Department of Energy
Office of Legacy Management

DEC 1 9 2005

Mr. Gary Janosko, Chief
U.S. Nuclear Regulatory Commission
Fuel Cycle Facilities Branch
Mail Stop T-8A33
Washington, DC 20555-0001

Subject: 2005 Annual Site Inspection and Monitoring Report for UMTRCA Title I Disposal Sites

Dear Mr. Janosko:

Four copies of the *2005 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites* are enclosed. The report covers the annual inspections of the licensed disposal sites. All of the sites remain in compliance with license requirements. A hurricane caused flood damage that occurred in 2004 along the perimeter of the Canonsburg, Pennsylvania, disposal site. A shallow depression around settlement plate SP-4 in the disposal cell cover at the Ambrosia Lake, New Mexico, disposal site was repaired. No impact to the integrity of the disposal cells occurred from either of these activities.

This report is submitted in compliance with the reporting requirements as set forth in 10 CFR 40.27. Each site was inspected, monitored, and maintained in accordance with requirements contained in site-specific, long-term surveillance plans.

If NRC has comments or questions about this report, please call me at (970) 248-6048.

Sincerely,

Thomas C. Pauling
Site Manager

Enclosure

cc w/o enclosure:
S. Hall, Stoller
Record File: ADM 115.03 (D. Roberts)

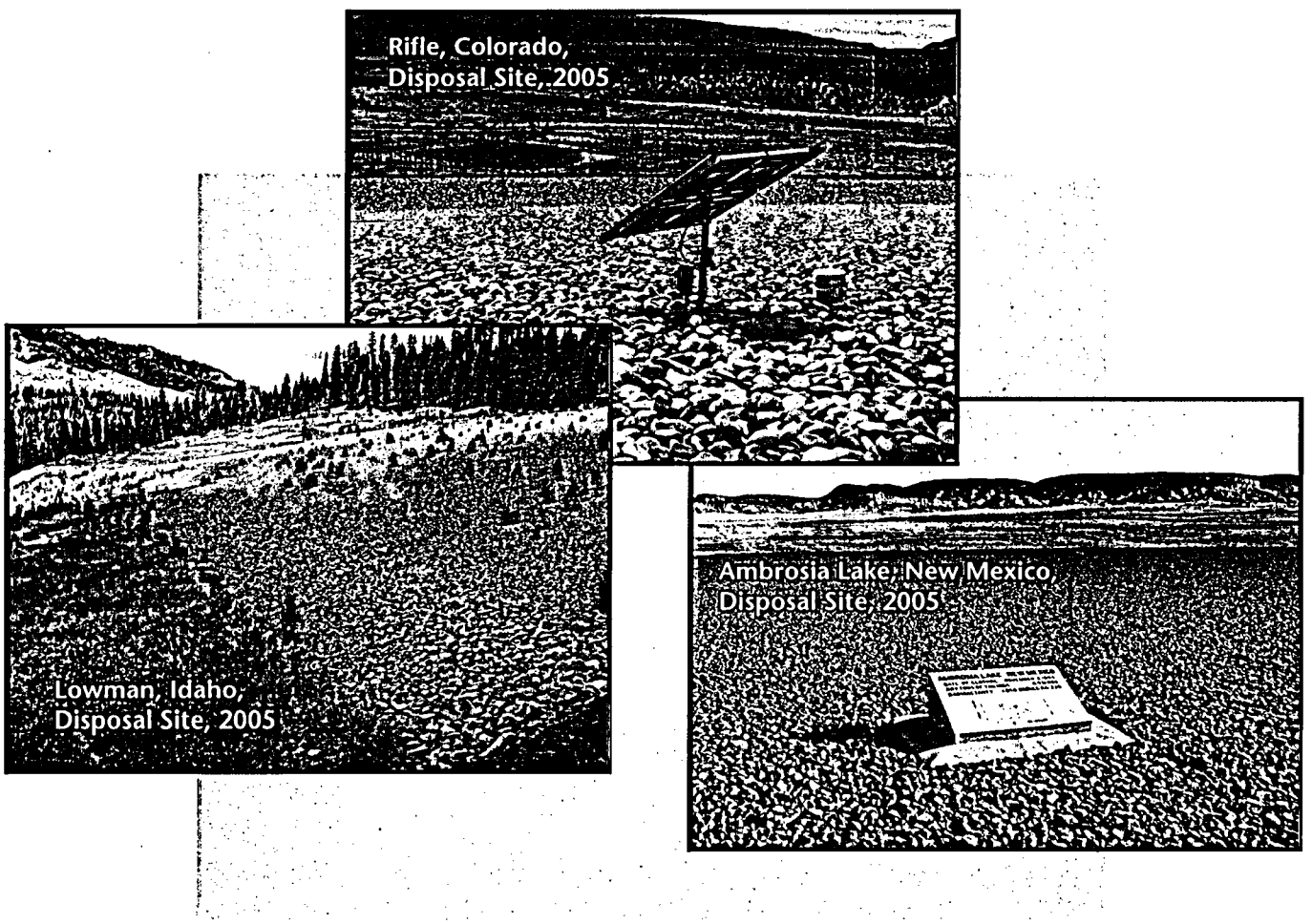
TCP/Title I Report to NRC.doc

DOE–LM/GJ1015–2005

U.S. Department of Energy
Office of Legacy Management

2005 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites

December 2005



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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DOE–LM/GJ1015–2005

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2005 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites

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Acronyms

ACL	alternate concentration limit
BIA	Bureau of Indian Affairs
BLM	U.S. Bureau of Land Management
CA	Cooperative Agreement
CAA	Custodial Access Agreement
CFR	*Code of Federal Regulations*
COC	Constituent of Concern
DOE	U.S. Department of Energy
GCAP	Ground Water Compliance Action Plan
GPS	Global positioning system
LM	Office of Legacy Management
LTSP	Long-Term Surveillance Plan
MCL	maximum concentration limit
mg/L	milligram(s) per liter
MSL	mean sea level
NECA	Navajo Engineering and Construction Authority
NRC	U.S. Nuclear Regulatory Commission
PCB	polychlorinated biphenyl(s)
PL	photo location
POC	point of compliance
POE	point of exposure
TDS	total dissolved solids
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978 (88 USC 7901, *et seq.*)
USFS	U.S. Forest Service
USGS/NEIC	United States Geological Survey National Earthquake Information Center

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.lm.doe.gov/.**

All of the sites require some degree of routine monitoring and maintenance which may include ground water and surface water monitoring, minor erosion control, vegetation and noxious weed control, fence and gate repairs, sign replacement, and minor trash removal. The following nonroutine activities[2] occurred in 2005:

- Ambrosia Lake, New Mexico—repaired a shallow depression around settlement plate SP–4 in the disposal cell cover;
- Canonsburg, Pennsylvania—conducted repairs to the stream bank and the security fence caused by 2004 flooding;
- Canonsburg, Pennsylvania—LTSP revised following a monitoring program evaluation to combine the ground water and surface water monitoring requirements with those described in the Ground Water Compliance Action Plan (GCAP);
- Falls City, Texas—LTSP required 5-year ground water monitoring program evaluation is being conducted;
- Lakeview, Oregon—field investigations on the effects of deep-rooted vegetation on cell performance through modeling of the movement of water through the radon barrier of the

[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.

cell cover and the installation of water flux meters in the cover to directly monitor percolation rates;

- Lakeview, Oregon—rock size median diameter measurements collected to comply with the minimum size requirement to protect the cell from erosion by storm runoff;
- Lakeview, Oregon—two earthquakes of magnitude 3.4 and 3.6 occurred within 15 miles (25 km) of the site; follow-up inspection found no effects at the disposal site;
- Lowman, Idaho—LTSP revised to allow natural plant community succession on the disposal cell and discontinue ground water monitoring at the site;
- Naturita, Colorado—LTSP required five-year monitoring program evaluation recommends a reduction in ground water monitoring;
- Rifle, Colorado—remote data transfer systems (available online) were installed to monitor cell dewatering and the associated evaporation pond performance;
- Rifle, Colorado—land survey conducted of eight settlement plates and three standpipes to determine if movement of the cell is occurring;
- Shiprock, New Mexico—studying the effect of plant encroachment on the cell to evaluate the need for continued vegetation control;
- Shiprock, New Mexico—continued research associated with cell performance and the collection of saturated hydraulic conductivity measurements;
- Spook, Wyoming—repaired concrete at the base of site marker SMK–1 that was found to be spalling.

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.

2005 Summary of UMTRCA Title I Site Actions and Issues

Site	Chapter	Page	Index No.	Actions and Issues
Ambrosia Lake, New Mexico	1	1–2	1A	Check access road agreement.
		1–2	1B	Maintenance: replaced faded warning signs, installed additional warning signs.
		1–5	1C	Maintenance: control of undesirable vegetation on cell cover.
		1–5	1D	Maintenance: control of undesirable vegetation on cell apron.
		1–6	1E	Ground water monitoring.
		1–7	1F	Corrective action: shallow depression on cell top repaired.
Burrell, Pennsylvania	2	2–2	2A	Maintenance: vegetation cleared along access road.
		2–2	2B	Maintenance: fence repairs.
		2–2	2C	Maintenance: entrance gate repair.
		2–2	2D	Maintenance: temporary entrance sign installed.
		2–6	2E	Coordinate with State to remove beavers; dam water backs up against cell.
		2–6	2F	Maintenance: control of undesirable and invasive vegetation.
		2–7	2G	Maintenance: control of noxious weeds.
		2–7	2H	Ground water monitoring.

Site	Chapter	Page	Index No.	Actions and Issues
Canonsburg, Pennsylvania	3	3–2	3A	Repaired fence damage caused by 2004 flooding.
		3–2	3B	Maintenance: replaced a perimeter sign.
		3–2	3C	Maintenance: reset erosion control marker ECM–2A.
		3–5	3D	Maintenance: control of noxious weeds on cell.
		3–6	3E	Maintenance: control of undesirable plants and noxious weeds along perimeter fence.
		3–7	3F	Repaired stream bank erosion caused by 2004 flooding.
		3–7	3G	Ground water monitoring.
		3–8	3H	LTSP revised to incorporate monitoring program evaluation recommendations and to combine with GCAP ground water and surface water monitoring requirements; pending NRC concurrence.
Durango, Colorado	4	4–2	4A	Maintenance: replaced missing perimeter sign.
		4–5	4B	Maintenance: vegetation control on side slopes of the cell.
		4–6	4C	Criteria for closure of the cell transient drainage collection and treatment system, and requirements for system decommissioning.
		4–7	4D	Maintenance: control of noxious weeds.
		4–8	4E	Ground water monitoring.
Falls City, Texas	5	5–2	5A	Maintenance: replaced missing entrance and perimeter signs.
		5–2	5B	Maintenance: vegetation control on cell.
		5–6	5C	Ground water monitoring.
		5–12	5D	LTSP required 5-year ground water monitoring program evaluation.
Grand Junction, Colorado	6	6–5	6A	Maintenance: vegetation control on the cell.
		6–6	6B	Maintenance: storm water retention pond was deepened to prevent saturation of the adjacent road.
		6–7	6C	Maintenance: noxious and invasive control.
		6–8	6D	Ground water monitoring.
Green River, Utah	7	7–6	7A	Ground water monitoring.
		7–7	7B	Ground water ACLs proposed to NRC and the State of Utah in the revised GCAP (Subpart B compliance strategy).
Gunnison, Colorado	8	8–2	8A	Vandalism: missing entrance and perimeter signs, damaged perimeter signs.
		8–6	8B	Successful revegetation.
		8–7	8C	Ground water monitoring.
Lakeview, Oregon	9	9–2	9A	Maintenance: access road cable gate lock replaced.
		9–2	9B	Maintenance: fence repaired.
		9–5	9C	Investigation on effects of deep-rooted vegetation on cell. performance.
		9–6	9D	Recalculated minimum required riprap size; revised LTSP remains pending NRC concurrence.
		9–6	9E	Riprap gradation monitoring.
		9–7	9F	Follow-up inspection after local earthquake.
Lowman, Idaho	10	10–2	10A	Ground water monitoring wells scheduled to be decommissioned in 2006.
		10–5	10B	LTSP revised to allow continued native vegetation encroachment on cell; NRC concurrence received.
		10–6	10C	Maintenance: erosion control.
		10–6	10D	Maintenance: control of noxious weeds.
		10–7	10E	LTSP revised to discontinuing ground water monitoring; NRC concurrence received.
Maybell, Colorado	11	11–2	11A	Maintenance: fence repair.
		11–5	11B	Termination of BLM remedial action agreement.
		11–6	11C	BLM right-of-way permit closed; successful revegetation.
		11–7	11D	Ground water level monitoring requirement fulfilled; NRC concurrence received.
Mexican Hat, Utah	12	12–2	12A	Maintenance: repaired perimeter fence.
		12–2	12B	Maintenance: damaged boundary monument.
		12–5	12C	Maintenance: control of undesirable plants.
		12–6	12D	Seep monitoring.
Naturita, Colorado	13	13–2	13A	Maintenance: access road rubble removed and erosion control.
		13–6	13B	Maintenance: control of noxious weeds.
		13–6	13C	Ground water monitoring.
		13–8	13D	LTSP required 5-year ground water monitoring program evaluation recommends reducing ground water monitoring; NRC concurrence pending.

Site	Chapter	Page	Index No.	Actions and Issues
Rifle, Colorado	14	14–2	14A	Maintenance: entrance sign replaced.
		14–5	14B	Settlement plates and standpipes on cell resurveyed.
		14–5	14C	Maintenance: erosion repair within the interceptor trench.
		14–6	14D	Maintenance: control of noxious weeds.
		14–6	14E	Reclamation: reseeded BLM Right-of-Way Reservation Permit area.
		14–7	14F	Disposal cell pore water level monitoring.
		14–8	14G	Continued cell dewatering.
Salt Lake City, Utah	15	15–2	15A	Restricted access.
		15–2	15B	Clean up of radiological surface contamination resulting from activity on an adjacent Envirocare waste haul road.
Shiprock, New Mexico	16	16–2	16A	Maintenance: removed accumulated weeds and trash.
		16–2	16B	Maintenance: replaced lock on entrance gate.
		16–6	16C	Evaluation: studying the need for continued vegetation control on cell.
		16–6	16D	Research: collection of saturated hydraulic conductivity measurements to evaluate cell performance.
Slick Rock, Colorado	17	17–5	17A	Maintenance: control of noxious and invasive weeds.
		17–6	17B	Reclamation: BLM right-of-way permit remains active.
Spook, Wyoming	18	18–2	18A	Maintenance: repaired concrete base of site marker.
		18–5	18B	Maintenance: control of noxious weeds.
Tuba City, Arizona	19	19–2	19A	Maintenance: fence repair.
		19–5	19B	Maintenance: control of deep-rooted plants on cell.
		19–5	19C	Monitoring vegetation encroachment and sand accretion on cell.
		19–6	19D	Evaluate whether to remove two inactive evaporation ponds.
		19–7	19E	Ground water monitoring.

1.0 Ambrosia Lake, New Mexico, Disposal Site

1.1 Compliance Summary

The Ambrosia Lake Disposal Site, inspected on August 30, 2005, was in excellent condition. Repairs made to a small depression on the cell cover were in excellent condition. Undesirable vegetation growing at the base of the disposal cell adjacent to the site entrance was cut and treated with herbicide. Mining restriction area warning signs posted along the west side of the site were faded and replaced. The site access road, owned by Rio Algom Mining, LLC, is scheduled for temporary realignment and the access agreement may need to be revised. No cause for a follow-up or contingency inspection was identified.

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

Institutional Controls—The 356-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1998. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site access road. The site access road is owned and controlled by Rio Algom Mining, LLC. The site is surrounded by privately owned land. The surrounding land is used primarily for livestock grazing and wildlife habitat.

1.3 Compliance Review

1.3.1 Annual Inspection and Report

The disposal site, located north of Grants, New Mexico, was inspected on August 30, 2005. 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. Due to a
1A scheduled change in alignment of the access road by the owner, Rio Algom Mining, LLC, the site access agreement may need to be revised.

The entrance and all perimeter signs were in good condition. 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 area warning signs (PL–1). Many of these signs had faded,
1B becoming illegible, and all were replaced in October 2005. Warning signs were also installed on the posts for perimeter signs P11 through P15.

Site Markers, Survey and Boundary Monuments—The two granite site markers (PL–2), 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 and in good condition (PL–3). Ground water monitoring is performed once every three years and was last performed in 2004 (results are presented below in Section 1.3.4).

Sediment is present in the bottom of both wells, but the volumes were determined insufficient to be a concern at this time. Although noted as damaged at the time of the 2004 inspection, the aboveground well vault for MW–0678 was secure and determined not to warrant repair at this time (PL–3).

Mine Vents—Two mine vent shafts, associated with abandoned underground mines, are within the site boundary. The mine vent north of the disposal cell has a spot-welded cover, and the other vent located near the southwest corner of the cell has a bolted-on cover. 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.

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.

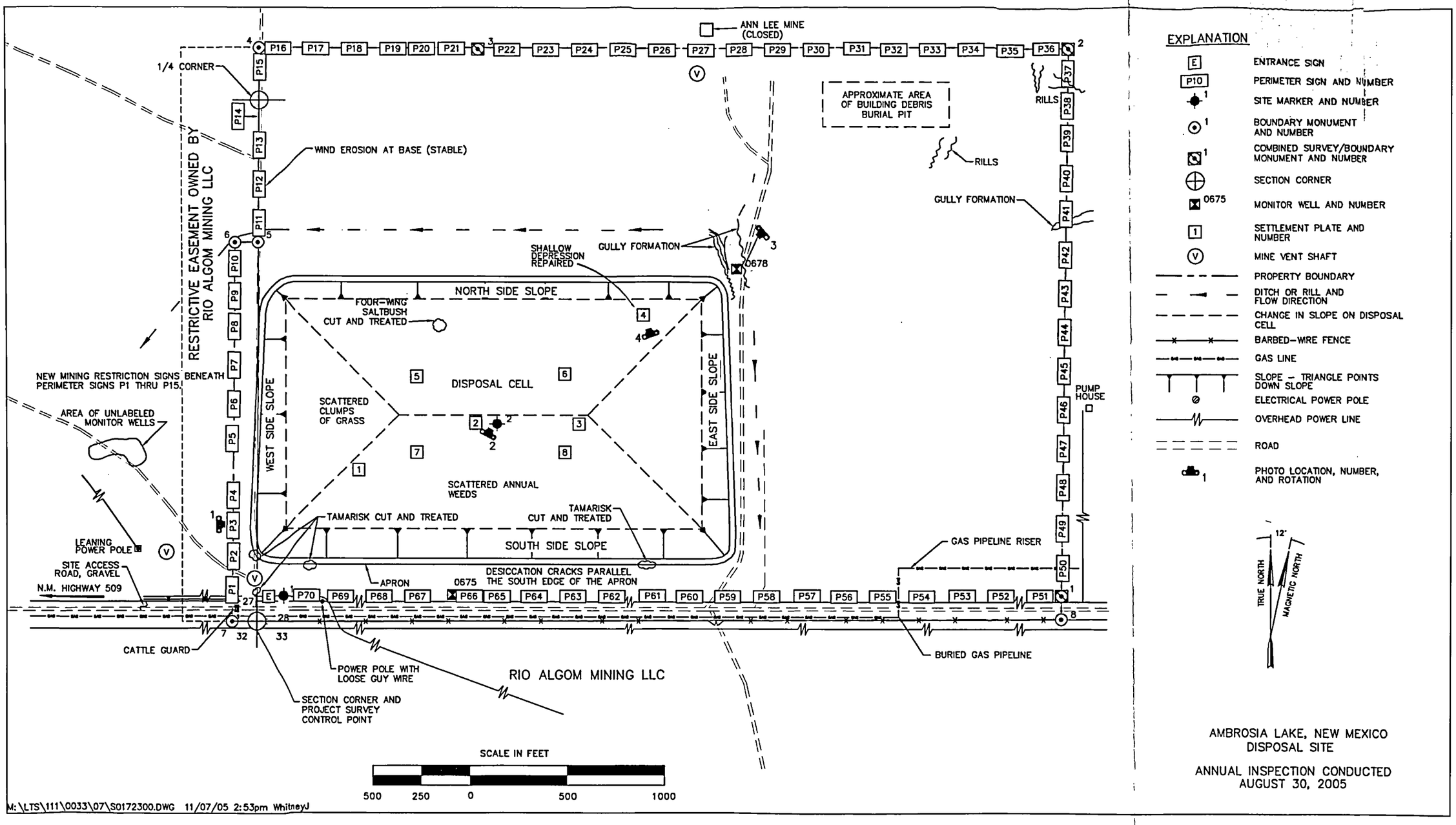


Figure 1–1. 2005 Annual Compliance Drawing for the Ambrosia Lake, New Mexico, Disposal Site

Top of Disposal Cell—The basalt riprap-covered top of the disposal cell is in excellent condition (PL–2). There was no evidence of cracking, settling, slumping, or erosion. Minor settlement at one displacement monument (i.e., settlement plate) was repaired. Additional discussion of this repair is presented below in Section 1.3.6.

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
1C inspection. The shrub was cut and treated with herbicide to prevent possible 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 were smoothed at the time the disposal cell top depression was repaired. There was no impact to the integrity of the disposal cell cover as a result of this activity.

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
1D disposal cell, primarily within the cell's apron. The shrubs were cut and treated with herbicide.

Desiccation cracks occur in the clay-rich backfill soil parallel to the apron along the south side of the cell. The cracks do not pose a threat to the disposal cell.

Graded and Revegetated Site Area—In general, site vegetation was healthier and better established 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, with headward erosion occurring away from the cell and no significant sedimentation.

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 identified that would impact the site.

Construction of a haul road by Rio Algom to transport radioactive materials from decommissioned evaporation ponds located southwest of the site to their UMTRCA Title II

disposal cell located west of the site is planned for 2006. This activity will require a temporary realignment of the site access road across Rio Algom property; however, these activities are not expected to impact the Ambrosia Lake site.

1.3.2 Follow-up or Contingency Inspections

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

1.3.3 Routine Maintenance and Repairs

Mining restriction area warning signs were replaced and undesirable plants were removed from the cell cover and along the cell apron in 2005.

1.3.4 Ground Water Monitoring

1E 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 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 December 2001), for up to 30 years, and will evaluate the results after every third sampling event.

The second round of post-closure sampling was conducted in September 2004, but the analytical results were not available in time for inclusion into the 2004 report and, therefore, are presented in this report. The data from the two post-closure sampling events are presented in Table 1–2. The analytical results indicate that uranium, molybdenum, and sulfate concentrations decreased in both wells, while selenium and nitrate concentrations increased.

Table 1-2. Analytical Results from Post-Closure Ground Water Sampling at the Ambrosia Lake, New Mexico, Disposal Site

Well	Uranium mg/L	Molybdenum mg/L	Selenium mg/L	Nitrate (as N) mg/L	Sulfate mg/L
December 7, 2001					
MW–0675	3.17	3.92	0.433	41.7	4,040
MW–0678	0.073	0.023	0.169	479	7,340
September 21, 2004					
MW–0675	1.10	0.600	0.660	50.0	3,200
MW–0678	0.057	0.012	0.230	520	6,800

mg/L = milligrams per liter

1.3.5 Settlement Plate Monitoring

The main tailings pile at the Ambrosia Lake Site was stabilized in place. Relocated contaminated materials (soil and debris) were placed on top of the tailings and covered with a radon/infiltration barrier. The top slopes and side slopes of the disposal cell were capped with rock to prevent wind and water erosion of the underlying radon/infiltration barrier and tailings. The stabilized disposal cell was constructed above the ground surface.

The tailings and contaminated materials were compacted before the radon barrier was completed; however, further consolidation was expected. Therefore, eight settlement plates (referred to as displacement monuments in the LTSP) were installed on the top of the disposal cell to monitor the anticipated settlement of the tailings embankment during placement of contaminated materials and the disposal cell cover. The settlement plates were installed at various depths according to specifications. The LTSP does not require monitoring of the settlement plates during routine annual inspections, but rather they be used to measure significant long-term settlement of the disposal cell.

A shallow depression around settlement plate SP–4, near the northeast corner of the disposal cell cover, was first noted during the 1997 inspection. There had been no visible indication to suggest the depression held water. However, comparison of annual inspection photographs indicated that the depression had increased in depth and area and, if settlement continued, there was concern that the depression could hold water and potentially erode a portion of the radon barrier. A survey of the depression and settlement plate in June 2004 indicated that settlement or consolidation had occurred in both the tailings that were in place prior to cell construction and in the relocated tailings that were placed over the existing tailings.

1F DOE completed the repair of this shallow depression around settlement plate SP–4 in August 2005. Construction consisted of raising the radon barrier, bedding layer, and riprap covered surfaces to designed grades (PL–4). A post-construction baseline land survey was performed in September 2005. Annual land surveys will be performed, as a best management practice, through 2007. Results of the September 2005 land survey are provided in Table 1–3. The annual post-construction land surveys will serve to demonstrate the successful repair of the shallow depression around settlement plate SP–4 and verify that additional settlement is not occurring. Visual inspections of the cell top surface made during annual inspections will be compared to results of the land surveys. Land surveys will only resume after 2007 if visual inspections indicate significant settlement on the disposal cell top.

Table 1-3. Results of the 2005 Settlement Plate Survey at the Ambrosia Lake, New Mexico, Disposal Site (elevation in feet above mean sea level)

Settlement Plate Location	Post-Repair Baseline Elevation (ft) September 2005
SP–1	7022.70
SP–2	7032.98
SP–3	7033.06
SP–4	7013.98
SP–5	7026.26
SP–6	7026.10
SP–7	7026.18
SP–8	7026.07

1.3.6 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.

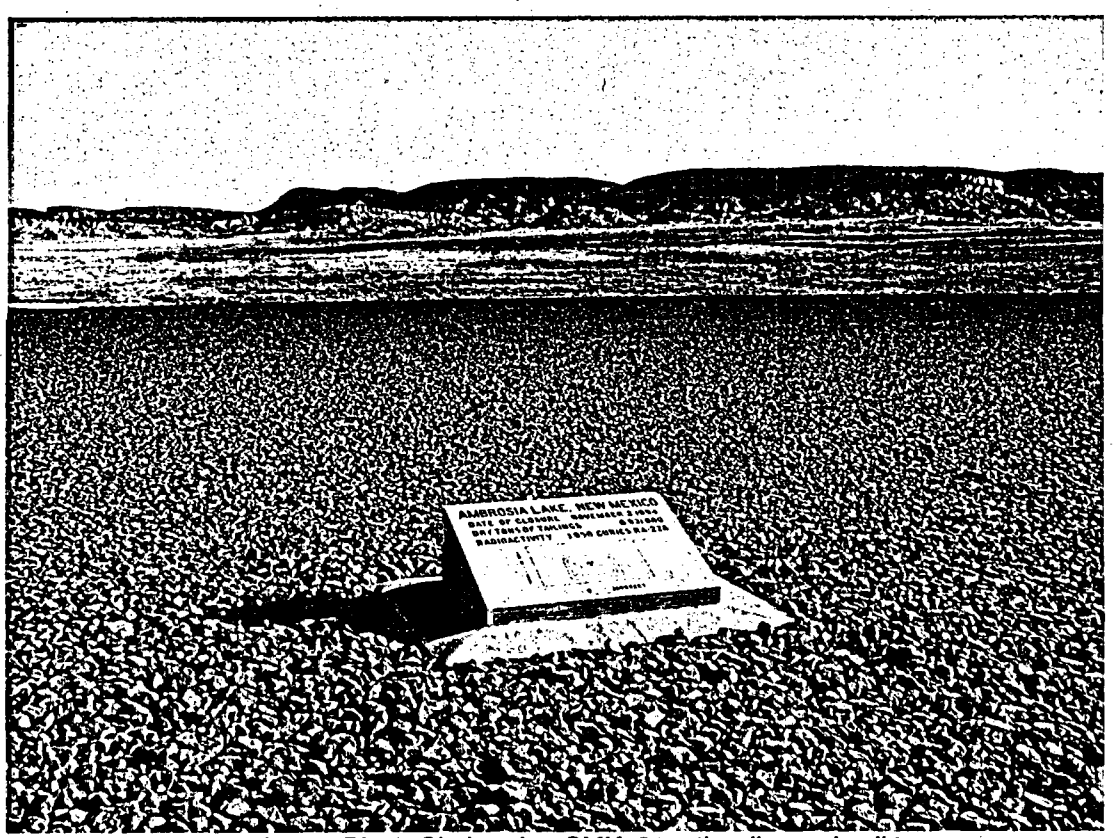
Because there was a potential for erosion of the radon barrier, the shallow depression on the cell cover was repaired in 2005 (see above, Section 1.3.5, for details).

1.3.7 Photographs

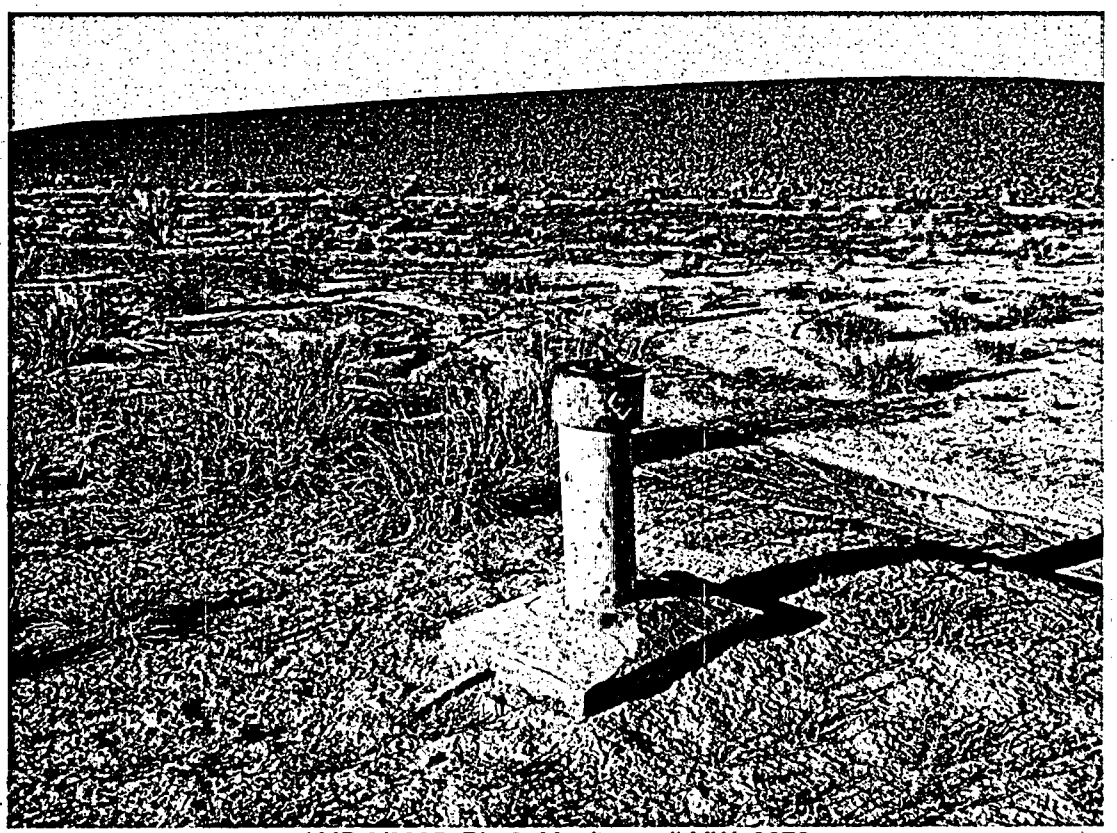
Table 1-4. Photographs Taken at the Ambrosia Lake, New Mexico, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	90	Mining restriction area warning sign.
PL–2	30	Site marker SMK–2 on the disposal cell top.
PL–3	230	Monitor well MW–0678.
PL–4	340	Settlement plate SP–4 on the disposal cell top where a small depression was repaired.

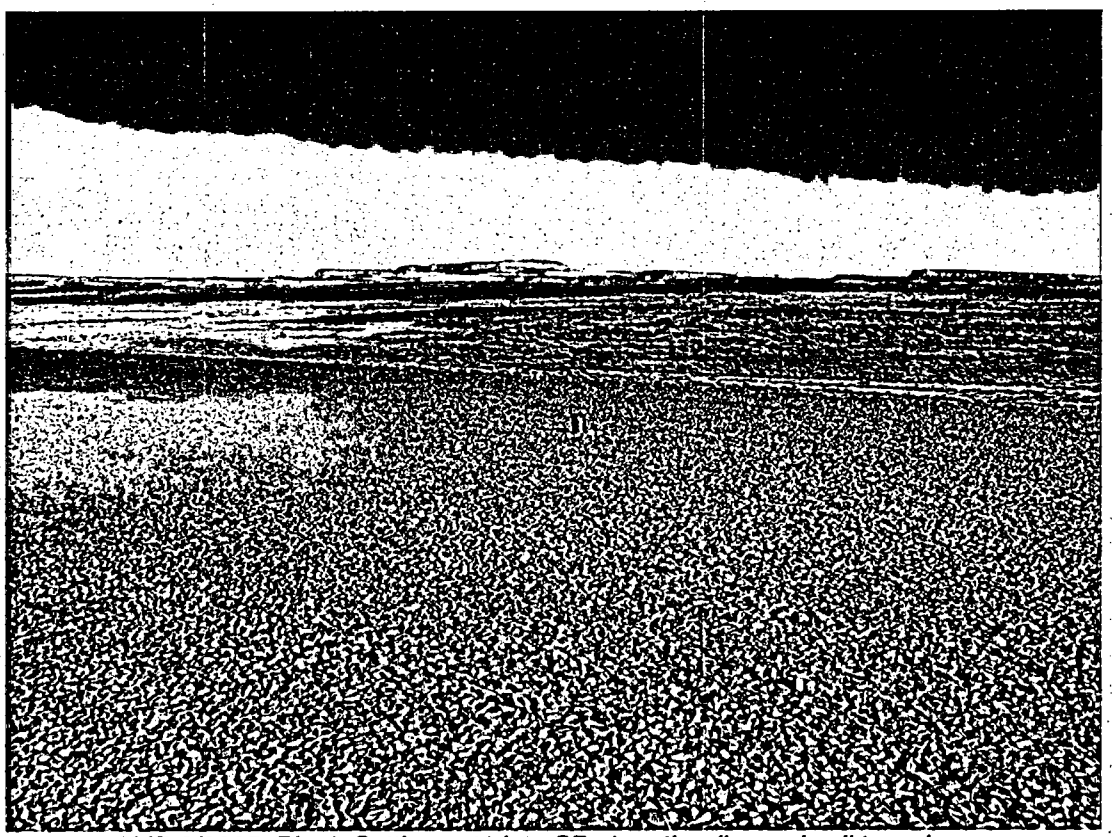
AMB 8/2005. PL–1. Mining restriction area warning sign.



AMB 8/2005. PL–2. Site marker SMK–2 on the disposal cell top.



AMB 8/2005. PL–3. Monitor well MW–0678.



AMB 8/2005. PL–4. Settlement plate SP–4 on the disposal cell top where a small depression was repaired.

2.0 Burrell, Pennsylvania, Disposal Site

2.1 Compliance Summary

The Burrell Disposal Site, inspected on September 20, 2005, was in excellent condition. The entrance sign was missing; a perimeter sign was modified and installed temporarily with contact information during the inspection. A contractor cut back vegetation encroaching on the access road and other portions of the railroad right-of-way. Control of undesirable vegetation continued and significantly reduced populations at the site. Herbicide was applied to noxious weeds located on railroad property along the site boundary. Beaver dams caused water in the slough to back up and flood the toe of the south side slope and the bottom of the security fence west of the site several feet in depth; the water had not risen to the elevation of the contaminated materials within the disposal cell and performance of the cell has not been adversely affected. Ground water monitoring performed in fall 2004 indicates there is no contamination being released and that the disposal cell is performing as designed. 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

Institutional Controls—The 72-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1994. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, a site perimeter fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site. Access to the site is off Strangford Road on a site access road within a perpetual right-of-way through private property (Tract 201–E) and across DOE leased land crossing the Norfolk Southern Railroad tracks. The site is bordered by the Conemaugh River to the south and railroad owned land to the north. The surrounding land is used primarily for, residential, recreation (hunting and fishing), and wildlife habitat.

2.3 Compliance Review

2.3.1 Annual Inspection and Report

The site, located southeast of Blairsville, Pennsylvania, was inspected on September 20, 2005. 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—Access to the site is off Strangford Road on a site access road within a perpetual right-of-way through private property (Tract 201–E) and across DOE leased land crossing the Norfolk Southern Railroad tracks. The access road leads from the railroad track crossing to the entrance gate in the east end of the site security fence. The hard-packed, gravel road remains serviceable, although potholes and depressions as deep as 6-8 inches
2A have developed 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. A contractor for the Norfolk Southern Railroad cut back vegetation encroaching on the access road and portions of the railroad right-of-way (PL–1).

Historically the area along the DOE right-of-way has been used for unpermitted dumping, hunting, target practice, and riding of all-terrain vehicles. DOE had attempted to control access across the right-of-way by maintaining a gate at Strangford Road and installing guardrails on each side of the gate. As a result of local complaints that the guardrails blocked parking areas, DOE removed several sections. Following years of replacing locks and the gate being damaged beyond repair in 2002, DOE received NRC concurrence and removed the gate at Strangford Road in 2003. Institutional control for the site is now established at the security fence.

Overall, the security fence was in good condition at the time of the inspection. It is rusty in many
2B places but remains intact. In spring, the maintenance subcontractor repaired several bent angle brackets and removed tree limbs that were overhanging the fence.

The entrance gate (on the east end of the security fence) and the personnel gate (on the west end of the security fence) were in good condition at the time of the inspection. The maintenance
2C subcontractor replaced the drop rod on the entrance gate in Spring 2005. The padlock on the west-end personnel gate, although rusty, was operable. All chains, locks, and fences periodically will need replacement due to the humid climate.

Perimeter signs attached to the northern perimeter fence (P1 through P8) were replaced in 2002 because they became illegible from gunshot damage. Perimeter signs P5 and P12 were replaced in fall 2004, and bullets have already damaged sign P5. Public access to this portion of the disposal cell is essentially unimpeded and there continues to be a significant amount of activity in this area. In 2005, most of the signs were in serviceable to excellent condition. The entrance sign was missing and a perimeter sign, with contact information added, was mounted temporarily
2D on the gate (PL–2). A replacement entrance sign will be installed in 2006. Perimeter sign P1 is bent but remains legible.

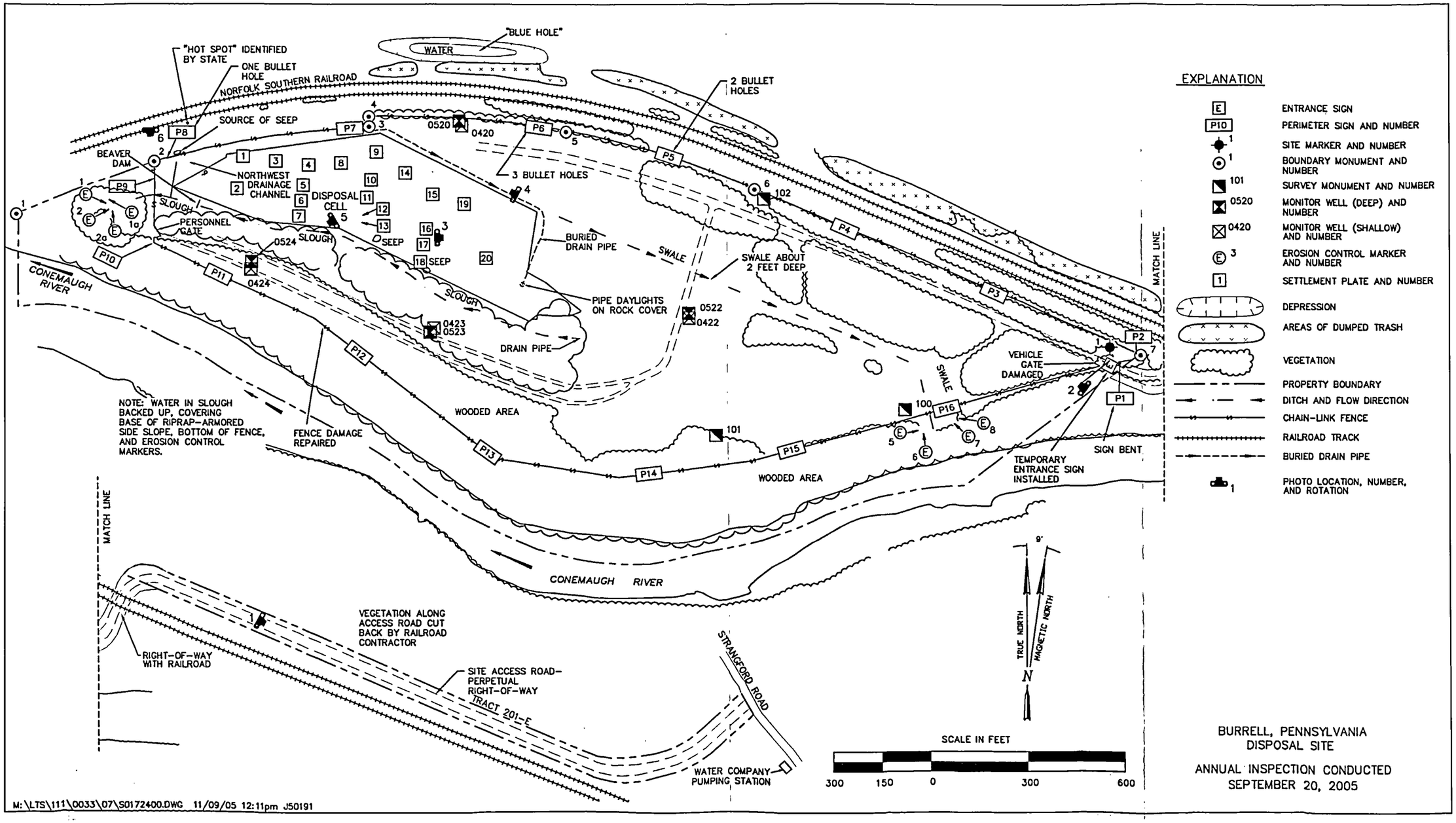


Figure 2–1. 2005 Annual Compliance Drawing for the Burrell, Pennsylvania, Disposal Site

Site Markers and Monuments—The site marker (SMK–1), at the east end of the site near the entrance gate, was in excellent condition. 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 were found and were in good condition.

Four pairs of erosion control markers are located in dense stands of vegetation, where they often are difficult to find. In 2005, the two pairs of erosion control markers west of the disposal cell were under water and not inspected. The erosion control markers southeast of the site were not inspected but no stream bank erosion was evident anywhere near the site.

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

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.

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 that might affect site integrity or the long-term performance of the site.

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–3), as vegetation eradication is no longer a requirement of the LTSP. 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.

The study concluded that plant growth on the cell poses no added public or environmental risk of exposure to contaminants within the disposal cell because the cell contains only 4 curies of radium-226 and the hazardous constituents are not leachable, even if infiltration occurs. Because vegetation grows so vigorously at this site, effective vegetation control on the cell cover would require an aggressive program entailing, at a minimum, an annual application of herbicides. The potential environmental and health risks associated with such a program are greater than risks resulting from allowing vegetation to establish naturally. The LTSP was revised (April 2000) to allow vegetation to grow on the disposal cell without further intervention; stating that such

growth will not increase risk to public health, safety, or the environment. In their concurrence of the of the revised 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 2005 inspection, the area along the drain was dry and no water was flowing from the outlet (PL–4). The wire hardware cloth was intact in the drain outlet. Water never has been observed 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 backed up as a result of a beaver dam at the southwest corner of the cell, and was covering the base of the riprap-armored side slope (PL–5). The water had not risen to the elevation of the contaminated
2E materials within the cell. DOE will coordinate with State wildlife officials to remove the beavers in accordance with State regulations, and then breach the dam.

One seep along the base of the south side slope of the disposal cell was located during the inspection and found to be dry. No water has been found at the seeps since the drain was installed north of the cell, which suggests that the drain is diverting water that otherwise would flow beneath the disposal cell.

Area Between the Disposal Cell and Site Boundary—Thick grass and thickets of woody plants cover the area between the disposal cell and the site security fence. 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. To comply with federal invasive species directives and to maintain plant diversity on the property, DOE initiated an aggressive weed control program of herbicide applications and mowing in spring 2004 after consultation with
2F Pennsylvania State University. DOE continued the vegetation control program in 2005 and results observed indicate the program is effective.

The railroad contractor that cut back the vegetation along the access road agreed to also cut vegetation between the tracks and the north fence to control knapweed. DOE had been mowing this area and very few knapweed plants were found at this location in 2005.

Site Perimeter—A significant amount of seep water was observed along the security fence about 60 feet east of perimeter sign P8 and immediately west of the disposal cell. The area will continue to be monitored to ensure the water does not pose a threat to the integrity or performance of the disposal cell.

In addition to the ponding found at the base of the disposal cell's south side slope, water in the slough has also backed up and is covering the bottom of the security fence on the west end of the

property (PL–6). Beaver or debris dams are likely the cause this ponding. This area was inaccessible because of heavy vegetation and high water. DOE will task the maintenance subcontractor to identify the problem and clear the channel to restore drainage.

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
2G infestation with herbicide in spring and fall of 2004 and 2005. The treatment will likely increase in 2006 because the occurrence of weeds in this area appears to have spread; however, a different type of herbicide may be utilized.

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 tracks provides access to a long, narrow wooded area along the tracks that has been used for unpermitted dumping. Dumping activity appears to have decreased since 2004, based on fewer observed piles of fresh debris. Although township authorities are aware of the problem, none of the trash has been removed. This activity is not a direct threat to the disposal site but 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.

In 2004, 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. The State visited the site again in2005 and did not report any concerns.

2.3.2 Follow-Up or Contingency Inspections

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

2.3.3 Routine Maintenance and Repairs

In 2005, DOE installed a temporary entrance sign, cleared encroaching vegetation along the access road, repaired and removed tree limbs from the site perimeter fence, repaired the entrance gate, and continued the undesirable vegetation and noxious weed control program.

2.3.4 Ground Water Monitoring

2H DOE monitors ground water at this site, as a best management practice, to evaluate the performance of the disposal cell. The revised LTSP (April 2000) stipulates monitoring every 5 years. DOE conducted ground water sampling in November 2004 and results were unavailable in time to include in the 2004 compliance report; therefore, the results are presented in this report.

In accordance with the LTSP, the ground water monitoring network consists of eight wells (in four pairs) that are monitored for four target analytes—lead, molybdenum, selenium, and uranium. In 40 CFR 192 Table 1 of Subpart A, the U.S. Environmental Protection Agency (EPA) has established maximum concentration limits (MCLs) for these analytes in ground water. The wells in the monitoring network are listed in Table 2–2 and MCLs for the four target analytes in Table 2–3. Time-concentration plots, beginning in 1996, for the four analytes are shown on Figures 2–2 through 2–5.

Table 2–2. Ground-Water Monitoring Network at the Burrell, Pennsylvania, Disposal Site

Monitor Well	Hydrologic Relationship
MW–0420 & MW–0520	Upgradient, or background
MW–0422 & MW–0522	Crossgradient
MW–0423 & MW–0523	Downgradient
MW–0424 & MW–0524	Downgradient

Table 2–3. Maximum Concentration Limits for Ground Water at the Burrell, Pennsylvania, Disposal Site

Constituent	MCL [a] (mg/L)
Lead	0.05
Molybdenum	0.1
Selenium	0.01
Uranium	0.044

[a]EPA MCLs as listed in 40 CFR 192 Table 1, Subpart A.

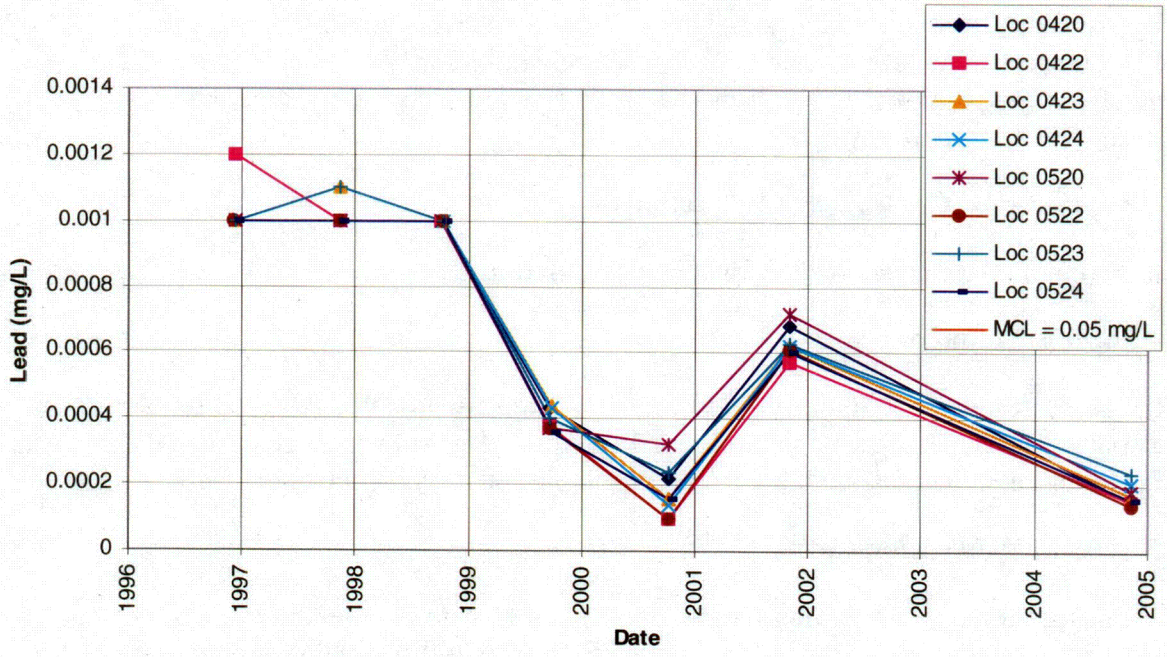


Figure 2–2. Time-Concentration Plots of Lead in Ground Water at the Burrell, Pennsylvania, Disposal Site

C01

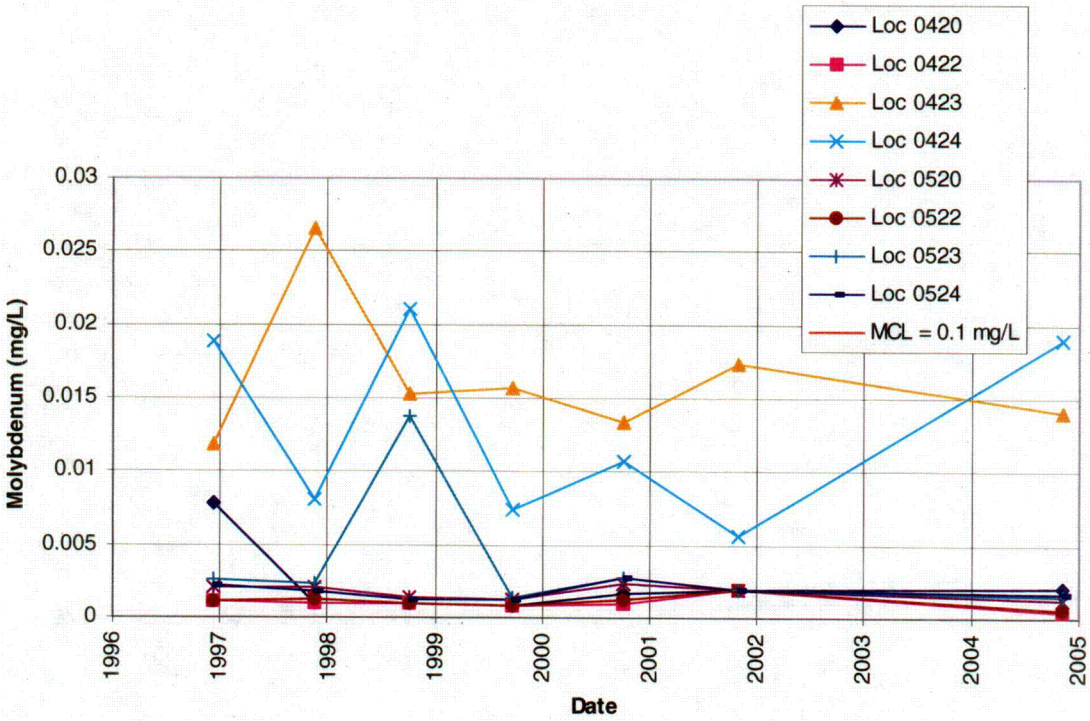


Figure 2–3. Time-Concentration Plots of Molybdenum in Ground Water at the Burrell, Pennsylvania, Disposal Site

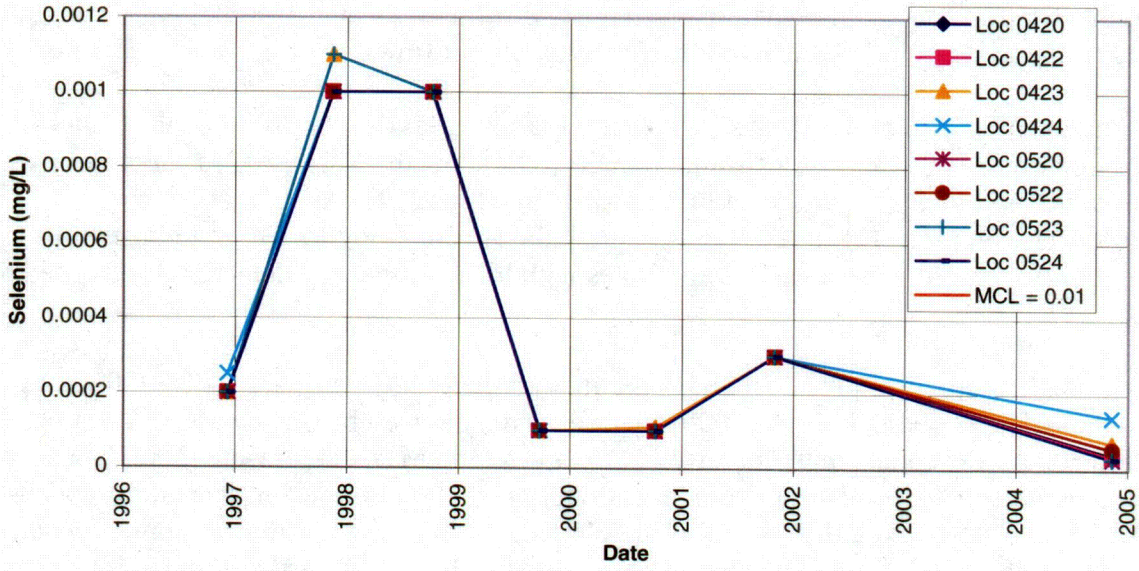


Figure 2–4. Time-Concentration Plots of Selenium in Ground Water at the Burrell, Pennsylvania, Disposal Site

C02

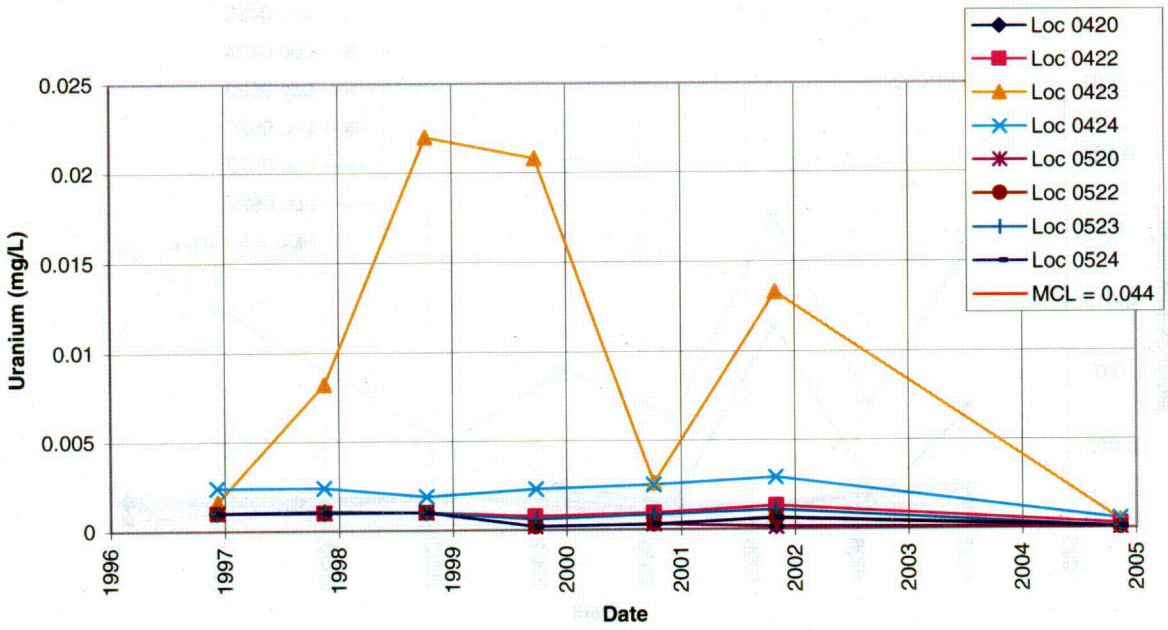


Figure 2–5. Time-Concentration Plots of Uranium in Ground Water at the Burrell, Pennsylvania, Disposal Site

Each pair of wells consists of a shallow well, completed in unconsolidated fill and alluvium (400-series wells); and a deeper well, completed in the shallow bedrock of the Casselman Formation (500-series wells). In addition to the wells, two seeps at the bottom of the south side slope of the disposal cell are also sampled if they yield sufficient water. Samples were not collected from the seeps in 2004 due to insufficient or absent flows.

Concentrations of lead in ground water in both the shallow alluvial wells (400-series wells) and the deeper bedrock wells (500-series wells) remain well below the MCL; 2004 results from all locations were more than two orders of magnitude below the MCL and approached the laboratory detection limit (Figure 2–2). Since 1996, the apparent downward trend in lead concentrations observed at all locations correlates with lower laboratory detection limits used for analysis.

Concentrations of molybdenum in ground water in both the shallow alluvial wells (400-series wells) and the deeper bedrock wells (500-series wells) remain well below the MCL; 2004 results from all locations, except downgradient wells MW–0423 and MW–0424, were more than an order of magnitude below and at or near the laboratory detection limit. Concentrations in wells MW–0423 and MW–0424, although still well below the MCL, have fluctuated more than other wells. Since 1996, molybdenum concentrations in all wells have remained within the historical range or have decreased (Figure 2–3).

Concentrations of selenium in ground water in both the shallow alluvial wells (400-series wells) and the deeper bedrock wells (500-series wells) remain well below the MCL; 2004 results from all locations were more than two orders of magnitude below the MCL and approached the

C03

laboratory detection limit (Figure 2–4). Since 1996, an apparent downward trend in selenium concentrations at all wells correlates with the lower laboratory detection limits used over the same time period.

Concentrations of uranium in ground water in both the shallow alluvial wells (400-series wells) and the deeper bedrock wells (500-series wells) remain well below the MCL; 2004 results from all locations were two orders of magnitude or more below the MCL and approach the laboratory detection limit. Since 1996, uranium concentrations in all wells have remained relatively constant, except in downgradient well MW–0423, which has shown considerable fluctuation below the MCL (Figure 2–5).

Given (1) that the monitoring network is satisfactory for its intended purpose, (2) that the concentration of the four target analytes remain well below the MCL and in most cases at or near the laboratory detection limit, (3) that there is currently no indication of seepage from the disposal cell, and (4) that ground water downgradient from the disposal cell is not significantly degraded relative to upgradient or background ground water, DOE concludes that the disposal cell effectively isolates the contaminated waste from the ground water environment. As stated in the revised LTSP, DOE commits to monitor on an every-fifth-year basis. After every such monitoring, DOE will review the data for trends or significant changes and DOE will, from time to time and with NRC concurrence, review the need to continue monitoring and may determine to discontinue monitoring or alter the monitoring frequency.

