



**U.S. Department of Energy**

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

Subject: 2003 Annual Site Inspection and Monitoring Report for UMTRCA Title I  
Disposal Sites

Dear Mr. Janosko:

Four copies of the *2003 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 18 licensed disposal sites and the closed portion of the unlicensed Grand Junction, Colorado, Disposal Site. All of the sites were found to be in good condition, and there were no conditions identified that would cause immediate concern or require immediate corrective actions.

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 the Nuclear Regulatory Commission has comments or questions about this report, please call me at (970) 248-6004.

Sincerely,

A handwritten signature in black ink that reads "Michael K. Tucker".

Michael K. Tucker  
Program Management Support

Enclosure

cc w/o enclosure:  
A. Kleinrath, LM-50  
R. Johnson, Stoller  
Project Admin. File (A. Temple)

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## Long-Term Surveillance and Maintenance Program

# 2003 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites

January 2004



GJO-2003-528-TAC

**2003 Annual Site Inspection and Monitoring Report  
for  
Uranium Mill Tailings Radiation Control Act  
Title I Disposal Sites**

January 2004

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

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## Acronyms

BLM	U.S. Bureau of Land Management
CFR	<i>Code of Federal Regulations</i>
DOE	U.S. Department of Energy
MCL	maximum concentration limit
mg/L	milligram(s) per liter
NRC	U.S. Nuclear Regulatory Commission
PCB	polychlorinated biphenyls
PL	photo location
TDS	total dissolved solids
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978 (88 USC 7901, <i>et seq.</i> )

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## Executive Summary

This report, in fulfillment of a license requirement, presents the results of Long-Term Surveillance and Maintenance Program stewardship activities conducted by the U.S. Department of Energy (DOE) in 2003 at 19 uranium mill tailings disposal sites established under Title I of the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978<sup>1</sup>. 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 licensed 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.

Long-term surveillance and maintenance services for these disposal sites are administered by the DOE office in Grand Junction, Colorado. Services include inspecting and maintaining the sites; monitoring of 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 Long-Term Surveillance Plans 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. Program plans and site compliance reports are available on the Internet at [www.gjo.doe.gov](http://www.gjo.doe.gov).

Many of the sites require routine monitoring and maintenance including ground water monitoring, minor erosion control, vegetation and noxious weed control, fence repairs, and sign replacement. The following nonroutine activities<sup>2</sup> occurred in 2003:

- Burrell, Pennsylvania—removed a damaged access gate that was no longer needed for site security;
- Lowman, Idaho—removed a silt fence and stabilized erosion in a collection ditch;
- Mexican Hat, Utah—repaired storm damage to a diversion ditch;
- Shiprock, New Mexico—reconstructed the storm-damaged outflow channel and replaced a washed-out boundary monument and a section of security fence.
- Slick Rock, Colorado—conducted radon monitoring to verify that removed standpipes from the cell did not degrade the protectiveness of the radon barrier.

<sup>1</sup> 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.

<sup>2</sup> Nonroutine activities are defined in the *Long-Term Surveillance and Maintenance Program Plan*, (GJO-99-93-TAR, June 1999) as activities implemented in response to changes in site conditions, regulatory setting, or management structure following a regulatory compliance review.



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

2003 Summary of UMTRCA Title I Site Issues and Status

Site	Chapter	Page	Index No.	Actions and Issues
Ambrosia Lake, New Mexico	1	1-2	1A	Shallow depression on disposal cell top.
		1-2	1B	Maintenance: vegetation control on cell top.
		1-5	1C	Maintenance: vegetation control along cell apron.
		1-5	1D	Ground water monitoring.
Burrell, Pennsylvania	2	2-1	2A	Maintenance: removed unneeded and damaged access gate.
		2-5	2B	Control of undesirable plants.
		2-5	2C	Maintenance: vegetation control along perimeter fence.
		2-6	2D	Ground water monitoring.
Canonsburg, Pennsylvania	3	3-2	3A	Maintenance: vegetation control on cell.
		3-5	3B	Maintenance: vegetation control in diversion channels and perimeter ditch.
		3-5	3C	Control of undesirable plants.
		3-6	3D	Institutional controls needed for sale of Area C.
		3-6	3E	Maintenance: erosion control.
		3-6	3F	Ground water monitoring.
Durango, Colorado	4	4-2	4A	Maintenance: replace missing perimeter sign.
		4-6	4B	Reservoir construction near disposal site.
		4-6	4C	Maintenance: vegetation control.
		4-7	4D	Ground water monitoring.
Falls City, Texas	5	5-2	5A	Maintenance: repaired fence.
		5-2	5B	Maintenance: vegetation control on cell.
		5-5	5C	Ground water monitoring.
		5-6	5D	Evaluating ground water monitoring.
Grand Junction, Colorado	6	6-2	6A	Maintenance: repaired erosion along access road.
		6-5	6B	Vegetation encroachment and evaluation.
		6-5	6C	Maintenance: repaired erosion of drainage ditch.
		6-10	6D	Ground water monitoring.
Green River, Utah	7	7-2	7A	Maintenance: repaired erosion around perimeter of cell.
		7-5	7B	Maintenance: diverted runoff away from a perimeter sign and a boundary monument.
		7-6	7C	Ground water monitoring.
Gunnison, Colorado	8	8-2	8A	Maintenance: replace the entrance sign and a missing perimeter sign.
		8-2	8B	Maintenance: repainted monitor well identification numbers.
		8-2	8C	Maintenance: vegetation control at decommissioned well site.
		8-6	8D	Maintenance: vegetation control on reclaimed haul road.
		8-7	8E	Ground water monitoring.
Lakeview, Oregon	9	9-2	9A	Maintenance: fence repaired.
		9-2	9B	Maintenance: replaced damaged perimeter sign.
		9-2	9C	Investigation on effects of vegetation on cell.
		9-5	9D	Riprap size recalculated for gradation tests.
Lowman, Idaho	10	10-2	10A	Revised Long-Term Surveillance Plan in preparation to allow vegetation encroachment on cell.
		10-2	10B	Maintenance: vegetation control.
		10-5	10C	Maintenance: repaired erosion in collection ditch.
		10-5	10D	Maintenance: removed silt fence and armored rills.
		10-6	10E	Revised Long-Term Surveillance Plan in preparation to discontinue ground water monitoring.
Maybell, Colorado	11	11-2	11A	Maintenance: replaced damaged perimeter sign.
		11-2	11B	Maintenance: repaired cracked site marker base.
		11-5	11C	Maintenance: vegetation control on cell.
		11-6	11D	Ground water level monitoring.
		11-6	11E	Settlement plates survey results.

Site	Chapter	Page	Index No.	Actions and Issues
Mexican Hat, Utah	12	12-2	12A	Maintenance: replaced perimeter signs and stabilized a perimeter sign.
		12-2	12B	Maintenance: stabilized a boundary monument.
		12-2	12C	Maintenance: repaired storm-damaged diversion ditch.
		12-5	12D	Seep monitoring.
Naturita, Colorado	13	13-5	13A	Toe drain right-of-way permits revised to perpetual easements.
		13-5	13B	Ground water monitoring.
Rifle, Colorado	14	14-1	14A	Maintenance: repaired access gate.
		14-2	14B	Maintenance: repaired fence.
		14-2	14C	Maintenance: replaced damaged and missing perimeter signs.
		14-6	14D	Maintenance: vegetation control around cell.
		14-6	14E	Reclamation: BLM Temporary Withdrawal Permit active until successful revegetation.
		14-7	14F	Pumping water from cell.
Salt Lake City, Utah	15	15-2	15A	Restricted access.
		15-2	15B	Maintenance: fence repair.
Shiprock, New Mexico	16	16-2	16A	Maintenance: repaired fence damaged by storm runoff.
		16-2	16B	Maintenance: replaced boundary monument washed away by storm runoff.
		16-2	16C	Maintenance: vegetation control on cell.
		16-5	16D	Maintenance: reconstructed outfall channel damaged by storm runoff.
Slick Rock, Colorado	17	17-2	17A	Erosion and deposition in a county road borrow ditch.
		17-2	17B	Maintenance: replaced damaged perimeter sign.
		17-2	17C	Radon monitoring.
		17-5	17D	Maintenance: vegetation control.
Spook, Wyoming	18	18-2	18A	Maintenance: erosion control.
Tuba City, Arizona	19	19-2	19A	Maintenance: fence repair.
		19-5	19B	Ground water monitoring.

End of current text

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## 1.0 Ambrosia Lake, New Mexico, Disposal Site

### 1.1 Compliance Summary

The Ambrosia Lake Disposal Site, inspected on May 14, 2003, was in good condition. A small depression is present on the disposal cell top but is not affecting the integrity or performance of the cell. Deep-rooted vegetation observed on and around the cell cover was cut and treated with herbicide. Trespassing was evident by the presence of vehicle tracks along the apron and on the cell top. Inspectors identified no requirement for a follow-up or contingency inspection.

### 1.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Ambrosia Lake, New Mexico, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 1-1 lists these requirements.

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

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

### 1.3 Compliance Review

#### 1.3.1 Annual Inspection and Report

The disposal site, located north of Grants, New Mexico, was inspected on May 14, 2003. 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. Numerous locks are connected in series to allow other users passage through the gate. The access road passes through the DOE-owned property along the south boundary of the site.

The entrance and all perimeter signs were in good condition. Two perimeter signs along the northern property boundary had rotated on their posts; the movement most likely was caused by prevailing winds. Inspectors realigned the signs to their proper position. Future inspections will continue to monitor the condition of the signs.

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

**Monitor Wells**—Two monitor wells remain at this site. Both wells were inspected and found to be secure and in excellent condition.

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

### 1.3.1.2 Transects

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

**Top of Disposal Cell**—The top of the disposal cell generally was in good condition (PL-1). With the exception of one location there was no evidence of cracking, settling, slumping, or erosion. A small shallow depression around settlement plate SP-4 was first noted during the 1997 inspection; however, there has been no evidence to suggest the depression holds water. At the time of the 2003 annual inspection, the subsidence was estimated to measure approximately 1 foot in depth (PL-2). The depression will continue to be monitored to determine if it is increasing and to ensure that the integrity and performance of the cell cover is maintained. The elevation of SP-4 and the diameter of the depression will be surveyed in 2004.

1A

**Four-wing saltbush shrubs**, a deep-rooted plant, noted during the 2002 site inspection were cut and treated with herbicide prior to the 2003 inspection. Only one of this type of shrub was noted during the 2003 inspection, and it was cut and treated with herbicide. Several clumps of grass were growing on the cell top where windblown sand is accumulating in the riprap.

1B

Trespassing was evident on top of the disposal cell. An all-terrain vehicle (ATV) had been driven to the top of the cell and used to mark four circles with diameters between 40 and 60 feet (PL-3). Another area of surface disturbance was noted near the southeast corner of the cell top. The tracks were very shallow and do not impair the integrity or performance of the cover.

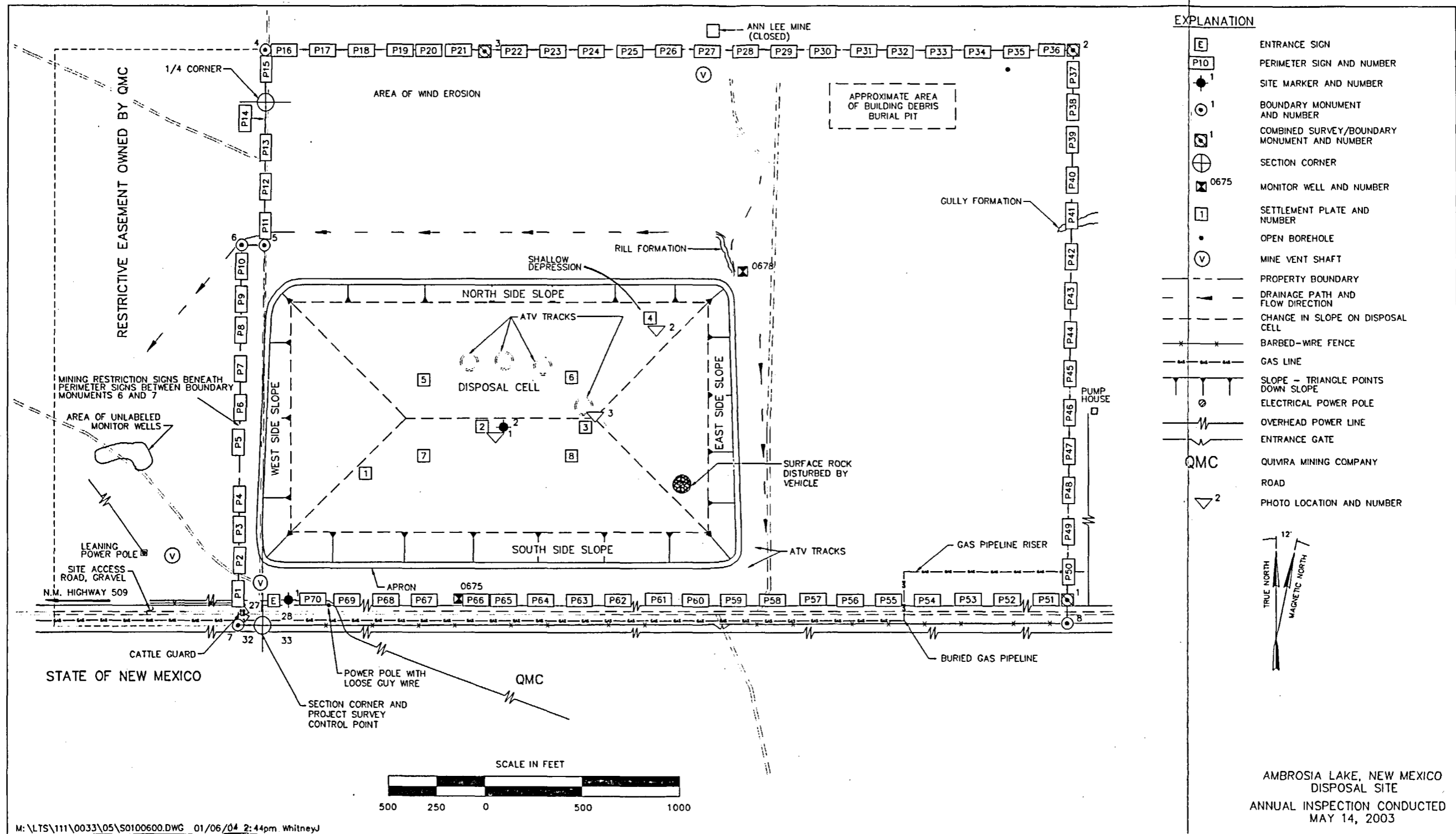


Figure 1-1. 2003 Annual Compliance Drawing for the Ambrosia Lake, New Mexico, Disposal Site

**Side Slopes and Apron**—The side slopes and apron were in excellent condition and showed no evidence of cracking, settling, slumping, or erosion. The apron was dry and there was no evidence of animal burrowing.

1C Several tamarisk shrubs, a deep-rooted plant, identified along the south apron during the 2002 inspection were cut and treated with herbicide prior to the 2003 inspection. New growth found during the 2003 inspection also was cut and treated.

Tracks from an ATV were noted along the apron on the south and east sides of the disposal cell. Unauthorized access and trespass on DOE property will continue to be monitored.

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

Rills and gullies within the DOE property north and east of the disposal cell have been monitored for several years. These erosional features, unchanged from the previous inspection, currently do not present a threat to the performance or integrity of the disposal cell because headward erosion is away from the cell and sediment deposition is not expected to reach the apron.

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

### 1.3.2 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 1.3.3 Routine Maintenance and Repairs

Deep-rooted shrubs were cut and treated with herbicide after the 2002 inspection and during the 2003 inspection, and two perimeter signs were realigned during the inspection.

### 1.3.4 Ground Water Monitoring

1D The Long-Term Surveillance Plan 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, for up to 30 years, and will evaluate the results after every third sampling event. The first post-closure sampling event was conducted in 2001.

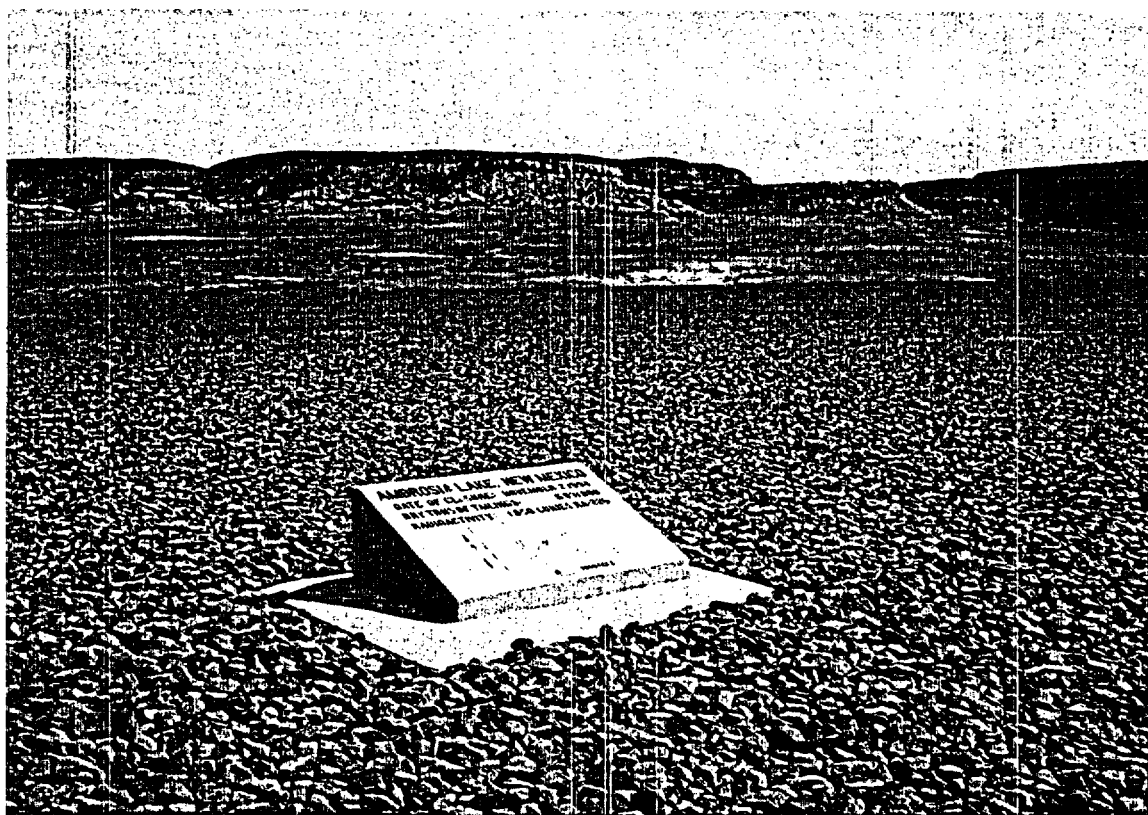
### 1.3.5 Corrective Action

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

No corrective action was required in 2003.

### 1.3.6 Photographs

Photograph Location Number	Azimuth	Description
PL-1	35	Site marker SM-2 at the center of the cell cover.
PL-2	320	Depression centered around settlement plate SP-4.
PL-3	315	Circular-shaped vehicular disturbance on the north facet of the cell cover.



*AMB 5/2003. PL-1. Site marker SM-2 at the center of the cell cover.*





*AMB 5/2003. PL-2. Depression centered around settlement plate SP-4.*



*AMB 5/2003. PL-3. Circular-shaped vehicular disturbance on the north facet of the cell cover.*

End of current section

2003 UMTRCA Title I Annual Report  
Ambrosia Lake, New Mexico  
Page 1-8

## 2.0 Burrell, Pennsylvania, Disposal Site

### 2.1 Compliance Summary

The Burrell Disposal Site, inspected on October 28, 2003, was in excellent condition. The derelict access gate at Strangford Road was removed, and vegetation along the security fence and access routes to the monitor wells was cut. Infestations of knapweed and poison hemlock, both undesirable species, were identified on the site and will require control. 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 for the U.S. Department of Energy Burrell Vicinity Property, Blairsville, Pennsylvania* (GJO-2002-331-TAR, U.S. Department of Energy (DOE) office at Grand Junction, April 2000, revised) and in procedures established by the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 2-1.

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

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

### 2.3 Compliance Review

#### 2.3.1 Annual Inspection and Report

The site, located southeast of Blairsville, Pennsylvania, was inspected on October 28, 2003. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 2-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

##### 2.3.1.1 Specific Site Surveillance Features

**Site Access, Fence, Gates, and Signs**—An access road leads from Strangford Road to the security fence at the site boundary. The former access gate at Strangford Road was unsuccessful in keeping people off the access road and out of the areas adjacent to the site, and was open and heavily damaged at the time of the 2002 inspection. DOE determined that limiting site access at Strangford Road did not enhance site security or protectiveness, and received concurrence from the U.S. Nuclear Regulatory Commission on April 28, 2003, to remove the gate. The gate was removed prior to the 2003 inspection (PL-1). The hard-packed graveled access road runs southwest across DOE's perpetual right-of-way (Tract 201-E) and DOE's leased crossing over Norfolk Southern Railroad right-of-way to the site. There were shallow potholes in the road but it was easily passable in a passenger car.

2A

The security fence is chain link with three strands of barbed wire on top. The fence, installed after DOE acquired the site in 1986, is rusty at many places but remains secure. Inspectors removed small limbs that had fallen across the fence. Vegetation had been cleared along accessible portions of the fence. Service life expectancy of the fence in the damp climate along the Conemaugh River is expected to be 25 to 30 years. Both gates in the fence—a vehicle entrance gate at the east end of the site and a personnel gate at the west end—were locked and in excellent condition.

The entrance sign and 17 perimeter signs are attached to the security fence. Historically, the signs along the northern perimeter fence (P1 through P8) are subject to bullet damage. All of those signs were replaced after the 2001 inspection and, although some have new bullet holes, were legible. Because access to the other side of the site is more difficult, the remaining perimeter signs except P16 were in good condition. The reflective material is peeling off of P16 and the sign will be replaced in 2004.

**Site Markers and Monuments**—The site has one site marker, which is at the east end of the site near the entrance gate. Vegetation around the site marker is cleared annually. Other Title I disposal sites have two site markers. The revised Long-Term Surveillance Plan 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. Three of the boundary monuments were covered by soil and were unearthed. To assist in future inspections, white PVC pipe was placed over the iron pipes that mark the survey monument locations.

Four pairs of erosion control markers are located in dense stands of Japanese knotweed, where they are usually difficult to find. At the time of the inspection the knotweed had died back for the season and all of the markers were readily located. No stream bank erosion was evident.

**Monitor Wells**—The site has four pairs of monitor wells, and all were in good condition. The lock was missing on MW-0423 and was replaced. Corridors to the wells are mowed annually to maintain access to and provide working space around the wells. Vegetation has re-established where two monitor wells were decommissioned in 2002, and no additional restoration work is required.

### 2.3.1.2 Transects

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

**Disposal Cell**—The top and side slopes of the disposal cell are covered with riprap and were in excellent condition. There was no evidence of settling, slumping, or other indications of instability.

Trees and shrubs continue to establish in the riprap (PL-2). In the past, this vegetation was aggressively controlled with massive applications of herbicide. A study that evaluated risks posed by encroachment of plants on the disposal cell demonstrated that the plants will not degrade the long-term performance of the cell and may improve performance by reducing moisture in the cover through evapotranspiration.

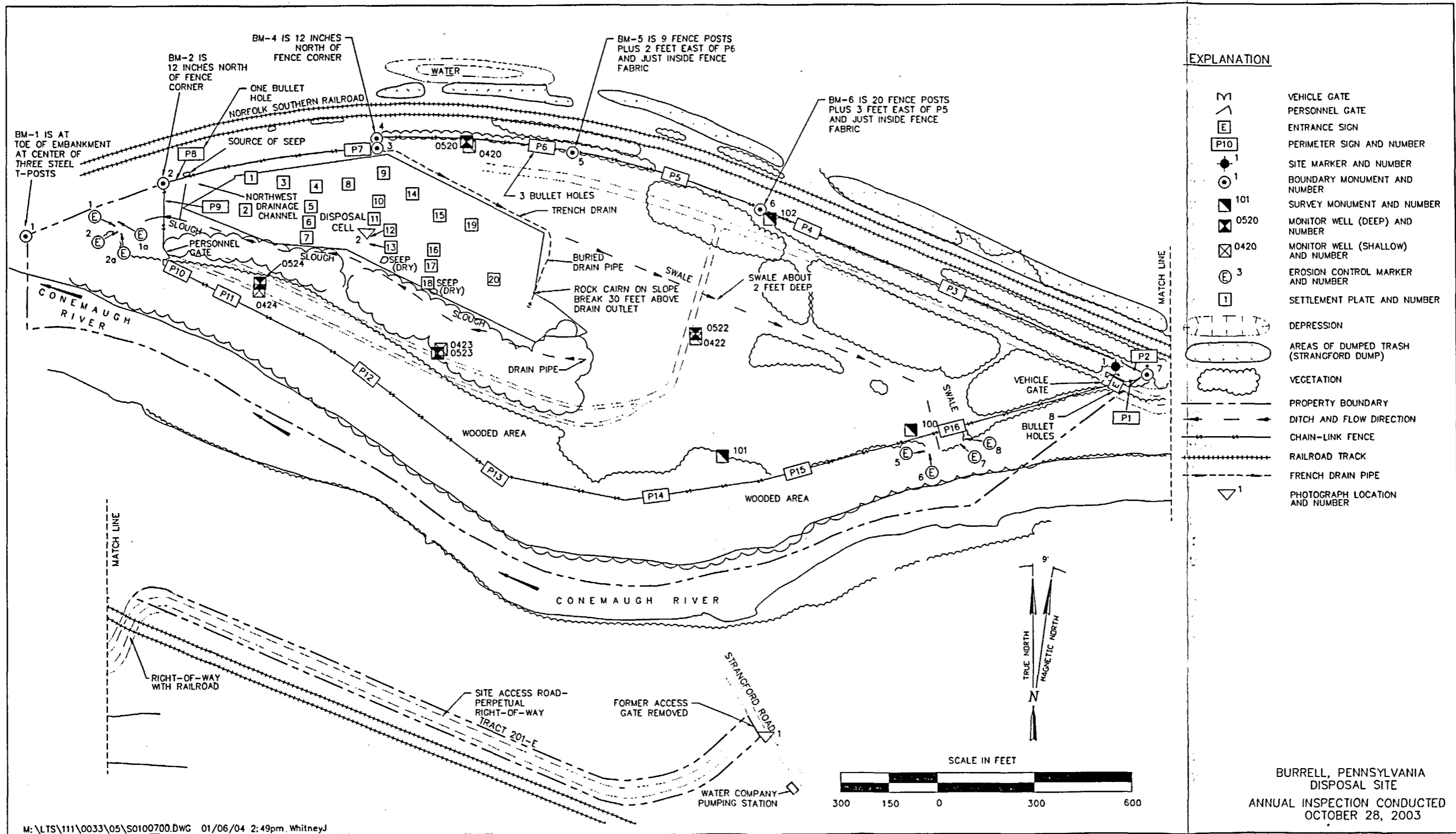


Figure 2-1. 2003 Annual Compliance Drawing for the Burrell, Pennsylvania, Disposal Site

The revised Long-Term Surveillance Plan allows the vegetation to grow on the disposal cell without further intervention; such growth will not increase risk to public health, safety, or the environment. In their concurrence in the revised Long-Term Surveillance Plan, 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 patch of spotted knapweed was found on the crest of the cell. DOE will identify and implement a method to control this undesirable weed.

Seeps previously found along the base of the south side slope were found to be dry. In 1998, DOE installed a perforated pipe and a gravel-filled trench drain along the northern edge of the disposal cell to improve drainage. It was suspected that water flowing in the seeps originated in a low-lying area north of the disposal cell. The reduced and usually absent flow at the seeps since the drain was installed suggests that the drain is diverting water that otherwise would flow beneath the disposal cell to the seeps.

At the time of the 2003 inspection, the area along the drain was dry and no water was flowing from the outlet. The wire fabric was intact in the drain outlet. Water has never been observed flowing from the outlet since the system was installed, perhaps because water is absorbed by the material through which the trench passes. Inspectors placed a sleeve of PVC pipe over the existing iron pipe at the drainage pipe outlet, which was hard to locate in the progressively more dense vegetation establishing in the area. The slough at the foot of the disposal cell, fed by ground water, was flowing normally.

**2B Area Between the Disposal Cell and Site Boundary**—The area surrounding the disposal cell and inside the security fence is covered by thick grass and thickets of woody plants. Spotted knapweed, observed in past inspections in the adjacent railroad right-of-way, has spread across most of the DOE property and currently is interspersed with native desirable plants. The knapweed is not a listed noxious species in Pennsylvania but is recognized as an invasive species. It seems to be out-competing desirable species on the site and in some places is creating a monoculture. To comply with federal invasive species directives and to maintain plant diversity on the property, DOE added knapweed control to the scope of routine maintenance activities at the site after the 2001 inspection. Effective control measures based on advice from local weed control experts are being evaluated. DOE asked the Norfolk Southern Railroad to control the knapweed on their property also. The railroad sprayed the weeds on their property in 2001, and DOE will request additional spraying in 2004.

Poison hemlock was identified along the access routes to monitor wells MW-0423 and MW-0424. 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. DOE is evaluating effective control measures for this plant also.

**2C Site Perimeter**—A 5-foot-wide swath was mowed on both sides of the fence in September 2003. DOE also clears woody vegetation from the fence as necessary. DOE has been conducting this maintenance annually to improve access to the fence and prolong its service life. Mowing and clearing will be repeated every 2 to 3 years, or as necessary, to keep the fence clear of vegetation.

Seeps along the security fence, located about 60 feet east of perimeter sign P8 and immediately west of the disposal cell, were flowing. Significant amounts of water were observed in these

areas, along with the presence of wetland-type vegetation (e.g., cattails and willows). The seeps will continue to be monitored to ensure they do not pose a threat to the integrity or performance of the disposal cell.

Canada thistle, a state-listed noxious weed, was identified on railroad property near boundary monument BM-2. DOE may need to control this weed to prevent its spread onto their property.

**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. North of the site and the railroad tracks, a dirt road provided access to the decommissioned monitor wells. This road also provides access to a long, narrow wooded area along the tracks that has been used for unpermitted dumping. Dumping appears to have decreased in recent years, but there was evidence of new debris in 2003. Although this activity is not a direct threat to the disposal site, the amount of dumping is an indication of the overall level of activity near the disposal site and may be a predictor of vandalism. Therefore, conditions at the dump will continue to be monitored. Other areas around the site remained unchanged.

### 2.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 2.3.3 Routine Maintenance and Repairs

In 2003, DOE removed the Strangford Road access gate and cleared vegetation from fence lines and monitor well access routes.

### 2.3.4 Ground Water Monitoring

2D

DOE monitors ground water at this site, as a best management practice, to evaluate the effectiveness of the remedial action. The revised Long-Term Surveillance Plan stipulates monitoring every 5 years. No monitoring was required in 2003; DOE will sample ground water again in 2006.

### 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 2003.

### 2.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL-1	270	Location of the former access gate at Strangford Road.
PL-2	45	Vegetation on the south slope of the disposal cell.



*BUR 10/2003. PL-1. Location of the former access gate at Strangford Road.*



*BUR 10/2003. PL-2. Vegetation on the south slope of the disposal cell.*



End of current section

## 3.0 Canonsburg, Pennsylvania, Disposal Site

### 3.1 Compliance Summary

The Canonsburg Disposal Site, inspected on October 29, 2003, was in excellent condition. The reconstructed bank downstream from the site along Chartiers Creek at Area C remains stable and was in excellent condition. Significant infestations of Canada thistle and poison hemlock were found on the east portions of the site and in Area C and will be controlled by DOE. Ground water monitoring showed uranium concentrations remained above the maximum concentration limit at two of four downgradient wells; however, the public health and environment are adequately protected. No need was identified for a follow-up or contingency inspection.

### 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 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 the DOE office at Grand Junction 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* (Document No. U0035910, DOE-GJO, February 2000) are applicable. Site stewardship 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 <sup>a</sup>	Section 3.3.4
Corrective Action	Section 4.4	Section 3.3.5

<sup>a</sup>Ground Water Compliance Action Plan.

### 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 October 29, 2003. Features and photograph locations (PLs) mentioned in this report are shown on Figure 3-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

### 3.3.1.1 Specific Site Surveillance Features

**Access, Gates, Fence, and Signs**—Access to the site is directly from Strabane Avenue, a public right-of-way. The entrance gate, located at the southeast corner of the site along Strabane Avenue, was locked and in good condition. A vehicle gate located on the northeast side of the site was inoperable due to a corroded lock and thick vine growth. This gate is not used, so there is no need to replace the lock; however, DOE will remove the vines as part of routine maintenance of the security fence.

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 generally was in acceptable condition and remains secure. From the far western corner of the fence, north along the top of the bank above Chartiers Creek, to near perimeter sign P5, the concrete collar at the bottom of several fence posts was exposed. During site construction, DOE removed soil from this area to improve site drainage; however, all fence posts were stable.

The site has an entrance sign at the entrance gate and 11 perimeter signs. One perimeter sign was missing and another had corroded fasteners; DOE will replace the sign and fasteners in 2004. The entrance sign and the other perimeter signs were in good condition.

**Site Markers and Monuments**—The two site markers, three survey monuments, and three of the four boundary monuments were undisturbed and in excellent condition. Boundary monument BM-4 was not inspected because it is buried under riprap of the perimeter ditch.

Erosion control markers along the bank of Chartiers Creek were undisturbed. 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. No new erosion was noted along the bank.

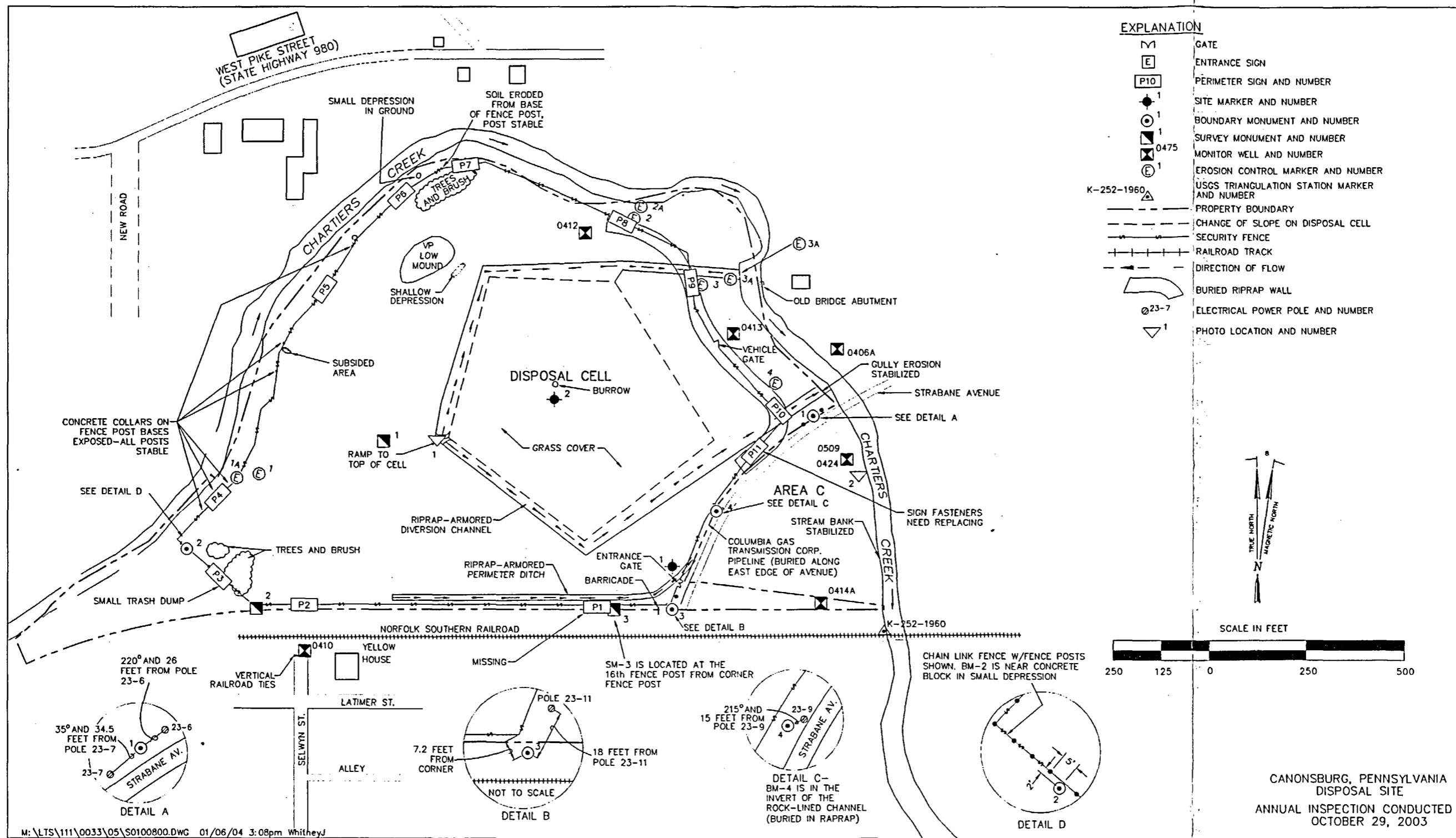
**Monitor Wells**—The ground water monitoring network consists of six monitor wells which are sampled annually in accordance with the Long-Term Surveillance Plan and the Ground Water Compliance Action Plan. The wells were secure and in excellent condition.

DOE decommissioned all wells that were not required for compliance monitoring (18 wells) in September 2002. The former well sites were successfully restored and will no longer be inspected.

### 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.

3A **Disposal Cell**—The grass-covered disposal cell surface was in excellent condition. The grass is mowed and mulched annually, most recently in September 2003. There was no evidence of slumping, settling, erosion, or other modifying process.



**Diversion Channels and Perimeter Ditch**—Diversion channels around the disposal cell and the perimeter ditch along the south and east sides of the site are armored with riprap and were in good condition. 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.

3B Vegetation in the diversion channels and perimeter ditch was treated with herbicide in 2002 and the dead woody plant material was removed in 2003. Some perennial vegetation, consisting primarily of grass-like plants, is re-establishing but currently is not impairing the function of the channels and ditch (PL-1).

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

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

3C Poison hemlock was identified on the site. 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. DOE is evaluating effective control measures for this plant.

Infestations of Canada thistle, a state-listed noxious weed, were located primarily in an area northeast of the disposal cell between the security fence and Chartiers Creek prior to 2001. The infestations were unsuccessfully treated with herbicide in 2001 and 2002. The thistle has spread to several locations within the security fence, including on the northeast side slope of the disposal cell. DOE is developing a new control strategy that may include a combination of mechanical and chemical treatments timed to most effectively control the weeds.

