in excellent condition.

Three survey monuments, SM–1, SM–2, and SM–3, are located along the fence line. Survey monuments SM–1 and SM–3 were in excellent condition; SM–2 was covered with sediment and not verified. DOE will locate SM–2 and place a marker at the location for future reference.

Six boundary monuments define the corners of the site boundary. All six monuments were found and were in excellent condition.

Monitor Wells—Ground water monitoring is not required at the disposal site. All monitor wells (7) and standpipes (2) were decommissioned in 2001 and 2002, respectively. In fall 2002,
17B after removal of the standpipes from the cell, DOE initiated a 1-year period of radon monitoring at the site to ensure that the radon barrier was not compromised. Quarterly measurements were taken at six locations adjacent to the cell and at one offsite location. The annual average radon concentrations at the cell ranged from 0.90 to 1.38 picocuries per liter, compared to the background radon concentration of 1.3 picocuries per liter derived from the offsite location. These measurements verified that removal of the standpipes did not compromise the radon barrier of the cell.

17.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the rock-covered top of the disposal cell including side slopes, key trench, and apron; (2) the area between the disposal cell and the site boundary including the stock pond, re-contoured and reseeded areas, and the stock fence; and (3) the outlying area including the spoils pile.

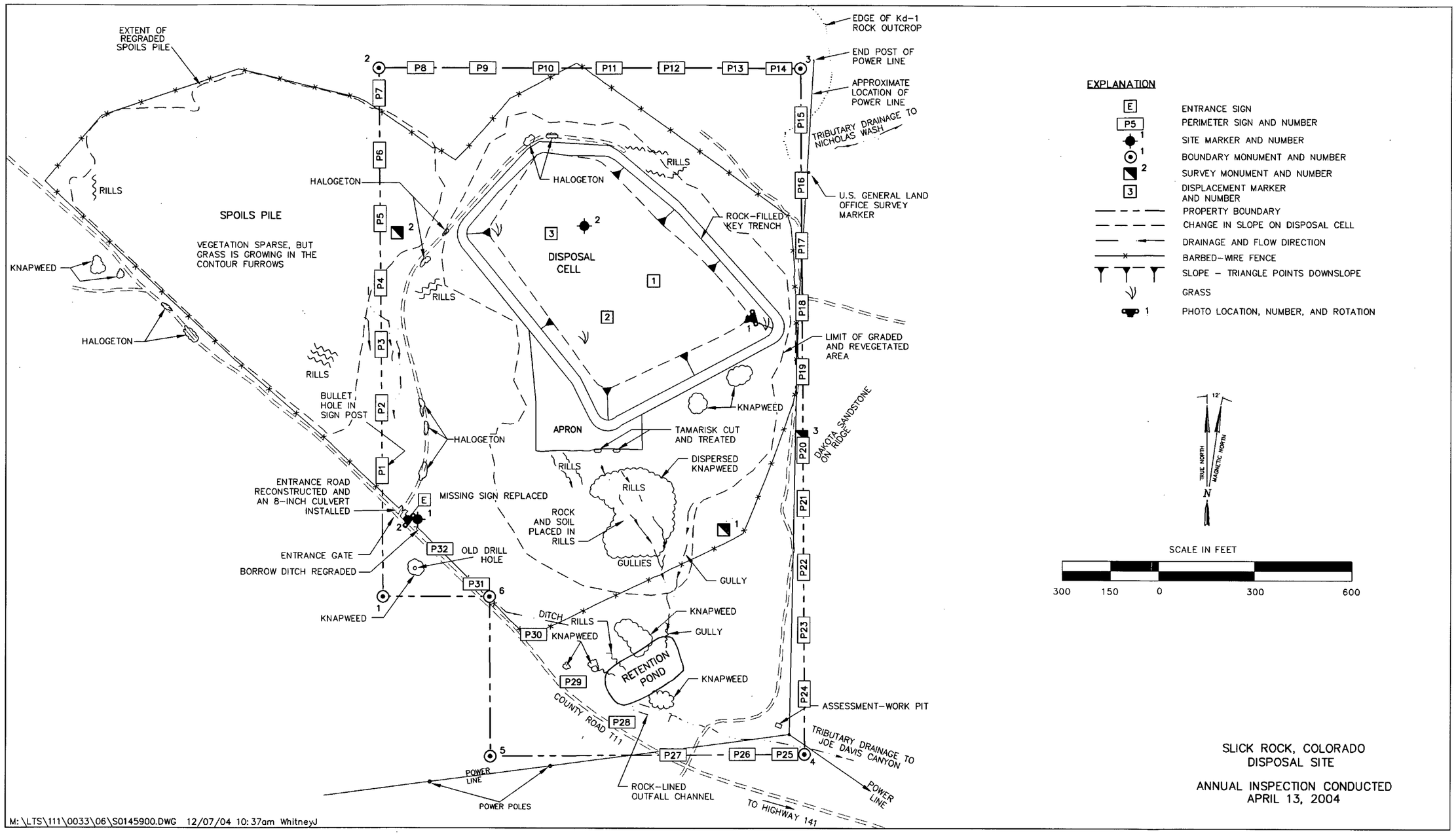


Figure 17–1. 2004 Annual Compliance Drawing for the Slick Rock, Colorado, Disposal Site

Within each transect, inspectors examined specific site surveillance features, such as survey and boundary monuments, signs, and site markers. Inspectors examined each transect for evidence of erosion, settling, slumping, or other disturbance that might affect site integrity or the long-term performance of the site.

Disposal Cell, Side Slopes, Key Trench, and Apron—Rock covering the disposal cell, key trench, and apron is rounded cobble- and pebble-sized material. The rock was in excellent condition. No evidence of settling, slumping, or erosion was seen on any of the rock-covered surfaces of the disposal cell (PL–1).

Area Between the Disposal Cell and the Site Boundary—The area around the disposal cell includes the retention pond and the graded and reseeded areas. Surface drainage from the disposal cell flows south into the retention pond, which is constructed in a channel tributary to Joe Davis Canyon. An outflow channel below the pond is lined with rounded cobblestones for a short distance. The pond, which contained a minor amount of water at the time of the inspection, and outflow channel were in excellent condition.

As noted in 2003, erosional rills formed down slope from the disposal cell apron between the apron and retention pond. During a severe rainstorm in fall 2003, these rills deepened and the site entrance road was washed out where it crosses the borrow ditch between the county road and the
17C entrance gate. In 2004, rock and soil were placed in the rills to disrupt runoff flow. The borrow ditch was deepened to divert runoff from the county road, and an 8-inch diameter culvert and compacted road base were installed at the site entrance to provide access across the borrow ditch (PL–2). Erosion will continue to be monitored at the site.

Reclaimed disturbed areas around the disposal cell are primarily on the west, south, and northeast sides of the cell. These areas were graded and seeded in 1996 and seeded again in March 1999. These areas have successfully revegetated.

A few small tamarisk plants were found south of the cell and in the retention pond. All were cut
17D and treated with herbicide. Noxious weeds (Russian knapweed and halogeton) also were found at the site and were sprayed with herbicide.

Outlying Area—During construction of the disposal cell, material excavated from the site was placed in a 60-foot-high spoils pile on the west side of the site. A right-of-way permit, granted to DOE by the U.S. Bureau of Land Management (BLM), encompasses the spoils pile and the former staging area adjacent to the site entrance. The permit allowed DOE temporary access across and use of BLM-managed land for construction activities. One of the stipulations of the permit requires DOE to successfully revegetate these areas. During a site inspection in 2001, BLM did not consider either of the areas successfully revegetated because of the lack of plant cover, abundance of weeds, and presence of erosional features.