2.3.5 Corrective Action

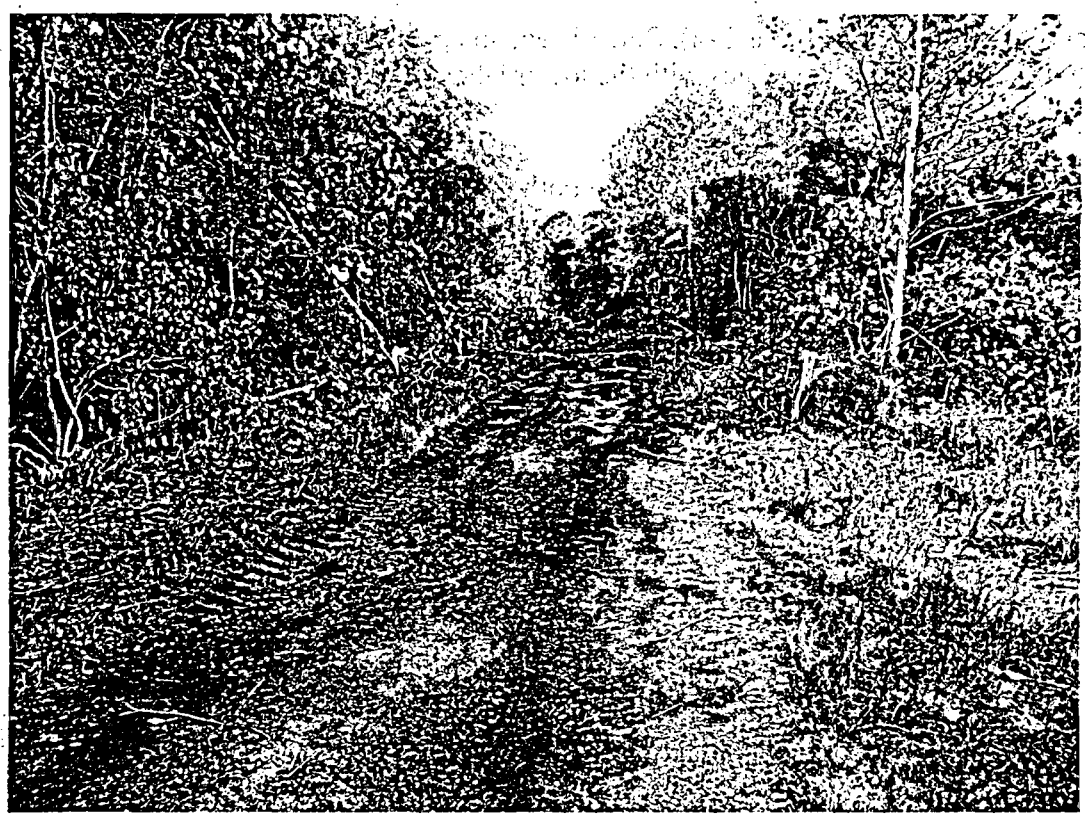
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2005.

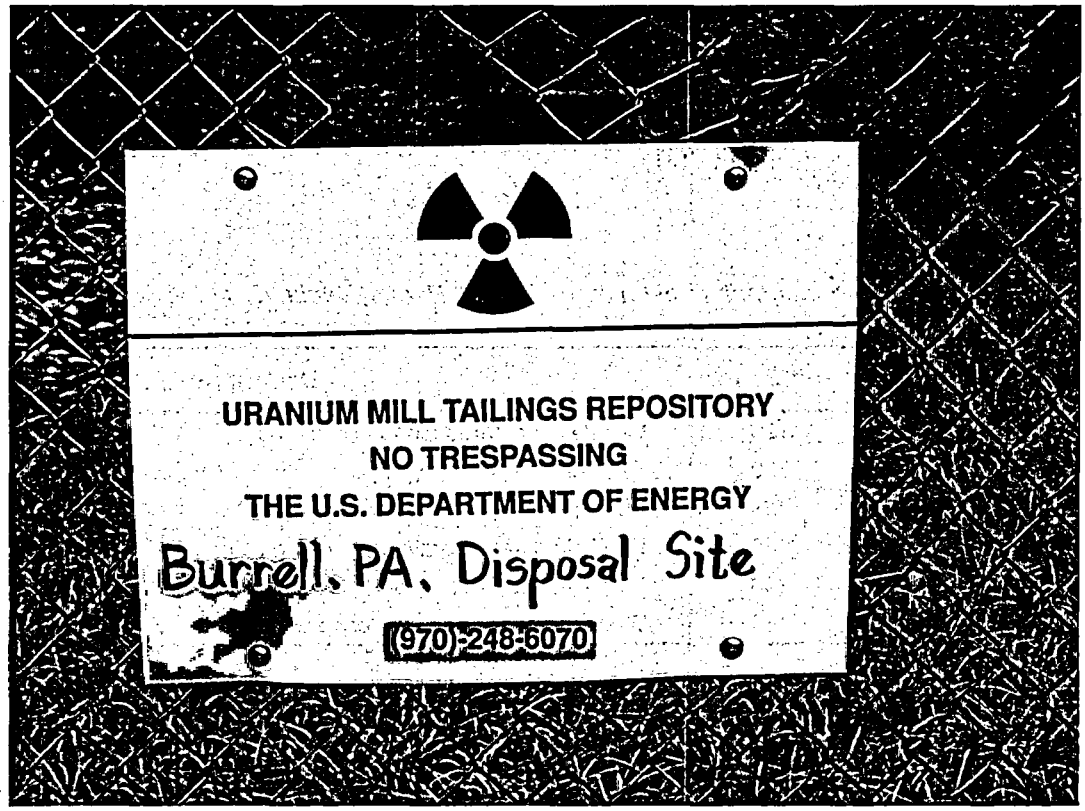
2.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	120	Vegetation cleared along access road.
PL–2	300	Temporary entrance sign.
PL–3	90	Vegetation on cell's south side slope.
PL–4	300	Rock-filled trench drain north of the cell.
PL–5	240	Toe of the cell's south side slope showing water level in slough.
PL–6	180	West end of site security fence under water.

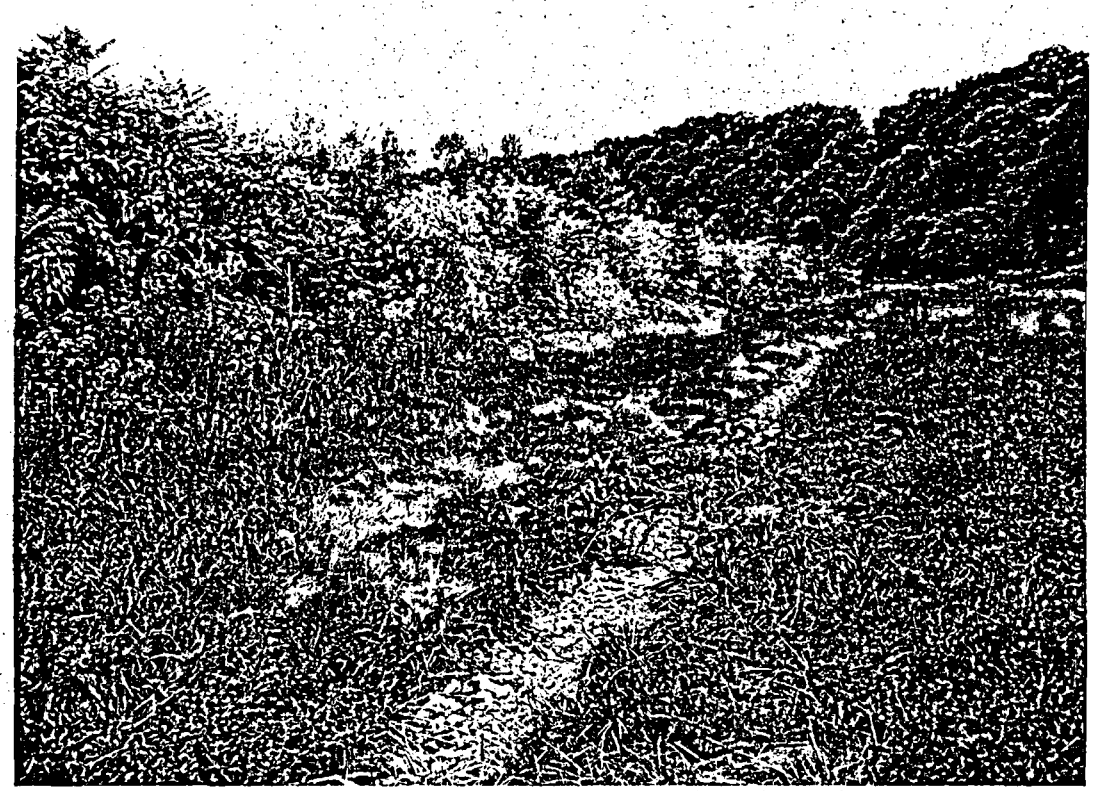


BUR 9/2005. PL–1. Vegetation cleared along access road.



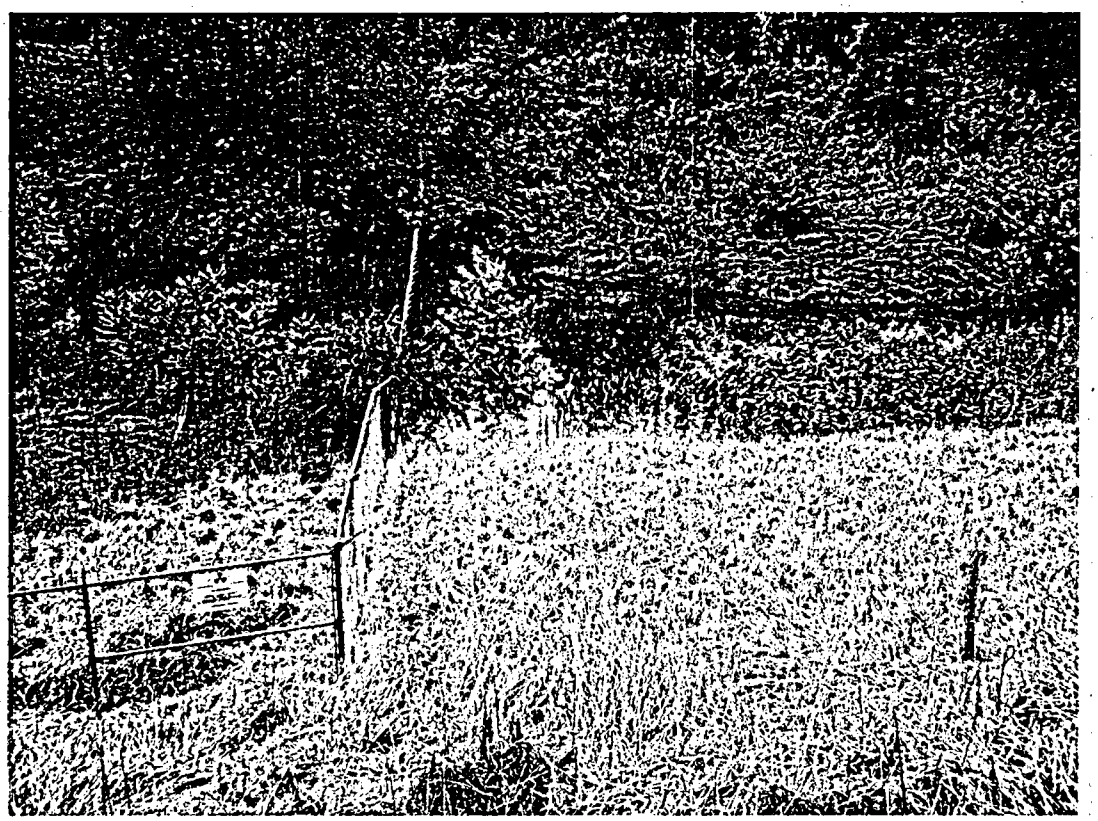
BUR 9/2005. PL–2. Temporary entrance sign.

BUR 9/2005. PL–3. Vegetation on the cell's south side slope.



BUR 9/2005. PL–4. Rock-filled trench drain north of the cell.

BUR 9/2005. PL–5. Toe of the cell's south side slope showing water level in slough.



BUR 9/2005. PL–6. West end of site security fence under water.

3.0 Canonsburg, Pennsylvania, Disposal Site

3.1 Compliance Summary

The Canonsburg Disposal Site, inspected on September 21, 2005, was in excellent condition. In 2005, repairs resulting from flood damage caused by hurricane-related storms in 2004 along portions of Chartiers Creek adjacent to the site were successfully conducted. The disposal cell and drainage structures were not damaged by the flooding and were in excellent condition. Areas from which flood debris was removed appear clean and well maintained. Noxious and invasive weed infestations have been reduced but ongoing control is required. Several perimeter signs were replaced and trash was removed from along the adjacent public road directly west of the disposal cell. Ground water and surface water monitoring continued at the site to assess the performance of the disposal cell; results indicate the risk associated with uranium in ground water beneath the site to be negligible. No other maintenance needs or cause for follow-on inspection was noted.

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

Institutional Controls—The 30-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1996. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, a site security fence, warning/no trespassing signs mounted on the security fence, and a locked gate at the entrance to the site. The site is surrounded by privately owned land to the south and Chartiers Creek to the east and north, and a public road to the west. The surrounding land is urban, used primarily for residential housing and commercial business.

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 21, 2005. 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 within the borough of Canonsburg in Washington County, Pennsylvania. 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 and 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. Floodwater from the 2004 hurricanes damaged approximately a 400 foot-long section of the security fence. Floodwater flowed over the top of the stream bank near perimeter sign P6 and damaged the fence between P6 and P8. A large tree had washed out of the stream bank, resulting in erosion that extended under the security fence. DOE notified NRC of the damage and obtained concurrence from NRC on the proposed plan to
3A repair the fence and stream bank. In March 2005, DOE replaced the damaged portion of the fence and moved it back from the top of the stream bank (PL–1). Global positioning system (GPS) location information was collected for the new fence alignment and the base map was updated.

The site has an entrance sign at the entrance gate and 11 perimeter signs. Perimeter sign P11 was
3B replaced because the fasteners were severely corroded and the sign, although still legible, was faded significantly. The entrance sign and all 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.

Four pairs of erosion control markers (EMCs) were initially installed 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, which could not be found in 2004 due to thick vegetation, was located in 2005 and marker ECM–2A, which was not found in 2004 because it had been buried by debris and
3C sediment deposited by floodwater, was reset in 2005. Location information for marker ECM–2A was collected using GPS equipment.

Monitor Wells—The ground water monitoring network consists of six monitor wells (MW–0406A, MW–0410, MW–0412, MW–0413, MW–0414B, and MW–0424) that are sampled annually in accordance with the LTSP and the GCAP. The wells were secure and in excellent condition.

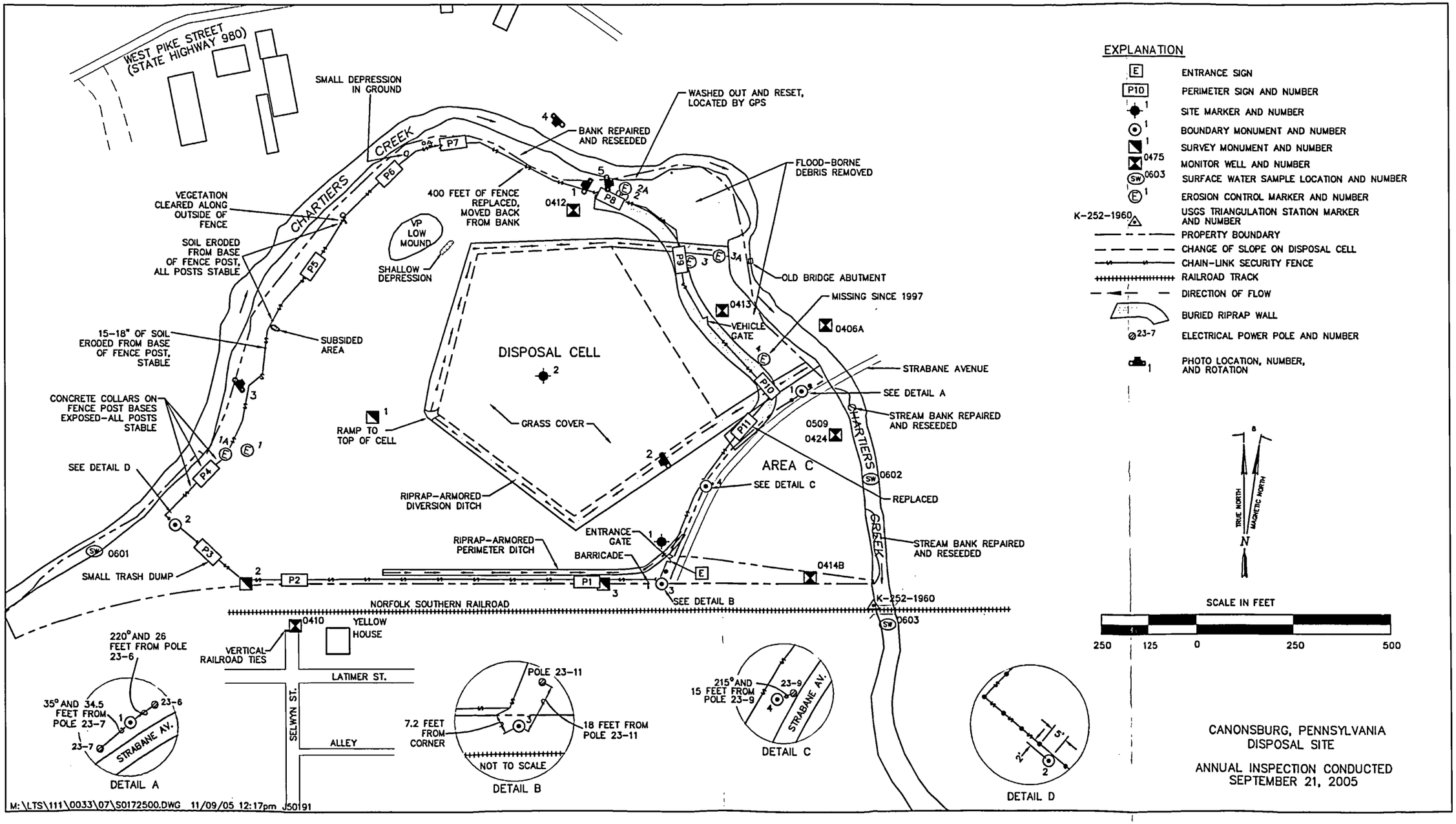


Figure 3–1. 2005 Annual Compliance Drawing for the Canonsburg, Pennsylvania, Disposal Site

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.

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 that might affect site integrity or the long-term performance of the site.

Disposal Cell—The 2004 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.

3D Areas on the northeast side slope of the disposal cell have scattered Canada thistle, a noxious weed. The affected areas were sprayed with herbicide in 2005 and populations were found greatly reduced.

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 in 2004 by diverting storm water away from the cell and conveying it off site.

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 and the dead woody plant material was removed in 2005 (PL-2).

Other Areas On Site—Thick grass covers the area from the diversion channels around the disposal cell outward to the security fence. The 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.

Poison hemlock has been identified and controlled on the site as needed since 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. Poison hemlock abundance and extent was greatly reduced from 2004. At the time of the inspection, poison hemlock was still present at the west end of the perimeter ditch. Canada thistle, a state-listed noxious weed, has been identified and controlled on the site since 2001. Because Canada thistle reproduces by horizontal roots and seed, the most effective control

is a combination of mechanical and chemical treatments. In spring 2005, DOE sprayed the infested areas on site and in Area C. A selective herbicide that would not harm grasses was used. The infested areas are mowed twice a month, weather permitting. In fall 2005, at the time of the inspection, noxious weed populations were greatly reduced and the grass turf was healthy.

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. In 2005, vegetation was cleared from the outside of the fence (PL–3). The base of the fence was treated with herbicide in 2005. Erosion caused by flooding of Chartiers Creek damaged a portion of the security fence, as discussed previously (Section 3.3.1.1).

3E Canada thistle plants interspersed with healthy vegetation along the outside of the security fence on the north side of the property were treated with herbicide in 2005. 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 continue to be monitored 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 in land use 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 processing 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 2005.

Erosion along the stream bank worsened in the years following site remediation. To protect Area C, DOE completed a bank stabilization project in 2001. However, floodwater from the hurricane-related storms in 2004 caused erosion damage to the reconstructed stream bank. Approximately 100 feet of previously reconstructed stream bank was damaged downstream from the Strabane Avenue Bridge 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.

3F In 2005, DOE obtained concurrence from NRC on the proposed plan to repair damages caused by the 2004 flooding. In March and April 2005, DOE repaired the flood damage along Area C by building up the stream bank and hardening it with riprap (PL–4). DOE removed additional debris from the flood plain north of the site in September 2005 (PL–5). The disturbed areas were seeded for further stabilization.

Chartiers Creek is an active, meandering waterway that is only partially restrained on the east end of the disposal site. The creek is slowly cutting into the bank and, as mentioned previously, erosion control marker ECM–4A was lost to erosion in 1997. Fresh bank erosion along this portion of the creek was noted during the 2005 inspection. The flooding in 2004 apparently moved bars and other creek features, and the creek is in the process of stabilizing. Currently, the stream bank erosion is not a threat to the site and DOE will continue to monitor the streambank.

The Commonwealth put Area C up for sale to the public in 2001, but DOE informed the Commonwealth of restrictions on parcel transfers stipulated in UMTRCA and the Cooperative Agreement between DOE and the Commonwealth. Consequently, the sale was suspended while DOE conveyed to the Commonwealth specific instructions on implementing necessary land use controls. The state concurred that the deed for Area C, if transferred to another entity, will carry restrictions to limit excavation in the area, prohibit disturbance of the stream bank, maintain access for monitoring, and prevent the area from being used for residential purposes. A high-bidder has been identified and the state informed DOE that the completion of the sale is imminent.

During the 2005 inspection, trash was removed along Strabane Avenue on and adjacent to DOE property.

3.3.2 Follow-up or Contingency Inspections

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

3.3.3 Routine Maintenance and Repairs

In 2005, replaced perimeter sign P11, reset erosion control marker ECM–2A, mowed grass on and adjacent to the disposal cell, removed vegetation along the perimeter fence, and sprayed noxious and invasive weeds.

3.3.4 Non-Routine Maintenance and Repairs

In 2005, DOE repaired flood damage along portions of the Chartiers Creek (stream bank reconstruction, debris removal, and the security fence replacement).

3.3.5 Ground Water and Surface Water Monitoring

3G DOE monitors ground water and surface water at the Canonsburg site to comply with requirements in the LTSP and the subsequent Ground Water Compliance Action Plan (GCAP). The LTSP only requires monitoring as a best management practice. 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 (Table 3–2 and 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 (MCL) 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; Table 3–2) 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 (Table 3–3). The LTSP was revised
3H to combine the separate requirements into a comprehensive site-wide monitoring program. The revised LTSP has been submitted to NRC for concurrence.

Table 3–2. Ground Water and Surface Water Sampling Locations at the Canonsburg, Pennsylvania, Disposal Site

Sample Locations Current LTSP (DOE 1995b)	Sample Locations GCAP (DOE 2000)	Sample Locations Revised LTSP
Monitor wells: MW–0410 Upgradient MW–0406 Downgradient[a] MW–0412 Downgradient MW–0413 Downgradient MW–0424 Downgradient MW–0414 Crossgradient[b]	Monitor wells: MW–0406 Downgradient MW–0412 Downgradient (POC) MW–0413 Downgradient (POC) MW–0414 Crossgradient (POC)	Monitor wells: MW–0406 Downgradient (BMP) MW–0412 Downgradient (POC) MW–0413 Downgradient (POC) MW–0414 Crossgradient (POC) MW–0424 Downgradient (BMP)
Surface water locations: SW–0601 Upstream SW–0602 Adjacent to Area C SW–0603 Downstream	Surface water location: SW-0602 Adjacent to Area C	Surface water location: SW-0602 Adjacent to Area C (POE)

[a]MW–0406 was destroyed during a sanitary sewer construction project in 2001 and replaced. The current designation is MW–0406A.
[b]MW–0414 has been replaced twice because of damage during construction. The current designation is MW–0414B.
BMP = best management practice
POC = point of compliance
POE = point of exposure

Table 3–3. Reference Standards for Ground Water and Surface Water Monitoring at the Canonsburg Disposal Site

Analyte	Standard/MCL	ACL	Standard Source
Uranium – ground water	0.044 mg/L	1.0 mg/L	40 CFR 192 -- MCL
Uranium – surface water	0.044 mg/L	0.01 mg/L	40 CFR 192 -- MCL
Molybdenum	0.1 mg/L	--	40 CFR 192 -- MCL
Manganese[a]	0.05 mg/L	--	40 CFR 143.3 -- Secondary drinking water standard

[a]A risk-based concentration of 1.7 mg/L has also been established for surface water based on EPA documentation (included in the revised LTSP).

Molybdenum and uranium are currently the target analytes identified in the LTSP (Table 3–4), with uranium being the analyte of primary concern. Target analytes under the GCAP are

molybdenum, uranium, and manganese. In the revised LTSP, uranium is the only constituent of concern (COC). 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 (Table 3–3). 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 (a risk-based concentration of 1.7 mg/L has also been established for surface water based on EPA documentation and included in the revised LTSP). 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.

Table 3–4. Analytes For Ground Water and Surface Water at the Canonsburg, Pennsylvania, Disposal Site

Field Measurements	Current LTSP		GCAP	Revised LTSP
	Water-Quality Indicators	Specific Analytes	Specific Analytes	All Analytes
Alkalinity Dissolved oxygen pH Specific conductance Temperature Turbidity	Calcium Chloride Magnesium Potassium Sodium Sulfate	Uranium Molybdenum	Uranium Manganese Molybdenum	Uranium

The revised LTSP includes the following changes to the ground water and surface water monitoring program: (1) Eliminating the upgradient background well MW–0410 and two surface water sampling locations; the upstream location SW–0601 and the downstream location SW–0603 from the monitoring network (Table 3–2). (2) Eliminating water quality indicators and analyzing only uranium as the sole COC, along with the routine field measurements performed at the time of sampling (Table 3–4). (3) Conduct monitoring annually for the next 5 years (through 2010) and then reevaluate the monitoring program.

The objectives of the revised monitoring program will be to (1) evaluate downgradient contaminant trends in ground water in the shallow unconsolidated materials and in surface water, (2) demonstrate that concentrations of uranium at the point-of-compliance (POC) locations are decreasing as predicted and that the system remains in compliance with the GCAP, and (3) ensure that remedial actions at the disposal site and Area C continue to protect human health, safety, and the environment.

Monitoring Results—The analytical results of the ground water and surface water monitoring performed in November 2004 are presented below. Analytical results from the October 2005 monitoring were not available for inclusion in this report and will be provided in the 2006 compliance report. Time-concentration plots, from 1995 through 2004, for the three target analytes—uranium, molybdenum, and manganese in ground water are shown on Figures 3–2 through 3–4 and in surface water on Figures 3–5 through 3–7.

Uranium is the analyte of primary concern at this site because of the frequency with which it has exceeded its MCL of 0.044 mg/L, particularly in two of the downgradient wells (MW–0412 and MW–0413). In 2004, uranium concentrations in ground water continued above the MCL, but considerably below the ACL, in these two wells (Figure 3–2). Concentrations at well MW–0412

have increased during the last 3 years, following a continued downward trend, to the highest concentration (0.23 mg/L) since the LTSP-required monitoring began in 1995. Concentrations at well MW–0413 had increased for two years, following several years of a downward trend, with the latest result again having decreased from the previous result. Uranium levels were substantially below the MCL, and well below the ACL, at the rest of the locations in 2004. Uranium concentrations were near the laboratory detection limit at all sampling locations in Chartiers Creek (Figure 3–5).

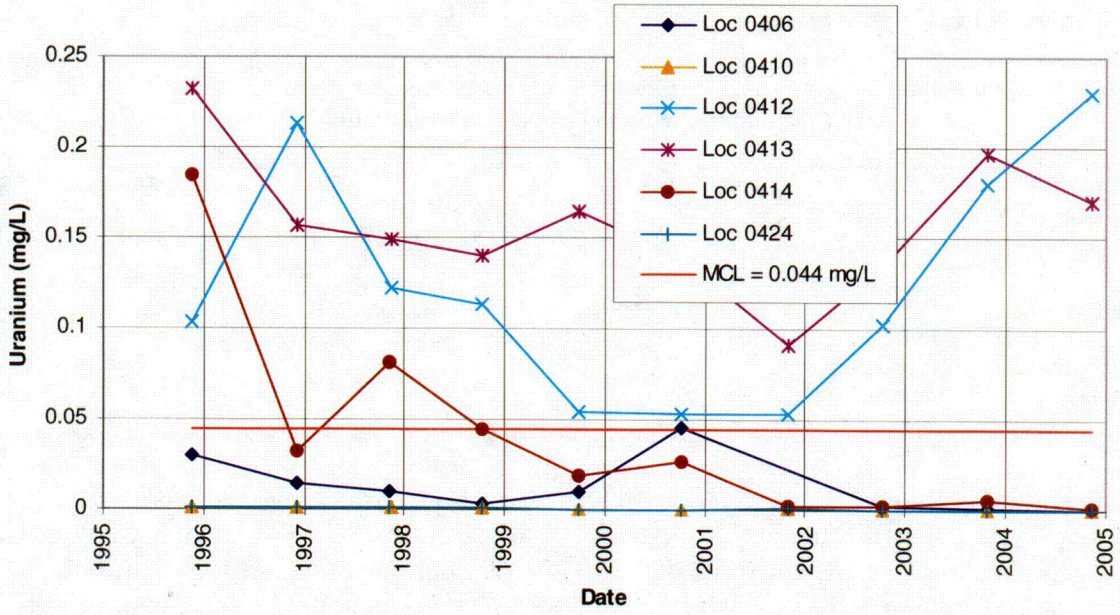


Figure 3–2. Time-Concentration Plots of Uranium in Ground Water at the Canonsburg, Pennsylvania, Disposal Site

DOE continues to consider the risk associated with uranium in ground water within the unconsolidated materials and shallow bedrock beneath the site to be negligible because neither unit is considered a viable aquifer from a water resource perspective, but only in the sense that the zone is capable of discharging to surface water (Appendix A to 10 CFR Part 40). Because the materials are not ideal for aquifer formation and the source of recharge to the shallow units is minimal, sustained yield to a well from these units would be limited. The shallow ground water is not normally used as a drinking water supply in the area, although some domestic water is derived from a few private wells deeper than 100 feet. Institutional controls, in the form of government ownership of the site, prevent access to the ground water directly beneath the site. NRC concurred in deleting ground water use restrictions for Area C in 2003. Most of the residents in the area are connected to a municipal water system, which is supplied by surface water reservoirs upgradient from the site. Chartiers Creek, adjacent to and the discharge point for the shallow ground water beneath the site, is not a source of potable water. Additionally, uranium concentrations reported from samples collected from the creek are near the detection limit and have declined in recent years. Therefore, human health and the environment are adequately protected.

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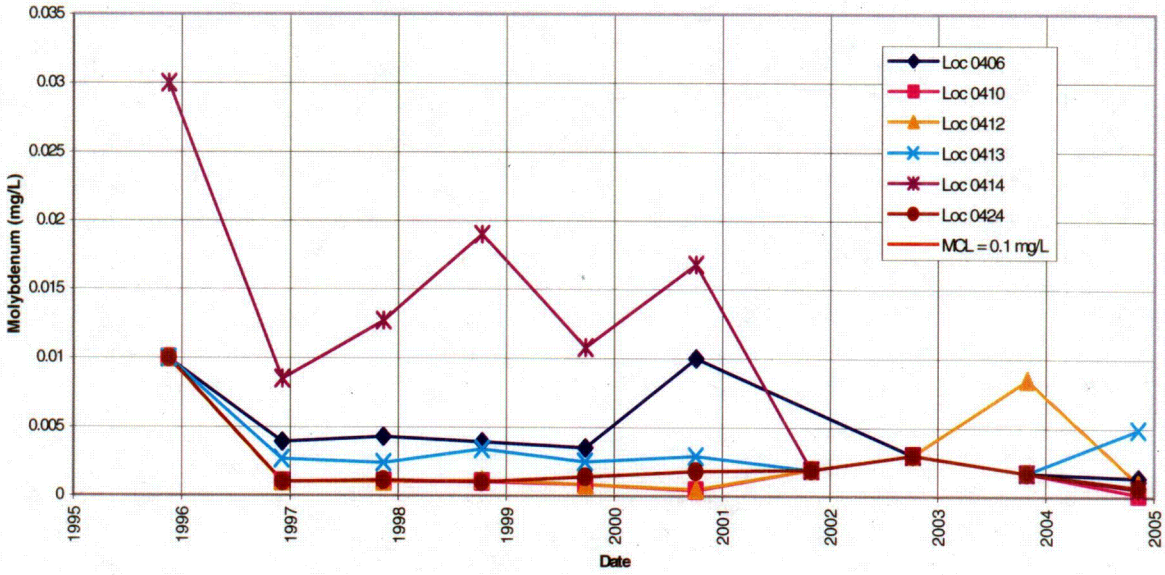


Figure 3–3. Time-Concentration Plots of Molybdenum in Ground Water at the Canonsburg, Pennsylvania, Disposal Site

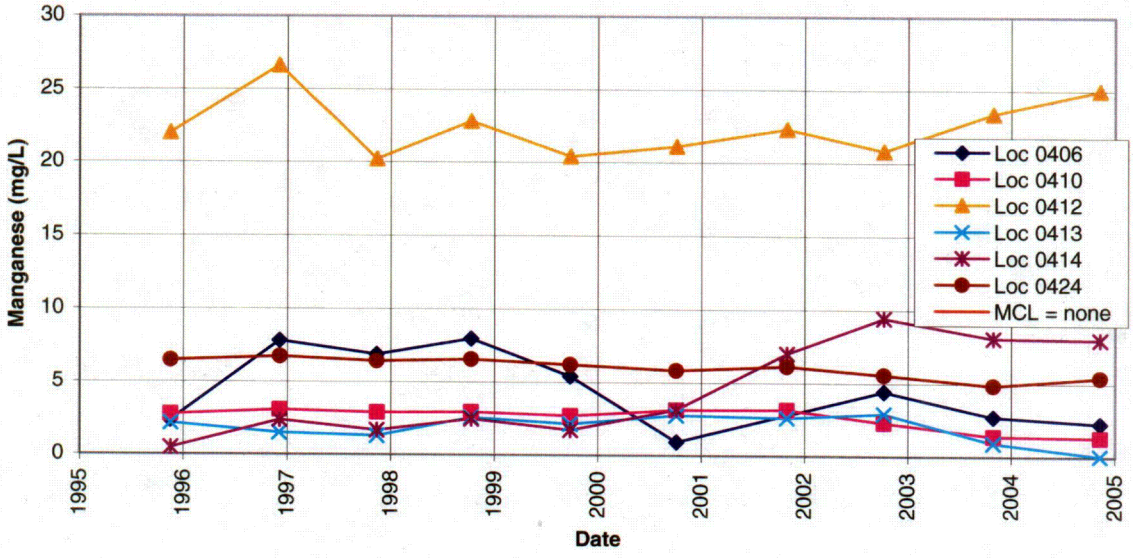


Figure 3–4. Time-Concentration Plots of Manganese in Ground Water at the Canonsburg, Pennsylvania, Disposal Site

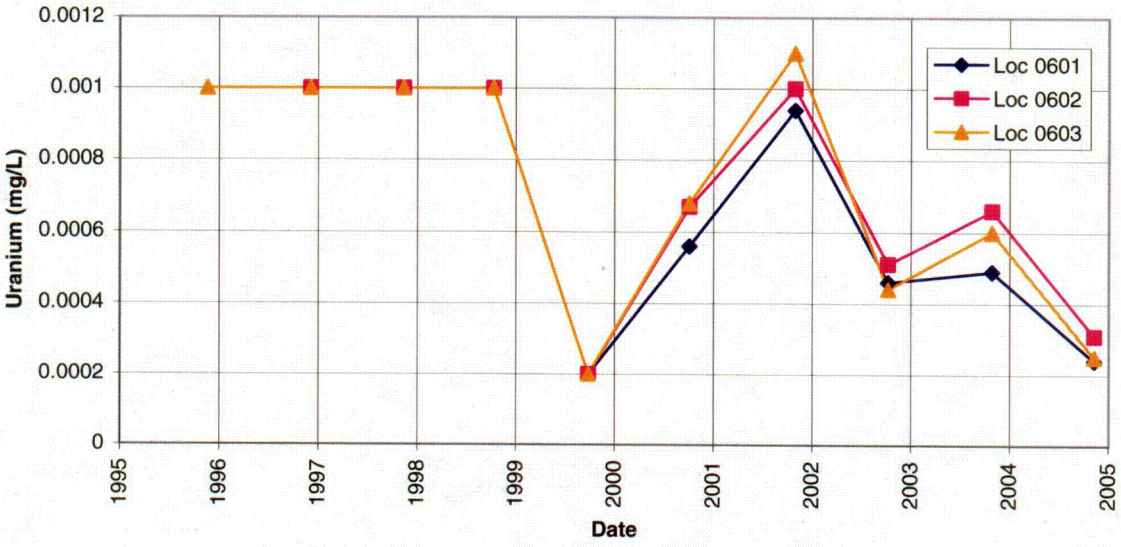


Figure 3–5. Time-Concentration Plots of Uranium in Surface Water at the Canonsburg, Pennsylvania, Disposal Site

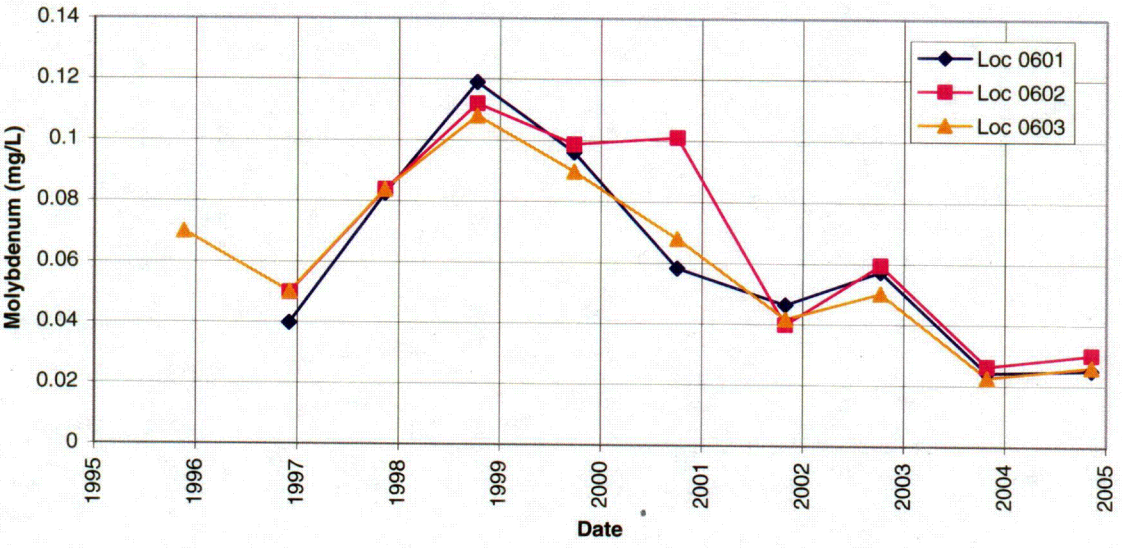


Figure 3–6. Time-Concentration Plots of Molybdenum in Surface Water at the Canonsburg, Pennsylvania, Disposal Site

C06

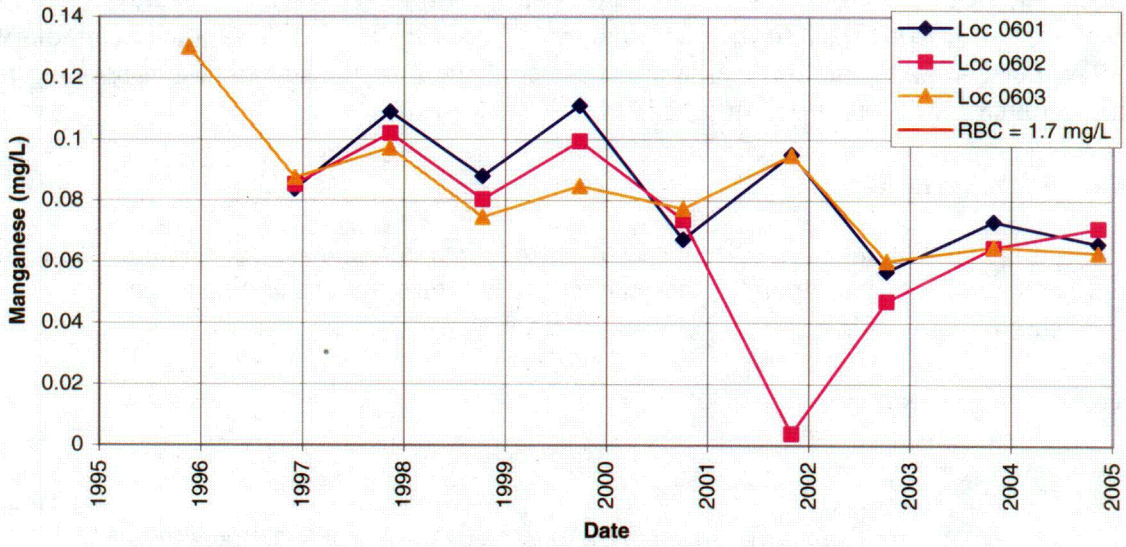


Figure 3–7. Time-Concentration Plots of Manganese in Surface Water at the Canonsburg, Pennsylvania, Disposal Site

Molybdenum concentrations in ground water continued well below both the MCL and ACL at all locations, with values continuing near the laboratory detection limit. The highest concentrations were reported from well MW–0414 in the initial years of monitoring and have decreased significantly in more recent years, displaying an overall decreasing trend (Figure 3–3). In general, all other wells have remained relatively constant following the initial results. The maximum concentration of molybdenum reported in 2004 was 0.0049 mg/L from well MW–0413.

The concentrations of molybdenum in the Chartiers Creek samples, as in the past, were higher than in ground water samples, though still well below the MCL in recent years. Concentrations at all locations exceeded the MCL in 1998 and again, although only slightly, at location SW–0602 in 2000 (Figure 3–6). Surface water concentrations both upstream and downstream of the site, in excess of those in ground water, although decreasing, indicate an ambient or upstream source of molybdenum rather than from site related activities. The surface water quality is indistinguishable between upgradient and downgradient locations.

Manganese levels in ground water continue to exceed the secondary drinking water standard at all point of compliance wells except in well MW–0413, where in 2004 the concentration (0.044 mg/L) was just below the standard. Results from November 2004 are generally consistent with results from previous years; no increasing or decreasing trends are observed with the exception of well MW–0414 where an increasing trend can be observed (Figure 3–4). Concentrations of manganese reported from well MW–0412 (25 mg/L in 2004) continue significantly above all other wells. The concentration in the upgradient background well

C07

MW–0410 remains below other wells except MW–0413. Prior to 2002, well MW–0414 also reported concentrations below the upgradient background well.

Manganese concentrations in surface water at the point of exposure in Chartiers Creek display an overall decreasing trend at all three locations, although location SW–0602 has recently increased from a low reached in 2001 back to the historical trend line (Figure 3–7). With the exception of location SW–0602 in 2001 and 2002, all manganese concentrations in surface water remain just above the secondary drinking water standard.

3.3.6 Corrective Action

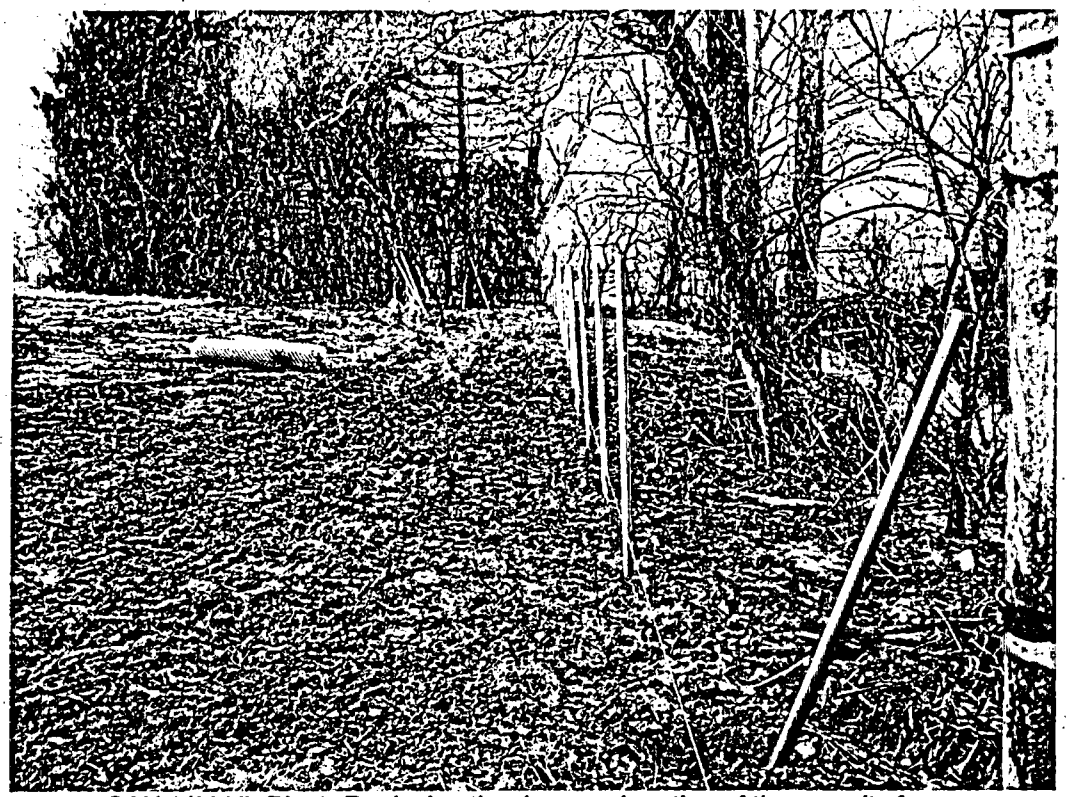
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2005.

3.3.7 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	300	Replacing the damaged portion of the security fence.
PL–2	240	Diversion channel showing vegetation conditions.
PL–3	55	Cleared path along outside of site perimeter security fence.
PL–4	225	Repair to stream bank northeast of disposal cell.
PL–5	85	Debris removal along Chartiers Creek.



CAN 3/2005. PL–1. Replacing the damaged portion of the security fence.

CAN 9/2005. PL–2. Diversion channel showing vegetation conditions.

CAN 9/2005. PL–3. Cleared path along outside of site perimeter security fence

CAN 3/2005. PL–4 Repair to stream bank northeast of disposal cell.

CAN 9/2005. PL–5. Debris removal along Chartiers Creek.

End of current section

4.0 Durango, Colorado, Disposal Site

4.1 Compliance Summary

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

4.2 Compliance Requirements

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

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

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

Institutional Controls—The 121-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1996. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, warning/no trespassing signs placed along the property boundary and a locked gate at the entrance to the site. The site is not fenced except along the county road. The site is surrounded by federal property administered by the U.S. Bureau of Land Management and U.S. Bureau of Reclamation. The surrounding land is used primarily for wildlife habitat.

4.3 Compliance Review

4.3.1 Annual Inspection and Report

The site, located southwest of Durango, Colorado, was inspected on June 7, 2005. Results of the inspection are described below. Features and photograph locations (PLs) discussed in this report are shown on Figure 4–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

4.3.1.1 Specific Site Surveillance Features

Access Road, Entrance Gates, Entrance Sign, and Perimeter Signs—Access to the site is by La Plata County Road 212, which is a dedicated public right-of-way that crosses the southwest corner of DOE property. The entrance gate and guardrails along the county road, installed in October 2000, and the original entrance gate closer to the cell were in good condition.

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

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

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

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

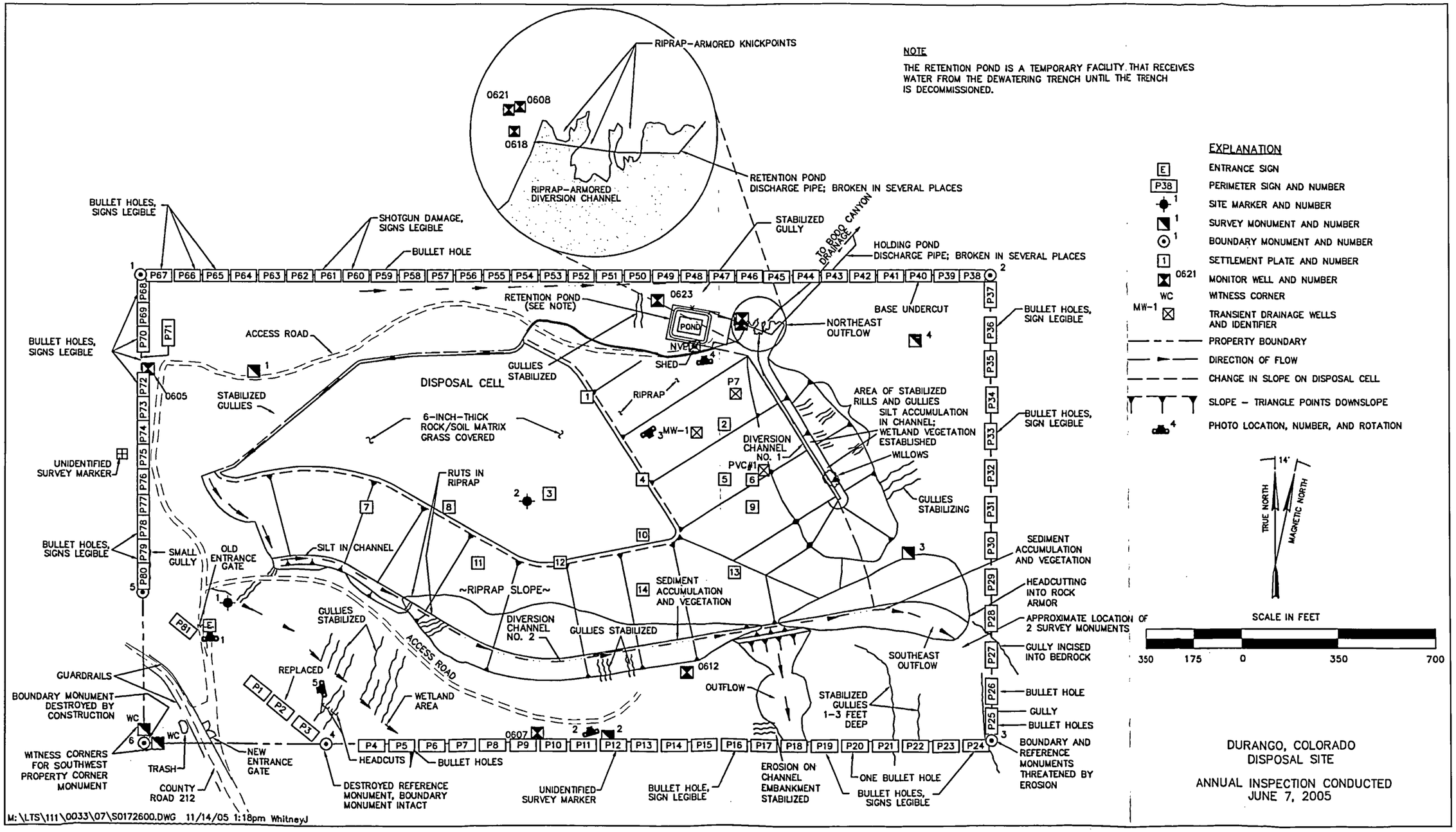


Figure 4–1. 2005 Annual Compliance Drawing for the Durango, Colorado, Disposal Site

4.3.1.2 Transects

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Significant infestations of noxious weeds are present in the areas between the cell and the
4D property boundary. These areas were sprayed with applications of herbicide during the spring and fall of 2005.

Outlying Area—The area beyond the site boundary for a distance of 0.25 mile was visually inspected for signs of erosion, development, or other disturbance during the inspection. Previously, land uses were wildlife habitat and recreation. However, the U.S. Bureau of Reclamation currently is constructing the Animas-La Plata Project. As a result of this project, boundary monument BM–6 was destroyed. A water intake and pumping plant structure is under construction at the Animas River on the site of the former raffinate ponds. The pipeline between the pumping plant and the Ridges Basin Reservoir—currently under construction—is adjacent to County Road 211 and passes just south of the disposal site. Pipelines that were within the footprint of the reservoir were rerouted parallel to County Road 212 on the west side of the disposal site. The U.S. Bureau of Reclamation erected a sign adjacent to the disposal site entrance that contains a map of the project and a Notice of Closure for the Ridges Basin area. The DOE disposal site is immediately adjacent to the northern Ridges Basin area boundary. Recreational use of the area is expected to increase substantially upon completion of the reservoir project.

4.3.2 Follow-up or Contingency Inspections

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

4.3.3 Routine Maintenance and Repairs

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

4.3.4 Ground Water Monitoring

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

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

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

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

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

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

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

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

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

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

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

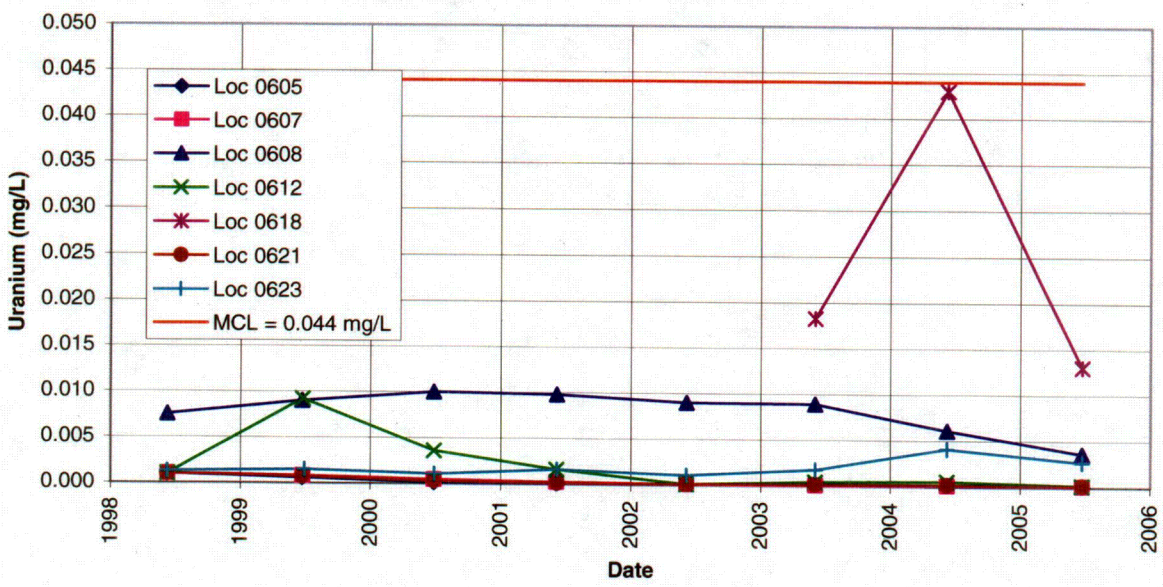


Figure 4–2. Time-Concentration Plots of Uranium in Ground Water at the Durango, Colorado, Disposal Site

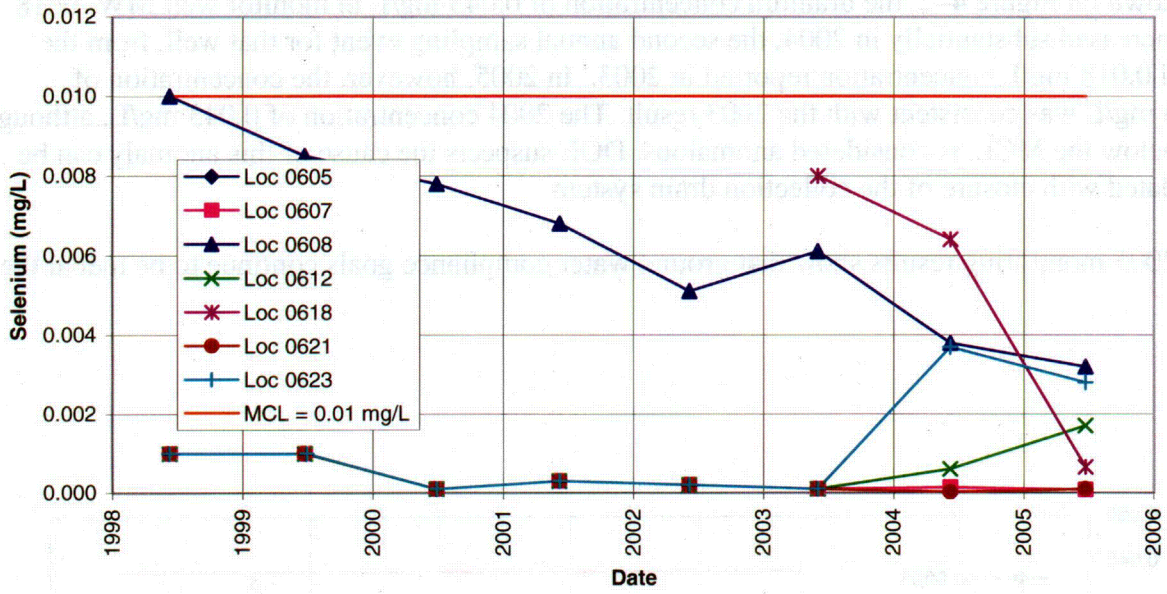


Figure 4–3. Time-Concentration Plots of Selenium in Ground Water at the Durango, Colorado, Disposal Site

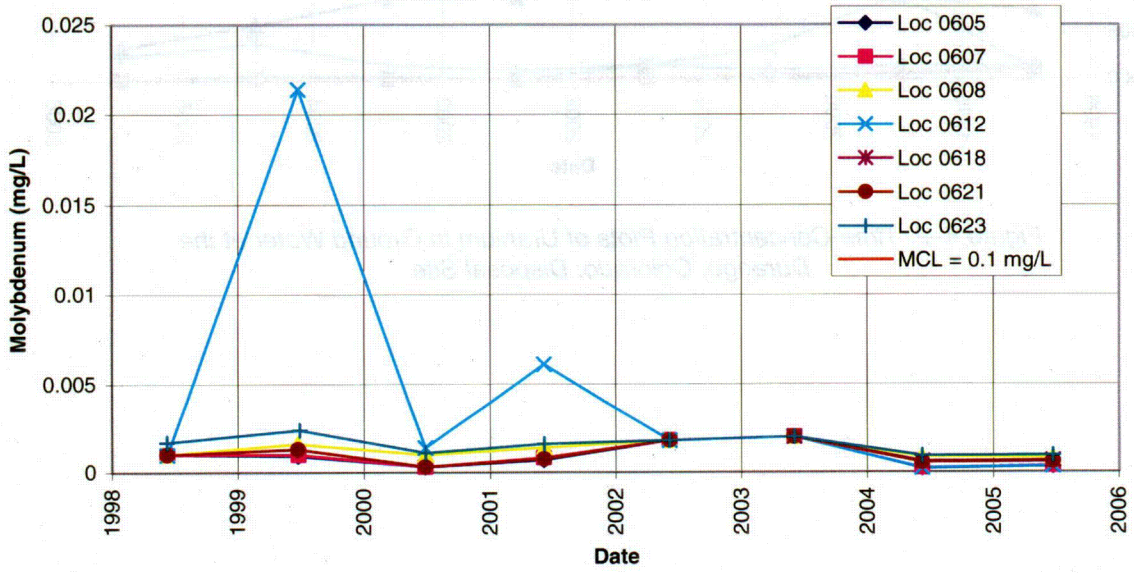


Figure 4–4. Time-Concentration Plots of Molybdenum in Ground Water at the Durango, Colorado, Disposal Site

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4.3.5 Corrective Action

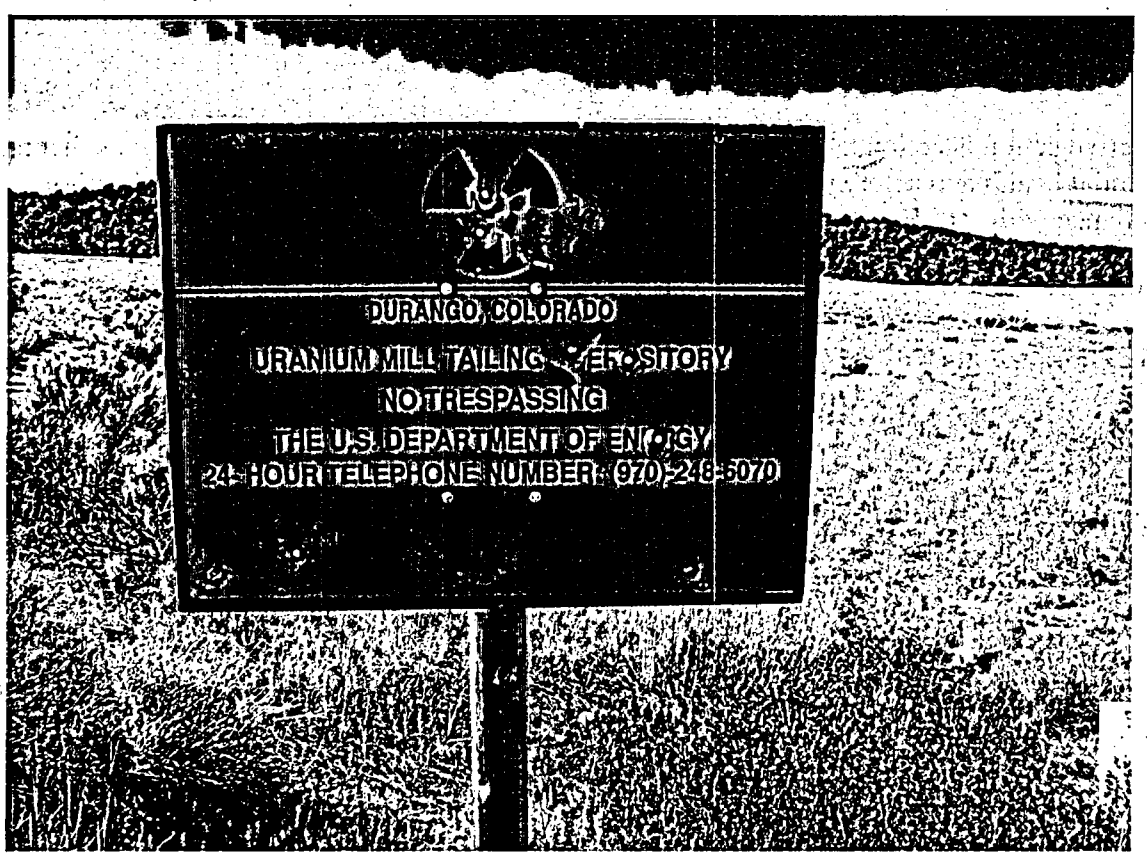
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2005.