**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.

Canada thistle plants were interspersed with healthy vegetation along the outside of the security fence on the north side of the property. DOE will conduct spot spraying at the appropriate time of year to kill the plants and prevent their spread; if unsuccessful, a new control strategy will be developed.

The property line on the northern half of the site runs along the bank of Chartiers Creek. There was no evidence of erosion along the creek bank.

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

3D Area C is a triangular, grass-covered property across Strabane Avenue east of the site. Area C was remediated as part of the mill site and is owned by the Commonwealth of Pennsylvania. It is not part of the disposal site, but DOE continues to cut the grass as a courtesy to the commonwealth. Pennsylvania solicited bids from the public for purchase of Area C. The sale has been put on hold pending agreement with DOE on deed restrictions limiting excavation in the area and preventing the area from being used for residential purposes. DOE must also have ongoing access to two ground water monitor wells and a surface water sampling location on Area C.

3E Erosion had occurred along the bank of Chartiers Creek at Area C after completion of remedial action. To correct this problem, DOE reconstructed and revegetated the bank between December 2000 and May 2001. The site inspection indicated that these efforts have stabilized the bank (PL-2). Seeded grass has established on the slope of the stream bank and native vegetation is establishing, but survival of willow plantings is limited mostly to the south end of the restored bank. DOE placed rock in a shallow erosion feature at the south end of the reconstructed bank earlier in 2003, and at the time of the inspection the area was stable.

During the Chartiers Creek bank stabilization project, Area C was used as a staging area for heavy equipment and the entire surface was disturbed. A good cover of grass has established in most areas, but Canada thistle and poison hemlock have become established along the shoulder of the bank. The invasion of these species is attributed to the bank stabilization project, and DOE will control the plants in the same manner established for the infestations on DOE property.

### 3.3.2 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 3.3.3 Routine Maintenance and Repairs

DOE mowed grass, removed vegetation along the perimeter fence, and placed rock in a shallow erosion feature during 2003.

### 3.3.4 Ground Water Monitoring

3F DOE monitors ground water and surface water at the Canonsburg site to comply with requirements in the Long-Term Surveillance Plan and the subsequent Ground Water Compliance Action Plan. The purpose of the monitoring is to evaluate contaminant trends in ground water in the shallow unconfined aquifer, which consists of unconsolidated soils, stream deposits, and clean fill.

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

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

Molybdenum concentrations were at or below the laboratory detection limit and significantly below the maximum concentration limit in all ground water samples collected in October 2003. The concentrations of molybdenum in the Chartiers Creek samples, as in the past, were higher than in ground water samples, though still below the maximum concentration limit. The elevated and generally consistent levels in the creek indicate a significant ambient or upstream source of molybdenum.

Uranium is the analyte of primary concern at this site because of the frequency with which it has exceeded its maximum concentration limit of 0.044 mg/L; time-concentration plots for uranium in ground water are shown in Figure 3-2. Uranium concentrations in ground water exceeded the standard at two of the downgradient wells (MW-0412 and MW-0413). Concentrations at these two locations have increased during the last 2 years and future results will be evaluated to determine if there is a trend. Uranium levels were substantially below the standard at the rest of the locations in 2003. Uranium concentrations were below the laboratory detection limit at all sampling locations in Chartiers Creek.

Manganese levels exceed the secondary drinking water standard at all point of compliance wells. Results from October 2003 are generally consistent with results from previous years. Manganese concentration in surface water at the point of exposure location in Chartiers Creek has decreased and is currently just above the secondary drinking water standard.

**Canonsburg, PA  
Uranium in Ground Water**

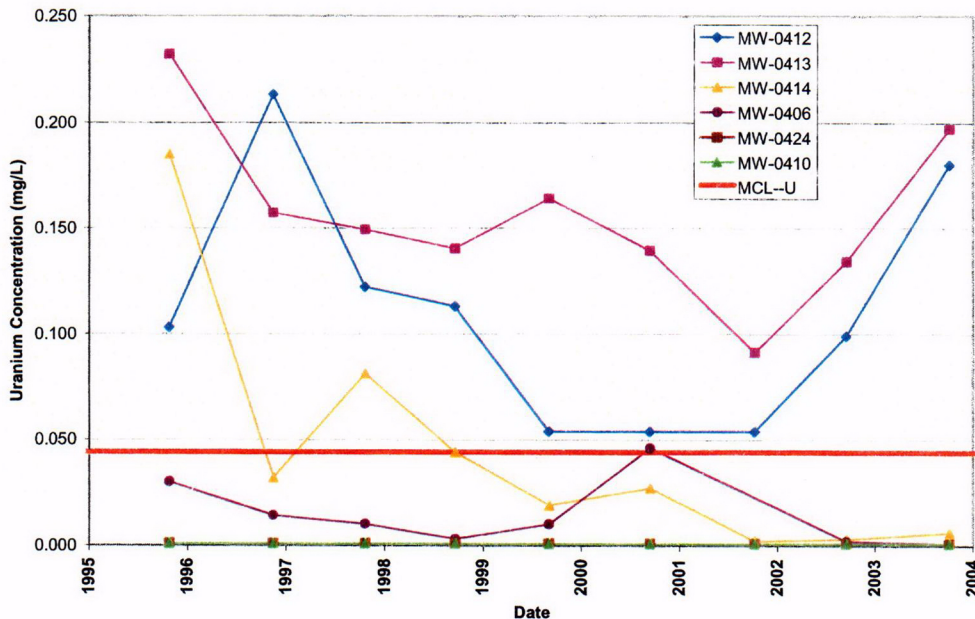


Figure 3-2. Uranium in Ground Water at the Canonsburg, Pennsylvania, Disposal Site

DOE continues to consider the risk associated with uranium in ground water to be negligible because institutional controls, in the form of government ownership of the site, prevent access to the ground water, and because uranium concentrations are below detection limits in Chartiers Creek. Therefore, public health and the environment are adequately protected.

### 3.3.5 Corrective Action

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

No corrective action was required in 2003.

### 3.3.6 Photographs

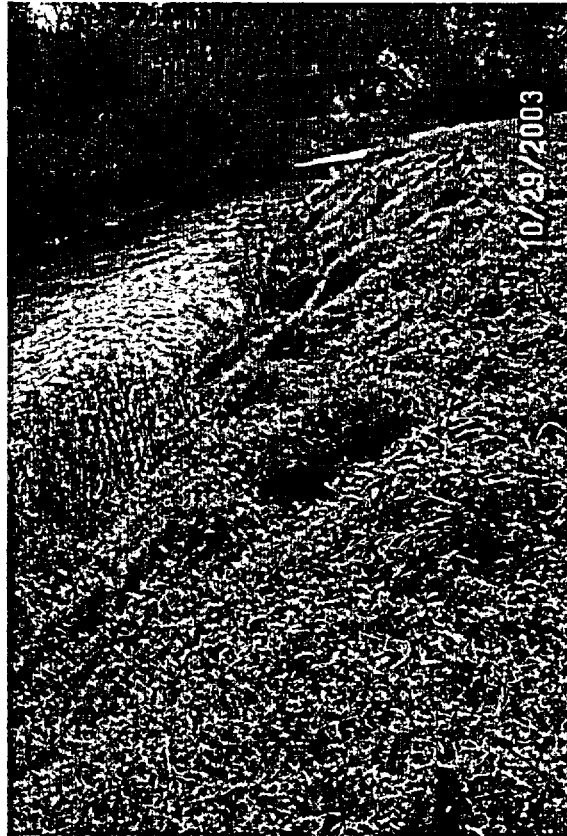
Table 3-2. Photographs Taken at the Canonsburg, Pennsylvania, Disposal Site

Photograph Location Number	Azimuth	Description
PL-1	15	Vegetation encroachment in the western diversion channel.
PL-2	170	The stabilized bank of Chartiers Creek along Area C.





*CAN 10/2003. PL-1. Vegetation encroachment in the western diversion channel.*



*CAN 10/2003. PL-2. The stabilized bank of Chartiers Creek along Area C.*

End of current section

## 4.0 Durango, Colorado, Disposal Site

### 4.1 Compliance Summary

The Durango Disposal Site was inspected on June 17, 2003, and was in good condition. A couple of perimeter signs had new bullet holes, but evidence of significant vandalism was not observed. The entrance sign and a missing perimeter sign were replaced in 2003.

Vegetation on top of the cell, consisting primarily of seeded grass species, was healthy and has recovered from the previous year's drought conditions. Scattered woody vegetation (trees and shrubs), which continues to encroach on the side slopes, was cut and treated with herbicide. Biological control efforts to eliminate musk thistle continue. Infestations of other noxious weeds at the site were mapped and are being controlled with herbicide.

Construction of a new reservoir is occurring south and west of the disposal site. Heavy construction traffic is present on the county road that crosses the southwest corner of the site. Recreational use of the area is expected to increase substantially upon completion of the reservoir project.

No requirement for a follow-up or contingency 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 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 4-1.

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

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

## 4.3 Compliance Review

### 4.3.1 Annual Inspection and Report

The site, located southwest of Durango, Colorado, was inspected on June 17, 2003. Results of the inspection are described below. Features and photograph locations (PLs) discussed in this report are shown on Figure 4-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

#### 4.3.1.1 Specific Site Surveillance Features

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

4A The entrance sign, illegible due to gunshot damage, was replaced prior to the inspection and was undamaged at the time of the inspection. Perimeter sign P77 was missing and was replaced. Sixteen signs had bullet holes but all remain legible.

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 reservoir and increased recreational use in the area will be monitored.

**Site Markers, Survey and Boundary Monuments**—Site markers, survey monuments, and boundary monuments were in good to excellent condition. The site marker near the entrance gate (SMK-1) has been slightly damaged by bullets; however, it was legible and in generally good condition. Previously, several boundary monuments were damaged by erosion or vandalism; however, they were intact and legible, and do not warrant any further action at this time.

**Monitor Wells**—Monitor wells were locked and in excellent condition. Monitor well MW-0618 was added to the monitoring network as a supplement to well MW-0608.

#### 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 retention pond; (5) the site boundary; and (6) the outlying area.

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

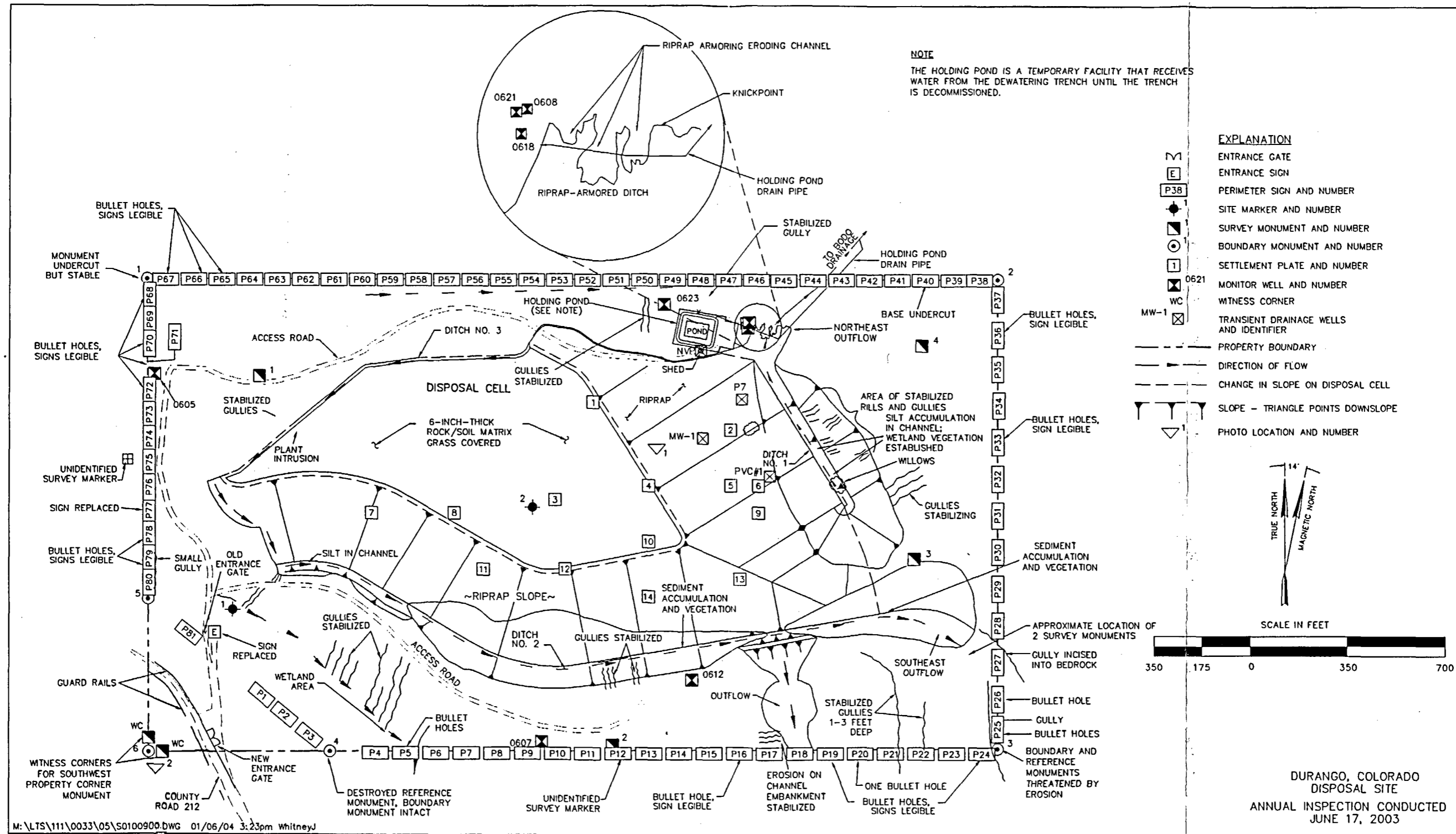


Figure 4-1. 2003 Annual Compliance Drawing for the Durango, Colorado, Disposal Site

Vegetation on top of the cell was in good condition and had recovered from the stresses caused by the 2002 drought. The vegetation consisted of seeded grasses and several volunteer species including deep-rooted shrubs. Woody species of trees and shrubs found during the 2002 inspection subsequently were cut and treated with herbicide, and none were found during the 2003 inspection. A few plants of two noxious weed species, musk thistle and houndstongue, were found on top of the cell during the 2003 inspection. The musk thistle was cut and treated with herbicide, and the houndstongue was treated later in the month by a certified applicator.

**Side Slopes of Disposal Cell**—The riprap-covered side slopes of the disposal cell were in excellent condition. Disturbances resulting from natural processes, such as subsidence, rock deterioration, or slope failure, were not observed. No evidence of vehicle use on the cell was observed.

Vegetation continues to encroach on the side slopes of the cell, particularly on the east and southeast sides (PL-1). The species included deep-rooted shrubs and trees and several noxious weeds that require control by the state or La Plata County (Canada thistle, musk thistle, and houndstongue). The woody trees and shrubs were cut and herbicide was applied to their stalks. Herbicide was applied to the Canada thistle and houndstongue later in the month and again during the fall.

DOE initiated biological control of the musk thistle at the site in 2002 by releasing the Thistle Defoliating Beetle at thistle locations. This beetle has been used by the state to control the thistle in the area around the disposal site. More beetles and the Thistle Rosette Weevil were released in early August 2003. The effectiveness of this biological control effort will be evaluated during future inspections.

**Drainage Ditches**—Rock-armored drainage ditches were constructed along the northwest, south, and east sides of the disposal cell. These ditches direct runoff into natural drainages that carry storm water away from the disposal site. Erosion and sedimentation has occurred at several places along these channels where the slopes above the ditches are steep. There was no evidence of recent slope erosion or accumulations of sloughed material into the rock-armored drainage ditches in 2003.

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

The riprap-covered outflow of Ditch No. 1 was designed to erode back to a rock-filled trench and self-armor in the process. The knickpoint was mapped with global positioning system equipment in 1999. Significant movement of the knickpoint has not occurred since that time.

Infestations of noxious weeds, including houndstongue and several species of thistle and knapweed, were treated with herbicide in the summer and fall of 2003. Musk thistle is undergoing biological control.

**Treatment Cells and Retention Pond**—The treatment cells, retention pond, and surrounding security fence were in good condition. Treatment cells containing zero-valent iron have been operating at this site since 1996 to remove metals from transient drainage water after it exits the disposal cell collection gallery. The water level in the pond is very low because only a small quantity of water is draining from the disposal cell.

**Site Boundary**—The site is not fenced. No evidence of vehicular trespass was observed during the 2003 inspection. Previous vehicular trespass at this site resulted in damage to survey monuments, created ruts in roads and off-road areas, and damaged sensitive, reseeded areas that jeopardize soil and slope stabilization efforts. Future inspections will continue to monitor trespass conditions at the site, and appropriate preventive measures will be implemented as needed.

Areas of rill and gully erosion on the south-facing slope along the southern boundary of the site were stable. Establishment of vegetation in these areas and exposure of resistant bedrock in the gully are effectively preventing further erosion. Migration of riprap down the steep hill below the outflow of Ditch No. 2 has subsided. No new erosion had occurred on or around the site.

Significant infestations of musk thistle were observed in the areas between the cell and the property boundary. These areas are being treated with beetles and weevils. Smaller patches of Canada thistle, houndstongue, and knapweed were sprayed with herbicide during summer and fall applications.

**4B** **Outlying Area**—The area beyond the site boundary for a distance of 0.25 mile was visually inspected for signs of erosion, development, or other disturbance. The U.S. Bureau of Reclamation has begun the multi-year construction of the Animas-La Plata Project. A water intake and pumping plant structure is being constructed at the Animas River on the site of the former raffinate ponds. The pipeline to the reservoir being built southwest of the disposal site will be adjacent to County Road 211 and pass just south of the cell. Pipelines that are within the footprint of the reservoir are being rerouted parallel to County Road 212 on the west side of the disposal site (PL-2). Heavy construction traffic is present on County Road 212, and 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 2003.

#### **4.3.3 Routine Maintenance and Repairs**

**4C** The damaged entrance sign and a missing perimeter sign were replaced. Woody species on the cell side slopes were cut and their stems were treated with herbicide. Beetles and weevils were released for the second consecutive year to control musk thistle. Other noxious weeds identified at the site were treated with herbicide during summer and fall applications.

#### 4.3.4 Ground Water Monitoring

4D Ground water is monitored at the Durango site to verify the initial performance of the disposal cell. The monitoring network consists of six wells. Four wells are completed in the uppermost aquifer (bedrock of the Cliff House Sandstone and the Menefee Formation), including one upgradient (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 cell. Monitor well MW-0618 (screened to the bottom of the alluvial aquifer) near companion well MW-0608 (screened to 10 feet above the base of the alluvial aquifer) was added to the monitoring network in 2002 because it represents the full section of the alluvial aquifer.

The monitor wells are sampled annually. Samples are analyzed for standard water quality parameters and three indicator analytes: molybdenum, selenium, and uranium. The performance standards for the three indicator analytes are the respective maximum concentration limits established by the U.S. Environmental Protection Agency in Table 1 to Subpart A of 40 CFR 192.

Results of monitoring in 2003 were consistent with previous years. Concentrations of all three indicator analytes were below the respective maximum concentration limits, and most results were less than detection limits or minimum detectable activity. The data give reasonable assurance that the disposal cell is performing as designed.

#### 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.

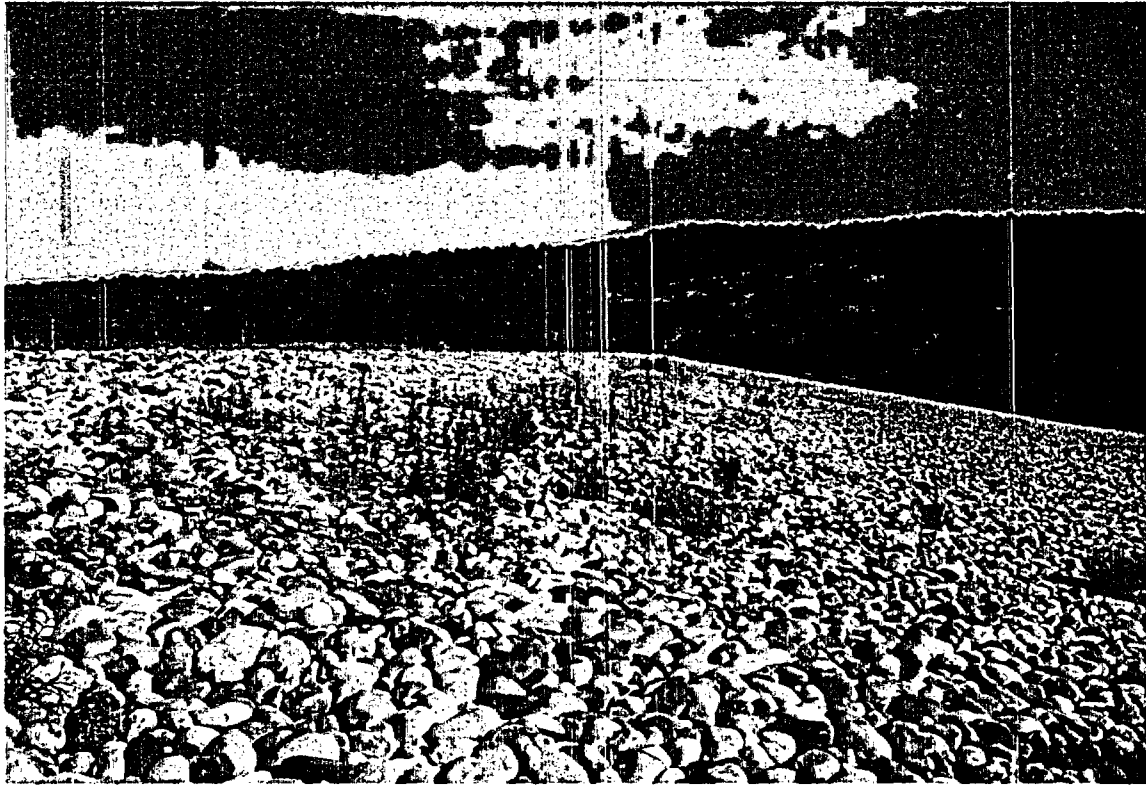
No corrective action was required in 2003.

#### 4.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL-1	310	Vegetation, including Canada thistle, on the east side slope of the cell.
PL-2	330	Utility construction along the west side of the property.





*DUR 6/2003. PL-1. Vegetation, including Canada thistle, on the east side slope of the cell.*

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*DUR 6/2003. PL-2. Utility construction along the west side of the property.*

End of current section

U.S. DEPARTMENT OF ENERGY  
OFFICE OF ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT  
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## 5.0 Falls City, Texas, Disposal Site

### 5.1 Compliance Summary

The Falls City Disposal Site, inspected on January 15, 2003, was in excellent condition. Maintenance items included continued grass management, control of small trees and shrubs growing in the riprap on the side slopes, and minor fence repairs. Results of ground water monitoring were consistent with results from previous years and indicate essentially steady-state conditions. No cause for a follow-up or contingency inspection was identified.

### 5.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Falls City, Texas, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 5-1. Additional ground water monitoring began in accordance with the Ground Water Compliance Action Plan, which was submitted to the U.S. Nuclear Regulatory Commission on March 19, 1998 and received concurrence on September 18, 1998.

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

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

<sup>a</sup>Ground Water Compliance Action Plan.

### 5.3 Compliance Review

#### 5.3.1 Annual Inspection and Report

The site, located east of Falls City, Texas, was inspected on January 15, 2003. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 5-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

##### 5.3.1.1 Specific Site Surveillance Features

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

5A

this position and is sufficient to keep cattle and casual intruders out. It does not need to be replaced yet. The top two wires were tightened near perimeter sign P33. A deer trail was present near perimeter sign P35 where a fence strand was broken; the strand will be repaired in 2004. There is no indication that livestock have ever entered the site; in fact, no livestock were visible near the disposal site. Repair will be increasingly necessary as this fence predates construction of the disposal cell. Barbed wire has corroded and is easily broken by animals or by the vegetation growing in the fence line. However, in the absence of livestock pressure, there is little justification for replacing the fence.

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

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

**Monitor Wells**—Monitor wells MW-0709 and MW-0858 were locked and in excellent condition. Wells in the monitoring network were inspected and sampled during October 2002, at which 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.

5B

**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 excellent condition. The grass is cut and baled by a local hay farmer, and numerous bales were on top of the cell at the time of the inspection. There are no trees or woody shrubs on top of the disposal cell; grass cutting appears to be an effective control of these plants. Some woody species were present along the edge of the transition zone where the grass is not cut because of close proximity to the riprap. These shrubs require periodic cutting and treatment with herbicide.

Locally heavy precipitation received in the week prior to the inspection saturated the ground in the region. The soil on the cell top was saturated with water, and standing water (up to 2 inches deep) was noted at one location along the northwest edge of the cell top. Water was actively draining from the cell cover and the accumulation was not considered to be a problem. However, the location of the standing water will continue to be inspected to ensure the cover sheds water as designed.

The side slopes are covered with riprap and were in excellent 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.

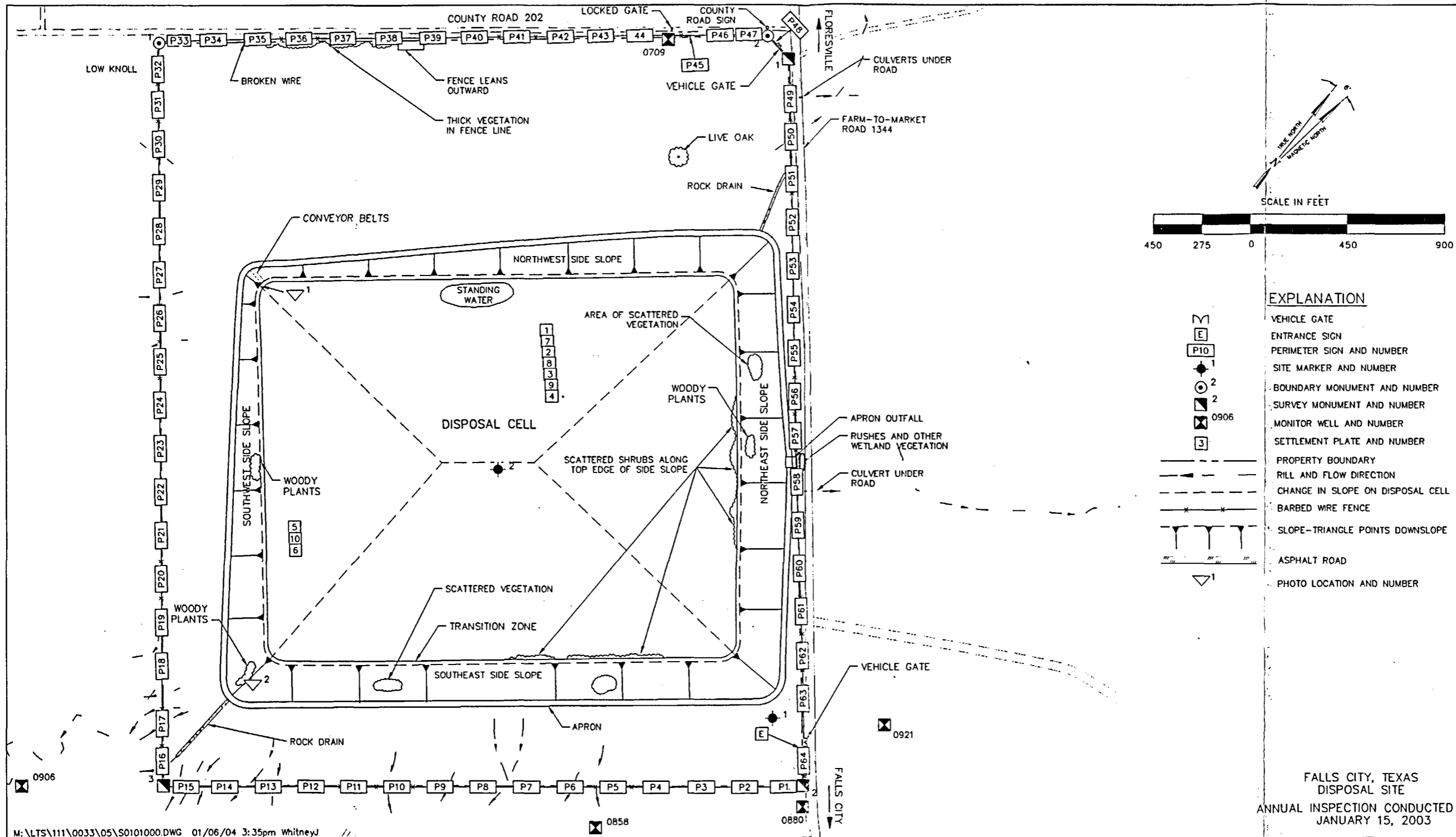


Figure 5-1. 2003 Annual Compliance Drawing for the Falls City, Texas, Disposal Site

Two tracks of steel-belted rubber conveyor belt material were placed on the west corner of the disposal cell by the hay farmer (PL-1). The conveyor belt material appears to keep the rocks from being overturned as farm equipment is driven up and down the side slope, and does not adversely affect the function of the disposal cell. The material may be left in place as long as it does not fragment into smaller pieces and become distributed as litter.

Most vegetation on the side slopes was dead due to herbicide treatment; however, a few woody plant species were found growing along the side slopes (PL-2). Greasewood and similar species are concerns because they are deep-rooted. Vegetation control will continue on the side slopes.

**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. Coverage was good and the turf appeared healthy and well cared for. Grass is managed by cutting and baling two or three times each year, depending on the weather. The cutting and baling process is clean and thorough, and appears to be an effective control against the growth of trees or other woody plants. Grass was left uncut along the fence, along rock drains, and around the site markers.

Water was actively flowing in the north and south rock drains due to recent heavy rainfall. Although the flow rate was low, active drainage from the cell cover was evident. Grass growing in both drains, as noted in previous inspections, was not impeding the flow of water draining from the cell. Water was contained within the drains and there was no evidence of large pools of water impounded by grass encroachment. 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.

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

### 5.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 5.3.3 Routine Maintenance and Repairs

Continued grass cutting and baling on the cell top and between the cell and the site perimeter, control of shrubs growing in the riprap on the side slopes, and minor fence repairs were performed in 2003.

### 5.3.4 Ground Water Monitoring

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

5C

The disposal cell performance monitoring network consists of five monitor wells (MW-0709, 0858, 0880, 0906, and 0921) that are sampled semiannually as specified in the Long-Term Surveillance Plan. The ground water compliance monitoring network consists of five monitor wells (MW-0862, 0886, 0891, 0924, and 0963) that are sampled annually as specified in the Ground Water Compliance Action Plan. Ground water samples from the ten monitor wells are analyzed for 33 constituents, including ten which have maximum concentration limits specified in Table 1 to Subpart A of 40 CFR 192. The Long-Term Surveillance Plan identifies pH levels in ground water as the indicator for disposal cell performance on the basis of tailings pore-fluid chemistry. The monitor well network is shown on Figure 5-2.

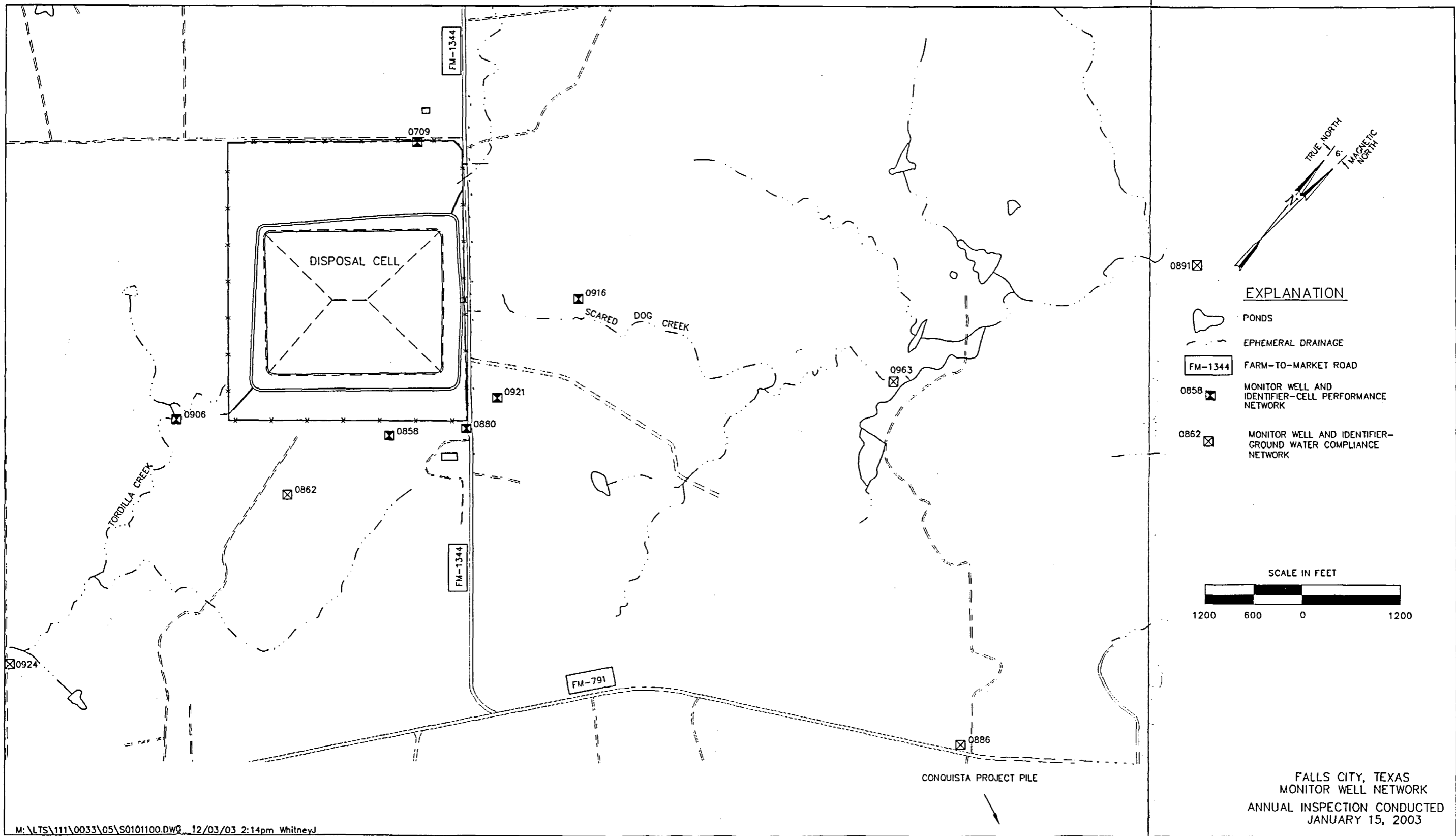
Analytical results from 2003 generally are consistent with previous results and what would be expected of ground water conditions in a naturally mineralized area that has been impacted by uranium exploration and mining activities. Levels of pH have not varied significantly in recent years (Figures 5-3 and 5-4) and it does not appear that pH is a good indicator for what is occurring with concentrations of uranium or other select constituents in ground water. There is no statistical correlation between changes in pH and changes with the select constituents.

Uranium concentrations in ground water in the vicinity of the disposal cell are consistent with previous results with the exception of monitor well MW-0880, where concentrations continue to increase (Figure 5-5). This increase may be an indication of seepage from the disposal cell, as expected; there is no risk however, because ground water is not used in the area. Uranium in ground water in the compliance monitoring network has varied substantially in two wells (MW-0891 and 0924) since 1997 and exceeded the maximum concentration limit of 0.044 mg/L in three wells (MW-0891, 0924, and 0963) in 2003 (Figure 5-6). Concentrations of other analytes in ground water are similar to previous results.

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

Ground water levels in monitor wells near the disposal cell have declined by several feet since construction, but have been relatively constant for the last several years. The water level data indicate that the falling water table in the vicinity of the cell was related to dissipation of the ground water mound beneath the disposal cell. Ground water levels at the compliance monitoring locations have remained relatively constant since monitoring began. Minor fluctuations in water level are likely caused by seasonal factors affecting recharge rates.