In September 2001, DOE regraded the slopes of the spoils pile to reduce and reshape them to more natural contours in order to control erosion. After regrading, the spoils pile and former staging area were ripped on the contour and seeded with native vegetation. These regraded areas continue to be monitored for revegetation success and erosional features. Observations indicate the vegetative cover, though very sparse, is showing signs of improvement. Grasses are

beginning to establish in the contour furrows, but prevailing drought conditions in the region continue to hamper the successful establishment of vegetation on the regraded areas. Some rills were noted but, due to the contour furrowing, no significant erosional features have developed in the regraded areas. The locations will continue to be monitored in future inspections and will be
17E evaluated annually to determine whether additional seeding or erosion control measures are necessary. Annual monitoring will continue until revegetation is successful and the BLM right-of-way permit is closed.

The Kd-1 sandstone unit, which outcrops near the northeast corner of the property, was identified in the LTSP as a potential pathway of lateral migration of transient drainage from the disposal cell. This potential pathway was of concern if the water level in the cell reached a critical elevation (i.e.; the bottom of the Kd-1 sandstone unit). The water level in the cell continued to drop below the critical elevation and the standpipes were removed in 2001 in accordance with the LTSP. Because the water in the cell is below the Kd-1 sandstone unit and, therefore, cannot drain from the cell through the unit, monitoring of the outcrop is no longer necessary as stipulated in the LTSP. However, continued monitoring of the Kd-1 sandstone unit outcrop is performed as a best management practice. In 2004, there was no evidence of moist soil, mineralization, or phreatophyte vegetation at the outcrop that would indicate that drainage had occurred through this unit.

The natural, undisturbed areas outside the disposal site support grass and scattered piñon and juniper trees. The primary land use is grazing. Steep hillsides north and northeast of the site slope eastward into Nicholas Wash. Areas north and northeast of the site are routinely used for recreational purposes (e.g., hunting, four-wheeling, firewood cutting, etc.). No disturbances in the outlying areas were noted in 2004.

17.3.2 Follow-Up or Contingency Inspections

On November 7, 2004, an earthquake registering 4.1 on the Richter scale was recorded in
17F Paradox Valley, about 20 miles north of the disposal site. In accordance with the LTSP, a follow-up inspection was performed on December 1 to document any effects that the earthquake might have had on the disposal cell. No disturbances were observed at or adjacent to the site, and the disposal cell was in excellent condition.

17.3.3 Routine Maintenance and Repairs

Erosion damage to the entrance road and a location between the apron and retention pond caused by a severe rainstorm in fall 2003 was repaired in 2004. Also, tamarisk and noxious weeds were treated with herbicide in 2004.

17.3.4 Ground Water Monitoring

DOE does not monitor ground water at this site because there is no pre-existing contaminant plume at the disposal site, and the uppermost aquifer is not a current or potential source of drinking water due to low yield.

17.3.5 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.

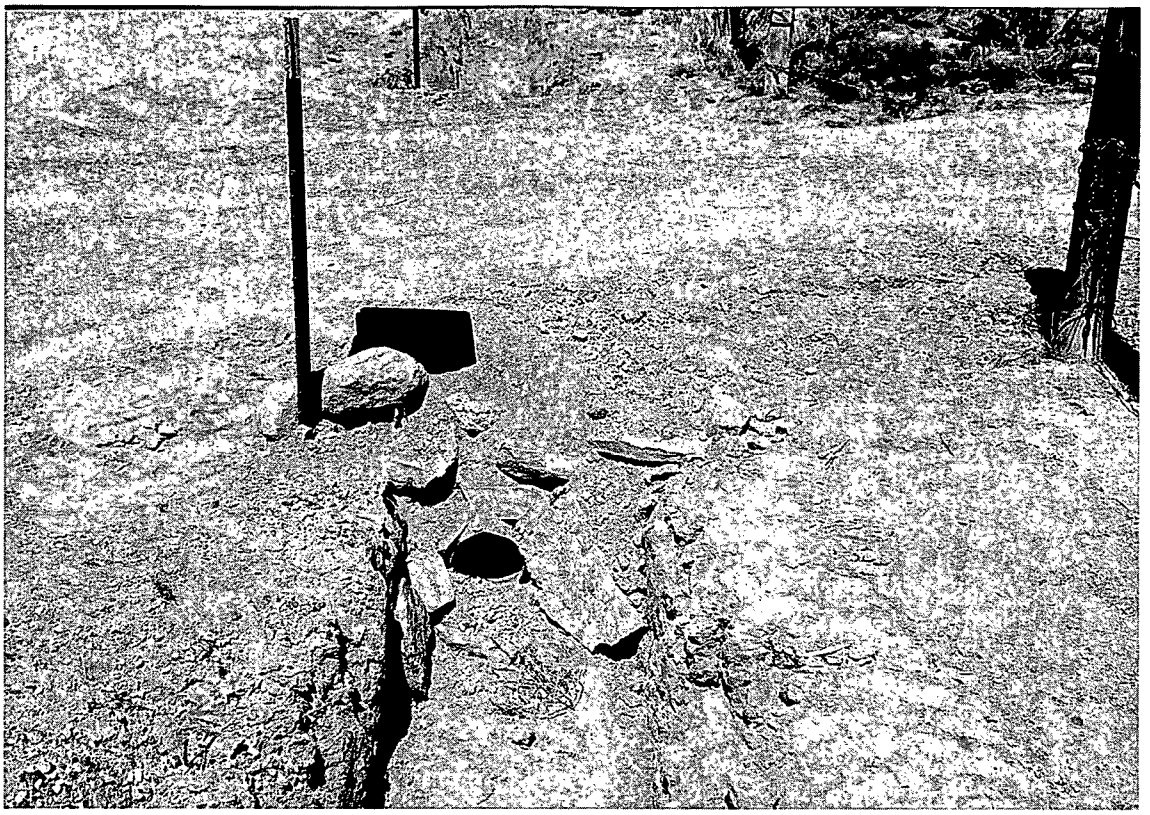
No corrective action was required in 2004.

17.3.6 Photographs

Table 17–2. Photographs Taken at the Slick Rock, Colorado, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	235	View showing integrity of rock-covered surfaces along the southeast side of the disposal cell.
PL–2	315	New 8-inch diameter culvert and regraded road at the site entrance following erosion repair.

SRK 4/2004. PL–1. View showing integrity of rock-covered surfaces along the southeast side of the disposal cell.



SRK 4/2004. PL–2. New 8-inch diameter culvert and regraded road at the site entrance following erosion repair.

End of current section

18.0 Spook, Wyoming, Disposal Site

18.1 Compliance Summary

The Spook, Wyoming, Disposal Site, inspected on August 31, 2004, was in excellent condition. Concrete around the base of a site marker is spalling and will be repaired in 2005. Minor erosion is occurring at several locations and will continue to be monitored and evaluated; erosion repairs are not necessary at this time. Several infestations of noxious weeds were sprayed with herbicide. No requirement for a follow-up or contingency inspection was identified.

18.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Spook, Wyoming, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Spook, Wyoming, Disposal Site* (DOE/AL/350215.000, Rev. 0, U.S. Department of Energy [DOE], Albuquerque Operations Office, January 1993) 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 license requirements are listed in Table 18–1.

Table 18–1. License Requirements for the Spook, Wyoming, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 18.3.1
Follow-up or Contingency Inspections	Section 7.0	Section 18.3.2
Routine Maintenance and Repairs	Section 8.0	Section 18.3.3
Ground Water Monitoring	Section 5.2	Section 18.3.4
Corrective Action	Section 9.0	Section 18.3.5

18.3 Compliance Review

18.3.1 Annual Inspection and Report

The site, located in north central Converse County, Wyoming, was inspected on August 31, 2004. Results of the inspection are described below. Features and the photograph locations (PLs) mentioned in this report are shown on Figure 18–1. The number in the left margin of this report refers to items summarized in the Executive Summary table.

18.3.1.1 Specific Site Surveillance Features

Access Road and Signs—Site access is maintained through perpetual easements across the Hornbuckle Ranch. The road to the site is graded and hard packed. North of the Dry Fork of the Cheyenne River, the road narrows to a seldom-used dirt track. The track is not surfaced and may be difficult to use in wet weather. The road continues and enters the Hardy Ranch about 0.5 mile north of the site, and is the access route to the Bear Creek, Wyoming, UMTRCA Title II site.

