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Long-Term Surveillance and Maintenance Program

2002 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites

December 2002

Work Performed Under DOE Contract No. DE–AC13–02GJ79491 for the U.S. Department of Energy
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Long-Term Surveillance and Maintenance Program

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Prepared for
U.S. Department of Energy
Idaho Operations Office
Grand Junction, Colorado

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Acronyms

BLM	U.S. Bureau of Land Management
CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
GJO	Grand Junction Office
MCL	maximum concentration limit
mg/L	milligrams per liter
NRC	U.S. Nuclear Regulatory Commission
PCB	polychlorinated biphenyls
pCi/L	picocuries per liter
PL	Photo Location
TDS	total dissolved solids
UMTRA	Uranium Mill Tailings Remedial Action [Project]
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978 (88 USC 7901, *et seq*.)

Executive Summary

This report, in fulfillment of a license requirement, presents the results of Long-Term Surveillance and Maintenance Program stewardship activities conducted by the U.S. Department of Energy (DOE) in 2002 at 19 uranium mill tailings disposal sites established under Title I of the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978[1]. These activities verified that the UMTRCA Title I disposal sites remain in compliance with license requirements.

DOE operates 18 UMTRCA Title I sites under a general license granted by the U.S. Nuclear Regulatory Commission in accordance with Title 10 *Code of Federal Regulations* Part 40.27. The Grand Junction, Colorado, disposal site, included in the list of 19 Title I sites, will not be licensed until an open, operating portion of the cell is filled and closed, perhaps in 2023. This site is inspected in accordance with an interim Long-Term Surveillance Plan.

The Long-Term Surveillance and Maintenance Program at the DOE Grand Junction, Colorado, Office is responsible for providing stewardship services for these disposal sites. Services include site inspections and maintenance, monitoring of environmental media and institutional controls, conducting any necessary corrective action, and performing administrative, records, stakeholder participation, 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**.

Many of the sites require routine maintenance including vegetation control, fence repairs, and sign replacement. The following nonroutine activities[2] occurred in 2002:

- Burrell, Pennsylvania—regulator concurred with revised Long-Term Surveillance Plan;
- Maybell, Colorado—placed additional riprap for erosion control, and installed boundary monuments at all property corners;
- Mexican Hat, Utah—revised the monitoring frequency for ground water seeps, and conducted a follow-up inspection to assess storm damage;
- Naturita, Colorado—closed the storm water discharge permit;
- Rifle, Colorado—installed a new fence and gate across the site access road; and
- Decommissioned 41 unneeded monitor wells and standpipes at five sites.

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

[2] 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 and monitoring activities performed by the Long-Term Surveillance and Maintenance Program 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.

2002 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	Control of vegetation on cell top.
		1–5	1C	Control of vegetation along cell apron.
		1–5	1D	Ground water monitoring.
Burrell, Pennsylvania	2	2–1	2A	U.S. Nuclear Regulatory Commission concurrence with revised Long-Term Surveillance Plan.
		2–2	2B	Obtain regulator concurrence to remove derelict access gate.
				Maintenance: damaged perimeter signs replaced.
		2–2	2C	Maintenance: missing boundary monument cap replaced.
		2–5	2D	Unneeded monitor wells decommissioned.
		2–5	2E	
Canonsburg, Pennsylvania	3	3–2	3A	Maintenance: missing perimeter sign replaced.
		3–2	3B	Unneeded monitor wells decommissioned.
		3–5	3C	Institutional controls needed for sale of Area C.
		3–6	3D	Ground water monitoring.
Durango, Colorado	4	4–2	4A	Maintenance: missing perimeter signs replaced and reinforced.
		4–2	4B	Maintenance: vegetation control.
		4–2	4C	Maintenance: biological control of vegetation initiated.
		4–6	4D	Ground water monitoring: existing well added to monitoring network.
Falls City, Texas	5	5–2	5A	Maintenance: vegetation control.
		5–5	5B	Ground water monitoring.
Grand Junction, Colorado	6	6–2	6A	Maintenance: erosion along access road.
		6–2	6B	Maintenance: perimeter signs resecured or replaced.
		6–5	6C	Vegetation encroachment and evaluation.
		6–5	6D	Maintenance: erosion of drainage ditch.
		6–10	6E	Ground water monitoring.
Green River, Utah	7	7–2	7A	Maintenance: missing perimeter signs replaced.
		7–5	7B	Maintenance: access gate resecured.
		7–6	7C	Ground water monitoring.
		7–7	7D	Precipitation monitoring.
Gunnison, Colorado	8	8–2	8A	Maintenance: missing perimeter sign replaced.
		8–2	8B	Maintenance: vegetation control.
		8–5	8C	Inspected condition of riprap in test areas.
Lakeview, Oregon	9	9–1	9A	Revised Long-Term Surveillance Plan pending NRC concurrence.
		9–2	9B	Maintenance: fence repaired.
		9–2	9C	Maintenance: entrance sign replaced.
		9–2	9D	Investigation on effects of vegetation on cell.
		9–5	9E	Riprap size recalculated for gradation tests.
Lowman, Idaho	10	10–2	10A	Vegetation encroachment.
		10–5	10B	Control of noxious weeds.
		10–6	10C	Revised Long-Term Surveillance Plan in preparation.
Maybell, Colorado	11	11–2	11A	Maintenance: fence repaired.
		11–2	11B	Perimeter sign locations verified.
		11–2	11C	Boundary monuments installed.
		11–5	11D	Unneeded monitor wells decommissioned.
		11–5	11E	Maintenance: vegetation control.
		11–5	11F	Additional riprap placed for erosion control.
		11–7	11G	Settlement plates resurveyed.
Mexican Hat, Utah	12	12–2	12A	Storm runoff damage.
		12–5	12B	Follow-up inspection to assess storm damage.
		12–5	12C	Seep monitoring: revised sampling requirement.

Site	Chapter	Page	Index No.	Actions and Issues
Naturita, Colorado	13	13–2	13A	Standpipe decommissioned.
		13–5	13B	Revision of toe drain right-of-way permits pending.
		13–5	13C	Storm water discharge permit closed.
		13–5	13D	Maintenance: vegetation control.
		13–6	13E	Ground water monitoring.
Rifle, Colorado	14	14–2	14A	Security: fence and gate installed across access road.
		14–2	14B	Maintenance: cell-dewatering pump and wellhead repaired.
		14–6	14C	New erosion near cell.
		14–6	14D	Reclamation: BLM Temporary Permit active until successful revegetation.
Salt Lake City, Utah	15	15–2	15A	New access route.
		15–2	15B	New entrance gate and relocated entrance sign.
Shiprock, New Mexico	16	16–2	16A	Erosion and fence damage from storm runoff.
		16–2	16B	Boundary monument washed away.
		16–5	16C	Vegetation encroachment.
		16–5	16D	Erosion below armored portion of outfall channel.
Slick Rock, Colorado	17	17–2	17A	Maintenance: fence repaired.
		17–2	17B	Two standpipes decommissioned.
		17–5	17C	Maintenance: vegetation control.
Spook, Wyoming	18	18–5	18A	Agreement executed between DOE and adjacent landowner concerning use of water well.
Tuba City, Arizona	19	19–2	19A	Active ground water remediation activities.
		19–5	19B	Maintenance: vegetation control.
		19–5	19C	On-going evaluation of sand accumulation and vegetation encroachment on cell.
		19–5	19D	Sand and tumbleweed accumulation along fence.
		19–6	19E	Ground water monitoring.

End of current text

2002 Annual Compliance Report
Ambrosia Lake, New Mexico, Disposal Site

Compliance Summary

The site, inspected on May 8, 2002, was in excellent condition. Several perimeter signs were realigned and resecured. Deep-rooted vegetation was observed on and around the cell cover and will be removed. DOE conducted the first post-closure ground water sampling event for the site. Inspectors identified no requirement for a follow-up or contingency inspection.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Sections 6.0 and 7.0	Section 2.0
Routine Maintenance and Repairs	Section 8.0	Section 3.0
Ground Water Monitoring	Section 5.0	Section 4.0
Corrective Action	Section 9.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, north of Grants, New Mexico, was inspected on May 8, 2002. Results of the inspection are described below. Features 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.