4.3.6 Photographs

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

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

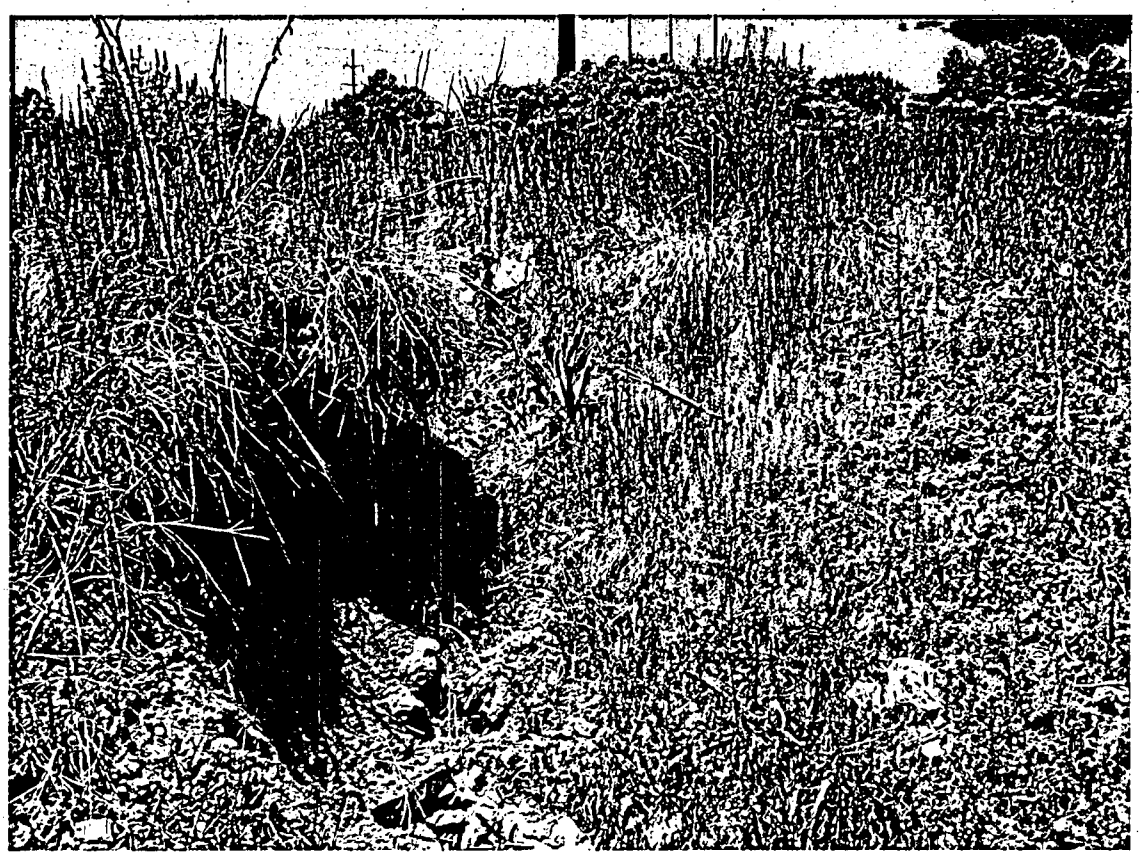


DUR 6/2005. PL–1. Entrance sign damaged by gunshots but still legible

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

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

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



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

5.0 Falls City, Texas, Disposal Site

5.1 Compliance Summary

The Falls City Disposal Site, inspected on January 26, 2005, was in good condition. Ongoing maintenance items include grass management and control of small trees and shrubs growing in the riprap on the side slopes. Willows in the south drain were removed. The northwest perimeter fence is damaged at several locations and, along with the entrance gate, needs repair. Seven perimeter signs and the entrance sign were replaced. Ground water monitoring results indicate essentially steady-state conditions for the last year. The ground water monitoring program is being evaluated as required every 5 years by the Long-Term Surveillance Plan (LTSP). No other maintenance needs or cause for a follow-up or contingency inspection were 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 is conducted in accordance with the Ground Water Compliance Action Plan (GCAP) (DOE, Grand Junction, Colorado, March 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

Institutional Controls—The 593-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1998. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, a site perimeter fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site access road. The site is surrounded by privately owned land. The surrounding land is used primarily for livestock grazing, hay production, and wildlife habitat.

5.3 Compliance Review

5.3.1 Annual Inspection and Report

The site, located east of Falls City, Texas, was inspected on January 26, 2005. 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 functional. The entrance gate is too wide to be supported by the gatepost as installed, and it sags. Consequently, the gate does not open fully and will be repaired.

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 where it was damaged at several locations during county road maintenance. The fence is stable in this position and is sufficient to keep cattle and casual intruders out, but will be repaired. This property boundary perimeter fence predates cell construction and requires occasional repairs of broken strands, and eventually will need to be replaced.

5A The entrance sign, located at the main entrance gate, was missing and was replaced. There are 64 perimeter sign locations along the site boundary; seven perimeter signs were missing and were replaced.

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

Monitor Wells—Monitor well MW–0709 was locked and in excellent condition. The other wells in the ground water monitoring network were inspected when they were sampled during May and November 2005. At that time, 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.

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

Top 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 (PL–1). Typically, the grass is cut
5B and baled by a local hay farmer; usually two cuttings are performed each year from the disposal site.

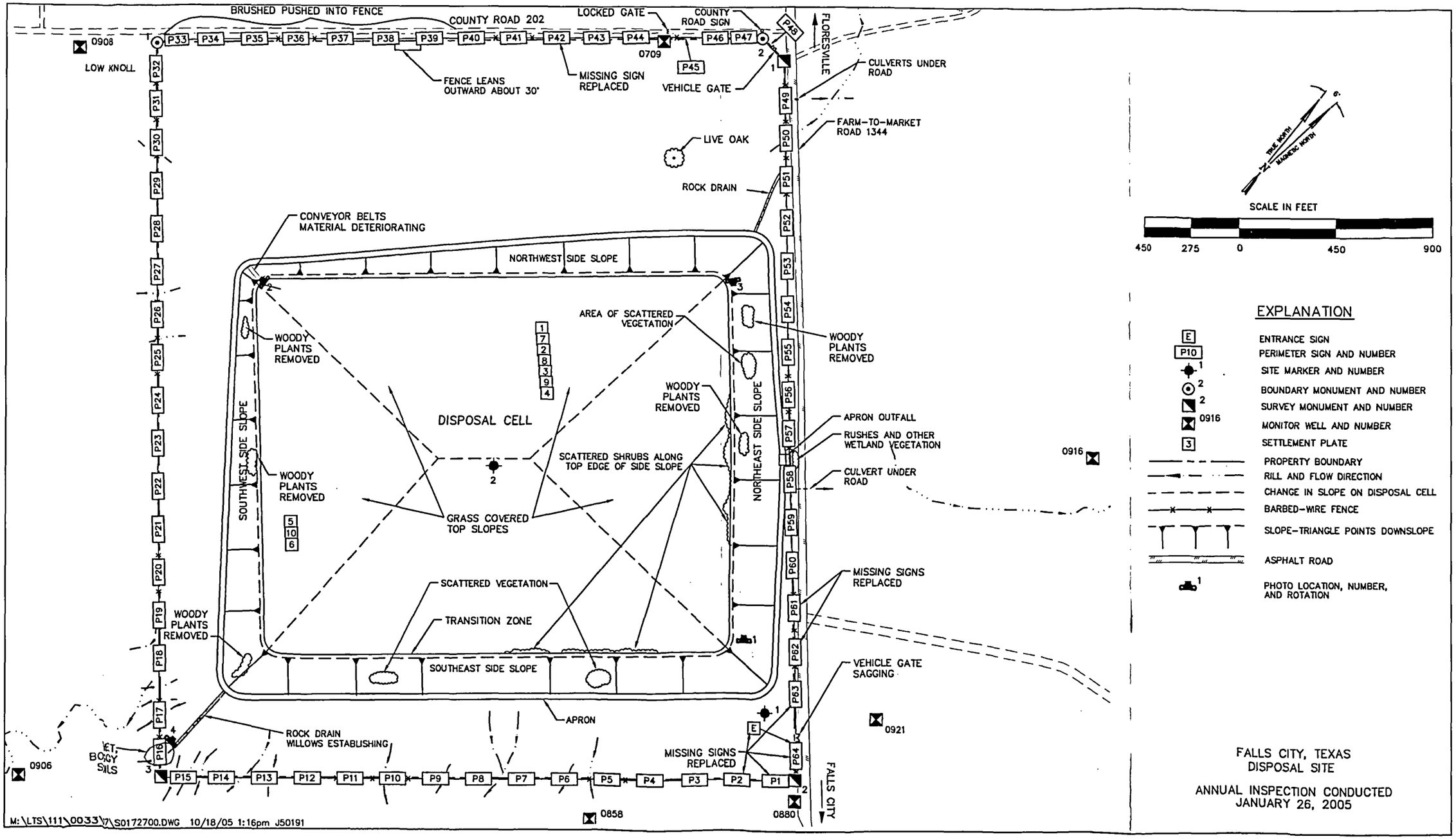


Figure 5–1. 2005 Annual Compliance Drawing for the Falls City, Texas, Disposal Site

Grass that grows after the second cutting is shredded, or mulched, in spring to increase water retention. Grass cutting appears to be an effective control for keeping trees and woody shrubs from establishing on the cell top.

The top slope of the disposal cell and the surrounding areas was not cut in 2004 so the turf could recover from recent drought. The farmer had shredded three passes around the top slope and an access path to the settlement plates prior to the inspection. Minor woody vegetation, mostly mesquite, was scattered across the top slope, particularly 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 woody vegetation was treated with herbicide.

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.

To access the top of the disposal cell, the farmer uses two tracks of steel-belted rubber conveyor belt material on the west corner of the disposal cell side slope (PL–2). The belting material stabilizes hay equipment traversing the riprap slope, and may protect the rocks from breakage. The conveyor belt material does not adversely affect the function of the disposal cell. The belting material is deteriorating and inspectors discussed removal of the belting material and installing a gravel or concrete ramp in recognition that turf maintenance will be required in perpetuity.

Trees and woody shrubs, including deep-rooted greasewood, tend to establish on the side slopes and require periodic removal. Although less than in previous years, patches of these plants were present at the time of the inspection. At the time of the inspection, deep-rooted species were observed growing again in areas that were previously treated with herbicide. The most prevalent areas were found in various locations along the southeast and northeast side slopes (PL–3). The trees and shrubs on the side slopes were cut 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. No water was observed flowing in either the north or the south rock drains but 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. Inspectors noted willows growing in the south rock drain (PL–4). The willows were cut and the stumps treated with herbicide. Inspectors saw no evidence of erosional problems at the site.

One of the three large culverts that extend beneath Farm-to-Market Road 1344 near perimeter sign P49 was partially obstructed with sediment and weed accumulation in 2004, and was free of debris.

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. The Texas General Land Office sold state-owned land east of the disposal site to a private utility. The parcel is currently fallow and local residents are concerned about the wild fire hazard. 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 2005.

5.3.3 Routine Maintenance and Repairs

In 2005, DOE replaced missing entrance and perimeter signs. DOE also continued grass cutting and bailing on the cell top and between the cell and the site perimeter, and controlled trees and woody shrubs growing in the riprap on the side slopes and along the south rock drain.

5.3.4 Ground Water Monitoring

5C 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 ground water downgradient from the site are not exposed to processing-related contamination. Because supplemental standards apply to this site, no concentration limits or point of compliance have been established. Ground water in the uppermost aquifer beneath the site is designated as limited use (Class III) because it is not currently or potentially a source of drinking water due to widespread ambient contamination that cannot be cleaned up using methods reasonably employed by public water supply systems. Background water quality varies by orders of magnitude in the area since the aquifer is in an area of naturally occurring redistribution of uranium mineralization. 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) are 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 that have maximum concentration limits specified in Table 1 to Subpart A of 40 CFR 192. Ground water level monitoring is performed for all wells in both the disposal cell performance monitoring network and the ground water compliance-monitoring network. The monitor well networks are shown on Figure 5–2.

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. However, an analysis of all pH and uranium sample results indicate that there is no correlation between changes in pH and changes in uranium in any of the monitor wells. Time-concentration plots for pH and uranium from 1996 through May 2005 are included as Figures 5–3 through 5–6.

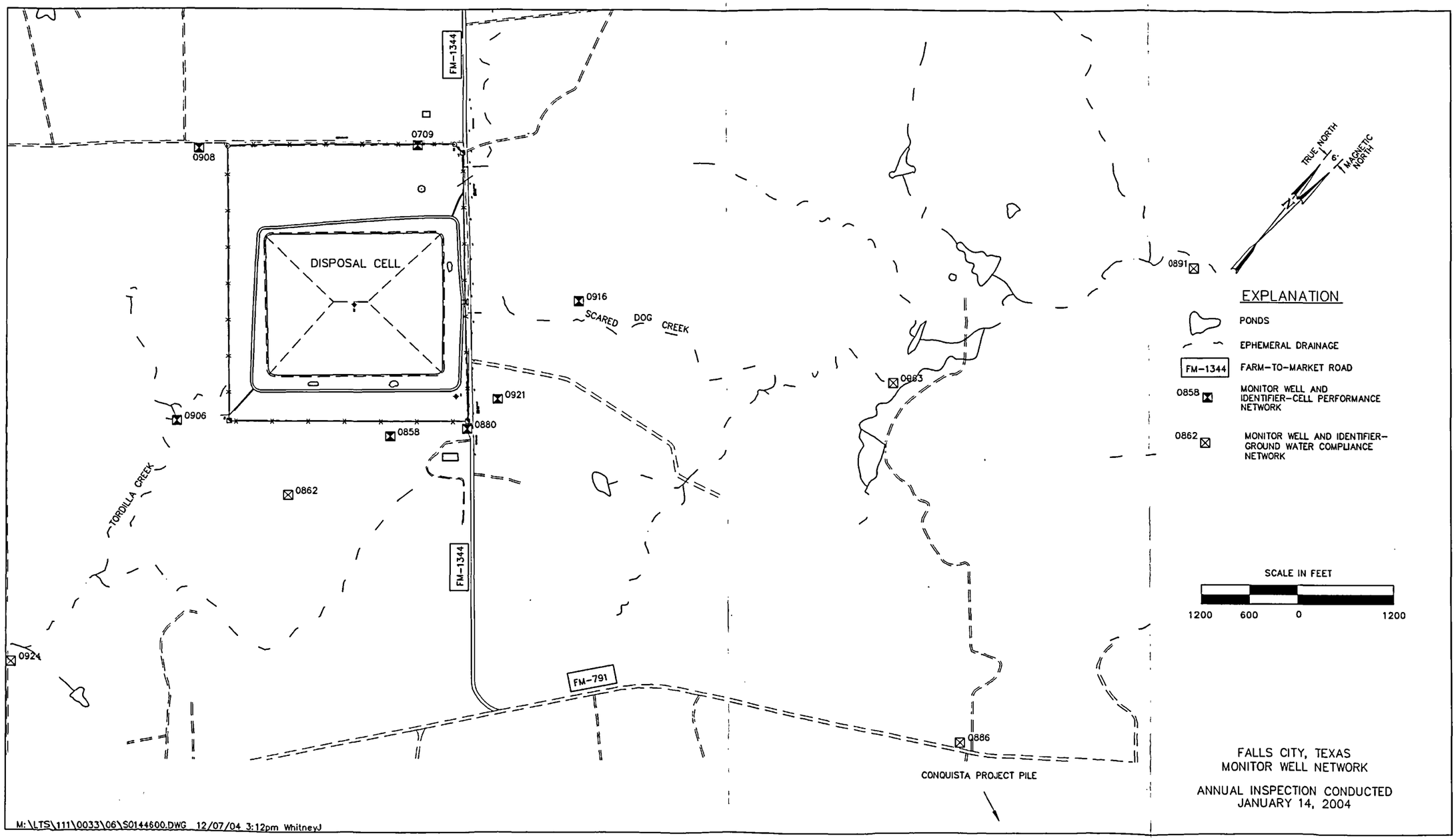


Figure 5–2. Monitor Well Network at the Falls City, Texas, Disposal Site

In 2005, sampling for the biannual disposal cell performance monitoring was conducted in May and November, and sampling for the annual ground water compliance monitoring was conducted in May. Analytical results from the November 2005 disposal cell performance sampling were not available in time for inclusion into this report and will be reported in the 2006 compliance report.

In the same regard, the December 2004 disposal cell performance sampling results were not available for inclusion in the 2004 compliance report and are presented in this report.

Ground Water Quality Monitoring—Analytical results from December 2004 and May 2005 were 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, mining, and processing activities.

Levels of pH did not vary significantly from previous results, and have historically shown consistency since late 1998 with two exceptions: MW–0880 and MW–0886 fluctuated one and two units of measurement, respectively (Figures 5–3 and 5–4).

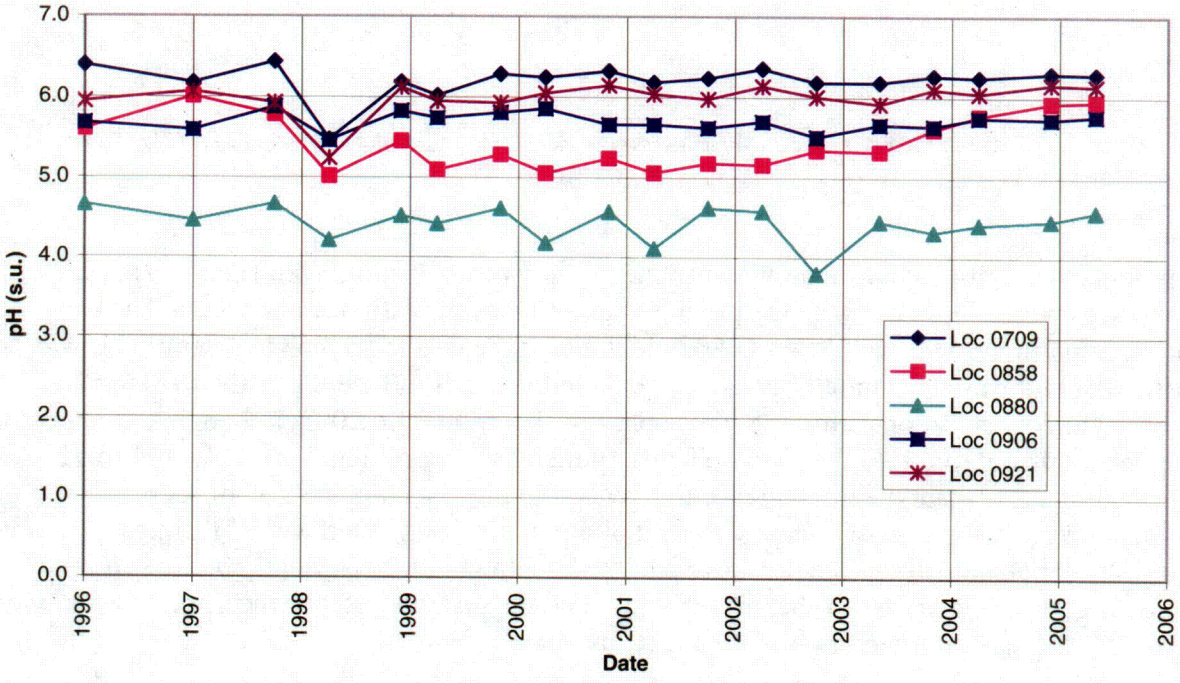


Figure 5–3. pH in Ground Water at Cell Performance Monitoring Locations at the Falls City, Texas, Disposal Site

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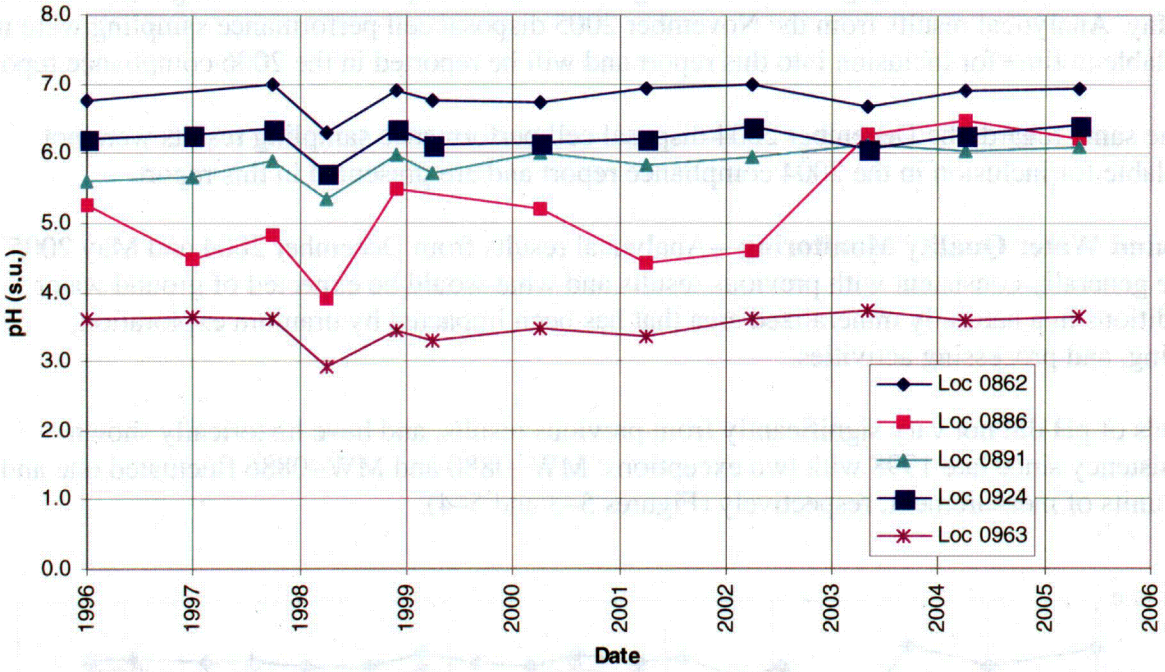

Figure 5–4. pH in Ground Water at Compliance Monitoring Locations at the Falls City, Texas, Disposal Site

Uranium concentrations in ground water in the vicinity of the disposal cell (i.e.; performance monitoring) were consistent with the previous sampling event with one exception. The concentration in monitor well MW–0880, which had increased from 8.63 to 14 milligrams per liter (mg/L) and was substantially greater than the other wells (all were less than 1.0 mg/L), decreased to concentrations similar to those previously reported in 2003; although still appearing to be on an upward trend (Figure 5–5). The sharp increase reported in April 2004 (14 mg/L) appears anomalous. The overall increase in MW–0880 may be an indication of seepage from the disposal cell or dissipation of a legacy mound of contaminated ground water. Tailings pore water is very similar chemically to the processing related contamination. Currently, there is no risk because there is no local use of the ground water and the ground water in the uppermost aquifer beneath the site is designated as limited use (Class III).

As shown on Figure 5–6, uranium concentrations in ground water in the compliance monitoring network has varied substantially in two wells (MW–0891 and MW–0924) since 1997 and has 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 well MW–0924 is likely the result of naturally occurring uranium because the pH hasn't decreased which would indicate movement of the processing related plume, particularly in this environment where uranium is highly mobile. Additionally, the uranium distribution varies spatially and the wells between well MW–0924 and the cell continue to have low concentrations.

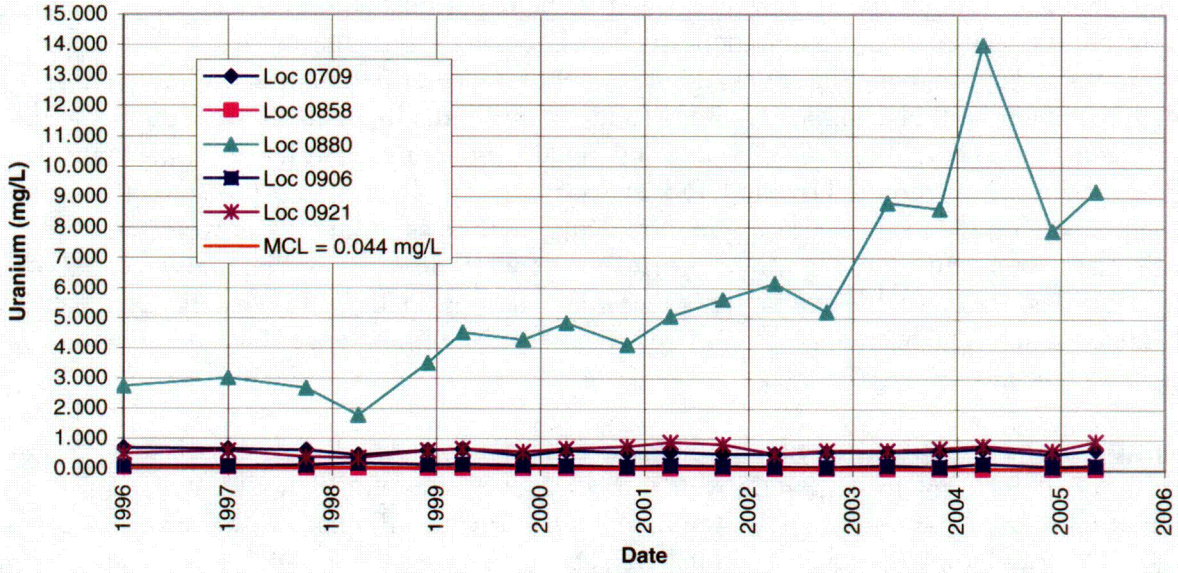

Figure 5–5. Uranium in Ground Water at Cell Performance Monitoring Locations at the Falls City, Texas, Disposal Site

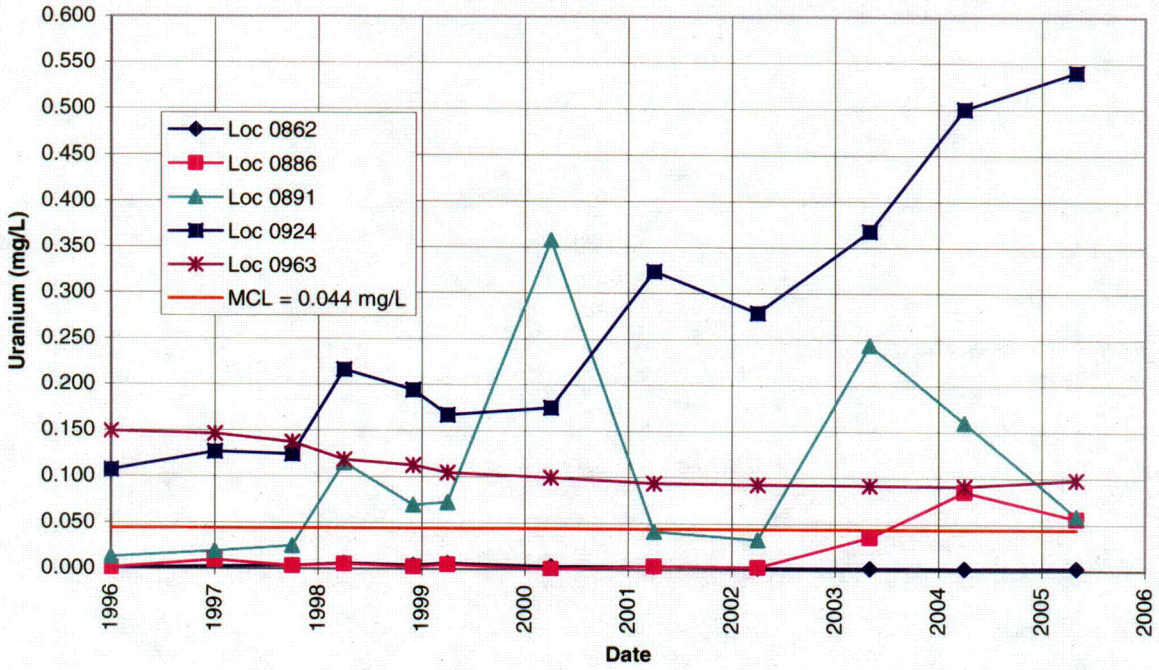

Figure 5–6. Uranium in Ground Water at Compliance Monitoring Locations at the Falls City, Texas, Disposal Site

Monitoring for the designated suite of analytes in ground water does not appear to be an effective means to assess the performance of the disposal cell because the area is affected by widespread

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ambient contamination (naturally occurring uranium mineralization) and uranium exploration, mining, and processing 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 currently evaluating the ground water monitoring program at the site, as required by the LTSP every 5 years, to determine if protectiveness can be demonstrated with reduced monitoring requirements, such as sampling fewer wells, analyzing fewer constituents, and sampling the cell performance wells annually or biennially instead of every 6 months. Based on the evaluation's recommendations, DOE will revise the LTSP for NRC concurrence. The revised plan will likely recommend eliminating pH as an indicator for cell performance.

5D

Ground Water Level Monitoring—Ground water levels in the wells near the disposal cell used to monitor cell performance had initially declined by several feet for the first few years following construction with one exception: MW–0906 which had fluctuated up and down several feet (Figure 5–7). Beginning in late 2002 all the wells began to rise except MW–0858, which began in 2004. Since that time two of the wells (MW–0709 and MW–0880) have returned to initial levels and two others (MW–0858 and MW–0921) have risen only slightly. Monitor well MW–0906, which had initially fluctuated, began to rise in early 2002 increasing approximately two feet and currently is more than five feet higher than initial post-construction levels. 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.

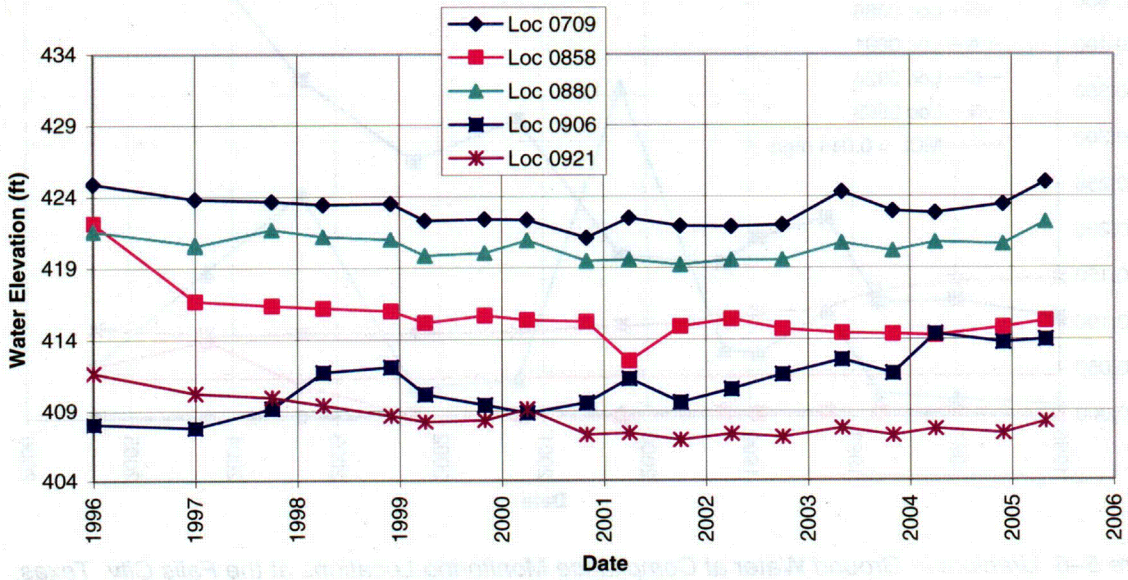

Figure 5–7. Water Level Measurements at Cell Performance Monitoring Locations at the Falls City, Texas, Disposal Site

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The cell performance water level data through the first several years following construction indicate that the falling water table in the vicinity of the cell was likely related to dissipation of the processing site-related ground water mound beneath the disposal cell. The more recent rise in water levels may be a result of increased precipitation or localized mounding from water being shed from the disposal cell.

Water levels at the ground water compliance monitoring locations have all steadily increased several feet since monitoring began in 1996, indicating a regional effect (Figure 5–8).

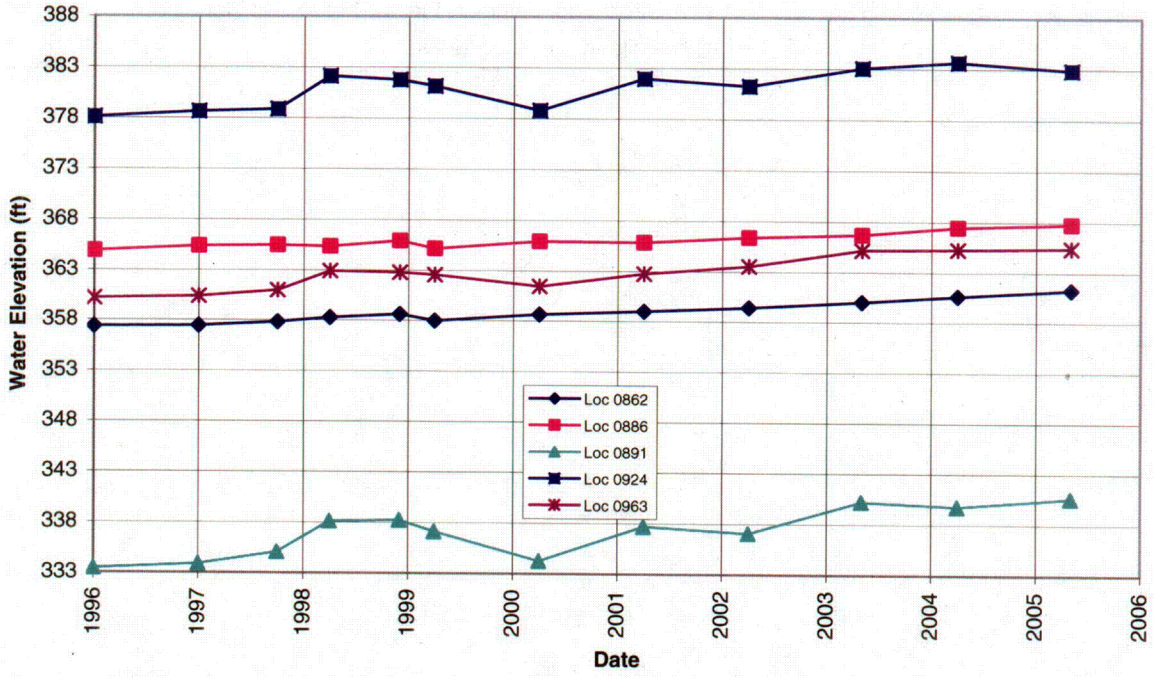


Figure 5–8. Water Level Measurements at Ground Water Compliance Monitoring Locations at the Falls City, Texas, Disposal Site

5.3.5 Corrective Action

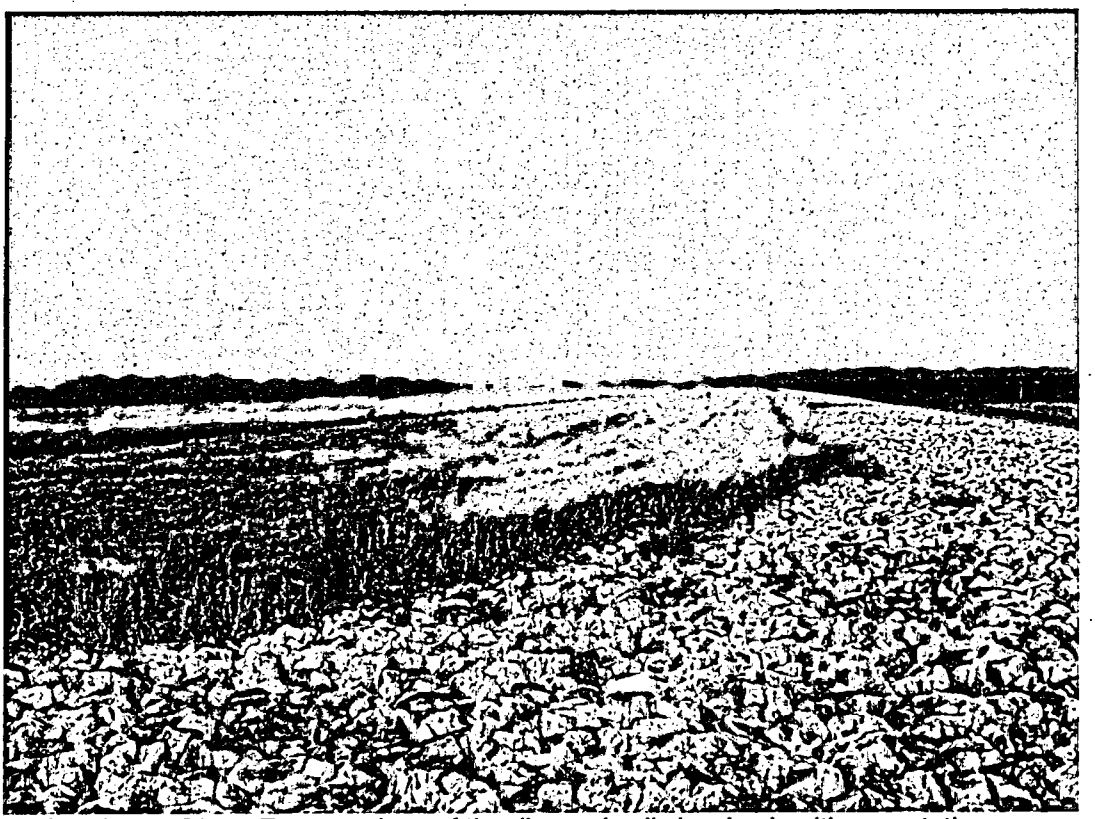
Corrective action addresses out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2005.

5.3.6 Photographs

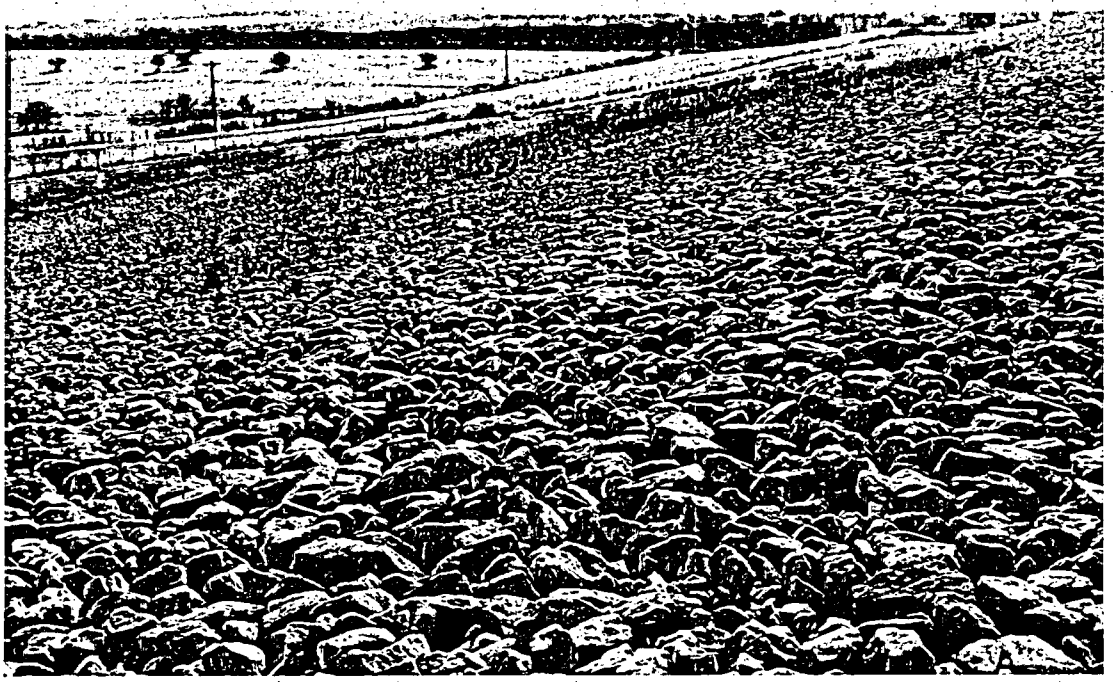
Table 5–3. Photographs Taken at the Falls City, Texas, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	320	East top slope of the disposal cell showing healthy vegetative cover.
PL–2	270	Ramp on side slope in the west corner used for farming equipment to access the cell top.
PL–3	135	Undesirable vegetation on the northeast side slope.
PL–4	5	Willows along south toe drain.



FCT 1/2005. PL–1. East top slope of the disposal cell showing healthy vegetative cover.

FCT 1/2005. PL–2. Ramp on side slope in the west corner used for farming equipment to access the cell top.



FCT 1/2005. PL–3. Undesirable vegetation on the northeast side slope.

FCT 1/2005. PL–4. Willows along south toe drain.

6.0 Grand Junction, Colorado, Disposal Site

6.1 Compliance Summary

The Grand Junction Disposal Site, inspected on March 2, 2005, 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.

In 2005, the storm water retention pond was deepened to prevent continued saturation of an adjacent road during runoff events. Deep-rooted shrubs on the cell top and the tamarisk found in off-cell areas were cut and treated with herbicide. Ground water monitoring was performed as a best management practice to assess the performance of the disposal cell; results indicate the disposal cell has not affected ground water quality. Vandalism and property theft (tools) occurred at the site and were reported; the disposal cell and associated features were not disturbed. There was no cause 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

Institutional Controls—The 360-acre disposal site is owned by the United States of America. A portion of the disposal cell remains open to receive additional low-level residual radioactive material (RRM) generated under the UMTRCA program. Weekly inspections of the active portion of the site are performed to verify the site is secure, and radon is monitored continuously to ensure the open portion of the cell is protective of human health and the environment. This portion of the disposal cell is scheduled to remain open until 2023, or until filled to its design capacity, at which time it will be closed in accordance with design criteria. Upon concurrence with the final closure of the open portion of the cell and the final version of the LTSP, the site will be accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27). DOE will then become the licensee and, in accordance with the requirements for UMTRCA Title

I sites, will be responsible for the custody and long-term care of the site. The open and active portion of the disposal cell within the closed but unlicensed portion of the disposal cell makes the Grand Junction Disposal Site unique among the 19 UMTRCA Title I disposal sites.

DOE currently is, and will remain, the disposal site operator until final closure. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, a site perimeter fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site access road. Access to the site is provided by a perpetual right-of-way across land administered by the U.S. Bureau of Land Management (BLM) to a second locked gate at the site entrance. The site is surrounded by BLM owned land. The surrounding land is used primarily for livestock grazing and wildlife habitat.

6.3 Compliance Review

6.3.1 Annual Inspection and Report

The site, located south of Grand Junction, Colorado, was inspected on March 2, 2005. 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.

Only closed and completed parts of the disposal cell and surrounding disposal site are addressed during the annual inspection. The open cell, occupying approximately 21 acres in the center of the disposal cell, the temporary structures associated with its operation, and the temporary contaminated material stockpile areas, are not formally inspected except as they may affect the long-term safety and performance of the closed portion of the disposal cell.

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. No erosion problems were observed along the access road. The fence along the right-of-way corridor is in excellent condition; repairs were made during fall 2004 due to damage by livestock. 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.

During the past year two security incidents occurred at the site that were reported to the local authorities. In late 2004, the lock on the site access road gate was found shot off and replaced. And in early 2005, a break-in occurred at the site and tools were stolen from a storage building. No damage to the disposal cell or other features at the site occurred.

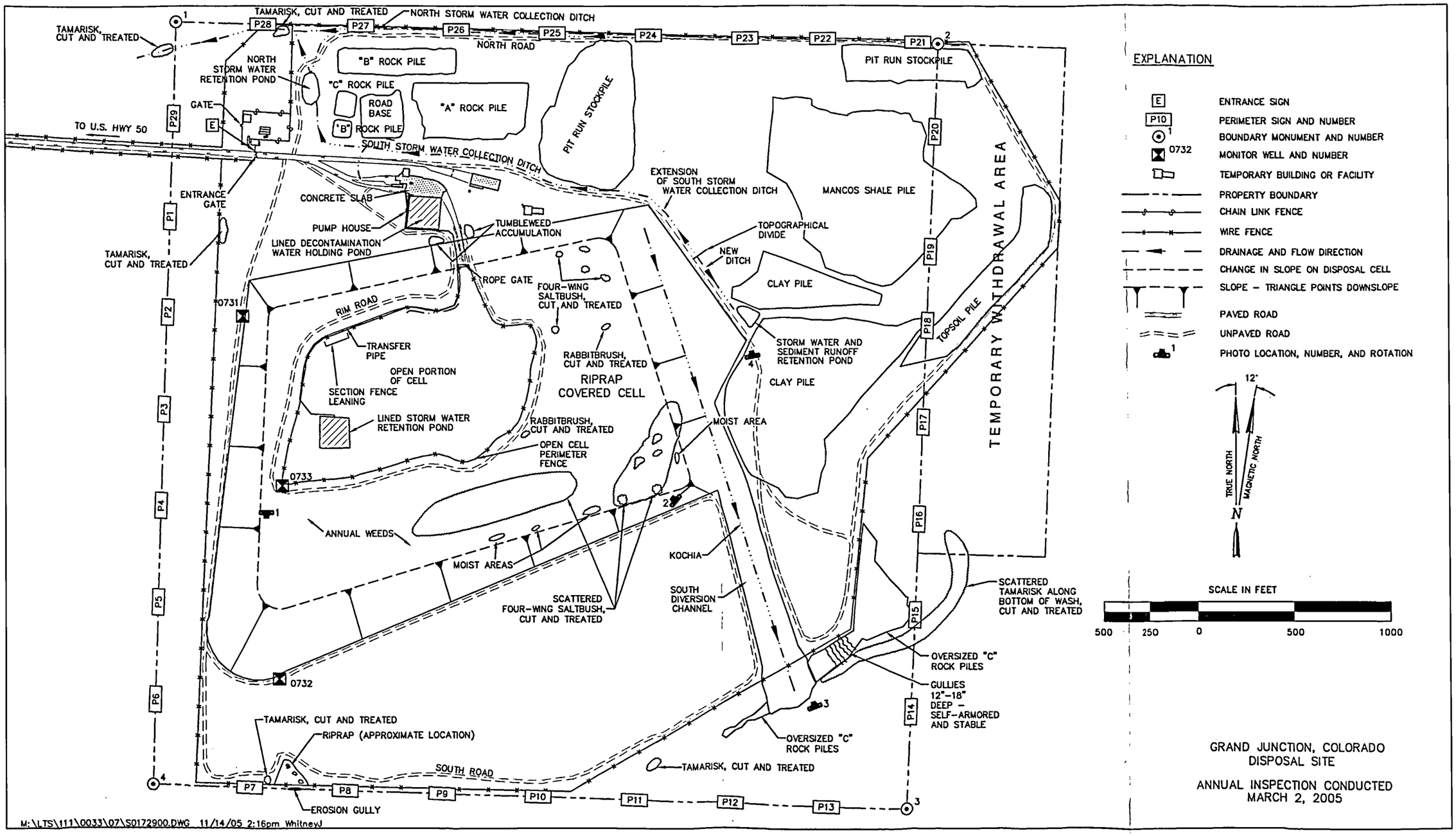


Figure 6–1. 2005 Annual Compliance Drawing for the Grand Junction, Colorado, Disposal Site

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.

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 that might affect site integrity or the long-term performance of the site.

Closed Portion of the Disposal Cell—The top and side slopes of the disposal cell are covered with basalt riprap. The rock is durable and was in excellent condition. There was no evidence of slope instability (PL–1).

Storm water drains toward the southeast corner of the cell. Several moist areas with evaporite deposits were observed. The moist areas typically have a higher percentage of fine particles at the surface than the remainder of the cover and are assumed to be the result of above average precipitation that occurred during the winter months. There was no evidence of settling or erosion of the cell cover.

Minimal plant encroachment was observed on the side slopes (PL–1). However, plant encroachment is occurring on the cell top, mostly on the southeastern part of the cell (PL–2). As stated in the LTSP, the deep-rooted shrubs potentially could pose a threat to the long-term integrity and performance of the radon/infiltration barrier, and will be removed. Deep-rooted
6A plants were cut back and treated with herbicide in 2001 and again in 2005. A preliminary study of the in situ saturated conductivity of the cover materials was conducted at four test locations in 2003 to see if the root systems of four-wing saltbush shrubs increased infiltration through the

radon barrier. The results were not definitive and a follow-up investigation of the cover materials may be desirable to determine whether the deep-rooted shrubs need to be removed periodically. Leaving the plants in place may improve the performance of the cell cover by reducing infiltration of water through uptake and also providing additional erosion control.

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 vegetation growth, including annual grasses and weeds and some deep-rooted shrubs, exists within the channel; however, there was not enough growth to impede water flow within the channel. Erosional features at the outfall of the channel are self-armoring with large riprap boulders and are stable (PL–3).

Other drainage features at the site include north and south storm water collection ditches and the north storm water retention pond, and a storm water and sediment collection pond on the east side of the South Diversion Channel that was constructed in 2004. These drainage features control storm water runoff primarily from the various cover materials stockpiled on the northern and eastern portions of the disposal site property. The ditches are small and unimproved. The north storm water collection ditch also captures run-on storm water from a large catchment area north and east of the disposal site. The south storm water collection ditch flows west into the north storm water retention pond. Occasional maintenance (i.e., blading) of the ditches may be required if flows are impeded or obstructed. Accumulations of sediment and tumbleweeds were observed in both ditches. The drainage ditches and the north storm water retention pond were functioning as designed.

Water captured in the north storm water collection ditch discharges into a large natural drainage north and west of the disposal cell. A gully at the outfall of the ditch near perimeter sign P28 is self-armoring with the abundant basaltic rock in the soil at that location and appears to be stable.

Snowmelt runoff and heavy storm events resulted in sheet flow that saturated segments of the site road that runs along the eastern edge of the South Diversion Channel. This sheet flow washed sediment over the road and into the South Diversion Channel, providing a soil bed for plant growth that could eventually impede the function of the diversion channel. In 2004, a ditch was cut along the east side of the road to divert runoff either northwest into the south storm water collection ditch or southeast into a new storm water and sediment runoff retention pond (PL–4). However, the access road adjacent to the new retention pond continued to get saturated during runoff events. In 2005, the retention pond was deepened to prevent saturation of the adjacent road during runoff events. 6B

Area Between the Disposal Cell and the Site Boundary—There are 12 discrete stockpiles of rock and soil between the disposal cell and the site boundary on the north and east sides of the disposal cell. These materials eventually will be used to cover and close the open portion of the cell. Minor rill erosion was found on some of the soil stockpiles; however, there was no indication of off-site sediment transport. The natural vegetation was becoming well established, and was successfully stabilizing the stockpiles 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 within the site. A small erosional area was present along the site boundary between the perimeter fence and a wash near the South Diversion Channel outfall. The gullies in this area were found to be self-armoring with basaltic rock and appeared to be stable.

A significant stand of tamarisk was found growing along the wash that crosses the southeast corner of the site. Smaller isolated stands of tamarisk were also growing along the south side and northwest corner of the site. Tamarisk is a deep-rooted, water-depleting noxious weed that is recommended for removal in Mesa County. Although the plants at these locations do not threaten
6C the integrity or performance of the disposal cell, they were cut and treated with herbicide to remove the seed source to reduce the chance of the plants establishing on the disposal cell. DOE began removing tamarisk in 2004 to prevent it from spreading.

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.

A gully has developed along the south perimeter fence (near perimeter sign P8) on the fringe of a riprap-armored drainage area. The gully was encroaching on the fence line and at some point may erode beneath one or more of the line posts. At the time of the inspection, the fence and posts were taut and secure.

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 portion of the cell.

Outlying Area—The area outward from the disposal site for a distance of 0.25 mile was visually inspected. No development or disturbance that could affect the disposal site was observed. 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.

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 2005.

6.3.3 Routine Maintenance and Repairs

In 2005, DOE deepened the storm water retention pond, cut and treated with herbicide deep-rooted plants on the cell and tamarisk along site boundaries.

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 as a best management practice 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 ground water in the paleochannels is not impacted by seepage (transient drainage) from the disposal cell (Table 6–2). 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 ground water directly beneath the disposal cell has not risen high enough to move laterally into the paleochannels.

Table 6–2. Ground Water Monitoring Network at the Grand Junction, Colorado, Disposal Site

Monitor Well	Hydrologic Relationship
MW–0731	Paleochannel, downgradient, edge of cell, north side
MW–0732	Paleochannel, downgradient, edge of cell, south side
MW–0733	Disposal cell, deepest location, downgradient, center

Ground Water Level Monitoring—The water level in the disposal cell well MW–0733 has remained relatively steady, with less than 2 feet of variation since 1998. In comparison, water levels within the two paleochannels at wells MW–0731 and MW–0732 have varied up to approximately 5 and 10 feet, respectively, since 1998. Still the water level in the disposal cell well MW–0733 has remained at least 30 and 10 feet lower (deeper) than water levels in the paleochannels at wells MW–0731 and MW–0732, respectively, since 1998 (Figure 6–2).

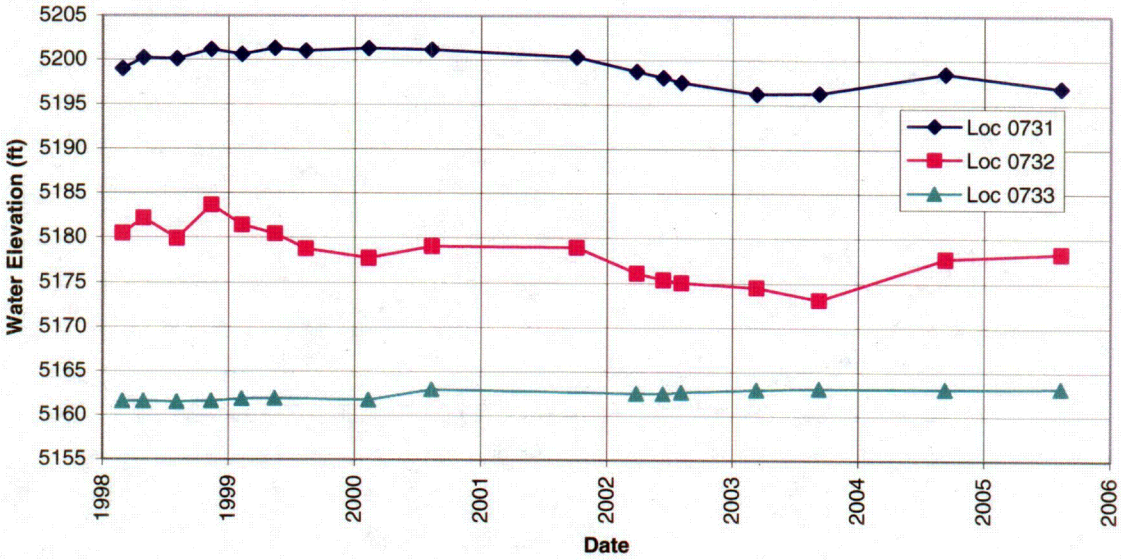


Figure 6–2. Water Level Measurements at the Grand Junction, Colorado, Disposal Site

On the basis of this information, there is no hydraulic potential for ground water at the base of the disposal cell at well MW–0733 to migrate to the paleochannels at wells MW–0731 and MW–0732.

Ground Water Quality Monitoring—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 are molybdenum, nitrate, selenium, and uranium. In 40 CFR 192 Table 1 in Subpart A, the U.S. Environmental Protection Agency (EPA) has established maximum concentration limits (MCLs) for these analytes in ground water (Table 6–3). Time-concentration plots, from 1998 through 2005, for three key indicator analytes—nitrate (as nitrogen), selenium, and uranium are shown on Figures 6–3 through 6–5.

Table 6–3. Maximum Concentration Limits for Ground Water at the Grand Junction, Colorado, Disposal Site

Constituent	MCL [a] (mg/L)
Molybdenum	0.1
Nitrate (as N)	10
Selenium	0.01
Uranium	0.044

[a]EPA MCLs as listed in 40 CFR 192 Table 1, Subpart A.
MCL = maximum concentration limit.
Mg/L = milligrams per liter.