The site is open range and unfenced. All 10 perimeter signs and one entrance sign were in place and legible. Several perimeter signs have bullet holes and perimeter sign P7 is slightly bent and the paint is cracked; however, there is no need for repair at this time.

Site Markers and Monuments—The two site markers, eight boundary monuments, and three survey monuments were in excellent condition with the following minor exceptions. Concrete at the base of site marker SMK–1 is spalling (PL–1) and will be repaired in 2005 to prevent additional damage. Wind has scoured soil from beneath the surface concrete collar around boundary monument BM–6 and perimeter sign P10, but both features are stable and require no repair at this time.

Monitor Wells—Ground water monitoring is not required at this site. DOE abandoned all monitor wells in October 2000 and closed out the permits. Restored well locations in the immediate vicinity of the disposal site were found to be in excellent condition and difficult to distinguish from surrounding land. Outlying decommissioned well sites were not checked.

An old water supply well remains on the site. DOE granted use of the well for agricultural and other purposes to Mr. Kirk Hornbuckle on behalf of Hornbuckle Ranch Limited Partnership, the owner of record of the surrounding ranch. The agreement stipulates that users will hold DOE harmless from all liability associated with use of the well. The well is completed in a deeper aquifer not affected by regional uranium mineralization. The electricity meter has been removed, and there have been no indications of well use since inspections began.

18.3.1.2 Transects

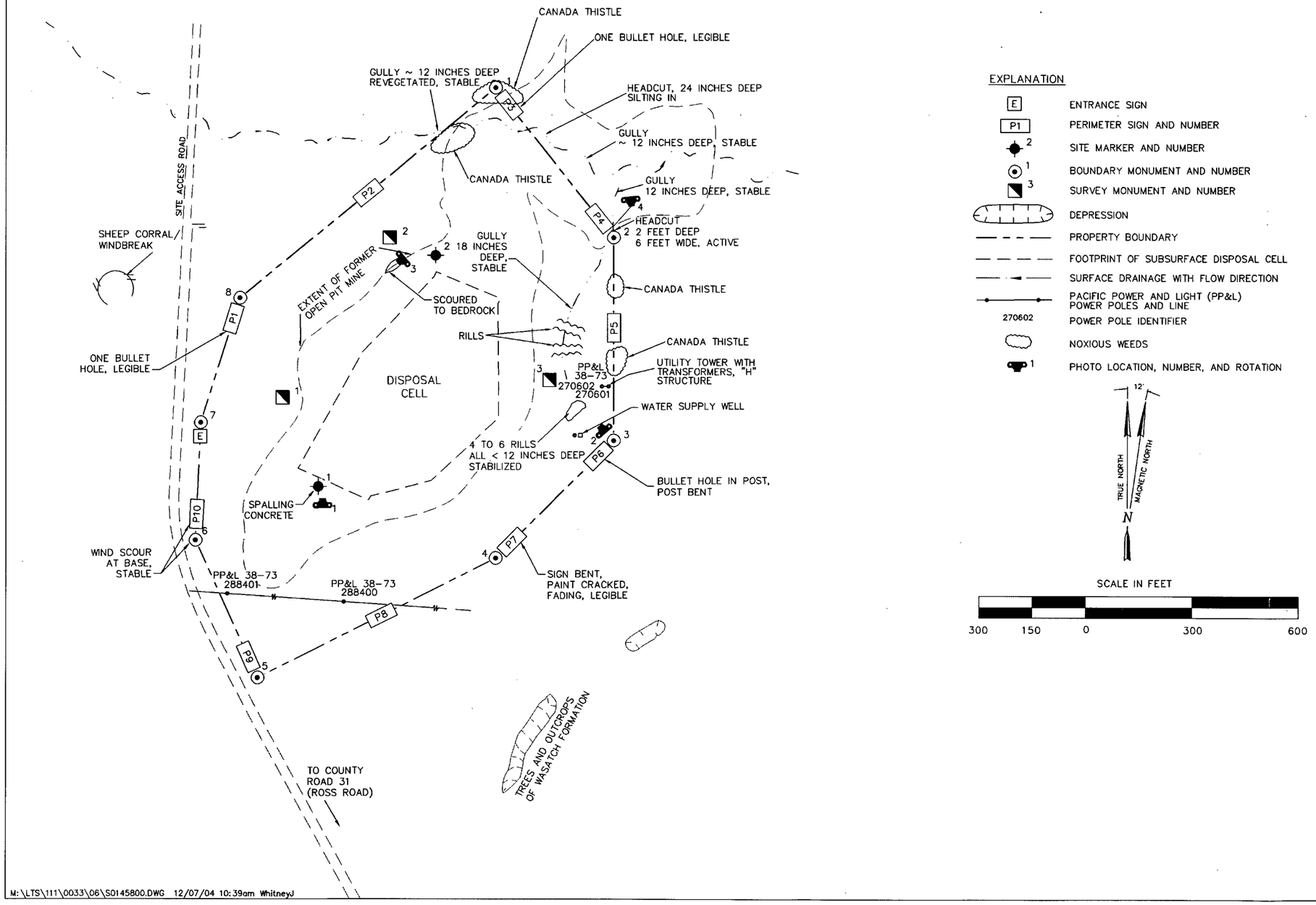
To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the disposal site; (2) the site perimeter; and (3) the outlying area.

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.

Disposal Site—The Spook site is unique among Title I sites in that tailings were encapsulated in the bottom of an open pit mine and covered with 40 to 60 feet of clean fill and topsoil. None of the observations and concerns routinely associated with above-grade disposal cells, such as quality of the riprap, stability of side slopes, or the presence of deep-rooted plants (biointrusion) above the radon barrier apply to this site.

The surface of the site was in excellent condition. No evidence of settling was observed over the former mine pit. Vegetation across the site, consisting of grasses and forbs, appears healthy and is indistinguishable from that which grows on the surrounding hills and valleys (PL–2). The same species are present and the overall health and density of vegetation are similar.

The site is not fenced, and the local landowner controls the grazing on DOE property as an extension of his ranching activities. The range appears healthy and has not been overgrazed.



EXPLANATION

- E — ENTRANCE SIGN
- P1 — PERIMETER SIGN AND NUMBER
- 2 — SITE MARKER AND NUMBER
- 1 — BOUNDARY MONUMENT AND NUMBER
- 3 — SURVEY MONUMENT AND NUMBER
- DEPRESSION
- PROPERTY BOUNDARY
- FOOTPRINT OF SUBSURFACE DISPOSAL CELL
- SURFACE DRAINAGE WITH FLOW DIRECTION
- PACIFIC POWER AND LIGHT (PP&L) POWER POLES AND LINE
- 270602 — POWER POLE IDENTIFIER
- NOXIOUS WEEDS
- 1 — PHOTO LOCATION, NUMBER, AND ROTATION

SCALE IN FEET

300 150 0 300 600

SPOOK, WYOMING
DISPOSAL SITE

ANNUAL INSPECTION CONDUCTED
AUGUST 31, 2004

Figure 18–1. 2004 Annual Compliance Drawing for the Spook, Wyoming, Disposal Site

Pacific Power and Light Company owns a transmission line that crosses the southern end of the site. They also own three transformers on an aboveground platform near the water supply well to provide power for a down-hole pump.

Most erosion features observed during previous inspections within the property boundary have stabilized, as indicated by vegetation growing in the channels. A gully has scoured to bedrock in the northwest portion of the site (PL–3) and several small rills were noted along the east side of the site, but these erosion features are not adversely impacting the site.

Site Perimeter—Inspectors walked the site perimeter. All as-built features were in good to excellent condition, as described above. If there were no perimeter signs along the boundary, the perimeter of the site would be indistinguishable from the open range beyond.