Falls City, Texas  
pH in Ground Water -- Disposal Cell Performance

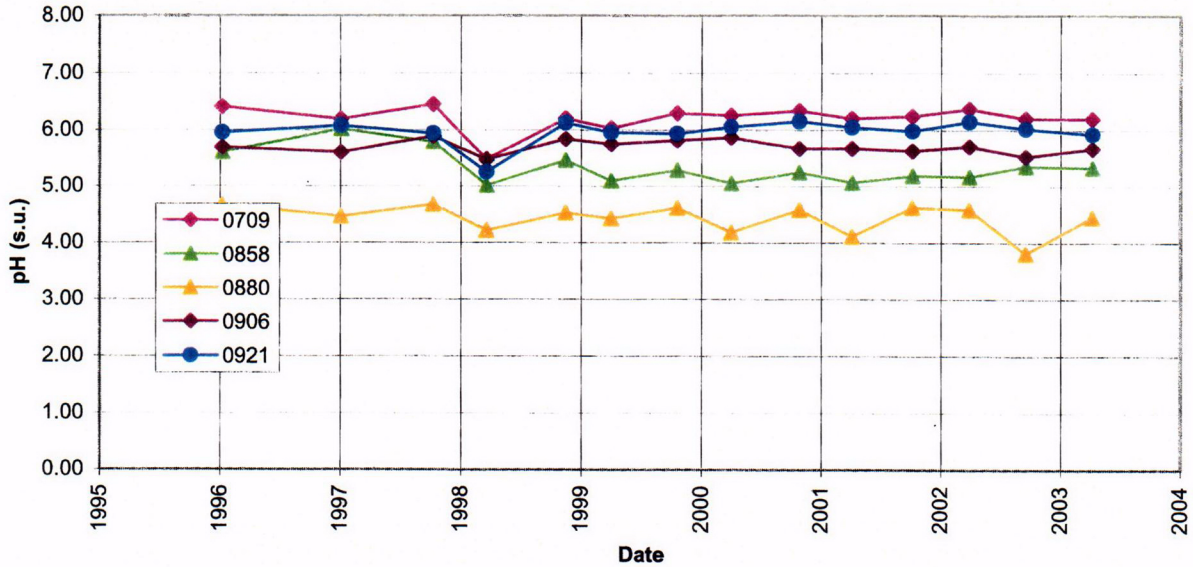


Figure 5-3. pH in Ground Water at Cell Performance Monitoring Locations at the Falls City, Texas, Disposal Site

Falls City, Texas  
pH in Ground Water -- Ground Water Compliance

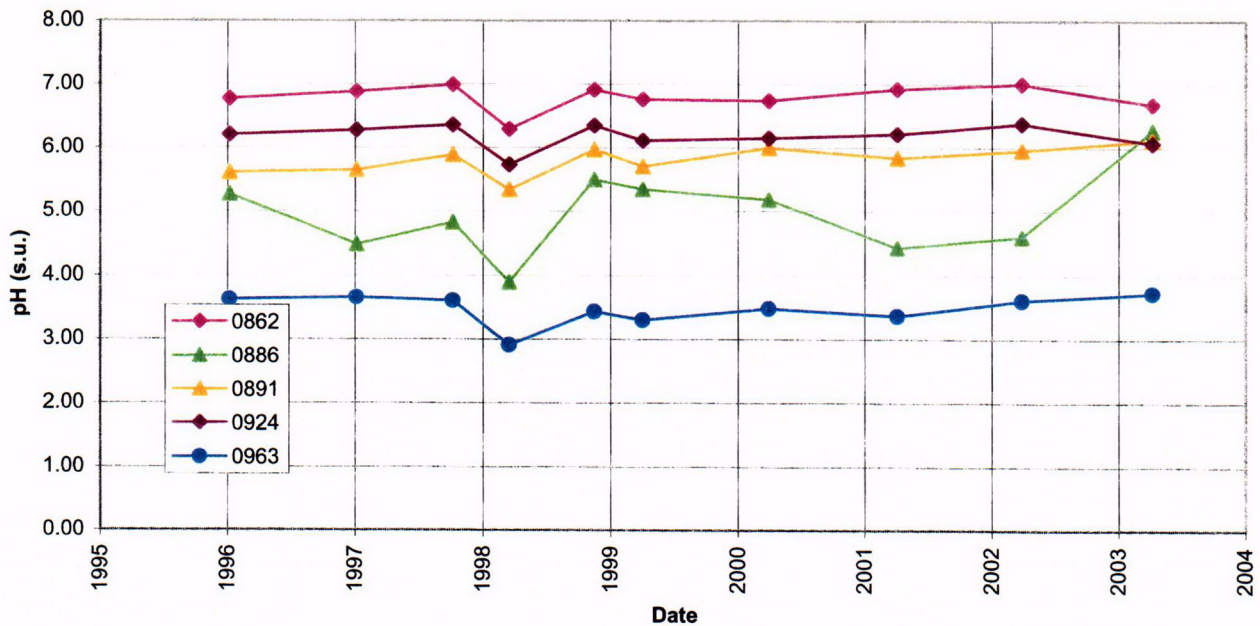


Figure 5-4. pH in Ground Water at Compliance Monitoring Locations at the Falls City, Texas, Disposal Site

COZ

**Falls City, Texas**  
**Uranium in Ground Water -- Disposal Cell Performance**

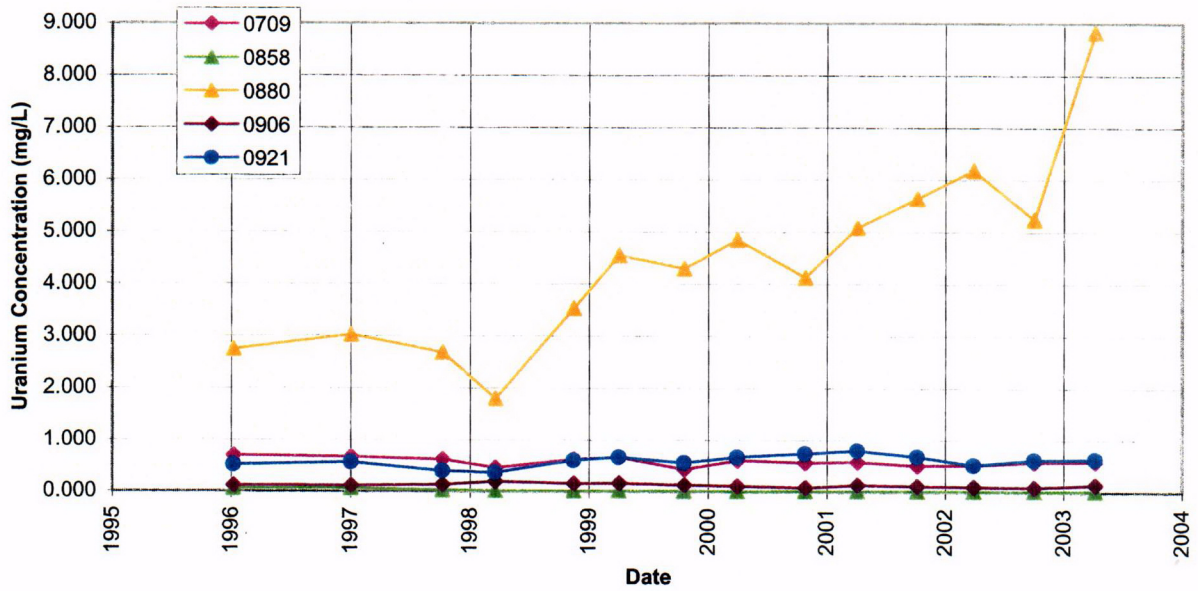


Figure 5-5. Uranium in Ground Water at Cell Performance Monitoring Locations at the Falls City, Texas, Disposal Site

**Falls City, Texas**  
**Uranium in Ground Water -- Ground Water Compliance**

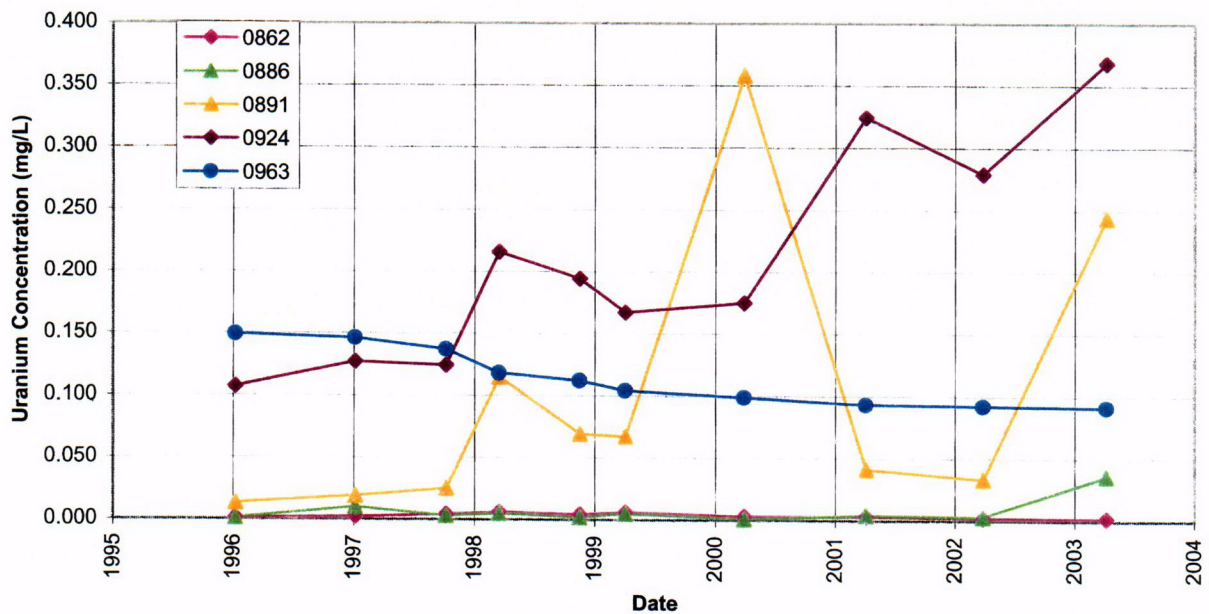


Figure 5-6. Uranium in Ground Water at Compliance Monitoring Locations at the Falls City, Texas, Disposal Site

### 5.3.5 Corrective Action

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

No corrective action was required in 2003.

### 5.3.6 Photographs

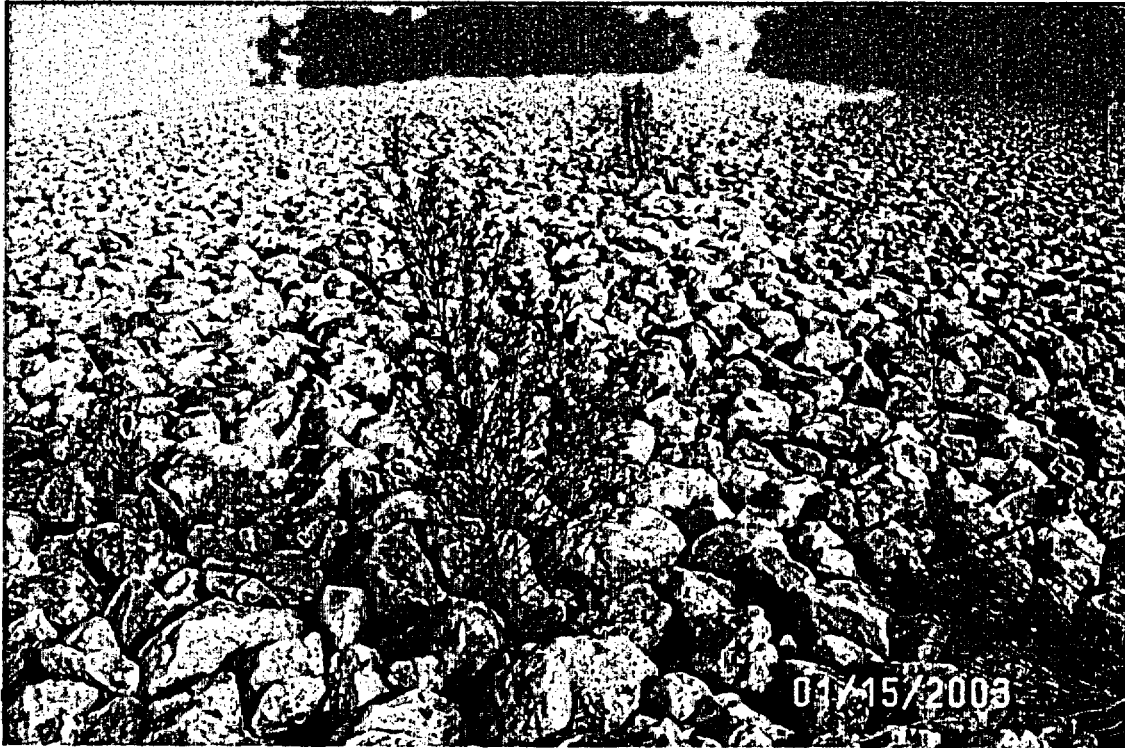
*Table 5-3. Photographs Taken at the Falls City, Texas, Disposal Site*

<b>Photograph Location Number</b>	<b>Azimuth</b>	<b>Description</b>
PL-1	270	Conveyor belt material placed on the side slope at the west corner of the disposal cell.
PL-2	0	Woody plants on the side slope at the south corner of the disposal cell.



*FCT 1/2003. PL-1. Conveyor belt material placed on the side slope at the west corner of the disposal cell.*

U.S. DEPARTMENT OF ENERGY  
OFFICE OF ENVIRONMENTAL RESTORATION  
AND WASTE MANAGEMENT  
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*FCT 1/2003. PL-2. Woody plants on the side slope at the south corner of the disposal cell.*

End of current section

## 6.0 Grand Junction, Colorado, Disposal Site

### 6.1 Compliance Summary

The Grand Junction Disposal Site, inspected on March 11, 2003, 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.

Erosion in a drainage ditch along the access road was threatening to damage the road and subsequently was repaired. An eroded storm water ditch along the north property boundary also was repaired. Plants, primarily annual weeds, are continuing to encroach on the disposal cell, especially on the south side. Vegetation on the reclaimed former ramp area on the east side of U.S. Highway 50 is slowly establishing. No cause for a follow-up or contingency inspection was identified.

### 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 6-1.

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

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

### 6.3 Compliance Review

#### 6.3.1 Annual Inspection and Report

The site, located south of Grand Junction, Colorado, was inspected on March 11, 2003. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 6-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.



### 6.3.1.1 Specific Site Surveillance Features

**Site Access Gate, Access Road, and Entrance Gate**—The site access gate is a steel, double-swing stock gate that is secured by a chain and DOE padlock. The gate, in excellent condition, controls access to the site from U.S. Highway 50. A paved all-weather access road extends approximately 1.7 miles east along DOE's perpetual right-of-way, through federal land administered by the U.S. Bureau of Land Management (BLM), to the site entrance gate. The 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. The fence along the right-of-way corridor was in good condition.

6A The drainage ditch along the south side of the access road had diverted into an arroyo that passes under the road near the site access gate. Significant erosion had occurred at this location and threatened to undercut the road; therefore, the drainage ditch and erosion damage were repaired.

**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 (PL-1). There are 75 warning sign locations, each about 200 feet apart along the site boundary.

**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.

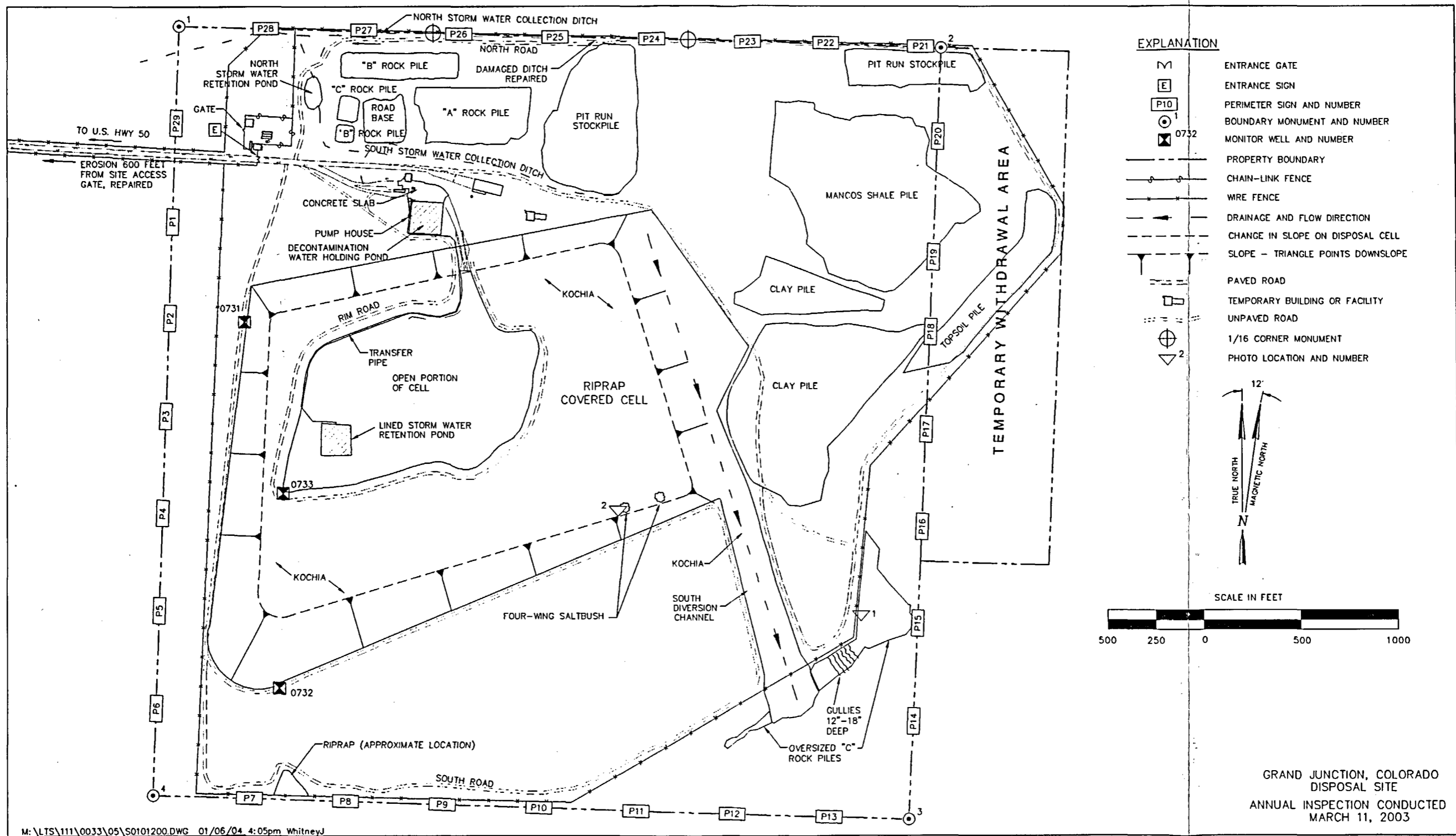


Figure 6-1. 2003 Annual Compliance Drawing for the Grand Junction, Colorado, Disposal Site

**Closed Portion of the Disposal Cell**—DOE will manage the open portion of the cell at the disposal site to accept waste until 2023 or until the cell is filled to its design capacity. The annual inspection does not include the open cell or the temporary structures associated with the operation of the open cell, except as they may affect the long-term safety and performance of the closed portion of the disposal cell. The open cell occupies approximately 7 acres in the center of the disposal cell. A lined retention pond is at the bottom of the open cell to collect storm water to prevent infiltration. Water in the pond is used for dust control when waste materials are being placed in the cell.

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

6B Minimal plant encroachment was observed on the side slopes. However, plant encroachment is occurring on the cell top, mostly on the southeastern part of the cell (PL-2). Deep-rooted plants, which were cut back and treated with herbicide in 2001, may change the performance characteristics of the radon/infiltration barrier. An investigation is underway by DOE to evaluate whether or not the deep-rooted vegetation needs to be controlled. Until the evaluation is completed, these plants will be controlled.

**Diversion Structures and Drainage Channels**—The south diversion channel, a large riprap-armored structure that conveys storm runoff from the disposal cell southeast into a natural drainage that flows away from the site to the southwest, was in excellent condition. Some minor plant growth, mostly kochia and Russian thistle, exists within the channel; however, there was not enough plant growth to impede water flow within the channel.

Other drainage features at the site include north and south storm water collection ditches and a storm water retention pond. These features are along the northern edge of the disposal site. The ditches are small and unimproved.

6C The north storm water collection ditch captures runoff from a large catchment area north and east of the disposal site. Water captured in this ditch flows into a large natural drainage north and west of the disposal cell. The north road crosses the north storm water collection ditch between perimeter signs P24 and P25. Tire ruts had caused water to leave the collection ditch and flow down the road. The ditch was reconstructed and the road was repaired in 2003.

The south storm water collection ditch collects onsite storm water from the cover material stockpile areas and other places across the northern part of the site. This ditch flows west into the north storm water retention pond. A second ditch flows south into the north storm water retention pond. Both ditches are small and are filling with sediment and weeds, but continue to convey water without overtopping. There was no evidence of the retention pond overtopping.

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

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

On the south and west sides of the disposal site, between the disposal cell and the perimeter fence, the ground is relatively flat and covered with native vegetation that consists primarily of perennial grasses and small shrubs. Unlike the areas north and east of the disposal cell, the areas south and west are mostly undisturbed. No erosion was observed south and west of the disposal cell.

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

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

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

An overpass formerly crossed U.S. Highway 50 along the old haul road between the railroad off-loading area and the disposal cell. The overpass and access ramps were removed in the spring of 1998. Although the access ramp area on the east side of the highway was recontoured, rill and gully erosion was occurring on the southern and western parts of the former ramp area. This access ramp area was regraded and hydroseeded in the fall of 1999. Grasses and weeds are beginning to establish and are helping to stabilize the soil surface. No evidence of rill or gully erosion was noted in 2003. 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 2003.

### **6.3.3 Routine Maintenance and Repairs**

Erosion damage to the drainage ditch along the access road was stabilized and damage to the north storm water collection ditch and associated north road were repaired in 2003.

### 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.

In lieu of monitoring ground water in the uppermost aquifer, ground water in two monitor wells in or very near buried alluvial paleochannels adjacent to the disposal cell (MW-0731 and MW-0732) and one monitor well in the disposal cell (MW-0733) is monitored to assess performance of the disposal cell and to ensure that any water in the paleochannels is not impacted by seepage (transient drainage) from the disposal cell (Figure 6-1). The paleochannel wells are along the west (downgradient) edge of the disposal cell and are screened at the interface between the alluvium and shallow Mancos Shale. The third well is in the southwest corner of the open portion of the disposal cell and is used primarily for measurement of water levels in the deepest part of the disposal cell to demonstrate that intracell water will not rise high enough to move laterally into the paleochannels. The water level in the disposal cell well is approximately 35 and 10 feet lower (deeper) than water levels in the paleochannels at MW-0731 and MW-0732, respectively (Figure 6-2). This indicates that ground water cannot seep from the disposal cell to the paleochannels.

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

Results from sampling in 2003 were consistent with results from the past several years. Molybdenum and vanadium concentrations in ground water continued to be near or below the required laboratory detection limits and significantly below the MCL or risk-based standard at all wells. Nitrate concentrations exceeded the MCL of 44 mg/L in MW-0732 and MW-0733, but were below the MCL in MW-0731 (Figure 6-3). Selenium levels continued to exceed the MCL of 0.01 mg/L at both downgradient wells and remained below the standard at MW-0733 (Figure 6-4). Sulfate concentrations continued to be relatively high in all wells, at approximately 6,700 mg/L in the disposal cell, and just below 4,000 mg/L in the paleochannel wells. High sulfate concentrations are typical of the regional soils, which contain gypsum. Concentrations of TDS continued above 10,000 mg/L in the disposal cell well. Concentrations of TDS in ground water in the paleochannel wells were around 7,000 mg/L. Uranium concentrations were just below the MCL of 0.044 mg/L in MW-0731, and were substantially below the MCL in MW-0732 and MW-0733 (Figure 6-5). PCBs were not detected in the samples from any of the wells.

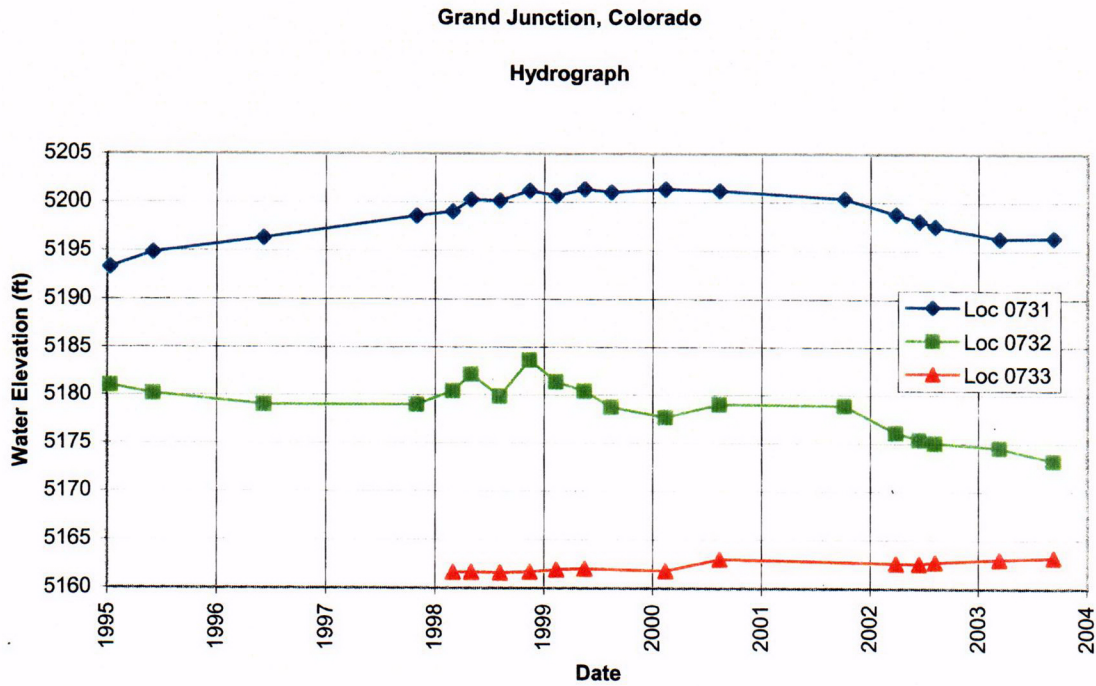


Figure 6-2. Water Level Measurements at the Grand Junction, Colorado, Disposal Site

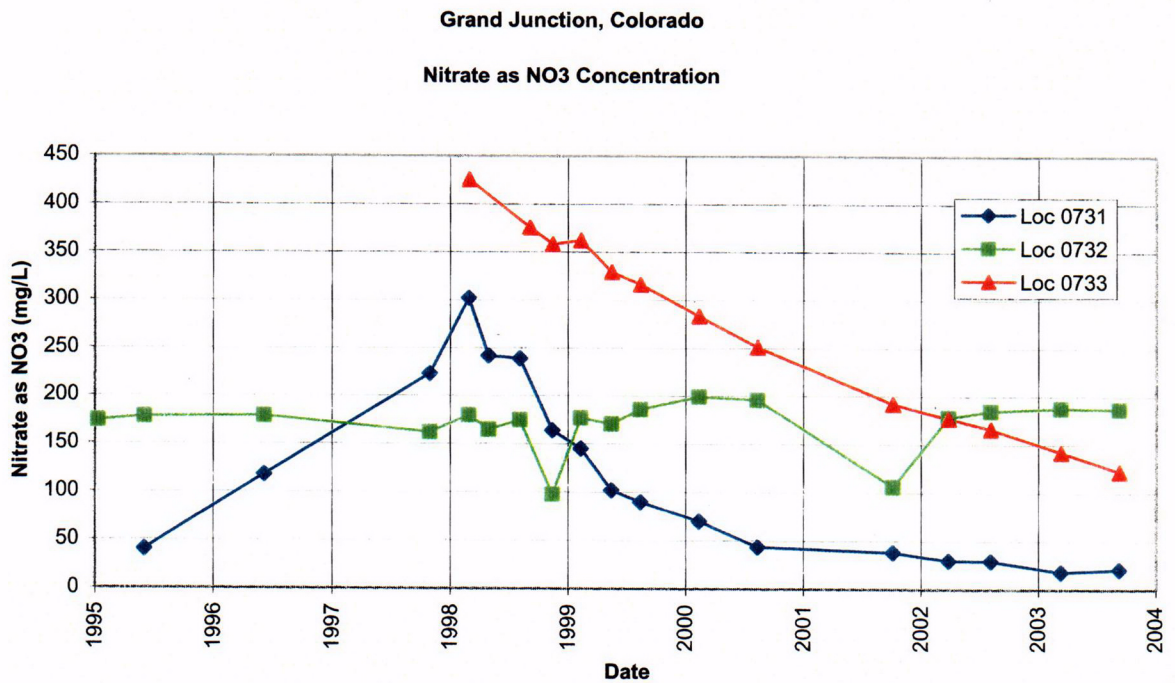


Figure 6-3. Time-Concentration Plots of Nitrate (as NO<sub>3</sub>) in Ground Water at the Grand Junction, Colorado, Disposal Site

Grand Junction, Colorado

Selenium Concentration

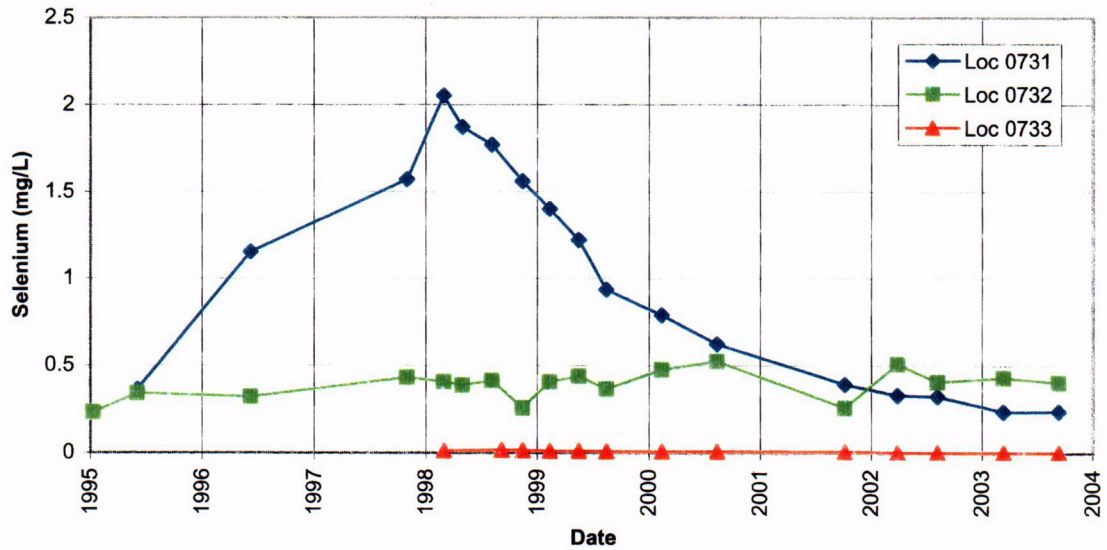


Figure 6-4. Time-Concentration Plots of Selenium in Ground Water at the Grand Junction, Colorado, Disposal Site

Grand Junction, Colorado

Uranium Concentration

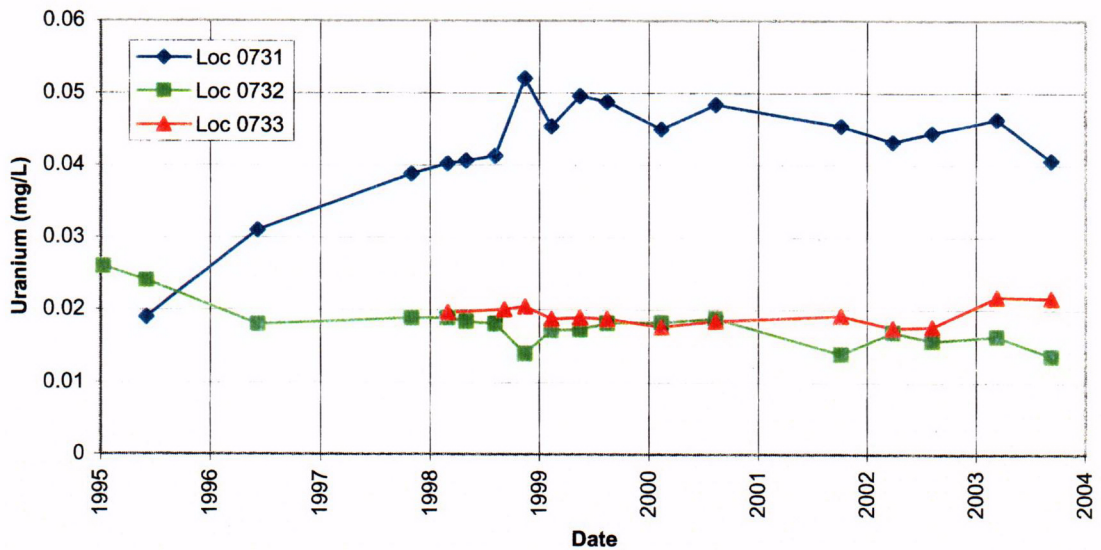


Figure 6-5. Time-Concentration Plots of Uranium in Ground Water at the Grand Junction, Colorado, Disposal Site

C05

6D Monitoring results indicate ground water in the paleochannels has not been affected by transient drainage from the disposal cell. This is expected because water levels in the paleochannels are higher than in the disposal cell. Elevated levels of nitrate, sulfate, and uranium in ground water in the paleochannels are most likely due to leaching 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, sulfate, 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 2003.

### 6.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL-1	290	Warning signs on the perimeter fence.
PL-2	15	Scattered vegetation on cell top near the southeast corner of disposal cell.





GRJ 03/2003. PL-1. Warning signs on the perimeter fence.



GRJ 03/2003. PL-2. Scattered vegetation on cell top near the southeast corner of disposal cell.

End of current section

## 7.0 Green River, Utah, Disposal Site

### 7.1 Compliance Summary

The Green River Disposal Site, inspected on March 13, 2003, was in good condition. Erosion had occurred along the cell perimeter road (adjacent to the cell apron) and around the property boundary but posed no threat to the integrity of the cell; the erosion damage was repaired in December. Ground water monitoring continued in 2003 for the purpose of evaluating cell performance, trends in contaminant levels, and the relationship between local precipitation and ground water elevations. No need was identified for a follow-up or contingency inspection.

### 7.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Green River, Utah, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 7-1.

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

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

### 7.3 Compliance Review

#### 7.3.1 Annual Inspection and Report

The site, located southeast of Green River, Utah, was inspected on March 13, 2003. 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, and Signs**—Access to the site is from a paved public road that leads south from Green River or north from U.S. Interstate Highway 70. Entrance to the site is through a tubular steel gate in the stock fence along the paved road. Past this gate, a short track leads across state land to the disposal cell, which is enclosed within a chain link security fence. The chain link fence is set back 50 to 250 feet from the site boundary. Two vehicle access gates are installed in this fence at the south and east corners of the fence line. A personnel gate is at the north corner of the fence line. The road, fence, and gates were in excellent condition.

The site has one entrance sign and 17 perimeter signs. The signs are on posts set along the unfenced site boundary. Erosion had occurred around the base of two perimeter signs, but the signs were stable and all were in excellent condition.

**Site Markers and Monuments**—The two granite site markers, 11 boundary monuments, and three survey monuments were in excellent condition. Erosion had occurred around the base of two boundary monuments, but the monuments were stable.

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

### 7.3.1.2 Transects

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

**Disposal Cell and Adjacent Area Inside the Security Fence**—The side and top slopes of the disposal cell are armored with riprap. The riprap was in excellent condition, and there was no evidence of subsidence, differential settlement, slumping, or other modifying process. No plant growth was observed on the cell.

7A The riprap-filled diversion channel (apron) along the base of the disposal cell on all sides was in excellent condition. Runoff from a storm event in fall 2002 resulted in minor sediment deposition near the south corner of the cell and created two small gullies in the cell perimeter road as the water drained into the apron (PL-1). The erosion did not present a threat to the integrity of the cell; however the gullies were filled and minor site grading was performed to divert runoff water away from the cell apron.

A series of linear cracks running parallel to the northeastern edge of the disposal cell are still present but continue to be filled with wind-blown sediments. The cracks may have been caused by settling 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. The station was in excellent condition.

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

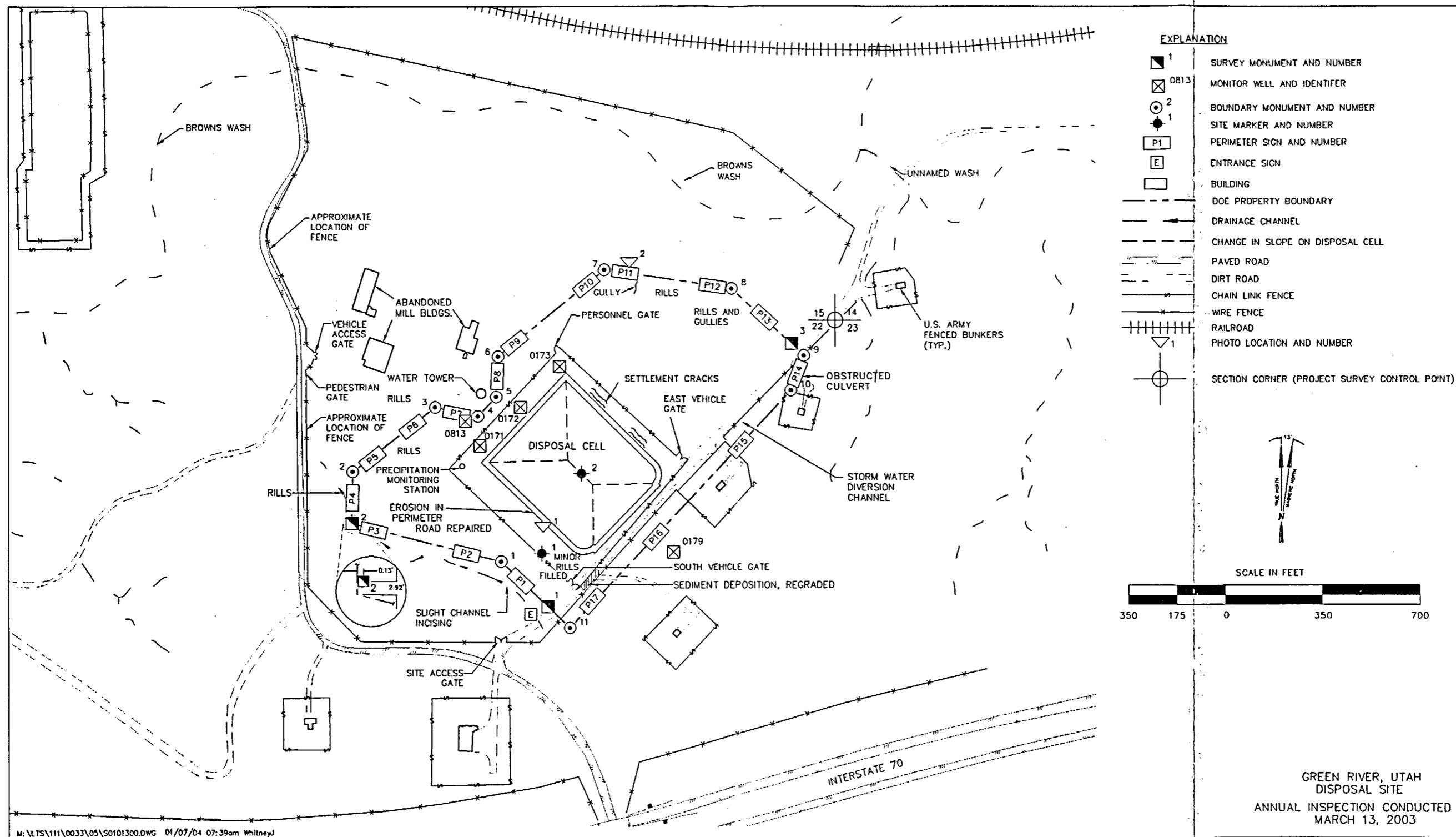


Figure 7-1. 2003 Annual Compliance Drawing for the Green River, Utah, Disposal Site

7B Rill erosion on the west side of the property appears to have increased but does not pose a threat to the integrity of the cell. Site grading was performed to repair erosion damage and to divert runoff away from perimeter sign P4 and boundary monument BM-3.

Rill and gully erosion noted during previous inspections on the hillside northeast of the disposal cell in the area between boundary monument BM-7 and survey monument SM-3 appears to have increased (PL-2). Maximum gully depth in this area is approximately 3 feet. The rill and gully erosion poses no threat to the integrity of the disposal cell but eventually could damage perimeter signs and boundary monuments; therefore, monitoring of erosion in this area will continue.