C15

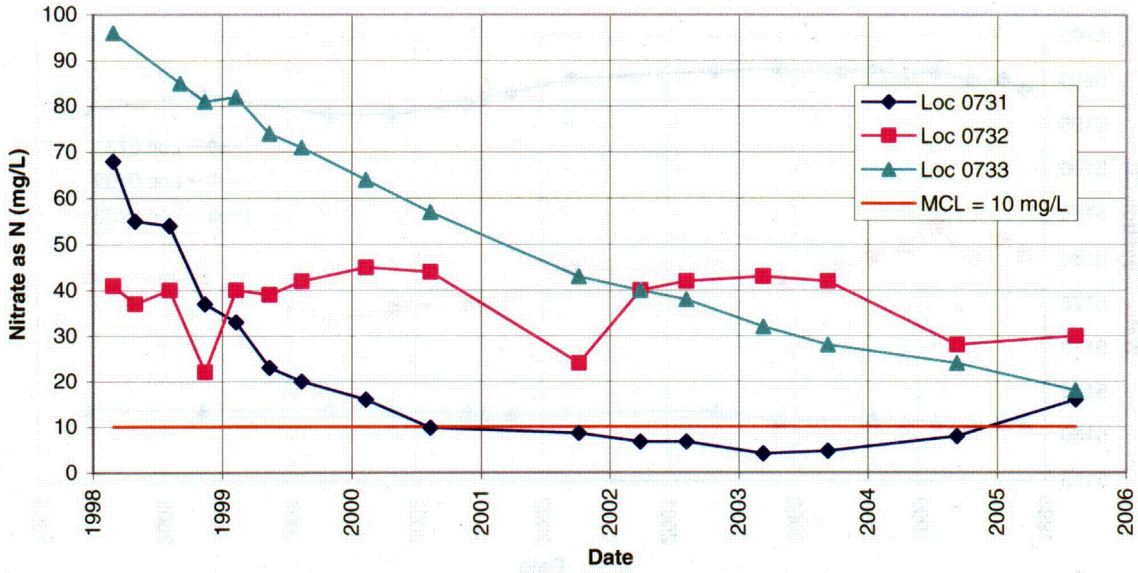


Figure 6–3. Time-Concentration Plots of Nitrate (as N) in Ground Water at the Grand Junction, Colorado, Disposal Site

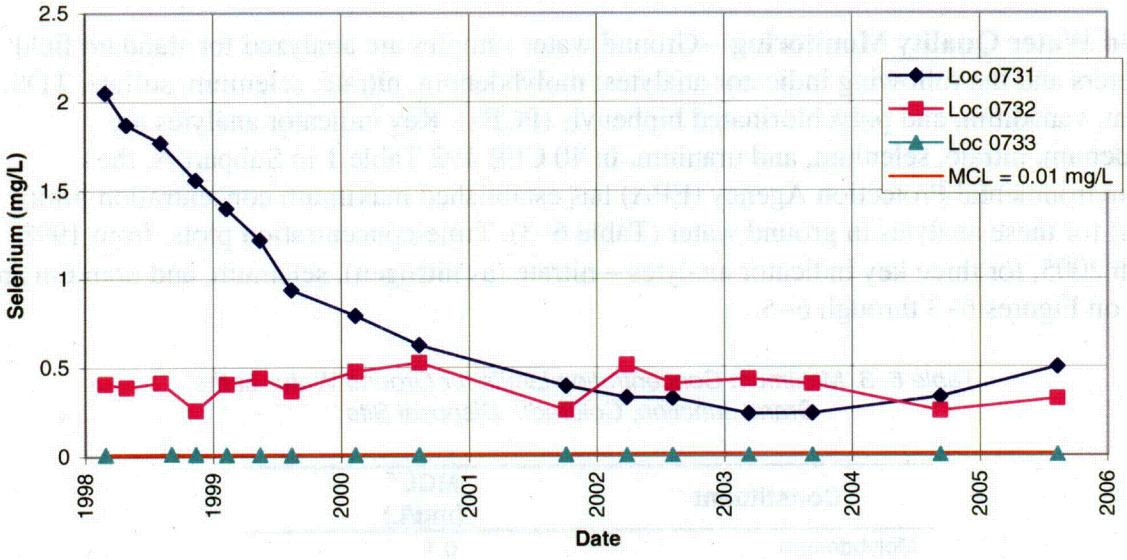


Figure 6–4. Time-Concentration Plots of Selenium in Ground Water at the Grand Junction, Colorado, Disposal Site

C16

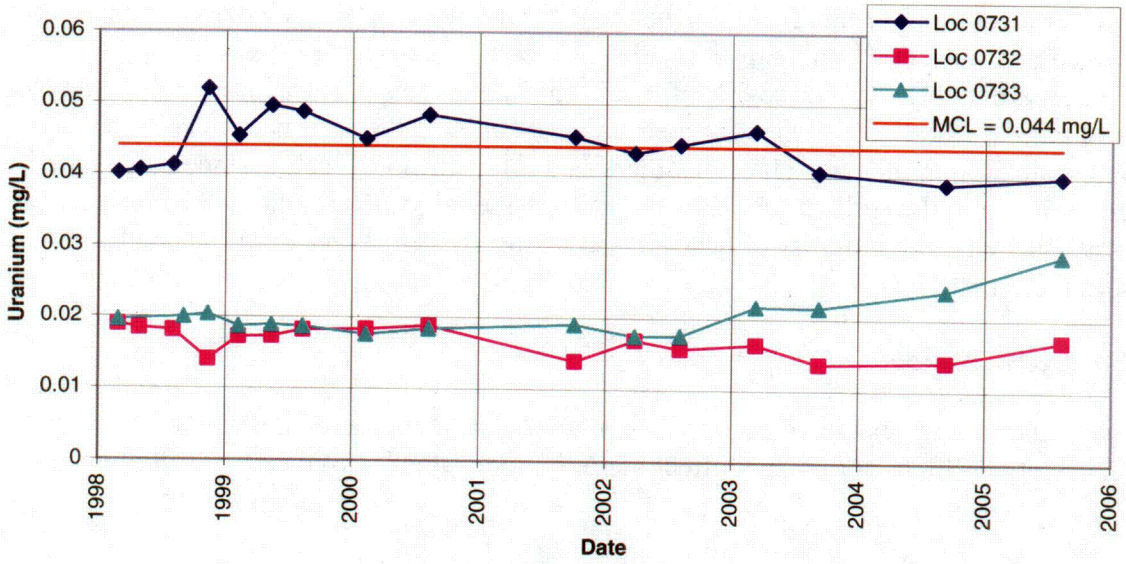


Figure 6–5. Time-Concentration Plots of Uranium in Ground Water at the Grand Junction, Colorado, Disposal Site

Results from sampling in 2005 were generally consistent with results from the past several years.

Nitrate (as nitrogen) concentrations in ground water exceeded the MCL of 10 mg/L in all three monitor wells. Concentrations in well MW–0731 have been below the MCL since 2000 following a steep downward trend, but increased to just above the MCL in 2005. Concentrations in well MW–0732 remain relatively consistent above the MCL, and concentrations in well MW–0733 continue to trend downward to slightly above the MCL in 2005 (Figure 6–3). In 2005, the highest concentration of nitrate, 30 mg/L, occurred in paleochannel well MW–0732. Historically, the highest concentration of nitrate (96 mg/L) occurred in 1998 from the disposal cell well MW–0733.

Selenium levels continued to exceed the MCL of 0.01 mg/L in both paleochannel wells MW–0731 and MW–0732, and remained well below the standard in MW–0733 in the disposal cell (Figure 6–4). In 2005, the highest concentration of selenium, 0.5 mg/L, occurred in paleochannel well MW–0731 and compares to an historical high of 2.05 mg/L in 1998 from the same well. These concentrations can 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 and have remained relatively consistent since 1998 (Figure 6–5). In 2005, the highest concentration of uranium, 0.04 mg/L, occurred in paleochannel well MW–0731 and compares to an historical high of 0.052 mg/L in 1998 from the same well.

C17

Molybdenum concentrations in ground water continued to be near the required laboratory detection limit and significantly below the MCL of 0.1 mg/L in all wells. Concentrations of PCBs were not detected in any of the wells.

Ground water level monitoring results suggest that ground water in the paleochannels has not been affected by transient drainage from the disposal cell 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.

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.

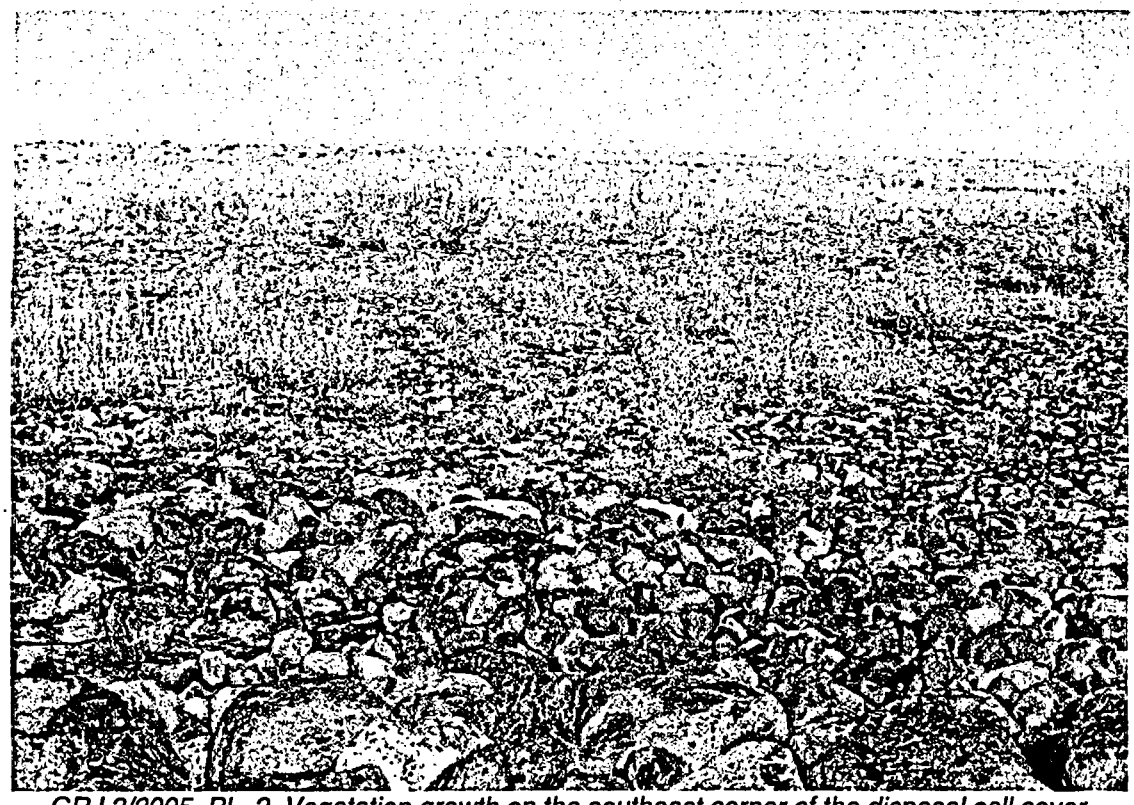
No corrective action was required in 2005.

6.3.6 Photographs

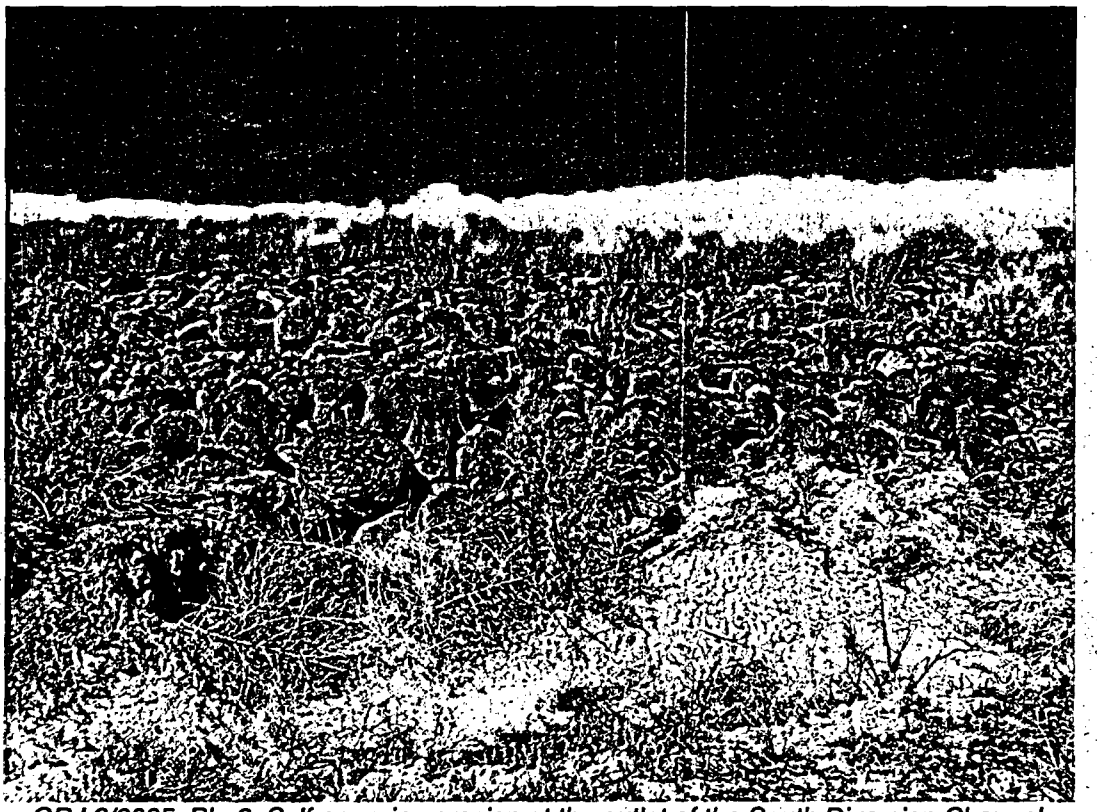
Table 9–2. Photographs Taken at the Grand Junction, Colorado, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	180	Rock-covered surfaces near the southwest corner of the disposal cell.
PL–2	310	Vegetation growth on the southeast corner of the disposal cell cover.
PL–3	340	Self-armoring erosion at the outlet of the South Diversion Channel.
PL–4	350	Storm water and sediment runoff retention pond on the east side of the South Diversion Channel.

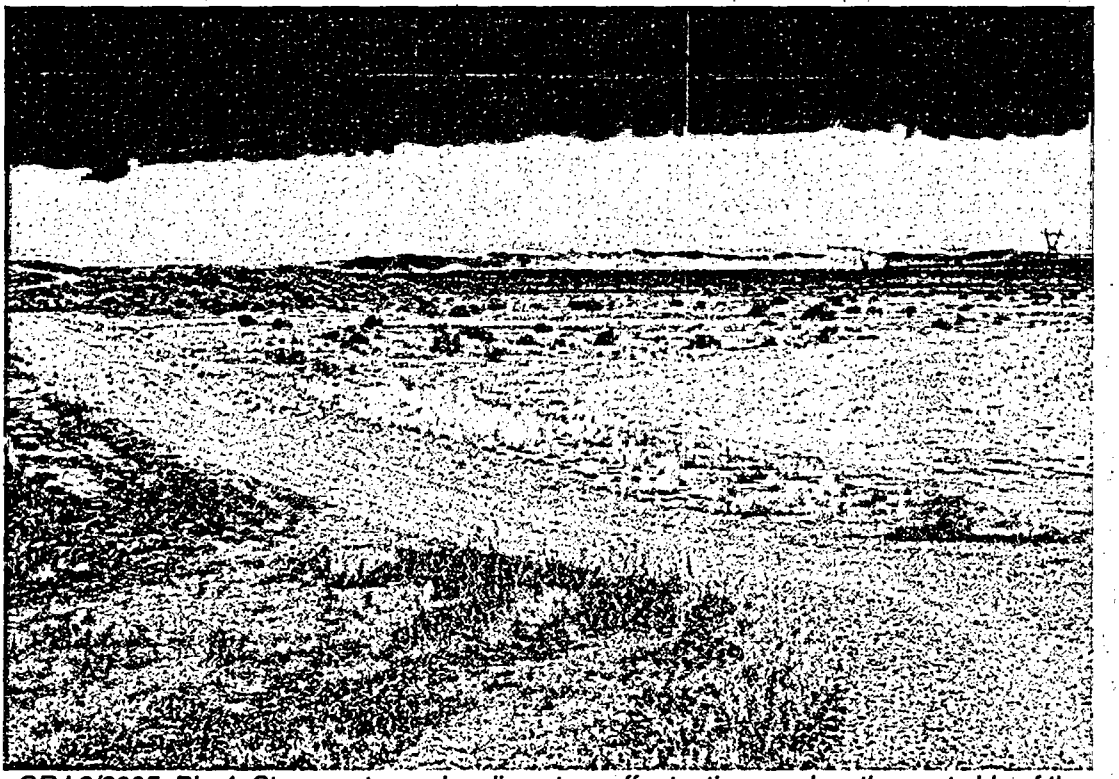
GRJ 3/2005. PL–1. Rock-covered surfaces near the southwest corner of the disposal cell.



GRJ 3/2005. PL–2. Vegetation growth on the southeast corner of the disposal cell cover.



GRJ 3/2005. PL–3. Self-armoring erosion at the outlet of the South Diversion Channel.



GRJ 3/2005. PL–4. Storm water and sediment runoff retention pond on the east side of the South Diversion Channel.

7.0 Green River, Utah, Disposal Site

7.1 Compliance Summary

The Green River Disposal Site, inspected on March 3, 2005, was in good condition. A slight depression on the southeast facet of the cell had been noted during the 2004 inspection. The 2005 inspection verified that all side slope surfaces are slightly irregular due to construction methods or minor settling that has occurred within the cell. There was no evidence of displacement of cover rock or bedding material on the side slope surfaces or along their contacts with the perimeter apron. Therefore, the disposal cell is stable and in excellent condition. Despite several significant rainfall events in the months prior to the inspection, all surveillance features at the site were stable and in excellent condition. Ground water monitoring continued in 2005 for the purpose of evaluating cell performance. No cause 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

Institutional Controls—The 25-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1998. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, a site perimeter security fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site security fence. Perpetual easement with the U.S. Department of Army also provides control of access to the site. The site is bordered by a mainline track of the Union Pacific Railroad to the north, U.S. Interstate 70 to the south, U.S. Department of Army property to the east, and the Green River to the west. The surrounding land is used primarily for U.S. Department of Army activities, railroad and vehicular transportation, and wildlife habitat.

7.3 Compliance Review

7.3.1 Annual Inspection and Report

The site, located southeast of Green River, Utah, was inspected on March 3, 2005. 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 south from Green River on Utah State Highway 191 onto a county owned frontage road and across state land and U.S. Army property. The site lies north of U.S. Interstate Highway 70 across a short track of Army property. Entrance to the site is through a locked steel gate in the stock fence along the paved road. Although damaged by shotgun fire, this gate is still operational. 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 between 50 and 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 set on posts along the unfenced site boundary. All of the 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.

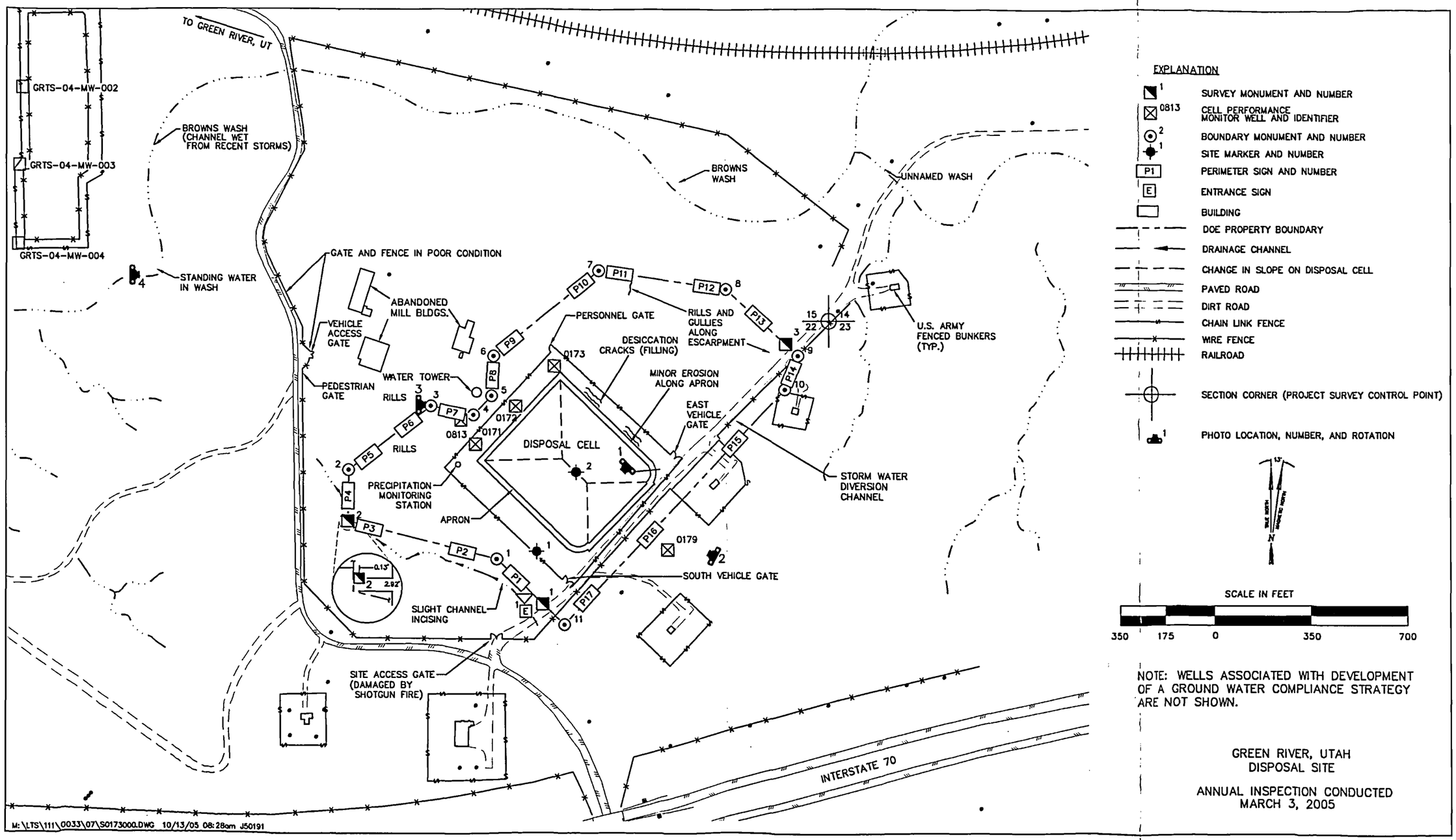
Monitor Wells—The ground water monitoring network consists of four point-of-compliance wells northwest of the disposal cell (MW–0171, MW–0172, MW–0173, and MW–0813). An additional well offsite (MW–0179) is used for monitoring the aquifer water level. These wells were secure and in excellent condition. 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.

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 Cell and Adjacent Area Inside the Security Fence—The slopes of the disposal cell cover are armored with riprap. The riprap was in excellent condition. During the 2004 inspection it was thought that minor slumping apparently had occurred on the southeast facet of the cell. All



EXPLANATION

- SURVEY MONUMENT AND NUMBER
- CELL PERFORMANCE MONITOR WELL AND IDENTIFIER
- BOUNDARY MONUMENT AND NUMBER
- SITE MARKER AND NUMBER
- PERIMETER SIGN AND NUMBER
- ENTRANCE SIGN
- BUILDING
- DOE PROPERTY BOUNDARY
- DRAINAGE CHANNEL
- CHANGE IN SLOPE ON DISPOSAL CELL
- PAVED ROAD
- DIRT ROAD
- CHAIN LINK FENCE
- WIRE FENCE
- RAILROAD
- SECTION CORNER (PROJECT SURVEY CONTROL POINT)
- PHOTO LOCATION, NUMBER, AND ROTATION

TRUE NORTH
MAGNETIC NORTH
N

SCALE IN FEET

350 175 0 350 700

NOTE: WELLS ASSOCIATED WITH DEVELOPMENT OF A GROUND WATER COMPLIANCE STRATEGY ARE NOT SHOWN.

GREEN RIVER, UTAH
DISPOSAL SITE

ANNUAL INSPECTION CONDUCTED
MARCH 3, 2005

Figure 7–1. 2005 Annual Compliance Drawing for the Green River, Utah, Disposal Site

side slopes of the cell were again carefully inspected during the 2005 inspection and it was apparent that a minor grade break exists about 15 to 20 feet above the toe of the slope on all sides of the cell, with the steeper segment at the bottom of the slope (PL–1). All side slope surfaces are slightly irregular due to construction methods or minor settling that has occurred within the cell. There was no evidence of displacement of cover rock or bedding material on the side slope surfaces or along their contacts with the perimeter apron. Therefore, the disposal cell is stable and in excellent condition (PL–2).

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 continue to be successful, and no new erosion was evident.

A series of linear cracks running parallel to the northeastern edge of disposal cell were still present but continue to be filled with wind-blown sediments. Rodents have burrowed into the cracks at several locations. The cracks probably were caused by shrinkage (desiccation) of the soils that were backfilled against the cell apron and do not pose a threat to the integrity of the disposal cell or warrant any maintenance action.

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 in the underlying Cedar Mountain Formation aquifer. No correlation was observed through 2004 measurements and the station is no longer being used.

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. However, natural and seeded plants appear to have reached abundances comparable to the sparsely vegetated surrounding areas and revegetation is therefore considered to be successful.

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

Due to significant rainfall events in the months prior to the inspection, additional erosion occurred in the rills and gullies along the escarpment northeast of the disposal cell in the area between boundary monument BM–7 and survey monument SM–3. 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 could eventually damage perimeter signs and boundary monuments; therefore, the erosion features in this area will continue to be monitored.

The entrance to a storm water diversion channel culvert located near the northeast corner of the property was completely obstructed with eroded sediments. The culvert underlies an entrance road leading to an abandoned U.S. Army White Sands Missile Range bunker that is no longer in use. The asphalt entrance road is blocked by a continuous fence (no gate) and is unused and in disrepair. Because the road is blocked and unused, no further maintenance will be performed at this location and runoff will be allowed to flow over the road.

There was no evidence of trespassing or vandalism on DOE property found during the annual inspection. 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. DOE will continue to monitor for evidence of trespassing and vandalism on its property.

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 recent and previous inspections include the natural drainage southwest of the site and rills and gullies northwest of the water tower. Minor erosion continues but currently does not pose a threat to the integrity of the disposal cell or site surveillance features. 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 and upwind of the DOE property. The buildings are in a severe state of disrepair and debris (e.g., roofing materials, siding, trash) tends to be blown from the buildings onto DOE property. Accumulation of building materials blown onto DOE property was not significant, but will continue to be monitored and debris will be removed as necessary.

Due to recent rainfall events, the alluvium in the bottom of ephemeral Browns Wash was moist and standing water was present where the wash crosses outcrops of the Cedar Mountain Formation (PL–4). This location is projected for compliance monitoring because it is the furthest extent of backwater from the Green River and because the outcrops may be a possible discharge location for the Cedar Mountain Formation aquifer (the aquifer is contaminated under the disposal cell). However, this inspection and subsequent site visits confirmed that temporary pools form in scour holes following every runoff event in Browns Wash, and there is no vegetative evidence of seepage from the bedrock.

7.3.2 Follow-Up or Contingency Inspections

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

7.3.3 Routine Maintenance and Repairs

No maintenance or repairs were performed at the disposal site in 2005.

7.3.4 Ground Water Monitoring

7A DOE currently is monitoring ground water in four point-of-compliance wells in the uppermost aquifer downgradient from the disposal cell. These four point-of-compliance wells are: MW–0171, MW–0172, MW–0173, and MW–0813. The purpose of the monitoring is to evaluate the performance of the disposal cell. Ground water samples are collected quarterly, and are monitored for three target analytes—nitrate, sulfate, and uranium, as stipulated in the LTSP. Arsenic and selenium are also monitored because of concentrations that exceed U.S. Environmental Protection Agency maximum concentration limits (MCL) provided in 40 CFR 192 Table 1 of Subpart A. Water levels are measured in the point-of-compliance wells and in offsite monitor well MW–0179.

Based on the evaluation of several years of analytical data and associated risk, the alternate concentration limits (ACL) listed in Table 7-2 will be proposed to NRC and the State of Utah. These proposed ACLs will be applicable to all point-of-compliance wells and are presented in
7B the draft *Preliminary Final Ground Water Compliance Action Plan for the Green River, Utah, (UMTRCA Title I) Disposal Site* currently under review by the State. An ACL is not proposed for sulfate because there is currently no primary drinking water standard for that constituent.

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

Constituent	MCL (mg/L)	Proposed ACL (mg/L)
Arsenic	0.05	5.0
Nitrate (as N)	10	1,000
Selenium	0.01	1.0
Uranium	0.044	4.4

Key: ACL = alternate concentration limit; MCL = maximum concentration limit; mg/L = milligrams per liter

Samples were collected quarterly for 3 years beginning in 1998 with the provision that monitoring requirements would be reevaluated in 2001 to determine if contaminant levels in ground water decreased, as expected, to levels that existed prior to construction of the disposal cell. The evaluation report concluded that concentrations were within a reasonable range of compliance relative to the proposed concentration limits provided in the LTSP. However, it is understood that the presence of preexisting processing-related ground water contamination in the disposal cell vicinity complicates the assessment of disposal cell performance. In addition, changes in concentration levels unrelated to disposal cell performance may occur at the site as a result of preexisting contamination.

As a result of the evaluation, quarterly monitoring of the four point-of-compliance wells has continued pending approval of the site-wide compliance strategy and monitoring program. 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 because the ground water is not used and the river water is unaffected by site contaminants.

Ground Water Quality Monitoring—Time-concentration plots for the period 1998 through June 2005 for the three target analytes—nitrate (as nitrogen), sulfate, and uranium, as well as for arsenic and selenium, are shown on Figures 7–2 through 7–6.

Concentrations of nitrate in ground water continued above the MCL but are considerably below the proposed ACL (Table 7–2) except in well MW–0813, where values continue near the laboratory detection limit (Figure 7–2). Since 1998, concentrations in wells MW–0171 and MW–0813 have remained essentially constant, while there has been an overall upward trend for well MW–0173 and a downward trend for well MW–0172.

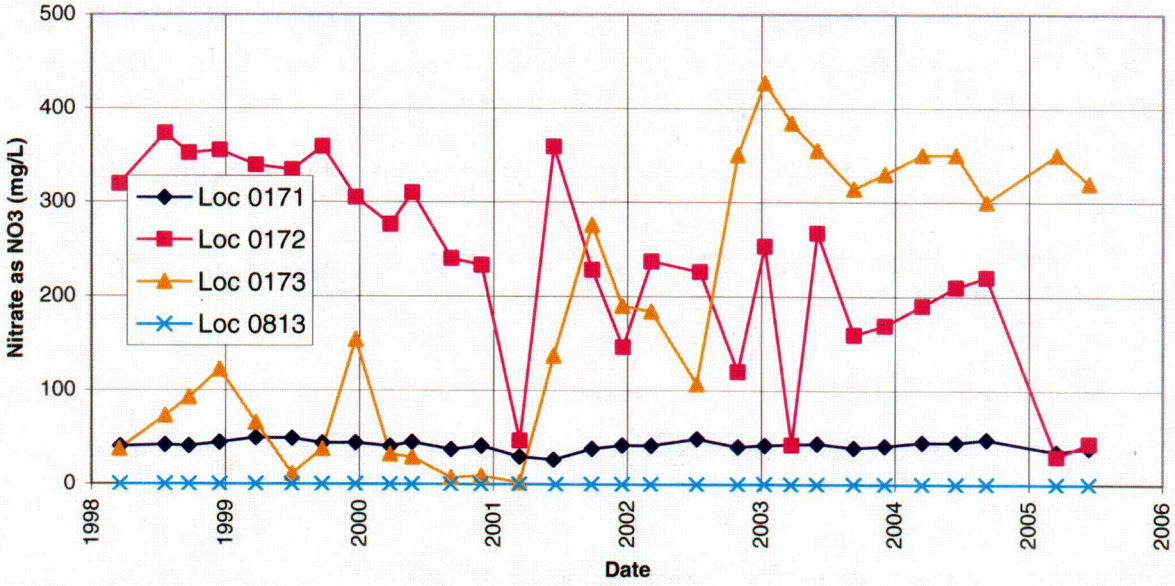


Figure 7–2. Time-Concentration Plots of Nitrate (as N) in Ground Water at the Green River, Utah, Disposal Site

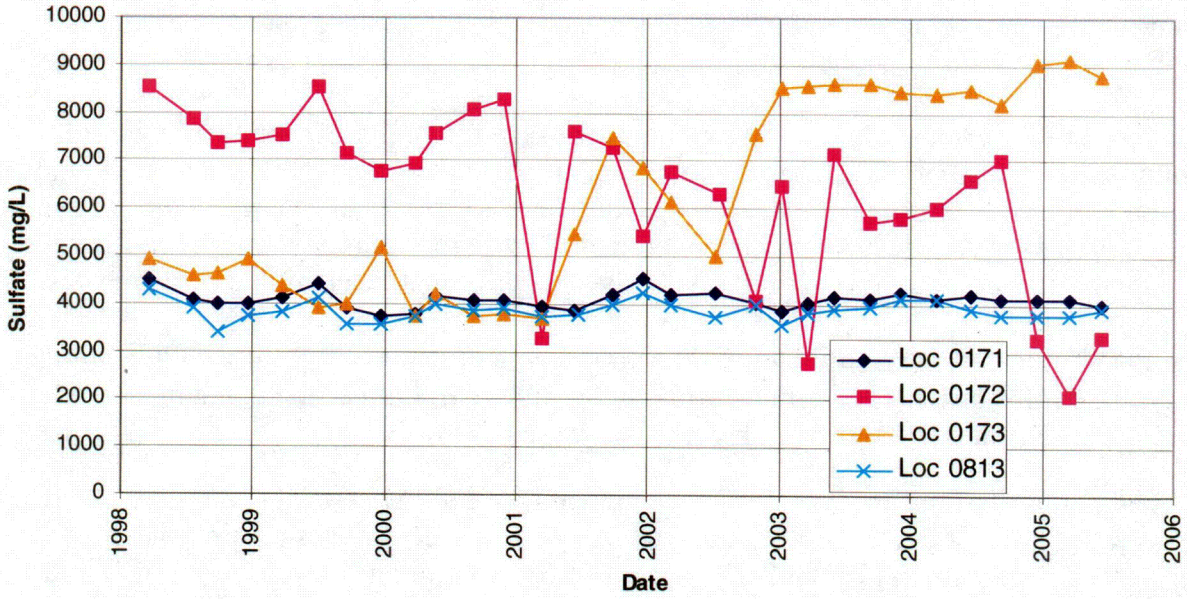


Figure 7–3. Time-Concentration Plots of Sulfate in Ground Water at the Green River, Utah, Disposal Site

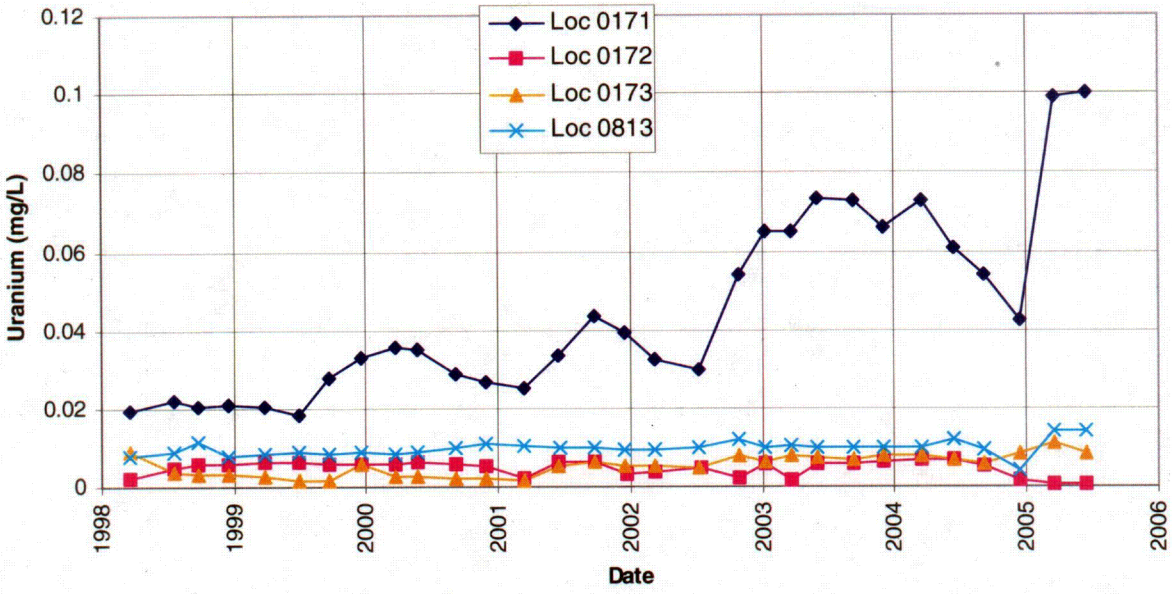


Figure 7–4. Time-Concentration Plots of Uranium in Ground Water at the Green River, Utah, Disposal Site

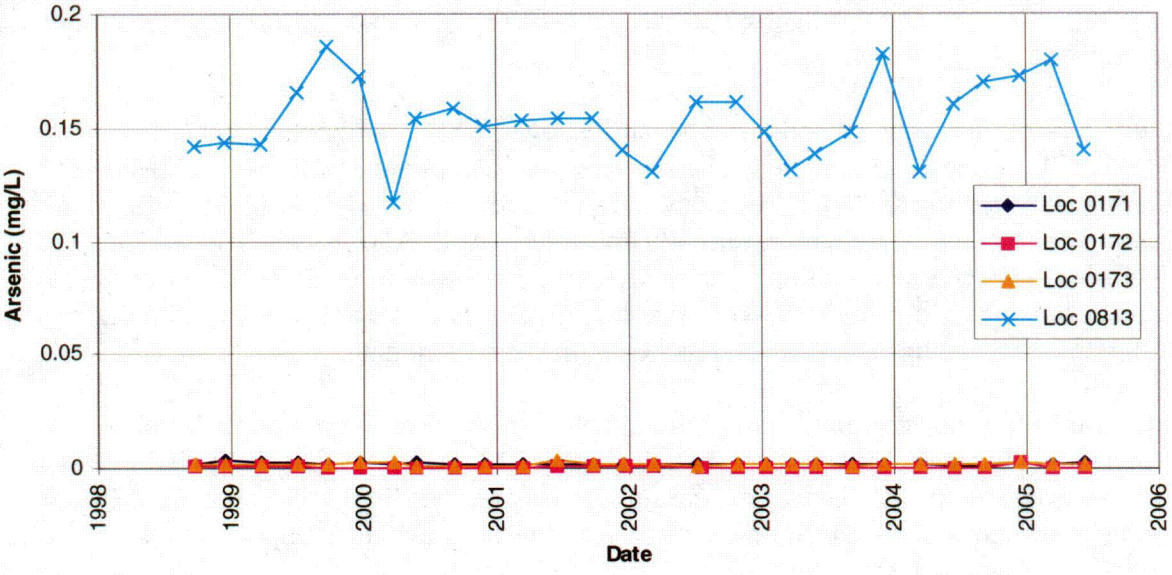


Figure 7–5. Time-Concentration Plots of Arsenic in Ground Water at the Green River, Utah, Disposal Site

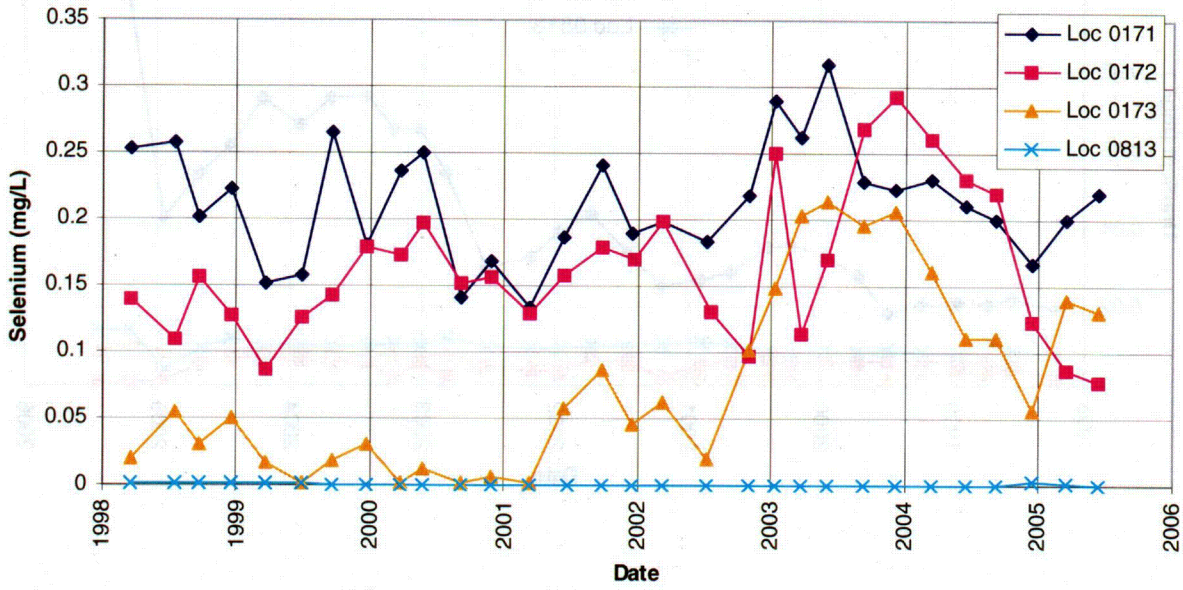


Figure 7–6. Time-Concentration Plots of Selenium in Ground Water at the Green River, Utah, Disposal Site

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; as with nitrate, a decreasing trend in MW–0172 and an increasing trend in MW–0173 can also be observed with sulfate concentrations.

Uranium concentrations in ground water remain below the MCL and considerably below the proposed ACL (Table 7–2) in three of the four point-of-compliance wells. At well MW–0171, with only one exception since fall 2002, levels have exceeded the MCL (Figure 7–4). Uranium concentrations continue to remain essentially constant in wells MW–0172, MW–0173, and MW–0813. However, an overall upward trend continues in well MW–0171. Uranium is the only constituent of concern in well MW–0171 that has indicated an upward trend; no conclusions regarding the cause of the trend can be reached with the current data.

Arsenic concentrations in ground water remain below the MCL and considerably below the proposed ACL (Table 7–2) in wells MW–0171, MW–0172, and MW–0173. In well MW–0813, levels have exceeded the MCL over the entire sampling period (Figure 7–5) but are substantially below the proposed ACL. Concentrations in MW–0813 have averaged approximately 0.15 mg/L since 1998 with no apparent trend.

Selenium concentrations in ground water continued above the MCL but considerably below the proposed ACL (Table 7–2) in wells MW–0171, MW–0172, and MW–0173; values in well

CZO

MW–0813 remain near the laboratory detection limit (Figure 7–6). Except for MW–0813, there has been considerable variation in selenium concentrations; however, no trends are apparent.

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. Continuous measurements indicate four erroneous manual measurements occurred in 2000, 2001, and 2003—the continuous measurements indicated essentially no change at those times (Figure 7–7). Well hydrographs indicate that an overall decrease in the ground water elevation of approximately 2 feet occurred from 1998 through 2004, followed by a sharp increase of approximately 3 feet in 2005. This increase in ground water elevations is likely a result of recharge caused from the increased regional precipitation that occurred in late 2004 and throughout 2005.

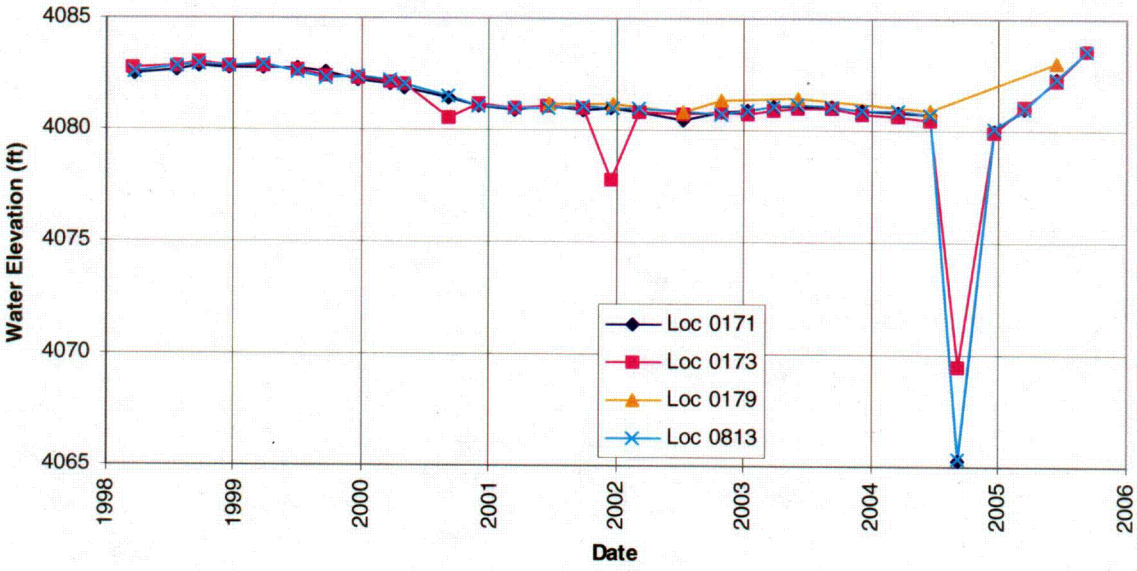


Figure 7–7. Ground Water Elevations at the Green River, Utah, Disposal Site

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 2005.

7.3.6 Photographs

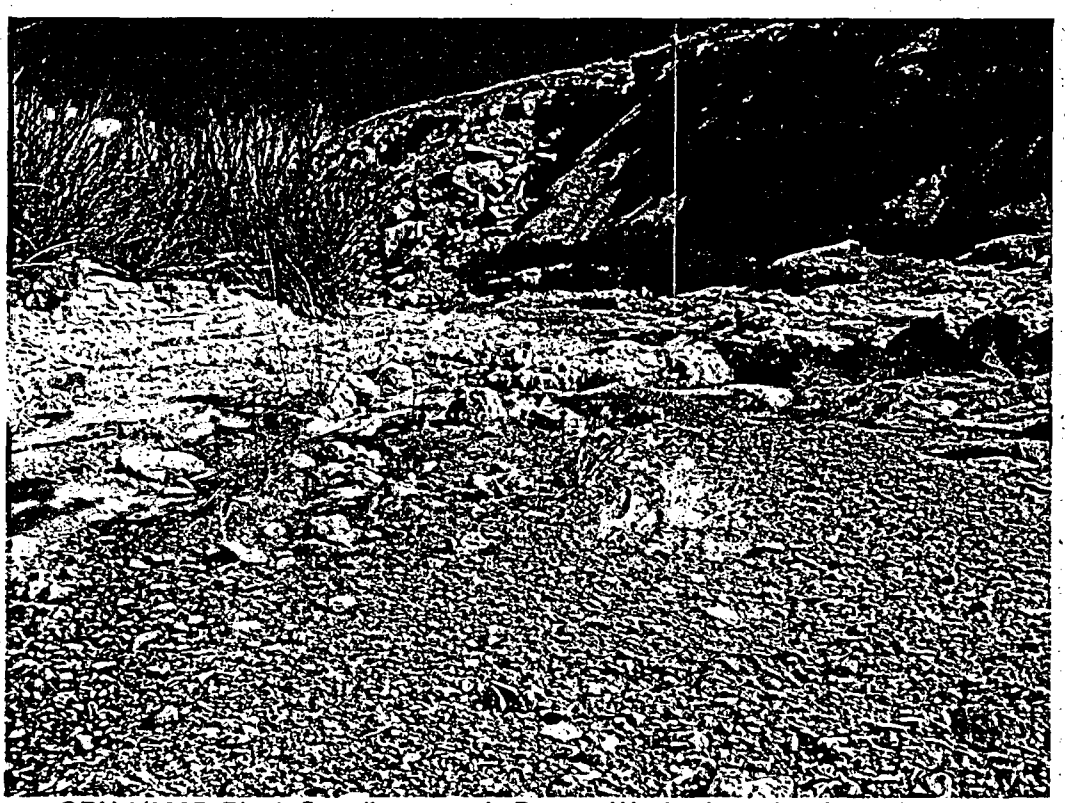
Table 7–3. Photographs Taken at the Green River, Utah, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	225	The southeast side slope of the disposal cell viewed from the east corner.
PL–2	300	View northwest towards the disposal cell.
PL–3	90	Successful erosion control around boundary monument BM-3.
PL–4	90	Standing water in Browns Wash where the channel crosses Cedar Mountain Formation bedrock.

GRN 3/2005. PL–1. The southeast side slope of the disposal cell viewed from the east corner.

GRN 3/2005. PL–2. View northwest towards the disposal cell.

GRN 3/2005. PL–3. Successful erosion control around boundary monument BM-3.



GRN 3/2005. PL–4. Standing water in Browns Wash where the channel crosses Cedar Mountain Formation bedrock.

8.0 Gunnison, Colorado, Disposal Site

8.1 Compliance Summary

The Gunnison Disposal Site, inspected on June 21, 2005, was in excellent condition. Six perimeter sign and the entrance sign were missing and bullets had damaged several others. All former erosion areas were stable. Areas reseeded in 2004 along the former Chance Gulch haul road require further monitoring, and therefore, the BLM right-of-way permit is still active. Revegetation of reseeded areas on Tenderfoot Mountain haul road is completed (determined to meet BLM Wildlife Mitigation Plan criteria for closure). 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

Institutional Controls—The 92-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1997. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, a site perimeter fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site. The site is surrounded by BLM owned land. The surrounding land is used primarily for livestock grazing and wildlife habitat.

8.3 Compliance Review

8.3.1 Annual Inspection and Report

The site, located southeast of Gunnison, Colorado, was inspected on June 21, 2005. 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— Access to the site is off Gunnison County Road 42 onto U.S. Bureau of Land Management (BLM) Road 3068 to the site entrance gate. The road to the site is an all-weather gravel road maintained by the BLM and was in good condition. The 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, found missing at the time of the inspection, was replaced. Perimeter signs P3, P4, P36, P40, P43, and P45 were also missing and replaced. Several other perimeter signs have gunshot damage but all were legible except P44 which was be replaced (P–1). 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 top strand of wire was broken at perimeter sign P38 and was repaired; otherwise, the fence and gates are 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. Identification numbers were repainted the two of the 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.

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 that might affect site integrity or the long-term performance of the site.

Top of Disposal Cell—The top of the disposal cell was in excellent condition (PL–2). 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.

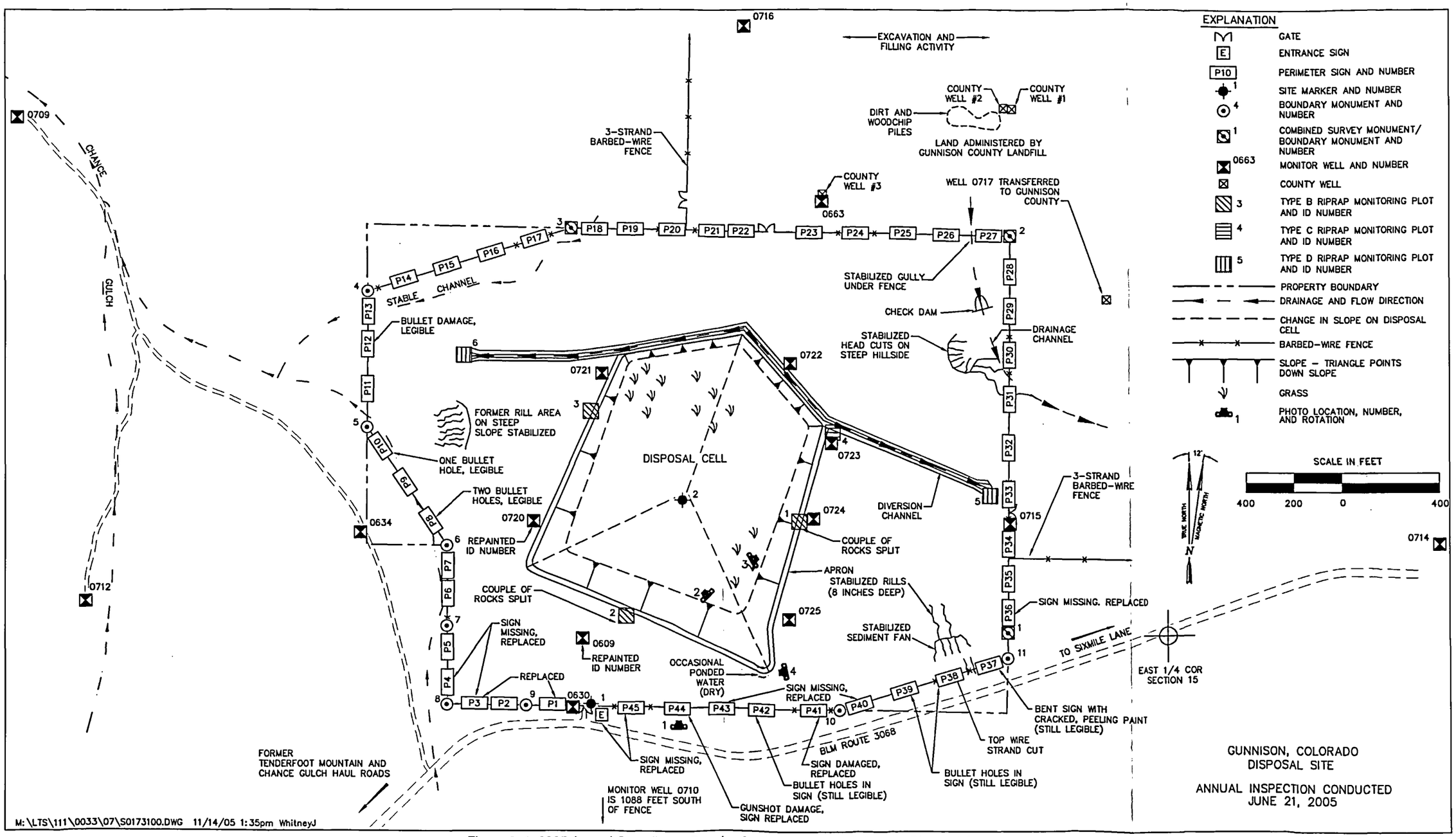


Figure 8–1. 2005 Annual Compliance Drawing for the Gunnison, Colorado, Disposal Site

Side Slopes, Apron, and Diversion Ditches—The riprap-covered side slopes, apron, and diversion ditches were in excellent condition (PL–3). 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 (PL–4).

The condition of the riprap in six monitoring plots was visually inspected. Each monitoring plot, roughly 1 square meter in area, is in a "critical flow path" location in the apron and diversion channels. Corners of each monitoring plot are marked with orange paint. A couple of rocks were found to have split in each of two of the monitoring plots in the apron (Numbers 1 and 2) but, overall, the rock is in excellent condition. As outlined in the LTSP, annual photographing and comparing of these monitoring plots occurred through the 2002 inspection, and the monitoring plots will be photographed every 5 years until 2017. The monitoring plots will be photographed again in 2007.

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 2005 inspection, the seeded areas were in excellent condition. Reclaimed areas had good coverage of vegetation, mostly grass. However, shrub and forb abundance and diversity is much less in reclaimed areas than in undisturbed areas.

During the 2005 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. No recent erosion was evident.

- 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 continues to be 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. Several perimeter signs were missing and others had been damaged since the 2004 inspection.

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 (PL–3). A check dam was constructed on landfill property west of the disposal site, apparently to control sediment transport. 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.

This transect also includes several reseeded areas on the reclaimed former Chance Gulch and Tenderfoot Mountain haul roads, which are approximately 1.5 and 2.25 miles west of the disposal cell, respectively.

The Chance Gulch haul road was established during cell construction to access a borrow area. The restored area is within critical habitat of the Gunnison sage grouse. A BLM right-of-way permit and a Wildlife Mitigation Plan establish criteria for successful revegetation for this road. The BLM 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 has been working to revegetate the road through a period of extended drought to meet BLM restoration criteria and close permits.

Although restoration has been successful along most of the reclaimed road, several isolated areas along the Chance Gulch haul road were reseeded in October 2000 to meet BLM's vegetation success criteria for species diversity. Additional areas were reseeded and mulched in fall 2004 to promote species diversity. A DOE representative met with Bureau of Land Management (BLM) staff to inspect the restored areas on June 20, 2005. BLM concluded the restored areas do not yet satisfy permit closure criteria. Weed control activities and inspections will be conducted for one more year in 2006.

The former Tenderfoot Mountain haul road extends from the disposal cell westward to the former processing site. The BLM right-of-way permit required successful revegetation of this haul road, also. The vegetative cover within the reseeded areas on Tenderfoot Mountain haul
8B road was determined to meet BLM Wildlife Mitigation Plan criteria. No further action is required of DOE at this location.

8.3.2 Follow-up or Contingency Inspections

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

8.3.3 Routine Maintenance and Repairs

In 2005, DOE replaced the entrance sign and several perimeter signs, a broken strand on a section of the perimeter fence was repaired, and identification numbers were repainted on two monitor wells.

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 2005; 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 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

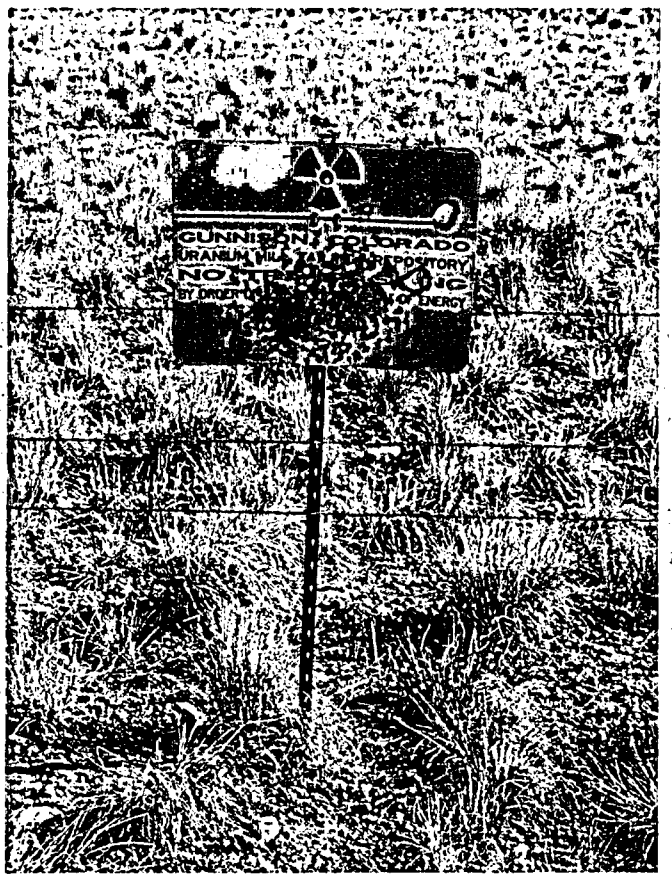
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2005.