Most erosion features observed during previous inspections along and adjacent to the property boundary have stabilized. Only one gully, near perimeter sign P4, was active (PL–4). Inspectors placed some rocks at the knickpoint in 2003 to help control the erosion, but headcutting progressed a couple more feet closer to the site perimeter during the past year. There is no immediate threat to site surveillance features or the cell, but the erosion will continue to be monitored and may require repair in the future.

The site is sprayed by the Converse County weed control agent on an as-needed basis to control noxious weeds. Several infestations of Canada thistle, a noxious weed, were sprayed in 2004.
18A New infestations of Canada thistle were observed along the perimeter of the site and will be sprayed in 2005.

Outlying Area—The area beyond the site boundary for a distance of about 0.25 mile was examined for erosion, disturbance, change in land use, or other features of possible concern. No concerns were noted.

18.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

18.3.3 Routine Maintenance and Repairs

Noxious weeds were sprayed with herbicide in 2004.

18.3.4 Ground Water Monitoring

Ground water in the uppermost aquifer at this site is contaminated as a result of widespread, naturally occurring uranium mineralization. The aquifer is of limited use due to marginal yield and because it cannot be cleaned up by methods reasonably employed in public water systems. Therefore, supplemental standards have been applied, and ground water monitoring is not required.

18.3.5 Corrective Action

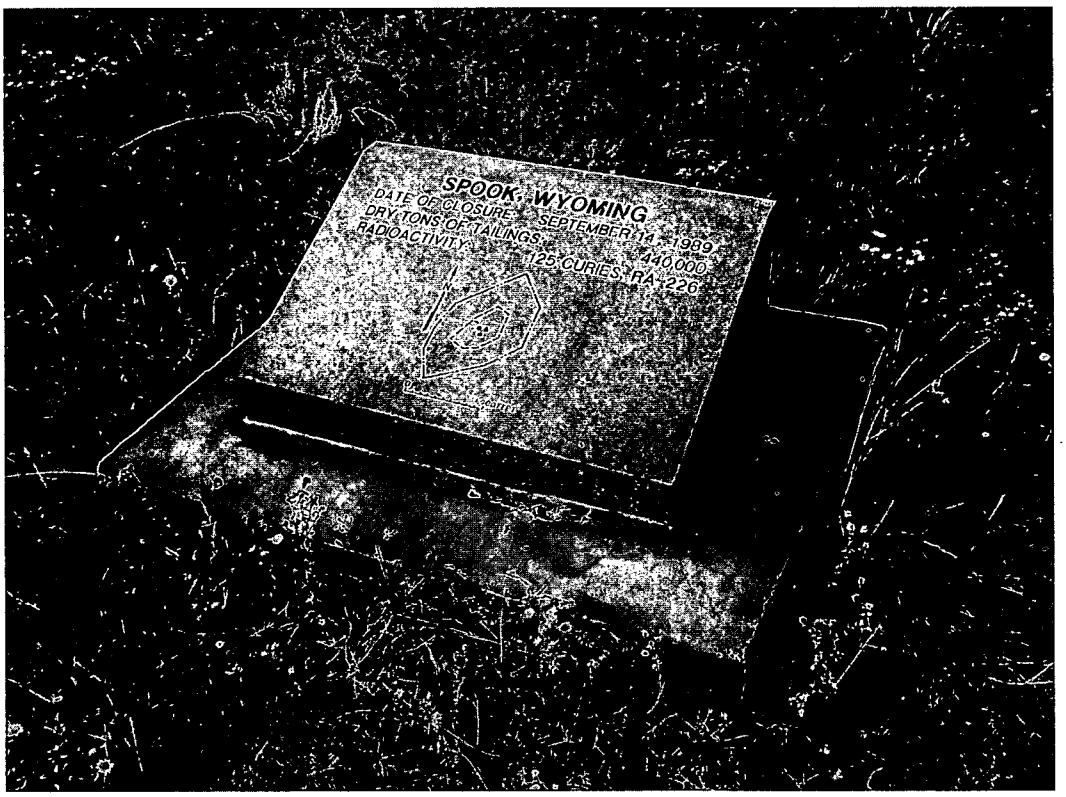
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2004.

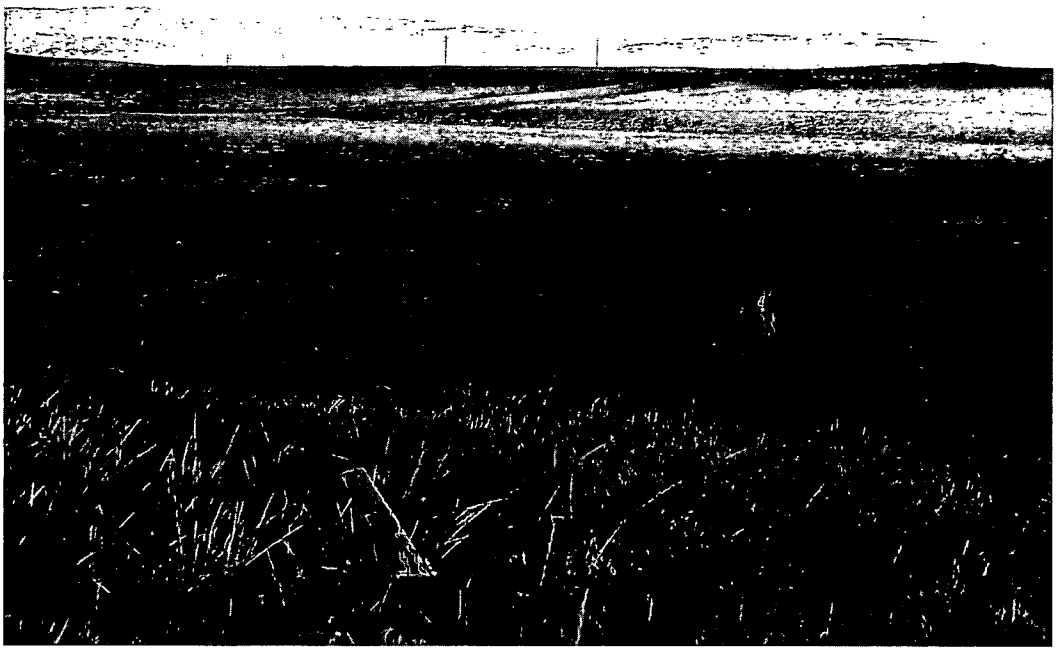
18.3.6 Photographs

Table 18–2. Photographs Taken at the Spook, Wyoming, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	0	Site marker SMK–1, showing spalling concrete on its base.
PL–2	320	View northwest across the cell showing healthy vegetation.
PL–3	230	Erosion feature scoured to bedrock adjacent to the cell cover.
PL–4	175	Active erosion near perimeter sign P4 and boundary monument BM–2.