1.1 Specific Site Surveillance Features

Access Road, Entrance Sign, Perimeter Signs—The Ambrosia Lake Disposal Site is accessed via a gravel road that leads to the site (and beyond) from New Mexico State Highway 509. The site is reached by passing through a locked gate and traveling east along this road for approximately 1 mile. The gate is locked 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. Several perimeter signs along the western property boundary had rotated on their posts; the movement most likely caused by prevailing winds. Inspectors realigned the signs to their proper position and resecured the associated hardware. 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—Twenty monitor wells were decommissioned in September 2001. All decommissioned monitor well sites were reclaimed at the time of decommissioning. There is little to no evidence of land disturbance associated with these reclaimed sites, and the vegetation, although sparse, is expected to be restored to a condition representative of the surrounding, undisturbed areas. There is no further need to inspect these decommissioned sites during future inspections.

Only two monitor wells (0675 and 0678) 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 located 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.

1.2 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 was in excellent condition. With exception of one location there was no evidence of cracking, settling, slumping, or erosion. A shallow
1A depression around settlement plate SP−4 was first noted during the 1997 inspection; however, there has been no visible indication to suggest the depression holds water. At the time of the 2002 annual inspection, the subsidence was estimated to measure approximately 20 feet across and approximately 1 foot in depth. The depression will continue to be monitored to ensure the integrity of the cell cover.

1B Several isolated four-wing saltbush shrubs were observed at various locations on the cell cover. These deep-rooted shrubs growing on the disposal cell will be removed before the next inspection.

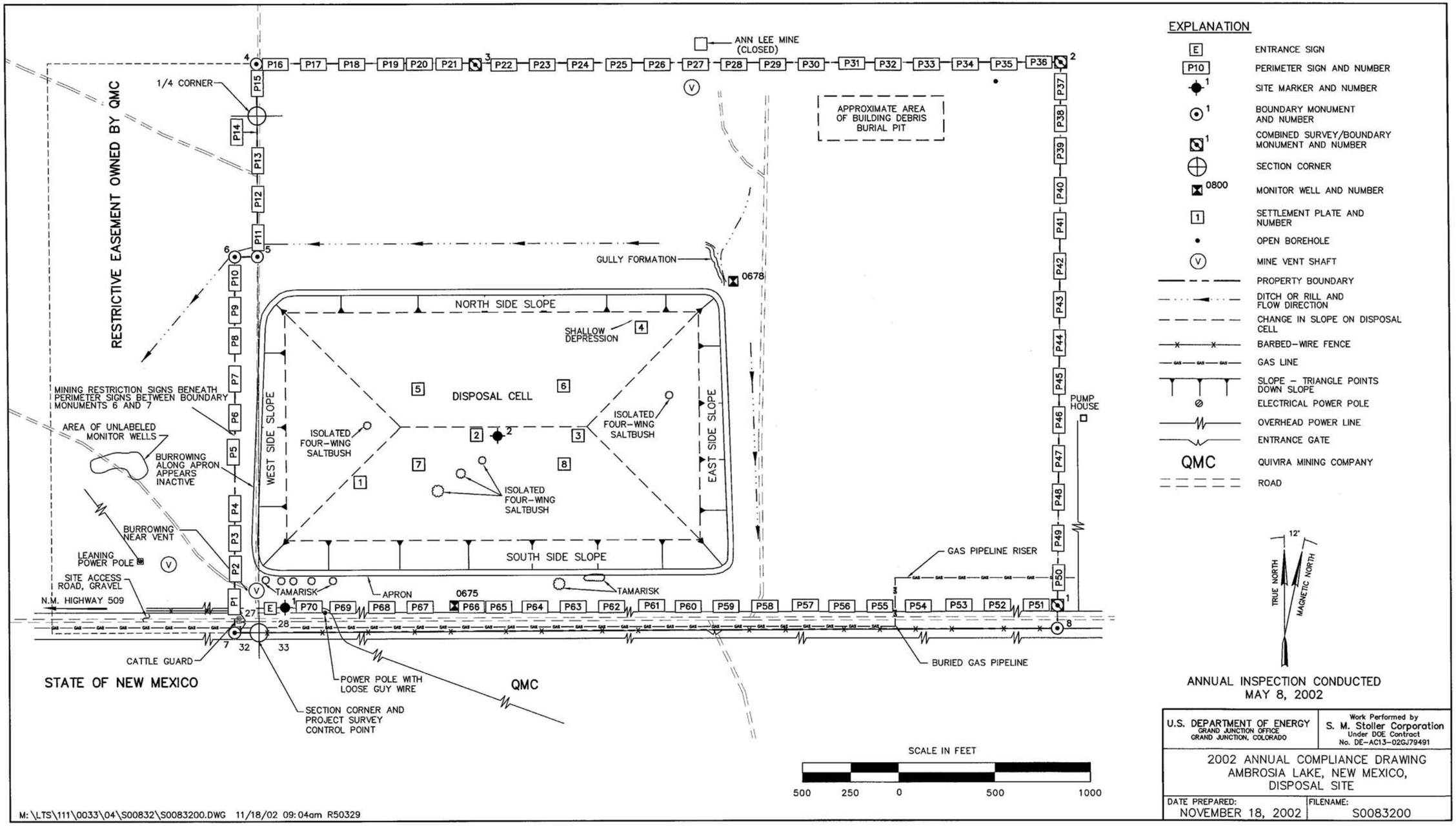


Figure 1–1. 2002 Annual Compliance Drawing for the Ambrosia Lake, New Mexico, Disposal Site

Side Slopes and Apron—The side slopes and apron were in excellent condition and showed no evidence of cracking, settling, slumping, or erosion. Tamarisk was observed growing in several
1C locations along the southern edge of the disposal cell apron and will be removed before the next inspection. No evidence of recent animal burrowing was noted during this year's inspection. No standing water was observed in the apron along the south side slope, as had been noted during previous inspections.

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. Inspectors observed little evidence of cattle grazing adjacent to the disposal cell and 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.

For several years, inspectors have monitored rills and gullies within the DOE property north and east of the disposal cell. The gullies are located at sufficient distances from the disposal cell that they do not present an immediate threat to the cell. The gullies appeared to be stabilizing.

Outlying Area—The area within 0.25 mile of the site boundary was inspected and found to be unchanged.

2.0 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

Other than realigning several perimeter signs, no maintenance or repairs were required in 2002.

4.0 Ground Water Monitoring

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 0675 is completed in the alluvium, and monitor well 0678 is completed in the uppermost sandstone bed. DOE samples these locations once every third year, for up to 30 years, and evaluates the results after every third sampling event.

1D The first post-closure sampling event was conducted on December 7, 2001. The data from this sampling event are presented in Table 1−2.

Table 1−2. Analytical Results from the December 7, 2001, Sampling Event

Well	pH	Electrical Conductivity µOhms/cm	Uranium mg/L	Molybdenum mg/L	Selenium mg/L	Nitrate (as N) mg/L	Sulfate mg/L
0675	6.72	7,000	3.17	3.92	0.433	41.7	4,040
0678	7.26	14,280	0.073	0.023	0.169	479	7,340

µOhms/cm = micro-ohms per centimeter
mg/L = milligrams per liter

5.0 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 2002.

2002 Annual Compliance Report
Burrell, Pennsylvania, Disposal Site

Compliance Summary

The site, inspected on September 12, 2002, was in good condition. A sheared-off boundary monument and perimeter signs rendered illegible by gunfire were replaced, and vegetation was cleared from the security fence. The access gate at Strangford Road was derelict and nonfunctional. Two redundant ground water monitor wells were decommissioned in 2002. Inspectors identified no requirement for a follow-up or contingency inspection.

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* [DOE] *Burrell Vicinity Property, Blairsville, Pennsylvania* (GJO−2002−331−TAR, U.S. Department of Energy, Grand Junction Office, April 2000) and in procedures established by the DOE Grand Junction Office to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27).

2A The Long-Term Surveillance Plan was revised in April 2000 and received concurrence by the U.S. Nuclear Regulatory Commission in February 2002. Revisions entail the following:

- Discontinuing vegetation control on the cell cover;
- Eliminating ground water monitoring at monitor wells 0421 and 0521;
- Discontinue analyses for ammonia, cyanide, gross alpha, radium-226, radium-228, and vanadium in ground water;
- Decreasing ground water sampling frequency to once every 5 years;
- Eliminating surface water sampling on the Conemough River; and,
- Removing a reference to a site marker that was never installed.