The entrance to a storm water diversion channel culvert near the northeast corner of the property is completely obstructed with eroded sediments. The culvert underlies an entrance road leading to a locked 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. The culvert entrance has a tendency to get obstructed with sediment and dead weeds and has been cleaned out on several occasions. 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.

No evidence of trespass on DOE property was noted during the inspection. The barbed-wire stock fence on the surrounding State-owned property provides only minimal security. Inspectors will continue to monitor and record incidents of trespass on the site.

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

The public road from which the site is accessed bends around the southwest corner of the site and continues to the north. The State's barbed and wire fabric stock fence parallels the road. Vehicle and pedestrian gates in this fence west of the site, that allow access to the former millsite buildings and to DOE's unfenced property, were locked.

Abandoned buildings associated with milling activities at the Green River processing site are located northwest of the DOE property. The buildings are in a severe state of disrepair, and debris (e.g., roofing materials, siding, trash) has been blown from the buildings onto DOE property.

### 7.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 7.3.3 Routine Maintenance and Repairs

Minor site grading to divert runoff away from the cell, a perimeter sign, and a boundary monument was performed in 2003.

### 7.3.4 Ground Water Monitoring

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

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

Monitor Well	Nitrate (as NO <sub>3</sub> ) (mg/L)	Uranium (mg/L)	Sulfate (mg/L)
MW-0171	44	0.044	3,334
MW-0172	102	0.067	4,985
MW-0173	44	0.044	4,000
MW-0813	44	0.069	4,440

Note: Maximum concentration limits from Table 1 to Subpart A of 40 CFR 192 are 44 milligrams per liter (mg/L) for nitrate (as NO<sub>3</sub>) and 0.044 mg/L for uranium. Other proposed concentration limits were determined from background levels for specific wells.

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

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

Sulfate concentrations in ground water have remained relatively constant in wells MW-0171 and MW-0813 since the disposal cell was constructed (Figure 7-3). Concentrations in wells MW-0172 and MW-0173 have fluctuated substantially since 1996. Concentrations in 2003 continued above the proposed concentration limits (Table 7-2) in wells MW-0171, MW-0172, and MW-0173. Sulfate concentration was below the proposed limit in well MW-0813.

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

**Ground Water Level Monitoring**—Ground water levels in several monitor wells adjacent to the disposal cell have been measured manually since 1991, and continually with down-hole dataloggers for the past 5 years. Well hydrographs indicate an overall decrease in the ground water elevation of approximately 4 feet since 1993 (Figure 7-5).

A precipitation monitoring station was installed in the west corner of the secured site in 2001. DOE is evaluating the relationship between precipitation and ground water elevations near the disposal cell to determine if runoff from the cell has an impact on ground water flow at the site, which affects contaminant migration. Based on information collected to date, precipitation has been minimal, and there is no obvious correlation with ground water elevations measured by dataloggers in the wells adjacent to the disposal cell (Figure 7-5).

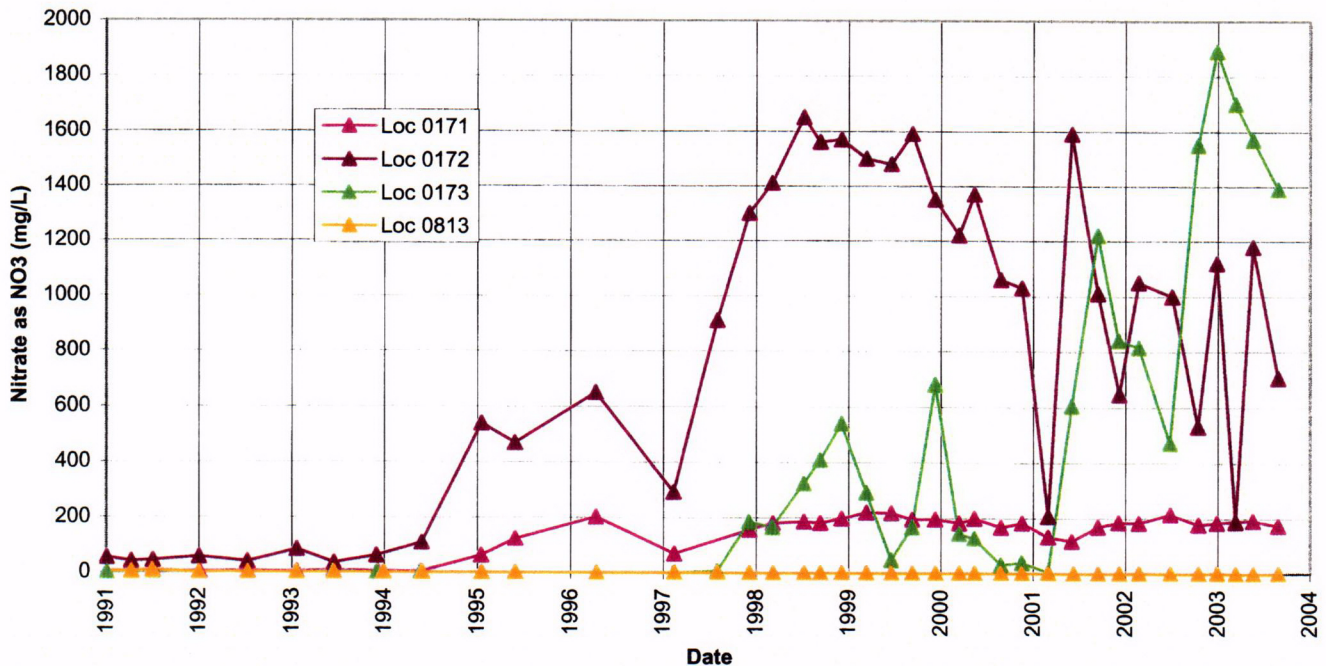


Figure 7-2. Time-Concentration Plots of Nitrate (as NO<sub>3</sub>) in Ground Water at the Green River, Utah, Disposal Site

CO6



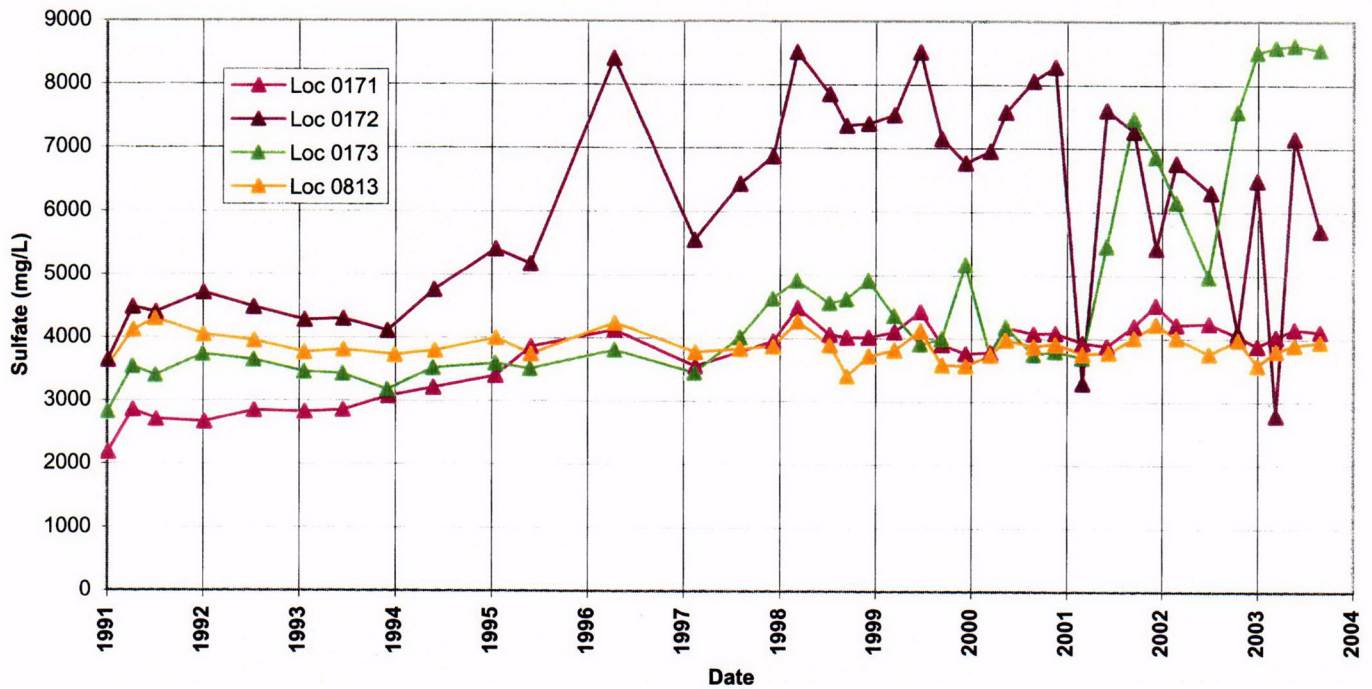


Figure 7-3. Time-Concentration Plots of Sulfate in Ground Water at the Green River, Utah, Disposal Site

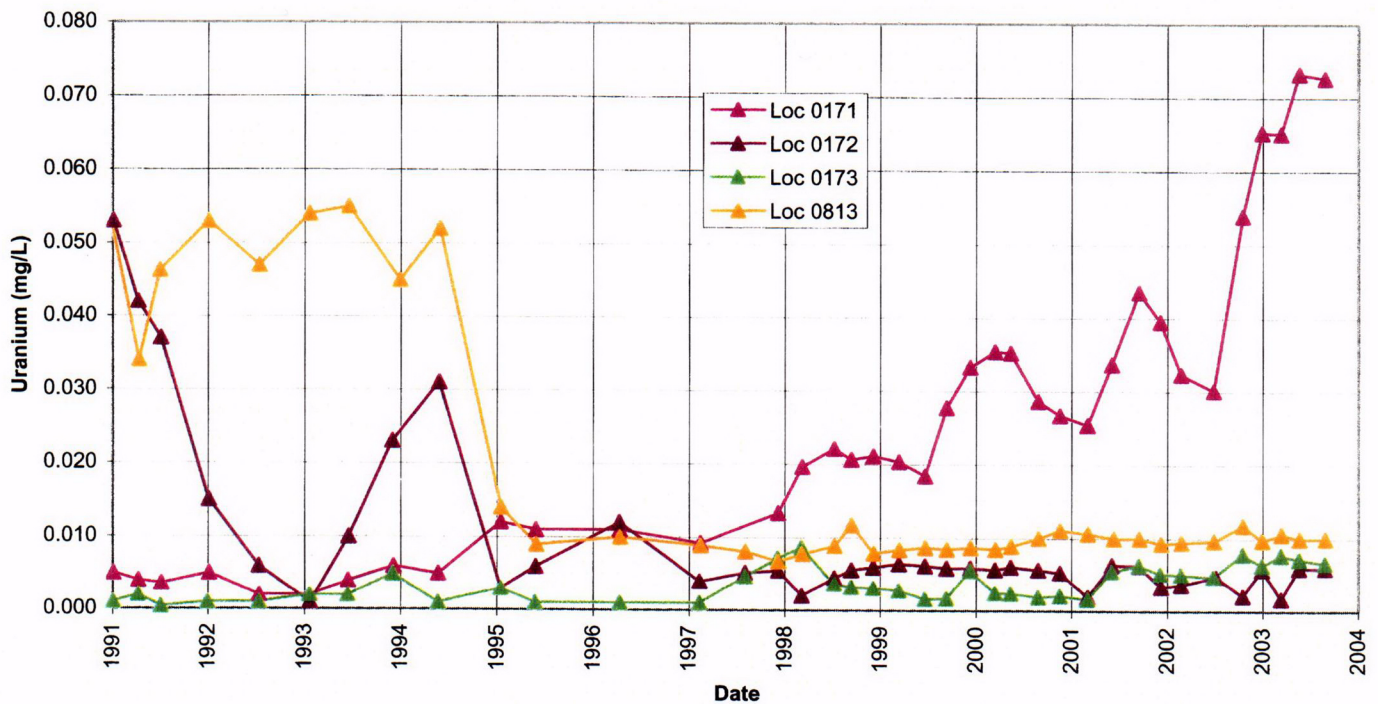


Figure 7-4. Time-Concentration Plots of Uranium in Ground Water at the Green River, Utah, Disposal Site

C07

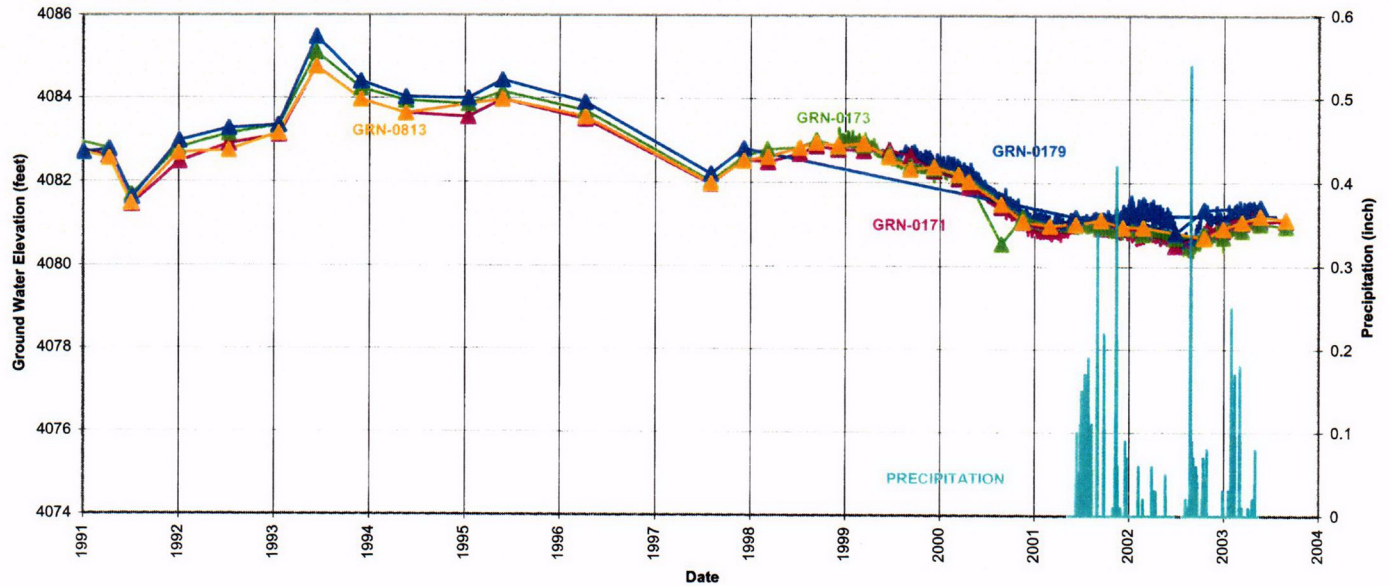


Figure 7-5. Ground Water Elevations and Precipitation at the Green River, Utah, Disposal Site

### 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.

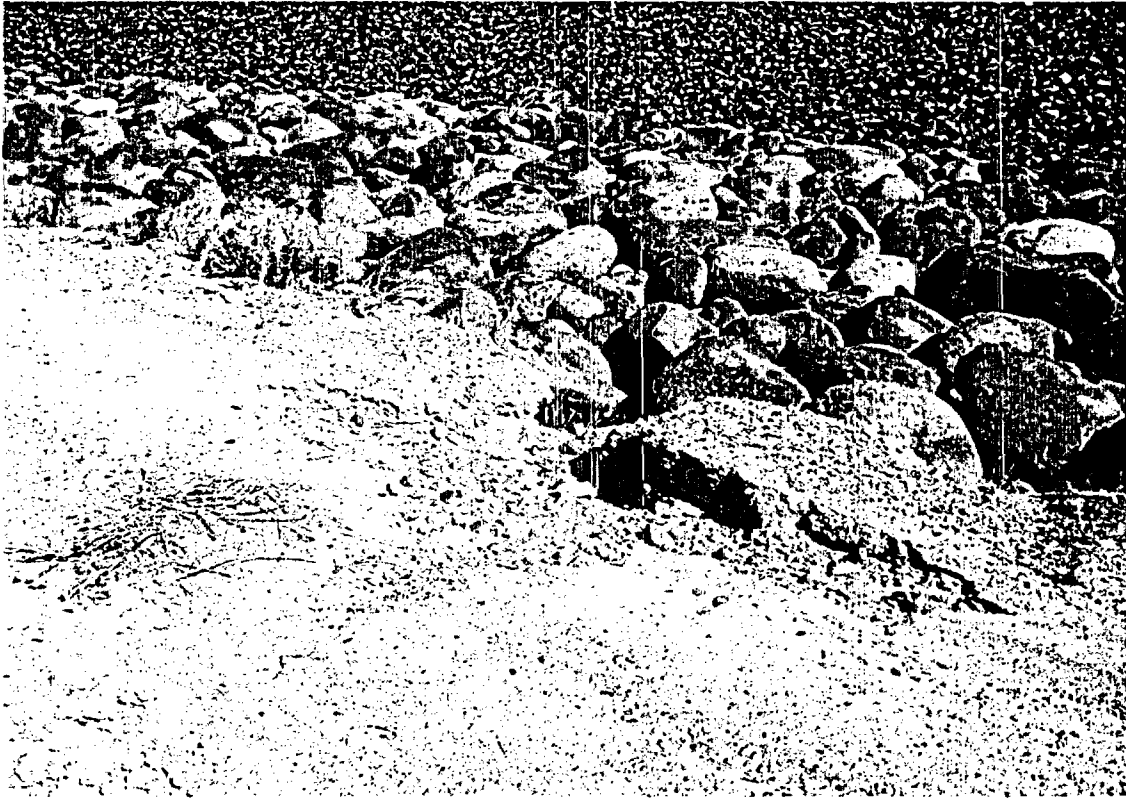
No corrective action was required in 2003.

### 7.3.6 Photographs

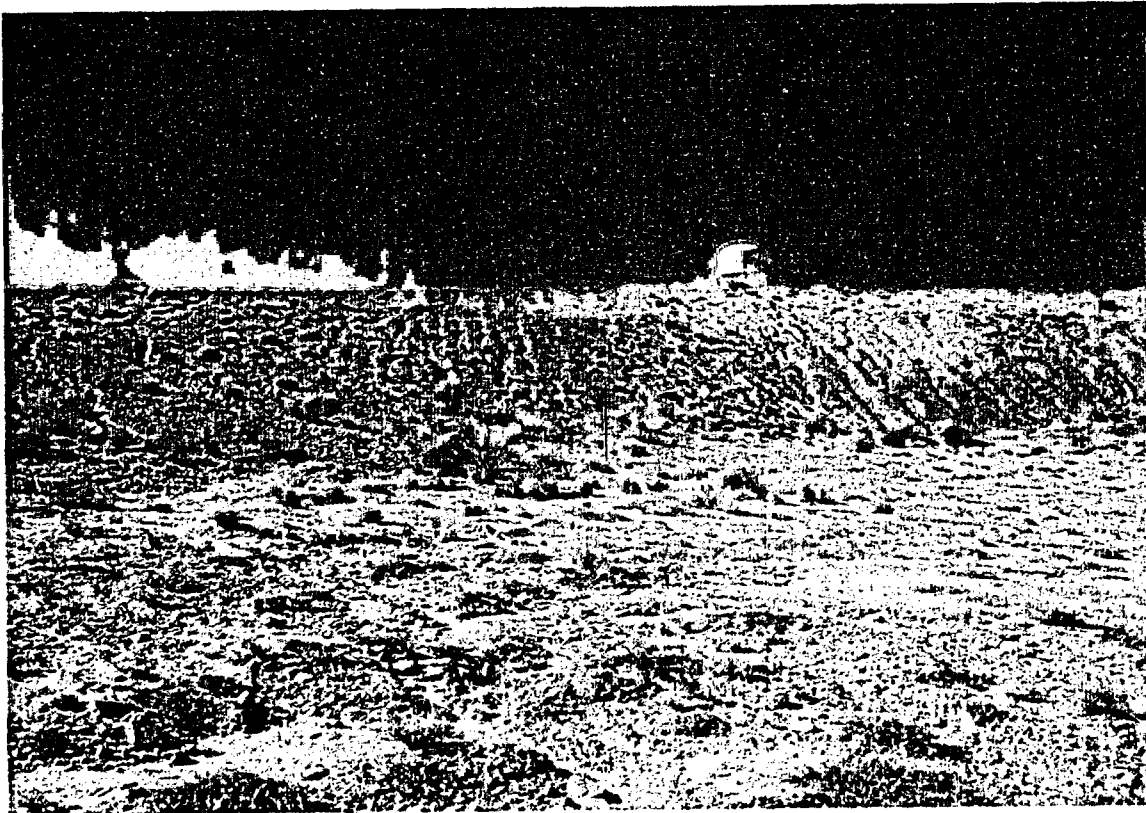
Table 7-3. Photographs Taken at the Green River, Utah, Disposal Site

Photograph Location Number	Azimuth	Description
PL-1	0	Erosion in the cell perimeter road along the southwest side of the disposal cell.
PL-2	225	Erosion along the north side of the property near perimeter sign P11.

C08



*GRN 03/2003. PL-1. Erosion in the cell perimeter road along the southwest side of the disposal cell.*



*GRN 03/2003. PL-2. Erosion along the north side of the property near perimeter sign P11.*

End of current section

## 8.0 Gunnison, Colorado, Disposal Site

### 8.1 Compliance Summary

The Gunnison Disposal Site was inspected on September 3 and 4, 2003, and was in excellent condition. A missing perimeter sign was replaced and a new entrance sign was installed. The identification numbers on several monitor wells were repainted. Reseeded areas along the former Chance Gulch and Tenderfoot Mountain haul roads have not yet successfully revegetated because of continued drought conditions. Canada thistle plants were identified at two locations and were sprayed with herbicide in fall 2003. No cause for a follow-up 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 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 8-1.

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

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

### 8.3 Compliance Review

#### 8.3.1 Annual Inspection and Report

The site, located southeast of Gunnison, Colorado, was inspected on September 3 and 4, 2003. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 8-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

##### 8.3.1.1 Specific Site Surveillance Features

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

8A An entrance sign and 45 perimeter signs are attached to the posts of the perimeter fence. The entrance sign, just east of the entrance gate, was replaced with a new sign (PL-1); the former sign identified DOE-Albuquerque as the owner. Perimeter sign P1 was missing and was replaced. Perimeter sign P37 is bent and has cracked paint, but was still legible. Perimeter signs P38, P39, P42, and P44 have bullet holes in them, but all were still legible. The other perimeter signs were in excellent condition.

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

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

8B **Monitor Wells**—The ground water monitoring network at the Gunnison disposal site consists of 16 wells. All monitor wells were secure and in excellent condition. Due to faded or peeled paint, the identification numbers on five of the compliance wells were repainted.

8C Fourteen former monitor wells on and off the disposal site were decommissioned during 2001. Inspectors visited these former well sites to ensure the surface had been reclaimed properly. All reclaimed sites were in good condition. At the former location of wells MW-0640 and MW-0713 (near perimeter sign P42), a patch of Canada thistle—a state-listed noxious weed—observed in the 2002 inspection had been sprayed with herbicide. One thistle plant was found at the location during the 2003 inspection and was treated with herbicide in fall 2003.

### 8.3.1.2 Transects

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

**Top of Disposal Cell**—The top of the disposal cell was in excellent condition. There was no evidence of erosion, settling, or slumping. Several isolated patches of grass were observed on the disposal cell cover; however, these plants do not present a hazard or cause for concern at this time.

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

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

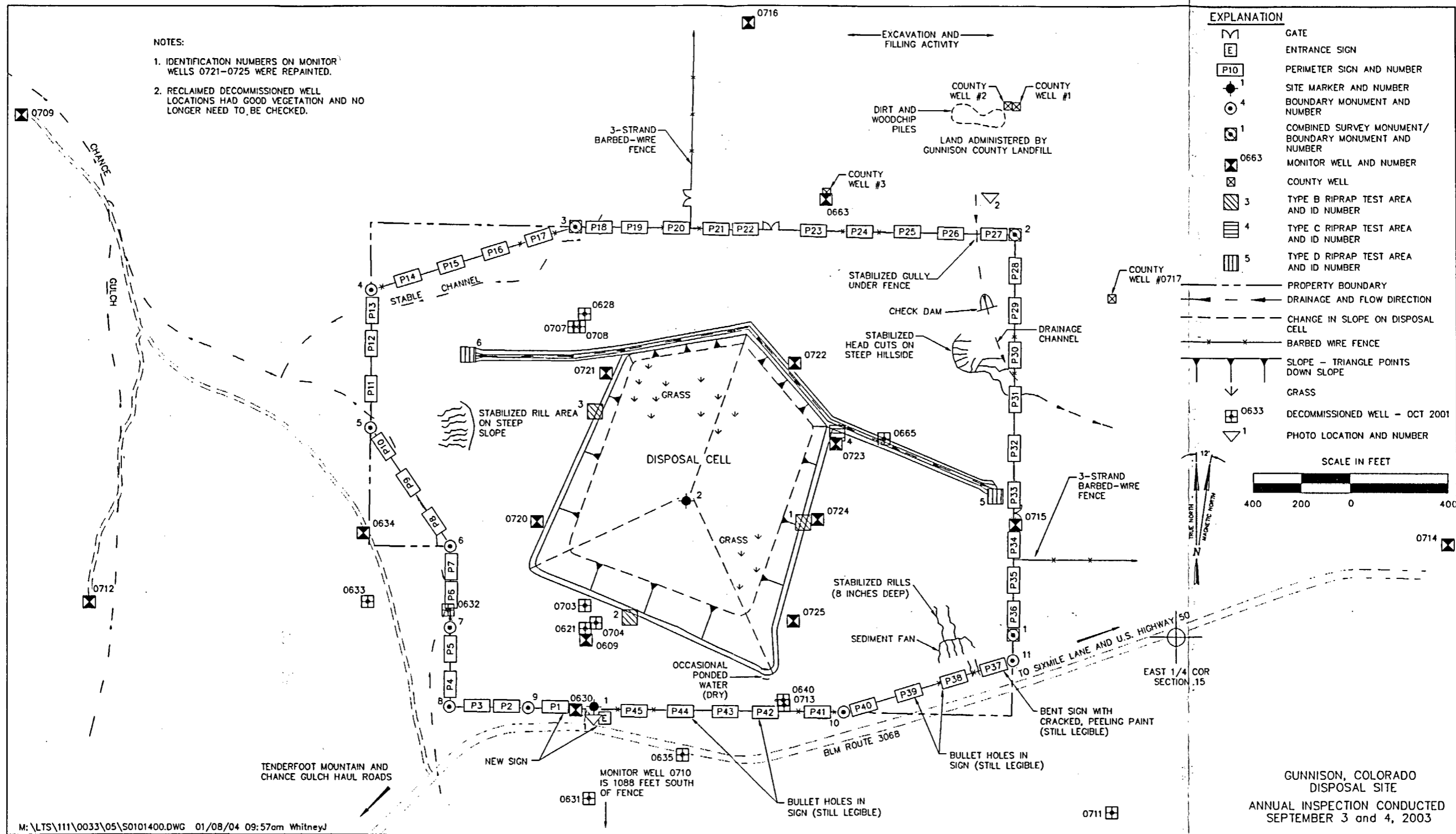


Figure 8-1. 2003 Annual Compliance Drawing for the Gunnison, Colorado, Disposal Site



The condition of the riprap in six test squares was inspected. Each test square, roughly 1 square meter, is in a "critical flow path" location in the diversion channels. Corners of each test square are marked with orange paint. During the 2002 inspection, inspectors installed a steel t-post covered with white PVC pipe on the northeast corner of each test square. No degradation of the rock was noted when visual comparisons were made with the 2002 inspection photographs of the test squares. As outlined in the Long-Term Surveillance Plan, annual photographing and comparing of these test plots occurred through the 2002 inspection, and the test plots will be photographed every 5 years until 2017. DOE will re-photograph the test squares in 2007.

**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 2003 inspection, the seeded areas were in excellent condition.

During the 2003 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 becoming well established on the steeper portions of the eroded slopes.
- In the northeast portion of the property, a series of deep gullies and headcuts had formed at a natural slope break in the terrain. As noted in previous inspection reports, these gullies appear to be stabilizing with the successful establishment of sagebrush and various grasses. The drainage channel between perimeter signs P30 and P31 does not appear to be worsening.
- In the northwest portion of the property, a drainage channel tributary to Chance Gulch was investigated. This area was stable and in good condition.
- On the west side of the property, rills had been noted on the steep west-facing slope during previous inspections. Surface rock fragments appear to have stabilized the slope.

The steep topography of these areas makes them susceptible to erosion. Inspectors will continue to monitor for signs of increased erosion or any other indications of slope instability, but no action is required at this time.

**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 the drawing. 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. Dirt and woodchips are piled at that location (PL-2), and trenching and filling activities are occurring immediately north of the piles. Although this activity does not appear to pose a threat to the disposal site, DOE will continue to monitor the level of activity occurring near the site property boundaries and its outlying monitor wells.

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

Revegetation of reseeded areas on Chance Gulch haul road has been unsuccessful, primarily because of continued drought conditions, and is not expected to be successful in the future if no action is taken. The BLM permit requires the establishment of forbs (e.g., alfalfa, buckwheat, vetch, and wild flowers) to improve habitat for sage grouse and pronghorn antelope. To meet permit requirements, DOE plans to reseed the affected areas in 2004 with a new seed mix and cover these areas with mulch.

Inspectors noted that vegetative cover within the reseeded areas on Tenderfoot Mountain haul road had improved somewhat from the previous year. In general, the percentage of weedy plant cover had decreased, and the percentage of desirable plant cover had increased. However, the reseeded areas continue to be dominated by annual weeds. Sparse vegetative cover has allowed the development of rills in a portion of one reseeded area. Revegetation success has been hindered by severe drought conditions during the last 2 years in the Gunnison area. If vegetative cover has not improved by the time of the 2004 inspection, the BLM representative will likely expect DOE to reseed the sites in fall 2004.

8D Several patches of Canada thistle were found in the catch basin of a check dam on the reclaimed Tenderfoot Mountain haul road during a previous inspection and subsequently were sprayed with herbicide. New growth of the thistle was observed at this location during the 2003 inspection and was sprayed in fall 2003.

### **8.3.2 Follow-up or Contingency Inspections**

No follow-up or contingency inspections were required in 2003.

### **8.3.3 Routine Maintenance and Repairs**

A new entrance sign was installed, a missing perimeter sign was replaced, identification numbers were repainted on several monitor wells, and Canada thistle was sprayed with herbicide at two locations.

### 8.3.4 Ground Water Monitoring

8E 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 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 2003; the next sampling and measurement event is scheduled for 2006. The indicator analyte for cell performance is uranium. Analytical results obtained thus far have been consistent, with concentrations of uranium at or below background levels, indicating that the disposal cell is performing as designed.

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

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

### 8.3.5 Corrective Action

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

No corrective action was required in 2003.

### 8.3.6 Photographs

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

Photograph Location Number	Azimuth	Description of Photograph
PL-1	20	Site marker SMK-1 and the new entrance sign.
PL-2	0	County landfill dirt and woodchip piles near the northeast corner of the disposal site.



*GUN 9/2003. PL-1. Site marker SMK-1 and the new entrance sign.*



*GUN 9/2003. PL-2. County landfill dirt and woodchip piles near the northeast corner of the disposal site.*

End of current section

## 9.0 Lakeview, Oregon, Disposal Site

### 9.1 Compliance Summary

The Lakeview Disposal Site, inspected on June 25 and 26, 2003, was in good condition. A revised Long-Term Surveillance Plan, which includes a recalculated median diameter of the side slope riprap (the minimum size required to protect the cell from erosion by storm runoff), is pending U.S. Nuclear Regulatory Commission (NRC) concurrence. Results of the fifth annual gradation test on the west side slope indicate that the median diameter of the riprap remains substantially above the recalculated minimum size. A damaged perimeter sign was replaced and broken strands of the perimeter fence were repaired. No need was identified for a follow-up or contingency inspection.

### 9.2 Compliance Requirements

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

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

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

### 9.3 Compliance Review

#### 9.3.1 Annual Inspection and Report

The site, northwest of Lakeview, Oregon, was inspected on June 25 and 26, 2003. Results of the inspection are described below. Features and the photograph locations (PLs) mentioned in this report are shown on Figure 9-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

##### 9.3.1.1 Specific Site Surveillance Features

**Access Road, Entrance Gate, Fence, and Signs**—Access to the site is gained by traveling a gravel road that heads west off County Road 2-16B. The 1.2-mile access road between the county road and the DOE property boundary has a perpetual easement across private property

(Collins Ranch). A DOE lock is on a cable gate across the access road at a cattle guard approximately 0.5 mile east of the site.

9A A barbed wire boundary fence encompasses the site. Broken strands on the west and north boundary fence were repaired.

9B The entrance sign, replaced in 2002, was in good condition. Nine of the twelve perimeter signs were in good condition. Perimeter signs P9, P10, and P12 have been damaged by bullets, and sign P10 was replaced; signs P9 and P12 are still legible.

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

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

#### 9.3.1.2 Transects

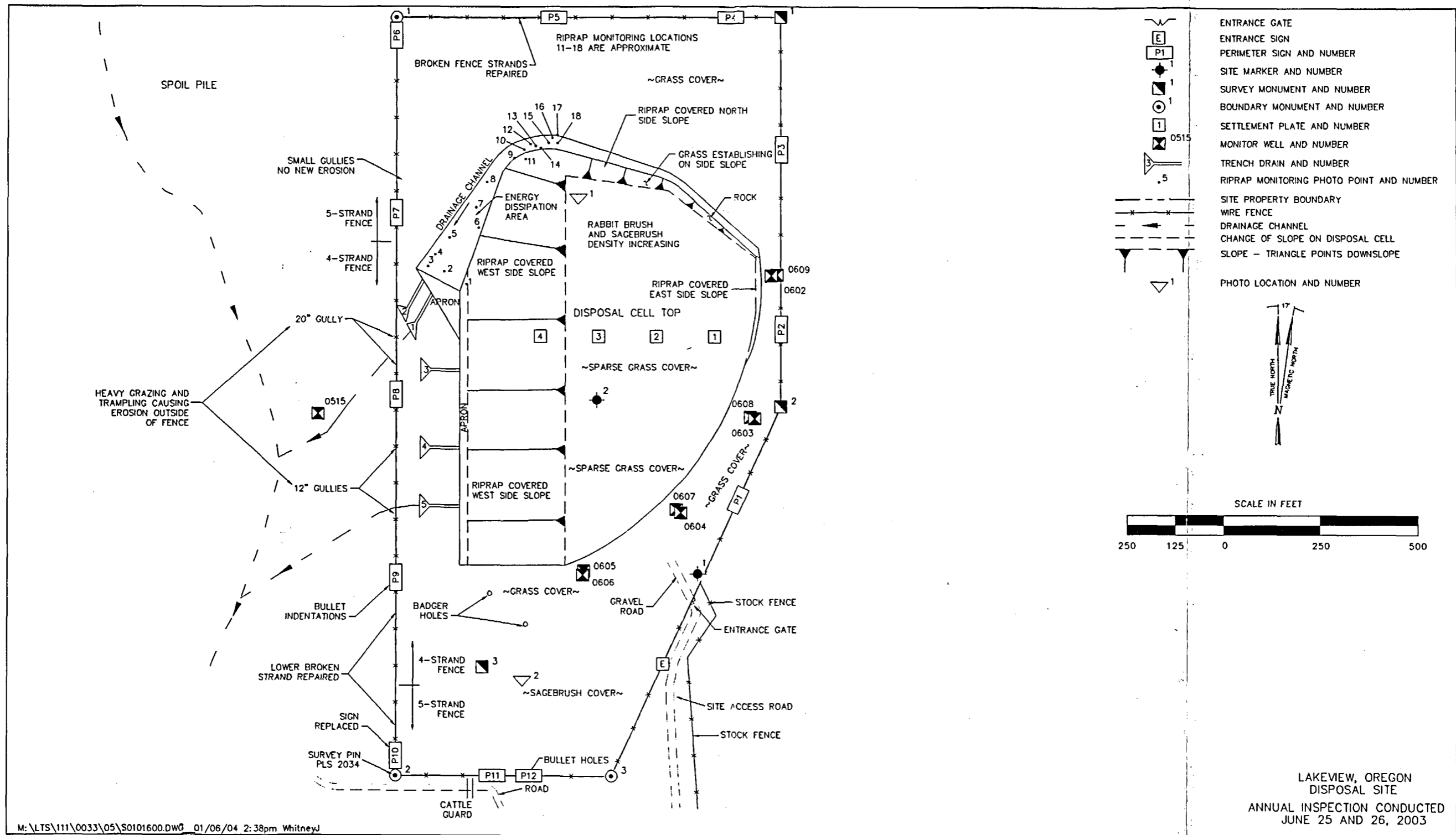
To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the top of disposal cell; (2) the side slopes of the disposal cell and adjacent drainage channel, aprons, and trench drains; and (3) the site perimeter and outlying area.

**Top of the Disposal Cell**—The design for the top of the disposal cell has produced conditions that favor the growth of deep-rooted plants. The top slope was seeded with grasses, but the low water-storage capacity of the thin (nominal 4-inch-thick) topsoil layer has limited grass growth to scattered patches of deeper-rooted wheat grasses. Movement of precipitation through the riprap and bedding layers and into the radon barrier favors the growth of shrubs. Many mature rabbitbrush plants and sagebrush plants grow on the top of the disposal cell (PL-1), and shrub density currently exceeds that of the native plant community adjacent to the site.

Deep-rooted plants have the potential to increase the hydraulic conductivity of the radon barrier, allowing meteoric water to leach contaminants from the encapsulated tailings and into the underlying soil and ground water. In contrast, an increase in plant cover indicates an increase in transpiration rate, which removes water from the root zone and reduces the probability of saturation and leaching of contaminants.

9C DOE, in collaboration with Sandia National Laboratories, continues to conduct a risk-based performance evaluation of the cell cover to determine how biointrusion affects infiltration through the radon barrier. Fieldwork in 2003 focused on developing scenarios and sequence of processes or events that describe possible future conditions at the disposal cell. Soils and vegetation at locations around the disposal cell site were characterized. These sites, selected as disposal site analogs, represent a reasonable range of wet and dry future climate scenarios. Soil physical properties, plant community characteristics, and leaf area index were measured at the analog sites. The saturated hydraulic conductivity was measured with air-entry permeameters (PL-2). These analog site data will be used to conduct performance calculations and sensitivity/uncertainty analyses using the Framework for Risk Analysis in Multimedia Environmental Systems model developed by Pacific Northwest National Laboratory. Results of the analyses, expected to be completed in 2004, will be presented in a separate report.





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

9D

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 model currently accepted by NRC. The recalculated minimum  $D_{50}$  necessary to protect the disposal cell is 1.8 inches. DOE submitted a revised Long-Term Surveillance Plan in 2002 addressing the recalculated  $D_{50}$ ; the plan is pending NRC concurrence.