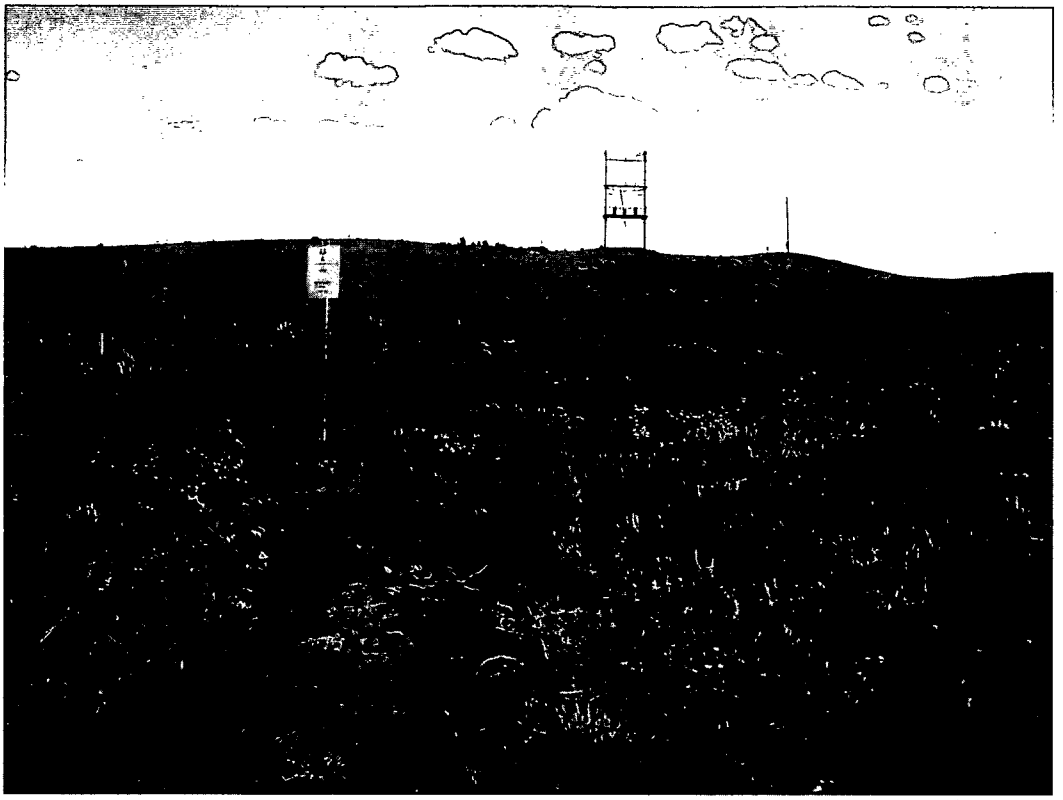


SPK 8/2004. PL–1. Site marker SMK–1, showing spalling concrete on its base.



SPK 8/2004. PL–2. View northwest across the cell showing healthy vegetation.

SPK 8/2004. PL–3. Erosion feature scoured to bedrock adjacent to the cell cover.



SPK 8/2004. PL–4. Active erosion near perimeter sign P4 and boundary monument BM–2.

End of current section

19.0 Tuba City, Arizona, Disposal Site

19.1 Compliance Summary

The Tuba City Disposal Site, inspected on September 14, 2004, was in good condition. Plant abundance on the cover and side slopes had not significantly changed since the previous inspection. Sand accumulation on the rock apron along the south toe of the disposal cell and in the drainage ditches was unchanged from last year and does not prevent these features from functioning as designed. DOE continues to evaluate long-term effects of sand accumulation and the plant encroachment, particularly growth of deep-rooted plants, on the disposal cell and rock apron. Results of disposal cell ground water monitoring in 2004 indicate no significant change in ground water quality when compared to 2003 results. No need was identified for a follow-up or contingency inspection.

19.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Tuba City, Arizona, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan* [LTSP] *for the Tuba City, Arizona, Disposal Site* (DOE/AL/62350–182, Rev. 0, U.S. Department of Energy [DOE], Albuquerque Operations Office, October 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 19–1.

Table 19–1. License Requirements for the Tuba City, Arizona, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.1	Section 19.3.1
Follow-up or Contingency Inspections	Section 7.0	Section 19.3.2
Routine Maintenance and Repairs	Section 8.0	Section 19.3.3
Ground Water Monitoring	Section 5.2	Section 19.3.4
Corrective Action	Section 9.0	Section 19.3.5

19.3 Compliance Review

19.3.1 Annual Inspection and Report

The site, located east of Tuba City, Arizona, was inspected on September 14, 2004. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 19–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

Many features and structures at the site, such as office buildings, evaporation ponds, water treatment plant, and a network of extraction and injection wells, are associated with active ground water remediation activities and are not addressed in the LTSP. The annual inspection does not include these features or structures.

19.3.1.1 Specific Site Surveillance Features

Access Road, Fence, Gate, and Signs—A short, hard-packed and graveled road leads from U.S. Highway 160 to the entrance gate in the fence along the north edge of the disposal site. The gate was in excellent condition. DOE has perpetual access to the site through a Custody and Access Agreement with the Navajo Nation.

The security fence around the site is chain link with three strands of barbed wire at the top. The fence is in good condition. A section of the top-rail of the perimeter fence was separated and will be repaired. Wind erosion has occurred beneath portions of the perimeter fence in the northwest corner of the site property boundary, resulting in gaps of up to 24 inches below the bottom of the fence fabric and the current ground surface (PL–1). The gaps were filled and stabilized with rock and soil to prevent weakening of the fence posts and unauthorized access into the site property. 19A

One entrance sign and 30 pairs of perimeter signs are situated around the site. All signs are on steel posts inside the fence and set back about 5 feet from the site boundary. Each perimeter sign consists of a "No Trespassing" sign placed above a pictorial sign showing the disposal cell configuration. The pictorial signs are faded but legible; however, many of the "No Trespassing" signs were in poor condition due to bullet damage and deterioration from exposure to intense sunlight and temperature extremes and will be replaced.

Markers and Monuments—Two granite site markers, one near the entrance gate and the other on top of the disposal cell, were in excellent condition. One boundary monument and three combined survey/boundary monuments mark the four corners of the site. Each monument is set back at various distances from the true corners of the site boundary. Windblown sand and weeds tend to accumulate at some monument locations. All monuments were undisturbed and in excellent condition.

Monitor Wells—The seven wells of the disposal cell ground water monitoring network were secure and in excellent condition.

19.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the disposal cell; (2) the area between the disposal cell and the site boundary; and (3) the outlying area.

Disposal Cell—The disposal cell is covered with riprap for erosion protection. The rock was in excellent condition. Inspectors discovered no evidence of slumping, settling, or instability on the top or side slopes of the disposal cell.

Patches of dead annual weeds were seen on the top and side slopes of the cell (PL–2). Only one deep-rooted woody plant (four-wing saltbush) was observed on top of the disposal cell.

For comparison purposes, photographs of vegetation cover were retaken at established locations on the south side slope and toe drain to document annual changes in vegetation conditions and sand accretion at the site (PL–3). The 2004 photographs showed there was very little change in vegetation conditions from the previous inspection. DOE continues to evaluate the effects of