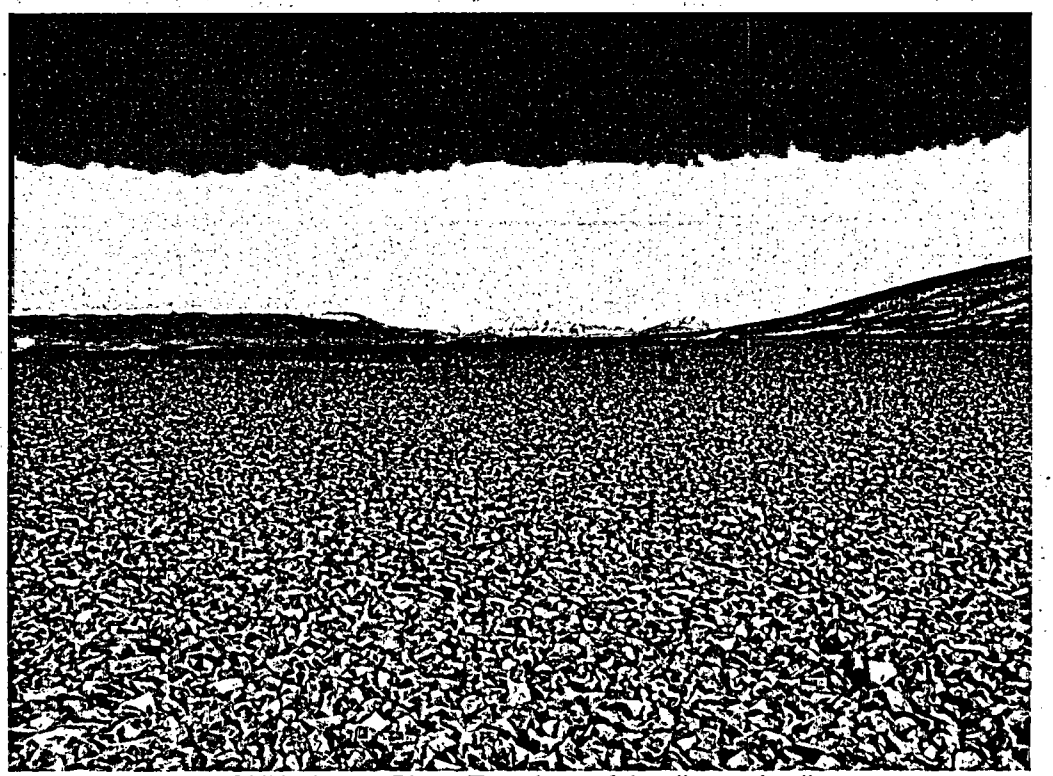
8.3.6 Photographs

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

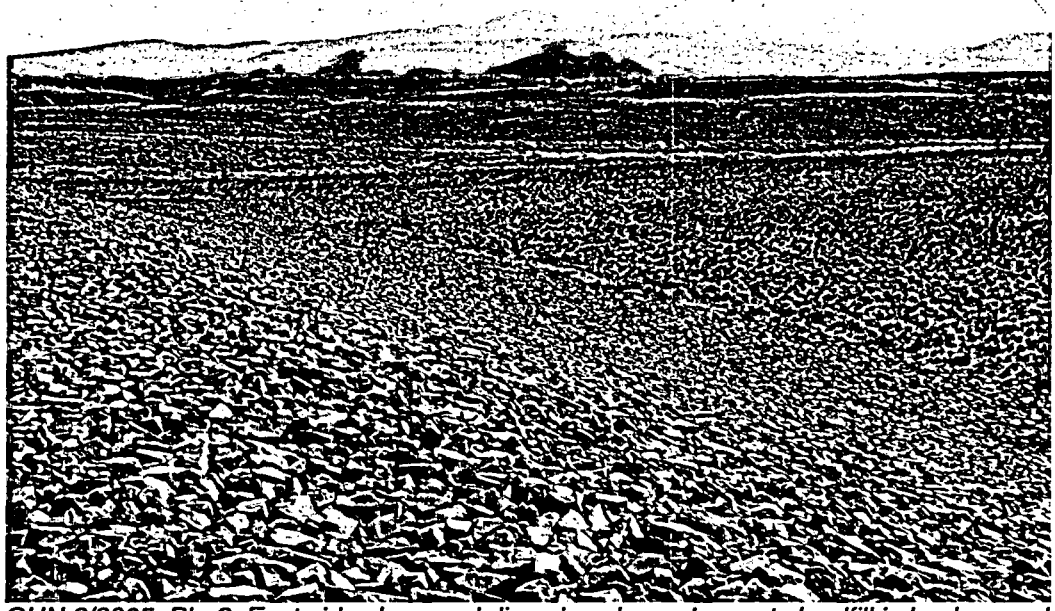
Photograph Location Number	Azimuth	Description of Photograph
PL–1	NA	Perimeter sign P44 showing gunshot damage.
PL–2	315	Top slope of the disposal cell.
PL–3	60	East side slope and diversion channel, county landfill in background.
PL–4	260	Southeast toe of the cell showing high water mark from ponded water.



GUN 6/2005. PL–1. Perimeter sign P44 showing gunshot damage.



GUN 6/2005. PL–2. Top slope of the disposal cell.



GUN 6/2005. PL–3. East side slope and diversion channel, county landfill in background.

GUN 6/2005. PL–4. Southeast toe of the cell showing high water mark from ponded water.

9.0 Lakeview, Oregon, Disposal Site

9.1 Compliance Summary

The Lakeview Disposal Site, inspected on July 13, 2005, was in good condition. Minor repairs were made to broken strands and loose sections of the perimeter fence. The seeded grass cover was improved on top of the cell and along the western side beyond the toe due to unusually high moisture during the spring. Field investigation on the effects of deep-rooted vegetation on cell performance continued through the modeling of the movement of water through the radon barrier of the cell cover and with the installation of water flux meters in the cover to directly monitor percolation rates.

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), remains pending U.S. Nuclear Regulatory Commission (NRC) concurrence. Results of the 2005 gradation test on the west side slope indicated that the median diameter of the riprap (2.41 inches) remains substantially above the recalculated minimum size (1.8 inches).

Two earthquakes of magnitude 3.4 and 3.6 occurred within 15 miles (25 km) of Lakeview, Oregon, during the year. No effects were observed from the first seismic activity during the annual inspection. And, a follow-up inspection conducted in late September 2005 after the second earthquake occurred found no disturbance and the disposal cell was observed to be in excellent condition.

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

Institutional Controls—The 40-acre disposal site is owned by the United States of America and was accepted under the NRC general license (10 CFR 40.27) in 1995. It was acquired from the privately held Collins Ranch by the State of Oregon through a civil action suit (Lake County Circuit Case No. L-86-060-CV, File No. 330-050-TL001-86) and transferred to the DOE for long-term care and ownership. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the

property, a site perimeter fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site. Perpetual easement to the site is provided on a private gravel road through the Collins Ranch. A locked cable across the access road on the Collins property, located about 1,800 feet east of the entrance gate, limits access to the site. The site is surrounded by privately owned land. The surrounding land is used primarily for livestock grazing and wildlife habitat.

9.3 Compliance Review

9.3.1 Annual Inspection and Report

The site, northwest of Lakeview, Oregon, was inspected on July 13, 2005. 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 0.4 mile east of the site. The DOE lock was missing at the time of the inspection,
9A so the chain was cut for access and another DOE lock was installed.

9B A barbed-wire boundary fence surrounds the site. Broken strands of barbed wire on the north boundary fence were removed and replaced with new strands. The lower part of the east boundary fence is strung with wire mesh, and a loose section again required tightening.

The entrance sign was in good condition. Ten of the twelve perimeter signs were in excellent 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.

Seismic Activity—The Lakeview Disposal Site is located in a seismically active region of the United States. The United States Geological Survey National Earthquake Information Center (USGS/NEIC) notifies DOE when earthquakes of magnitude 3.0 or greater occur within 20 miles (0.3 degree) of a disposal cell and when earthquakes of magnitude 5.0 or greater occur within 70 miles (1.0 degree) of a disposal cell. Two such events occurred in 2005. The first was of magnitude 3.4 on June 11 and occurred about 15 miles east-northeast of Lakeview. The second was of 3.6 magnitude quake and occurred about 15 miles east of Lakeview on August 12 (after the annual inspection). Earthquakes of this magnitude are common for the Lakeview area. No damage was noted during the 2005 inspection from the first earthquake. The site was visited again in late September following the second earthquake and found to be sound. The 2006 inspection will again look for any effects specific to these seismic activities.

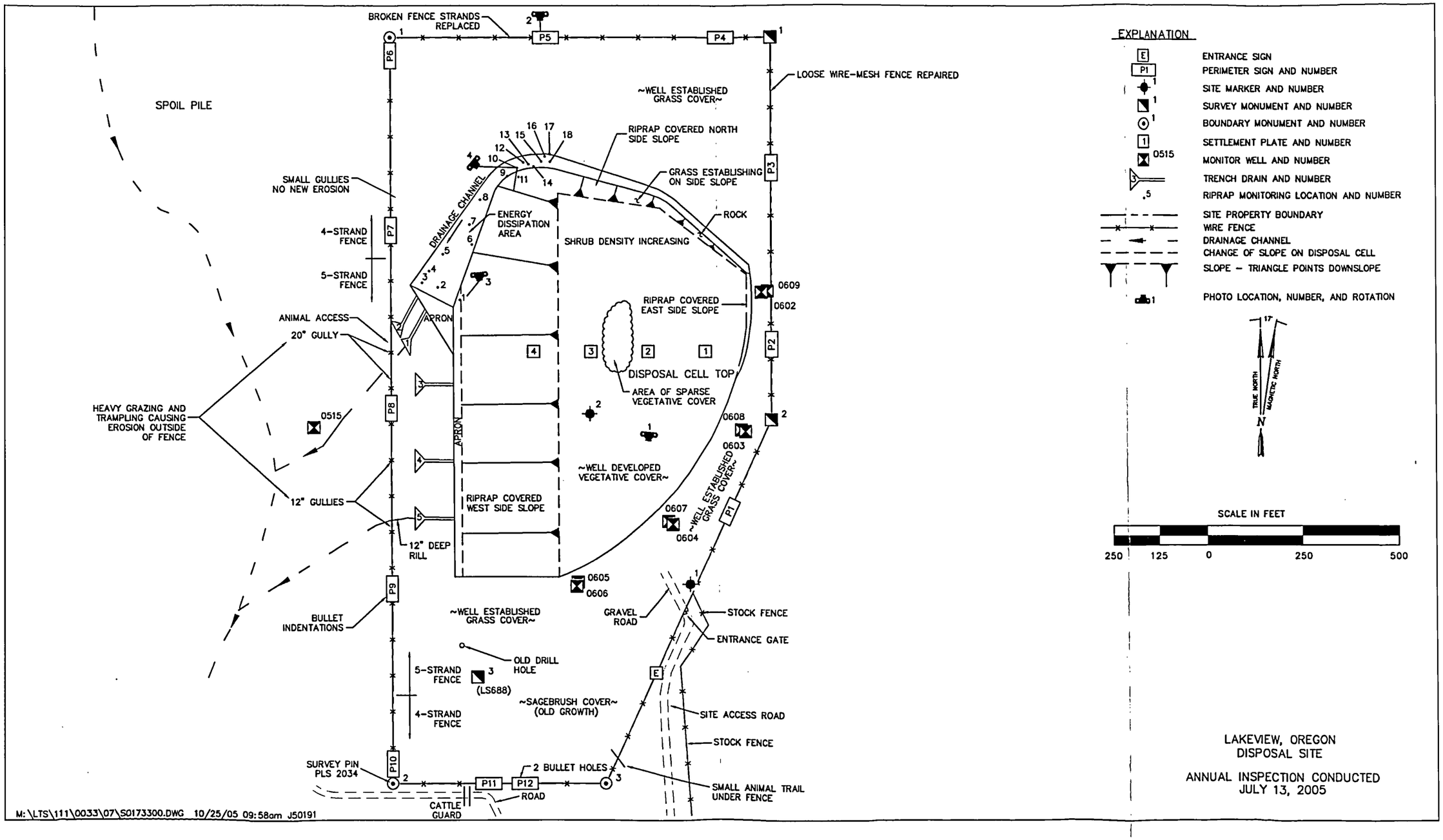


Figure 9–1. 2005 Annual Compliance Drawing for the Lakeview, Oregon, Disposal Site

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.

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 that might affect site integrity or the long-term performance of the site.

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 thin soil layer overlying a layer of rock on the top slope stores very little water, hence, most precipitation percolates deeper where it either drains laterally in the coarse sand layer or infiltrates the compacted soil layer (radon barrier).

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. Grass cover has gradually increased over the years as patches of deeper-rooted wheat grasses have spread. Considerably more vegetation was noted in the 2005 inspection than during the 2004 inspection, a likely result of the increased precipitation in 2005 (PL–1). Perennials and annuals, although limited, are also establishing on the cell top. Some areas still were found to have sparse vegetation.

Movement of precipitation through the riprap and bedding layers and into the radon barrier also favors the growth of shrubs. Sagebrush, rabbitbrush, and bitterbrush, which dominate plant communities surrounding the site, have been establishing on the top of the disposal cell. During the 2005 inspection it was noted that the shrub density continues to increase. Shrub growth likely will continue to increase until it approaches or exceeds levels observed in native plant communities adjacent to the site.

9C Field investigations at the Lakeview site continue and indicate that a combination of soil development and root intrusion by the deep-rooted shrubs has increased the hydraulic conductivity of the radon barrier in the cell cover, which may allow meteoric water to percolate into and leach contaminants from the underlying tailings. In situ tests have shown that the saturated hydraulic conductivity of the radon barrier ranges between 1×10^{-6} and 1×10^{-4} centimeters per second (cm/s). The design target was 1×10^{-7} to 1×10^{-8} cm/s. 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 installed instrumentation in 2005 to directly measure percolation rates through the cell cover and into the tailings. Several recently developed wicking lysimeters (water flux meters) capable of directly monitoring unsaturated water fluxes ranging from less than 10 millimeters per year to more than 1,000 millimeters per year were installed within or directly below the cell cover. Results of this monitoring will be included in the 2006 annual report. These measurements will continue for three to five years.

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–2). The side slope cover shows no sign of slumping or movement.

Riprap for the 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 had 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
9D 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 remains pending NRC concurrence.

9E The annual side slope riprap field gradation test was performed for the ninth year during the 2005 inspection (PL–3). Particle size distribution (weight percent) by count data was collected at 20 locations. The results indicate an average D_{50} of 2.41 inches with a 95 percent confidence interval between 2.15 and 2.67 inches. The D_{50} value measured for 2005 is similar to values measured for most of the previous 5 years: 2000 (D_{50} = 2.49), 2001 (D_{50} = 2.56), 2002 (D_{50} = 2.35), 2003 (D_{50} = 2.74), and 2004 (D_{50} = 2.48).

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, although variable (from 2.35 to 2.74 inches), shows little decrease in rock size overall based on the average D_{50} of 2.52 inches. This decreasing trend may be because the basaltic rocks used on the side slope were 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. However, the current method of rock-size measurement has been performed for the past 5 years and does provide a consistent metric for cover material changes.

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 (PL–4), 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 energy dissipation area at 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— This transect includes the area extending from the disposal cell to the site boundary and the area within 0.25 mile surrounding the site.

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. Small gullies observed forming downslope of the rock were not large enough to warrant repair. Reseeded areas between the disposal cell and site boundary were well established, and the native grass and shrub communities outside the site boundary were in good condition except some areas on the west where heavy grazing occurs. The area within 0.25 mile of the site boundary was unchanged from 2004.

9.3.2 Follow-up or Contingency Inspections

The USGS/NEIC notified DOE that two earthquakes occurred near the site in 2005. One was recorded on June 11, 2005 about 15 miles east-northeast of Lakeview that registered a magnitude of 3.4 on the Richter scale and a second occurred on August 12 about 15 miles east of Lakeview that registered a magnitude 3.6. Observations made during the annual inspection indicated that no effect had occurred on the site from the first earthquake; the disposal cell and the adjacent area were in excellent condition. And in accordance with the LTSP, a follow-up inspection was conducted in late September 2005 to document any effects that the second earthquake might have had on the site and the disposal cell. No disturbances were observed at or adjacent to the site, and the disposal cell was in excellent condition.

9F

9.3.3 Routine Maintenance and Repairs

In 2005, DOE replaced the lock on access road cable gate and performed minor fence repairs.

9.3.4 Ground Water Monitoring

DOE monitors ground water quality in the uppermost aquifer at this site once every 5 years, with the most recent sampling event performed in 2004. No monitoring was performed in 2005. Constituents analyzed every 5 years include arsenic, cadmium, and uranium. Their respective maximum concentration limits (MCLs), established by the U.S. Environmental Protection Agency in Table 1 to Subpart A of 40 CFR 192, 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 in

2004 and were consistent with sampling results from 1999. Based on the monitoring results to date, there is no indication of any degradation of ground water in the vicinity of the site. The next ground water quality compliance monitoring is scheduled for 2009.

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.

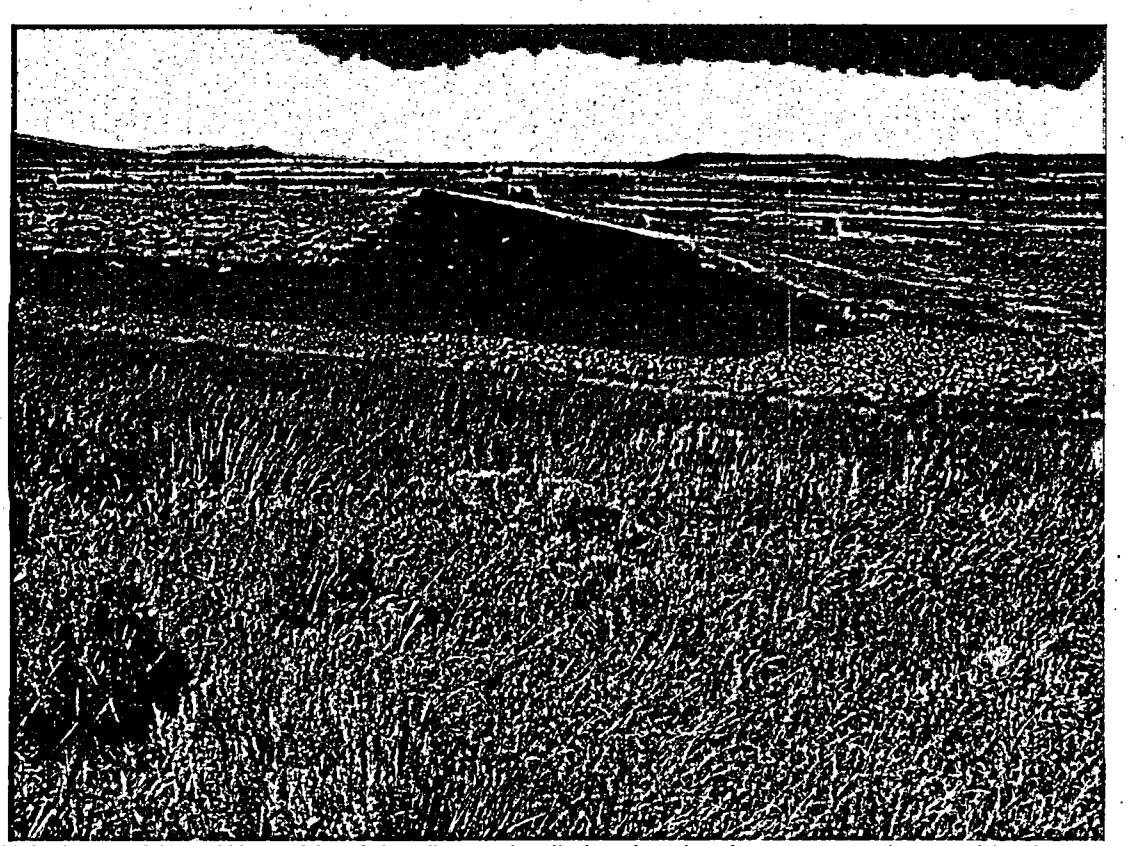
No corrective action was required in 2005.

9.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	185	Top of cell showing increased vegetation cover; sparse areas remain.
PL–2	180	West side of the disposal cell showing the riprap-covered west side slope and the drainage channel energy dissipation area.
PL–3	175	Collecting annual side slope riprap gradation test measurements.
PL–4	130	Northeast site showing increased vegetation on the disposal cell, north side slope, and upper drainage channel.

LKV 7/2005. PL–1. Top of cell showing increased vegetation cover; sparse areas remain.



LKV 7/2005. PL–2. West side of the disposal cell showing the riprap-covered west side slope and drainage channel energy dissipation area.

LKV 7/2005. PL–3. Collecting annual side slope riprap gradation test measurements.

LKV 7/2005. PL–4. Northeast site showing increased vegetation on the disposal cell, north side slope, and upper drainage channel.

10.0 Lowman, Idaho, Disposal Site

10.1 Compliance Summary

The Lowman Disposal Site, inspected on June 29, 2005, was in excellent condition. A small breach in a runoff interceptor bench was repaired during the site inspection to prevent erosion. Noxious weeds throughout the site were treated with herbicide. Maturing ponderosa pine trees are beginning to encroach on several perimeter signs, a site marker, and a survey/boundary monument; the obstructing trees and branches will be removed during the 2006 inspection. The Long-Term Surveillance and Maintenance Plan (LTSP) was revised, and approved by the U.S. Nuclear Regulatory Commission (NRC), to allow natural plant community succession on the disposal cell and discontinue ground water monitoring at the site. Inspectors found 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 for the U.S. Department of Energy [DOE] Lowman, Idaho, (UMTRCA Title I) Disposal Site* (DOE–LM/GJ771–2005, Revision 2, January 2005) 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 3.3	Section 10.3.1
Follow-up or Contingency Inspections	Section 3.4	Section 10.3.2
Routine Maintenance and Repairs	Section 3.5	Section 10.3.3
Ground Water Monitoring	Section 3.7	Section 10.3.4
Corrective Action	Section 3.6	Section 10.3.5

Institutional Controls—The 18-acre disposal site is owned by the United States of America and was accepted under the NRC general license (10 CFR 40.27) in 1994. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, warning/no trespassing signs placed along the property boundary, and a locked gate across the access road that leads to the site. The U.S. Forest Service (USFS) granted a perpetual easement for DOE to use the road to gain access to the site for surveillance, maintenance, and monitoring activities. The site is not fenced, but the topography and forest vegetation restrict or prevent vehicular access around the access gate or along the site perimeter.

The site is bounded on the east, south, and west sides by the Boise National Forest and, therefore, is protected from development or changes in land use. A parcel of reclaimed area immediately north of DOE property is owned by the State of Idaho, which acquired it from the USFS under Section 104 of UMTRCA for the purpose of remedial action. The State may eventually convey this parcel back to the USFS.

10.3 Compliance Review

10.3.1 Annual Inspection and Report

The site, located northeast of Lowman, Idaho, was inspected on June 29, 2005. 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 about 650-foot north of Idaho State Highway 21. 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. Four signs have bullet holes or dents, but were legible and do not need to be replaced. The other perimeter signs were in excellent condition.

Ponderosa pine trees have begun to encroach upon some of the perimeter signs and will soon block views of the signs or damage them (PL–1). Trees next to perimeter signs P1, P5, P6, and P18 will be cut during the 2006 inspection.

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

Young ponderosa pine trees are growing next to SMK–1 (PL–2) and monument SM–1/BM–1. These trees will be cut during the 2006 inspection to avoid damage to the features and to make them easier to find.

Monitor Wells—The monitoring network at the site consists of six monitor wells; MW–0548, MW–0549, MW–0575, MW–0580, MW–0583, and MW–0641, and one seep; SP–0561. Four of the wells are on site and two are just outside the site boundary. The seep 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 identified as LOW–01–029, east of the cell and not part of the monitoring network, was secure.

10A In accordance with the revised LTSP (January 2005), to which DOE received NRC concurrence (April 2005), ground water monitoring is no longer required. All seven wells are scheduled for decommissioning in 2006 in accordance with State of Idaho ground water protection requirements. Until the wells are decommissioned, inspections will continue to ensure security.

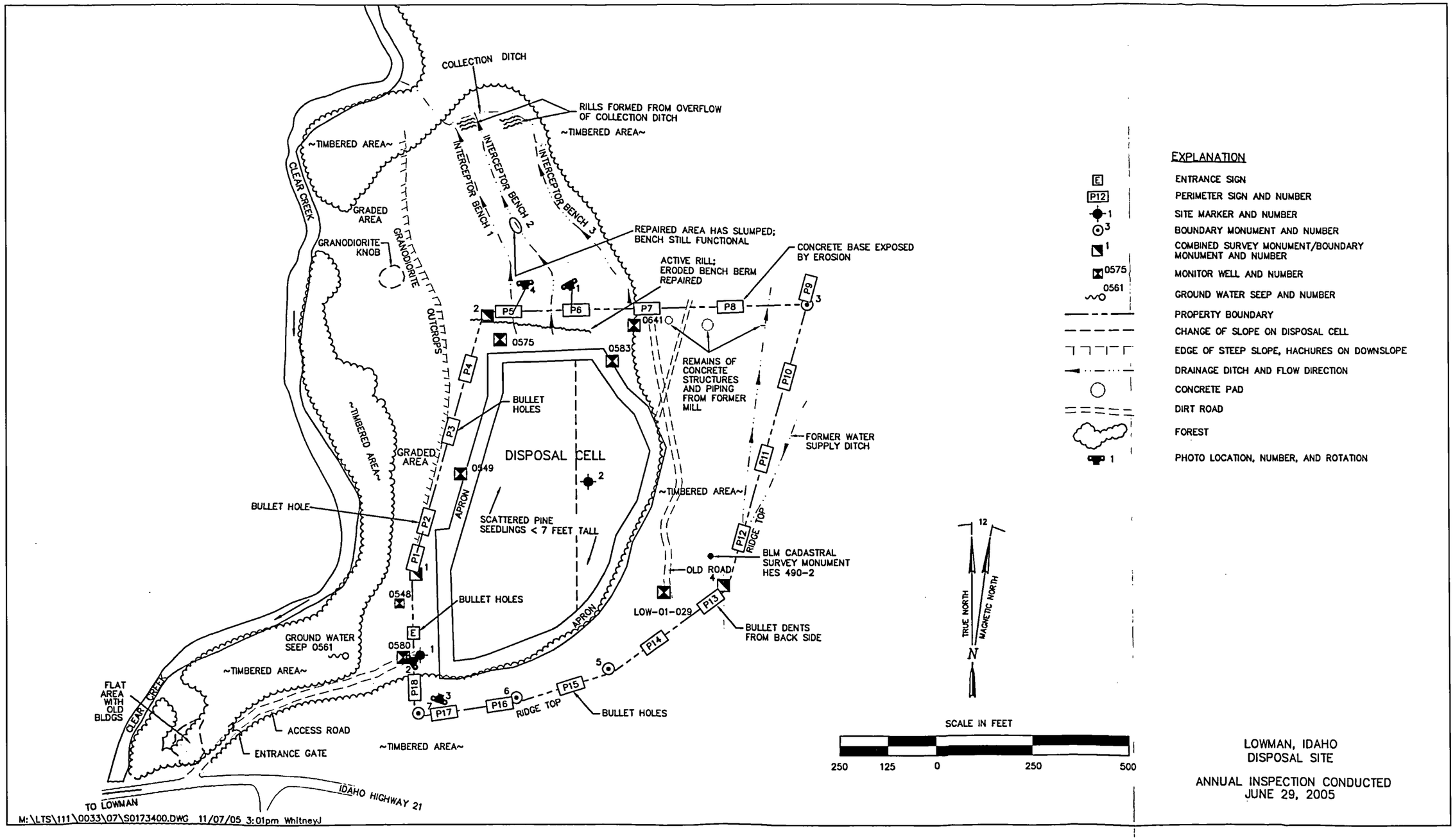


Figure 10–1. 2005 Annual Compliance Drawing for the Lowman, Idaho, Disposal Site

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.

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 that might affect site integrity or the long-term performance of the site.

Top and Side Slope of the Disposal Cell—Basalt riprap armors the top and west-facing side slope of the disposal cell. An apron of larger riprap surrounds the disposal cell on all sides. The riprap was in excellent condition (PL–3).

No evidence of instability, such as subsidence, slumping, differential settlement, or cracking was observed. Rock degradation was not evident. The surface of the riprap has become more irregular with time. When the cell was first constructed, the riprap surface was smooth and uniform. Over time, individual rocks shifted—primarily from freeze-thaw action and minor differential settling—and formed the present-day irregular surface. No cause for concern exists, as the riprap cover is stable and continues to provide effective erosion control at the site.

Vegetation encroachment continues on the top and side slope of the disposal cell (PL–2 and PL–3). Encroachment is expected as part of the natural processes operating at this location. The State of Idaho also 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 largest ponderosa pine trees on the cover are now approximately 7 feet in height.

In 2002, the DOE Long-Term Performance Project evaluated the results of column leach studies as part of a larger evaluation of the effect of plant encroachment on the long-term performance of the disposal cell. The hard-rock material (sands of Idaho Batholith materials containing auxiliary thorium and uranium and subjected to chemical and mechanical weathering processes) contained in the Lowman disposal cell is resistant to leaching. Increases in the cover's saturated hydraulic conductivity as a result of roots penetrating the compacted soil layer will not result in ground water contamination. Recognizing this, the Remedial Action Plan states that the disposal cell cover is not required to control infiltration.

The natural plant community succession can be allowed to proceed without increased risk to public health, safety, or the environment. The LTSP was revised to allow continued
10B encroachment of the native plant community. Although DOE is no longer required to manage the pine forest as it matures, the revised LTSP states that DOE will repair any damage that may occur to the riprap cover and underlying cover layers to maintain protection from erosion and possible consequent dispersion of cell contents.

Area Between the Disposal Cell and the Site Boundary—The steep slopes east and south of the site were stable and vegetated with well-established ponderosa pine and grasses. One active erosion rill no more than 8 inches in depth was previously discovered along the north boundary of the site adjacent to perimeter signs P5 and P6; it had bisected the berms of the lower two interceptor benches. The breach in Interceptor Bench 1 was repaired in October 2004, and the
10C breach in Interceptor Bench 2 was repaired during the 2005 inspection (PL–4). The repair made in Interceptor Bench 1 continues to remain in good condition.

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 the site. 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 USFS land and was unchanged.

In fall 1998, DOE completed an erosion control project to stabilize eroding slopes west and north of the disposal cell on the parcel owned by the State. The slopes were regraded and reseeded. Three interceptor benches and a collection ditch were installed on the slope north of the site to collect storm water and direct it into a natural drainage that runs into Clear Creek. DOE repaired subsequent erosion damage to the upper benches in fall 1999.

After the 1999 repairs, additional erosion occurred near the upper end of the collection ditch. At this location, a natural drainage from the ridge northeast of the site drains toward Clear Creek. Because water flow from this drainage potentially could overwhelm the collection ditch and exceed its design capacity, the erosion area was repaired and hardened with rock in July 2003.

At the time of the 2005 inspection, the interceptor benches and collection ditch were in good condition. However, a breach in the north end of Interceptor Bench 2 was discovered during the inspection. Runoff water from above the bench now flows across the berm through several large rills into Interceptor Bench 1 and the collection ditch. The rills appear to be protected from further downcutting by the underlying bedrock, loose rock, and vegetation (primarily ponderosa pine).

After the inspection, DOE notified the State that it considers its erosion control activities on the State parcel to be complete. Erosion will continue to be monitored during annual site inspections to ensure protection of the disposal cell and other site surveillance features such as property signs and boundary monuments. If significant erosion is observed on the State parcel and it appears that sediment potentially could enter Clear Creek, DOE will notify the State.

10.3.2 Noxious Weeds

Infestations of the noxious weeds spotted knapweed and dalmatian toadflax continue to persist, and were again identified on and adjacent to the site in 2005. Since 2003, applications of herbicide in both the spring and fall have been effective in significantly reducing the weed populations. Additional herbicide was applied (spot applications) in September 2005 to control
10D noxious weeds found intermittently throughout the site and the area just outside the site boundary, particularly west and north of the disposal cell. DOE will continue to monitor the success of herbicide applications.

An area approximately 1 acre in size in the southwest corner of the site, which had become barren as a result of the herbicide applications, was reseeded with desirable perennial species in fall 2004 to help prevent future infestations by noxious weeds. At the time of the 2005 inspection, this area was well vegetated with both undesirable annual species and desirable perennial species. Very few noxious weeds were present. This area will continue to be monitored for revegetation success.

10.3.3 Follow-Up or Contingency Inspections

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

10.3.4 Routine Maintenance and Repairs

In 2005, a small breach in the middle interceptor bench was repaired to prevent further erosion and herbicide was applied to control infestations of noxious weeds.

10.3.5 Ground Water Monitoring

In accordance with the LTSP, DOE monitored ground water at this site annually from 1994 through 2004 to verify the initial performance of the disposal cell. The LTSP also directed periodic performance evaluations be conducted to determine: (1) the effectiveness of the disposal cell ground water compliance strategy, (2) the effectiveness of the ground water monitoring plan, and (3) the need for continued ground water monitoring. Based on an evaluation of the ground water monitoring results to date it was concluded that there was no technical rationale to continue ground water monitoring because cell performance monitoring indicated that no contaminants had leached from the cell. Therefore, the disposal cell presents no impact on ground water quality near the site and there is no unacceptable risk to human health and the
10E environment. Consequently, NRC approved the revised LTSP that stated all ground water monitoring at the Lowman site is no longer required.

10.3.6 Corrective Action

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

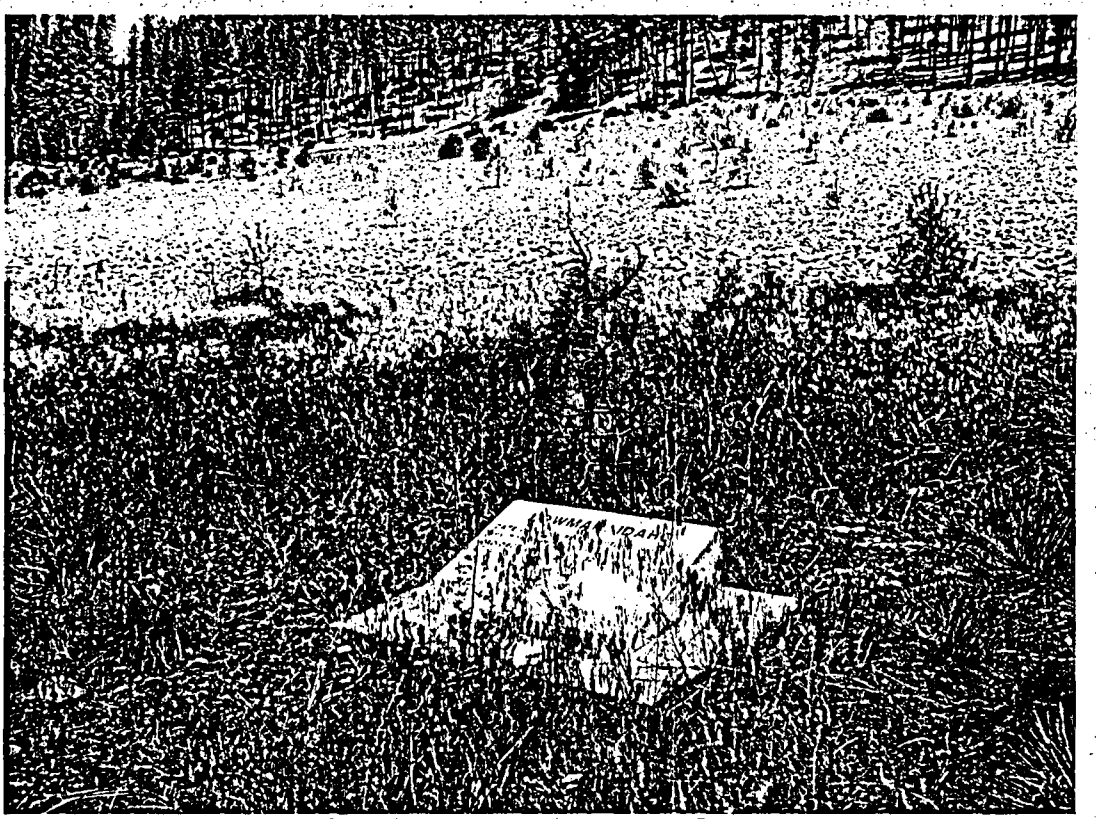
No corrective action was required in 2005.

10.3.7 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	150	Ponderosa pine growing in front of perimeter sign P6.
PL–2	55	Site marker SMK-1.
PL–3	20	View north across the toe of the disposal cell.
PL–4	175	Completed erosion repair of Interceptor Bench 1.

LOW 6/2005. PL–1. Ponderosa pine growing in front of perimeter sign P6.



LOW 6/2005. PL–2. Site marker SMK-1.

LOW 6/2005. PL–3. View north across the toe of the disposal cell.

LOW 6/2005. PL–4. Completed erosion repair of Interceptor Bench 1.

End of current section

11.0 Maybell, Colorado, Disposal Site

11.1 Compliance Summary

The Maybell Disposal Site was inspected on August 2, 2005, and was in excellent condition. All erosion control features were functioning as designed and there was no evidence of sediment moving off site. Healthy vegetation has established on restored areas. Relinquishment of a right-of-way reservation for the reclaimed area north of the site was received from the U.S. Bureau of Land Management (BLM). Notice stating that DOE considered all conditions of the remedial action agreement have been satisfied was submitted to the BLM, and termination of the agreement is understood unless objection is received. No deep-rooted plants were found on the cell top. Concurrence to discontinue ground water level monitoring and decommission the monitor wells was received from the U.S. Nuclear Regulatory Commission (NRC). 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

Institutional Controls—The 251-acre disposal site is owned by the United States of America and was accepted under the NRC general license (10 CFR 40.27) in 1999. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, a site perimeter fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the site entrance. Other than the county road right-of-way northeast of the site, the property is surrounded by land owned by the BLM to the north and east and private owners to the south and west. The surrounding land is used primarily for livestock grazing and wildlife habitat, although open pits from past uranium mining activity remain near to the site.

11.3 Compliance Review

11.3.1 Annual Inspection and Report

The site, located northeast of Maybell, Colorado, was inspected on August 2, 2005. 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 Moffat County Road 53, a right-of-way crossing Bureau of Land Management (BLM) property at the location of the site entrance. The 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 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. A fifth and final locked gate is located directly west of perimeter sign P3 in the northwest corner of the property and provides access to the monitor wells located in the southwest portion of the property. All the gates are standard tubular metal stock gates and were in good condition.

A barbed wire stock fence that surrounds the disposal cell and drainage structures was in good
11A condition. A broken wire was found adjacent to perimeter sign P3 and was repaired. Evidence of deer, elk, and pronghorn antelope is abundant on the site, and these big game animals probably are the cause of loose and broken wires often found at the site.

The entrance sign, mounted on a t-post in the fence line, is next to 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 granite 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 last surveyed in July 2004, which concluded the 5-year post-construction annual settlement survey requirement stipulated in the site LTSP. The surveys demonstrated that no significant settlement had occurred on the disposal cell top.

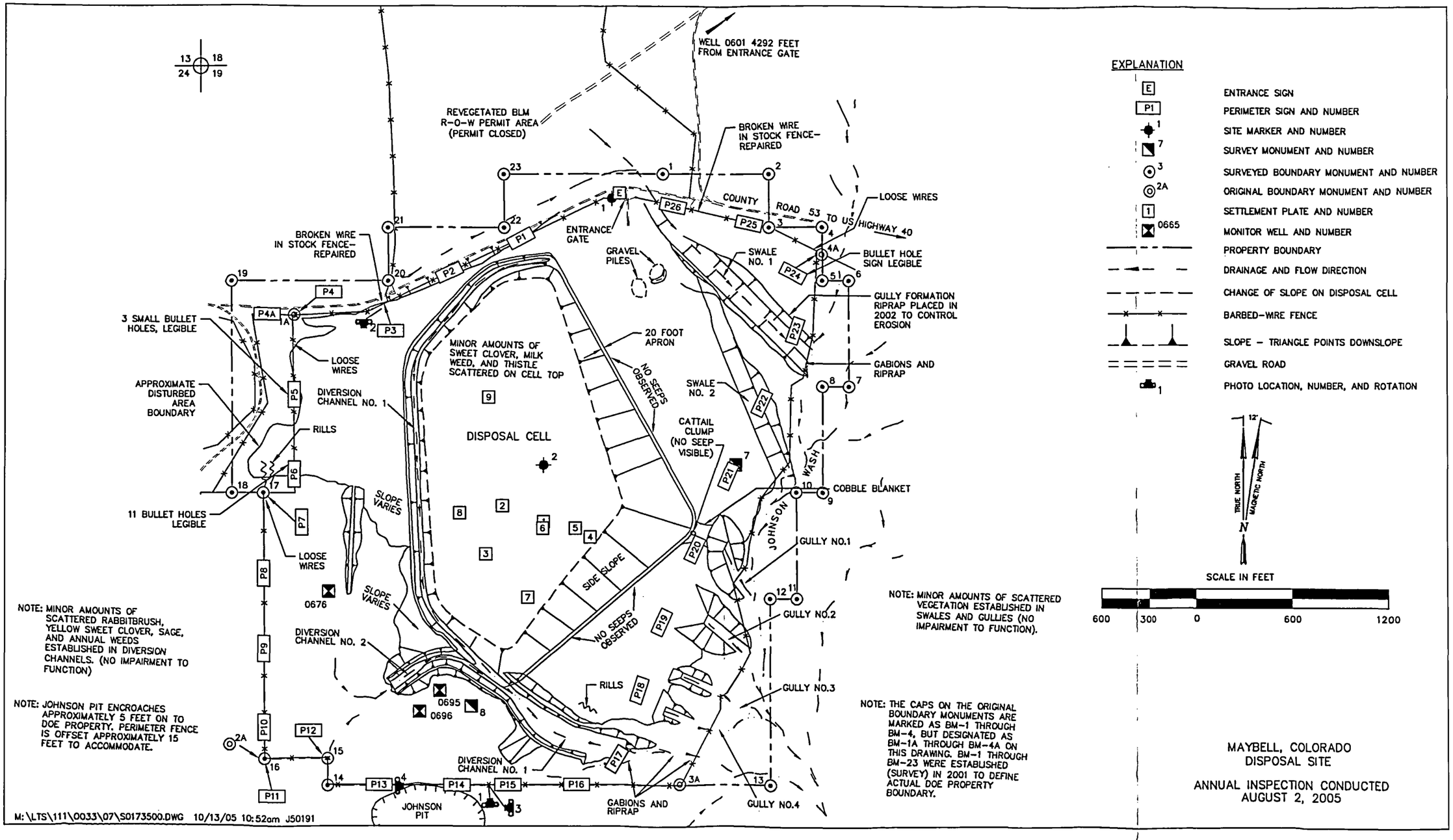


Figure 11–1. 2005 Annual Compliance Drawing for the Maybell, Colorado, Disposal Site

Monitor Wells—Four monitor wells are located onsite and were formerly used for water level measurements. All the wells inspected were secure and in good condition. Water level measurements were concluded in 2004 with concurrence received from NRC in January 2005 as described in Section 11.3.4 below. DOE intends to decommission the wells in 2006.

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.

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 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.

Minor vegetation encroachment, consisting primarily of grasses and annual weeds, were observed on the cell top and side slopes (PL–2). No deep-rooted woody plant species were found growing on the disposal cell. Previously treated areas showed no evidence of new growth.

In accordance with the LTSP, inspectors looked for seeps on the northeast and southeast side slopes because large quantities of slimes were encapsulated in this portion of the cell. No seeps were observed. 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. 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. No standing water was noted at the time of the inspection.

Other Areas On Site—The rock-armored diversion channels, 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. No new head cutting was observed. Evidence of erosion will continue to be monitored during annual site inspections.

Vegetation in the reclaimed areas on the site was diverse and healthy. In August 2004, DOE requested termination of a remedial action agreement with the BLM based on the successful reclamation. However, termination of the remedial action agreement for the site was not received. In pursuit, DOE submitted a follow-up letter in January 2005 stating that it considered
11B all conditions of the remedial action agreement had been met, and that as further indication of successful site reclamation, DOE had received termination of the site Storm Water Discharge Permit by the Colorado Department of Public Health and the Environment in June 2004. The January 2005 follow-up correspondence concluded by stating that unless any objections were received from the BLM, DOE considered the remedial action agreement to be terminated. No objections have been received from the BLM.

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. 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
11C provided written concurrence that the site had revegetated successfully, with no erosion occurring, and relinquished the right-of-way reservation in September 2004.

Directly south of the site is a former open pit uranium mine referred to as the Johnson Pit (PL–3). Minor encroachment (approximately 5 feet) of the Johnson Pit onto DOE property at the south end of the site was noted and documented; however, evidence of recent encroachment was not observed (PL–4). The perimeter fence in this location diverts approximately 15 feet off of an east/west line to accommodate this minor encroachment. The encroachment does not adversely affect the disposal cell or any of the associated erosion control features.

11.3.2 Follow-Up or Contingency Inspections

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

11.3.3 Routine Maintenance and Repairs

Minor repair was made to the perimeter fence at one location adjacent to perimeter sign P3.

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. Narrative supplemental standards have been applied, and ground water quality 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 have been related to transient drainage from the disposal cell. Evaluation of datalogger information from November 1995 through March 2004 (in excess of the required 5-year period) showed a slight increasing trend of ground water levels since mid-1997 (Figure 11–2). As presented in a June 2004 Notice of Intent to the NRC, 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 former processing site-related ground water mound under the cell which, in turn, would be affected by the natural fluctuation of ground water levels in the area.

As stated in the notice, DOE satisfied the water level monitoring criteria specified in the LTSP. The criteria were (1) water levels in the down- and cross-gradient wells continue to vary with water levels in the distant up-gradient well, (2) it is possible to identify the contribution to water level from transient drainage in the noise created by atmospheric (barometric) effects, and (3) the transient water contribution can be separated from decrease of approximately two feet in water level due to dissipation of the ground water mound. In June 2004, DOE submitted a notice of intent to discontinue ground water level monitoring and decommission the monitor wells. Concurrence from the NRC was received in January 2005 and no ground water level monitoring was performed in 2005. The notice and subsequent concurrence serves as a modification to the LTSP, eliminating ground water level monitoring and reporting as a best management practice for long-term management of the Maybell disposal site.

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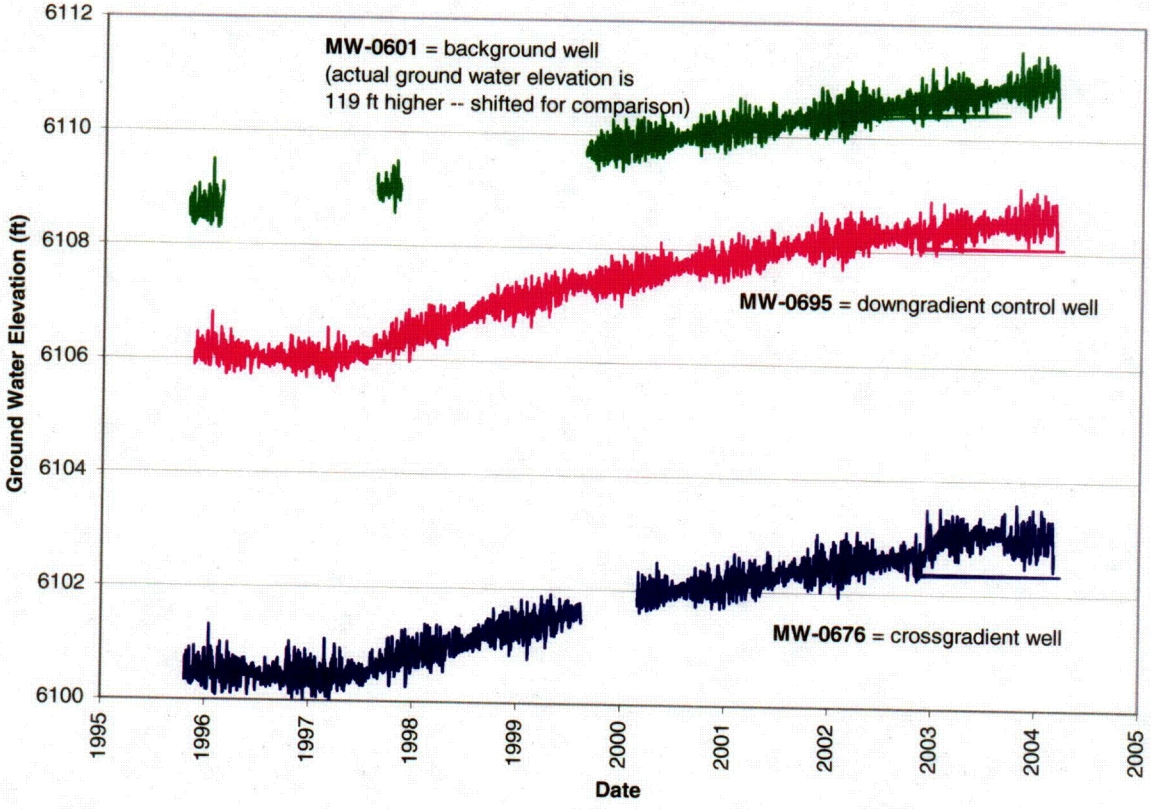


Figure 11–2. Water Level Measurements at the Maybell, Colorado, Disposal Site

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 2005.

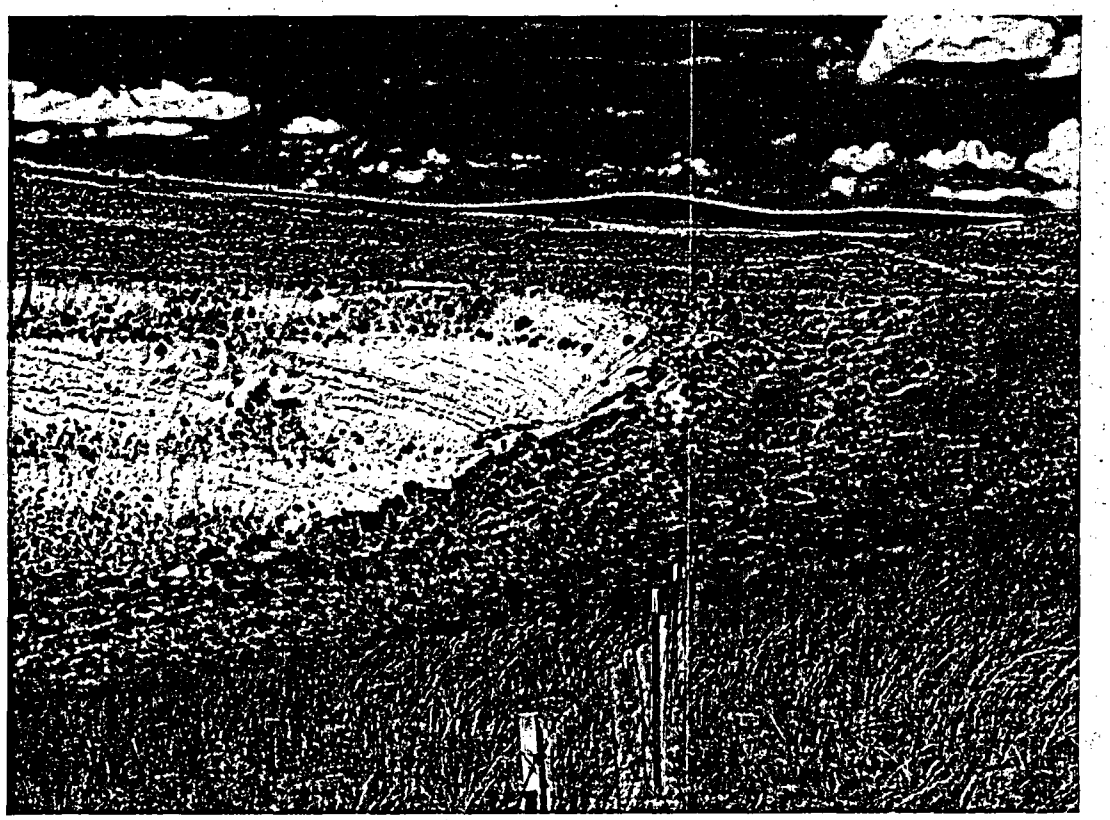
11.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	345	View of the disposal cell from just west of perimeter sign P15.
PL–2	180	View of Diversion Channel No.1, armored slope northwest of the disposal cell, and west side of the disposal cell showing scattered vegetation.
PL–3	270	View west along the south perimeter fence from just west of perimeter sign P15 showing the north end of the Johnson Pit.
PL–4	90	North end of the Johnson Pit showing the slight encroachment onto DOE property as a result of sloughing.

MAY 8/2005. PL–1 View of the disposal cell from just west of perimeter sign P15.

MAY 8/2005. PL–2. View of Diversion Channel No1, armored slope northwest of the disposal cell, and west side of the disposal cell showing scattered vegetation.



MAY 8/2005. PL–3. View west along the south perimeter fence from just west of perimeter sign P15 showing the north end of the Johnson Pit.

MAY 8/2005. PL–4. North end of the Johnson Pit showing the slight encroachment onto DOE property as a result of sloughing.

12.0 Mexican Hat, Utah, Disposal Site

12.1 Compliance Summary

The Mexican Hat, Utah, Disposal Site, inspected on April 27, 2005, was in good condition. Runoff from recent storm events continues to transport sediment into the west diversion channel and has resulted in vegetation growth within the channel; however, the performance of the diversion channel has not been impaired. Repairs were made to the perimeter fence segment damaged from storm events in 2004. A boundary monument at the southwest corner of the property is damaged and will be repaired in 2006. Trash continues to accumulate and trespassing continues to occur between the perimeter fence and the site boundary, but does not affect the security or integrity of the site. Tamarisk onsite was removed and treated with herbicide. Seep monitoring results continue to indicate the disposal cell is performing as designed, and that concentrations of all target constituents are likely the result of former uranium processing site operations and the naturally occurring water quality in the area. An evaluation of the monitoring program is planned for 2006. 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

Institutional Controls—The 119-acre disposal site is held in trust by the United States of America for the Bureau of Indian Affairs; the Navajo Nation retains title to the land. DOE and the Navajo Nation executed a Custodial Access Agreement (CAA) that conveys to the federal government title to the residual radioactive materials stabilized at the repository site and ensures that DOE has perpetual access to the site. UMTRCA authorized DOE to enter into Cooperative Agreement (CA) (DE-FC04-85AL26731) with the Navajo Nation and the U.S. Nuclear Regulatory Commission (NRC) required it prior to bringing the site under the general license. The purpose of the CA was to perform remedial actions at the former processing sites. The site was accepted under the NRC general license (10 CFR 40.27) in 1997. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal control of the property, a site perimeter fence, warning/no

trespassing signs placed along the property boundary, and a locked gate at the entrance to the site. The site is surrounded by Navajo Nation Reservation land. The surrounding land is used primarily for livestock grazing and wildlife habitat.

12.3 Compliance Review

12.3.1 Annual Inspection and Report

The site, located south of Mexican Hat, Utah, was inspected on April 27, 2005. 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. An eroded channel is developing on the access road between the parking area and the entrance gate; vehicular access may become difficult in the future. No repairs are necessary at this time. DOE has perpetual access to the site through a Custody and Access Agreement with the Navajo Nation.

A barbed-wire fence set inside the property boundary, with a chain-link gate at the site entrance, encloses the site. The entrance gate and the perimeter fence are in excellent condition. Where the perimeter fence crosses the terminus of the West Ditch storm water diversion channel, a fence post and several barbed-wire strands damaged by storm events and site intrusion by cattle, and
12A temporarily repaired to control access in 2004, were permanently repaired in 2005 (PL–1).

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. All site markers were in good condition. Boundary monument BM–7, located in the southwest corner of the property on the side of a dirt road, was found damaged by a vehicle (PL–2). The boundary monument stem and cap were removed from
12B the site and protection was placed over the jagged metal edge. Repairs will be made in 2006. Boundary monument BM–11, located in an area subject to erosion, remains stable. The markings on survey monument SM–5 are illegible; however, no action is required at this time. All other boundary and survey monuments were in good condition.

Monitor Wells—Three monitor wells (MW–0899, MW–0934, and MW–0935) are located onsite and were in good condition.

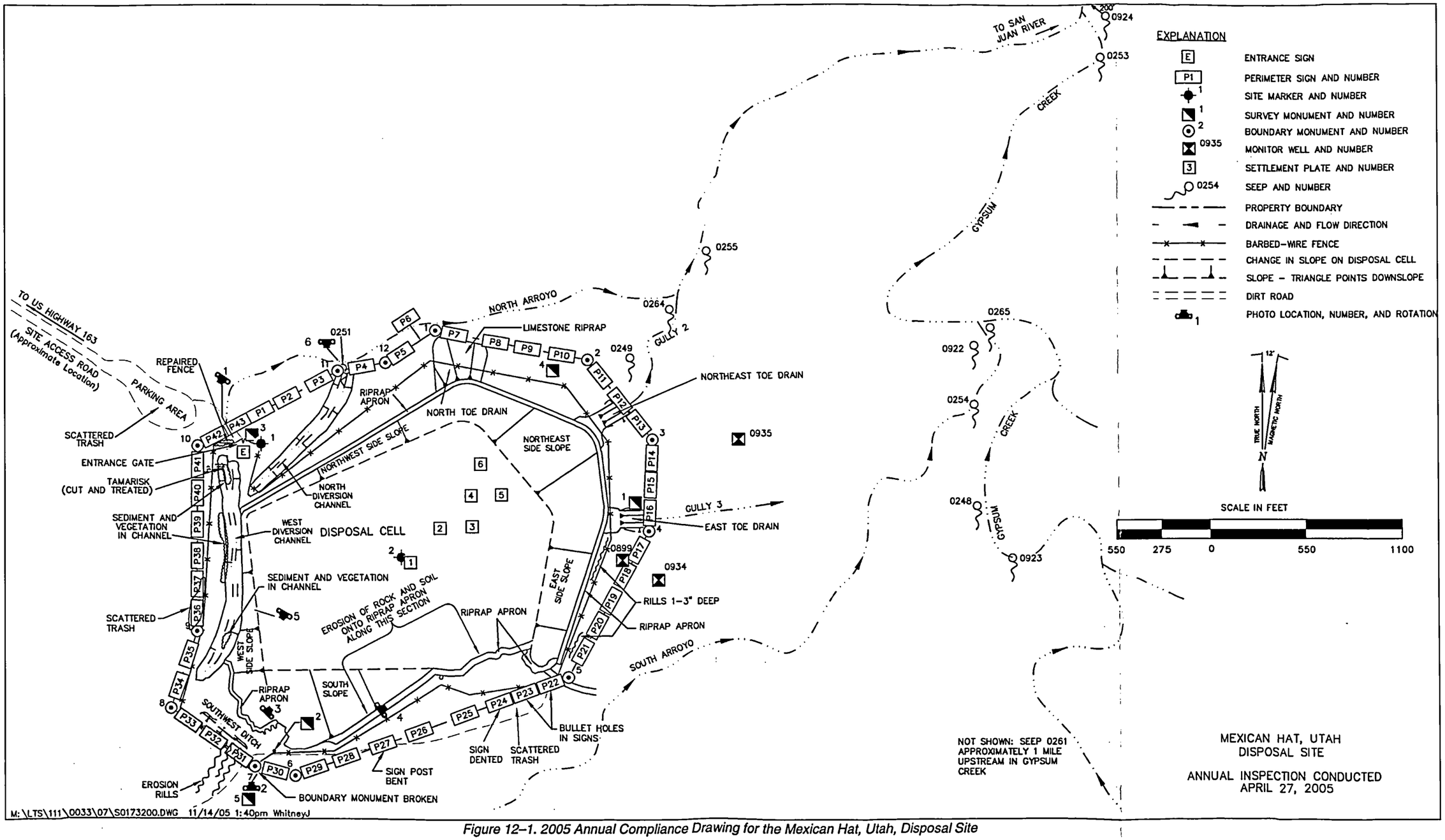


Figure 12–1. 2005 Annual Compliance Drawing for the Mexican Hat, Utah, Disposal Site

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

Top of Disposal Cell—The top of the riprap-armored disposal cell was in excellent condition (PL–3). 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 since construction because rock and soil have sloughed off the adjacent steep hill slope onto the apron. Based on comparisons with photographs from previous inspections, there was no significant increase in accumulation of the red sandstone and soil along the south apron (PL–4). As observed in past years, 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. However, as a best management practice, inspectors will continue to observe material that has fallen and accumulated on the edge of the apron in this area.

Off-site upgradient areas continue to erode and transport sediment onto the site and into the West Diversion Channel and Southwest Ditch. Plant growth, primarily annual weeds, is establishing where the sediment has accumulated in West Diversion Channel (PL–5). The sediment accumulation and plant growth have not affected the performance of these storm water diversion structures, and the rate of sedimentation is expected to diminish as the upgradient landscape
12C stabilizes. Tamarisk, a deep-rooted noxious plant, growing within the outlet of the West Diversion Channel was cut and the remaining stalks were treated with herbicide.

Area Between the Disposal Cell and the Site Boundary—Minor erosional rills and gullies are present upstream of the West Diversion Channel and Southwest Ditch, and along the east side slope of the cell. Though some sediment is entering the diversion structures, 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.

Scattered trash (e.g., broken glass, beer bottles and cans, automotive wastes, discarded tires, etc.) continues to accumulate in and adjacent to the site. Although most of the trash remains offsite, incremental trash removal will be planned as part of the annual inspections. Inspectors will note any type of trash that could be regulated as a hazardous waste (lead-acid batteries, used oils, etc.)

and dispose of it in accordance with applicable laws and regulations. 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 that is occurring, will continue to be monitored.