A side slope riprap field gradation test was performed for the fifth year during the 2003 inspection. Particle size distribution (weight percent) by count data was collected at 27 locations. The results indicate an average  $D_{50}$  of 2.74 inches. The average  $D_{50}$  in 2002 was 2.35 inches. The apparent increase in mean rock diameter may be related to the sampling method. Only rocks at the surface of the riprap layer are sampled and most sample locations are randomly generated. Pieces of crumbling rocks may drop into the interstices of the layer leaving more durable rock at the surface.

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

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

Grass encroachment has increased in the riprap on the north side slope, in the upper (eastern) part of the drainage channel, and in the energy dissipation area at the lower end of the drainage channel. Plant growth in the drainage channel is not significant and does not degrade the function of the channel.

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

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

### 9.3.2 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 9.3.3 Routine Maintenance and Repairs

DOE replaced a damaged perimeter sign and performed minor fence repairs in 2003.

### 9.3.4 Ground Water Monitoring

DOE monitors ground water at this site once every 5 years. Eight point-of-compliance wells are located east of the cell, and an upgradient well is located west of the cell. Ground water was sampled in 1999 and the results were included in the 1999 annual report. Ground water will be sampled again in 2004.

### 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 2003.

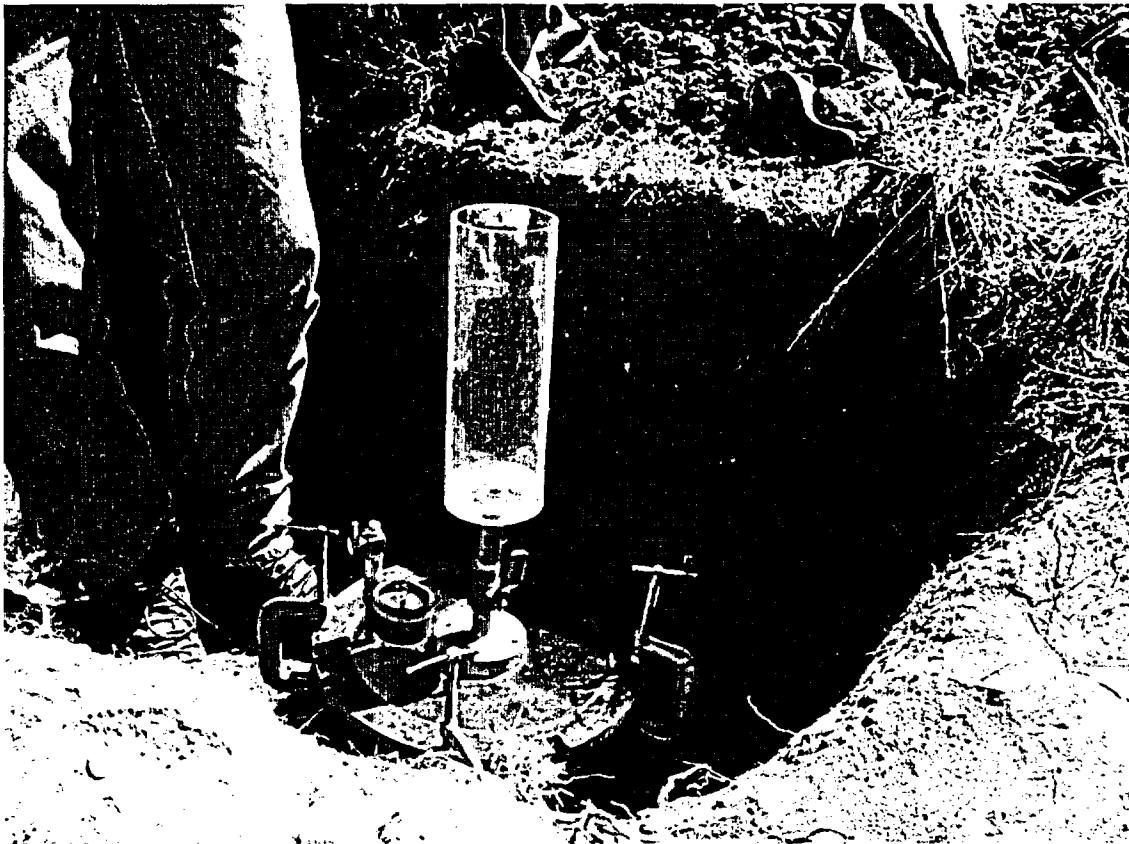
### 9.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL-1	120	Shrubs growing on the top slope of the disposal cell.
PL-2	70	Air-entry permeameter test at a soil analog site.



*LKV 6/2003. PL-1. Shrubs growing on the top slope of the disposal cell.*



*LKV 6/2003. PL-2. Air-entry permeameter test at a soil analog site.*

End of current section

## 10.0 Lowman, Idaho, Disposal Site

### 10.1 Compliance Summary

The Lowman Disposal Site, inspected on August 20, 2003, was in excellent condition. Areas to the north and west of the disposal cell, regraded and seeded in fall 1998, have successfully revegetated and are functioning as designed. In July 2003, a silt fence was removed and erosion features at two areas along the former silt fence and at the upper end of the collection ditch were stabilized by placement of rock. Herbicide was applied twice during 2003 to control noxious weeds at the site. Inspectors identified no cause for a follow-up or contingency inspection.

### 10.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Lowman, Idaho, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan for the Lowman, Idaho, Disposal Site* (DOE/AL/62350-36, Rev. 1, U.S. Department of Energy [DOE], Albuquerque Operations Office, April 1994) and in procedures established by the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 10-1.

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

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

### 10.3 Compliance Review

#### 10.3.1 Annual Inspection and Report

The site, located northeast of Lowman, Idaho, was inspected on August 20, 2003. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 10-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

##### 10.3.1.1 Specific Site Surveillance Features

**Access Road, Entrance Gate, and Signs**—The site is at the end of a hard-packed gravel road north of Idaho State Highway 21. The 500-foot long access road between the highway and the DOE property is along a perpetual easement granted by the U.S. Forest Service. The road was in excellent condition. A locked gate spans the road about 150 feet from the state highway and was in excellent condition.

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

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

**Monitor Wells**—The monitoring network at the site consists of six monitor wells and one spring. Four of the wells are on site and two are just outside the site boundary. The spring, location 0561, also is outside the site boundary near the southwest corner of the site. The wells have cap-and-pin locking systems and were in excellent condition. A seventh well (LOW-01-029), southeast of the cell, not part of the monitoring system, was secure.

### 10.3.1.2 Transects

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

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

10A Encroachment of vegetation continues on the top and side slope of the disposal cell (PL-1). Based on the results of column leach studies conducted by DOE, the natural plant community succession can be allowed to proceed without increased risk to public health, safety, or the environment. However, DOE plans to remove large ponderosa pine trees periodically, before they are susceptible to blowdown and consequent uprooting which would dislodge erosion-protection riprap. These recommendations will be included in a revised Long-Term Surveillance Plan that is expected to be submitted to NRC for concurrence in 2004.

**Area Between the Disposal Cell and the Site Boundary**—The steep slopes east and south of the site were stable with well-established ponderosa pine and grasses. The rills on the slopes immediately north and west of the cell were stable or gone as a result of erosion control and maintenance activities. DOE will continue to monitor this area for erosion.

10B Infestations of several species of noxious weeds continue to be a concern for DOE on and adjacent to the site. Two applications of herbicide were made in 2003, and the success of these treatments will be evaluated in 2004.

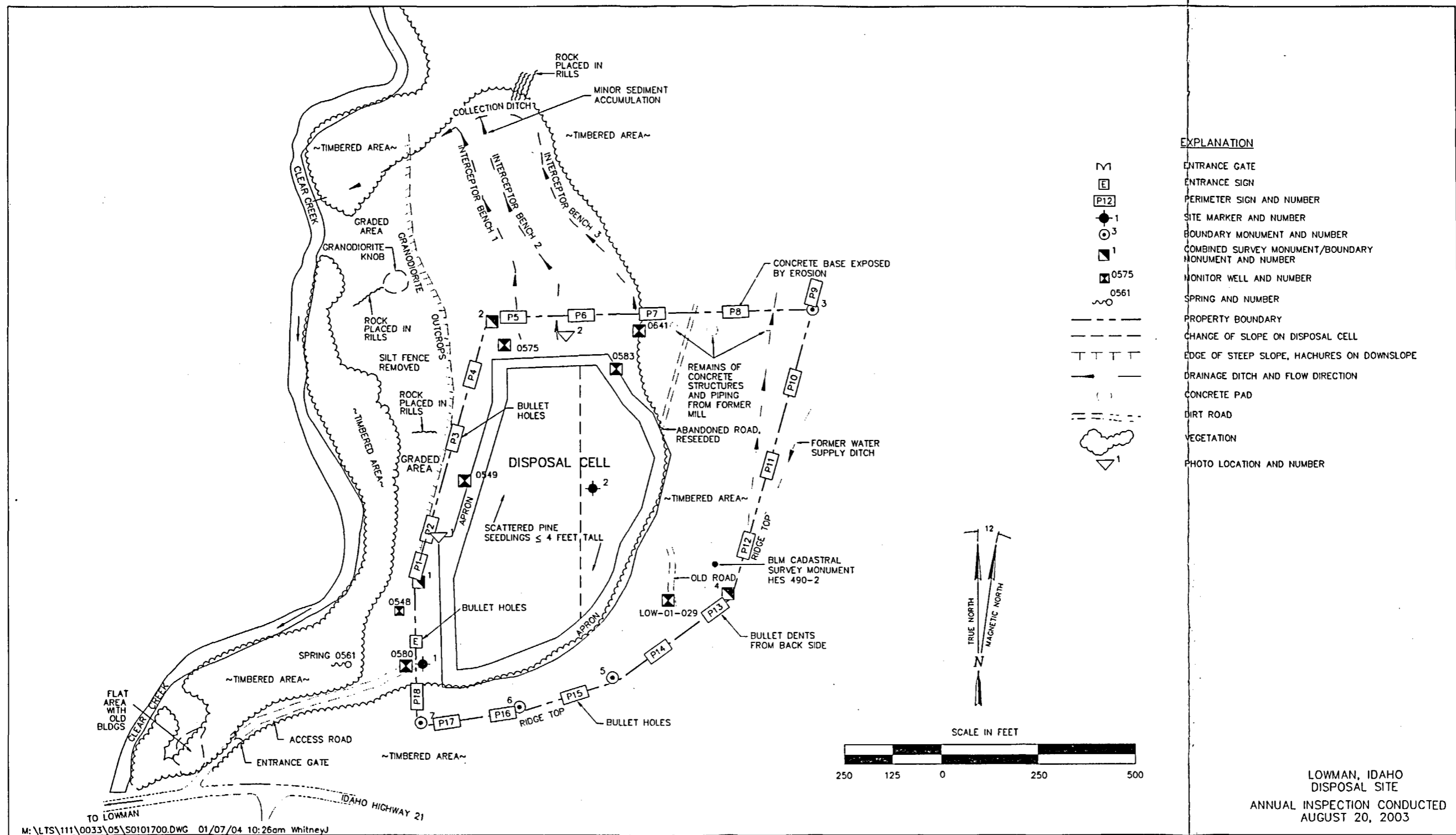


Figure 10-1. 2003 Annual Compliance Drawing for the Lowman, Idaho, Disposal Site



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

10C The interceptor benches, collection ditch, and vegetation were effectively controlling soil erosion in the revegetated area north and west of the site. Overall, the benches and collection ditch were in good condition (PL-2). Erosion has occurred near the upper end of the collection ditch. In July 2003, DOE repaired the erosion and hardened the area with rock. The revegetation effort on the slopes north and west of the disposal cell has been successful. DOE will continue to monitor the revegetated area for erosion.

10D A silt fence was erected in 1998 along the west side of the revegetation area. DOE removed the fence in July 2003 due to successful revegetation upgradient of the fence. Two erosion rills near the former silt fence location were armored with rock to prevent headward erosion. These rills do not affect the integrity of the disposal cell.

### 10.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 10.3.3 Routine Maintenance and Repairs

In 2003, a silt fence was removed, rock was placed in the collection ditch and several rills to prevent erosion, and herbicide was applied to control infestations of noxious weeds.

### 10.3.4 Ground Water Monitoring

DOE monitors ground water at this site annually to verify the initial performance of the disposal cell. Sampling locations are provided in Table 10-2.

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

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

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

July 2003 sampling results indicate that antimony concentrations in all downgradient wells were either below the laboratory detection limit or within the range of upgradient (background) concentrations. The maximum downgradient concentration of antimony observed in ground water in 2003 was less than 0.002 mg/L.

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

### 10.3.5 Corrective Action

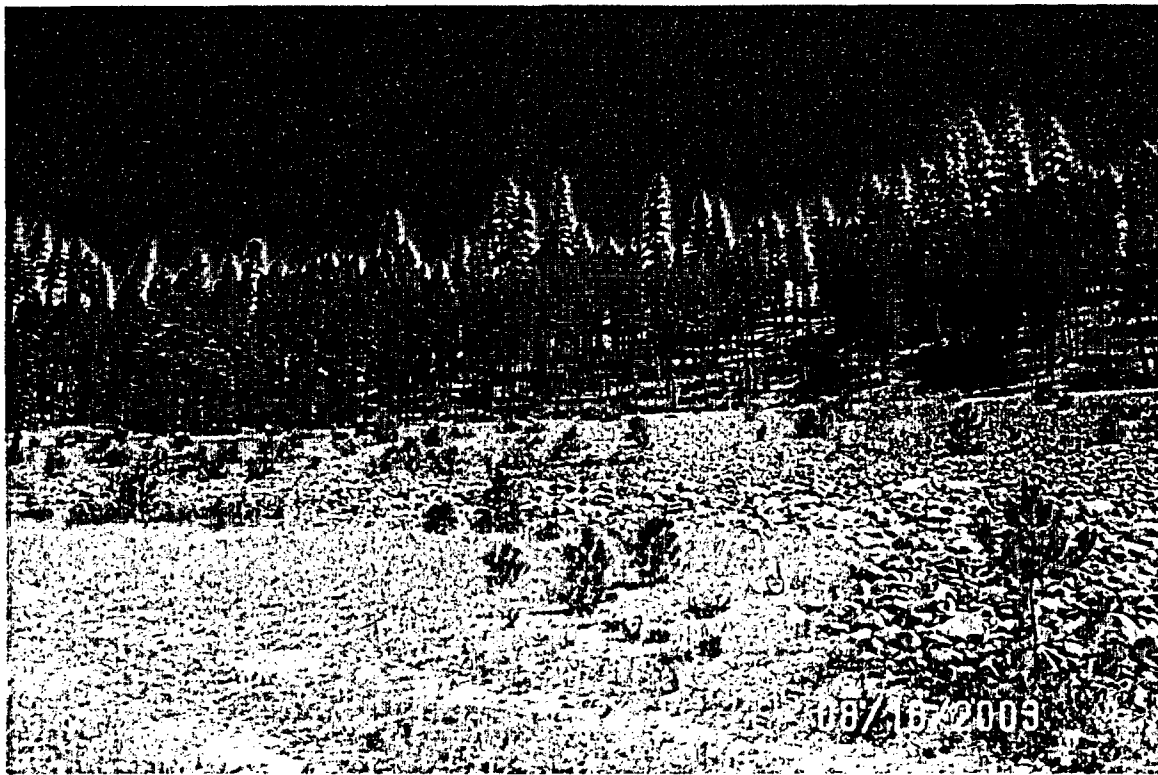
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2003.

### 10.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL-1	75	Vegetation encroachment on the cell top.
PL-2	340	Restored area north of the disposal site.



*LOW 8/2003. PL-1. Vegetation encroachment on the cell top.*



*LOW 8/2003. PL-2. Restored area north of the disposal site.*

End of current section

## 11.0 Maybell, Colorado, Disposal Site

### 11.1 Compliance Summary

The Maybell Disposal Site was inspected on August 5, 2003, and was in excellent condition. One perimeter sign had extensive bullet hole damage and was replaced. All erosion control features were in excellent condition and there was no evidence of sediment moving off site. Reclaimed areas had healthy vegetation. All observed tamarisk plants were cut and treated with herbicide; other deep-rooted plants found on the cell top also were cut and treated with herbicide. An annual survey of the cell settlement plates indicates no significant settlement has occurred since surveys were initiated in 2000. Inspectors identified no cause for a follow-up or contingency inspection.

### 11.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Maybell, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 11-1.

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

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

### 11.3 Compliance Review

#### 11.3.1 Annual Inspection and Report

The site, located northeast of Maybell, Colorado, was inspected on August 5, 2003. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 11-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

### 11.3.1.1 Specific Site Surveillance Features

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

Two DOE gates cross the county road along the northern boundary of the site. These gates keep cattle out of revegetated areas because there are no cattle guards in the road. Neither gate is locked. A third unlocked gate crosses the road that leads to a monitor well northeast of the site. A fourth gate is the locked entrance gate in the perimeter fence at the north end of the site. All the gates are standard tubular metal stock gates and were in good condition.

A standard stock fence that surrounds the disposal cell and drainage structures was in good condition. Loose wires were noted at three locations and subsequently were tightened.

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

11A 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. One sign, P25, was heavily damaged with bullet holes and was replaced. Three other signs have bullet holes but are legible. The remaining signs were in good condition.

11B **Site Markers and Monuments**—The site has two site markers, 27 boundary monuments, and two survey monuments. The surface of the concrete base of site marker SMK-2, on the cell top, had hairline fractures that were sealed prior to the 2003 inspection. All markers and monuments were in excellent condition.

**Settlement Plates**—There are nine settlement plates on top of the disposal cell. All were secure and in good condition. Elevations of the settlement plates were surveyed in June 2003.

**Monitor Wells**—Four monitor wells are used for water level measurements. The wells were secure and in good condition.

### 11.3.1.2 Transects

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

**Disposal Cell**—The disposal cell is armored with rock for erosion protection. No evidence of slumping, settling, erosion, or rock degradation was noted.

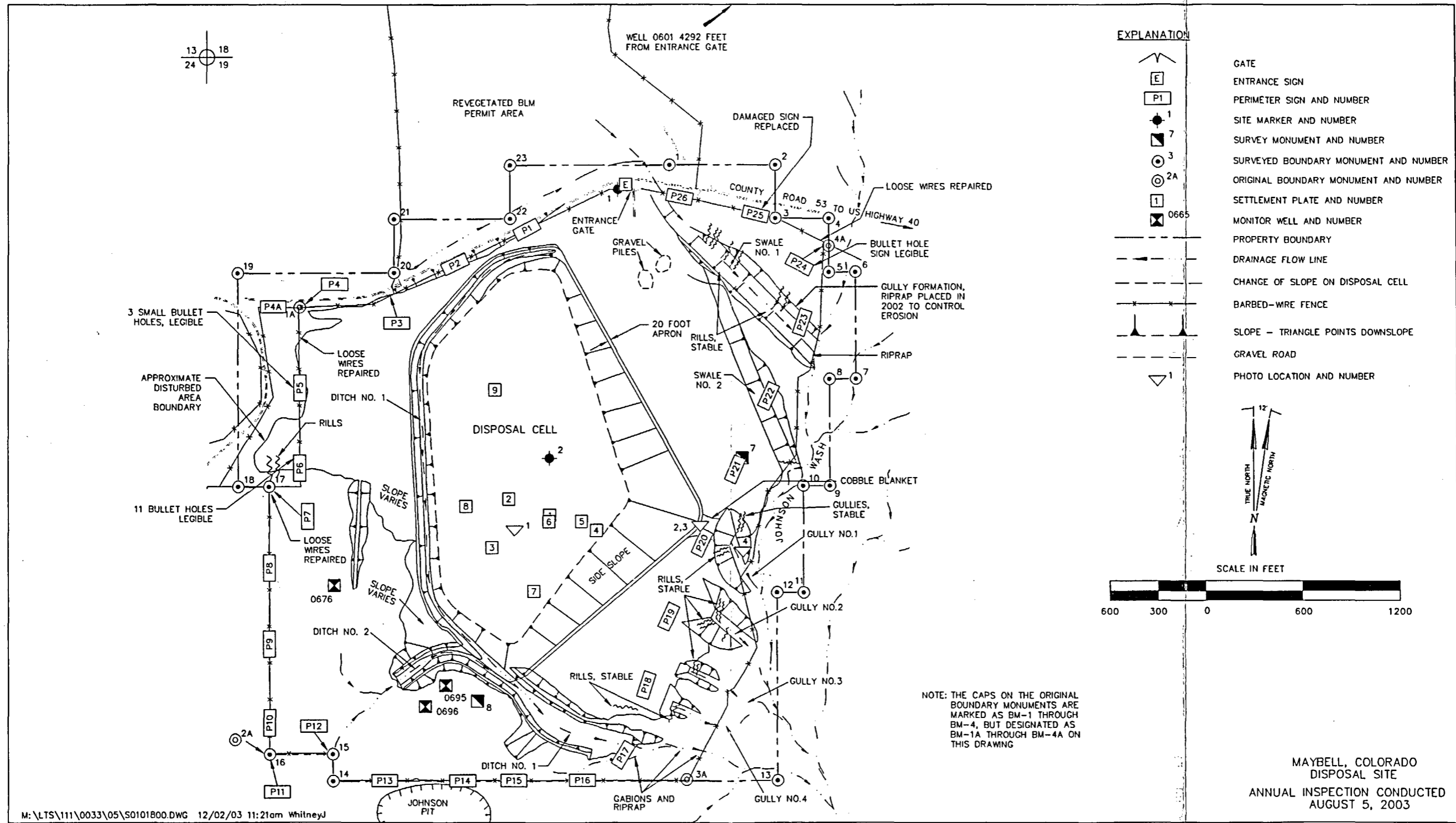


Figure 11-1. 2003 Annual Compliance Drawing for the Maybell, Colorado, Disposal Site

11C Occasional plants consisting of deep-rooted species, grasses, and annual weeds were observed on the cell top and side slopes. Deep-rooted plants (tamarisk and rabbitbrush) were cut and their stems were treated with herbicide (PL-1), and patches of unidentified thistle were sprayed with herbicide.

In accordance with the Long-Term Surveillance Plan, inspectors looked for seeps on the east corner and southeast side slopes because large quantities of slimes were encapsulated in this portion of the cell. The east corner of the cell is a topographic low point for draining a portion of runoff from the cell. No moisture was evident on the surfaces of the side slopes, but tamarisk (cut and treated with herbicide), cattail, yellow sweet clover, grasses, and annual weeds were growing on the cobble blanket at the toe of the east corner (PL-2). Standing water often is present in the apron at this location, and evaporite deposits have formed on the apron riprap (PL-3). A sample of the evaporite minerals was collected for laboratory analysis, and no analytes attributable to the cell contents were present.

**Other Areas On Site**—The rock-armored ditches, swales, and gullies were in good condition. There was no evidence of sediment moving offsite into Johnson Wash, and formerly active rills and gullies appear to be stabilizing due to self-armoring and increased vegetation (PL-4).

There was no evidence of livestock grazing within the fenced areas; however, wildlife signs are abundant. Vegetation diversity and density in graded and disturbed areas between the disposal cell and the site boundary is progressing. DOE will meet with U.S. Bureau of Land Management (BLM) staff in spring 2004 to discuss closure of the Remedial Action Agreement permit because of the successful revegetation in the disturbed areas.

Tamarisk was found at several locations. The plants were cut and the stems were treated with herbicide. Bull thistle, a non-noxious weed, also was observed at several locations on the site.

**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. DOE will meet with BLM staff in spring 2004 to discuss closure of the right-of-way permit for this area.

### **11.3.2 Follow-Up or Contingency Inspections**

No follow-up or contingency inspections were required in 2003.

### **11.3.3 Routine Maintenance and Repairs**

A damaged perimeter sign was replaced, the fence was tightened at several locations, cracks in the concrete base at a site marker were sealed, and deep-rooted plants on the cell top were cut and treated with herbicide.



### 11.3.4 Ground Water Monitoring

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

11D As a best management practice, DOE performs continuous ground water level monitoring downgradient from the disposal cell for the purpose of measuring changes in ground water levels that may be related to transient drainage caused by disposal cell construction. Evaluation of datalogger information from monitor wells MW-0695 (downgradient control well), MW-0676 (crossgradient well), and MW-0601 (upgradient/background well) from November 1995 through September 2003 shows a slight increasing trend of ground water levels since mid-1997 (Figure 11-2). Because the ground water level in the upgradient well is increasing at approximately the same rate as that in the downgradient wells, it is probable that the change in water level is related to regional causes rather than being directly related to disposal cell performance. The decision to discontinue ground water level monitoring and decommission the monitor wells will be based on evaluation of datalogger information over a 5-year period (through mid-2004).

### 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.

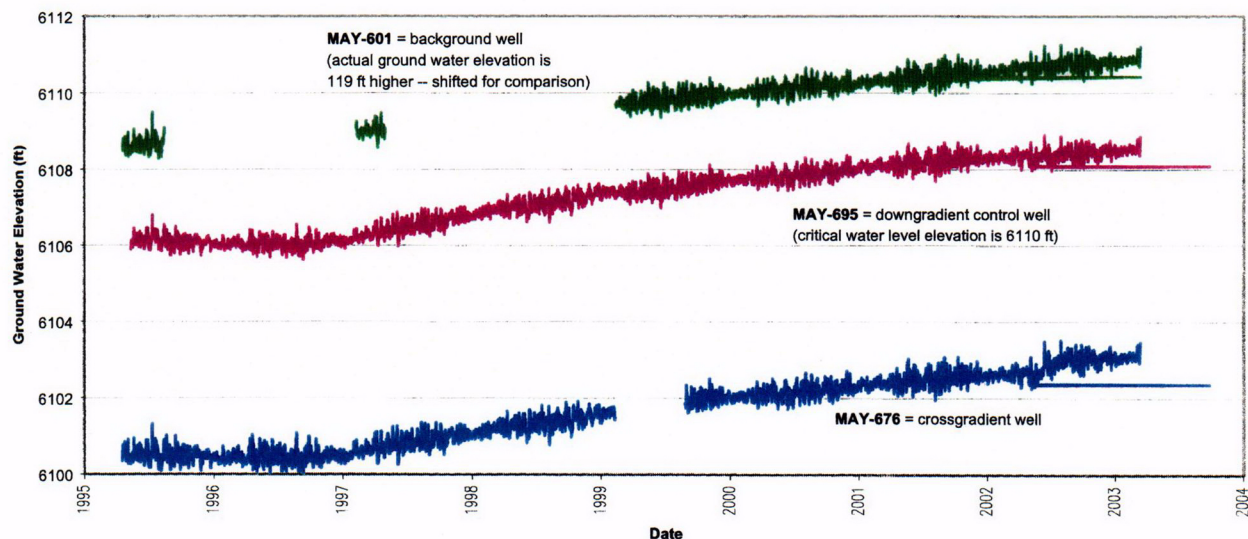
No corrective action was required in 2003.

### 11.3.6 Settlement Plate Monitoring

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

11E Results of the August 2000 baseline survey and the June 2003 survey are provided in Table 11-2. Elevation changes between 2000 and 2003 were insignificant; the maximum change is less than 2 inches. If no significant settlement occurs, DOE will complete a 5-year requirement for annual surveys in 2004.

**Maybell, Colorado  
Datalogger Ground Water Elevations**



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

*Table 11-2. Results of the 2003 Settlement Plate Survey at the Maybell, Colorado, Disposal Site  
(elevation in feet above mean sea level)*

Settlement Plate Location	Surveyed Elevation June 18, 2003	Baseline Elevation August 31, 2000	Difference in Elevation (feet)
SP-1	6,243.52	6,243.65	-0.13
SP-2	6,236.93	6,237.03	-0.10
SP-3	6,231.48	6,231.58	-0.10
SP-4	6,251.47	6,251.52	-0.05
SP-5	6,249.15	6,249.22	-0.07
SP-6	6,243.11	6,243.23	-0.12
SP-7	6,236.85	6,236.89	-0.04
SP-8	6,229.54	6,229.60	-0.06
SP-9	6,241.16	6,241.17	-0.01

**11.3.7 Photographs**

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

Photograph Location Number	Azimuth	Description
PL-1	350	Tamarisk on the cell top being cut.
PL-2	80	Vegetation in the cobble blanket at the east corner toe of the cell.
PL-3	0	Evaporite deposits on apron riprap at the east corner of the cell.
PL-4	345	Stabilizing rills and gullies on the east slope of Gully No. 1.

CO9



*MAY 8/2003. PL-1. Tamarisk on the cell top being cut.*



*MAY 8/2003. PL-2. Vegetation in the cobble blanket at the east corner toe of the cell.*



*MAY 8/2003. PL-3. Evaporite deposits on apron riprap at the east corner of the cell.*



*MAY 8/2003. PL-4. Stabilizing rills and gullies on the east slope of Gully No. 1.*

End of current section

## 12.0 Mexican Hat, Utah, Disposal Site

### 12.1 Compliance Summary

The Mexican Hat Disposal Site, inspected on September 11, 2003, was in excellent condition. Damages caused by storm runoff prior to the 2002 inspection have been repaired. Another severe storm event occurred two days before the 2003 inspection; however, no site features were damaged by the runoff. No maintenance tasks or cause for a follow-up or contingency inspection were 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 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 12-1.

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

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

### 12.3 Compliance Review

#### 12.3.1 Annual Inspection and Report

The site, located south of Mexican Hat, Utah, was inspected on September 11, 2003. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 12-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

##### 12.3.1.1 Specific Site Surveillance Features

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

A high-quality barbed-wire fence with a chain link entrance gate surrounds the site. Both the gate and the fence were in excellent condition. The entrance sign is located at the gate and was in excellent condition.

12A There are 43 perimeter sign locations and each location has a pair of signs: an upper property ownership sign and a lower radioactive materials disposal site warning sign. The lower sign was missing at locations P41 and P42 but the signs were found nearby and replaced. Some perimeter signs have bullet holes but all signs are legible. Perimeter sign P4, noted as unstable during the 2002 inspection, had been stabilized and was in good condition.

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

12B Rock was placed around boundary monument BM-11 and grading was performed to divert runoff around the monument to protect it from damage by erosion.

**Monitor Wells**—Sampling of monitor wells is not required by the Long-Term Surveillance Plan.

#### 12.3.1.2 Transects

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

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

**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.

The sloughing of red country rock and soil along the south apron did not increase significantly during the past year; the accumulation remains approximately 18- to 24-inches high against the base of the adjacent hill slope (PL-1). As in previous years, inspectors did not find evidence of channel erosion in this area, and the sloughed material does not appear to have filled the void spaces in the riprap beyond the toe of the hill slope. A photograph will be taken for the record annually until conditions stabilize.

12C Substantial erosional damage to the upper section of the West Ditch caused by a severe storm in 2002 was repaired following a geotechnical evaluation of the damage. Another severe storm totaling 1.25 inches of rainfall in the town of Mexican Hat occurred on September 9, 2003. The repaired washout area of the West Ditch was intact (PL-2), and no evidence of erosion, settling, or slumping was observed on the side slopes or in the diversion ditches. Some sediment and weeds were present in the lower end of West Ditch but do not affect the performance of the diversion ditch.

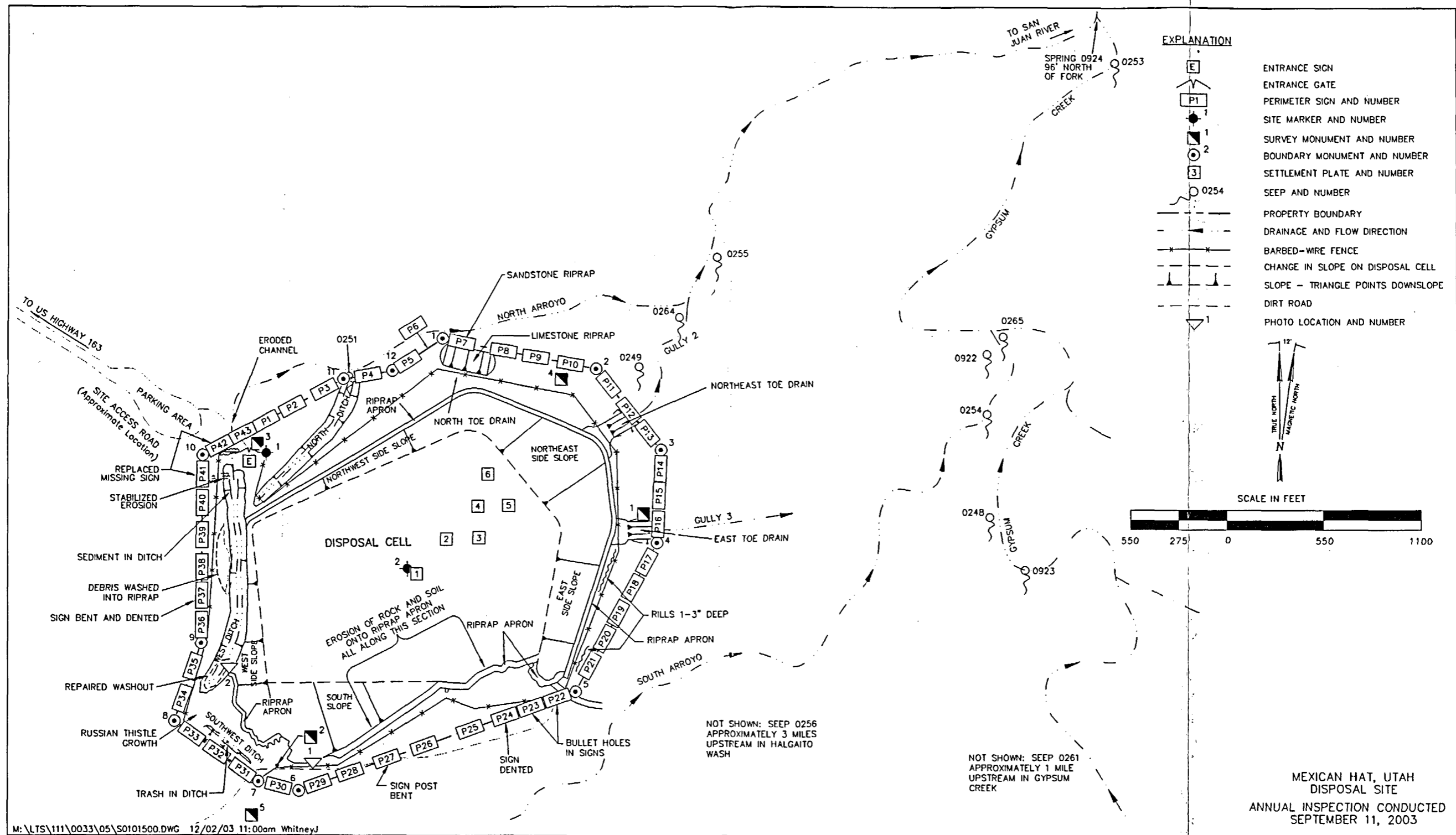


Figure 12-1. 2003 Annual Compliance Drawing for the Mexican Hat, Utah, Disposal Site



**Area Between the Disposal Cell and the Site Boundary**—Minor rills were present upstream of West Ditch and along the east side slope. Trash (primarily cans and bottles) had washed onto the site in the vicinity of West Ditch. Hill slopes around the disposal cell remain stable with only minor accumulations of loose material at the toe of the slopes.

Tumbleweed accumulation along the perimeter fence was insignificant. The only evidence of trespassing was the previously noted removal of perimeter signs.

**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. Nothing appeared to have changed except for evidence of storm runoff in the arroyos such as debris and localized sediment erosion and deposition.

### **12.3.2 Follow-Up or Contingency Inspections**

No follow-up or contingency inspections were required in 2003.

### **12.3.3 Routine Maintenance and Repairs**

All damages resulting from the 2002 storm were repaired prior to the 2003 inspection. Two missing perimeter signs were replaced during the 2003 inspection.

### **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 Long-Term Surveillance Plan.

12D Shallow ground water recharged by local precipitation is perched on top of the aquitard and emerges as seeps at several locations. Seep volume is low and does not constitute a water resource. The Long-Term Surveillance Plan requires annual monitoring of six seeps to assess disposal cell performance (seeps 0251 and 0264 along North Arroyo, and seeps 0248, 0254, 0261, and 0922 along Gypsum Creek). DOE monitored additional seeps on a quarterly basis since 1998 at the request of the Navajo Nation. Based on the seep assessment report sent to the Navajo Nation in April 2002, quarterly sampling was discontinued because there is no human health or ecological risk associated with exposure to the seep water. DOE sampled the six seeps in February 2003.

Sample results for three target analytes—nitrate, sulfate, and uranium—are shown on Figures 12-2 through 12-4. Maximum concentration limits of 44 milligrams per liter (mg/L) for nitrate (as NO<sub>3</sub>) and 0.044 mg/L for uranium are established by the U.S. Environmental Protection Agency in Table 1 to Subpart A of 40 CFR 192.

Concentrations of nitrate have been variable in the two North Arroyo seeps for the past several years and have declined substantially from greater than 2,000 mg/L to less than 500 mg/L in the past 3 years (Figure 12–2). Nitrate concentrations have remained relatively stable in the Gypsum Creek seeps for the past 5 years ranging from 150 to 400 mg/L. Concentrations in the background seep remain below 1 mg/L.

Sulfate concentrations similarly have decreased in the two North Arroyo seeps from greater than 6,000 mg/L to less than 4,000 mg/L since early 2000 (Figure 12–3). Concentrations in the Gypsum Creek seeps and the background seep have remained relatively steady between 3,000 and 4,000 mg/L during this time.

Concentrations of uranium in the North Arroyo seeps have decreased from greater than 2.0 mg/L to less than 1.0 mg/L since November 1999 (Figure 12–4). Concentrations remain relatively constant in the Gypsum Creek seeps at approximately 0.5 mg/L. Background levels at seep 0261 averaged 0.024 mg/L for the past several years.

Results of monitoring in 2003 show that concentrations of all target constituents are generally decreasing in the North Arroyo seeps and remaining relatively stable in the Gypsum Creek seeps. No trends of increase in concentrations are evident that would suggest degradation of the disposal cell cover.