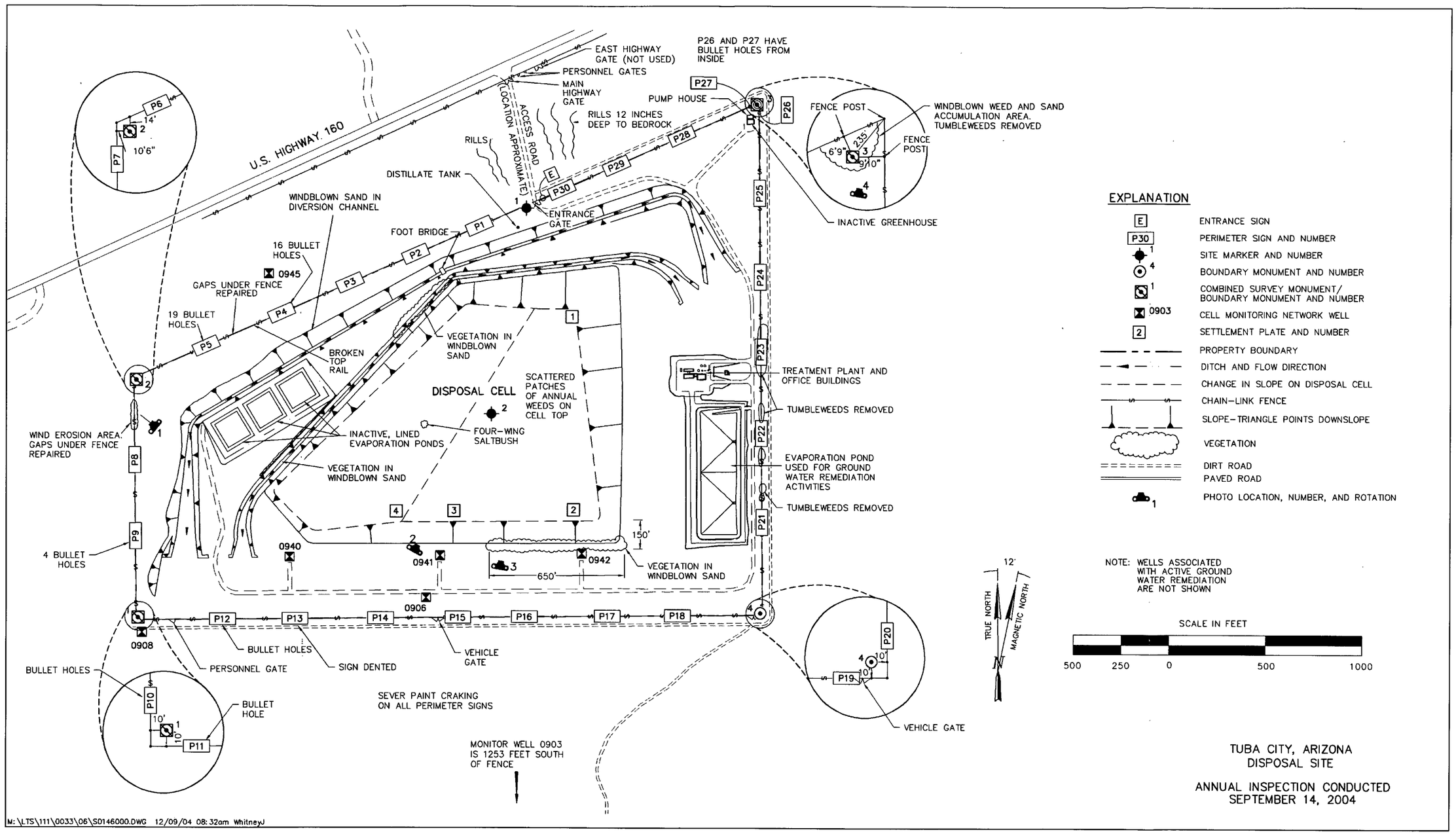


Figure 19–1. 2004 Annual Compliance Drawing for the Tuba City, Arizona, Disposal Site

19B vegetation encroachment and sand accretion on the cover, and to assess potential impacts to the radon barrier. Vegetation management (i.e., shrub removal and application of herbicides) may continue to be necessary.

Area Between the Disposal Cell and the Site Boundary—Ongoing ground water remediation activities continue to disturb small portions of the area between the disposal cell and the site boundary. Revegetation of these areas is slow but progressing. In general, the vegetation conditions on site are comparable to the vegetation conditions of the adjacent land off site.

Tumbleweeds (dead Russian thistle) tend to accumulate along the fence lines and can cause windblown sand deposition to occur. At the time of the 2004 inspection, tumbleweeds had
19C accumulated along the east fence line and in the northeast corner of the property (PL–4); the tumbleweeds subsequently were removed. The northeast corner boundary monument was buried in sand and was uncovered for verification.

Two rock-lined drainage channels are located on the north (upslope) side of the disposal cell and were in excellent condition. The outermost channel intercepts storm water and diverts it around the disposal cell to the south and east. The inner drainage channel, constructed at the toe of the north and northwest sides of the disposal cell, collects runoff from the disposal cell itself and diverts it to the south and east as well. Sand accumulation in the inner diversion channel and in the northwest segment of the outer diversion channel was unchanged since the 2003 inspection and does not interfere with the drainage function of the channels.

Outlying Area—The area beyond the site boundary for a distance of 0.25 mile was visually inspected. No erosion or new development, with the exception of ground water remediation activities, was noted.

19.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2004.

19.3.3 Routine Maintenance and Repairs

Wind-eroded gaps along portions of the security fence were filled and accumulations of tumbleweeds were removed during 2004.

19.3.4 Ground Water Monitoring

DOE monitors ground water, as required by the LTSP, to compare current conditions to initial
19D water quality at the site. This monitoring will not be indicative of disposal cell performance because ground water quality is degraded by contamination from former milling activities that will likely mask contamination that might leach from the disposal cell. However, the ground water quality data will be evaluated in conjunction with the 40 CFR 192 Subpart B remedy at the site.

In accordance with the LTSP, seven wells (Table 19–2) are monitored for four target analytes—molybdenum, nitrate, selenium, and uranium. In 40 CFR 192 Table 1 of Subpart A,

the U.S. Environmental Protection Agency has established maximum concentration limits (MCLs) for these analytes in ground water. These limits are 0.1 milligrams per liter (mg/L) for molybdenum, 44 mg/L for nitrate (as NO_3), 0.01 mg/L for selenium, and 0.044 mg/L for uranium. Time-concentration plots, beginning in 1998, for the four analytes are shown on Figures 19–2 through 19–5.

Table 19–2. Ground Water Monitoring Network at the Tuba City, Arizona, Disposal Site

Monitor Well	Hydrologic Relationship
MW–0903	Downgradient
MW–0906	Downgradient
MW–0908	Downgradient
MW–0940	Downgradient
MW–0941	Downgradient
MW–0942	Downgradient
MW–0945	Upgradient

Sample results from 2004 indicate that ground water quality downgradient from the former millsite is degraded with respect to all four target analytes. Ground water quality did not change significantly between 2003 and 2004.

Molybdenum concentrations were below the MCL in 2004. The concentrations have not varied significantly in the last 7 years (Figure 19–2).

In 2004, concentrations of nitrate (as NO_3) exceeded the MCL in samples from all monitor wells except background well MW–0945. Between 2003 and 2004, no significant increases or decreases in concentrations were observed in samples from any well, although concentrations varied considerably from well to well (Figure 19–3).

Consistent with historical data, selenium concentrations exceeded the MCL in 2004 in samples from all wells except background well MW–0945 and off-site, downgradient well MW–0903 (Figure 19–4).

Uranium concentrations exceeded the MCL in 2004 samples from all wells except background well MW–0945 and off-site, downgradient well MW–0903. Concentrations have remained fairly constant over time in samples from all wells except MW–0906 and MW–0940 (Figure 19–5).

19.3.5 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 2004.

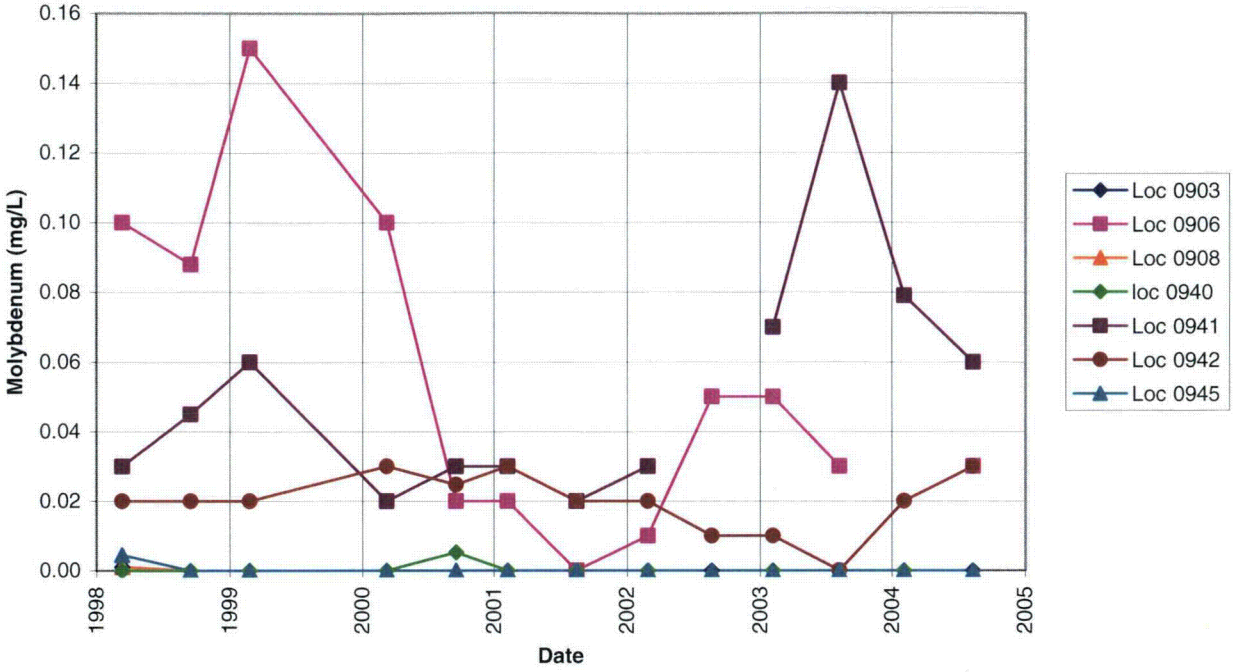


Figure 19–2. Time-Concentration Plots of Molybdenum in Ground Water at the Tuba City, Arizona, Disposal Site