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 2005.

12.3.3 Routine Maintenance and Repairs

Fence repairs and control of Tamarisk were performed in 2005.

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. DOE will seek NRC concurrence, in consultation with the Navajo Nation, to decommission monitor wells at the site in 2006.

Shallow ground water recharged by local precipitation is perched on top of the aquitard and
12D emerges as seeps at several locations. The LTSP requires annual monitoring of six seeps (Table 12–2) to assess disposal cell performance. Seep flow volume is low and does not constitute a water resource. The increased precipitation that occurred in 2005 did not result in a significant increase in seep flows as observed at the time of sampling.

Table 12-2. Seep Ground Water Monitoring Locations at the Mexican Hat, Utah, Disposal Site

Seep Number	Location	Hydrologic Relationship
LOC–0251	North Arroyo	Downgradient
LOC–0264	North Arroyo	Downgradient
LOC–0248	Gypsum Creek	Downgradient
LOC–0254	Gypsum Creek	Downgradient
LOC–0261	Gypsum Creek	Upgradient (background)
LOC–0922	Gypsum Creek	Downgradient

Due to ice or insufficient water, DOE was able to sample only three of the six seeps in February 2004. In 2005, sampling was moved to April to avoid freezing conditions and to maintain sampling during a wetter time of the year when disposal cell performance would be most evident. Samples were collected from five of the six seeps in 2005; only seep 0251 was not sampled due to insufficient water (PL–6).

Sample results for three target analytes—nitrate, sulfate, and uranium—from 1998 through 2005 are shown on time-concentration plots (Figures 12–2 through 12–4). The target analytes are monitored for an indication of degradation of seepage water quality. Although not required by the LTSP, results can be compared to U.S. Environmental Protection Agency maximum concentration limits (MCL) provided in 40 CFR 192 Table 1 of Subpart A (Table 12–3).

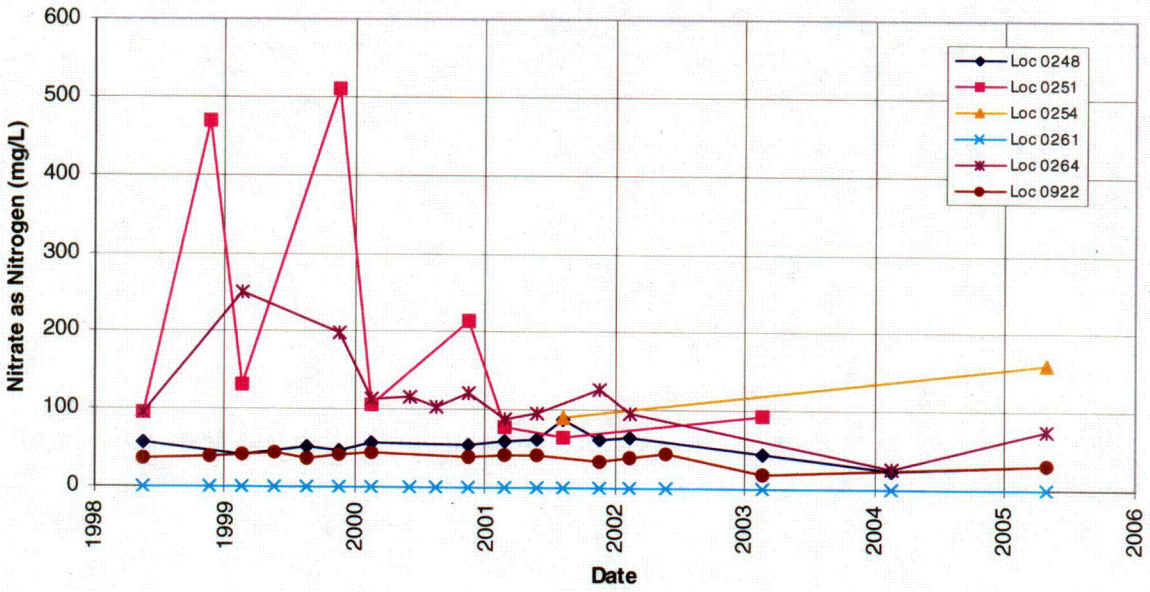


Figure 12–2. Time-Concentration Plots of Nitrate (as N) in Seep Water at the Mexican Hat, Utah, Disposal Site

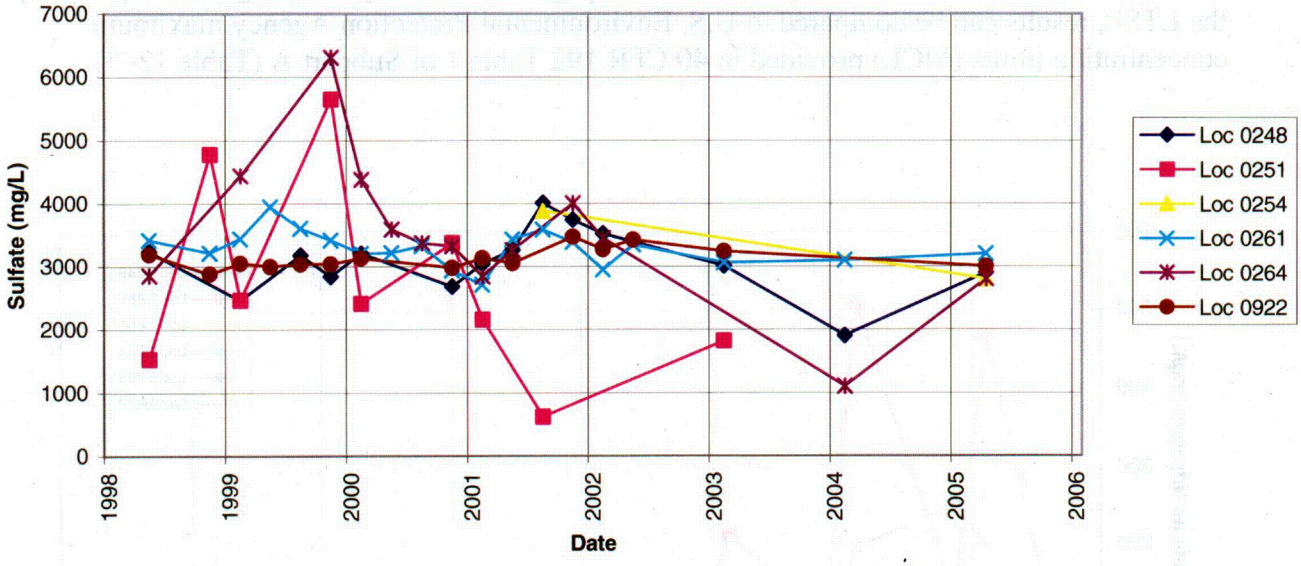


Figure 12–3. Time-Concentration Plots of Sulfate in Seep Water at the Mexican Hat, Utah, Disposal Site

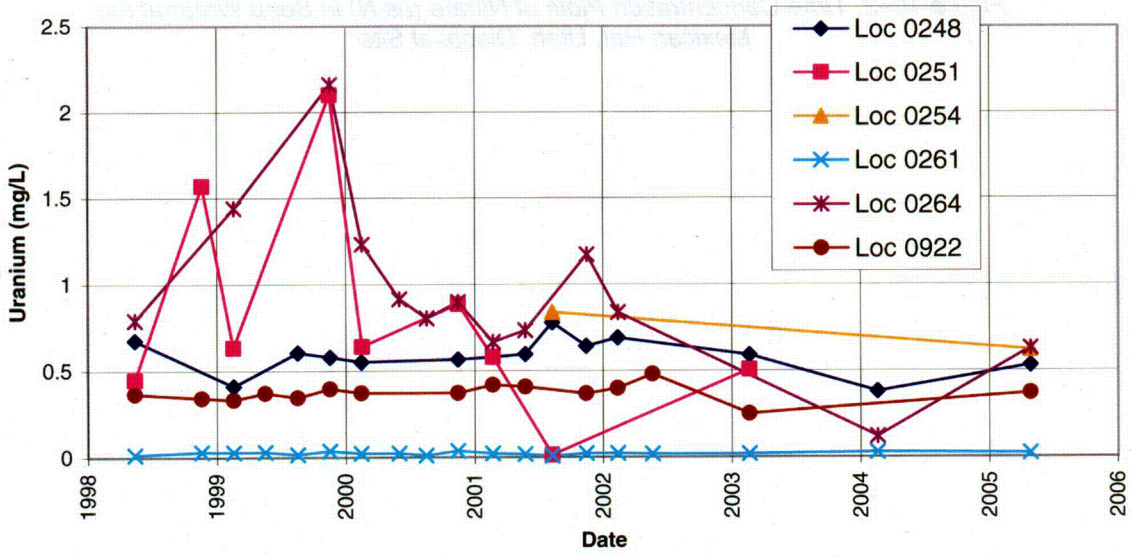


Figure 12–4. Time-Concentration Plots of Uranium in Seep Water at the Mexican Hat, Utah, Disposal Site

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Table 12-3. Maximum Concentration Limits for Ground Water at the Mexican Hat, Utah, Disposal Site

Constituent	MCL (mg/L)
Nitrate (as N)	10
Sulfate	NA
Uranium	0.044

Note: EPA maximum concentration limits (MCLs) as listed in 40 CFR 192 Table 1, Subpart A. 40 CFR 192 does not provide a MCL for sulfate.

Overall, concentrations for the three target analytes increased slightly from the previous sampling at all locations with the following exceptions. Uranium and sulfate at location 0254 and sulfate at location 0922 decreased slightly and all analyte concentrations at location 0261 (background) essentially stayed the same. Location 0254 has only been sampled once previously in August 2001 and location 0922 was not sampled in 2004, although, numerous prior sampling events have been performed at this location.

Concentrations of nitrate (as nitrogen) increased from 25 mg/L in 2004 to 74 mg/L in 2005 at North Arroyo seep location 0264 and from 23 to 32 mg/L in Gypsum Creek seep location 0248 (Figure 12–2). The maximum concentration of nitrate reported in 2005 was 160 mg/L from Gypsum Creek seep location 0254, compared to an historical site maximum concentration of 510 mg/L from North Arroyo seep location 0251 in 1999. The minimum concentration of nitrate reported in 2005, excluding background, was 31 mg/L from Gypsum Creek seep location 0922, compared to an historical site minimum concentration 17 mg/L from that same location in 2003. Concentrations in the background seep location 0261 remain below 1 mg/L.

Sulfate concentrations similarly have increased from 1,100 mg/L in 2004 to 2,800 mg/L in 2005 at North Arroyo seep location 0264 and from 1,900 to 2,900 mg/L in the Gypsum Creek seep location 0248 (Figure 12–3). The maximum concentration of sulfate reported in 2005 was 3,200 mg/L from the background seep location 0261, compared to an historical site maximum concentration of 6,310 mg/L from Gypsum Creek seep location 0254 in 1999. The minimum concentration of sulfate reported in 2005, excluding background, was 2,800 mg/L from both North Arroyo seep location 0264 and Gypsum Creek seep location 0254, compared to an historical site minimum concentration 614 mg/L from North Arroyo seep location 0251 in 2001. Background concentrations of sulfate have historically ranged between 2,700 and 3,950 mg/L at seep location 0261.

Concentrations of uranium increased from 0.12 mg/L in 2004 to 0.63 mg/L in 2005 at North Arroyo seep location 0264 and from 0.38 to 0.53 mg/L in Gypsum Creek seep location 0248 (Figure 12–2). The maximum concentration of uranium reported in 2005 was 0.63 mg/L from North Arroyo seep location 0264, compared to an historical site maximum concentration of 2.16 mg/L from North Arroyo seep location 0264 in 1999. The minimum concentration of uranium reported in 2005, excluding background, was 0.37 mg/L from Gypsum Creek seep location 0922, compared to an historical site minimum concentration 0.12 mg/L from North Arroyo seep location 0264 in 2004. Concentrations in the background seep location 0261 remain below the MCL of 0.044 mg/L.

Results of monitoring in 2005 show that concentrations of all target constituents are well below historical maximums reported in the North Arroyo seeps (approximately 500 feet downgradient of the disposal cell) and within the historical range in the Gypsum Creek seeps (approximately 2,200 feet cross/downgradient of the disposal cell). No trends of increasing concentrations are evident that would suggest degradation in the performance of the disposal cell. Decreasing trends are evident for all target analytes from the two downgradient locations closest to the disposal cell (locations 0251 and 0264). Concentrations of all target constituents are likely the result of former uranium processing site operations and the naturally occurring water quality in the area.

In accordance with the LTSP, seep monitoring has been performed since 1998 to monitor cell performance, when sufficient flows have allowed, due to concerns raised by the Navajo Nation. From the mid-1998 through early 2003 samples were collected on a quarterly basis and annually thereafter. Based on these monitoring results, the hydrogeological conditions at the site, the continued low yield from the seeps to be considered a water resource, and the absence of any receptors to demonstrate risk; an evaluation of the seep-monitoring program is warranted and will be conducted in 2006.

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.

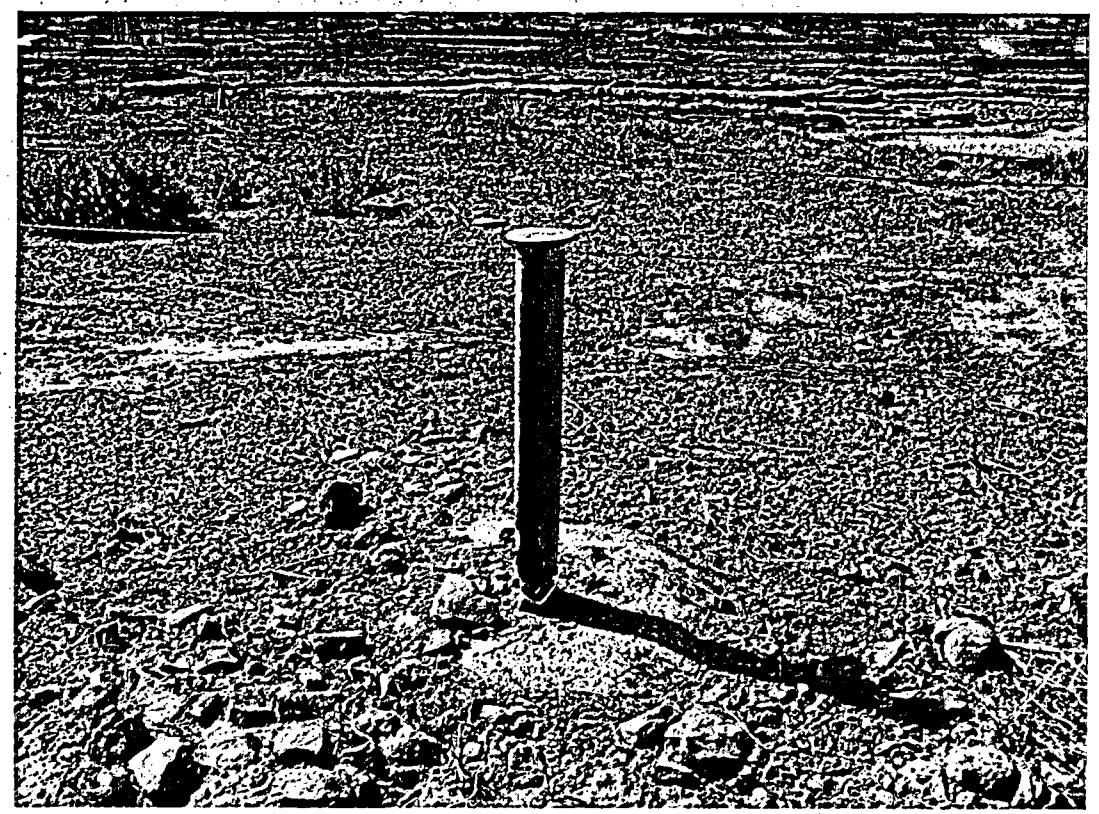
No corrective action was required in 2005.

12.3.6 Photographs

Table 12–4. Photographs Taken at the Mexican Hat, Utah, Disposal Site

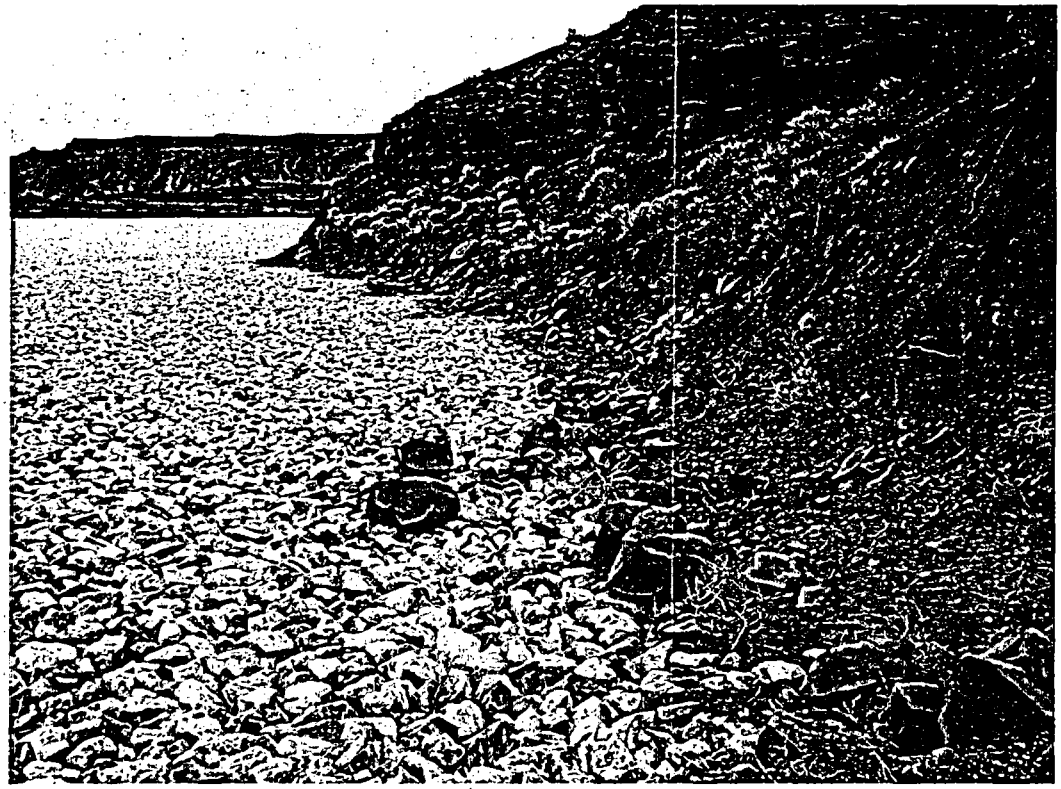
Photograph Location Number	Azimuth	Description
PL–1	215	Repaired fence at north end of west diversion channel.
PL–2	0	Damaged boundary monument BM-7; was found bent over to the ground.
PL–3	45	View across the top of the disposal cell.
PL–4	55	Fallen rock along apron edge at the south end of the disposal cell.
PL–5	210	Minor sediment accumulation and associated plant growth in south end of west diversion channel.
PL–6	180	Seep location 0251 in North Arroyo.

HAT 4/2005. PL–1. Repaired fence at north end of the west diversion channel.



HAT4/2005. PL–2. Damaged boundary monument BM-7; was found bent over to the ground.

HAT 4/2005. PL–3. View across the top of the disposal cell.



HAT 4/2005. PL–4. Fallen rock along apron edge at the south end of the disposal cell.

HAT 4/2005. PL–5. Minor sediment accumulation and associated plant growth in south end of west diversion channel.

HAT 4/2005. PL–6. Seep location 0251 in North Arroyo.

End of current section

13.0 Naturita, Colorado, Disposal Site

13.1 Compliance Summary

The Naturita Disposal Site, inspected on April 26, 2005, was in excellent condition. Rock rubble, which continues to fall on an onsite access road, was placed within a roadside gully to control erosion. Several loads of gravel were also distributed along the onsite access road to control further erosion. No disturbances have been observed following an earthquake that occurred in 2004 near the site. Noxious weeds, although reduced, persist at the site and require ongoing control; herbicide was applied in June 2005. Results of the ground water monitoring performed in November 2004 are presented. The 5-year monitoring evaluation required by the Long-Term Surveillance Plan (LTSP) recommended a reduction in ground water monitoring. No cause for a follow-up inspection was identified.

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

Institutional Controls—The 26.65-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1999. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1; consist of federal ownership of the property, a site perimeter fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site access road. The site is surrounded by federal property administered by the U.S. Bureau of Land Management on the north, east, and west sides. The UMETCO Title II Disposal Cell is adjacent to the southeast portion of the site and is scheduled for transfer to DOE. With the exception of the Title II disposal cell, the surrounding land is used primarily for grazing and wildlife habitat.

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 26, 2005. 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 secure 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.

13A Rock rubble continues to fall onto the middle to upper sections of an onsite monitor well access road located on the northwest side of the site (PL–1). Rubble was removed from the road in early September and placed within a small gully that formed on the down slope side of the road to prevent continued erosion. Additionally, several loads of gravel were brought to the site and distributed along this access road as needed to repair the erosional features. Rubble is expected to continue to fall and will be removed as needed.

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. Perimeter 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.

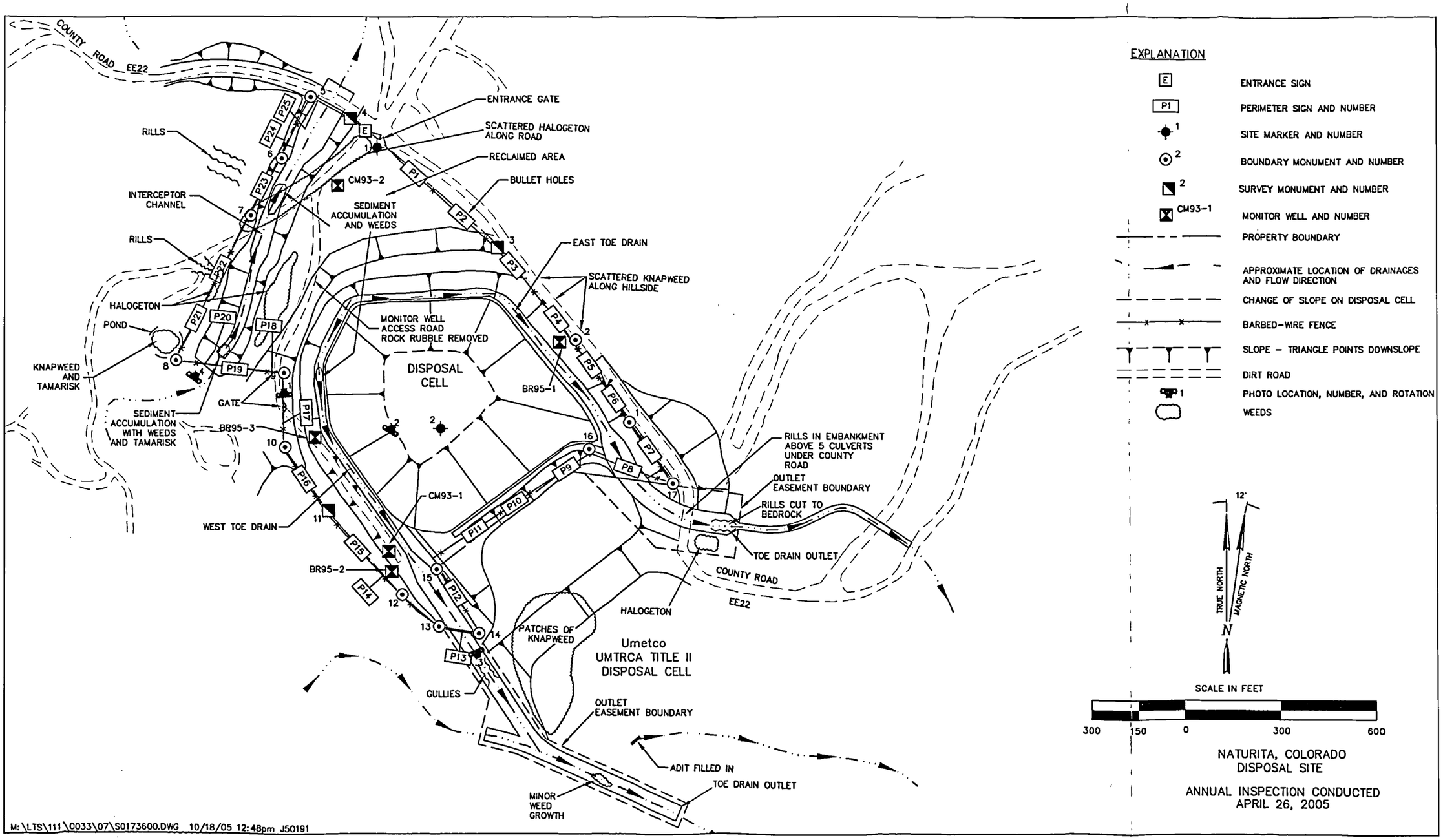


Figure 13–1. 2005 Annual Compliance Drawing for the Naturita, Colorado, Disposal Site

Monitor Wells—The ground water monitoring network has five wells: BR95–1, BR95–2, BR95–3, CM93–1 and CM93–2. 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. The rock is rounded, with larger rock on the side slopes than on the top. The rock-covered surfaces showed no signs of disturbance except on the southwest side of the top surface (PL–2). This is an area where a standpipe was removed several years ago and the slightly irregular surface is thought to be the result of that activity; the location will continue to be monitored for any further change. The remaining portions of 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.

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, 2004, to document any effects that the earthquake might have had on the disposal cell. No disturbances were observed during the follow-up inspection or during the 2005 inspection at or adjacent to the site, and the disposal cell was in excellent condition.

Toe Drains and Outlets—Two riprap-armored toe drains collect water from the cell side slopes and divert it to the southeast. The toe drain on the western side of the cell exits through a channel quarried through the wall of the Burbank Pit and into Hieroglyphic canyon and finally to the San Miguel River. Some sediment has accumulated in the upper end of the western toe drain allowing scattered weeds to grow. Farther down this drain beyond the armored portion, water is beginning to erode softer bedrock. A knickpoint is forming at the contact of the shale and overlying sandstone units within the Salt Wash Member of the Morrison Formation (PL–3). This is not a threat to the performance of the toe drain at this time. Further erosion at this point will be monitored. Minor patches of Russian knapweed, a noxious weed, were found in the lower drainage area and on the higher ground separating the drainage area from the Title II cell.

The eastern 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. No water was observed in the drain.

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. No culvert was installed where the channel crosses the road beyond the site entrance, so there is concern for storm water overtopping the road and causing damage that might impede access. Some erosion has occurred outside the property uphill from the channel resulting in minor deposition of sediment in the channel (PL–4). A small amount of vegetation, including two noxious weeds (halogeton and Russian knapweed), was observed at the southwest, upstream end of the channel (PL–4). Otherwise, the channel is in excellent condition. The accumulated sediment and plant growth does not impair the function of the channel at this time, and DOE treated the noxious weeds in June 2005.

Reclaimed Areas—The disturbed area north of the disposal cell and south of the interceptor channel was seeded at construction completion. Vegetation cover consisting of grasses, shrubs, and annual weeds, is well established. A storm water discharge permit, which addressed this area and the restored Club Mesa borrow area to the north of the site, 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.

Cotter Corporation reclamation activities were conducted on the slope along the west side of the property in the past year. Some erosion has occurred in an area uphill from perimeter sign P23 due to runoff from disturbed areas resulting in minor sediment accumulation in the interceptor channel.

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. Tamarisk were cut and treated at the site in 2004, and the area was sprayed with herbicide in an effort to control noxious weeds. The noxious-weed abundance has decreased, but control of
13B tamarisk and noxious weed growth at the site continues with herbicide again applied in June 2005.

13.3.2 Follow-Up or Contingency Inspections

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

13.3.3 Routine Maintenance and Repairs

In 2005, DOE removed additional rock rubble and filled gullies with gravel to prevent continued erosion along the monitor well access road, and applied herbicide to control noxious weeds.

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 (MCLs) 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 November 2004. Results, however, were not available in time for inclusion into the 2004 annual report and, therefore, are being reported in the 2005 annual report.

In 2004 concentrations of arsenic in ground water in the three shallower monitor wells (BR95–1, BR95–2, and BR95–3) were less than 0.005 milligrams per liter (mg/L) and well below the MCL of 0.05 mg/L. The historical maximum for arsenic of 0.0051 mg/L from these wells occurred in well BR95–3 in 1997. Concentrations of molybdenum in ground water from these wells in 2004 were below 0.02 mg/L (MCL is 0.1 mg/L). The historical maximum for molybdenum of 0.0309 mg/L from these wells occurred in well BR95–3 in 1997.

In 2004 uranium concentrations in ground water in the three shallower monitor wells (BR95–1, BR95–2, and BR95–3) ranged from 0.025 to 0.1 mg/L as shown in Figure 13–2 (MCL is 0.044 mg/L). Concentrations have remained relatively stable in wells BR95–2 and BR95–3 at approximately 0.040 and 0.020 mg/L, respectively, and have displayed only a very slight increase over time. Concentrations were at 0.1 mg/L in BR95–1 and have decreased slightly from the 0.117 mg/L reported in 2002 (BR95–1 has been sampled only two times, in 2002 and 2004, because another dry well was mistaken for the actual location in the past). The historical maximum for uranium from these wells was the 2002 result reported in well BR95–1 (0.117 mg/L). Concentrations of uranium in this range are not unexpected at the contact between the Salt Wash Member and the Summerville Formation. Uranium mineralization is present in the Salt Wash Member. An indication of the intrinsic mineralization of this ground water is the high level of uranium (2.59 mg/L in April 2001, Umetco result) in seep water approximately 0.5 mile north of the disposal cell. The seep is cross gradient from the disposal cell and represents discharge from the Salt Wash/Summerville contact.

Water levels have been measured in these three shallower monitor wells (BR95–1, BR95–2, and BR95–3) since 1997 and remain relatively stable.

Monitor wells CM93–1 and CM93–2 in the uppermost aquifer were last sampled in May 1997 and concentrations of all indicator analytes were at or near detection limits.

In accordance with the LTSP, the need for continued ground water monitoring was evaluated following the 2004 (or fifth year) sampling event. The monitoring evaluation recommended a
13D reduction in ground water monitoring. This recommendation took into consideration (1) the uppermost aquifer is hydrologically isolated from the surface by an aquitard consisting of unsaturated sandstone and relatively impermeable shale layers, (2) historical monitoring has demonstrated contamination does not occur within the uppermost aquifer, and (3) naturally occurring uranium mineralization affects water quality within the surface formation on which the disposal cell is constructed. The recommendation was to sample the Wingate Formation wells (CM93–1 and CM93–2) one more time and, assuming uranium concentrations are unchanged, discontinue monitoring altogether. NRC concurrence is required before DOE implements these changes and revises the LTSP.

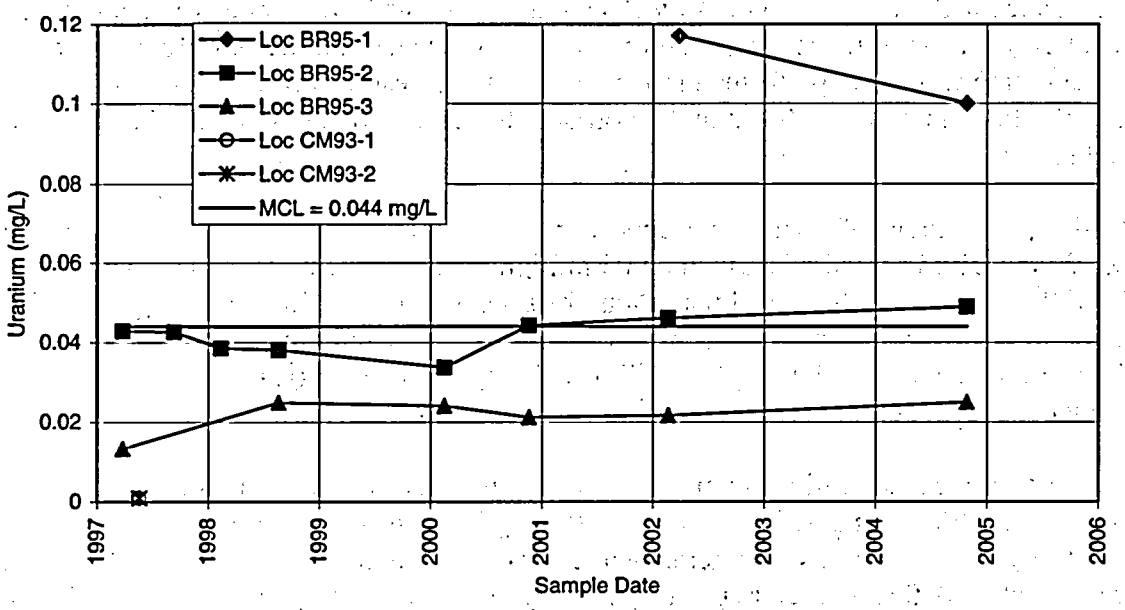


Figure 13–2. Time-Concentration Plots of Uranium in Ground Water at the Naturita, Colorado, Disposal Site

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.

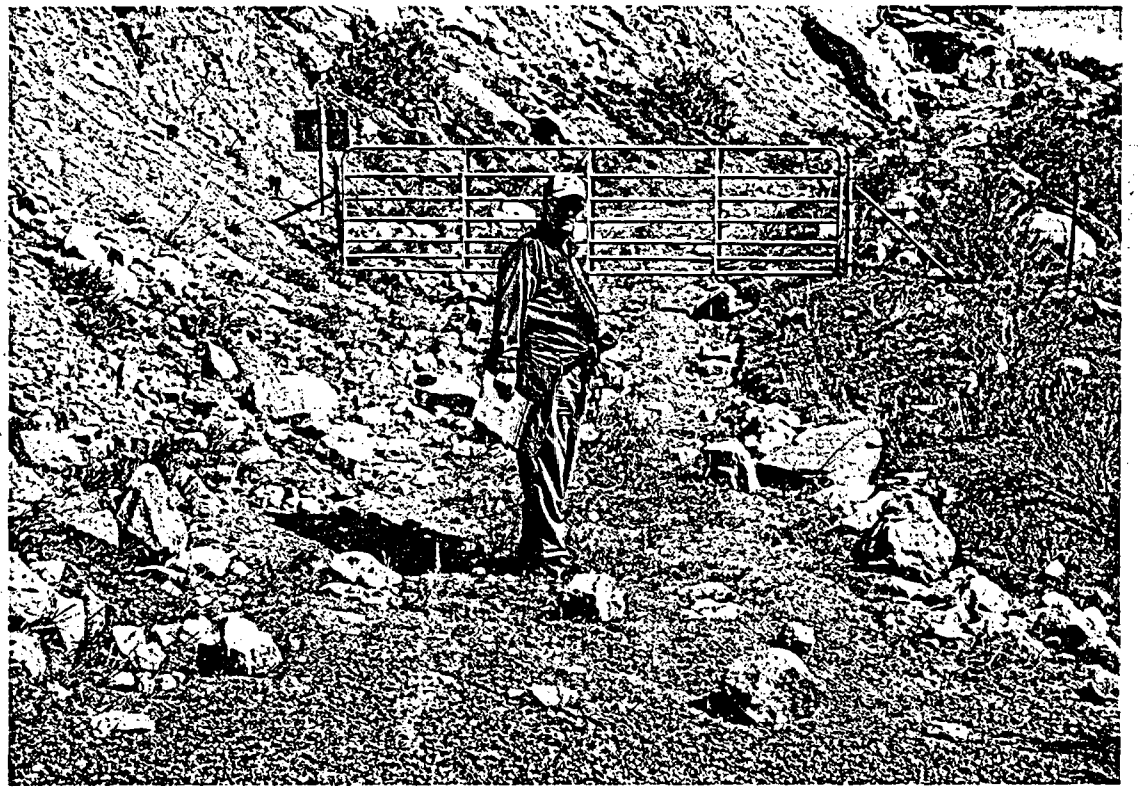
No corrective action was required in 2005.

C21

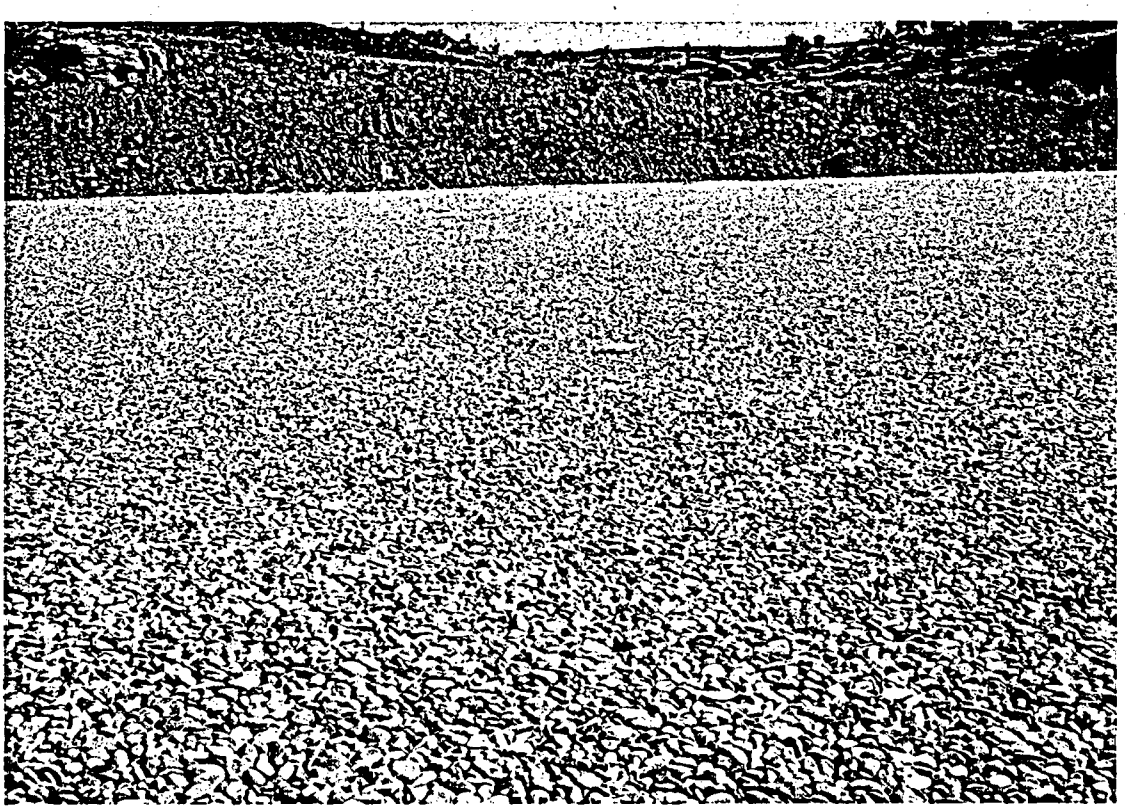
13.3.6 Photographs

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

Photograph Location Number	Azimuth	Description of Photograph
PL–1	355	Onsite access road showing fallen rock and placement within a roadside gully for erosion prevention.
PL–2	30	Slightly irregular surface on the southwestern portion of the disposal cell top.
PL–3	155	Lower part of southwest toe drain just beyond rock armor where erosion has produced a knickpoint between softer shale and harder sandstone.
PL–4	35	Upper interceptor channel showing minor sedimentation and plant growth.

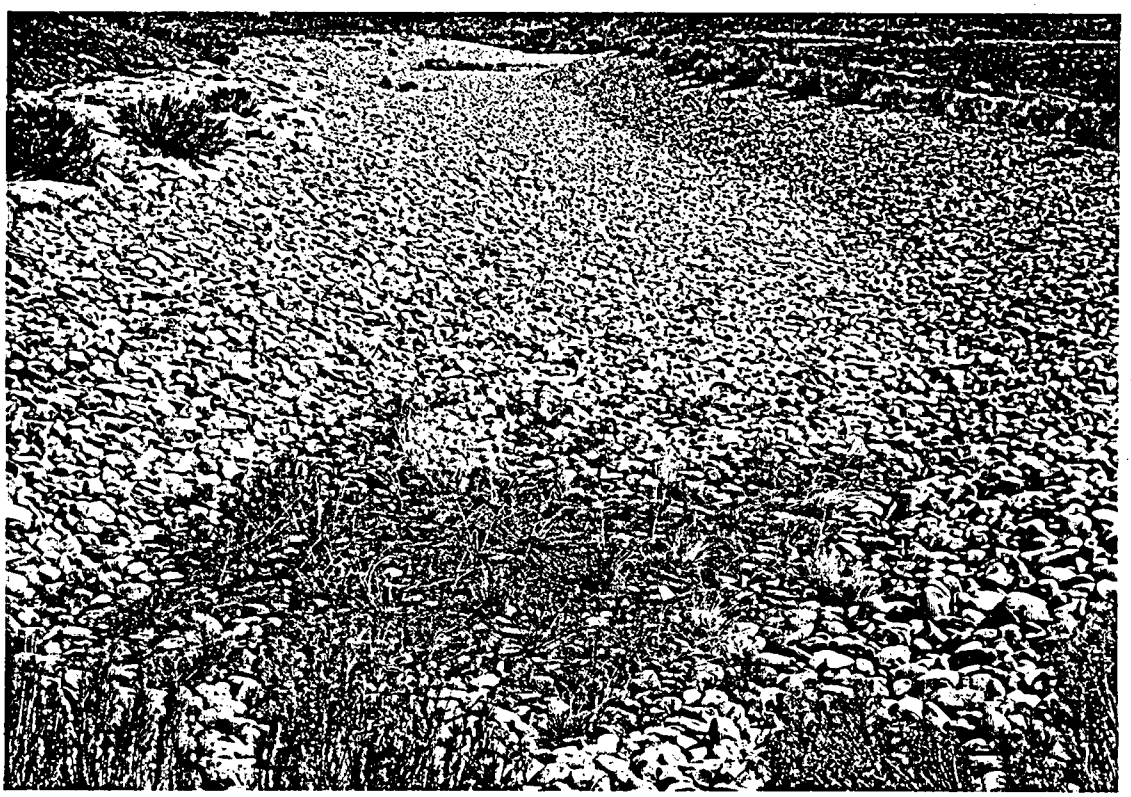


NAT 4/2005. PL–1. Onsite access road showing fallen rock and placement within a roadside gully for erosion prevention.



NAT 4/2005. PL–2. Slightly irregular surface on the southwestern portion of the disposal cell top.

NAT 4/2005. PL–3. Lower part of southwest toe drain just beyond rock armor where erosion has produced a knickpoint between softer shale and harder sandstone.



NAT 4/2005. PL–4. Upper interceptor channel showing minor sedimentation and plant growth.

End of current section

14.0 Rifle, Colorado, Disposal Site

14.1 Compliance Summary

The Rifle Disposal Site was inspected on August 9, 2005, and was in good condition. The entrance sign and a perimeter sign were missing. The entrance sign was replaced. A large rain event occurred in July and deposited debris on the access road and caused substantial erosion in the upper interceptor trench. The access road remains functional, however, the interceptor trench erosion was repaired. DOE continues to remove water from the disposal cell by pumping water from two standpipes to an evaporation pond. Remote data transfer systems were installed to monitor cell dewatering and the associated evaporation pond performance; the status of both are available online during operation. The standpipes appeared slightly inclined and tilting downhill, a situation that will be monitored; the settlement plates, which have not been surveyed for eight years, were resurveyed. The 16-acre Right-of-Way Reservation Permit area south of the site on U.S. Bureau of Land Management (BLM) land was reseeded. 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

Institutional Controls—The 205-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1998. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, access control fencing, warning/no trespassing signs placed along the disposal cell boundary, and a locked gate at the entrance to the site. The site is surrounded by federal property administered by the BLM with whom DOE maintains a perpetual right of way. The surrounding land is used primarily for livestock grazing and wildlife habitat.

14.3 Compliance Review

14.3.1 Annual Inspection and Report

The site, located five miles north of Rifle, Colorado, was inspected on August 9, 2005. 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 approximately a mile on a gravel road off of State Highway 13. A perpetual right of way across BLM property provides access to the site. 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 system. The gate was locked, although the steel guard for the lock was damaged by gunshot fire (PL–1). The vandalism was reported to the county sheriff.

The site entrance gate consists of a pair of tubular metal gates hinged to galvanized steel posts. It is 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. 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.

14A The entrance sign, replaced in 2003, was missing again at the time of the inspection and replaced (PL–2). Perimeter sign P9, located to east of the entrance sign, was also missing. It will be replaced during the next inspection. 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. Many of the survey and boundary monuments at this site are difficult to locate because trees, brush, and rough terrain obscure them. All survey and boundary monuments inspected were found to be 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 good condition. Dataloggers with remote data transfer systems are installed in MW–02 and MW–03 to measure water level

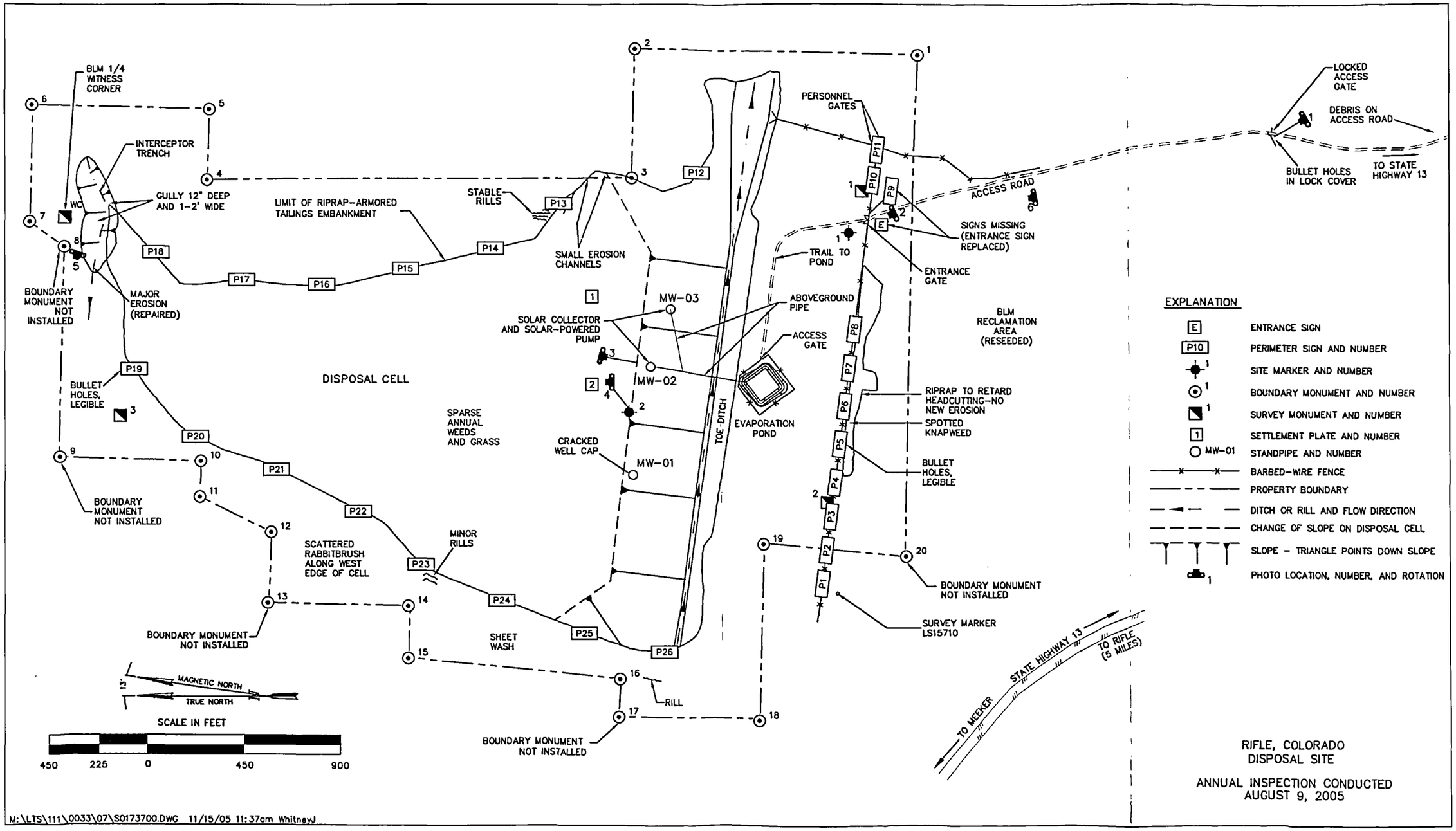


Figure 14–1. 2005 Annual Compliance Drawing for the Rifle, Colorado, Disposal Site

fluctuations. Information from this instrument is transmitted via cellular telephone technology to an Internet connection. These two standpipes have solar-powered pumps that discharge water through small-diameter aboveground plastic pipelines to a lined evaporation pond. The solar collectors are designed to automatically follow the position of the sun for optimal performance (PL–3). There is no datalogger or pump in MW–01 because it is too shallow and usually dry. Water level data collected from these two standpipes are presented below in Section 14.3.4.

Evaporation Pond—An evaporation pond was constructed in 2001 to receive water pumped from standpipes MW–02 and MW–03. A datalogger with a remote data transfer system (also available online) is installed in the evaporation pond to measure water level fluctuations. The lined pond, surrounding security fence, and locked fence gate were in excellent condition (PL–3).

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.

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

Disposal Cell and Interceptor Trench—Rock armor covering the 71-acre disposal cell was in excellent condition (PL–4). No evidence of subsidence, differential settlement, or slumping was noted. However, due to the apparent inclination of the standpipes suggesting possible movement of the cell, the eight settlement plates, which have not been surveyed in 8 years, were resurveyed
14B along with the standpipes. This activity will continue until DOE is satisfied that no movement of the cell has occurred. 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. A large rain event occurred in July that caused significant erosion to the
14C interceptor trench (PL–5). DOE repaired the erosion in fall 2005.

Herbicide treatment of noxious weeds on the south slope of the interceptor trench in 2004 was found to have been effective by significantly reducing the abundance. No additional treatment was performed at this location

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. 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, even though precipitation increased in 2005. 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.

Rills noted during previous inspections in the vicinity of perimeter sign P13 were stable. However, the runoff collected by the rills flows along the interface between the riprap and the adjacent reclaimed soil area. The runoff has scoured a small channel that currently averages about one foot wide and less than one foot deep and has exposed some of the gravel bedding material. When compared with photos taken in 2004 at this location, the channel was unchanged. This feature is not threatening the integrity of the disposal cell at this time; however, continued observation during subsequent site inspections is warranted.

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.

14D Herbicide applications this year have eliminated several infestations of noxious weeds in the reclaimed areas.

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 BLM-managed land was inspected. During construction of the cell, DOE was granted a Right-of-Way Reservation Permit by the BLM to use this area for topsoil storage and other purposes. This area was seeded at the same time as the disturbed areas adjacent to the cell on DOE-owned land. Approximately 16 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 16 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 2004 inspection, the coverage of these plants was greatly diminished, but the continued drought had not allowed desirable vegetation to reestablish. In the spring of 2005, DOE disced the area to destroy the remaining undesirable plants and reseeded it
14E with desirable species (PL–6). DOE will request that BLM close the Right-of-Way Reservation Permit during the next year.

14.3.2 Follow-Up or Contingency Inspections

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

14.3.3 Routine Maintenance and Repairs

In 2005, DOE replaced a missing entrance sign, repaired erosion within the interceptor trench located upslope of the disposal cell, applied herbicide to noxious weeds in the reclaimed areas, and disked and reseeded the 16-acre Right-of-Way Reservation Permit area south of the site on BLM land.

14.3.4 Ground Water Quality 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 useable aquifer by approximately 3,800 feet of low-permeability siltstones, shales, and sandstones.

14.3.5 Disposal Cell Pore Water Level Monitoring

14F DOE monitors pore water levels in the disposal cell at standpipes MW–02 and MW–03 to ensure that water within the disposal cell does not rise above the design protection feature, which would occur at an elevation of 6,020 feet. Tailings material at the toe of 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 embankment 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 embankment. This condition could weaken the down slope end of the cell and allow slumping to occur, and also could cause a contaminated seep to emerge on the south slope of the cell. Therefore, water level monitoring is performed and an action level for pumping when pore 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. Water levels were first observed to have slightly exceeded the action level in September 2000 recording an elevation of 6016.03 feet in MW–02 and 6016.27 feet in MW–03. 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 toe of the disposal cell, the rate of removal was not enough to lower the water level in the cell, as the level had not decreased by the end of 2003. During this same time period the production (volume of water being extracted) from MW–02 had begun to decrease for unknown reasons. Fluctuations above and below the action level occurred between September 2000 and May 2003 with levels in excess of the action level reaching a maximum in March 2003 recording an elevation of 6,016.61 feet in MW–02 and 6,016.66 feet in MW–03. 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.

At the time of the 2004 inspection, the pump in MW–02 had been operating at about 1 gallon per minute (gpm) and the pump in MW–03 at about 4 gpm. This year at the time of the inspection,
14G MW–02 was operating intermittently and producing little water and MW–03 was producing an estimated 2 to 3 gpm. The solar collector for MW–03 was tracking the position of the sun, but the panel for MW–02 was not tracking as closely. However, both appeared to be operational and in good condition. The plastic surface waterlines also were in good condition. Cell dewatering continues with evaporation rates in the evaporation pond having kept up with the influent rates, and the water level has remained well below the design capacity of the pond.

As shown by datalogger measurements (Figure 14–2), water levels steadily decreased during pumping in the past year, and the water level elevation has remained below 6,015 feet in both standpipes since late May 2005. During this period of pumping (May to October), fluctuations in the water levels represent typical drawdown and recovery that occurs during pumping on/off cycles. The pumps are shut off for the winter because of reduced evaporation rates and the threat of breakage from freezing of the surface waterlines.

Looking back to late November 2004 when the pumps were turned off for the winter, water levels increased to 6015 feet within a few days and very slowly increased over the winter toward the action level of 6016 feet. However, the water levels did not rise to the action level before pumping was resumed in late May 2005. This system will be further studied in 2006 to evaluate possible reasons for the rapid rise to 6015 feet and the subsequent near cessation of increases. Results of these studies will be reported in the 2006 annual report.

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.

14.3.6 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 continued in 2005.

14.3.7 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	290	Bullet damage to lock housing at lower access gate.
PL–2	340	Entrance sign replacement.
PL–3	110	Standpipe MW–02 with solar cell; evaporation pond in background.
PL–4	360	View of the disposal cell from site marker SMK–2.
PL–5	290	Erosion gully in bottom of lower portion of interceptor trench.
PL–6	330	Heavy tractor double-discing the BLM Right-of-Way Reservation area south of site.