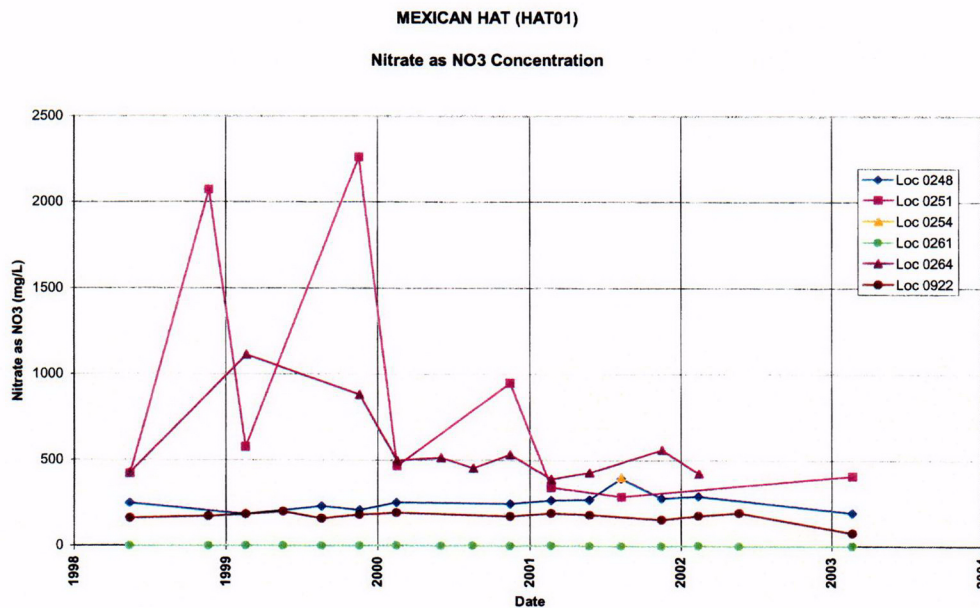


Figure 12–2. Time-Concentration Plots of Nitrate (as NO<sub>3</sub>) in Seep Water at the Mexican Hat, Utah, Disposal Site

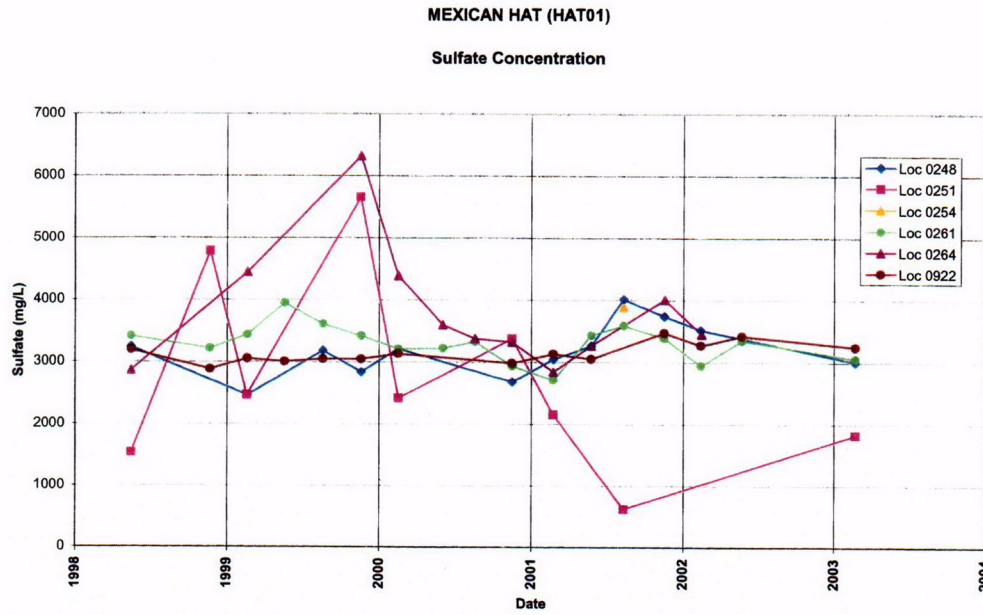


Figure 12-3. Time-Concentration Plots of Sulfate in Seep Water at the Mexican Hat, Utah, Disposal Site

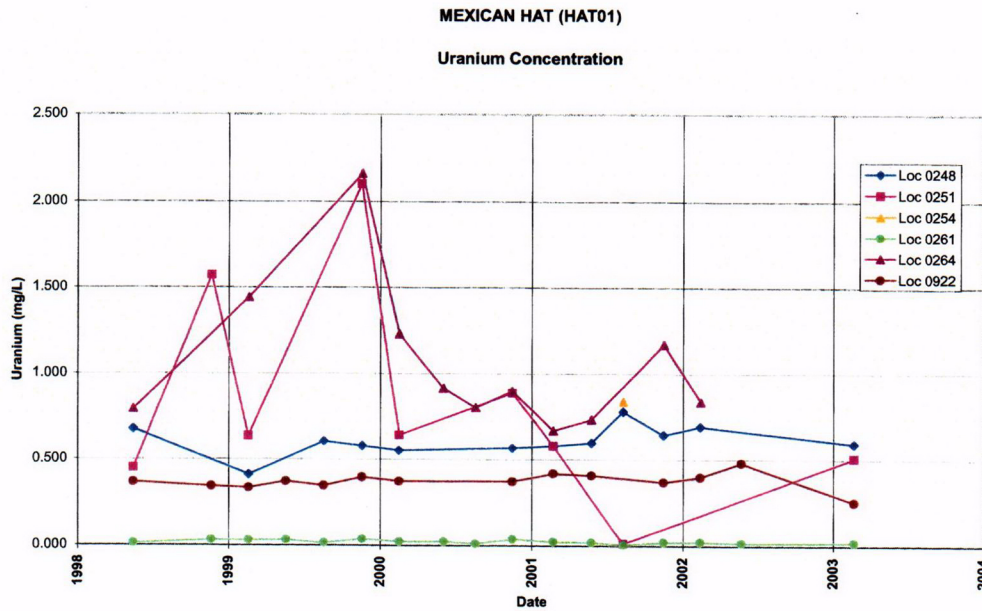


Figure 12-4. Time-Concentration Plots of Uranium in Seep Water at the Mexican Hat, Utah, Disposal Site

### 12.3.5 Corrective Action

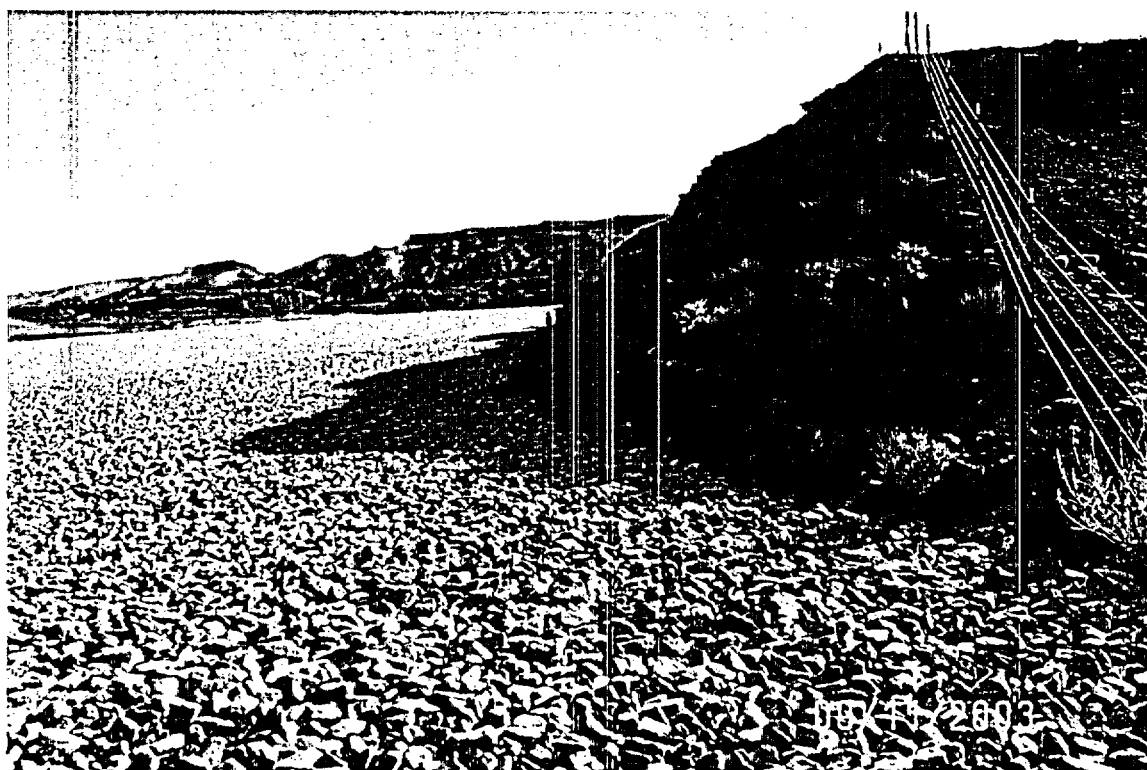
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2003.

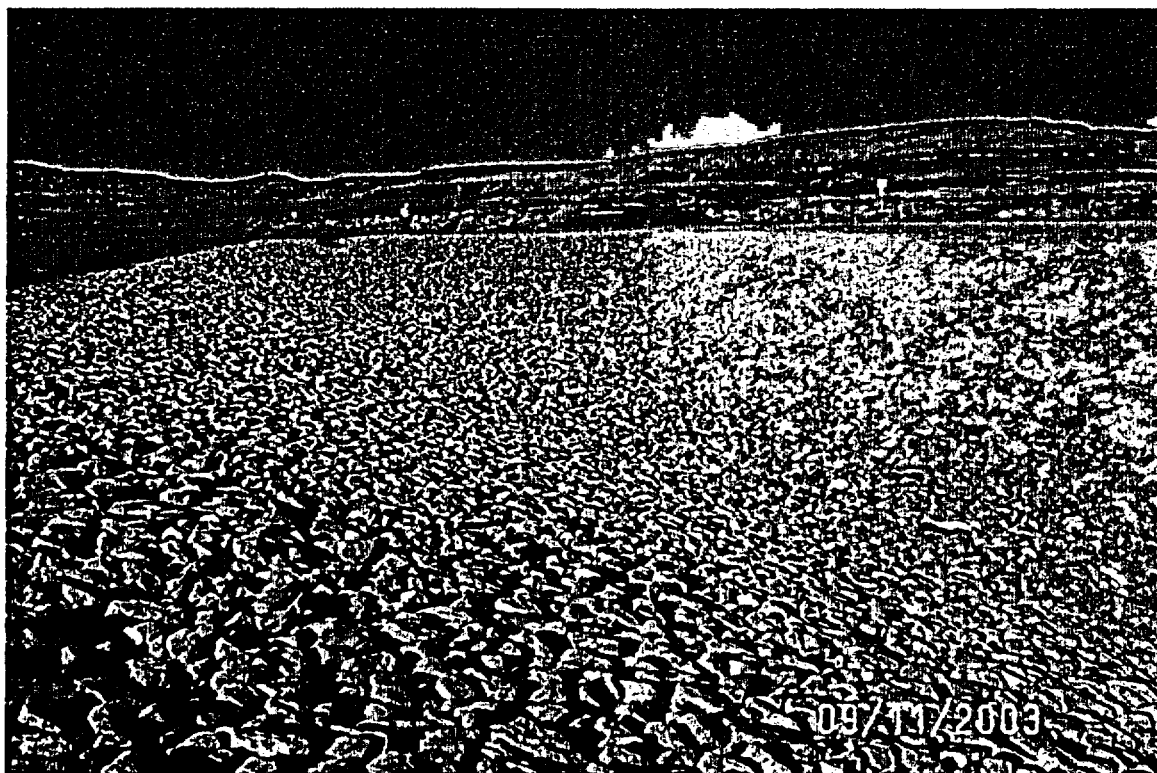
### 12.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL-1	60	Baseline location photograph of sloughing hill slope materials along the south apron.
PL-2	240	Repaired washout area at the head of West Ditch.



*HAT 9/2003. PL-1. Baseline location photograph of sloughing hill slope materials along the south apron.*



*HAT 9/2003. PL-2. Repaired washout area at the head of West Ditch.*

End of current section

## 13.0 Naturita, Colorado, Disposal Site

### 13.1 Compliance Summary

The Naturita Disposal Site, inspected on July 10, 2003, was in excellent condition. Global positioning system (GPS) equipment was used to determine the coordinates of several incorrectly mapped site surveillance features. Noxious weeds persist at the site and require ongoing control. No requirement for a follow-up or contingency 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 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 the DOE office at Grand Junction 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	Section 13.3.1
Follow-up or Contingency Inspections	Section 3.4	Section 13.3.2
Routine Maintenance and Repairs	Section 4.0	Section 13.3.3
Ground Water Monitoring	Section 2.6.2	Section 13.3.4
Corrective Action	Section 5.0	Section 13.3.5

### 13.3 Compliance Review

#### 13.3.1 Annual Inspection and Report

The site, located west of the former community of Uravan, Colorado, was inspected on July 10, 2003. 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 site entrance gate is gained from Montrose County Road EE22. The graveled county road was in good condition.

A barbed wire stock fence surrounds the site. The entrance gate is a pair of tubular metal gates suspended from galvanized steel gateposts. A chain with a padlock secures the two gates together. Two other metal gates allow access to monitor wells adjacent to the disposal cell on the west. The fence and all gates were in excellent condition.

The site has 25 perimeter signs and one entrance sign. Perimeter signs are on galvanized steel posts approximately 5 feet inside the perimeter fence. One sign (P2) has bullet holes but was legible. The other signs were in excellent condition. Several perimeter signs on the west side of the site were incorrectly positioned on the inspection drawing and their actual coordinates were determined using GPS equipment; the site map was updated and Figure 13-1 shows the correct locations.

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

The site property boundary has 17 corners, which are marked by boundary monuments or survey monuments. Three survey monuments (SM-3, SM-4, and SM-11) are used in lieu of boundary monuments. Survey monuments were installed during site construction for survey control; boundary monuments were installed after completion of construction. All boundary and survey monuments were undisturbed and in good condition. The boundary monuments on the west side of the site were incorrectly positioned on the inspection drawing and their actual coordinates were determined using GPS equipment; the locations shown on Figure 13-1 are correct.

**Monitor Wells**—The ground water monitoring network has five wells. All wells were locked and in excellent 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 (including the site perimeter); and (5) the outlying area.

**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 showed no signs of degradation and no vegetation was evident. No evidence of subsidence, differential settlement, slumping, or other modifying process was noted.

**Toe Drains and Outlets**—Two riprap-filled toe drains collect water from the cell side slopes and divert it to the southeast. The toe drain on the western side of the cell exits through a channel quarried through the wall of the Burbank Pit and into a deep canyon leading to the San Miguel River. Some sediment has accumulated in the upper end of the western toe drain. The eastern toe drain exits through the adjacent UMETCO UMRCA Title II disposal site and crosses beneath County Road EE22 through five culverts. Some erosion of loose material has occurred in the toe drain outlets, but the underlying sandstone bedrock (PL-1) limits further erosion. Patches of noxious weeds (halogeton and Russian knapweed) were found adjacent to the toe drain outlets; the weeds will be sprayed with herbicide in 2004.



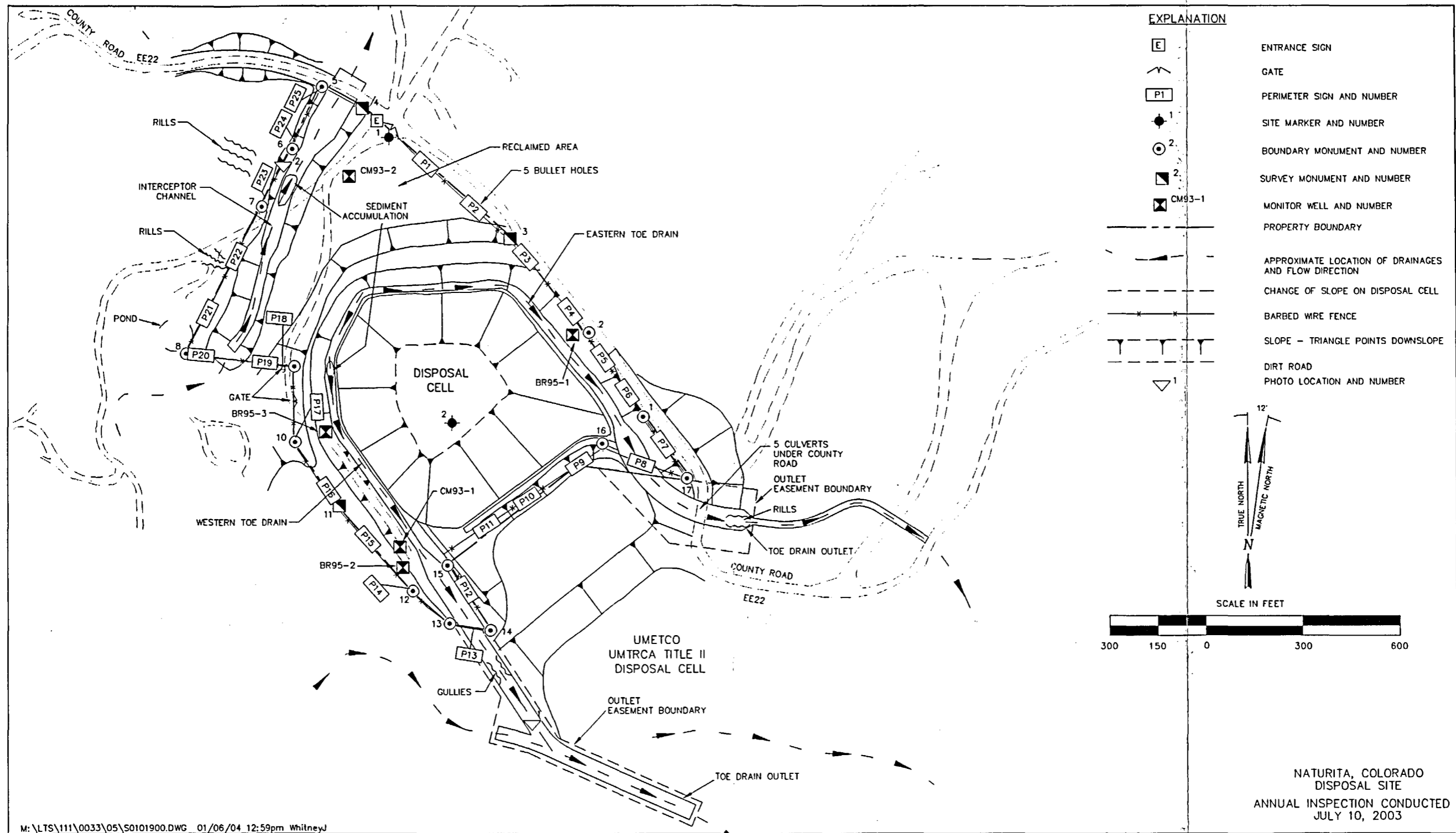


Figure 13-1. 2003 Annual Compliance Drawing for the Naturita, Colorado, Disposal Site

13A The U.S. Bureau of Land Management right-of-way permits for the toe drain outlets (the drains extend beyond the property boundary), originally set to expire in 2004, were modified as perpetual easements in 2003. The surveyed easement boundaries are shown on Figure 13-1.

**Interceptor Channel**—A riprap-armored interceptor channel, northwest of the disposal cell, diverts storm water and snowmelt run-on to the east across County Road EE22. Some erosion has occurred outside the property uphill from perimeter sign P23 resulting in deposition of sediment in the channel (PL-2). Otherwise, the channel was in excellent condition and the accumulated sediment does not impair the function of the channel. No culvert was installed where the channel crosses the road, so the road could be damaged when storm water exits the channel. Halogeton was observed near the upstream end of the channel and will be sprayed with herbicide in 2004.

**Reclaimed Areas**—The disturbed area north of the disposal cell and south of the interceptor channel was seeded at construction completion. Vegetation cover consists of grasses, shrubs, and annual weeds. A storm water discharge permit, which addressed this area and the restored Club Mesa borrow area to the north, 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; these activities did not impact the disposal site. Minor erosion has occurred in an area uphill from perimeter sign P23 due to runoff from areas disturbed by UMETCO activities; this area will continue to be monitored.

### 13.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 13.3.3 Routine Maintenance and Repairs

No maintenance or repairs were required in 2003.

### 13.3.4 Ground Water Monitoring

13B **Monitor Wells**—DOE monitors ground water at the site to demonstrate the initial performance of the disposal cell. The compliance strategy is to meet 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 Formation) downgradient from the disposal cell. The Wingate Formation lies approximately 600 feet beneath the disposal cell and is hydrologically isolated from the surface by unsaturated sandstone and relatively impermeable shale layers of the Salt Wash Member of the Morrison Formation and the Summerville Formation, respectively.

Best management practice monitoring will be 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 into this zone. 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. Indicator analytes are arsenic, molybdenum, and uranium.

Monitor wells are to be sampled every other year after licensing of the site (1999). Because the wells were sampled in 2002, no sampling was performed in 2003. The need for continued monitoring will be evaluated after the next sampling event in 2004.

### 13.3.5 Corrective Action

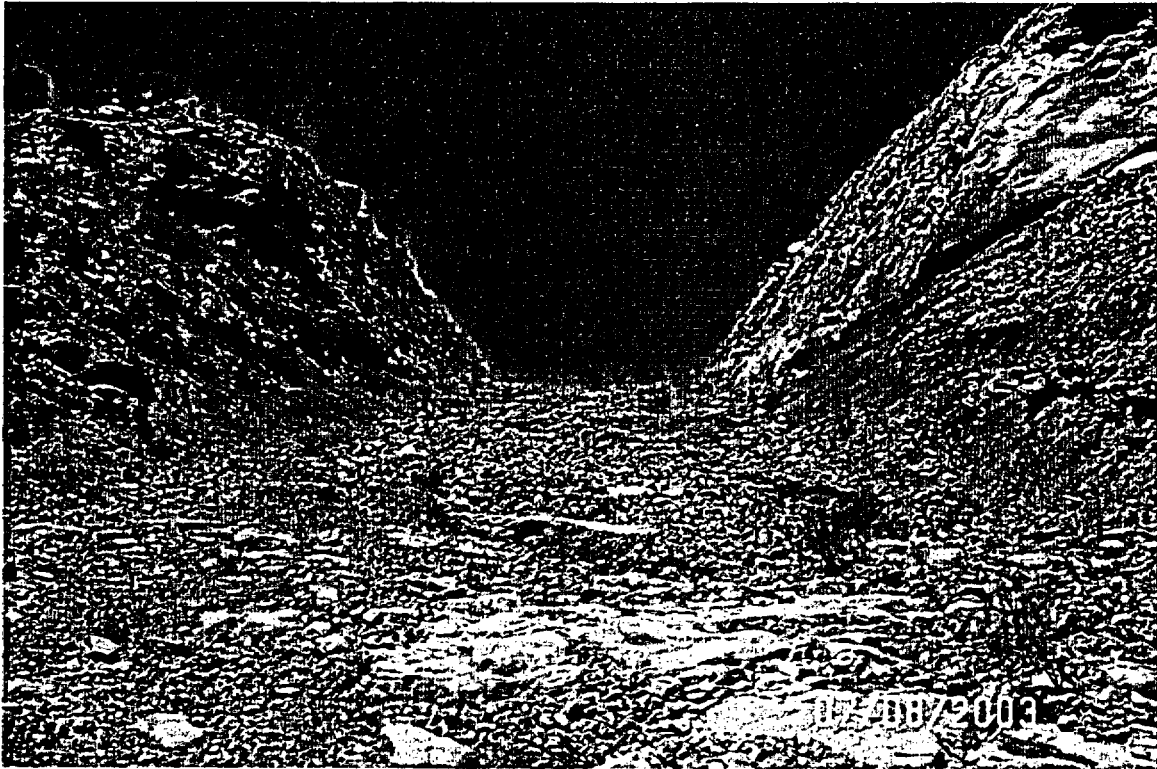
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2003.

### 13.3.6 Photographs

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

Photograph Location Number	Azimuth	Description of Photograph
PL-1	325	Erosion in the western toe drain outlet channel.
PL-2	145	Sediment accumulation in the interceptor channel.



*NAT 07/2003. PL-1. Erosion in the western toe drain outlet channel.*



*NAT 07/2003. PL-2. Sediment accumulation in the interceptor channel.*

End of current section

## 14.0 Rifle, Colorado, Disposal Site

### 14.1 Compliance Summary

The Rifle Disposal Site was inspected on August 7, 2003, and was in good condition. Trespassing, though reduced from previous years, continues to occur as indicated by damage to the access gate and damaged and missing signs. The access gate was repaired and reinforced, the entrance sign was replaced, and damaged and missing perimeter signs were replaced. Vegetation in disturbed areas continues to be stressed due to local drought conditions, and a 6-acre reclaimed area south of the site has not successfully revegetated with desirable vegetation. The water level elevation in the cell is being lowered as required by the Long-Term Surveillance Plan and, although currently is at an acceptable elevation, continued pumping is required to maintain that elevation. 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 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 14-1.

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

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

### 14.3 Compliance Review

#### 14.3.1 Annual Inspection and Report

The site, located north of Rifle, Colorado, was inspected on August 7, 2003. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 14-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

##### 14.3.1.1 Specific Site Surveillance Features

**Access Road, Gates, Fence, and Signs**—The site is reached by driving north on a gravel road from State Highway 13. In 2002, a steel fence and swinging gate were installed where the access road passes through a road cut to limit access to the site and prevent vandalism to the cell dewatering pumping system and evaporation pond. The gate was locked and operable, but it had been rammed and damaged by a vehicle (PL-1). In fall 2003, the gate was straightened and reinforced.

14A

The site entrance gate consists of a pair of tubular metal gates hinged to galvanized steel posts. A chain and padlock secures the two gates. The gate was locked and in excellent condition.

14B A conventional barbed wire stock fence is situated about half way between the southern edge of the toe ditch and the southern boundary of the site. 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. Bent fence posts near perimeter sign P7 were straightened.

14C The entrance sign was illegible due to damage from a shotgun blast and was replaced. Perimeter signs P5 and P10 were damaged by bullets and signs P9 and P11 were missing; these four perimeter signs were replaced. One other sign (P19) has bullet holes but was legible; all other signs were in excellent condition. Damaged and missing signs indicate continued trespassing and vandalism on the site but not to the degree that had been occurring prior to installation of the access road gate.

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

There are three survey monuments and 15 boundary monuments at this site. Boundary monuments are set at corners along an irregular site boundary. The site boundary has 20 corners; however, monuments were not set at 5 of the corners because of the rough terrain. Consequently, boundary monument locations BM-8, BM-9, BM-13, BM-17, and BM-20 were only marked with wooden lath, and are not included as part of the annual inspection. All survey and boundary monuments that were inspected were in good condition. Boundary monuments not visited during the 2002 inspection were checked during the 2003 inspection. Three boundary monuments were not visited during the 2003 inspection but will be checked during the next inspection.

**Standpipes**—The three standpipes, MW-01, MW-02, and MW-03, are located on the south sideslope of the disposal cell. They were undisturbed and in excellent condition. Dataloggers are installed in MW-02 and MW-03 to measure water level fluctuations. There is no data logger in MW-01 because it is too shallow and usually dry. The bottom of MW-01, at elevation 6,021.4 feet, is above the 6,016-foot water level elevation that constitutes the action level for pumping. Dataloggers in standpipes MW-02 and MW-03 are downloaded every 30 days.

A solar-powered pump was installed in MW-02 in 2001 to lower the water level in the cell as specified by the Long-Term Surveillance Plan. The solar collector was in excellent condition at the time of the inspection, and the pump was operating at a rate of 2.9 gallons per minute.

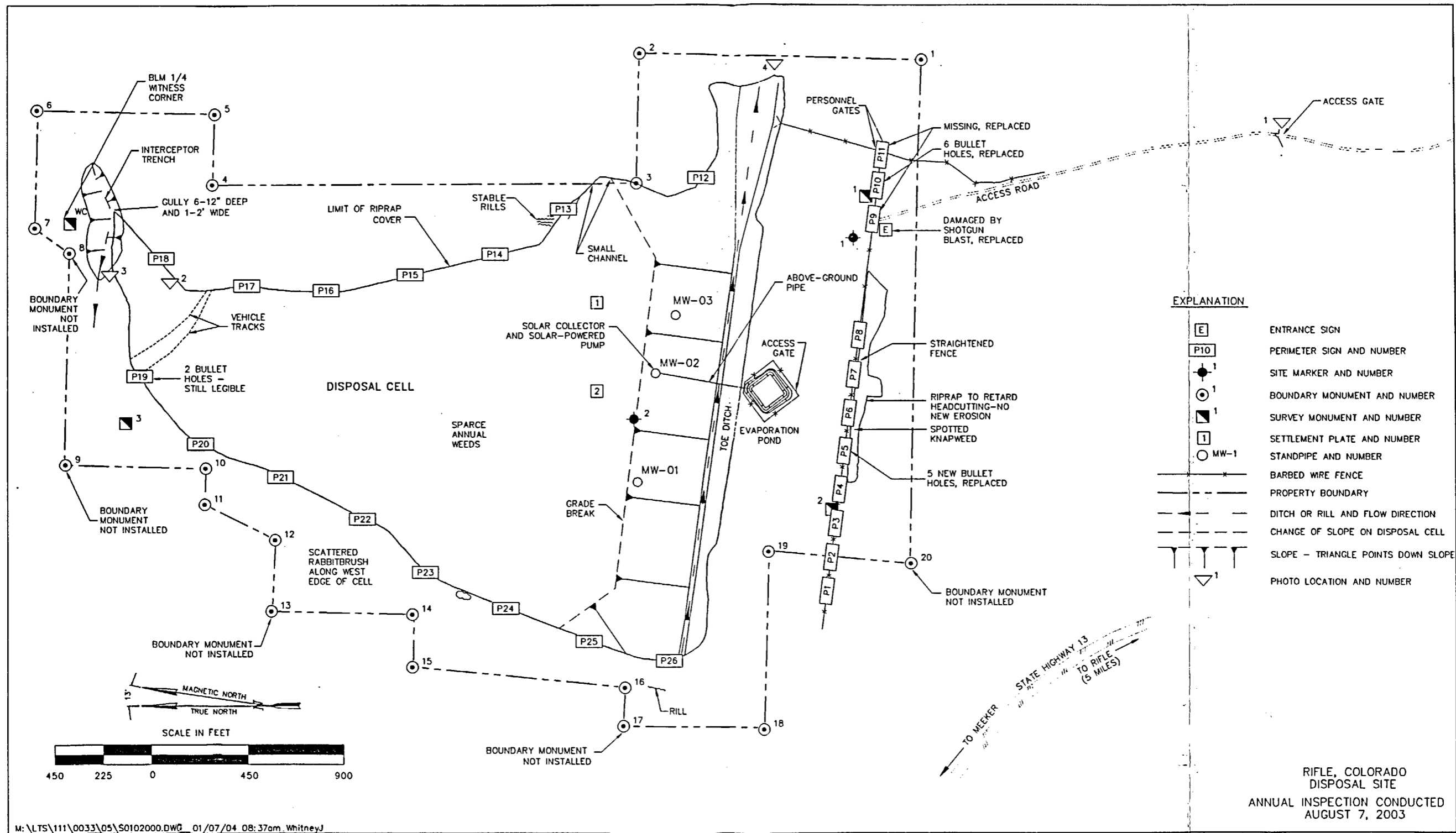


Figure 14-1. 2003 Annual Compliance Drawing for the Rifle, Colorado, Disposal Site



**Evaporation Pond**—An evaporation pond was constructed in 2001 to receive water pumped from standpipe MW-02. The above-ground polyethylene pipeline that conveys the water from the standpipe to the pond was in good condition. The lined pond, its surrounding security fence, and the locked fence gate also were in good condition. The water level was well below the design capacity of the pond.

**Monitor Wells**—Ground water monitoring is not required at the Rifle disposal site. The reclaimed sites of nine decommissioned monitor wells were in good condition and further monitoring of the sites is unnecessary.

#### 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.

**Disposal Cell and Interceptor Trench**—Rock armor covering the 71-acre disposal cell was in excellent condition. No plant encroachment was observed on the cell top. Two lines were visible across the cell top between perimeter signs P17 and P19 (PL-2). They were caused by vehicles that had to cross the cell during the decommissioning of a monitor well near sign P17 in 2001. Though easily seen from vantage points east and west of the cell cover during the lighting conditions at the time of the inspection, the lines were difficult to see when walking on the cover at their locations. These minor disturbances do not impact the integrity of the rock armor or cell cover. No evidence of subsidence, differential settlement, or slumping was noted.

An interceptor trench, constructed upslope of the disposal cell to protect the cell from storm-water and snowmelt runoff, was in excellent condition (PL-3). The trench diverts water to the arroyo west of the site and was designed so erosion below the outfall of the trench would be halted by bedrock. Erosion currently is limited to the colluvial materials above the bedrock.

**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 not significant and is not impairing the function of toe ditch.

Minor erosion, anticipated in the design, has occurred in the channel at the outlet below the toe ditch (PL-4). 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 2002 inspection indicates that no new erosion had occurred.

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

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

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 the surface and has exposed some of the gravel bedding material. When compared with photos taken during the 2002 inspection, this location was unchanged. This erosional feature is not threatening the integrity of the disposal cell at this time, but DOE will continue to monitor it during subsequent site inspections.

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 Several small and isolated infestations of noxious weeds (Canada thistle, spotted knapweed, and halogeton) were identified around the edges of the cell and toe ditch outlet. These weeds were sprayed with herbicide in September 2003. The patch of Canada thistle had been sprayed in June 2003 but some new plants were growing in the same location.

**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 the site or the long-term performance of the disposal cell.

14E The area directly south of the disposal cell on U.S. Bureau of Land Management (BLM)-managed land was inspected. During construction of the cell, DOE was granted a Temporary Withdrawal Permit by BLM to use this area for topsoil storage. This area was seeded at the same time as the disturbed areas adjacent to the cell on DOE-owned land. Approximately 6 acres of the area did not successfully revegetate and, late in 1999, BLM requested that DOE reseed this portion of the site. DOE disked and reseeded the 6 acres in October 2000. Due to drought conditions, desirable plant species were dormant or sparse during the 2002 and 2003 inspections, and the area currently is dominated by undesirable species consisting primarily of cheat grass and peppergrass. It is unlikely that BLM will close the Temporary Withdrawal permit until revegetation of this area with desirable species is successful.

### 14.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 14.3.3 Routine Maintenance and Repairs

In 2003, DOE repaired the access road gate, replaced damaged and missing signs, straightened bent fence posts, and sprayed noxious weeds with herbicide.

### 14.3.4 Ground Water Monitoring

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

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

14F Average water levels (as calculated using linear regression) in MW-02 approached the action level in August 2001. DOE subsequently installed a pump in this standpipe, constructed an evaporation pond, and began pumping from the standpipe to the pond. Since then, a total of approximately 830,000 gallons of water have been extracted from the disposal cell, and water levels have slowly decreased as shown by datalogger measurements (Figure 14-2).

The discharge rate from the solar-powered pump currently averages less than 3 gallons per minute during periods of operation. The oscillation in the datalogger trace for MW-02 in Figure 14-2 represents drawdown in the standpipe during pumping, and recovery of the water level when pumping ceases. The normal recording interval for the dataloggers is every 4 hours. However, to better track activities in the extraction well (MW-02), the interval was changed to every 5 minutes in July 2003. Gaps in the plot for MW-02 reflect periods of datalogger shutdown.

Because of decreased efficiency in the original pump, a new pump was installed in MW-02 in April 2003. The pump is set to automatically shut off at a certain depth, and remain off for a period of time to allow for recharge of water to the standpipe. The construction of MW-02 limits pumping to about half the design extraction rate, so a pump will be installed in MW-03 in 2004 to increase water extraction to the design rate of 5 gallons per minute.

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. DOE will monitor water levels with dataloggers and will adjust the frequency of downloading and manual water level checks on the basis of water level trends.

### 14.3.5 Corrective Action

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

The Long-Term Surveillance Plan establishes that corrective action will be taken if the water level in the disposal cell reaches 6016 feet in elevation. Corrective action was initiated late in 2001 with the installation of the evaporation pond and dewatering of the cell. This action has lowered the water level to an acceptable elevation and prevents water from overtopping the disposal cell liner. Dewatering of the cell continues.

### 14.3.6 Photographs

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

<b>Photograph Location Number</b>	<b>Azimuth</b>	<b>Description</b>
PL-1	260	Bent access road gate (subsequently repaired).
PL-2	220	Vehicle tracks across the disposal cell top.
PL-3	75	Interceptor trench at the north end of the disposal cell.
PL-4	295	Stabilized erosion at the toe ditch outlet.