Compliance 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 1.0
Follow-up or Contingency Inspections	Section 3.5	Section 2.0
Routine Maintenance and Repairs	Section 3.6	Section 3.0
Ground Water Monitoring	Section 3.7	Section 4.0
Corrective Action	Section 3.6.3	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, southeast of Blairsville, Pennsylvania, was inspected on September 12, 2002. 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.

1.1 Specific Site Surveillance Features

Site Access, Fence, Gates, and Signs—An access road leads from an access gate at Strangford Road to the entrance gate in the security fence at the site boundary. The hard-packed graveled 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. At the time of the 2002 site inspection, the road to the site was easily passable in a passenger car.

The area around the gate at Strangford Road has been a concern because the DOE access route apparently also provides easy access to the railroad right-of-way and adjacent property. Local residents historically used the area for dumping and driving off-road vehicles. Railroad and gas company maintenance personnel use the gate as a convenience and the railroad has its own no-trespassing sign on the gate. Previously, the railroad had its own padlock on the chain at the gate. Two gas wells on the Burrows' property are also serviced from the DOE access road.

DOE has tried to prevent use of its access road by keeping the gate locked and installing a guardrail along Strangford Road. However, on every site visit since 2000 the gate has been found open. Inspectors found the gate damaged and derelict in 2002 (PL−1 and PL−2).

The access gate will likely be an ongoing maintenance problem and access control has been
2B ignored by local residents. Also, limiting access to the site at Strangford Road does not enhance site protectiveness or security. Therefore, DOE will seek U.S. Nuclear Regulatory Commission concurrence in removing the gate at Strangford Road.

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. Service life expectancy of the fence in the damp climate along the Conemaugh River is expected to be 25 to 30 years. There are two gates in the fence—a vehicle gate at the east end of the site and a personnel gate at the west end. Locks have to be replaced every 2 or 3 years because of corrosion.

The entrance sign and 17 perimeter signs are attached to the security fence. Over the past several years, inspectors noted that perimeter signs along the northern perimeter fence between
2C perimeter sign locations P1 and P8 were progressively more damaged by gunfire to the point where, in 2001, the signs were essentially illegible. DOE replaced the damaged signs in December 2001. Inspectors found the new signs in reasonably good condition, although perimeter sign P6 already had two bullet holes in it. Because access to the other side of the site is more difficult, the remaining perimeter signs were in good condition.

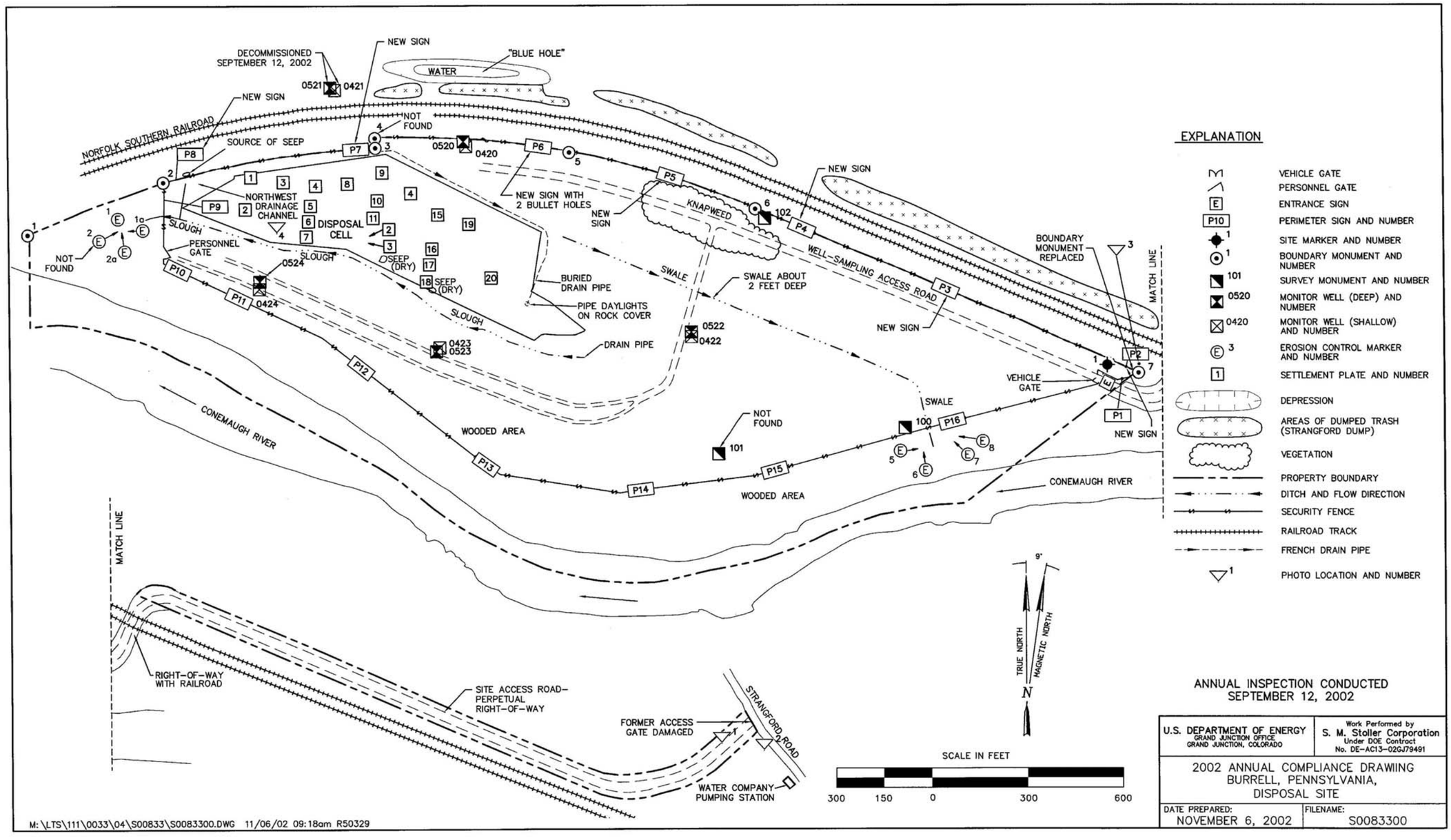


Figure 2–1. 2002 Annual Compliance Drawing for the Burrell, Pennsylvania, Disposal Site

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 three survey monuments (SM–100, SM−101, and SM–102) and seven boundary
2D monuments (BM–1 through BM–7). Because of dense vegetation, inspectors could not locate survey monument SM−1 or boundary monument BM−4. Remaining markers and monuments were undisturbed and in excellent condition. The cap on boundary monument BM–7, found sheared off in 2001, was replaced in December 2001 (PL−3).

Four pairs of erosion control markers (ECM–1 and 1a, ECM–2 and 2a, ECM–5 and 6, and ECM–7 and 8) are located in dense stands of Japanese knotweed, where they are difficult to find. Although inspectors could not locate two monuments in 2002, no stream bank erosion was evident.

Monitor Wells—The site has four pairs of monitor wells; all were in good condition. Corridors to the wells are mowed annually to improve access and provide working space around the wells.

The revised Long-Term Surveillance Plan deleted two wells from the ground water monitoring
2E network because they provided redundant background chemistry data and were located off DOE property. DOE decommissioned the two monitor wells, 0421 and 0521, during 2002.

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 instability on the side slopes.

Trees and shrubs continue to establish in the riprap (PL−4). 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.

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.

Seeps previously found along the base of the south side slope were found to be dry. In 1998, DOE installed a gravel-filled 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. The slough at the foot of the disposal cell, fed by ground water, was flowing normally.

Area Between the Disposal Cell and Site Boundary—The area between the disposal cell and the site boundary is heavily vegetated with grass and forest. The area appeared to be undisturbed and no compliance issues were evident.

Site Perimeter—A 5-foot-wide swath was mowed on both sides of the fence in July 2002. 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, about 60 feet east of perimeter sign P8 (just west of the disposal cell), were flowing. Inspectors will continue to monitor the area for the possibility that the railroad embankment may become unstable.

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. Inspectors found evidence of recent dumping, consisting of construction debris and landscaping waste. Township authorities are aware of the problem, but none of the trash has been removed. The dumping is not a direct threat to the disposal site but the amount of dumping is an indication of the overall level of activity near the disposal site and may be a predictor of vandalism. For this reason, inspectors continue to note conditions at the dump.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

DOE replaced damaged perimeter signs, repaired a boundary monument, and cleared vegetation from fence lines and monitor well access routes.

4.0 Ground Water Monitoring

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 2002; DOE will sample ground water again in 2006.