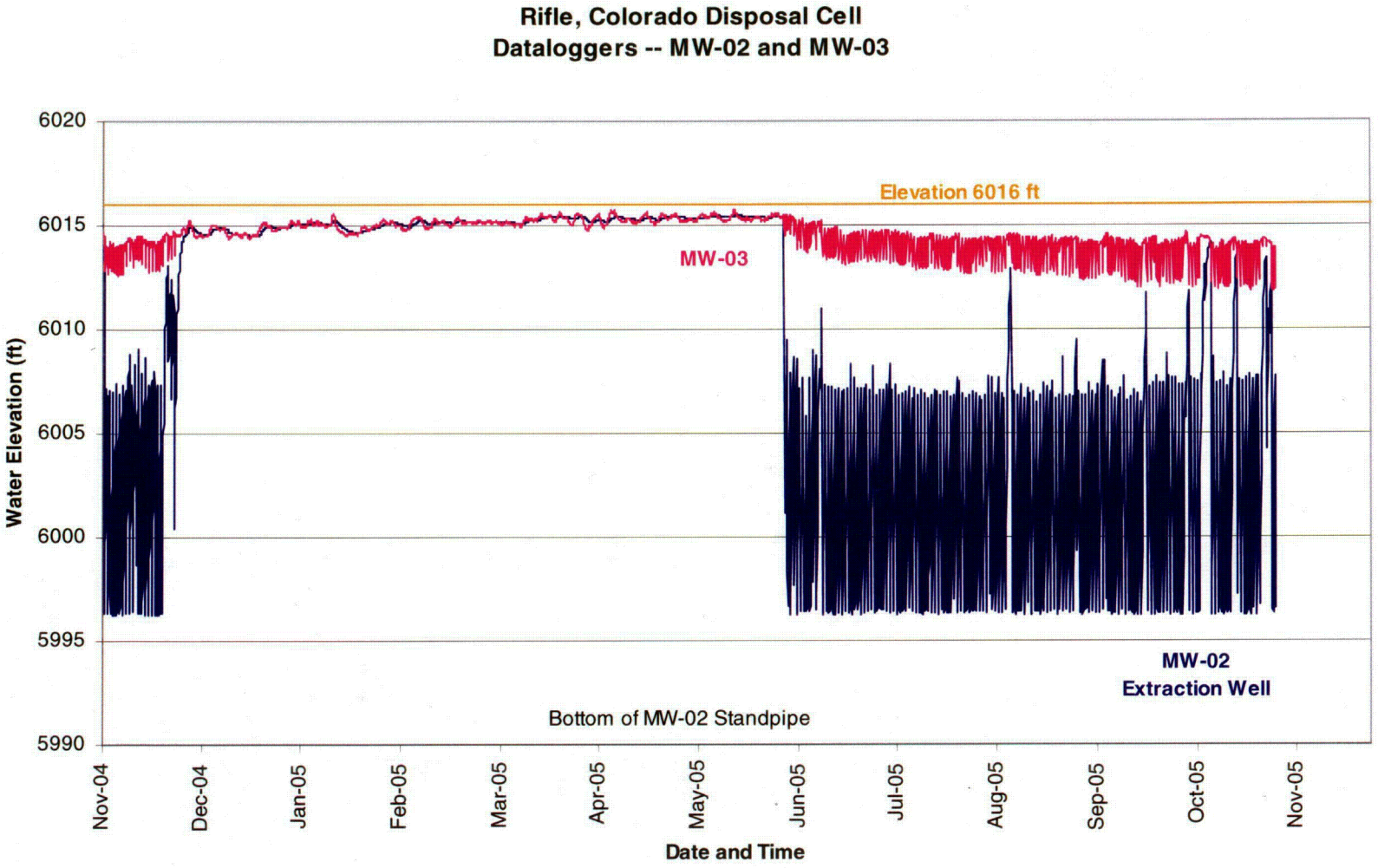
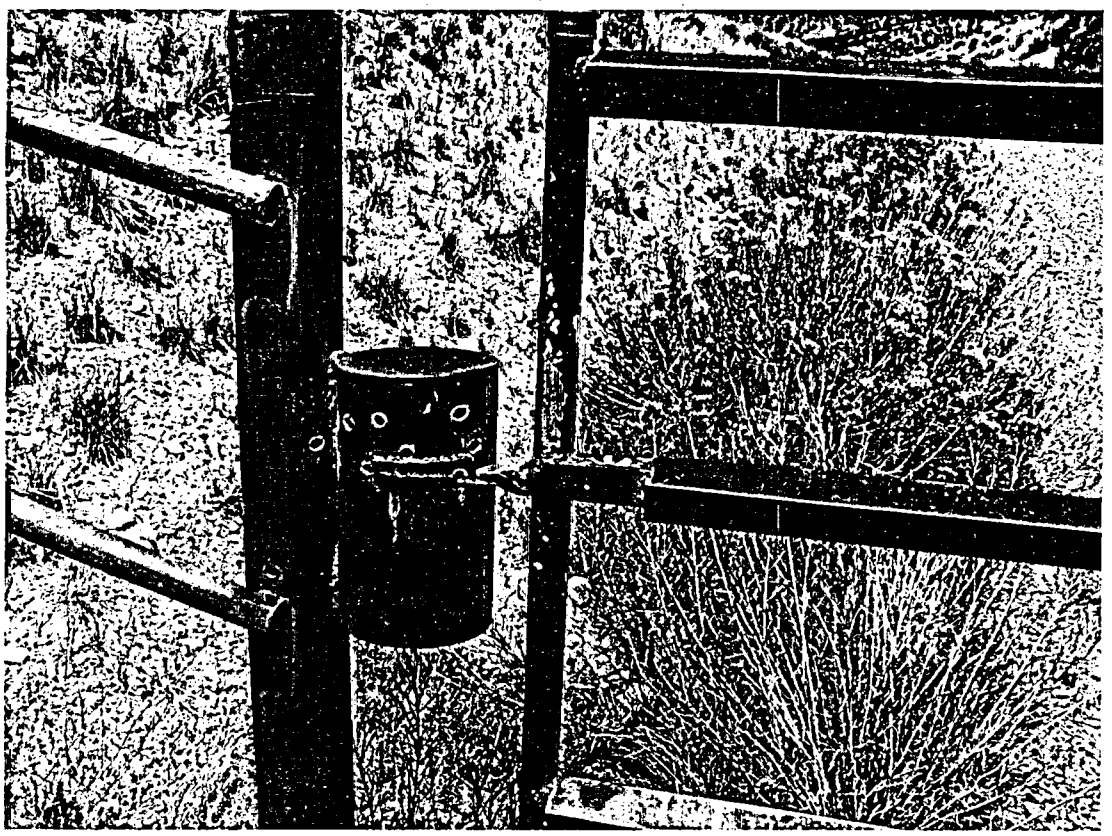
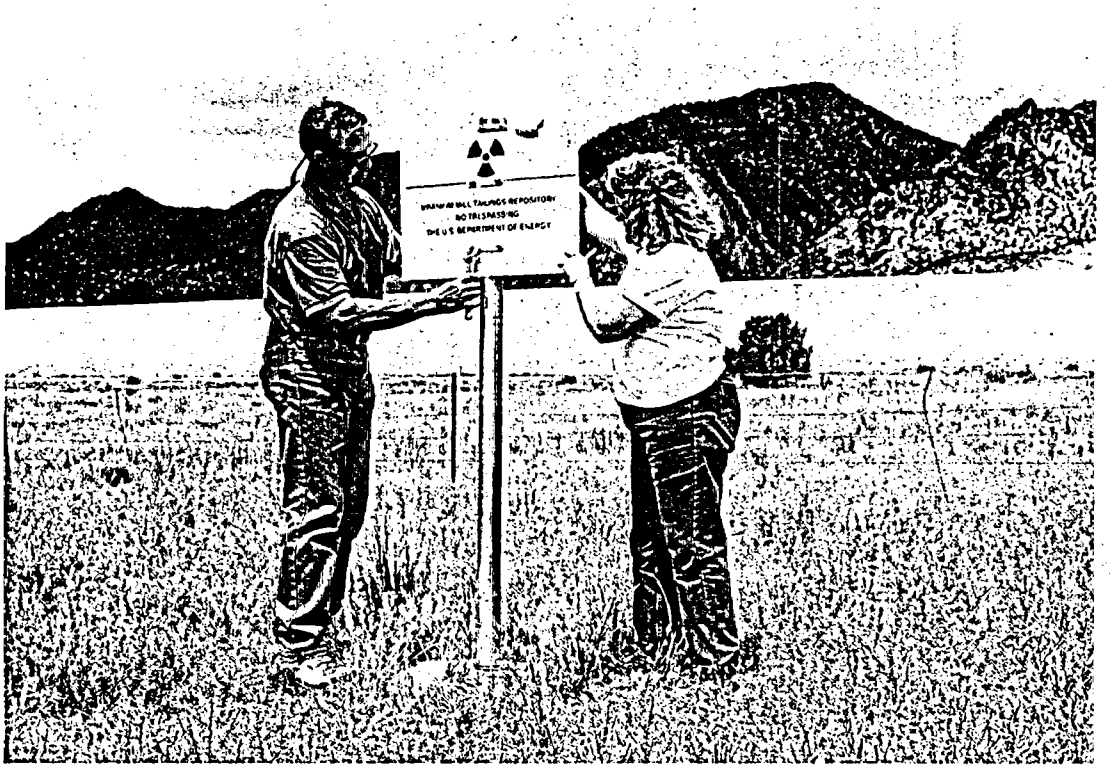


Figure 14–2. Water Levels in Standpipes MW–02 and MW–03 at the Rifle, Colorado, Disposal Site

C25



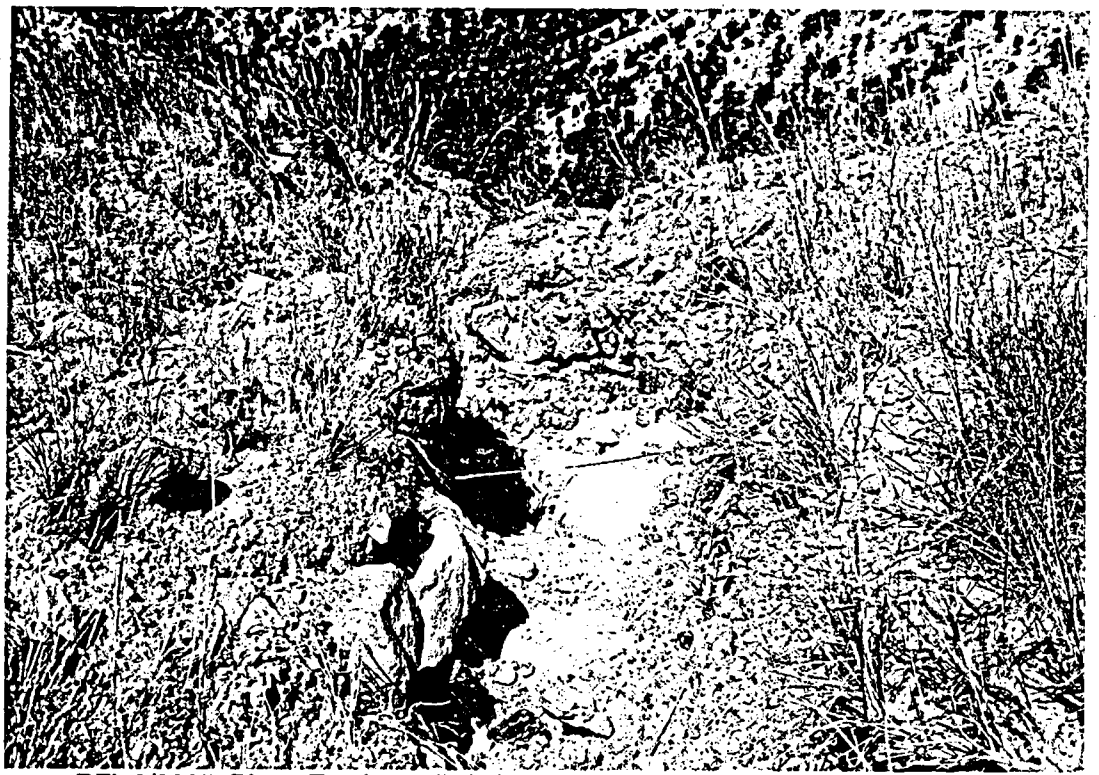
RFL 8/2005. PL–1. Bullet damage to lock housing at lower access gate.



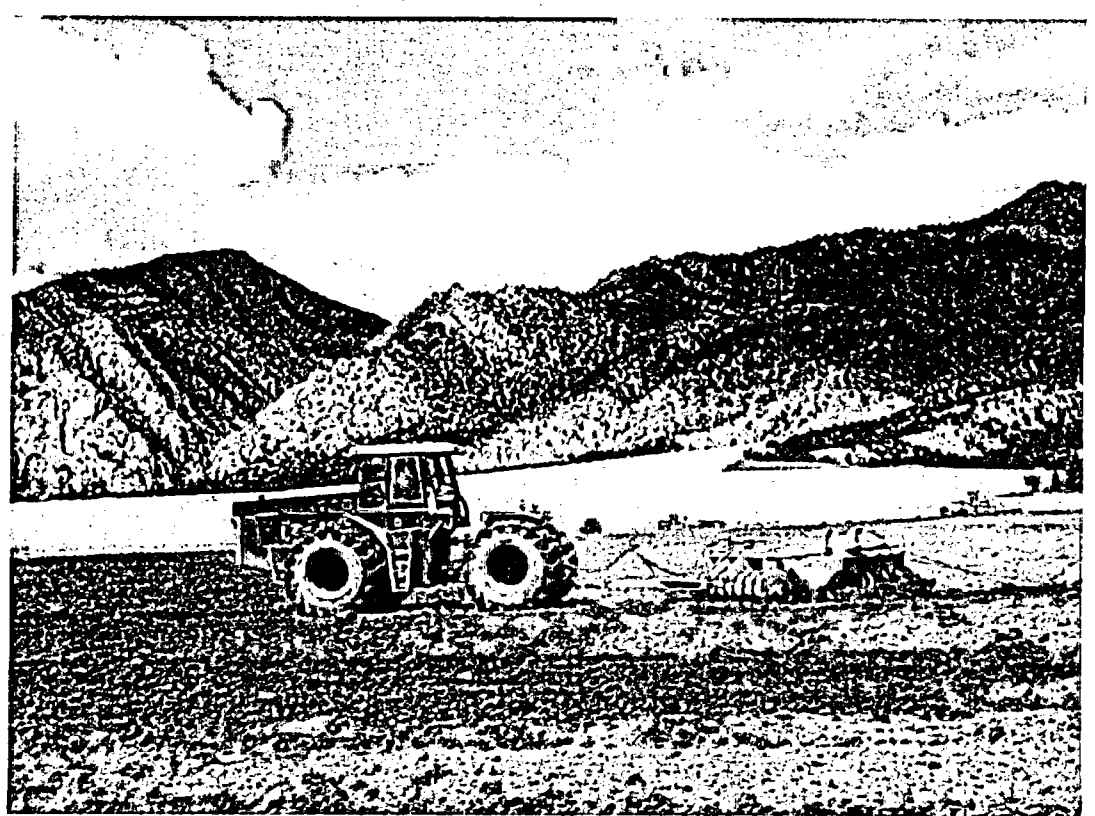
RFL 8/2005. PL–2. Entrance sign replacement.

RFL 8/2005. PL–3. Standpipe MW–02 with solar cell; evaporation pond in background.

RFL 8/2005. PL–4. View of the disposal cell from site marker SMK–2.



RFL 8/2005. PL–5. Erosion gully in bottom of lower portion of interceptor trench.



RFL 8/2005. PL–6. Heavy tractor double-discing the BLM Right-of-Way Reservation area south of site.

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, 2005, was in good condition. Due to ongoing radioactive waste disposal activities on the adjacent Envirocare of Utah, Inc., (Envirocare) property, personnel accessing the site must comply with Envirocare health and safety requirements. Envirocare personnel escort inspectors during the site inspection. Posted radiological contamination areas, excavated to approximately one-foot in depth, were observed against the north property boundary just outside of the security perimeter fence and within the site property around the southwest perimeter boundary monument. At the request of the inspectors, Envirocare uncovered a buried boundary monument within the radiological contamination area in the southwest corner of the site. Ground water monitoring is not required at this site. There were no maintenance requirements or cause 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

Institutional Controls—The 100-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1997. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, a site perimeter fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site. Access to the site is across private property owned by Envirocare of Utah, Inc that provides additional control of the site. The site is surrounded by privately owned land used for low-level radioactive waste disposal.

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, 2005. 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.

15A DOE has a perpetual easement across Envirocare property, but no longer has direct access to the northwest entrance of the site because of the presence of an active waste haul road. Due to Envirocare's ongoing radioactive waste disposal activities on the surrounding property (PL–1), the adjacent haul roads used to access the DOE site are designated as Restricted Areas (radiological control areas). After being briefed by Envirocare health and safety personnel on the radiological hazards and controls, inspectors sign a Radiological Work Permit and are issued dosimeters. Envirocare personnel escort the inspectors to the site and during the inspection. Access to the site is now along a new route to the southwest corner of the property.

A chain-link security fence owned and maintained by Envirocare is located on the site property boundary. A second chain-link security fence owned and maintained by DOE lies within the Envirocare fence on the east, west, and south sides. The north side has only one chain-link security fence along the property boundary. Envirocare has an additional fence bordering their haul roads north and west of the site. All fences were in good condition.

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 also locked and in good condition.

The entrance sign, located on the current entrance gate, was is excellent condition. All perimeter signs were present and in good condition. Perimeter sign P5 was found to have fallen at the time of the inspection and was remounted.

Site Markers and Monuments—Both granite site markers were in excellent condition. All four boundary monuments were in good condition. The southwest boundary monument, BM–4, was found buried at the time of the inspection. Envirocare had inadvertently covered BM–4 while
15B cleaning up surface contamination resulting from the transportation of radioactive waste along the adjacent haul road (PL–2). Envirocare personnel uncovered the monument during the inspection (PL–3). The area was designated as radiologically controlled at the time of the inspection. The area was cleaned-up and scanned by Envirocare to verify that all surface contamination had been removed before the radiological posting was removed.

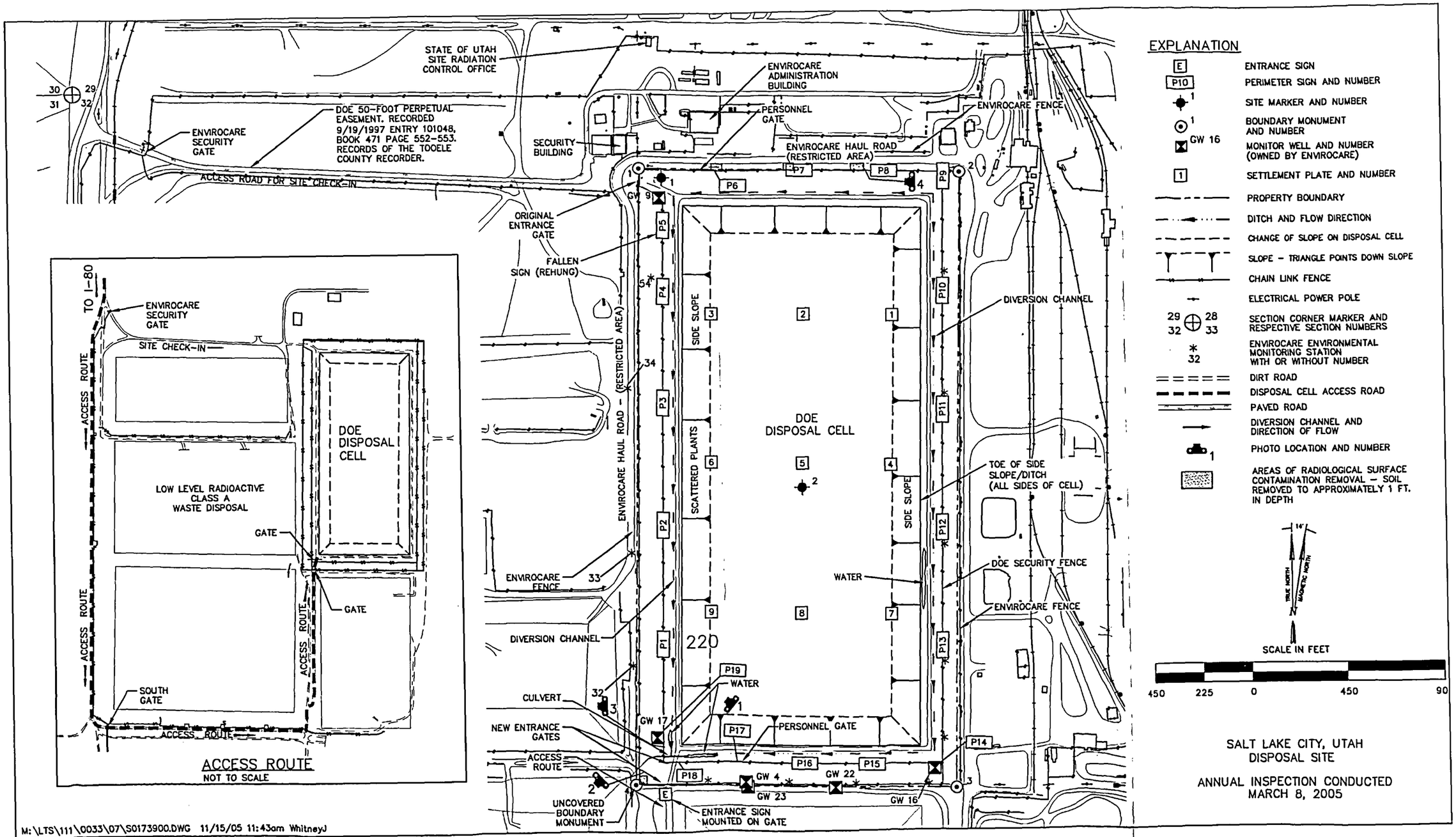


Figure 15–1. 2005 Annual Compliance Drawing for the Salt Lake (South Clive), Utah, Disposal Site

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 and are to be abandoned. None of the wells had been abandoned at the time of the inspection, but all were properly secured.

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.

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 that might affect site integrity or the long-term performance of the site.

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. A few isolated annual plants were present on the side slopes, but no deep-rooted plants were found on the disposal cell.

Area Between the Disposal Cell and the Site Boundary—The area between the toe of the disposal cell and the site boundary was inspected. Water was present in the toe drain along the southwest corner and the east side of the cell. All cell perimeter storm water diversion channels were in good condition. Minor plant encroachment has occurred in portions of the channels, however these plants do not degrade the function of the channels.

As previously discussed, at the time of the inspection in the southwest corner of the site inside the perimeter fence and surrounding BM–4 was a designated radiological control area. The surface soil contamination resulting from the transportation of radioactive waste along the adjacent haul road was remediated and verified clean by Envirocare before the radiological posting was removed.

Outlying Area—This transect extends from the Envirocare fence to 0.25 mile beyond the site boundary. Envirocare managed operations and activities surround the DOE property. 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 (PL–1). Directly to the south is a low-level radioactive waste disposal cell; to the southwest is a disposal cell containing 11e(2) low-level radioactive waste material regulated under the Atomic Energy Act of 1954; to the west Envirocare is continuing to fill a Class A low-level radioactive waste disposal cell; and to the east Envirocare operates a mixed-waste treatment and disposal facility. 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.

On the north side, between the DOE chain-link security perimeter fence (property boundary) and the Envirocare restricted area waste haul road fence, several locations were found during the inspection to have been excavated approximately one foot and posted as radiological surface contamination areas (PL–4). The contamination resulted from activity performed on the waste haul road adjacent to the site. Envirocare removed the contaminated surface soil in these areas and installed matting on the waste haul road fence to help reduce future contamination.

15.3.2 Follow-Up or Contingency Inspections

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

15.3.3 Routine Maintenance and Repairs

One boundary monument was uncovered and a perimeter sign was remounted in 2005.

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

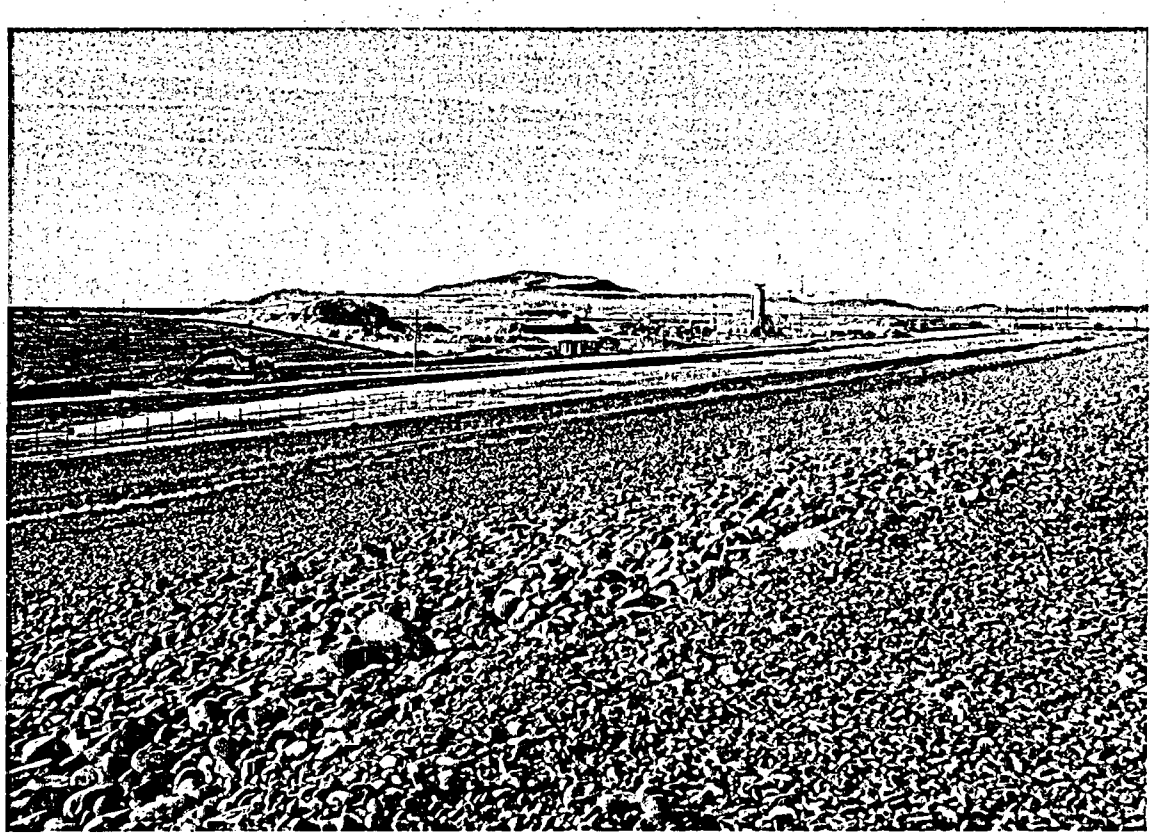
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2005.

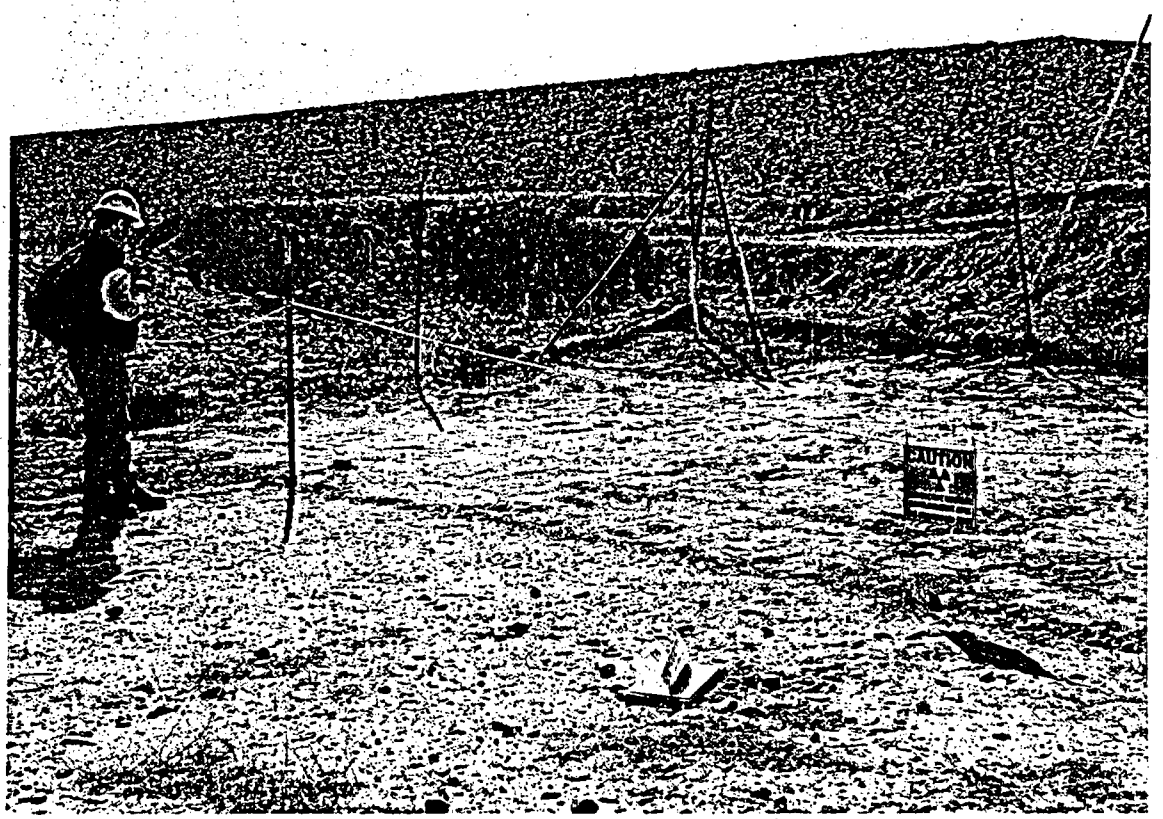
15.3.6 Photographs

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

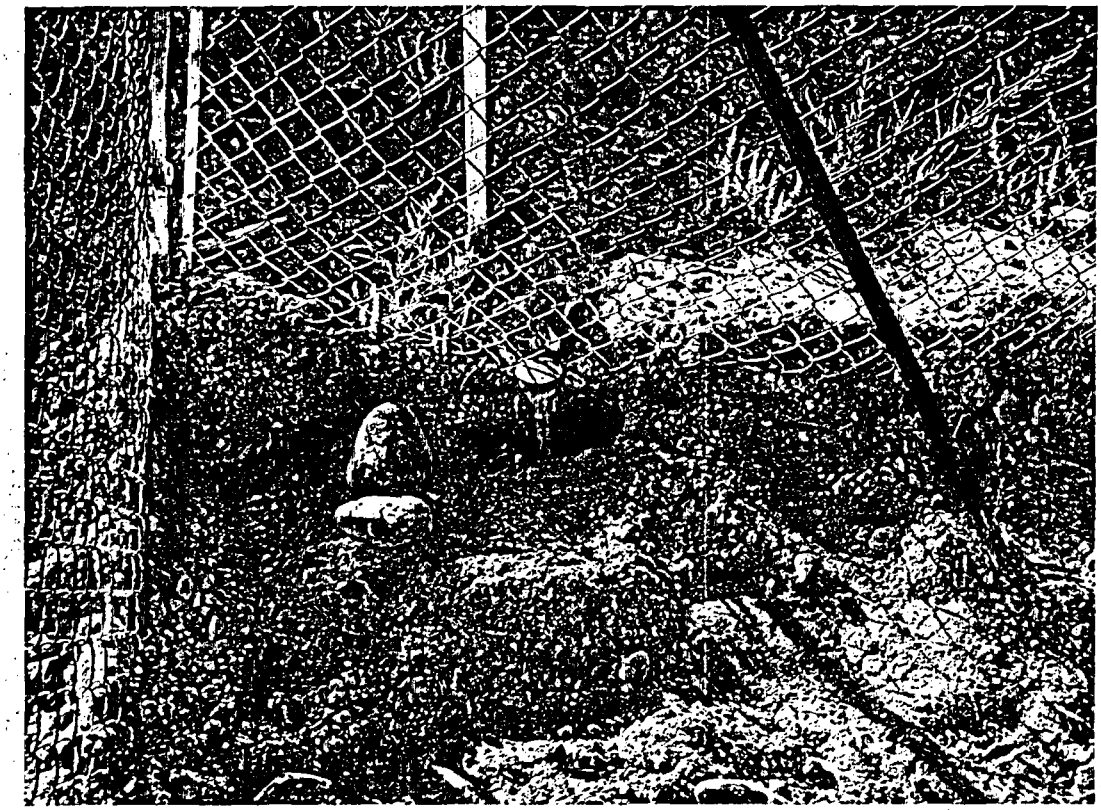
Photograph Location Number	Azimuth	Description
PL–1	300	Envirocare waste disposal activity directly west of the DOE cell.
PL–2	225	Boundary monument BM–4 covered within a posted radiological surface contamination area.
PL–3	270	Boundary monument BM–4 uncovered.
PL–4	270	Posted radiological surface contamination area directly north of the site boundary excavated to approximately 1 foot in depth.



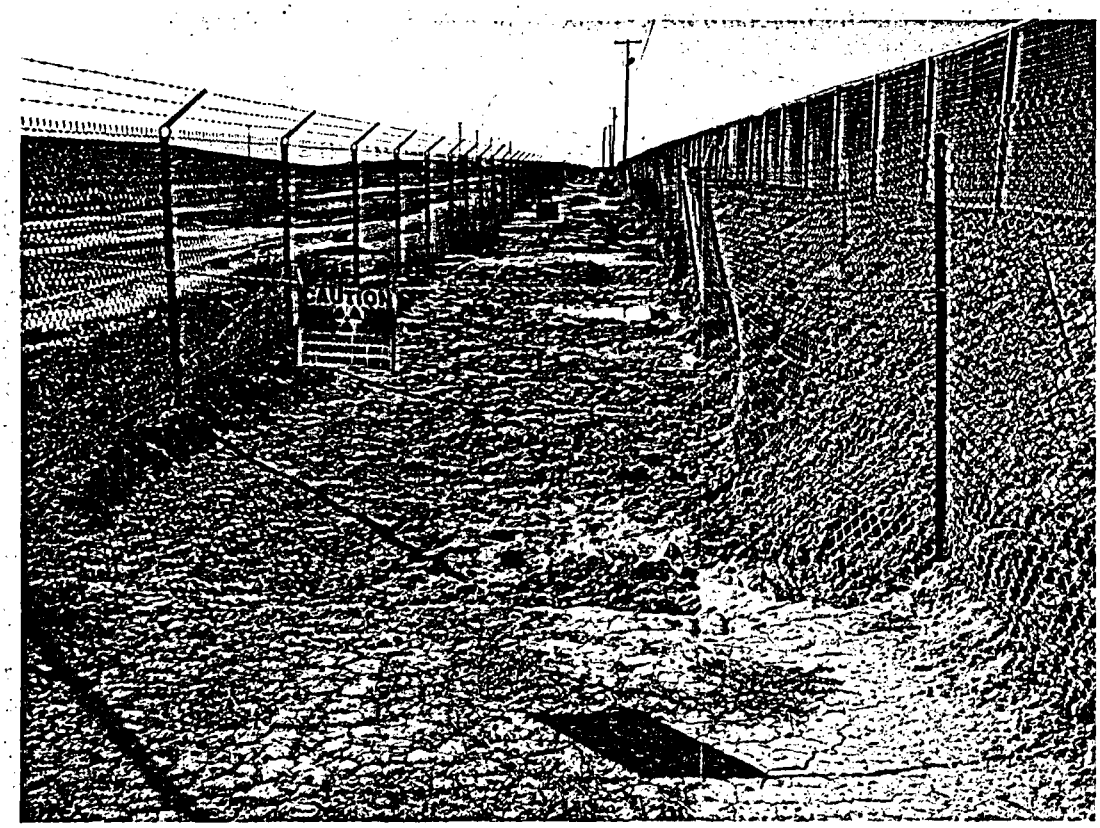
SLC 3/2005. PL–1. Envirocare waste disposal activity directly west of the DOE cell.



SLC 3/2005. PL–2. Boundary monument BM–4 covered within a posted radiological surface contamination area.



SLC 3/2005. PL–3. Boundary monument BM–4 uncovered.



SLC 3/2005. PL–4. Posted radiological surface contamination area directly north of the site boundary excavated to approximately 1 foot in depth.

16.0 Shiprock, New Mexico, Disposal Site

16.1 Compliance Summary

The Shiprock Disposal Site, inspected on June 8, 2005, was in excellent condition. The reconstructed drainage channel outlet was in excellent condition and functioning as designed. Research associated with cell performance, including the collection of saturated hydraulic conductivity measurements, continued. Woody vegetation continues to encroach onto the side slopes and cover on the disposal cell; however, this vegetation is not affecting the performance of the cell. DOE is currently studying the effect of plant encroachment on the cell to evaluate the need for continued vegetation control. Herbicide applied to noxious weeds has effectively controlled woody shrub growth in the outflow channel. DOE replaced missing perimeter sign P1 and the entrance gate lock, filled in several gaps under the perimeter fence, and removed accumulated weeds and trash along the perimeter fence. No other maintenance needs or 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

Institutional Controls—The 105-acre disposal site is held-in-trust by the United States of America for the Bureau of Indian Affairs; the Navajo Nation retains title to the land. The site was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1996. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal control of the property, a site perimeter fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site. DOE secured perpetual access to the site through a Custody and Access Agreement with the Navajo Nation. The site is surrounded by Navajo Nation Reservation land and the San Juan River. Surrounding land use includes a sand and gravel processing operation, a maintenance yard, and offices all operated by the Navajo Engineering and Construction Authority (NECA), along with some residential dwellings.

16.3 Compliance Review

16.3.1 Annual Inspection and Report

The site, located south of Shiprock, New Mexico, was inspected on June 8, 2005. 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 site is via a gravel road off U.S. Highway 491 and through a sand and gravel processing facility operated by the NECA to the main entrance gate.

The chain-link security fence along the perimeter was in good condition except for several bent poles on the portion that borders the NECA yard. Within the last year, bulldozing activity within the NECA yard resulted in a pile of dirt being pushed up against the fence fabric near perimeter sign P13 (PL–1). Inspectors will monitor this area to ensure that the fence remains intact over time.

A number of gaps beneath the fence, most formed by small animals, occur along the site perimeter. Several of these gaps were filled with rock during the inspection. These gaps are not a concern unless they are large enough to allow access by children, who live and play immediately west of the site. Inspectors will continue to monitor the number and size of these gaps and fill those that are large enough to provide human access.

Tumbleweeds and windblown trash accumulate along the perimeter fence on the southwest and southeast sides of the property. Periodic removal is necessary to mitigate potential fire hazards associated with the weeds and to ensure the site appears maintained. Accumulated weeds and
16A 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 2005. 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. A NECA lock is
16B on the gate leading through the gravel pit area. The DOE lock had been removed from the "daisy chain" and was replaced.

Four entrance signs and 17 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. Because perimeter signs P5 through P10 had been removed when the northeast perimeter fence was removed several years ago, the remaining signs were renumbered. At the time of this inspection, perimeter sign P1 was found missing and replaced. All other perimeter signs were intact and in good condition.

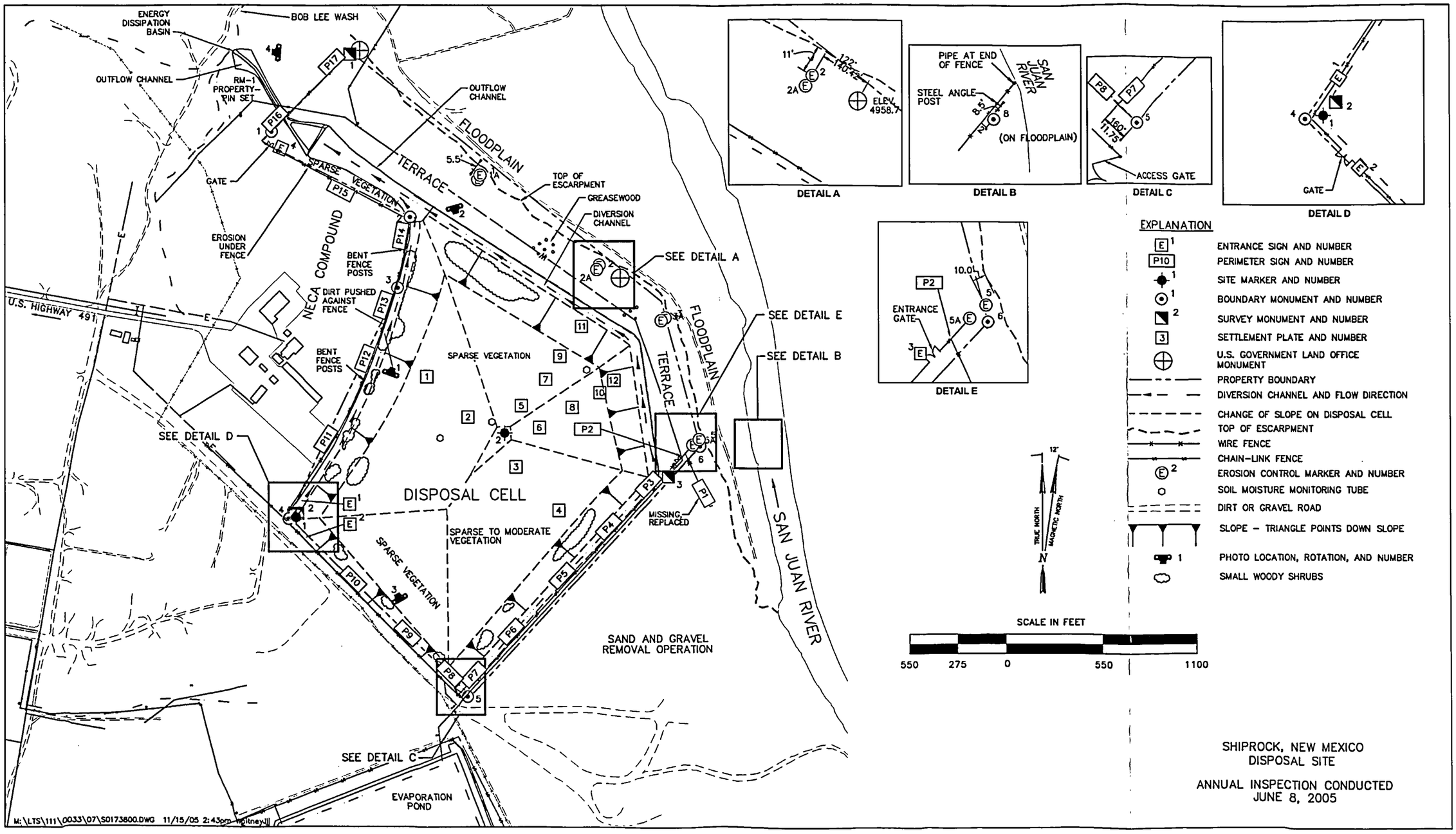


Figure 16–1. 2005 Annual Compliance Drawing for the Shiprock, New Mexico, Disposal Site

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. Boundary monuments BM–3, –4, –5, and –6 had not been located during the 2003 or 2004 inspections and are assumed to have been buried by windblown sand. During the 2005 inspection, an effort to locate these monuments with GPS equipment and shovels proved fruitless. Inspectors believe that BM–4 may have inadvertently been removed when windblown sand was bulldozed along the southwest perimeter fence in 2003 and BM–5 may have accidentally been removed when a ground water pipeline was installed in 2004. Because of an inaccuracy in the GPS navigation data, inspectors could not locate BM–3 or BM–6. An attempt to locate BM–3 and BM–6 will be made again in 2006. The remaining boundary monuments were in good condition.

The Bureau of Indian Affairs holds the land on which the disposal cell is situated in trust for the Navajo Nation. Because the land is not owned by DOE and the site lines of usage are clearly established by the security fence, the presence or exact location of boundary monuments is not a critical issue for managing the disposal site at this time. Should circumstances change in the future, and boundary monument locations become a critical issue, DOE will subcontract a licensed surveyor to find and/or reestablish the monuments.

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 because the wells are visited frequently by staff supporting the ground water restoration activity.

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.

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 that might affect site integrity or the long-term performance of the site.

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, northeast, and northwest side slopes. These areas were sprayed in September 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, and the population of woody shrubs growing on the cell side slopes continues to increase (PL–2). DOE is currently studying the effect of plant encroachment on the cell to evaluate the need for continued vegetation control.

16C

Five small research pits were located on the disposal cell cover (PL–3). These pits are associated with on-going research concerning cell performance, including the collection of saturated hydraulic conductivity measurements. They do not affect the performance of the cell cover.

16D

Diversion channels around the base of the disposal cell were in good condition. Tire tracks from a vehicle left ruts in the riprap along the northwest diversion channel; however, the ruts do not adversely affect the performance of the channel and are not a concern at this time. 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 present in the diversion channels does not affect the performance of the channels.

The outflow channel and energy dissipation basin, reconstructed in 2003 after significant erosion damage occurred, was in good condition (PL–4). Woody vegetation in the outflow channel was treated with herbicide in September 2004, and in 2005, inspectors found the treatment was effective. The need for additional herbicide applications to control woody vegetation will continue to be assessed.

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, 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.

Because of an unusually wet winter, flows in the San Juan River were higher than normal during the spring. Much of the floodplain was under water in the spring. At the time of the inspection, water remained puddled in backwater areas of the floodplain.

Halogeton, a noxious weed that was prevalent on the terrace area, was treated with herbicide in September 2004. This treatment was found to have been effective in 2005.

Outlying Area—A sand and gravel pit operated by the NECA is located immediately southeast of the disposal cell. 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 in 2002. 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 2005 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 2005.

16.3.3 Routine Maintenance and Repairs

In 2005, DOE replaced missing perimeter sign P1 and the entrance gate lock, filled in several gaps under the perimeter fence, and removed accumulated weeds and trash along the perimeter fence on the southwest and southeast sides of the property.

16.3.4 Ground Water Monitoring

Ground water monitoring is not required at this site because of the poor naturally occurring water quality, limited areal extent, and low yield in the uppermost aquifer beneath the disposal cell. Additionally, the higher piezometric head, combined with the low permeability of the unweathered Mancos Shale on which the disposal cell is constructed, will preclude movement of impacted water beneath the tailings pile into the deeper aquifers.

16.3.5 Corrective Action

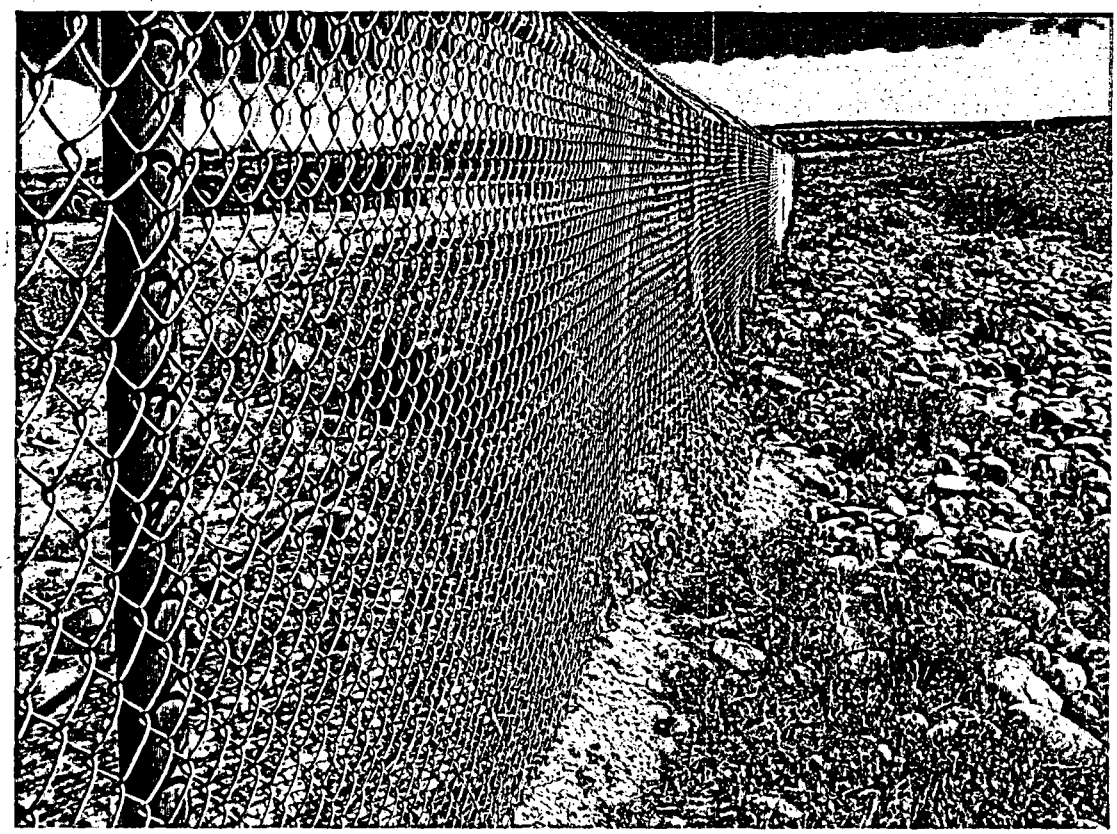
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2005.

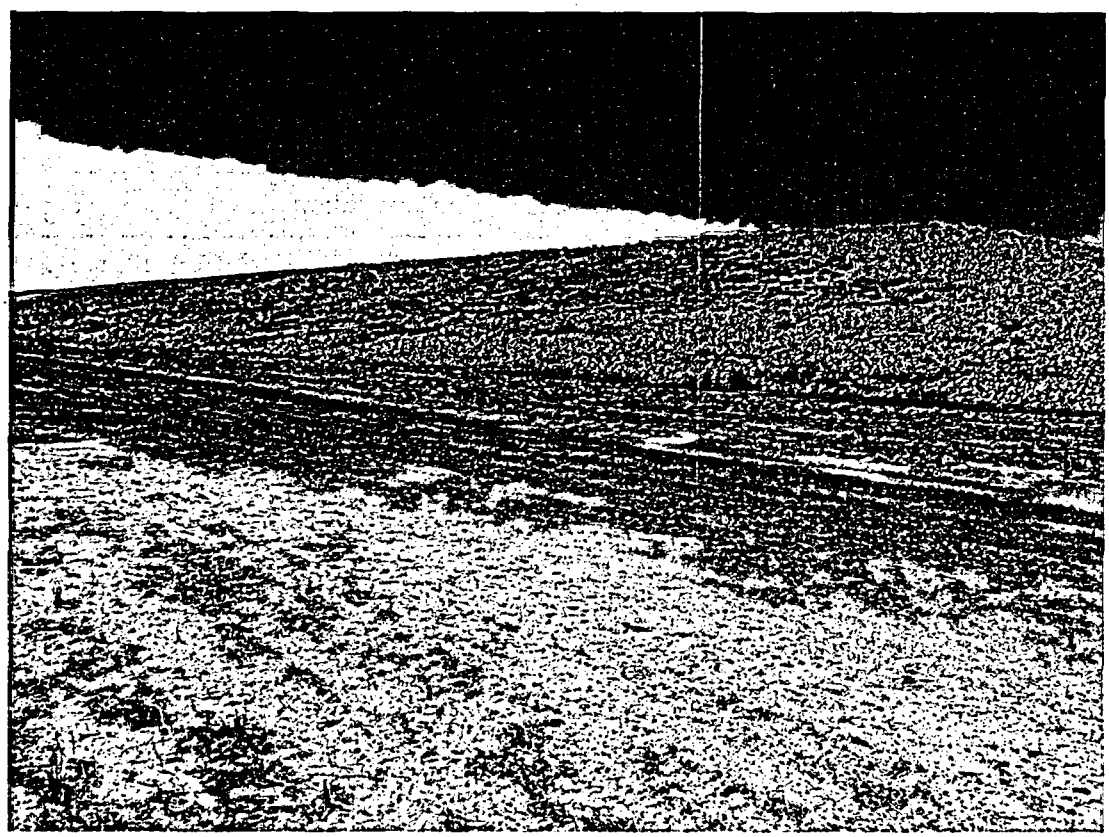
16.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	20	Dirt bulldozed into perimeter fence near perimeter sign 13.
PL–2	165	Vegetation growth on the NE side slope of disposal cell.
PL–3	330	Research pit on disposal cell top.
PL–4	275	Energy Dissipation Basin at the discharge point to the Outfall Channel adjacent to Bob Lee Wash.



SHP 6/2005. PL–1. Dirt bulldozed into perimeter fence near perimeter sign 13.



SHP 6/2005. PL–2. Vegetation growth on the NE side slope of disposal cell.

SHP 6/2005. PL–3. Research pit on disposal cell top.

SHP 6/2005. PL–4. Energy Dissipation Basin at the discharge point to the Outfall Channel adjacent to Bob Lee Wash.

End of current section

17.0 Slick Rock, Colorado, Disposal Site

17.1 Compliance Summary

The Slick Rock Disposal Site, inspected on April 26, 2005, remains in excellent condition. Gravel fill placed in rills in 2004 south of the disposal cell is retarding erosion, but the area continues to show minor erosion. No disturbances have been observed following an earthquake that occurred in November 2004 near the site. Vegetation on the reclaimed right-of-way permit areas show good progress in 2005 due to the above-average rainfall. Noxious weeds were sprayed with herbicide in 2005. No other maintenance needs or cause for a follow-up inspection was identified.

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

Institutional Controls—The 62-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1998. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, a site perimeter fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site. The site is surrounded by federal property administered by the U.S. Bureau of Land Management (BLM). The surrounding land is used primarily for livestock grazing and wildlife habitat.

17.3 Compliance Review

17.3.1 Annual Inspection and Report

The site, northeast of Slick Rock, Colorado, was inspected on April 26, 2005. 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.

Specific Site Surveillance Features

Access Road, Fence, Gate, and Signs— Access to the site is off County Road T11; 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.

The entrance sign is located inside the stock fence just east of the entrance gate and is in excellent condition. 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 perimeter sign P1 has a bullet hole; however, it remains sturdy and 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. All survey monuments were located and are in excellent condition.

Six boundary monuments define the corners of the site boundary. All six monuments were located and are 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. Following decommissioning, radon monitoring was performed at six locations adjacent to the cell and at one offsite location for a 1-year period to ensure that the radon barrier was not compromised during removal of the standpipes from the disposal cell. These measurements were presented in the 2004 compliance report and verified that removal of the standpipes did not compromise the radon barrier of the cell.

17.3.1.1 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.

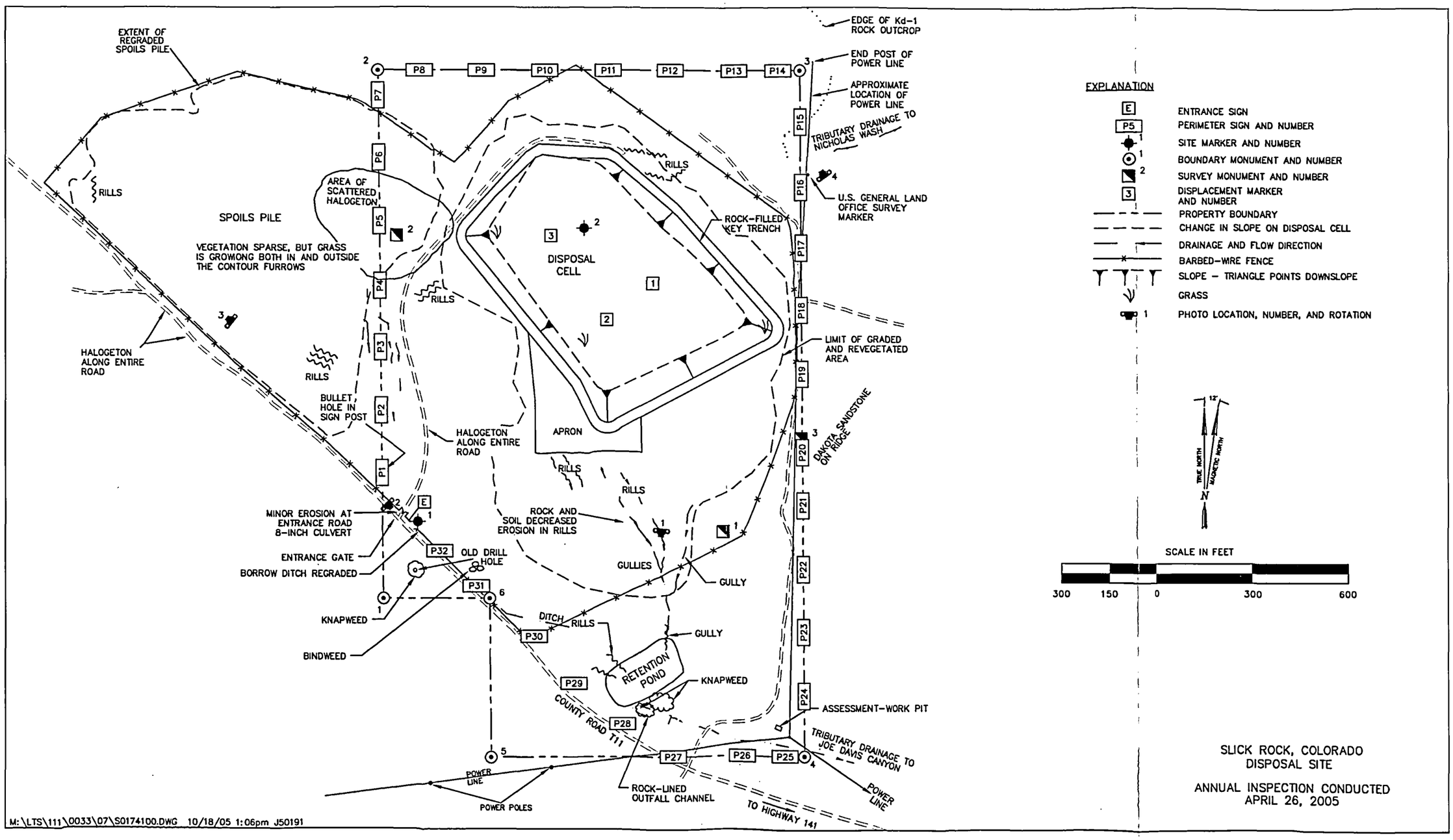


Figure 17–1. 2005 Annual Compliance Drawing for the Slick Rock, Colorado, Disposal Site

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.

On November 7, 2004, an earthquake registering 4.1 on the Richter scale was recorded in 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 site. No disturbances were observed in 2004 or 2005 at or adjacent to the site, and the disposal cell was in excellent condition.

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 2004, 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 entrance gate. In 2004, (1) the borrow ditch was deepened to divert runoff from the county road, (2) an 8-inch diameter culvert and compacted road base were installed at the site entrance to provide access across the borrow ditch, (3) rock and soil were placed in the rills to disrupt runoff flow (PL–1), and (4) the entrance road was repaired. The result of these erosion-prevention measures was to retard further erosion. In 2005, the rills remained stable and the culvert showed minor erosion (PL–2). The area will continue to be monitored to determine if additional maintenance is needed.

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. Vegetation on the disturbed areas is now similar in abundance and species diversity to undisturbed areas.

Noxious weeds (Russian knapweed, halogeton, and bindweed) also were found at the site and
17A were sprayed with herbicide three times in June and July 2005.

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 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 is improving (PL–3). Grasses are establishing in and beyond the contour furrows. Although the 2005 spring was wetter than the past several, the effect of prevailing drought conditions in the region would 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 evaluated annually to determine whether
17B 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 2005, there was no evidence of moist soil, mineralization, or phreatophyte vegetation at the outcrop that would indicate that drainage had occurred through this unit (PL–4).

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 2005.

17.3.2 Follow-Up or Contingency Inspections

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

17.3.3 Routine Maintenance and Repairs

Noxious weeds found at the site were sprayed with herbicide in June and July 2005.

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

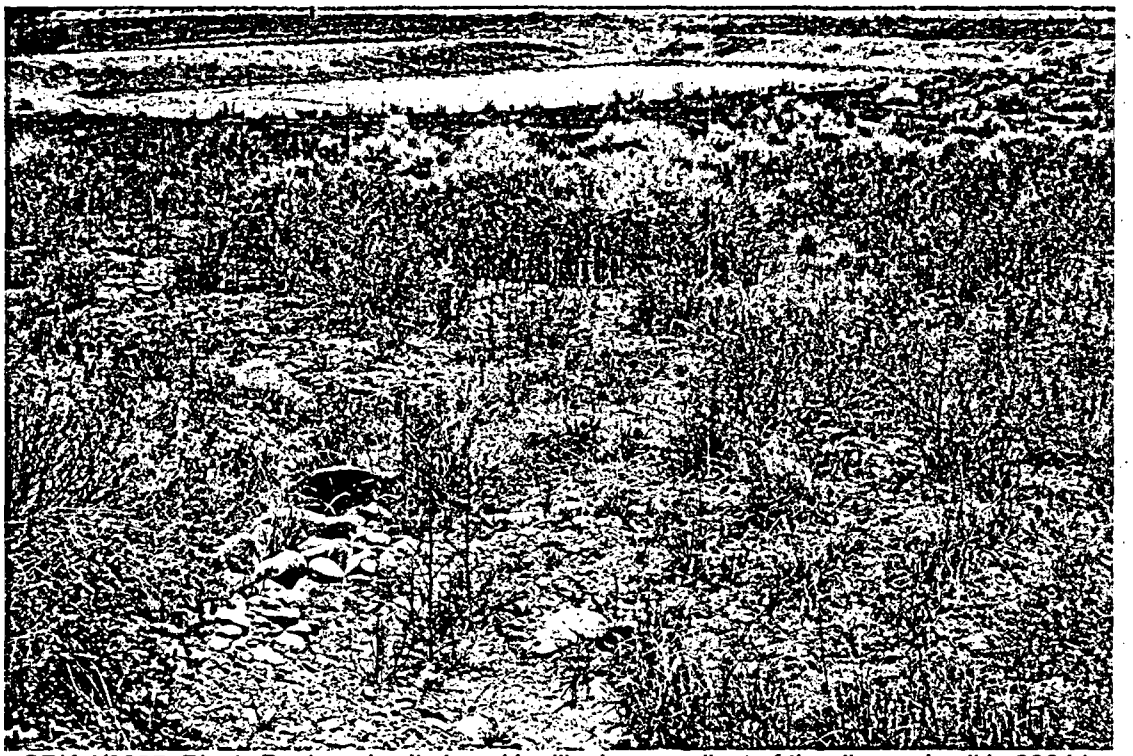
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2005.

17.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	185	Rock and soil placed in rills downgradient of the disposal cell in 2004 to prevent erosion; retention pond in background.
PL–2	135	Erosion of culvert installed at site entrance in 2004.
PL–3	310	Vegetative cover on the northwest corner of the reclaimed spoils pile.
PL–4	325	View of Kd-1 sandstone outcrop near northeast corner of disposal cell showing lack of erosion or moisture.



SRK 4/2005. PL–1. Rock and soil placed in rills downgradient of the disposal cell in 2004 to prevent erosion; retention pond in background.

SRK 4/2005. PL–2. Erosion of culvert installed at site entrance in 2004.

SRK 4/2005. PL–3. Vegetative cover on the northwest corner of the reclaimed spoils pile.

SRK 4/2005. PL–4. View of Kd-1 sandstone outcrop near northeast corner of disposal cell showing lack of erosion or moisture.

End of current section

18.0 Spook, Wyoming, Disposal Site

18.1 Compliance Summary

The Spook, Wyoming, Disposal Site, inspected on June 14, 2005, was in excellent condition. Concrete found to be spalling around the base of a site marker was repaired. Minor erosion occurring at several locations displayed little change from the previous year and will continue to be monitored and evaluated; erosion repairs are not necessary at this time. Noxious weeds found on site were treated with herbicide. No other maintenance needs or requirement for a follow-up or contingency inspection were 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

Institutional Controls—The 14-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1993. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, and warning/no trespassing signs placed along the property boundary; the site is not fenced. The site is surrounded by property owned by the Hornbuckle Ranch, and access is maintained through perpetual easements across the ranch.

18.3 Compliance Review

18.3.1 Annual Inspection and Report

The site, located in north central Converse County, Wyoming, was inspected on June 14, 2005. 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—Access to the site, located northwest of Douglas, Wyoming, is via Highway 93 to County Road 31 onto the Hornbuckle Ranch road. 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 that was found to be spalling (PL–1) during the 2004 inspection 18A was repaired to prevent additional damage (PL–2). Wind continues to scour soil from beneath the surface concrete collar around boundary monument BM–6 and perimeter sign P10, but both features are still 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.

An old water supply well remains on the site. The well, Spook #1 (Wyoming Permit No. U.W. 617), was installed in 1961 by the former landowner and predates site mining and milling activities. Well ownership was transferred to DOE when DOE acquired the site. It is completed in a deeper aquifer not affected by regional uranium mineralization and is permitted for 100 gallons per minute. 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, through a perpetual access agreement (DE–RO13–02GJ67289). The agreement stipulates that users will hold DOE harmless from all liability associated with use of the well. 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.