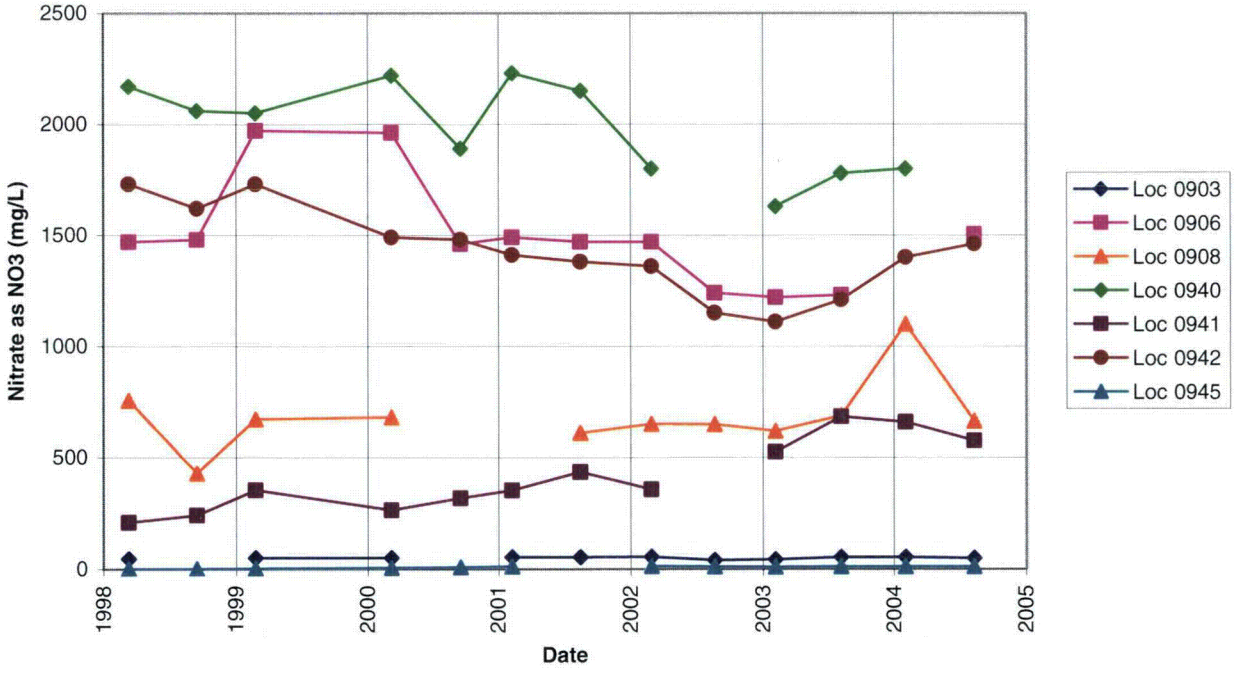


Figure 19–3. Time-Concentration Plots of Nitrate (as NO_3) in Ground Water at the Tuba City, Arizona, Disposal Site

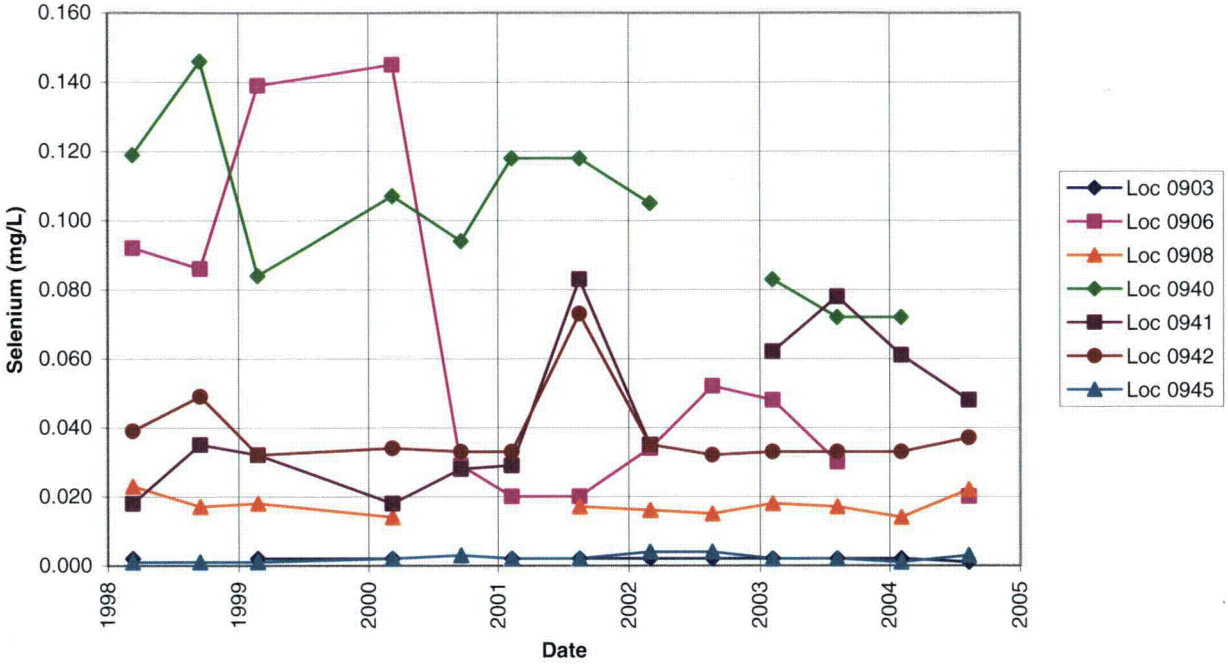


Figure 19–4. Time-Concentration Plots of Selenium in Ground Water at the Tuba City, Arizona, Disposal Site