5.0 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 2002.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	90	Damaged east gatepost at Strangford Road.
PL–2	180	Damaged west gatepost at Strangford Road.
PL–3	210	New cap on boundary monument BM–7.
PL–4	225	Vegetation growth on south toe of disposal cell.

PL–1. Damaged east gatepost at Strangford Road.

PL–2. Damaged west gatepost at Strangford Road.

PL–3. New cap on boundary monument BM–7.

PL–4. Vegetation growth on south toe of disposal cell.

End of current section

2002 Annual Compliance Report
Canonsburg, Pennsylvania, Disposal Site

Compliance Summary

The site, inspected on September 13, 2002, was in excellent condition. The grass on the cell cover and surrounding areas was healthy. Vegetation was killed using herbicide along the base of the security fence, in diversion channels, and in the perimeter ditch. DOE will remove the dead vegetation in 2003. Three missing perimeter signs were replaced early in the year. Inspectors noted in September that an additional sign was missing, which was replaced in October. The bank downstream from the site along Chartiers Creek at Area C, reconstructed in 2001, remains stable, although minor erosion at one location needs to be repaired. Ground water monitoring showed uranium concentrations remained above the maximum concentration limit at two of four downgradient wells. DOE decommissioned 18 unneeded monitor wells. No need was identified for a follow-up or contingency inspection.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Sections 3.2 and 6.2, Appendix E.4	Section 2.0
Routine Maintenance and Repairs	Section 6.1	Section 3.0
Ground Water Monitoring	Section 4.0 and the GCAP[a]	Section 4.0
Corrective Action	Section 4.4	Section 5.0

[a]Ground Water Compliance Action Plan, February 2000.

Compliance Review

1.0 Annual Inspection and Report

The site, located between the communities of Canonsburg and Houston, Pennsylvania, was inspected on September 13, 2002. 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.

1.1 Specific Site Surveillance Features

Access, Fence, Gates, and Signs—Access to the site is directly from Strabane Avenue, a public right-of-way.

The site is surrounded by a chain link security fence with three strands of barbed wire at the top. The fence was generally in good condition and remains secure. It continues to rust and the barbed wire is becoming brittle (PL–1). 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 entrance gate is at the southeast corner of the site along Strabane Avenue and a vehicle gate is in the east fence line. Both gates were secure and in good condition. Padlocks on both gates must be replaced every 3 or 4 years because of corrosion in the humid climate.

The site has an entrance sign at the entrance gate and 11 perimeter signs. Perimeter signs P3, P7, and P8, missing at the time of the 2001 inspection, were replaced in December 2001. Perimeter
3A sign P1 was missing at the time of the 2002 inspection and was replaced in October. Inspectors applied an adhesive overlay providing the current DOE-Grand Junction phone number to perimeter sign P5.

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

Erosion control markers along the bank of Chartiers Creek were undisturbed. One of these markers, ECM–4A, was lost to erosion in 1996. No new erosion was noted along the bank.

Monitor Wells—The ground water monitoring network consists of six monitor wells: 0406A, 0410, 0412, 0413, 0414A, and 0424. Monitor well 0414 was destroyed during the Chartiers Creek stream bank stabilization project and replaced with monitor well 0414A in May 2001. Another well, 0406, was destroyed in October 2001 and replaced with monitor well 0406A in January 2002. DOE replaced the cracked concrete collar on monitor well 0412. The wells were secure and in excellent condition.

3B DOE decommissioned all wells that were not required for compliance monitoring (18 wells) in September 2002.

1.2 Transects

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

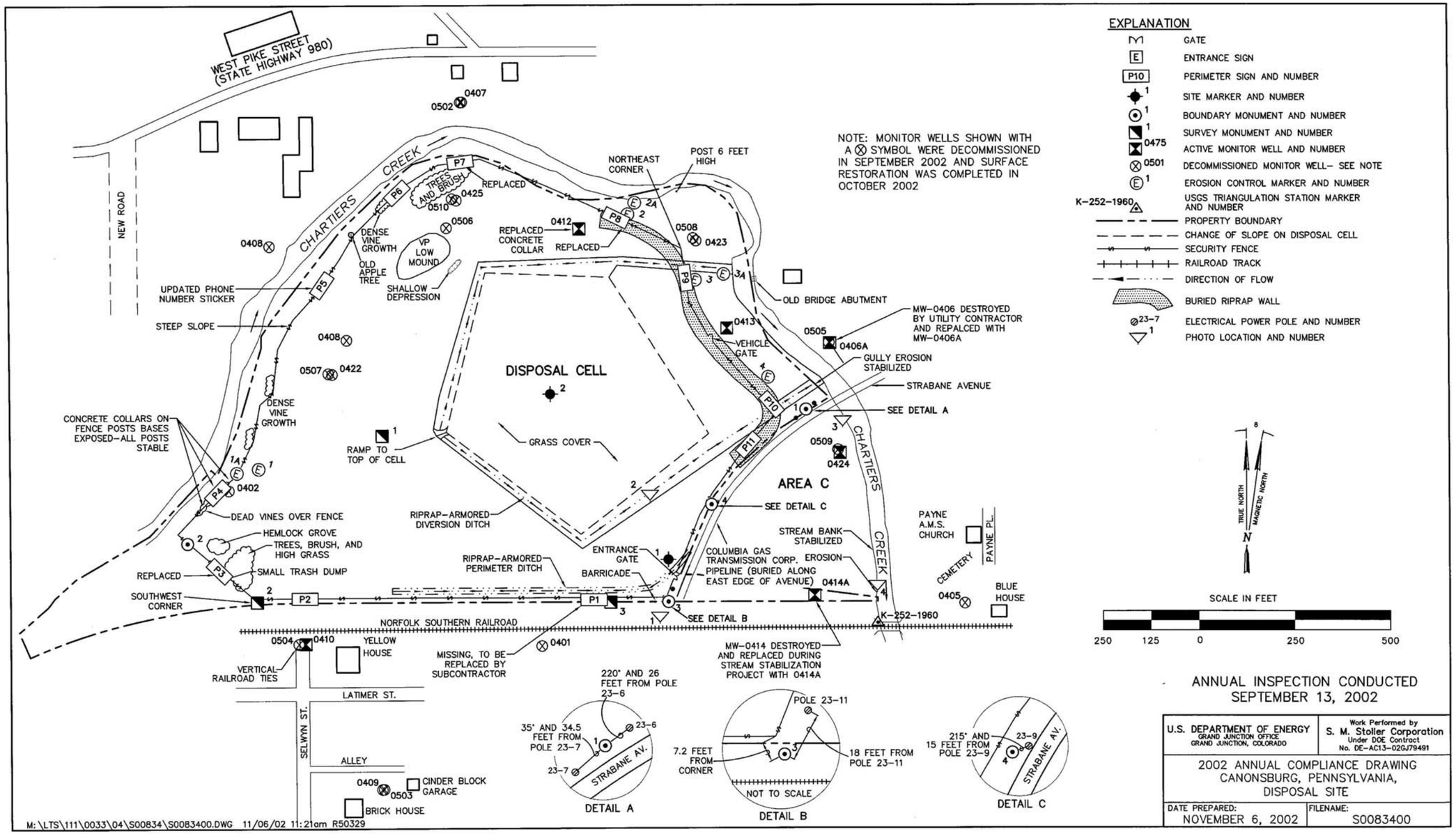


Figure 3–1. 2002 Annual Compliance Drawing for the Canonsburg, Pennsylvania, Disposal Site

Disposal Cell—The grass-covered disposal cell surface was in excellent condition. The grass is mowed and mulched annually, most recently in July 2002. 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 excellent condition.

Vegetation is cleared from the diversion channels and perimeter ditch every 2 or 3 years, or as needed, to maintain their ability to carry runoff from a severe storm event. In 2002, vegetation was treated with herbicide (PL–2); dead plant material will be removed from the channels and ditch in 2003.

In 1998, the spillway below the confluence of the eastern diversion channel and the perimeter ditch was rebuilt to correct an erosion problem. Inspectors did not observe any erosion or indication of malfunction at the riprap-armored spillway.

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 toward the creek from about erosion control marker ECM–2 eastward to the Strabane Avenue Bridge. The grass, mowed and mulched annually, 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. Minor removal is needed near perimeter sign P5; otherwise, the area inside the fence is park-like and well kept.