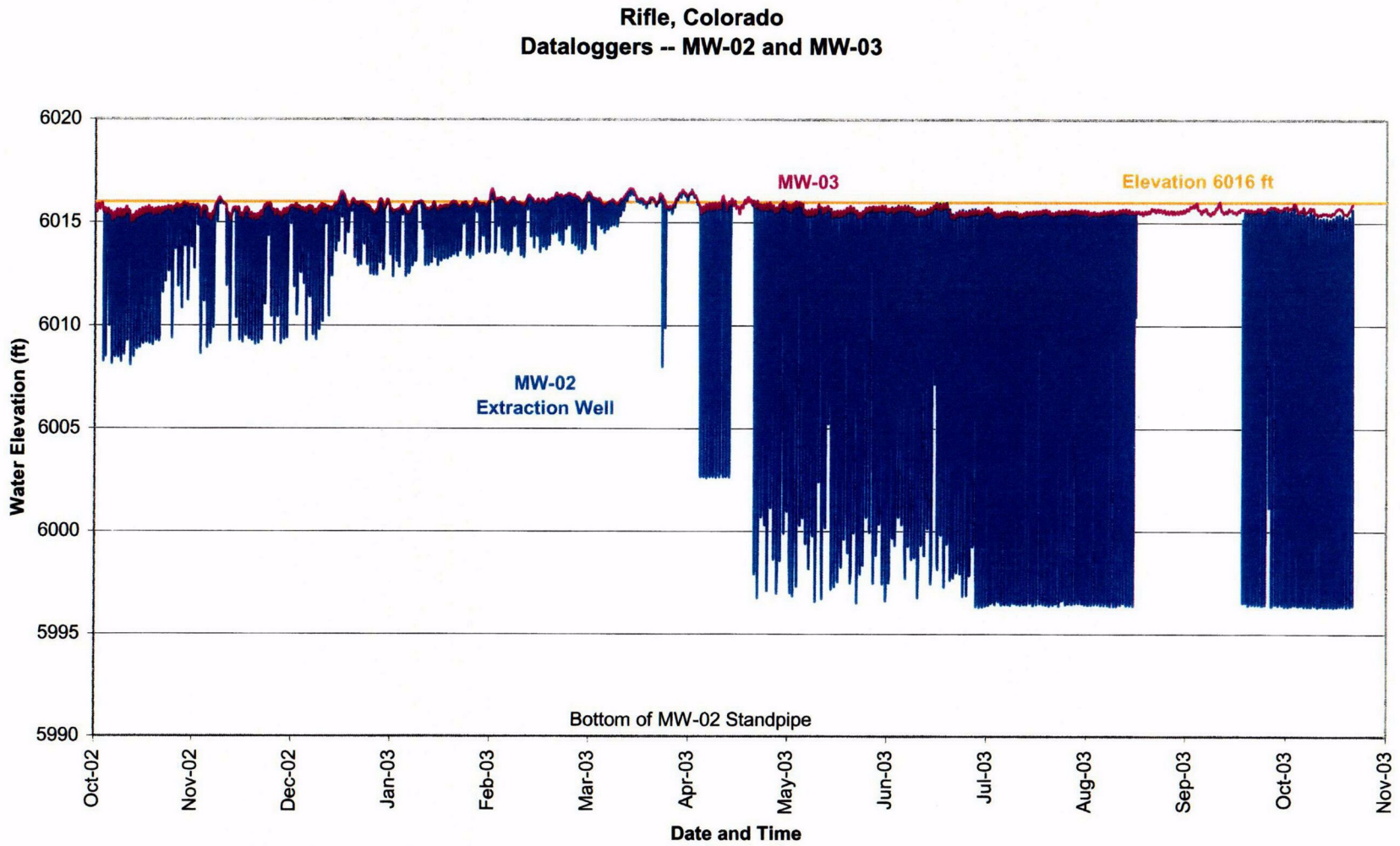
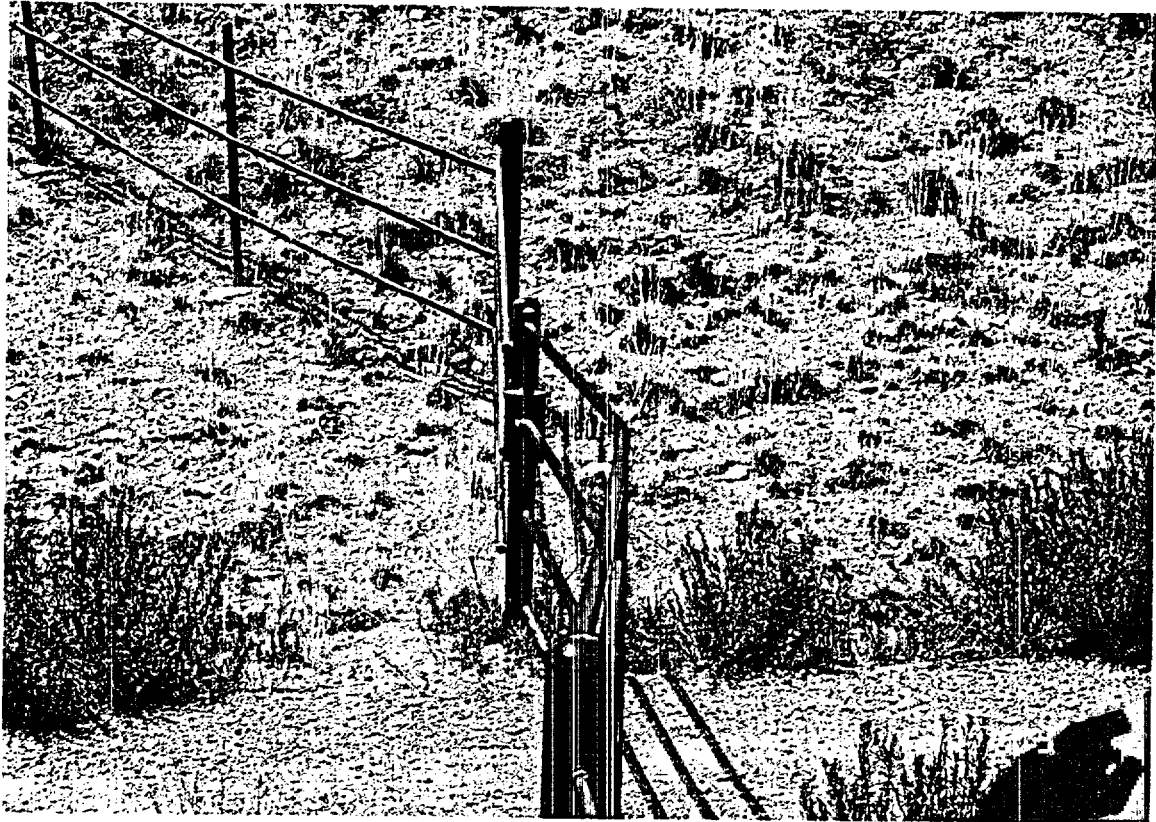


Figure 14-2. Water Levels in Standpipes MW-02 and MW-03 at the Rifle, Colorado, Disposal Site



*RFL 8/2003. PL-1. Bent access road gate (subsequently repaired).*



*RFL 8/2003. PL-2. Vehicle tracks across the disposal cell top.*



*RFL 8/2003. PL-3. Interceptor trench at the north end of the disposal cell.*



*RFL 8/2003. PL-4. Stabilized erosion at the toe ditch outlet.*

End of current section



## 15.0 Salt Lake City, Utah, Disposal Site

### 15.1 Compliance Summary

The Salt Lake City Disposal Site, inspected on June 23, 2003, was in good condition. Because of continuing activities on the adjacent Envirocare of Utah, Inc., (Envirocare) property, access to the disposal site is impeded. Due to restricted areas around the site, inspectors must be escorted by Envirocare personnel to gain access to the site. At the request of the inspectors, Envirocare repaired a section of damaged fence along the south boundary of the site. Ground water monitoring is not required at this site. There was no requirement for a follow-up or contingency inspection.

### 15.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Salt Lake City, Utah, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 15-1.

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

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

### 15.3 Compliance Review

#### 15.3.1 Annual Inspection and Report

The site, located 85 miles west of Salt Lake City, Utah, was inspected on June 23, 2003. 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 Envirocare's haul road around DOE property is designated as a Restricted Area. After signing a Radiological Work Permit and acquiring an Envirocare escort, inspectors now access the site along a new route to the southwest corner of the property.

15B DOE's chain link security fence, set inside the property boundary by distances of 13 to 114 feet, was in good condition. Envirocare has a chain link fence on or just outside the site property boundary, and an additional fence on the other side of their haul road along the north and west sides of the site. A section of Envirocare fence along the south boundary was damaged and, at the request of the inspectors, subsequently was repaired by Envirocare (PL-1 and PL-2).

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

The entrance sign, located on the new entrance gate, was in excellent condition. All perimeter signs were present and in good condition except for sign P5 which is illegible. Perimeter sign P5 will be replaced in 2004.

**Site Markers and Monuments**—Both granite site markers were in excellent condition. All four boundary monuments were in good condition. Boundary monuments BM-3 and BM-4, noted during the 2002 inspection as buried by several feet of fill by Envirocare's site activities, had subsequently been uncovered by Envirocare (PL-3).

**Monitor Wells**—Ground water monitor wells are present within the site security fence, between the site security fence and the Envirocare property boundary fence, and on adjacent Envirocare property. All monitor wells on DOE property belong to Envirocare.

In late 2000, Envirocare informed DOE that all monitor wells on the DOE property were to be abandoned. However, none of the wells had been abandoned but were properly secured at the time of the inspection.

### 15.3.1.2 Transects

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

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

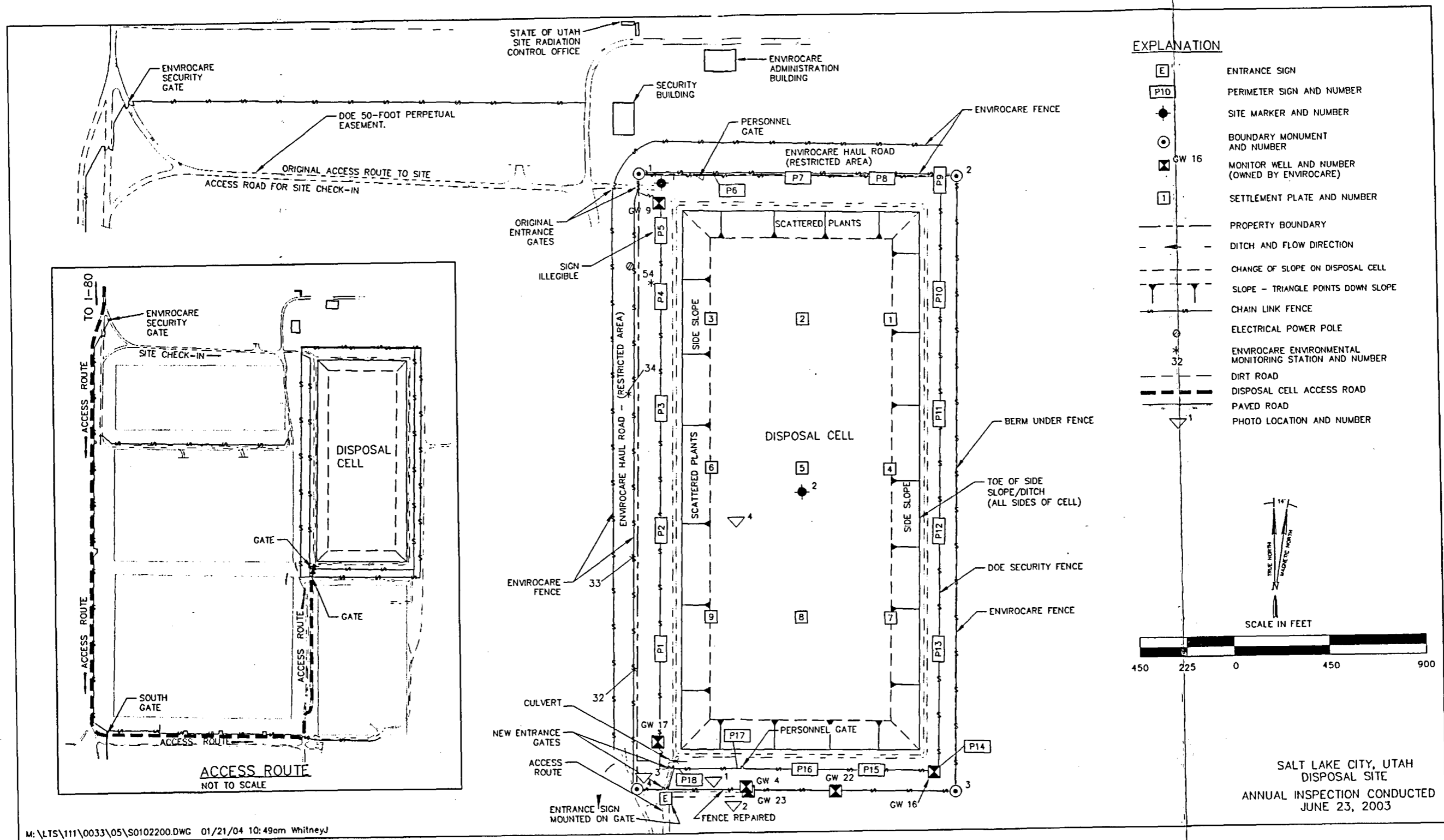


Figure 15-1. 2003 Annual Compliance Drawing for the Salt Lake (South Clive), Utah, Disposal Site

**Area Between the Disposal Cell and the Site Boundary**—No evidence of slumping, settling, erosion, or significant vegetation encroachment was seen in the area between the toe of the disposal cell and the site boundary.

**Outlying Area**—This transect extends from the Envirocare fence to 0.25 mile beyond the site boundary. Outside the site boundary are a variety of features and activities managed by Envirocare. On the east side of the site, incoming wastes are unloaded from rail cars and transferred to haul trucks. Disposal cells are in the process of being built or closed on the south and west sides of the site (PL-4). Directly to the south is a low-level radioactive waste disposal cell, and to the southwest is a waste disposal cell containing 11e.(2) material regulated under the Atomic Energy Act of 1954. With the exception of a corridor at the southwest corner of DOE's disposal site where the site access has been relocated, all areas surrounding DOE's property are restricted due to radiological hazards.

### 15.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 15.3.3 Routine Maintenance and Repairs

No maintenance was required in 2003. Envirocare repaired a section of their fence along the south property boundary.

### 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 Long-Term Surveillance Plan 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 2003.

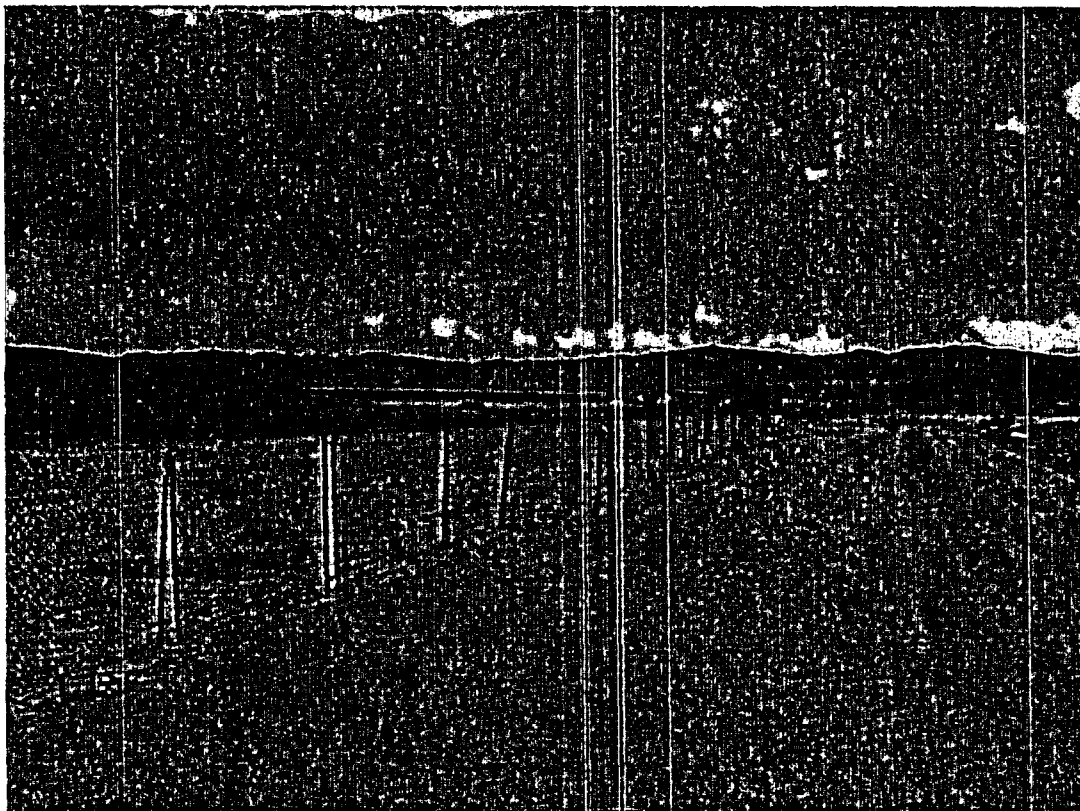
### 15.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL-1	120	Envirocare fence damage.
PL-2	80	Repaired Envirocare fence (photo provided by Envirocare).
PL-3	230	Boundary monument BM-4 uncovered by Envirocare.
PL-4	260	Envirocare Class A cell under construction west of the DOE disposal cell.



*SLC 6/2003. PL-1. Envirocare fence damage.*



*SLC 6/2003. PL-2. Repaired Envirocare fence (photo provided by Envirocare).*



*SLC 6/2003. PL-3. Boundary monument BM-4 uncovered by Envirocare.*



*SLC 6/2003. PL-4. Envirocare Class A cell under construction west of the DOE disposal cell.*

End of current section

## 16.0 Shiprock, New Mexico, Disposal Site

### 16.1 Compliance Summary

The Shiprock Disposal Site, inspected on June 18, 2003, was in good condition. Woody vegetation was removed from the cover, but vegetation encroachment continues on the riprap cover, side slopes, and diversion channels. Damage by runoff from storms in 2001 and 2002 was repaired in 2003. Repairs included reconstructing the outflow channel to its confluence with Bob Lee Wash, repairing the security fence, and replacing a boundary monument. Accumulations of weeds, trash, and windblown sand also were removed during 2003. No requirement for a follow-up or contingency inspection was identified.

### 16.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Shiprock, New Mexico, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 16-1.

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

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

### 16.3 Compliance Review

#### 16.3.1 Annual Inspection and Report

The site, located south of Shiprock, New Mexico, was inspected on June 18, 2003. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 16-1. Numbers in the left margin refer to items in the Executive Summary table.

##### 16.3.1.1 Specific Site Surveillance Features

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



16A The security fence along the site perimeter was in good condition; some posts are bent along the west side. A section of fence downstream of the outflow channel was damaged by runoff from a severe storm in September 2002. This section was repaired during winter 2003. Tumbleweeds and windblown trash accumulate along upwind portions of the perimeter fence and must be removed every 2 or 3 years to mitigate potential fire hazards associated with the weeds and to maintain site appearance. Accumulations of weeds and trash noted during the 2002 inspection were removed in May 2003, in addition to windblown sand accumulations along the southwest section of fence.

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 in good condition and locked.

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

**Site Markers and Monuments**—The two site markers were in good condition. Minor cracking in the concrete base of SMK-1 was sealed in May 2003.

16B Erosion resulting from the July 2001 storm washed away boundary monument BM-1. This boundary monument was replaced in a new location in February 2003. Boundary monuments BM-4 and BM-6 were buried with windblown sand and will be uncovered during the 2004 inspection. The other five boundary monuments were in good condition. The three survey monuments were in good condition.

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

### 16.3.1.2 Transects

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

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

16C 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 June 2001 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 in 2003. Several deep-rooted woody shrubs were found on the cell top and were cut and treated with herbicide (PL-1). The population of woody shrubs growing on the cell side slopes continues to increase. The DOE will continue to monitor and control vegetation growth to maintain the performance of the cell.

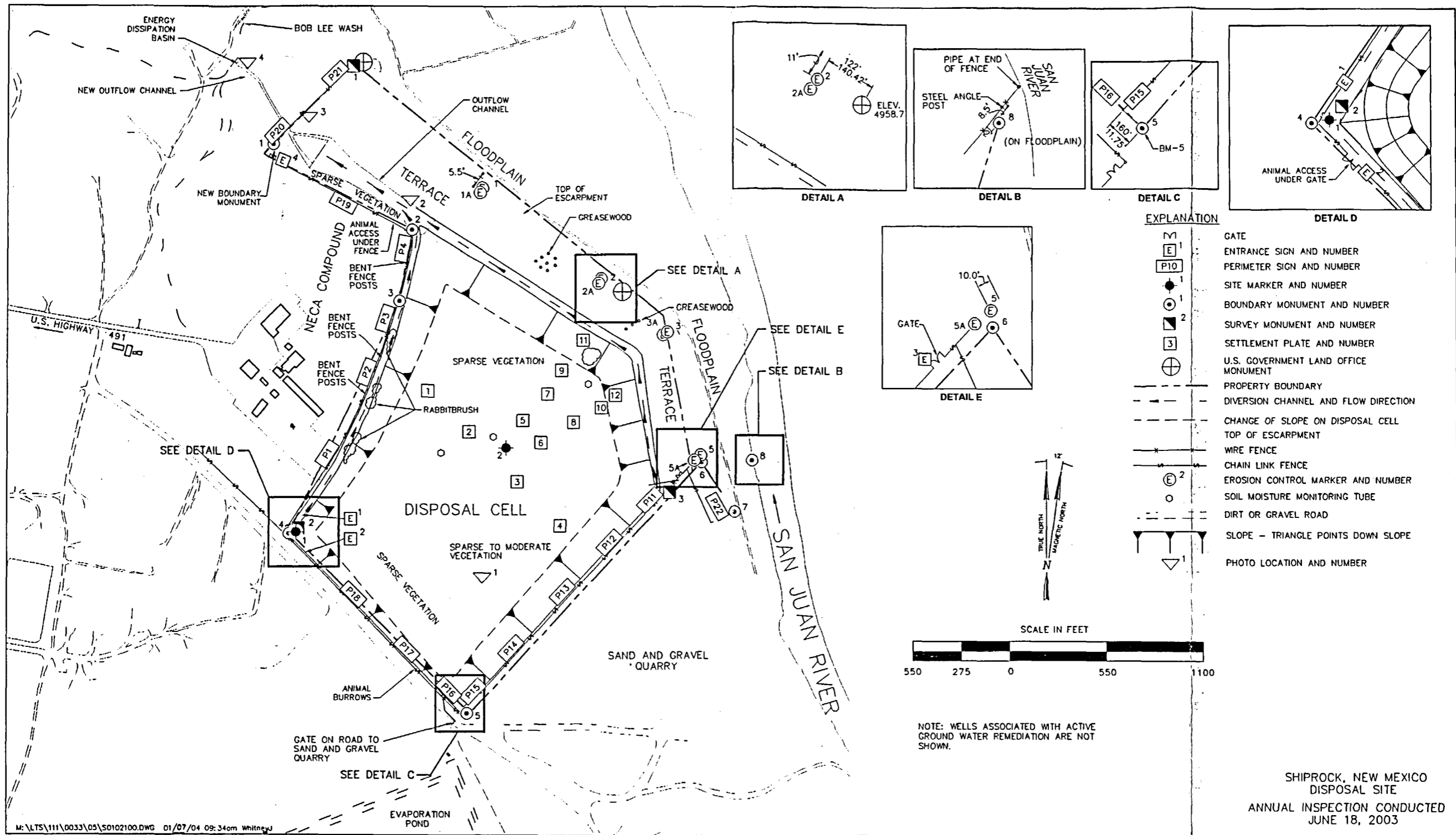


Figure 16-1. 2003 Annual Compliance Drawing for the Shiprock, New Mexico, Disposal Site

Diversion channels around the base of the disposal cell were in good condition. Site drainage is ultimately directed toward the outflow channel at the northwest corner of the site. Rock cover in the outflow channel was in good condition. Vegetation is increasing in the diversion and outflow channels (PL-2); however, the performance of the channels is not impaired.

16D Erosion damage downstream of the riprap-armored outflow channel was repaired in winter 2003. The outflow channel was extended to Bob Lee Wash and was lined with rock-filled gabions (PL-3). A gabion-lined energy dissipation basin was constructed at the confluence with Bob Lee Wash (PL-4). Additionally, the west side of the wash downstream of the outflow channel was reinforced with gabions to prevent erosion of an access road.

**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 and there was no evidence of erosion of the terrace or escarpment.

**Outlying Area**—A sand and gravel pit is located immediately southeast of the disposal cell. Gravel operations have had no apparent affect on disposal site security or integrity.

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 public road southwest of the disposal cell. A chain-link security fence encloses the area. Although the activities associated with the treatment of contaminated ground water at this site are not within the scope of the Long-Term Surveillance Plan, the pond will be monitored for general condition and security during future inspections. At the time of the 2003 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 2003.

### 16.3.3 Routine Maintenance and Repairs

In 2003, DOE reconstructed the outflow channel, repaired a damaged fence, replaced a missing boundary monument, removed deep-rooted plants from the cell top, and cleared windblown weeds, trash, and sand from fences.

### 16.3.4 Ground Water Monitoring

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

### 16.3.5 Corrective Action

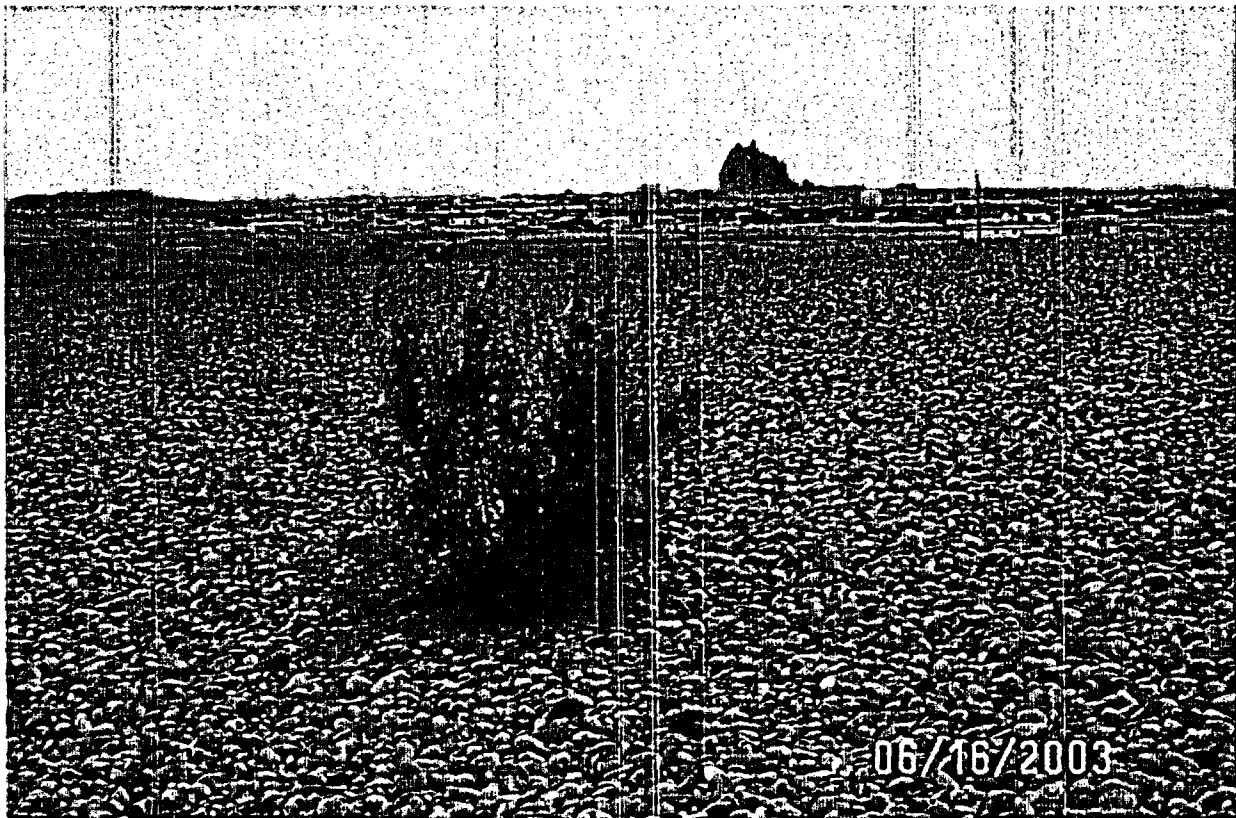
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2003.

### 16.3.6 Photographs

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

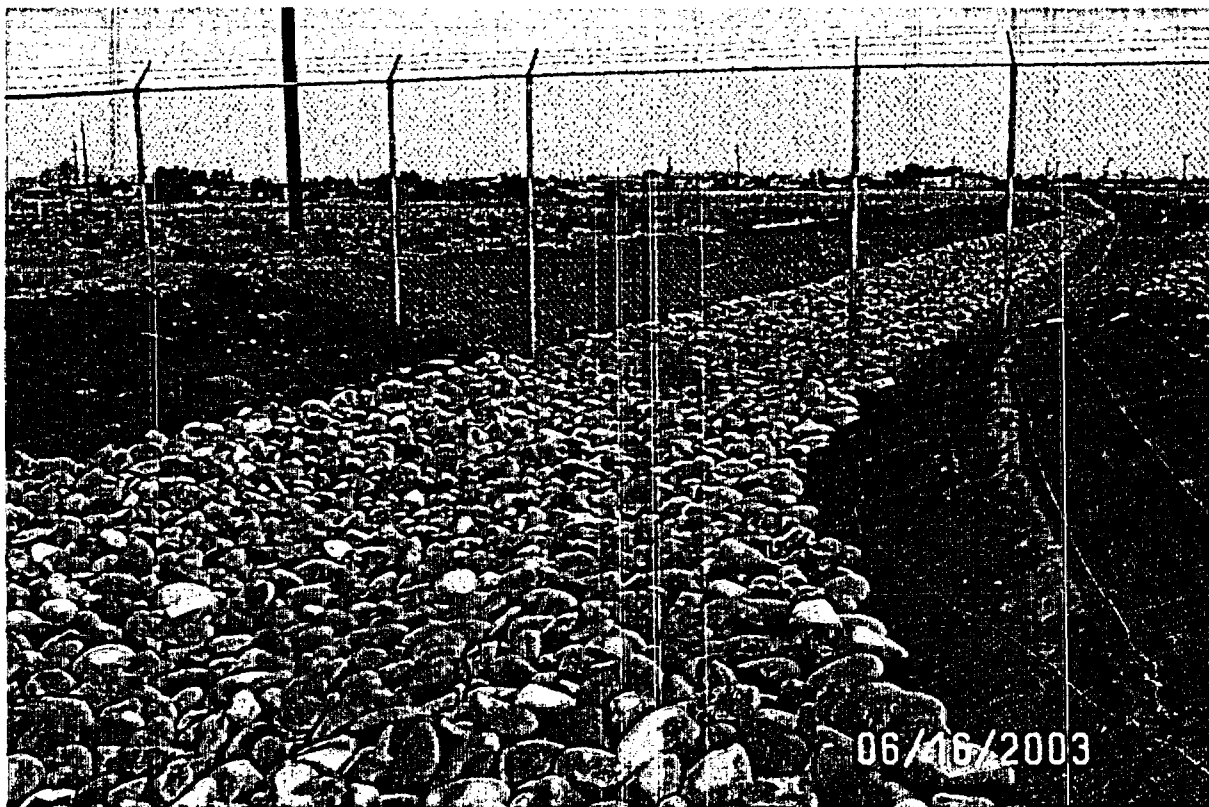
Photograph Location Number	Azimuth	Description
PL-1	210	Tamarisk on the cell top before being cut and treated with herbicide.
PL-2	300	Vegetation in the outflow channel.
PL-3	280	Reconstructed outflow channel where it exits the property.
PL-4	220	Energy dissipation basin at the mouth of the outflow channel in Bob Lee Wash.



SHP 6/2003. PL-1. Tamarisk on the cell top before being cut and treated with herbicide.



*SHP 6/2003. PL-2. Vegetation in the outflow channel.*



*SHP 6/2003. PL-3. Reconstructed outflow channel where it exits the property.*



*SHP 6/2003. PL-4. Energy dissipation basin at the mouth of the outflow channel in 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 July 10, 2003, was in excellent condition. A damaged perimeter sign was replaced. Vegetation in the reclaimed spoils pile area west of the site is sparse due to continued drought conditions. Several tamarisk plants were cut and treated with herbicide at the time of the inspection. Infestations of noxious weeds on site will continue to be treated with herbicide. Runoff from a severe rainstorm in fall 2003 washed out the site entrance road; repairs will be completed in 2004. No need for a follow-up or contingency 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 17-1.

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

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

### 17.3 Compliance Review

#### 17.3.1 Annual Inspection and Report

The site, northeast of Slick Rock, Colorado, was inspected on July 10, 2003. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 17-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

### 17.3.1.1 Specific Site Surveillance Features

17A **Access Road, Fence, Gate, and Signs**—Site access is by an improved gravel county road. The road was in excellent condition at the time of the inspection. A severe rainstorm in fall 2003 washed out the site entrance road where it crosses the county road borrow ditch. Downstream of the entrance road the borrow ditch was filled with sediment. DOE will repair the entrance road and regrade the borrow ditch in 2004.

The wire entrance gate was 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. No damages to the fence or gate were observed.

17B The entrance sign inside the stock fence just east of the entrance gate was in excellent condition. Thirty-two perimeter signs, attached to steel posts set in concrete, are spaced at approximately 200-foot intervals around the site. Perimeter sign P30 was heavily damaged by bullet holes and was replaced. Two other signs have slight damage but are legible. All other signs were in excellent condition.

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

17C **Monitor Wells**—Ground water monitoring is not required at the disposal site. All monitor wells (7) and standpipes (2) were decommissioned in 2001 and 2002, respectively. In fall 2002, after removal of the standpipes from the cell, DOE initiated a 1-year period of radon monitoring at the site to ensure that the radon barrier was not compromised. Preliminary results based on measurements through three quarters of the year confirm that the radon levels at the cell were indistinguishable from background levels.

### 17.3.1.2 Transects

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

**Disposal Cell**—The disposal cell, side slopes, key trench, and apron are armored with rounded cobble- and pebble-sized rock. The rock was in excellent condition. No evidence of settling, slumping, or erosion was observed on any of the rock-covered surfaces of the disposal cell.

**Area Between the Disposal Cell and the Site Boundary**—The area around the disposal cell includes a retention pond and 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 was dry at the time of the inspection, and outflow channel were in excellent condition.

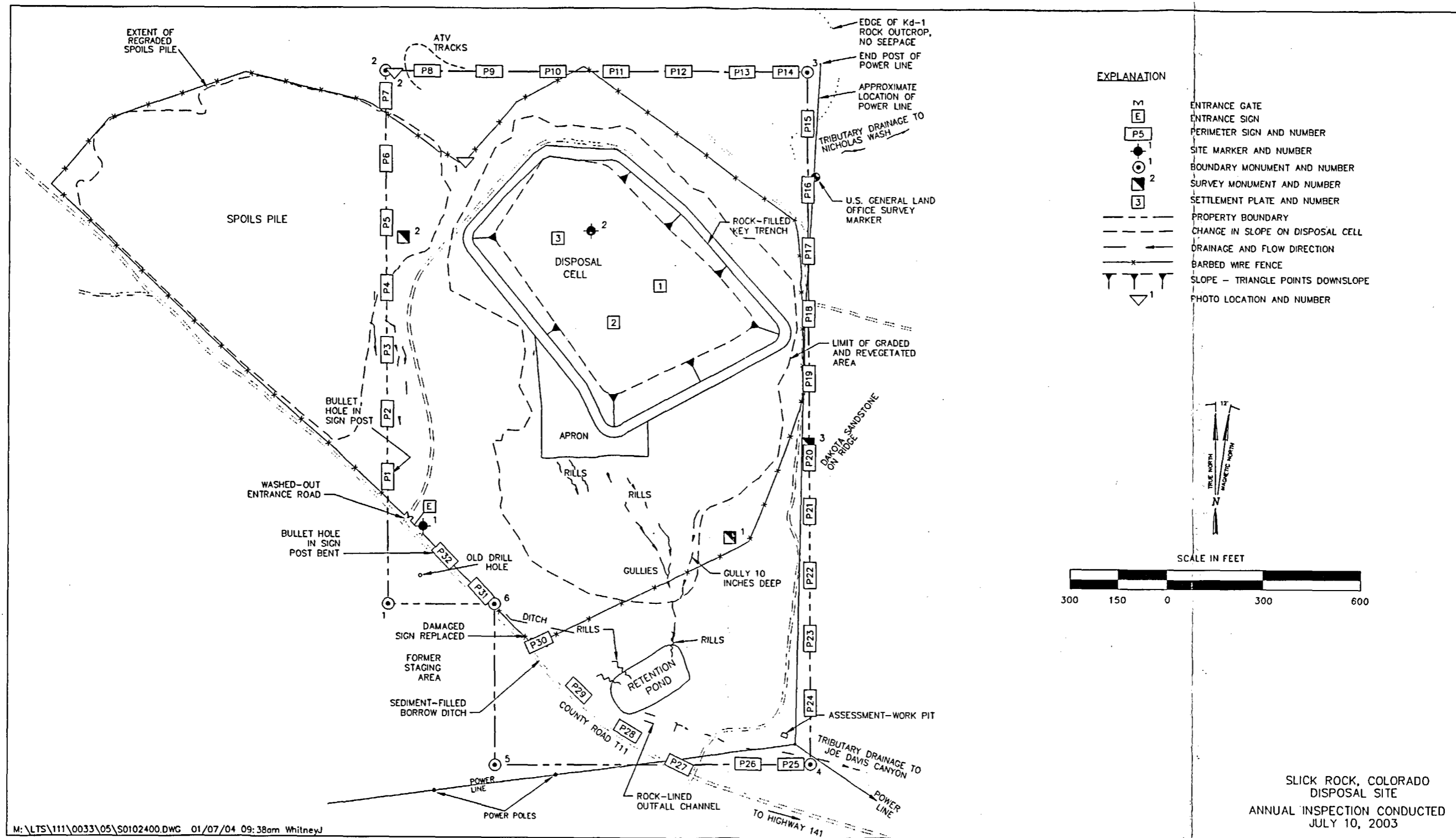


Figure 17-1. 2003 Annual Compliance Drawing for the Slick Rock, Colorado, Disposal Site

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

Some rills and gullies are present along the east side of the property and between the cell apron and retention pond. These erosional features are stabilizing but will continue to be monitored.

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 if the water level in the cell reached a critical elevation (the bottom of the Kd-1 sandstone unit). The water level continued to drop below the critical elevation and the standpipes were removed in accordance with the LTSP. There was no evidence of moist soil, mineralization, or phreatophyte vegetation at the outcrop that would indicate that drainage has occurred through this unit. 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.

17D A few small tamarisk plants were found south of the cell and in the retention pond, and all were cut and treated with herbicide. The noxious weeds Russian knapweed and halogeton also are present at the site and have been sprayed on several occasions. Infestations of these weeds were found at numerous locations on the site during the 2003 inspection. Herbicide treatments by the county weed control officer will continue.

**Outlying Area**—During construction of the disposal cell, material excavated from the site was placed in a 60-foot-high spoils pile on the west side of the site. A right-of-way permit, granted to DOE by the U.S. Bureau of Land Management (BLM), encompasses the spoils pile and the former staging area adjacent to the site entrance. The permit allowed DOE temporary access to cross and use BLM-managed land for construction activities. The permit requires DOE to successfully revegetate these areas.

In September 2001, DOE regraded the slopes of the spoils pile to reduce and reshape them to more natural contours to reduce erosion, and seeded the slopes. No significant erosional features have developed in the spoils pile area. DOE also ripped and reseeded the surface of the former staging area. Due to continued drought conditions in the region, the vegetative cover had not significantly improved over the previous year and continues to be very sparse in both areas (PL-1).

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.). Tracks from an all-terrain vehicle were observed on the northwest corner of the property (PL-2). Although perimeter signs are clearly visible in this area, this portion of the DOE site is uncontrolled (i.e., not fenced) and is susceptible to trespass. No other disturbances in the outlying areas were noted.

### 17.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 17.3.3 Routine Maintenance and Repairs

A damaged perimeter sign was replaced and noxious weeds were treated with herbicide in 2003.