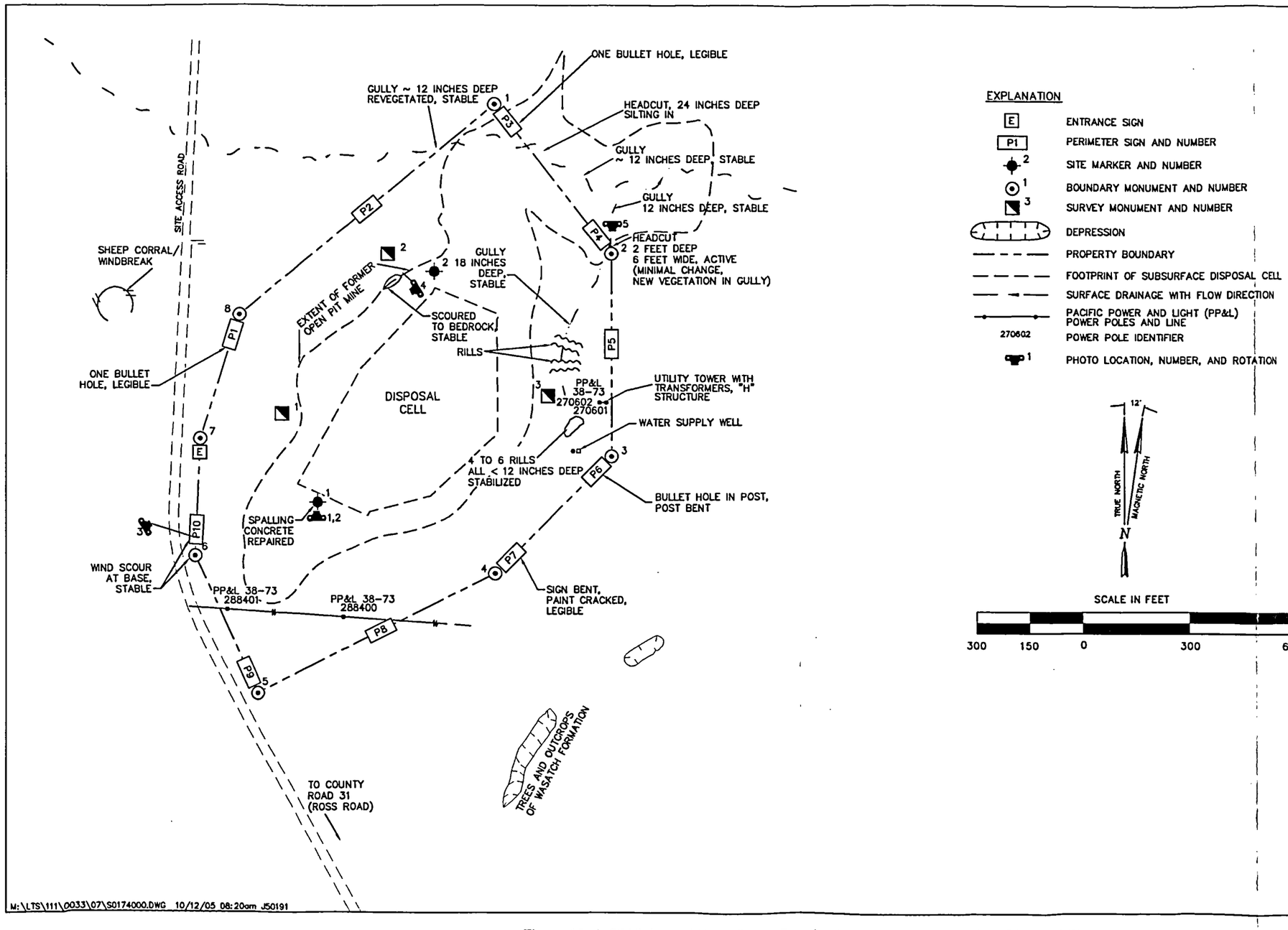


Figure 18–1. 2005 Annual Compliance Drawing for the Spook, Wyoming, Disposal Site

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–3). 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.

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–4), but this erosion feature is 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 very difficult to distinguish from the adjacent open range.

Most erosion features observed during previous inspections along and adjacent to the property boundary have stabilized. Only one gully, near perimeter sign P4, displays minimal activity, although new vegetation was noted to be establishing within the gully (PL–5). Inspectors placed some rocks at the knickpoint in 2003 to help control the erosion, but in 2004 headcutting had progressed a couple of more feet. This year headcutting appeared to have progressed less than a foot and stabilization of this gully is anticipated. There is no threat to site surveillance features or the cell. Monitoring of this erosion feature will continue until stabilization occurs.

No noxious weeds were observed at the time of the inspection. However, Canada thistle, a noxious weed, was present in past years and sprayed with herbicide by the Converse County weed control agent. The agent visited the site in September 2005 and found and sprayed small patches of Canada thistle; these patches were too small or the plants too immature to notice during the inspection.

18B

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 2005.

18.3.3 Routine Maintenance and Repairs

In 2005, DOE repaired spalling concrete around the base of site marker SMK–1 and sprayed noxious weeds with herbicide.

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

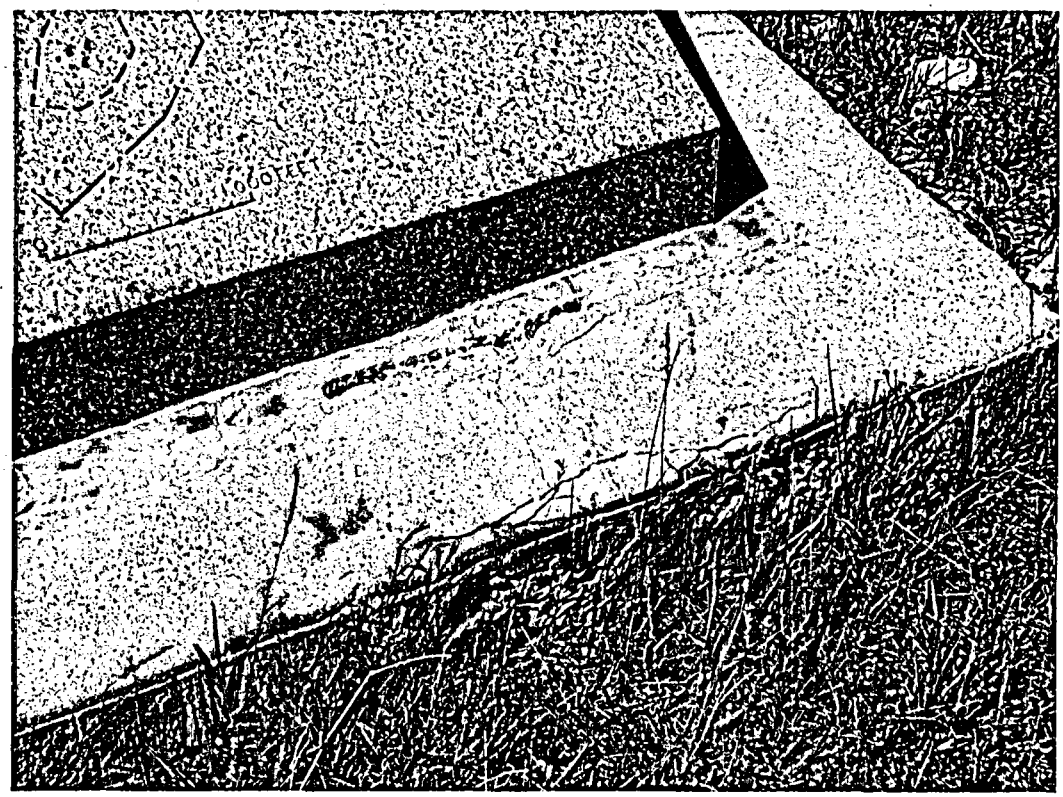
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2005.

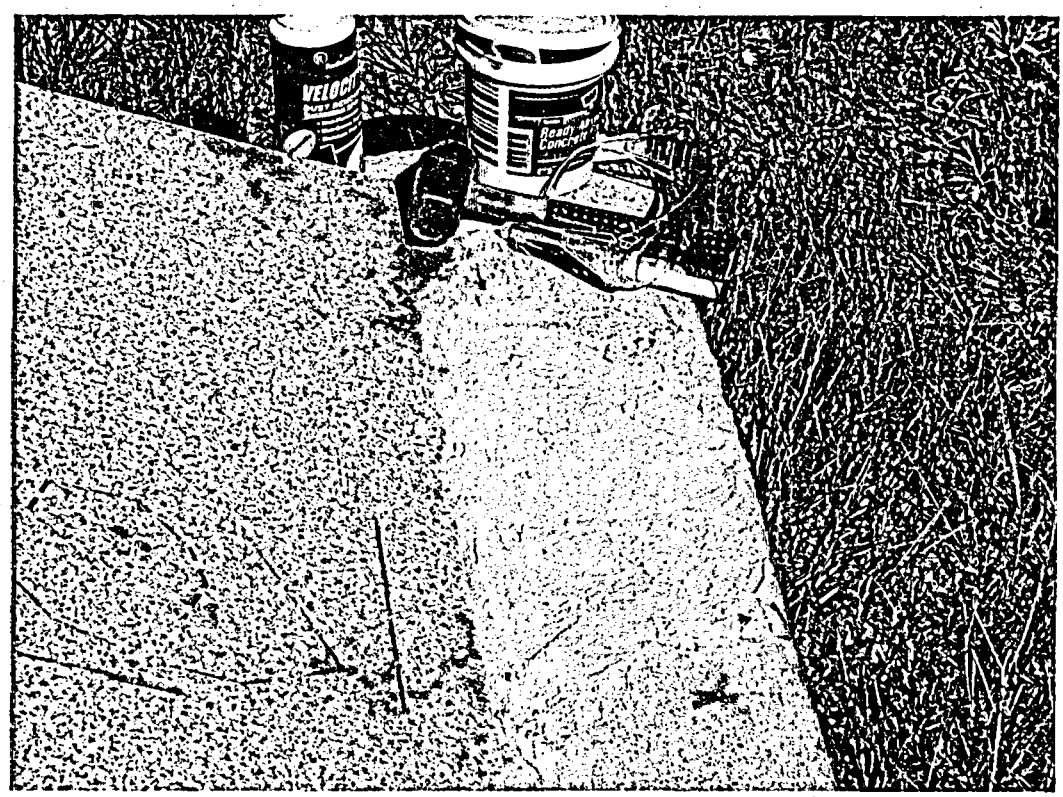
18.3.6 Photographs

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

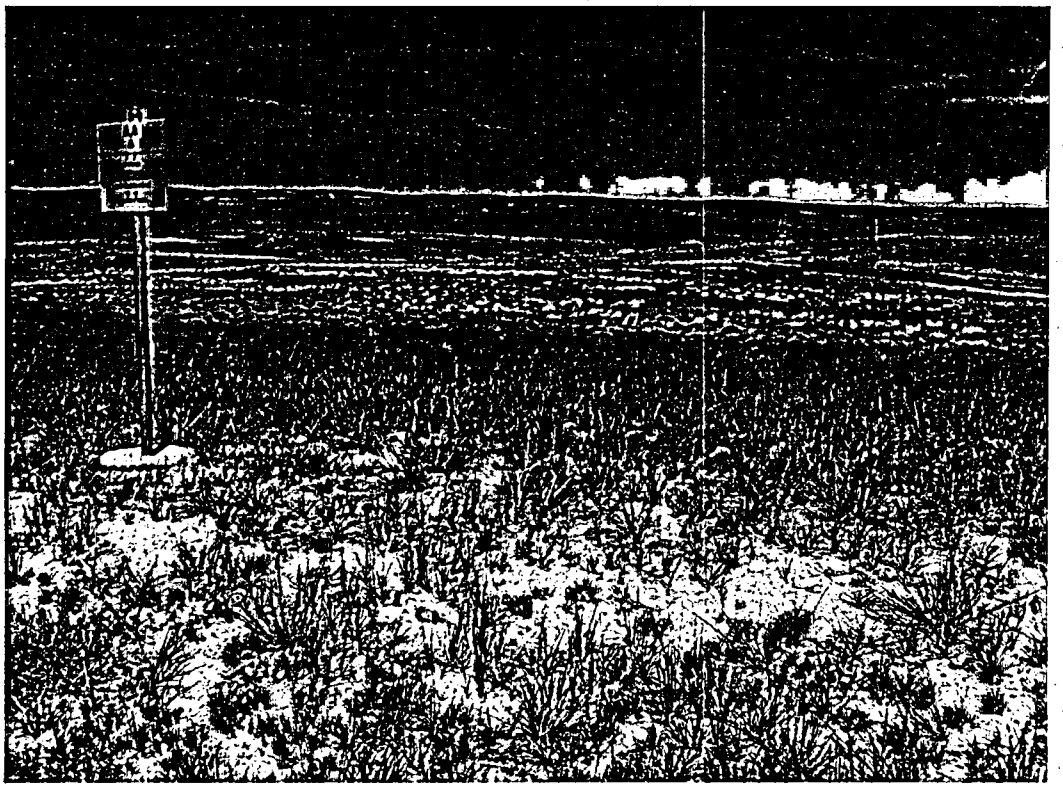
Photograph Location Number	Azimuth	Description
PL–1	NA	Close-up of spalling area on the concrete base of site marker SMK-1.
PL–2	NA	Repaired surface of the concrete base of site marker SMK-1.
PL–3	60	View across the disposal cell from perimeter sign P10.
PL–4	240	Erosion feature scoured to bedrock adjacent to the west edge of the disposal cell cover.
PL–5	180	Active erosion area near perimeter sign P4.



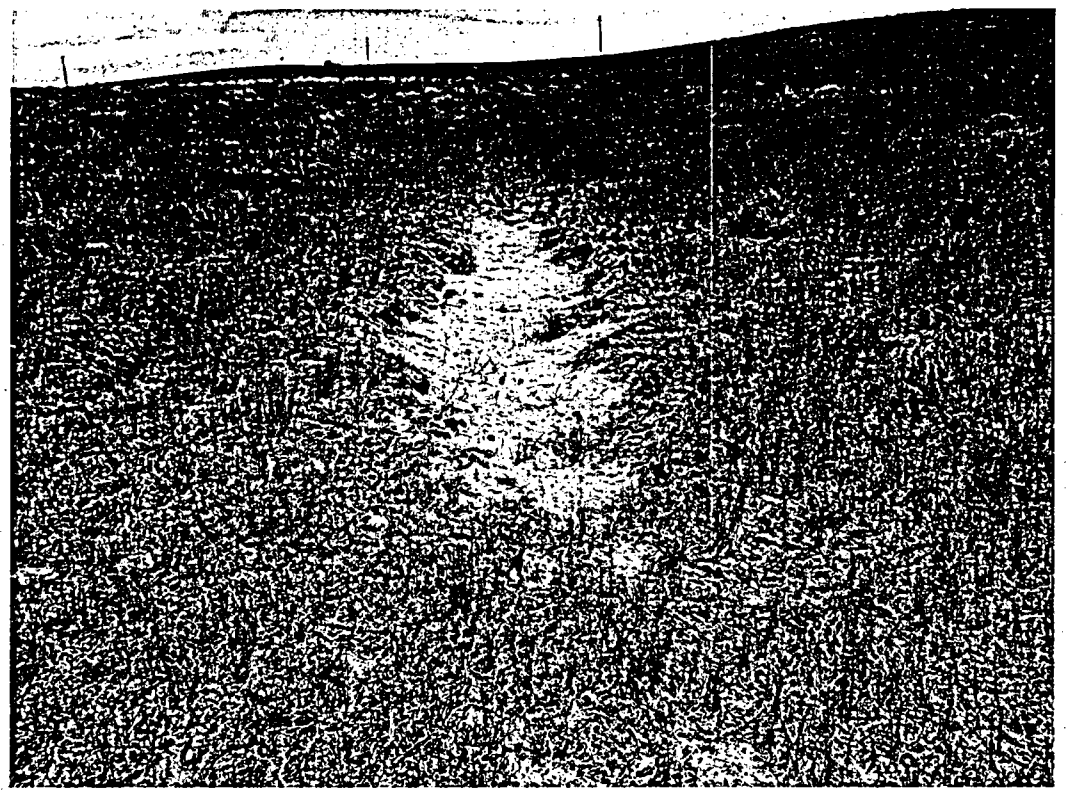
SPK 6/2005. PL–1. Close-up of spalling area on the concrete base of site marker SMK–1.



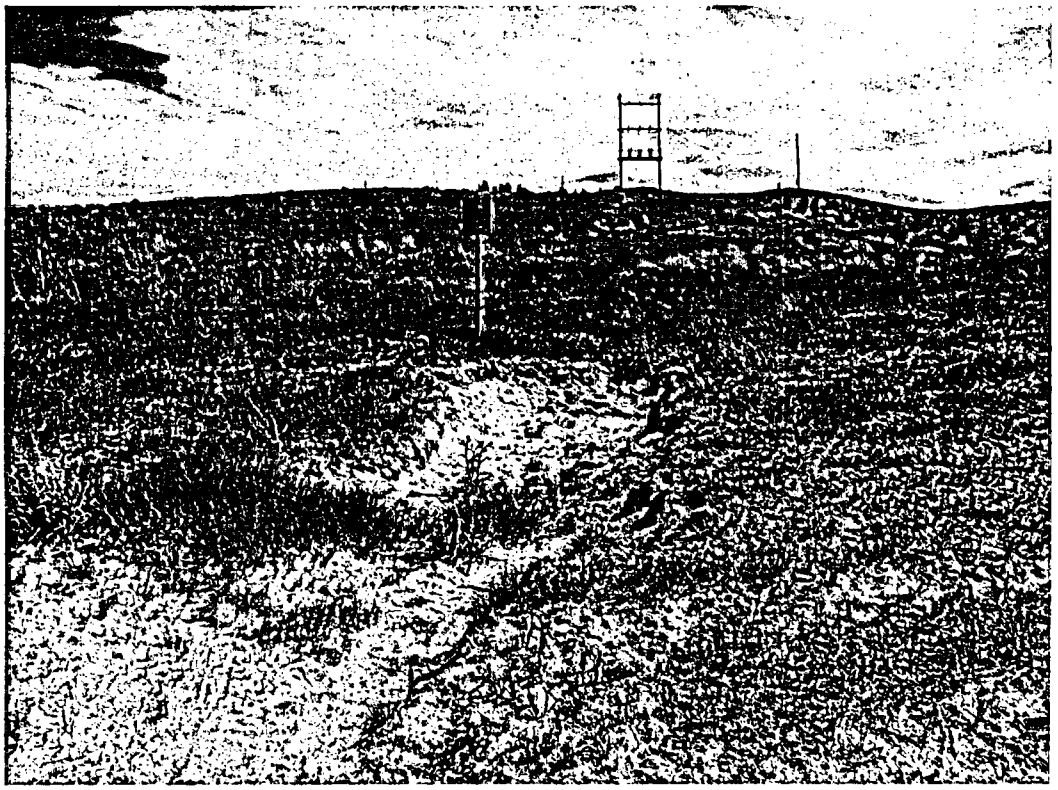
SPK 6/2005. PL–2. Repaired surface of the concrete base of site marker SMK–1.



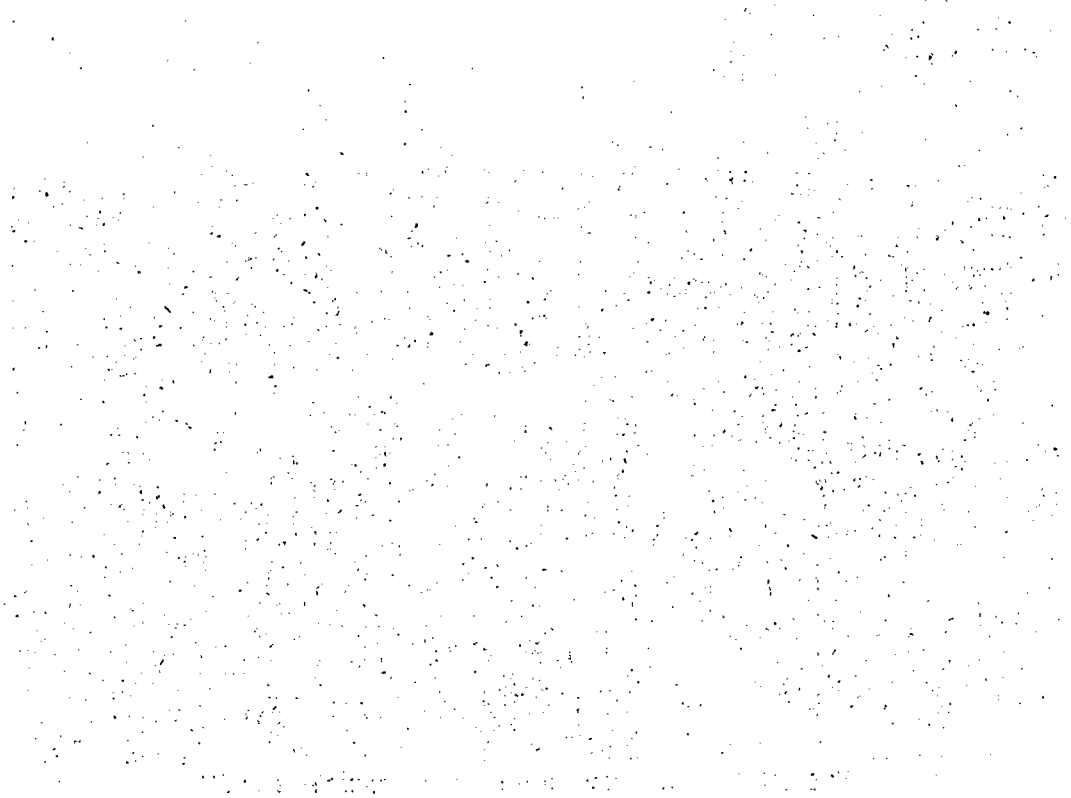
SPK 6/2005. PL–3. View across the disposal cell from perimeter sign P10.



SPK 6/2005. PL–4. Erosion feature scoured to bedrock adjacent to the west edge of the disposal cell cover.



SPK 6/2005. PL–5. Active erosion near perimeter sign P4.



End of current section

19.0 Tuba City, Arizona, Disposal Site

19.1 Compliance Summary

The Tuba City Disposal Site, inspected on April 28, 2005, was in good condition. Maintenance activities since the 2004 inspection included removing deep-rooted plants from the cell, filling in gaps under the security fence, removing accumulated tumbleweeds and debris along the fence, and replacing all of the perimeter signs because they were faded or damaged. Sand continues to accumulate at various locations along the toe of the disposal cell and in the diversion ditches; the increase is not significant and is not impacting the function of these features. U.S Department of Energy (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 2005 indicate no significant change in ground water quality when compared to historical results. No additional maintenance needs were identified or cause 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

Institutional Controls—The 145-acre disposal site is held in trust by the United States of America for the Bureau of Indian Affairs; the Navajo Nation retains title to the land. DOE and the Navajo Nation executed a Custodial Access Agreement (CAA) that conveys to the federal government title to the residual radioactive materials stabilized at the repository site and ensures that DOE has perpetual access to the site. UMTRCA authorized DOE to enter into Cooperative Agreement (CA) (DE-FC04-85AL26731) with the Navajo Nation and the U.S. Nuclear Regulatory Commission (NRC) required it prior to bringing the site under the general license. The purpose of the CA was to perform remedial actions at the former processing sites. The site was accepted under the NRC general license (10 CFR 40.27) in 1996 for compliance with 40 CFR 192, Subpart A and is not yet licensed for compliance with Subpart B because of active ground water remediation ongoing at the site. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal

control of the property, a site perimeter fence, warning/no trespassing signs placed along the property boundary, and a locked gate at the entrance to the site. The site is surrounded by Navajo Nation Reservation land. The surrounding land is used primarily for livestock grazing and wildlife habitat.

19.3 Compliance Review

19.3.1 Annual Inspection and Report

The site, located east of Tuba City, Arizona, was inspected on April 28, 2005. 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 ongoing 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 graveled road leads from U.S. Highway 160 to the entrance gate in the fence along the north edge of the disposal site. The access road, access gate, entrance gate, and entrance signs to the site are in good condition.

The security fence around the site is chain link with three strands of barbed wire at the top. The fence is in good condition. During the 2004 inspection, segments of the fence had gaps up to 24 inches in height caused by wind erosion. These gaps subsequently were filled with granular material and the segments were in excellent condition at the time of this inspection. Two burrows, probably dug by dogs, were noted and subsequently were filled with granular material. Other gaps up to approximately 3 inches in height, caused by wind erosion, were present at several locations. Such gaps are not considered to be a security concern because they are too small to allow unauthorized access into the site; however, most were filled with granular material also. The top rail of the perimeter fence is broken near perimeter signs P4 and P5 and is loose
19A near perimeter sign P24. The broken top rail will be repaired. However, the breaks are minor and do not compromise site security.

Two entrance signs and 30 perimeter signs are situated around the site. Perimeter signs are posted in pairs. Each sign pair, secured to a metal post and set back about 5 feet from the site boundary, consists of a "No Trespassing" sign with a radioactive materials tri-foil symbol and a schematic sign with a diagram of the disposal cell and the site boundary (that also includes the radioactive materials tri-foil symbol and lightening bolts which signify danger to the Navajo). All of the "No Trespassing" signs were noted to be in poor condition during the 2004 inspection due to vandalism (i.e., bullet holes) or deterioration from exposure to the weather and windblown sand; all of these metal signs were replaced by plastic signs in the fall of 2004. Many of the new signs were misaligned due to wind and will be straightened and better secured to the posts (PL–1). The metal schematic signs remain in good condition.

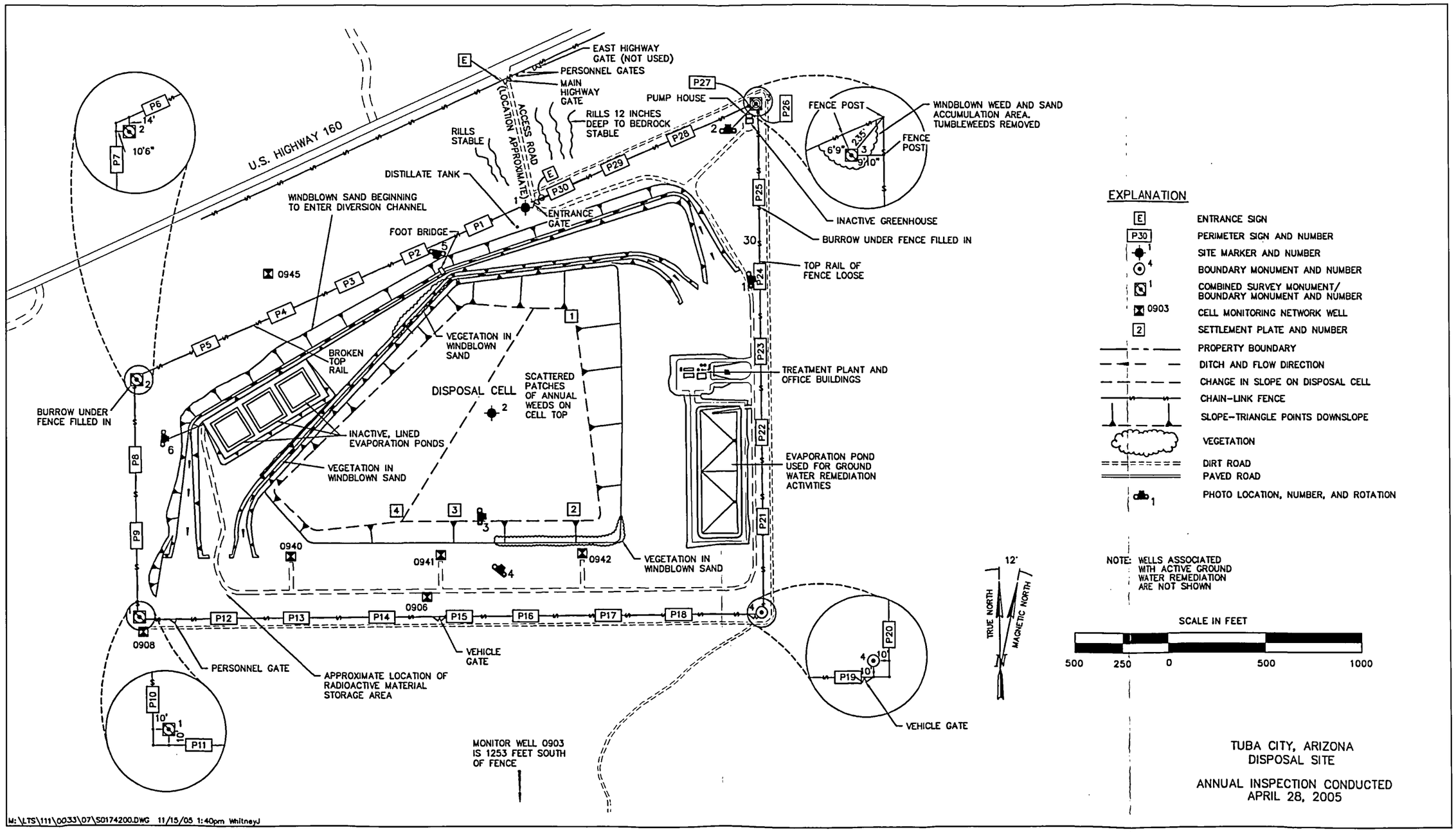


Figure 19–1. 2005 Annual Compliance Drawing for the Tuba City, Arizona, Disposal Site

Markers and Monuments—Two granite site markers, one just inside and to the right of the entrance gate and the other on top of the disposal cell, were in good 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. Boundary monument BM–3 was buried beneath a thin layer of sand and uncovered for verification (PL–2). All monuments were undisturbed and in excellent condition.

Monitor Wells— Seven wells comprise the cell performance monitoring network. The six wells inside and immediately adjacent to the disposal site were found to be secure and in excellent condition. Monitor well 0903, located about one quarter mile south of the cell, was not inspected but is maintained by personnel performing the sampling.

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.

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 Cell—The disposal cell is covered with riprap for erosion protection. The rock was in excellent condition and shows no signs of deterioration. Inspectors discovered no evidence of slumping, settling, or instability on the top or side slopes of the disposal cell (PL–3). All visible components of the disposal cell and cover were functioning as designed.

19B Deep-rooted shrubs are removed from the cell periodically in accordance with the LTSP to prevent potential penetration of the radon barrier, and shrubs were removed during the fall of 2004. Several small shrubs were observed on the cell during the 2005 inspection and were removed. A few clumps of grass and several patches of annual weeds were growing on the cell top and side slopes. These shallow-rooted plants are not a concern.

19C 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–4). The 2005 photographs showed there was very little change in vegetation conditions and sand accretion from the previous inspection, and no adverse effects to the performance of the cell have been observed. DOE continues to evaluate the effects of 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— Vegetation growth in the regraded areas adjacent to the disposal cell (inside the security fence) is comparable to vegetation conditions in surrounding undisturbed areas. However, ongoing ground water remediation

activities continue to disturb small portions of these regraded areas (PL–4). The disturbed areas will be monitored during annual inspections to ensure that revegetation progresses toward conditions typical of the surrounding plant communities.

Two rock-lined drainage channels are located on the north (upslope) side of the disposal cell and were in good 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 displayed very little change since the 2004 inspection and does not interfere with the drainage function of the channels (PL–5).

Sand erosion and deposition are of particular concern at the site. Unstable dunes in outlying areas are likely to contribute to sand accumulation along fence lines, in diversion channels, and in the rock cover of the disposal cell. However, revegetation of remediated areas surrounding the disposal cell appears to have been successful in reducing the rate of sand accumulation on site. Sand accretion and vegetation encroachment are checked annually in the diversion channels on the west, northwest, and north sides of the cell. The 2005 photographs show that there has been very little change at these locations since monitoring of sand accretion began in 2001 (PL–5). Also, no adverse effects to the performance of the diversion channels have been observed.

Three inactive evaporation ponds are located between the diversion channels on the west side of the site. Water was present in the ponds due to recent precipitation, which may attract dogs and other animals. The westernmost pond (PL–6) is retained as a backup pond for the new evaporation pond located on the east side of the site. DOE will evaluate whether to remove the other two inactive ponds before the backup pond is removed to reduce the potential safety hazard associated with the ponds. 19D

Tumbleweeds (dead Russian thistle) and windblown debris tend to accumulate along the fence lines and can cause windblown sand deposition to occur. These materials were removed during the fall of 2004, and no significant accumulations were observed during the 2005 inspection.

A small temporary storage area for radiologically contaminated materials associated with the ground water remediation project is located in the southwest corner of the site. The storage area, located within the fenced property boundary, is surrounded by radiological warning rope and posted as a radioactive material area. The pumps and treatment equipment, stored on pallets, have fixed low-level contamination and do not pose a risk of contaminating the underlying soil. Stored materials are periodically removed and disposed of at the Grand Junction Disposal Site located near Grand Junction, Colorado.

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 2005.

19.3.3 Routine Maintenance and Repairs

In 2005, DOE replaced damaged or illegible metal perimeter signs with plastic signs and removed deep-rooted plants from the disposal cell cover.

19.3.4 Ground Water Monitoring

DOE monitors ground water, as required by the LTSP, to compare current conditions to initial
19E disposal cell post-construction water quality at the site. Ground water quality degraded by contamination from former processing activities may mask the potential contamination that might leach from the disposal cell, and therefore, will not be indicative of cell performance. However, 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 compliance wells (Table 19–2) are monitored for four target analytes—molybdenum, nitrate (as nitrogen), selenium, and uranium. In 40 CFR 192 Table 1 of Subpart A, the U.S. Environmental Protection Agency (EPA) has established maximum concentration limits (MCLs) for these analytes in ground water (Table 19–3). 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

Table 19–3. Maximum Concentration Limits for Ground Water at the Tuba City, Arizona, Disposal Site

Constituent	MCL[a] (mg/L)
Molybdenum	0.1
Nitrate (as N)	10
Selenium	0.01
Uranium	0.044

[a]EPA MCLs as listed in 40 CFR 192 Table 1, Subpart A.
MCL = maximum concentration limit.
mg/L = milligrams per liter.

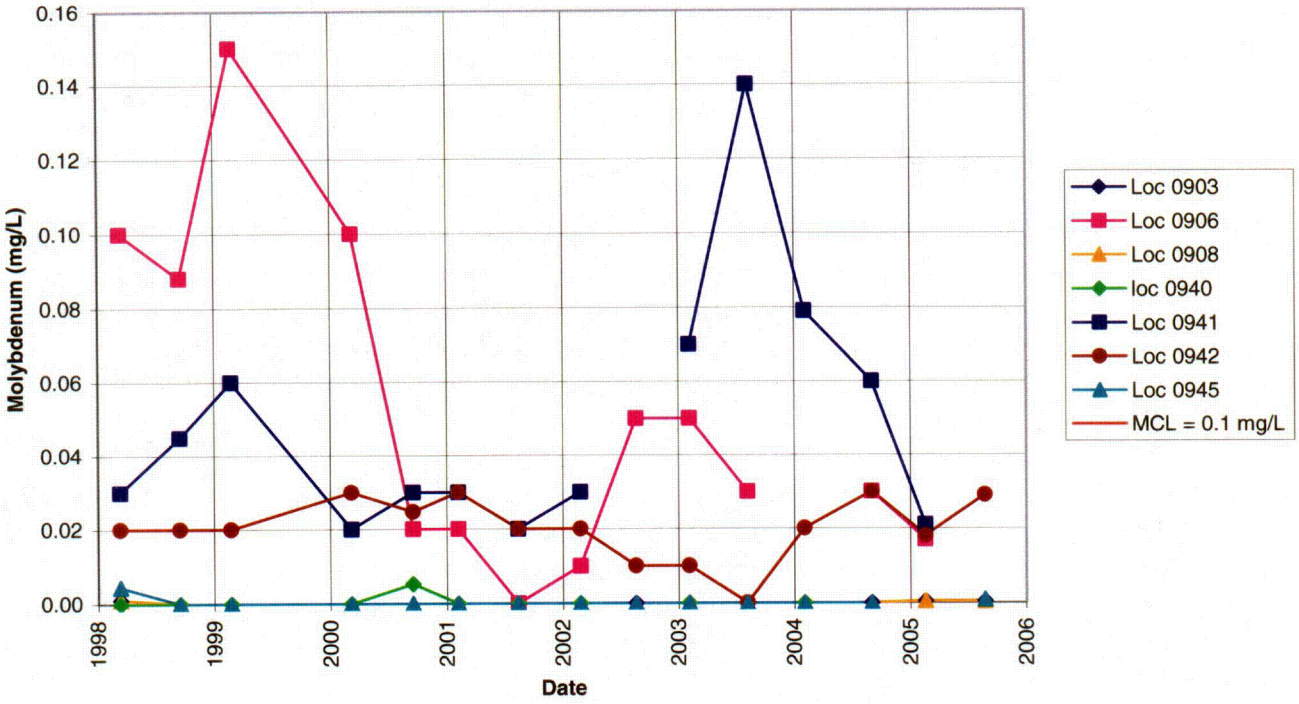


Figure 19–2. Time-Concentration Plots of Molybdenum in Ground Water at the Tuba City, Arizona, Disposal Site

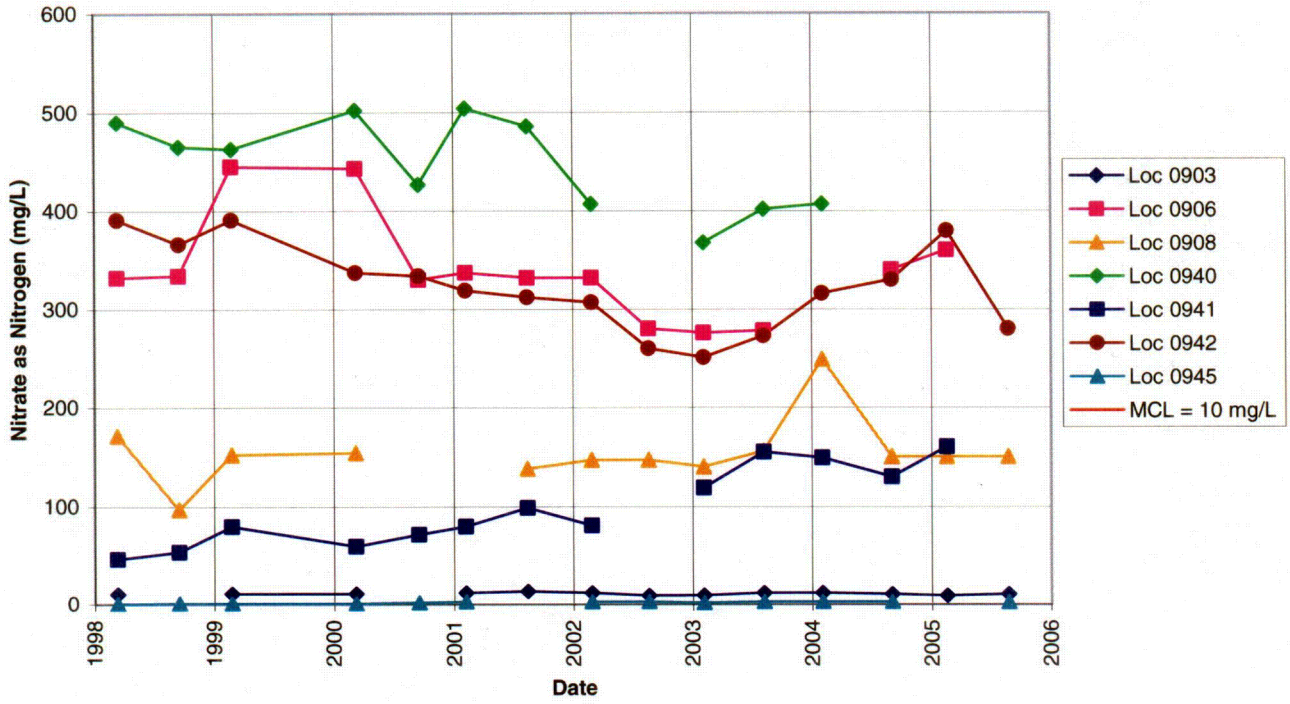


Figure 19–3. Time-Concentration Plots of Nitrate (as N) in Ground Water at the Tuba City, Arizona, Disposal Site

CZ6

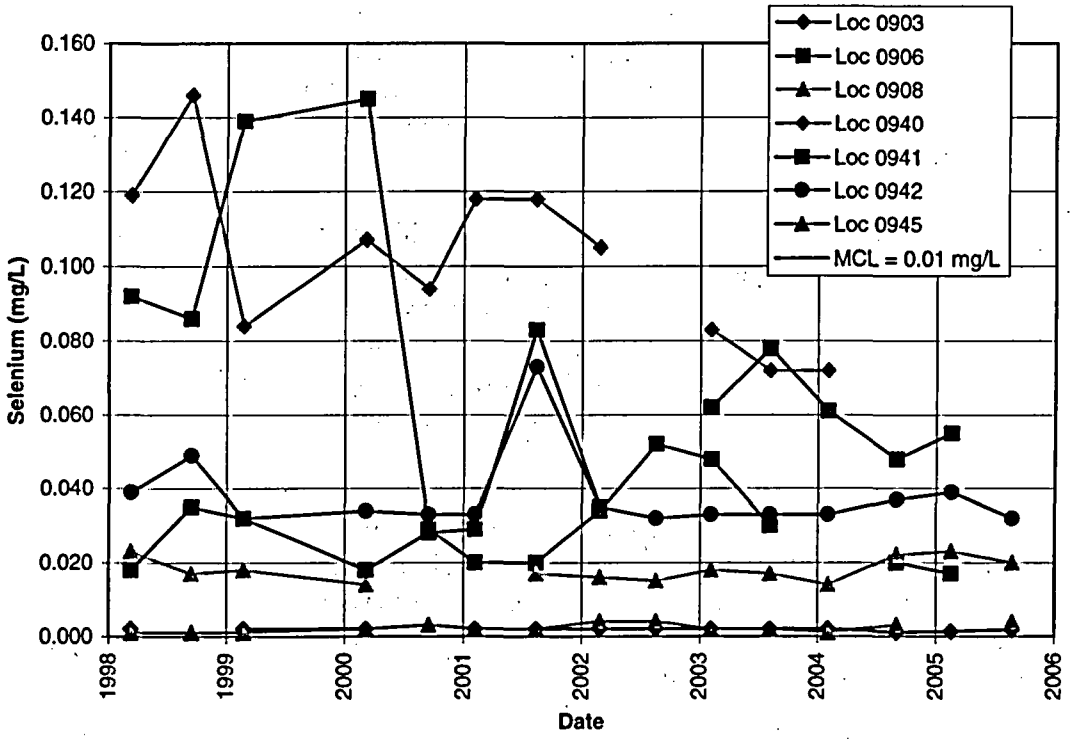


Figure 19–4. Time-Concentration Plots of Selenium in Ground Water at the Tuba City, Arizona, Disposal Site

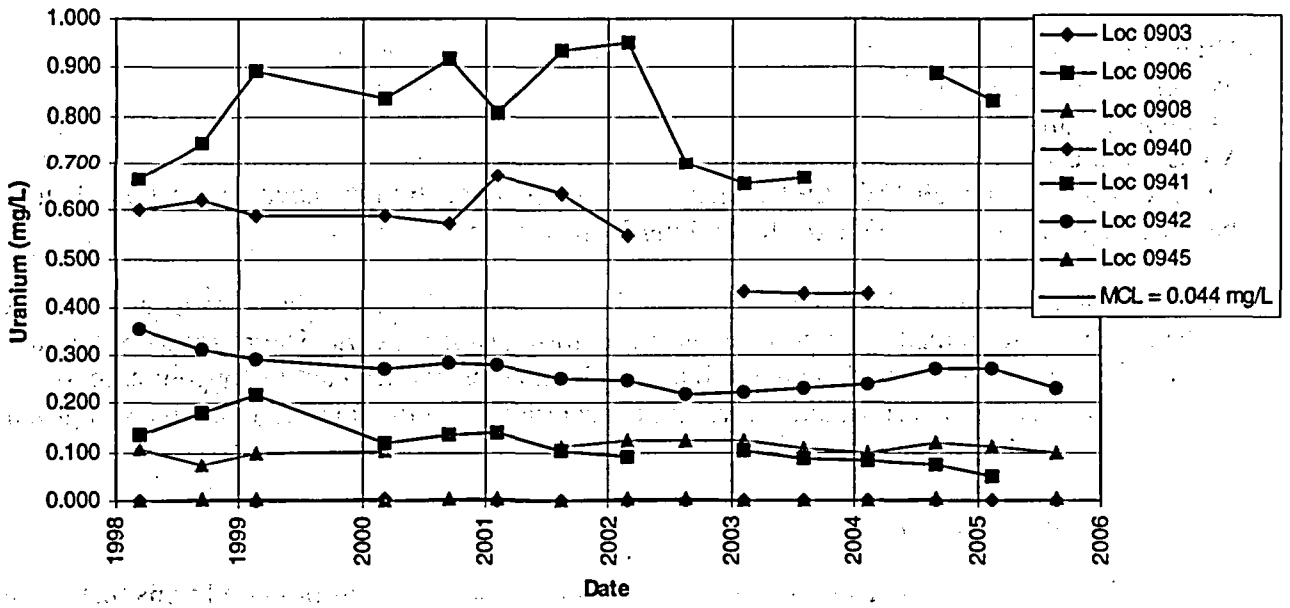
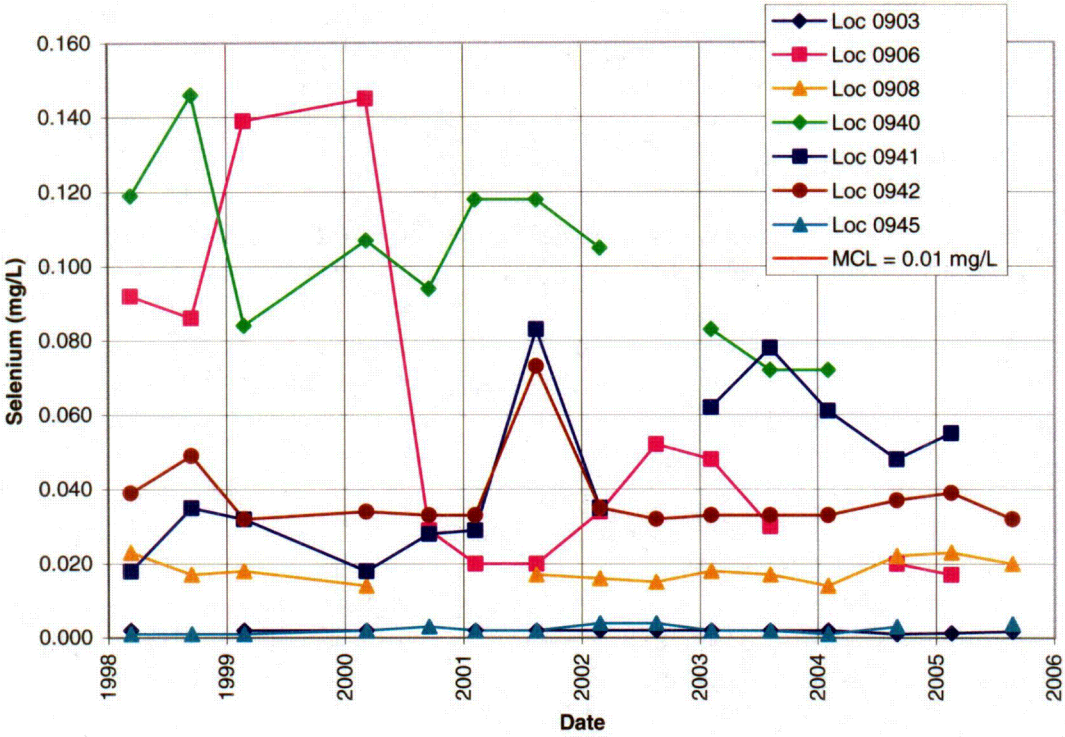


Figure 19–5. Time-Concentration Plots of Uranium in Ground Water at the Tuba City, Arizona, Disposal Site

C24



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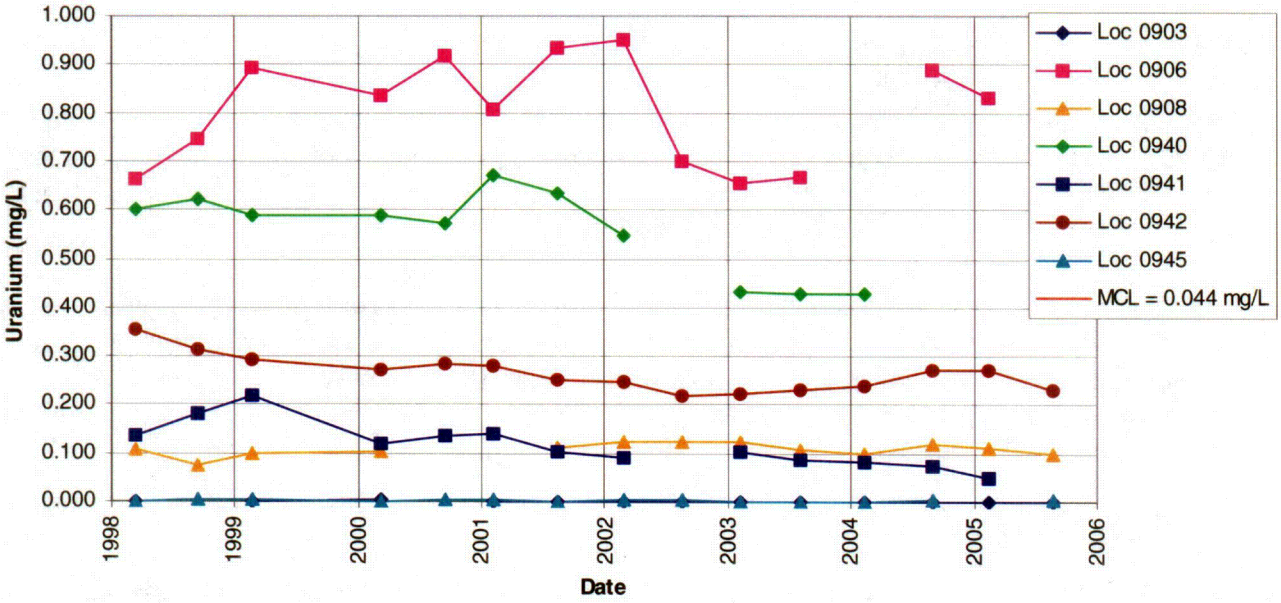

Figure 19–5. Time-Concentration Plots of Uranium in Ground Water at the Tuba City, Arizona, Disposal Site

C27

Sample results from 2005 indicate that ground water quality downgradient from the former millsite is degraded with respect to all four target analytes as is consistent with historical data. Concentrations of all four target analytes in both the upgradient background well MW–0945 and the off-site (~1,250 feet) downgradient well MW–0903 remain significantly lower than all of the remaining on-site wells.

Molybdenum concentrations in ground water were below the MCL (0.01 mg/L) in 2005 in all wells (Figure 19–2). Concentrations in onsite downgradient wells MW–0906 and MW–0941 have fluctuate substantially since 1998. Reported concentrations in these two wells have ranged from 0.01 mg/L to 0.15 mg/L in well MW–0906 and from 0.02 mg/L to 0.14 mg/L in well MW–0941. The remaining locations have historically shown concentrations below 0.04 mg/L, and the upgradient background well MW–0945 and the off-site downgradient well MW–0903 were at or near the detection limit.

Nitrate concentrations in ground water exceeded the MCL (10 mg/L), by an order of magnitude or more, in all onsite monitor wells except the upgradient background well MW–0945 (Figure 19–3). Concentrations in the off-site downgradient well MW–0903 were at the MCL in 2004 and only slightly above in 2005. Concentrations in all wells have remained relatively consistent, except in MW–0941 where an upward trend seems apparent. Nitrate concentrations have varied considerably from well to well since 1998.

Selenium concentrations in ground water exceeded the MCL (0.01 mg/L) in 2005 in all wells except the upgradient background well MW–0945 and the off-site downgradient well MW–0903 (Figure 19–4). Concentrations have remained fairly constant over time in two wells MW–0908 and MW–0942 (with one exception); the remaining on-site wells have fluctuated substantially since 1998.

Uranium concentrations in ground water exceeded the MCL (0.044 mg/L) in 2005 from all wells except the upgradient background well MW–0945 and the off-site downgradient well MW–0903; although, concentrations in well MW–0941 were reported only slightly above the MCL (Figure 19–5). Concentrations have remained fairly constant over time in all wells except onsite downgradient well MW–0906, where the highest concentrations have been reported and have fluctuated between 0.65 mg/L to 0.95 mg/L since 1998.

Active ground water remediation is ongoing at the site. The LTSP compliance wells are a subset of the ground water remediation performance monitoring well network. The progress of ground water remediation is evaluated annually, but remediation has not been active long enough to determine disposal cell performance. Overall, concentrations of the four target analytes in ground water are decreasing site-wide.

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 2005.

Sample results from 2005 indicate that ground water quality downgradient from the former millsite is degraded with respect to all four target analytes as is consistent with historical data. Concentrations of all four target analytes in both the upgradient background well MW–0945 and the off-site (~1,250 feet) downgradient well MW–0903 remain significantly lower than all of the remaining on-site wells.

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Nitrate concentrations in ground water exceeded the MCL (10 mg/L), by an order of magnitude or more, in all onsite monitor wells except the upgradient background well MW–0945 (Figure 19–3). Concentrations in the off-site downgradient well MW–0903 were at the MCL in 2004 and only slightly above in 2005. Concentrations in all wells have remained relatively consistent, except in MW–0941 where an upward trend seems apparent. Nitrate concentrations have varied considerably from well to well since 1998.

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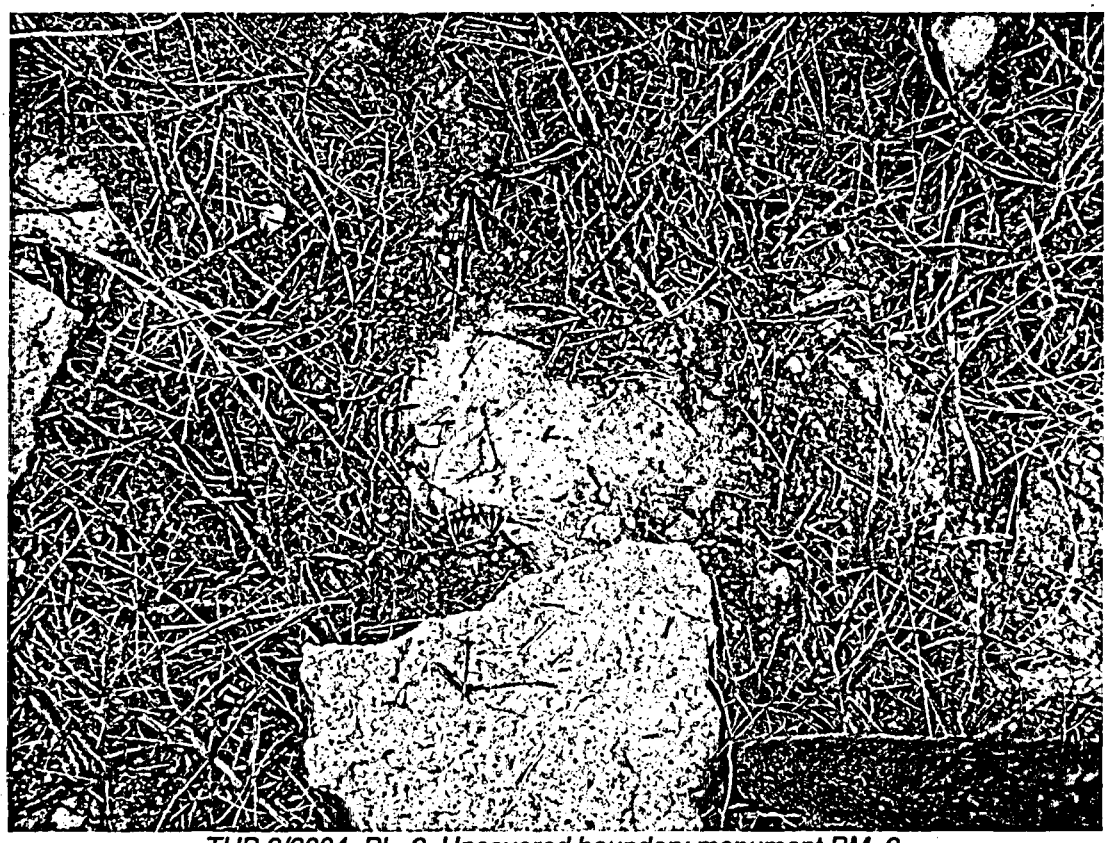
No corrective action was required in 2005.

19.3.6 Photographs

Table 19–4. Photographs Taken at the Tuba City, Arizona, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	80	New perimeter sign P24 turned around by wind.
PL–2	NA	Uncovered boundary monument BM–3.
PL–3	90	View east from the cell top along the south side slope showing ground water remediation activities in the background.
PL–4	40	Vegetation encroachment and sand accretion along the base of the south side slope of the disposal cell (reference photograph).
PL–5	190	Sand accumulation in the north diversion channel (reference photograph).
PL–6	95	The west inactive, lined evaporation pond.

TUB 9/2004. PL–1. New perimeter sign P24 turned around by wind.

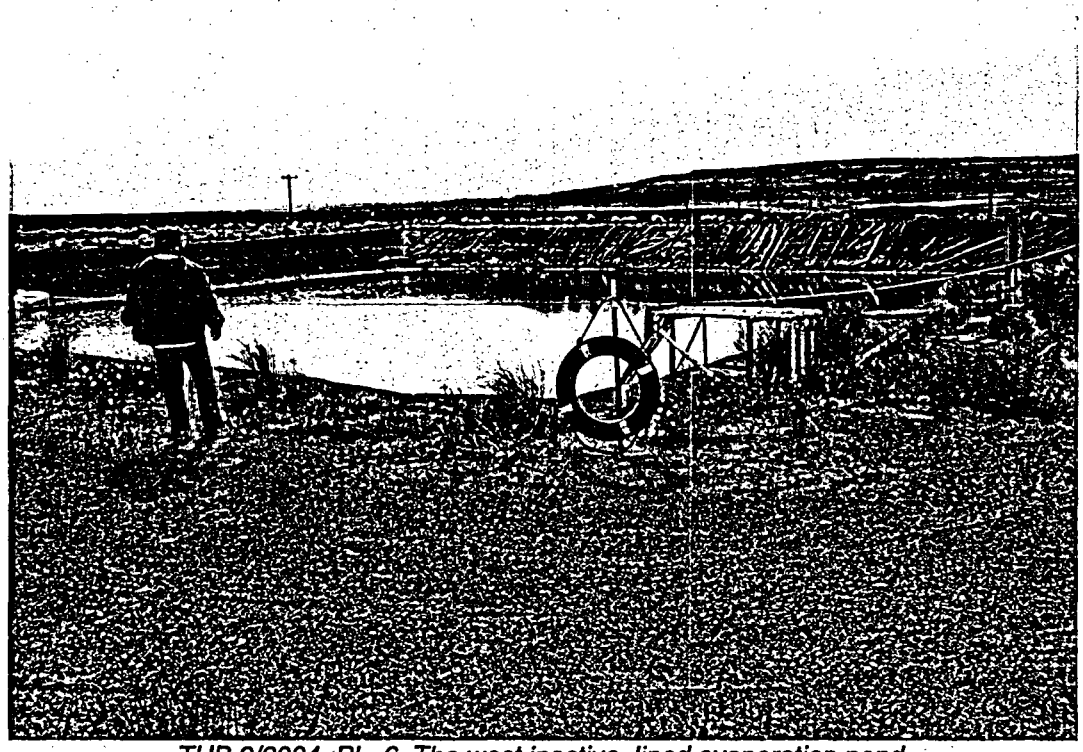


TUB 9/2004. PL–2. Uncovered boundary monument BM–3.

TUB 9/2004. PL–3. View east from the cell top along the south side slope showing ground water remediation activities in the background.

TUB 9/2004. PL–4. Vegetation encroachment and sand accretion along the base of the south side slope of the disposal cell (reference photograph).

TUB 9/2004. PL–5. Sand accumulation in the north diversion channel (reference photograph).



TUB 9/2004. PL–6. The west inactive, lined evaporation pond.