Site Perimeter—Annual mowing of the grass does not prevent trees, grass, and heavy brush from growing on and through the security fence. DOE mows a swath (as far as possible) on both sides of the fence with a tractor and bush hog. 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.

Inspectors did not observe evidence of erosion along Chartiers Creek.

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.

3C 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 institutional controls prohibiting excavation

deeper than 6 feet or residential use of the property. Additionally, DOE is reviewing ground water conditions to determine if ground water use restrictions are required. DOE will require a recorded easement to the wells and a surface water sampling location on Area C.

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. Seeded grass has established on the slope of the stream bank and native vegetation is establishing, but survival of willow plantings is poor (PL−3). DOE will place rock in a shallow erosion feature at the south end of the reconstructed bank (PL–4).

2.0 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

In addition to mowing the grass and managing other vegetation, DOE replaced three perimeter signs in December 2001, and one perimeter sign in October 2002.

4.0 Ground Water Monitoring

DOE monitors ground water and surface water at the Canonsburg site to comply with requirements in the Long-Term Surveillance Plan (October 1995), and the Ground Water Compliance Action Plan approved by the U.S. Nuclear Regulatory Commission in January 2000. The purpose of the monitoring is to evaluate contaminant trends in the shallow unconfined aquifer, which consists of unconsolidated soils, stream deposits, and clean fill. There is remnant contamination that pre-dates remediation in the soils and stream deposits.

The ground water monitoring network consists of six wells completed in the shallow unconfined aquifer; three surface water locations in Chartiers Creek are monitored also (Table 3–2). The Long-Term Surveillance Plan required sampling for 2 years after the site was licensed. This requirement was met by sampling in 1996 and 1997. However, because the concentration of
3D uranium in some wells remains above the maximum concentration limit of 0.044 milligrams per liter (mg/L), DOE continues to monitor the six wells and three surface water locations annually. DOE also monitors four wells, including three point of compliance wells (0402, 0413, and 0414) and one point of exposure surface water location (0602) for at least 5 years (through 2004) and up to 30 years (through 2029), to verify compliance with alternate concentration limits established by the Ground Water Compliance Action Plan.

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

Sample Locations Long-Term Surveillance Plan		Sample Locations Ground Water Compliance Action Plan	
Monitor wells:		Monitor wells:	
0410	Upgradient well	0406	Downgradient well
0406	Downgradient well	0412	Downgradient well
0412	Downgradient well	0413	Downgradient well
0413	Downgradient well	0414	Crossgradient well
0424	Downgradient well		
0414	Crossgradient well		
Surface water (Chartiers Creek) locations:		Surface water (Chartiers Creek) location:	
0601	Upstream from disposal cell	0602	Adjacent to Area C
0602	Adjacent to Area C		
0603	Downstream at railroad bridge		

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 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 the Ground Water Compliance Action Plan for the point of compliance wells; a limit of 0.01 mg/L was established for the point of exposure surface water location.

Molybdenum concentrations were below the laboratory reporting limit and significantly below the maximum concentration limit in all ground water samples collected in October 2002. 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. The disposal cell cannot be a significant contributor 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 (well 0424 is not shown because concentrations are at or below the detection limit). The plots representing wells 0406 and 0414 include respective data from replacement wells 0406A and 0414A. Uranium concentrations exceeded the standard at two of the four downgradient wells (0412 and 0413) in 2002. Historically (before 1992), uranium concentrations at well 0414 were consistently elevated above levels observed at upgradient well 0410 but still below the maximum concentration limit. Uranium concentrations at well 0414 increased between 1993 and 1995, and decreased until the well was replaced. Uranium concentrations observed in replacement wells 0406A and 0414A have been near the laboratory detection limit since they were installed, perhaps due to lithological or hydrological differences in the unconfined aquifer between them and the wells they replaced. Uranium concentrations were below the laboratory detection limit at all sampling locations in Chartiers Creek.

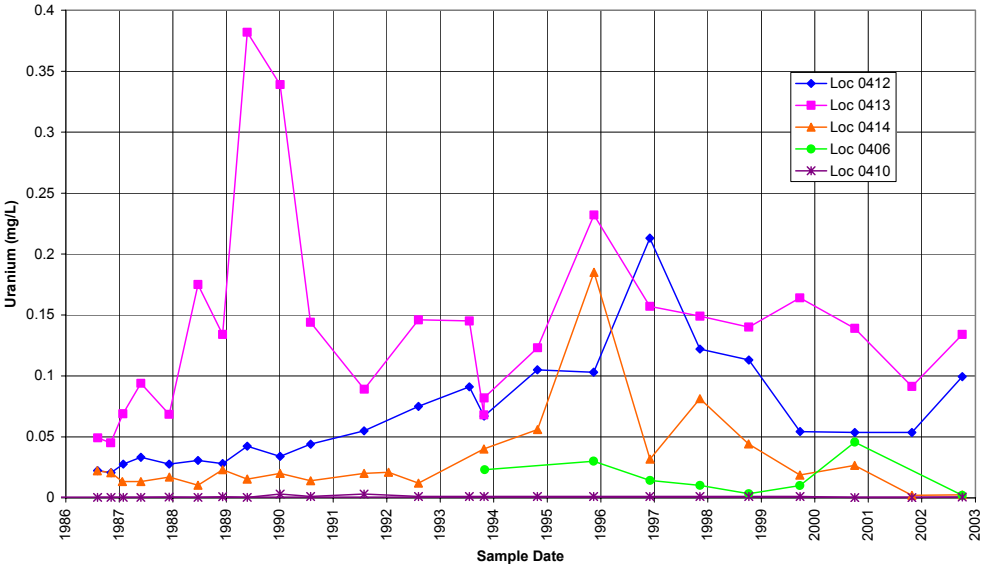


Figure 3−2. Time-Concentration Plot of Uranium in Ground Water at the Canonsburg, Pennsylvania, Disposal Site

The elevated concentration of uranium at some wells, and the wide fluctuations in uranium at these wells over the years, are probably unrelated to disposal cell performance for the following reasons: (1) there is remnant contamination outside the disposal cell; (2) the geochemistry of ground water in the unconsolidated materials beneath the disposal cell apparently is favorable for the mobilization of uranium; and (3) high levels of uranium existed in ground water before construction of the disposal cell.

Manganese levels exceed the secondary drinking water standard at all point of compliance wells by 2 to 3 orders of magnitude. Results from October 2002 are consistent with results from the previous 4 years, with one exception. The manganese concentration in replacement well 0414A has been higher in the last 2 years than in previous years. The increase in manganese concentration may be related to installation of the new well, perhaps due to lithological or hydrological differences in the unconfined aquifer between it and former well 0414. Manganese concentration in surface water at the point of exposure location in Chartiers Creek has decreased and is currently below the secondary drinking water standard.

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.

5.0 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 2002.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL−1	270	Security fence along south side of site showing rusting fabric.
PL−2	225	Treated vegetation in diversion channel.
PL−3	170	Restored stream bank.
PL−4	170	Erosion at south end of restored stream bank.

PL–1. Security fence along south side of site showing rusting fabric.

PL–2. Treated vegetation in diversion channel.

PL–3. Restored stream bank.

PL–4. Erosion at south end of restored stream bank.

End of current section

2002 Annual Compliance Report
Durango, Colorado, Disposal Site

Compliance Summary

The site, inspected on June 26, 2002, was in good condition. Vandalism continues to be a problem at the site. Three perimeter signs were missing, and new bullet holes were found in other perimeter signs. Several perimeter signs were replaced and reinforced with welded angle iron frames to curtail theft. Deep-rooted plants growing on the cell were cut down and herbicide was applied to their stalks. State-listed noxious weeds were treated with herbicide, and biological control was initiated for a weed recommended for control by the county. Ground water monitoring results indicated that the disposal cell is performing as designed. No requirement for a follow-up or contingency inspection was identified.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 7.0	Section 2.0
Routine Maintenance and Repairs	Section 8.0	Section 3.0
Ground Water Monitoring	Section 5.0	Section 4.0
Corrective Action	Section 5.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, southwest of Durango, Colorado, was inspected on June 26, 2002. 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.

1.1 Specific Site Surveillance Features

Entrance Gates, Entrance Sign, Perimeter Signs—The site is accessed by LaPlataCounty Road 212, 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 were in good condition.

Three perimeter signs near the site entrance (P1, P2, and P3) were missing and sixteen perimeter
4A signs had bullet holes. The three missing signs and four other damaged signs were replaced and reinforced with welded angle iron frames to curtail theft. DOE will evaluate the success of these efforts during future inspections.