### 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 2003.

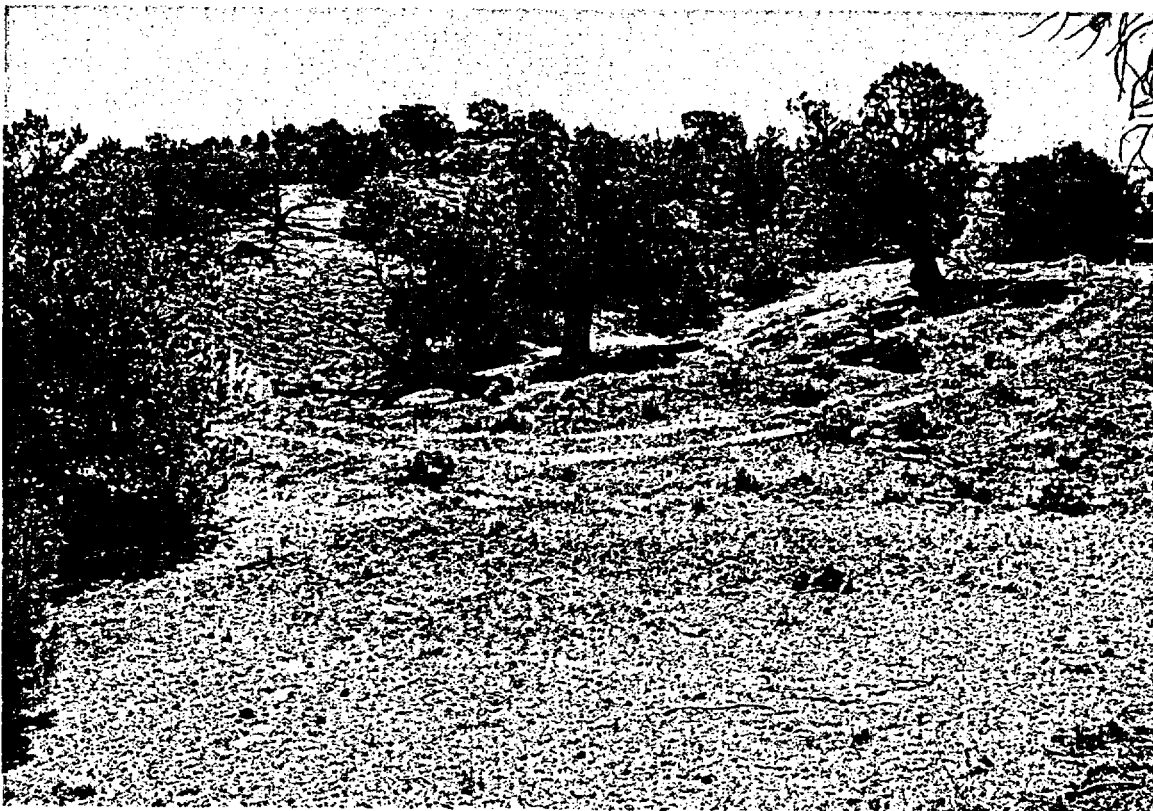
### 17.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL-1	270	Sparse vegetation on the northeast slope of the regraded spoils pile.
PL-2	120	All-terrain vehicle tracks in the northwest corner of the property.



*SRK 7/2003. PL-1. Sparse vegetation on the northeast slope of the regraded spoils pile.*



*SRK 7/2003. PL-2. All-terrain vehicle tracks in the northwest corner of the property.*

End of current section

## 18.0 Spook, Wyoming, Disposal Site

### 18.1 Compliance Summary

The Spook, Wyoming, Disposal Site, inspected on June 3, 2003, was in excellent condition. Reseeded areas have healthy and well-established grasses, forbs, and sagebrush, and there is no evidence of overgrazing even though the site is not fenced. Most previously identified rills and gullies have stabilized; rock was placed at the knickpoint of the only active gully to retard erosion. Ground water monitoring is not required at this site. No requirements for maintenance or 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 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 18-1.

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

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

### 18.3 Compliance Review

#### 18.3.1 Annual Inspection and Report

The site, located in north central Converse County, Wyoming, was inspected on June 3, 2003. 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, Gate, and Signs**—The road to the site is graded and hard packed. North of the Dry Fork of the Cheyenne River, the road narrows to an unsurfaced dirt track that is overgrown with grass. The road was passable but may be difficult to traverse in wet weather. DOE holds perpetual easements for the access road between County Road 31 and the site. Access to the Bear Creek UMTRCA Title II disposal site will be via this road.



Although there is an unlocked gate in the stock fence along the access road, the site itself is open range (unfenced). The site has one entrance sign and 10 perimeter signs set on posts along the site boundary. Three perimeter signs have bullet holes and perimeter sign P7 is slightly bent and the paint is cracked; these signs are still legible and the other signs were in excellent condition.

**Site Markers and Monuments**—The site has two site markers, eight boundary monuments, and three survey monuments. The concrete base of site marker SMK-1 is cracked and spalling but the granite marker is in excellent condition. Wind has scoured soil from beneath the surface concrete collar around boundary monument BM-6 but this will not compromise the integrity of the monument (PL-1). The other marker and monuments were undisturbed and in excellent condition.

**Monitor Wells**—Ground water monitoring is not required at this site.

### 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.

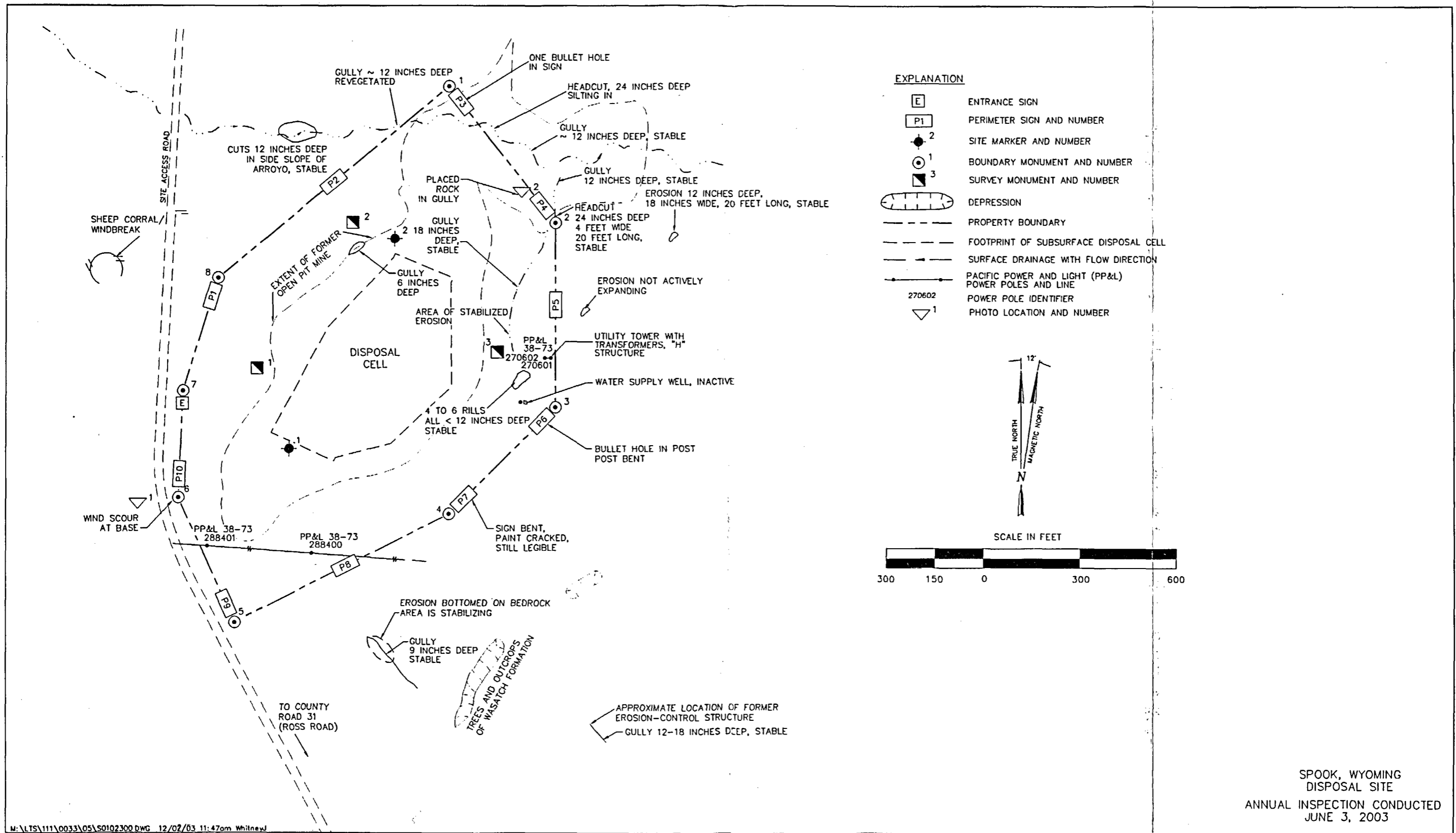
**Disposal Site**—The Spook site is unique among Title I sites in that the tailings were placed in the bottom of an open pit mine and covered with an engineered cover and 40 to 60 feet of clean fill and topsoil. None of the observations and concerns routinely associated with above-grade disposal cells,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

The surface of the site was in excellent condition. There was no evidence of settling over the back-filled open pit mine. The reseeded areas have healthy and well-established grasses and forbs. Sagebrush is establishing in the reseeded areas and, overall, the vegetation is indistinguishable from that growing naturally on the surrounding hills and valleys. The site perimeter is not fenced, and the adjacent landowner, Hornbuckle Ranch, manages the grazing on DOE property; there was no evidence of overgrazing.

18A Most erosion features observed during previous inspections have stabilized, as indicated by vegetation growing in the rills and gullies. Only one gully, near perimeter sign P4, appeared active; the inspectors placed some rocks at the knickpoint to help control the erosion (PL-2).

A water supply well, completed in an aquifer unaffected by regional uranium mineralization, remains at the site on DOE property. The well and the ground water it intercepts belong to DOE, but the adjacent landowner, Hornbuckle Ranch, historically has used the well for irrigation and for watering livestock. The electricity meter has been removed and there have been no indications that the well has been used since inspections began. DOE executed an agreement establishing DOE ownership of the well and providing Hornbuckle Ranch access to the well and use of the ground water at no cost or liability to DOE.

A power line and three transformers on a platform remain on site for power to the water supply well. The Pacific Power and Light Company holds a right-of-way agreement that survived the change of ownership to DOE.



SPOOK, WYOMING  
DISPOSAL SITE  
ANNUAL INSPECTION CONDUCTED  
JUNE 3, 2003

**Site Perimeter**—The site perimeter was in excellent condition. No erosion or other disturbance was observed. If there were no perimeter signs along the boundary, the perimeter of the site would be indistinguishable from the open range beyond.

**Outlying Area**—The area outward for a distance of about 0.25 mile from the site boundary was visually inspected. No disturbance, change in land use, or other features of possible concern were observed. Formerly active areas of erosion northeast and southeast of the site continue to be filling in with sediment and revegetating naturally.

### 18.3.2 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2003.

### 18.3.3 Routine Maintenance and Repairs

Other than placing rock at the knickpoint of a gully to retard erosion, no maintenance was required in 2003.

### 18.3.4 Ground Water Monitoring

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

### 18.3.5 Corrective Action

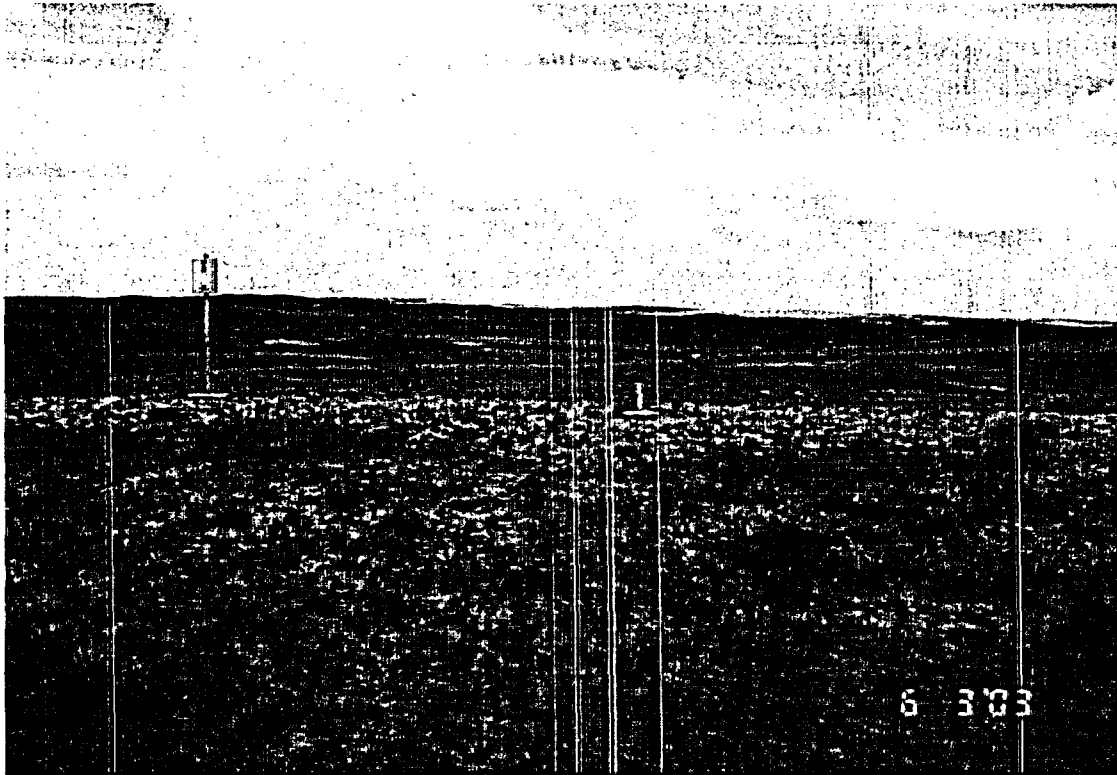
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2003.

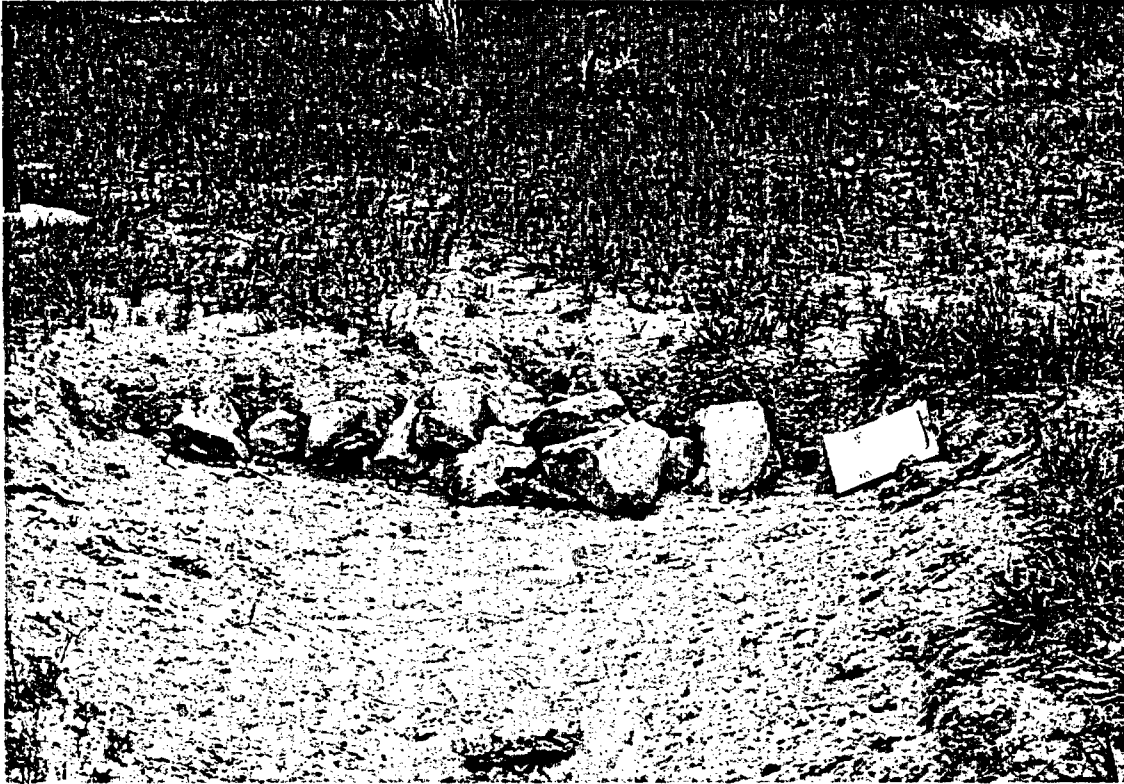
### 18.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL-1	90	Wind erosion around the concrete collar of boundary monument BM-6.
PL-2	180	Rocks placed at a gully knickpoint near perimeter sign P4.



*SPK 6/2003. PL-1. Wind erosion around the concrete collar of boundary monument BM-6.*



*SPK 6/2003. PL-2. Rocks placed at a gully knickpoint 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 September 10, 2003, was in excellent condition. Plant abundance on the cover and side slopes had not significantly changed since the previous inspection. Sand accumulation on the rock apron along the south toe of the disposal cell and in the drainage ditches was unchanged from last year and does not prevent these features from functioning as designed. DOE continues to evaluate long-term effects of sand accumulation and the plant encroachment, particularly growth of deep-rooted plants, on the disposal cell and rock apron. Results of ground water monitoring showed little variation from results reported in 2002. No need was identified for a follow-up or contingency inspection.

### 19.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Tuba City, Arizona, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I disposal site are specified in the *Long-Term Surveillance Plan 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 the DOE office at Grand Junction to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 19-1.

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

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

### 19.3 Compliance Review

#### 19.3.1 Annual Inspection and Report

The site, located east of Tuba City, Arizona, was inspected on September 10, 2003. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 19-1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

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

### 19.3.1.1 Specific Site Surveillance Features

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

19A The security fence around the site is chain link with three strands of barbed wire at the top. The security fence was in good condition at the time of the annual inspection. A broken bracket supporting the three strands of barbed wire was replaced prior to the inspection.

One entrance sign and 30 perimeter signs are situated around the site. All signs are on steel posts inside the fence and set back about 5 feet from the site boundary. Attached below each perimeter sign is a pictorial sign showing the disposal cell configuration. Some signs have bullet holes or dents, but all were legible.

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

**Monitor Wells**—The seven wells of the site ground water monitoring network were found to be secure and in excellent condition.

### 19.3.1.2 Transects

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

**Disposal Cell**—The disposal cell is covered with riprap for erosion protection. The rock was in excellent condition. Inspectors discovered no evidence of slumping, settling, or instability on the top or side slopes of the disposal cell (PL-1).

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

For comparison purposes, photographs of vegetation cover were retaken at baseline locations on the south side slope and toe drain to document annual changes in vegetation conditions at the site. The 2003 photographs showed there was very little change in vegetation conditions from the previous inspection. DOE will continue to evaluate the effects of sand accretion and vegetation encroachment on the cover, and to assess potential impacts to the radon barrier. Vegetation management (i.e., application of herbicides) may continue to be necessary.



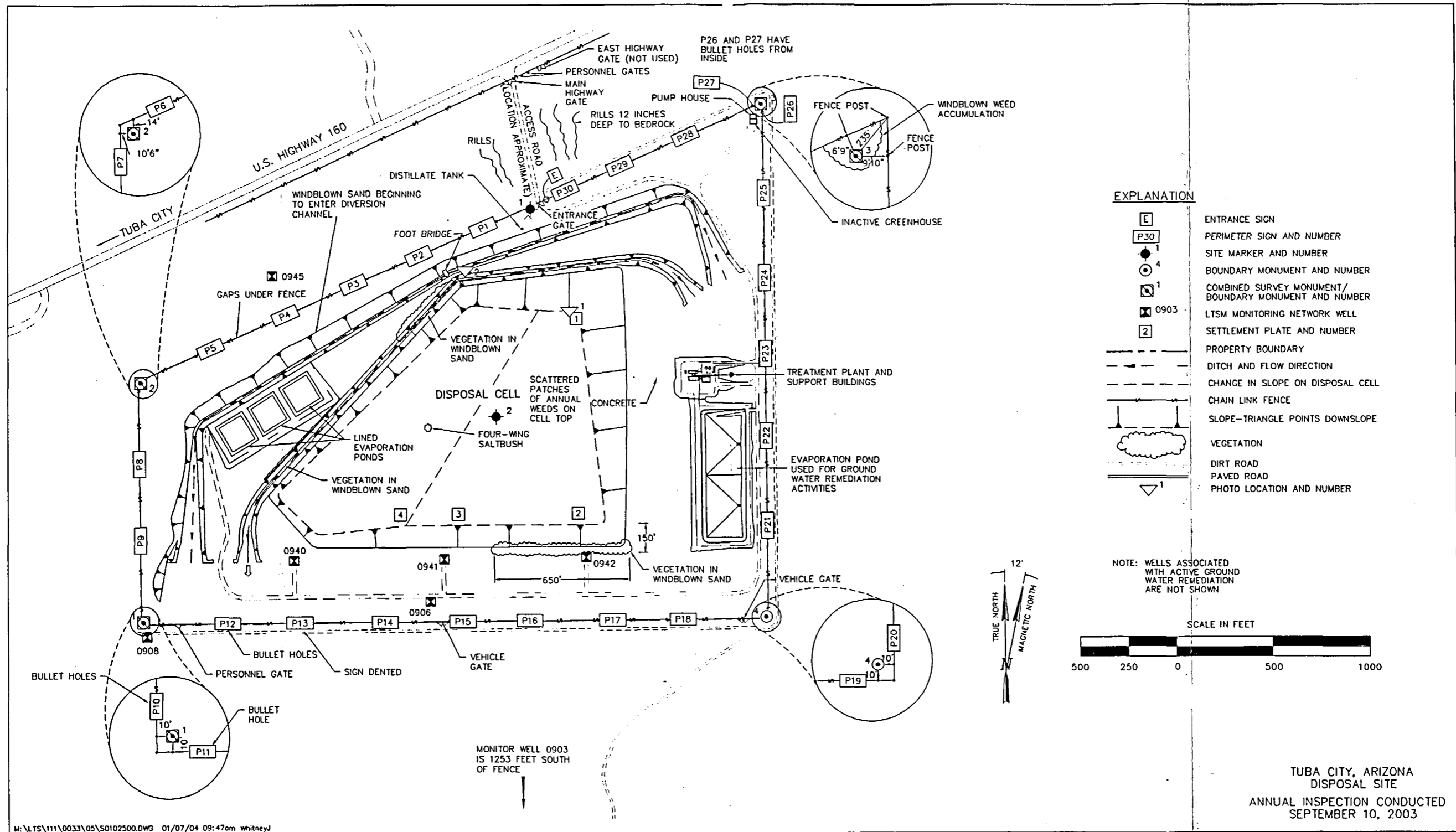


Figure 19-1. 2003 Annual Compliance Drawing for the Tuba City, Arizona, Disposal Site

**Area Between the Disposal Cell and the Site Boundary**—Ongoing ground water remediation activities continue to disturb small portions of the area between the disposal cell and the site boundary. Revegetation of these areas is slow but progressing. Inspectors will continue to monitor revegetation to ensure the existing vegetative cover is not further degraded by on-site activities. In general, the vegetation conditions on site are comparable to the vegetation conditions of the adjacent land off site.

Another ongoing issue at the site is tumbleweed (dead Russian thistle) and sand accumulation along the fence lines. Tumbleweeds tend to accumulate along the west and northeast portions of the perimeter fence, and sand tends to accumulate along the western fence line. At the time of the 2003 inspection, tumbleweed and sand accumulation was insignificant.

Two rock-lined drainage channels are located on the north (upslope) side of the disposal cell. The outermost channel intercepts storm water and diverts it around the disposal cell to the south and east. The inner drainage channel, constructed at the toe of the north and northwest sides of the disposal cell, collects runoff from the disposal cell itself and diverts it to the south and east as well. Sand accumulation in the inner diversion channel and in the northwest segment of the outer diversion channel was unchanged since the 2002 inspection and does not interfere with the drainage function of the channels (PL-2).

**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 2003.

### **19.3.3 Routine Maintenance and Repairs**

A bracket on the security fence was replaced prior to the 2003 inspection.

### **19.3.4 Ground Water Monitoring**

19B DOE monitors ground water to compare current conditions to baseline water quality. This monitoring will not be indicative of disposal cell performance because baseline (background) water quality is degraded by contamination from former milling activities that likely will mask contamination that might leach from the disposal cell.

In accordance with the Long-Term Surveillance Plan, seven wells (Table 19-2) are monitored for four target analytes—molybdenum, nitrate, selenium, and uranium. In 40 CFR 192 Table 1 of Subpart A, the U.S. Environmental Protection Agency has established maximum concentration limits for these analytes in ground water. These limits are 0.1 milligrams per liter (mg/L) for molybdenum, 44 mg/L for nitrate (as NO<sub>3</sub>), 0.01 mg/L for selenium, and 0.044 mg/L for uranium. Time-concentration plots, beginning in 1995, 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, off site
MW-0906	Downgradient, baseline
MW-0908	Downgradient, baseline
MW-0940	Downgradient, disposal cell boundary
MW-0941	Downgradient, disposal cell boundary
MW-0942	Downgradient, disposal cell boundary
MW-0945	Upgradient, baseline (background)

Sample results from 2003 indicate that ground water quality downgradient of the former millsite is degraded with respect to all four target analytes. Ground water quality did not change significantly between 2002 and 2003.

Molybdenum concentrations exceeded the 0.1 milligram per liter (mg/L) standard in the sample from monitor well MW-0941 in 2003. Except at MW-0906, molybdenum concentrations have not varied significantly in the last 8 years (Figure 19-2). Samples from MW-0906 typically have had higher and more variable molybdenum concentrations in the past than samples from other wells.

In 2003, concentrations of nitrate (as  $\text{NO}_3$ ) exceeded the 44 mg/L standard in samples from all monitor wells except background well MW-0945. Between 2002 and 2003, no significant increases or decreases in concentrations were observed in samples from any well, although concentrations varied considerably—by more than two orders of magnitude—from well to well (Figure 19-3).

Consistent with historical data, selenium concentrations exceeded the 0.01 mg/L standard in 2003 in samples from all wells except background well MW-0945 and off-site, downgradient well MW-0903. Selenium values have remained fairly consistent in samples from all wells except MW-0906 and MW-0940 (Figure 19-4).

Uranium concentrations exceeded the 0.044 mg/L standard in 2003 samples from all wells except background well MW-0945 and off-site, downgradient well MW-0903. Concentrations have remained fairly constant over time in samples from all wells except MW-0906 and MW-0940 (Figure 19-5).

**TUBA CITY (TUB01)**  
**Molybdenum Concentration**

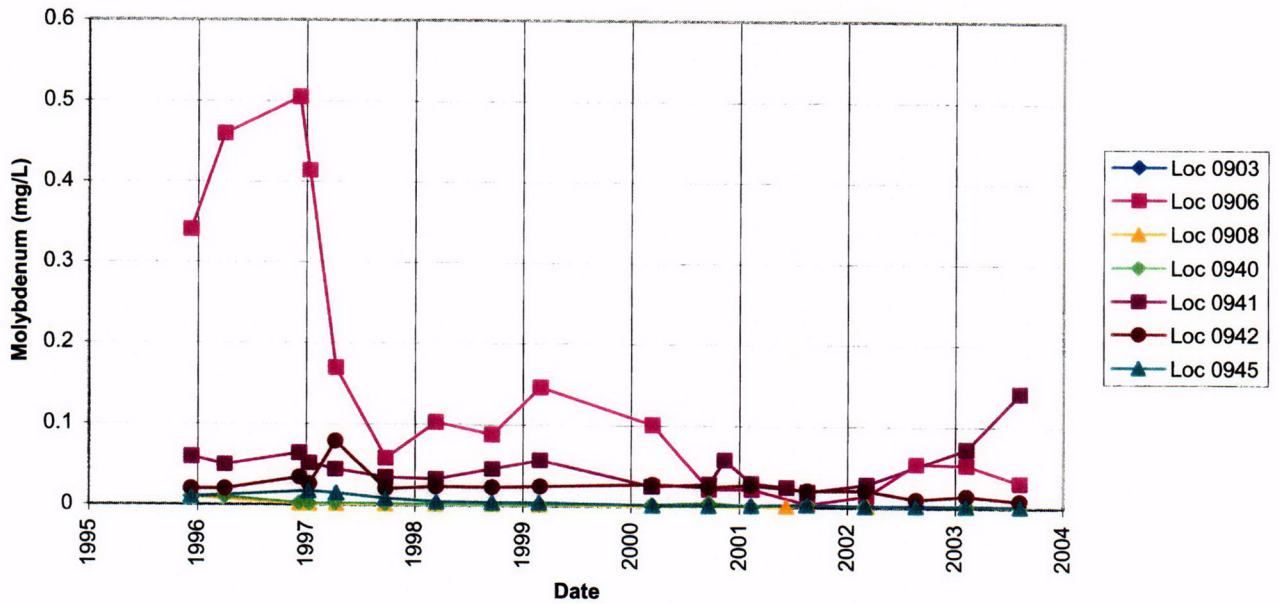


Figure 19-2. Time-Concentration Plots of Molybdenum in Ground Water at the Tuba City, Arizona, Disposal Site

**TUBA CITY (TUB01)**  
**Nitrate as NO<sub>3</sub> Concentration**

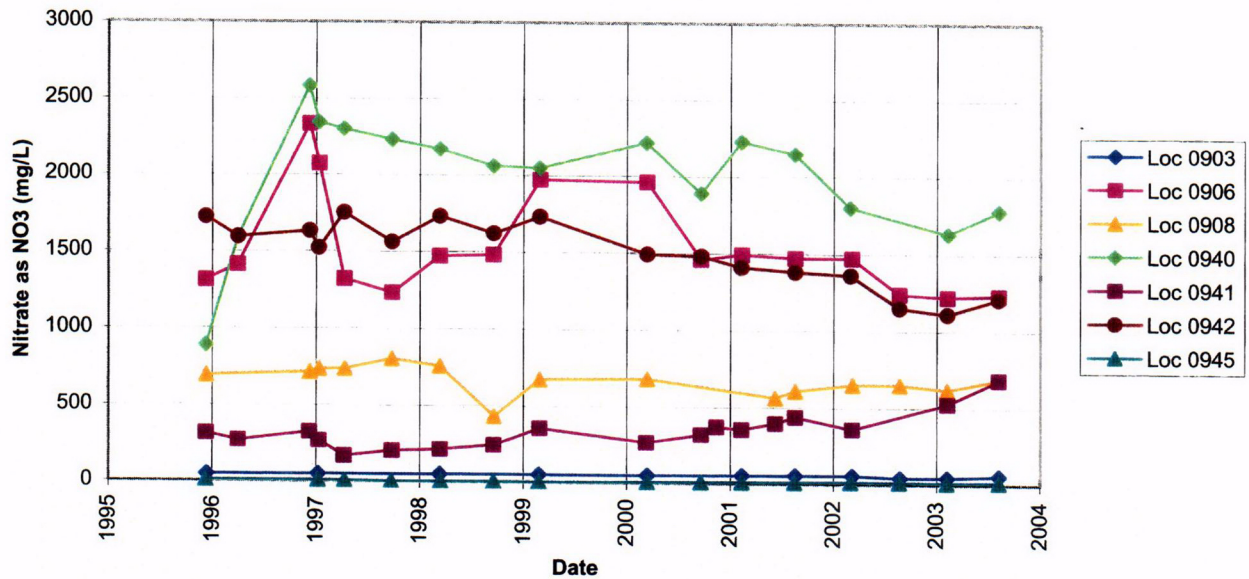


Figure 19-3. Time-Concentration Plots of Nitrate (as NO<sub>3</sub>) in Ground Water at the Tuba City, Arizona, Disposal Site

**TUBA CITY (TUB01)**  
**Selenium Concentration**

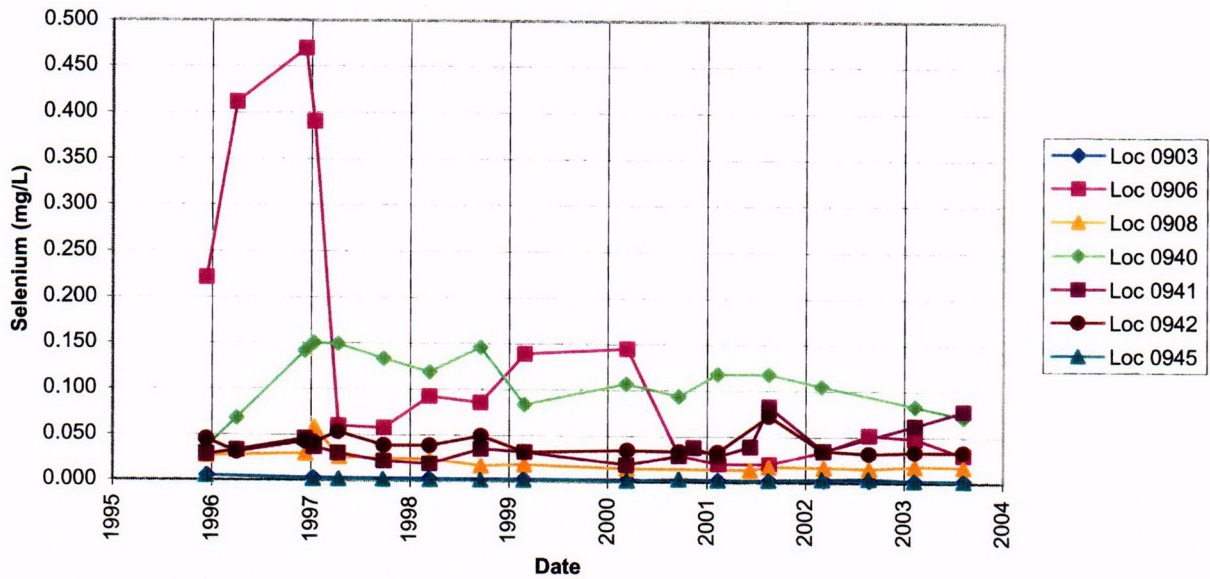


Figure 19-4. Time-Concentration Plots of Selenium in Ground Water at the Tuba City, Arizona, Disposal Site

**TUBA CITY (TUB01)**  
**Uranium Concentration**

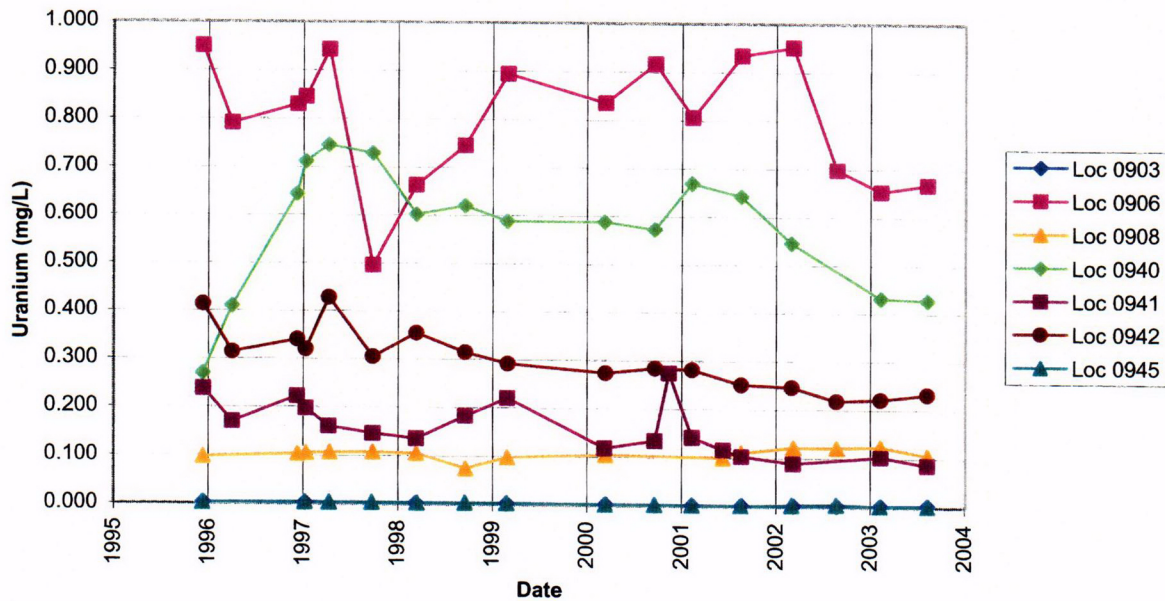


Figure 19-5. Time-Concentration Plots of Uranium in Ground Water at the Tuba City, Arizona, Disposal Site

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### 19.3.5 Corrective Action

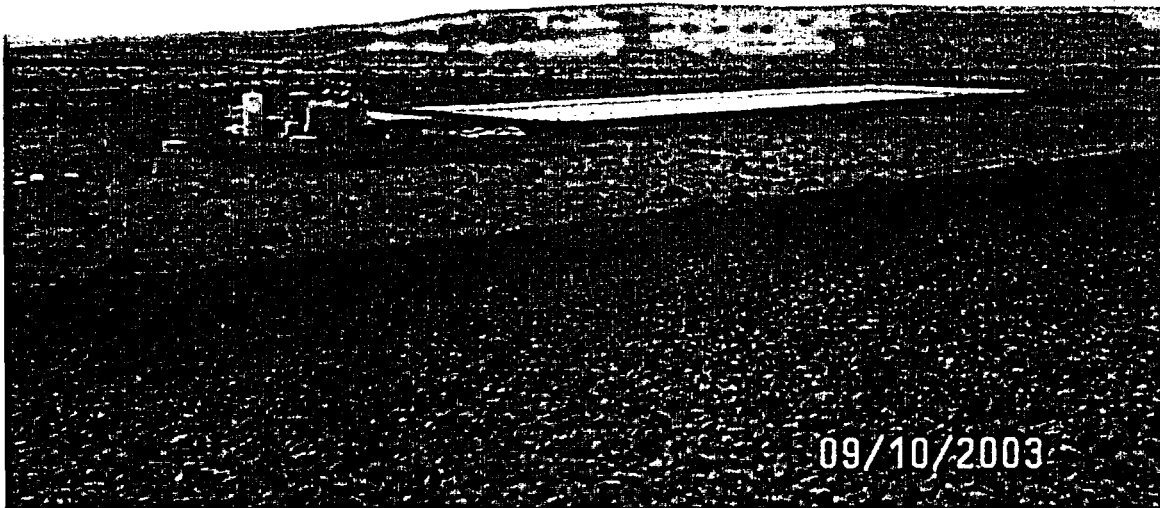
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2003.

### 19.3.6 Photographs

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

Photograph Location Number	Azimuth	Description
PL-1	135	East side slope of the cell and adjacent ground water remediation facilities.
PL-2	240	Sand accumulation and vegetation between the toe drainage channel (left) and the storm water diversion channel (right).



*TUB 9/2003. PL-1. East side slope of the cell and adjacent ground water remediation facilities.*



*TUB 9/2003. PL-2. Sand accumulation and vegetation between the toe drainage channel (left) and the storm water diversion channel (right).*