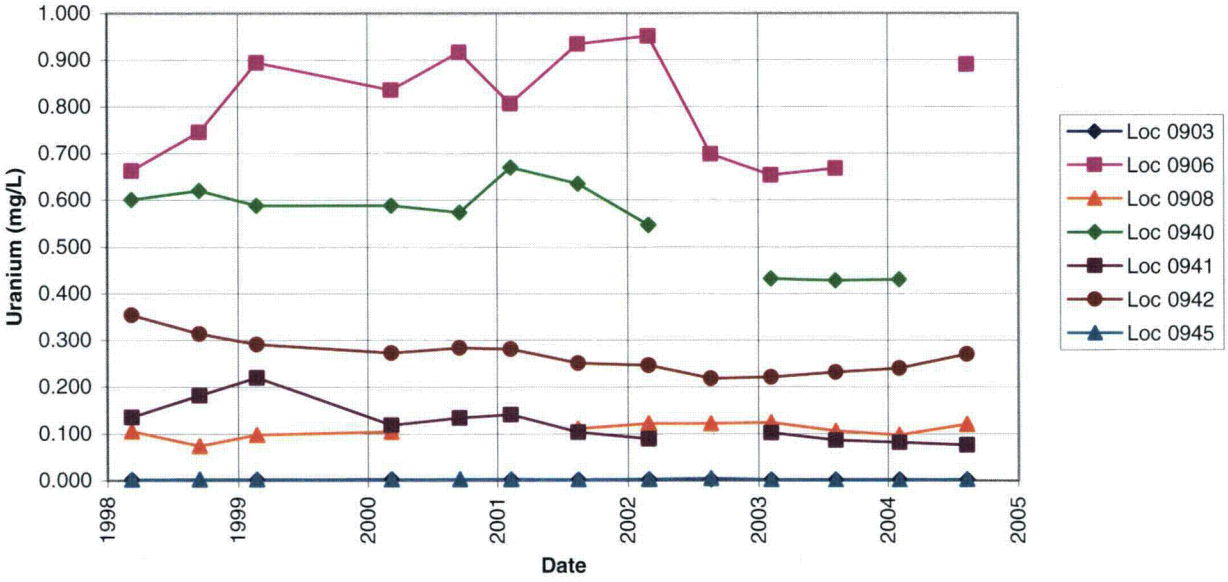


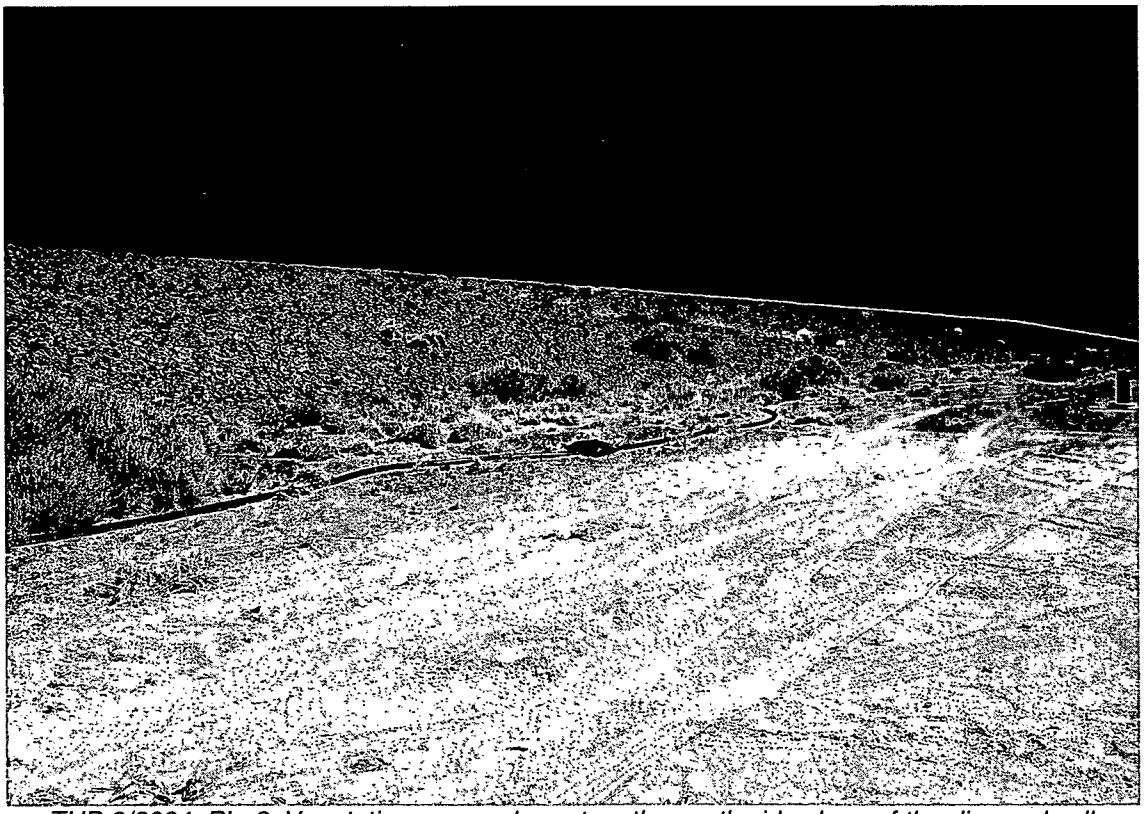
Figure 19–5. Time-Concentration Plots of Uranium in Ground Water at the Tuba City, Arizona, Disposal Site

19.3.6 Photographs

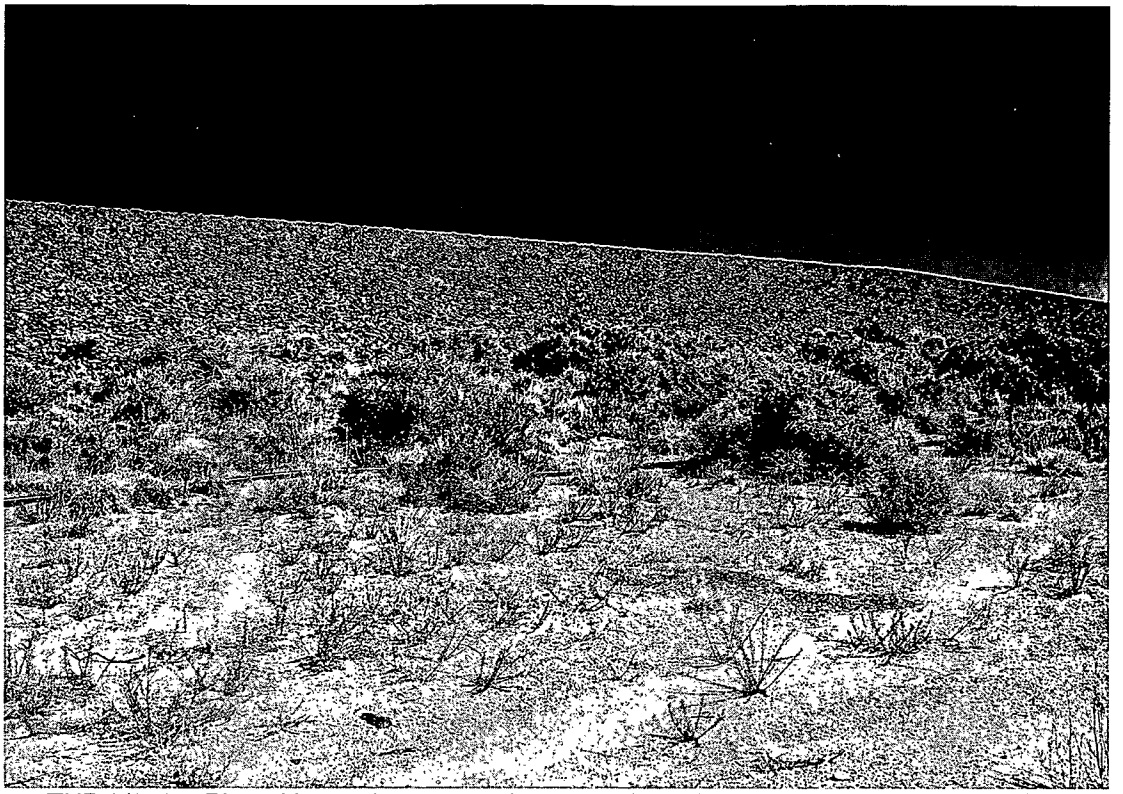
Table 19–3. Photographs Taken at the Tuba City, Arizona, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	310	Gap at the base of the security fence due to wind erosion.
PL–2	30	Vegetation encroachment on the south side slope of the disposal cell.
PL–3	10	Vegetation encroachment and sand accretion along the base of the south side slope of the disposal cell.
PL–4	10	Tumbleweeds and windblown sand deposits in the northeast corner of the site.

TUB 9/2004. PL–1. Gap at the base of the security fence due to wind erosion.



TUB 9/2004. PL–2. Vegetation encroachment on the south side slope of the disposal cell.



TUB 9/2004. PL–3. Vegetation encroachment and sand accretion along the base of the south side slope of the disposal cell.

TUB 9/2004. PL–4. Tumbleweeds and windblown sand deposits in the northeast corner of the site.

End of current section