Trespass and vandalism are very difficult to control because the site is isolated yet near the City of Durango. Although DOE has implemented various structural, institutional, and administrative controls at this site, including increased patrols by County Sheriff officers, vandalism continues to be an on-going concern and maintenance issue.

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 damaged by bullets; however, the marker was legible. 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 0618 was added to the monitoring network as a supplement to well 0608.

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.

At the time of the 2002 inspection, vegetation on top of the cell was dry and stressed due to
4B drought conditions. The vegetation consists of seeded grasses and several volunteer species including deep-rooted shrubs and trees (PL–1), and musk thistle. In accordance with the Long-Term Surveillance Plan, the deep-rooted plants were cut and herbicide was applied to their stalks.

Musk thistle needs to be controlled as recommended by La Plata County. DOE initiated biological
4C control of this weed 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. The effectiveness of this biological control effort will be evaluated during future inspections.

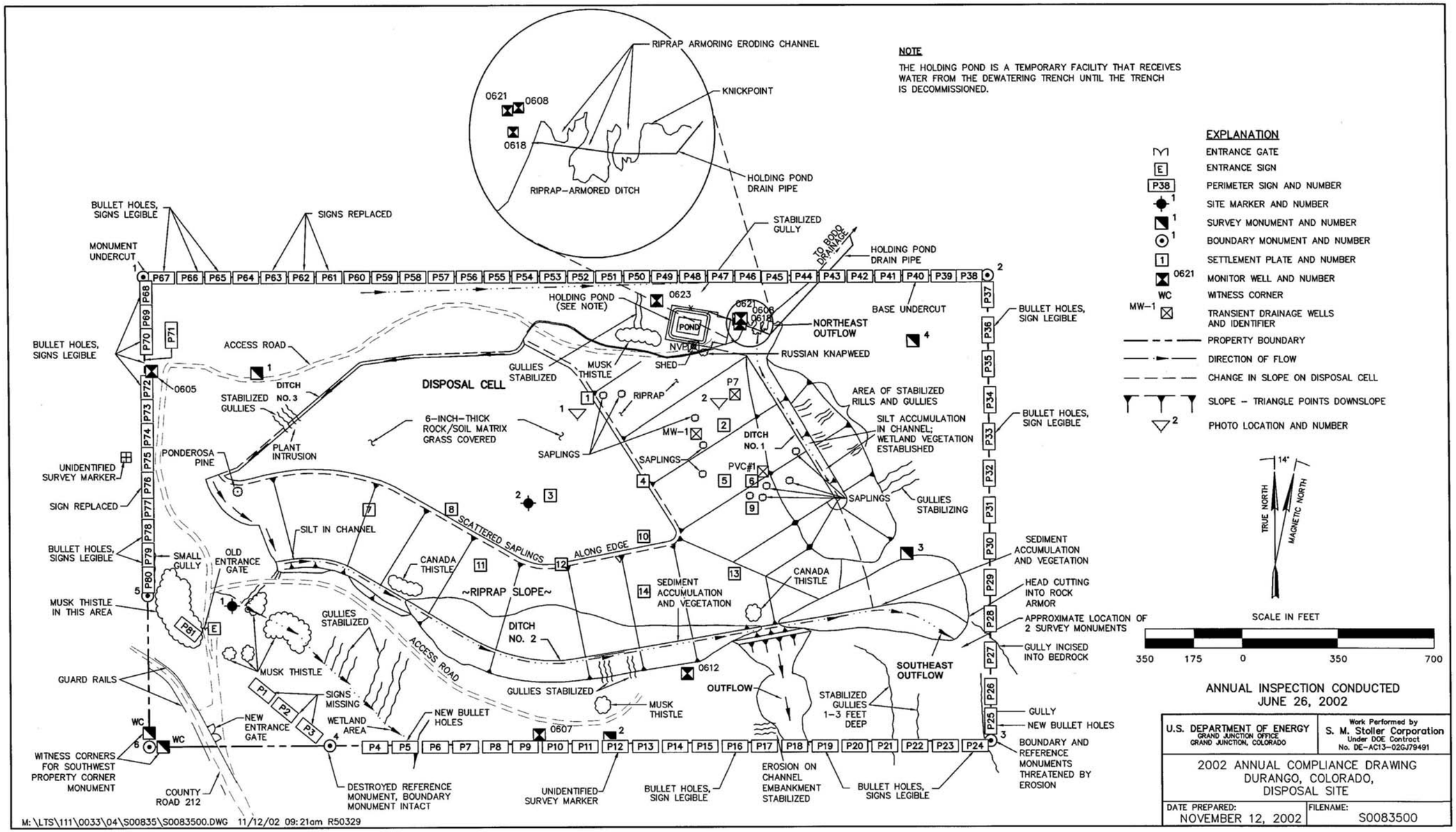


Figure 4–1. 2002 Annual Compliance Drawing for the Durango, Colorado, Disposal Site

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

Vegetation is increasing on the side slopes of the cell, particularly on the east and southeast sides (PL–2). The species included deep-rooted shrubs and trees, state-listed noxious weeds (Canada thistle and Russian knapweed), and musk thistle. The deep-rooted plants were cut and herbicide was applied to their stalks. Herbicide was also applied to the noxious weeds. Biological treatment was initiated to control musk thistle.

Drainage Ditches—Rock-armored drainage ditches were constructed beneath the toe of the side slope on 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 occurred at several places along these channels where the slopes above the ditches are steep, creating locales favoring plant growth. At places in Ditch Number 1, moist sediments support wetlands vegetation. Inspectors saw no evidence of recent slope erosion or accumulations of sloughed material into the rock-armored drainage ditches.

Treatment Cells and Retention Pond—The treatment cells, retention pond, and surrounding fence were in good condition.

Site Boundary—The site is not fenced. No evidence of vehicular trespass was observed during the 2002 inspection; however, vehicles can still access the disposal cell site from County Road 212 south of the recently installed guardrails. Vehicular trespass at this site has resulted in damage to survey monuments, creating ruts in roads and off-road areas, and damage to sensitive, reseeded areas that jeopardize soil and slope stabilization efforts. Future inspections will continue to monitor trespass conditions at the site, and appropriate preventative measures will be implemented as needed.

Previously rutted and disturbed areas at the site entrance were seeded in October 2000. During 2001, inspectors observed young grasses and non-noxious annual weeds emerging in these areas. However, due to the drought conditions, it was not possible to ascertain if the new grass is still viable. Grass growth will be evaluated during future inspections.

Areas of rill and gully erosion on the south-facing slope along the southern boundary of the site appeared 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 Number 2 has subsided. No new erosion had occurred on or around the site.

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. No activity or development that might affect site integrity was observed.

2.0 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

Several perimeter signs were replaced and reinforced. On the cell cover and side slopes, deep-rooted shrubs and trees were cut and treated with herbicide, noxious weeds were treated with herbicide, and biological treatment was initiated to control musk thistle plants.

4.0 Ground Water Monitoring

Ground water is monitored at the Durango site to verify the initial performance of the disposal cell. The monitoring network consists of six wells. Four wells are completed in the uppermost aquifer (bedrock of the Cliff House Sandstone and the Menefee Formation), including one upgradient (0605) and three downgradient point of compliance wells (0607, 0612, and 0621). Two wells are completed in the alluvium upgradient (0623) and downgradient (0608) from the cell. Monitor well 0618 (screened to the bottom of the alluvial aquifer) near companion well
4D 0608 (screened to 10 feet above the base of the alluvial aquifer) was added to the monitoring network 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 2002 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.

5.0 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 2002.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	45	Deep-rooted plant growth on disposal cell.
PL–2	270	Vegetation on east side slope of cell.

PL–1. Deep-rooted plant growth on disposal cell.

PL–2. Vegetation on east side slope of cell.

End of current section

2002 Annual Compliance Report
Falls City, Texas, Disposal Site

Compliance Summary

The site, inspected on January 16, 2002, was in excellent condition. Scattered small trees and bushes that colonized the side slopes of the disposal cell have largely been eliminated. Results of ground water monitoring were consistent with results from previous years and indicate essentially steady-state conditions. Other than ongoing management of the grass and side slope vegetation, and minor fence repairs, inspectors identified no requirement for additional maintenance or a follow-up or contingency inspection.

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 Grand Junction Office 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 received concurrence from the U.S. Nuclear Regulatory Commission on September 18, 1998. Provisions of the Ground Water Compliance Action Plan will be incorporated into the Long-Term Surveillance Plan.

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 1.0
Follow-up or Contingency Inspections	Section 7.0	Section 2.0
Routine Maintenance and Repairs	Section 8.0	Section 3.0
Ground Water Monitoring	Section 5.0 and the GCAP[a]	Section 4.0
Corrective Action	Sections 5.0 and 9.0	Section 5.0

[a]Ground Water Compliance Action Plan dated March 19, 1998

Compliance Review

1.0 Annual Inspection and Report

The site, east of Falls City, Texas, was inspected on January 16, 2002. 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.

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 in excellent condition but were not locked.

A barbed wire fence set on the property boundary encompasses the site. The fence predates cell construction and is corroding, but generally was in good condition except along the northwest boundary where it leans outward above a steep bank. The fence appeared to be sufficiently stable at this position to keep cattle out, and there was no indication that livestock has ever entered the site. A deer trail was present near perimeter sign P35 where a fence strand was broken.

The entrance sign, located at the main entrance gate, was in excellent condition. There are 64 perimeter signs along the site boundary. All signs were present and in good condition. Perimeter sign P43 had slipped down the post to the ground and was repositioned during the inspection.

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

Monitor Wells—The 12 wells in the cell performance and ground water compliance monitoring networks were locked and in excellent condition.

1.2 Transects

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

Top and Side Slopes of the Disposal Cell—The top of the disposal cell is covered with well-established coastal Bermuda grass and was in excellent condition. The grass is cut and baled by a local farmer. There are no trees or woody shrubs on top of the disposal cell; grass cutting appears
5A to be an effective control of these plants. Some woody species have established along the edge of the transition zone (PL–1) where the grass is not cut because of proximity to the riprap. These shrubs were cut and herbicide was applied to the stumps.

Small amounts of fractured riprap were observed along the side slopes, as also noted during previous inspections. It has not been determined if the fractured riprap is an artifact of quarrying and placement or an indication of rock degradation. If subsequent inspections indicate that rock degradation may be occurring, implementation of a formal monitoring program will be evaluated.

Small scattered trees and bushes that had established on the side slopes were mostly absent. Inspectors sprayed the plants with herbicide in previous years and a local farmer was contracted to eradicate the perennial plants. Greasewood and similar species are concerns because they are deep-rooted. Most vegetation was dead including annual plants and most woody species; however, new growth on some previously treated plants was observed (PL−2). Vegetation control will continue on the side slopes.

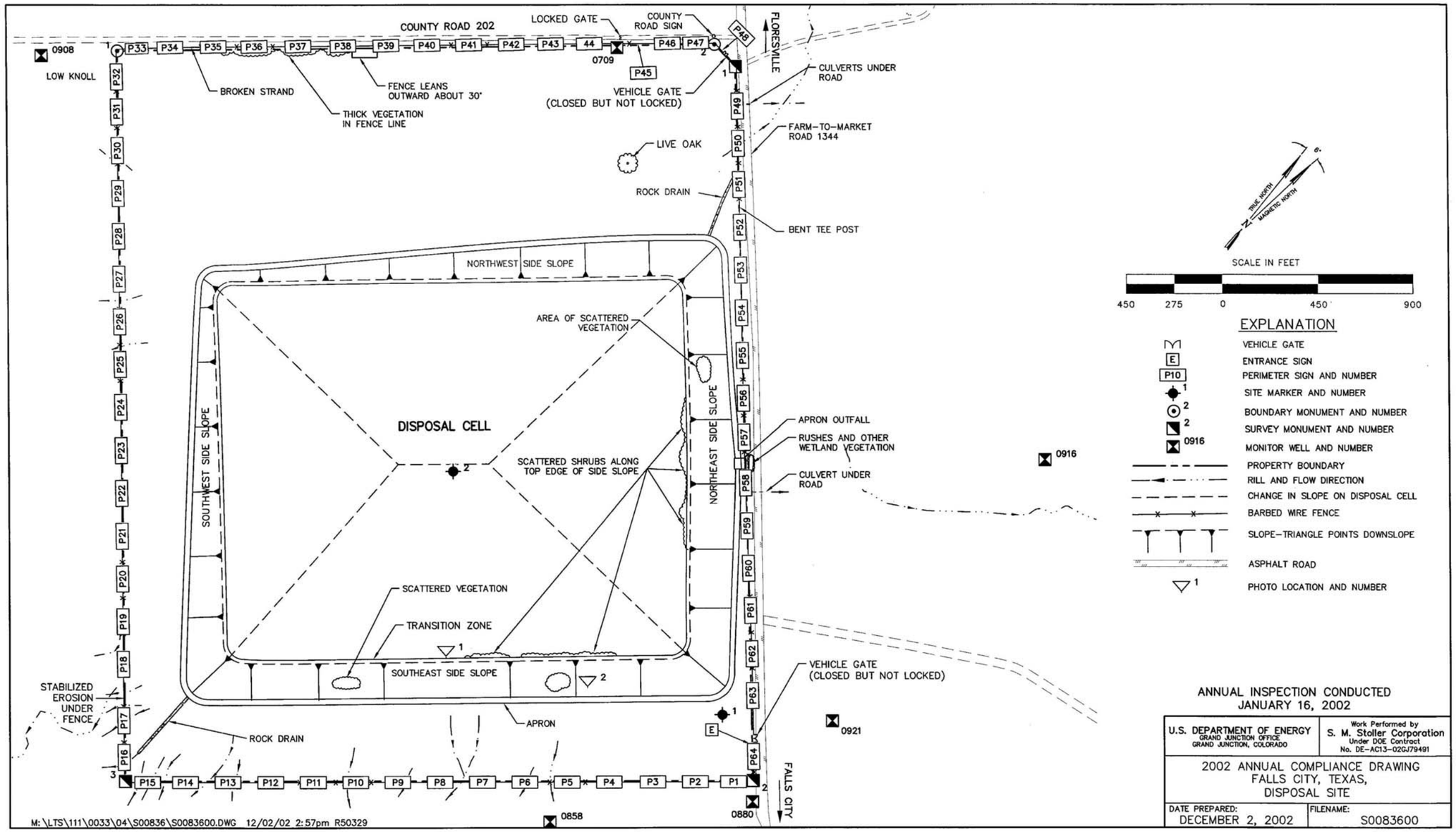


Figure 5–1. 2002 Annual Compliance Drawing for the Falls City, Texas, Disposal Site

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. A swath of grass was left uncut along the fence and also along rock drains, and around some of the as-built features, such as the site markers.

Water was standing at the north end of the north rock drain, and at the south end of the south rock drain. As noted in previous years, grass is growing in both drains but not in the apron outfall. The rock drains appeared to be functioning properly despite the grass encroachment but will continue to be monitored.

Minor gullies located south of the disposal cell were all shallow and stabilized by grass. Gully erosion is no longer considered a problem at the site.

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 observed.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

A perimeter sign was resecured at its proper position on its signpost. Woody plants along the transition zone between the cell top and the side slopes were cut down and their stalks were treated with herbicide. As an annual maintenance item, grass on the cell top and between the cell and the perimeter fence was cut and baled by a local farmer.

4.0 Ground Water Monitoring

DOE monitors ground water at the Falls City site for two purposes. Ground water is monitored in the uppermost aquifer to demonstrate the initial performance of the disposal cell. DOE also
5B monitors ground water downgradient of legacy plumes of contaminated ground water to ensure that users are not exposed to processing-related hazardous materials. The monitor well network is shown on Figure 5–2.

Cell Performance Monitoring—The cell performance monitoring network consists of seven wells (0709, 0858, 0880, 0906, 0908, 0916, and 0921) completed in the Conquista and Deweesville sandstone units, which together constitute the uppermost aquifer. Wells 0908 and 0916, completed in the unsaturated zone of the Conquista Sandstone, are dry and have never produced samples—these wells are used only to detect a rise in the water table. The other five wells are sampled twice each year.

As stipulated in the original Long-Term Surveillance Plan, samples are analyzed for 10 analytes, all with maximum concentration limits established by the U.S. Environmental Protection Agency in Table 1 to Subpart A of 40 CFR 192 (Table 5–2).

Table 5–2. Cell Performance Analytes and Standards for the Falls City, Texas, Disposal Site

Analyte	MCL[a]	Analyte	MCL[a]
Arsenic	0.05 mg/L	Nitrate (as N)	10 mg/L[b]
Cadmium	0.01 mg/L	Selenium	0.01 mg/L
Chromium	0.05 mg/L	Uranium	0.044 mg/L
Lead	0.05 mg/L	Radium-226+228	5 pCi/L
Molybdenum	0.10 mg/L	Gross alpha	15 pCi/L

Note: mg/L = milligrams per liter; pCi/L = picocuries per liter
[a]MCL = Maximum concentration limit established in 40 CFR 192.
[b]The standard of 10 mg/L for nitrate as N is equivalent to a concentration of 44 mg/L for nitrate as NO_3. Nitrate as NO_3 is the analyte measured for this site.

Monitoring for these analytes is now understood to be an ineffective and inappropriate means to monitor the initial performance of the disposal cell. Ground water at the site is in contact with naturally occurring uranium deposits and associated minerals. 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 naturally occurring ground water contaminated by minerals and human activities (mining, milling, and mineral exploration).

The Long-Term Surveillance Plan identifies pH as the indicator parameter for cell performance monitoring on the basis of tailings pore-fluid chemistry. However, legacy plumes typified by low pH exist beneath the cell in a ground water mound created by infiltration from historical tailings impoundments and mill effluent discharges. These plumes would be expected to spread outward as the ground water seeks an equilibrium level; however, buffering mechanisms caused by interaction of low pH waters and formation materials are expected to limit plume extent. The pH of the ground water samples collected in 2001 and 2002 was essentially unchanged and consistent with previous results for all wells (Figure 5−3).

Analytical results from 2002 are consistent with previous results and what would be expected of ground water contaminated by uranium mineralization. Of the 10 analytes, concentrations of arsenic, cadmium, selenium, and uranium, and activities of radium and gross alpha, continue to exceed their respective standards in several wells. Uranium concentrations, though near or below the standard in most wells, continue to increase well above the standard in monitor well 0880 (Figure 5–4). This increase in concentration may be an indication of a legacy plume spreading outward as expected.

Water level measurements from the monitor wells indicate that the elevation of the water table has generally dropped several feet since the disposal cell was constructed, but has been relatively stable since 2001. The water level data indicate that the falling water table in the vicinity of the cell probably is not part of a regional trend but is, instead, a local effect due to dissipation of the ground water mound beneath the disposal cell.

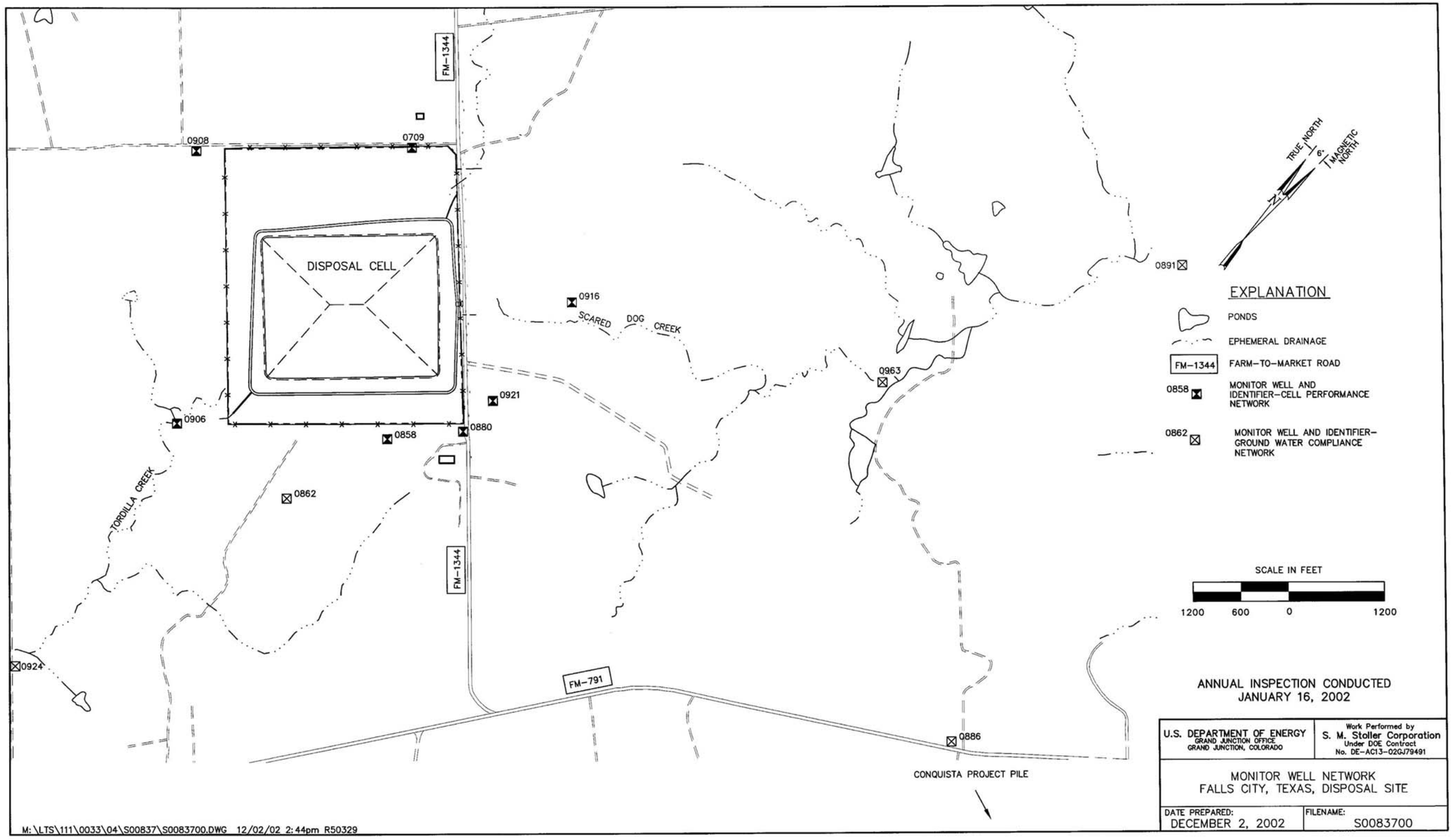


Figure 5–2. Monitor Well Network at the Falls City, Texas, Disposal Site

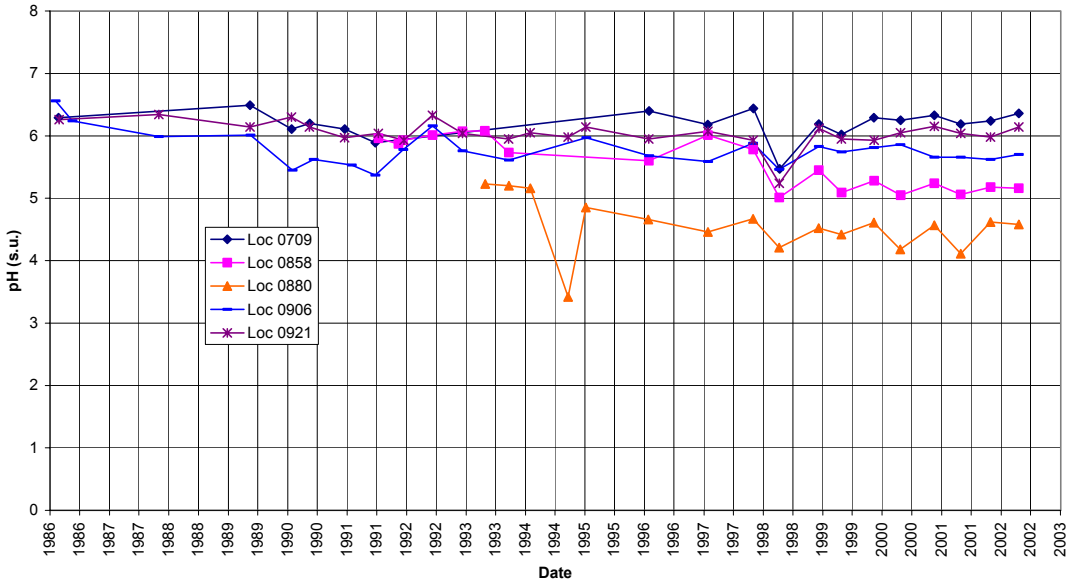


Figure 5−3. Plots of Ground Water pH at Cell Performance Monitor Well Locations at the Falls City, Texas, Disposal Site

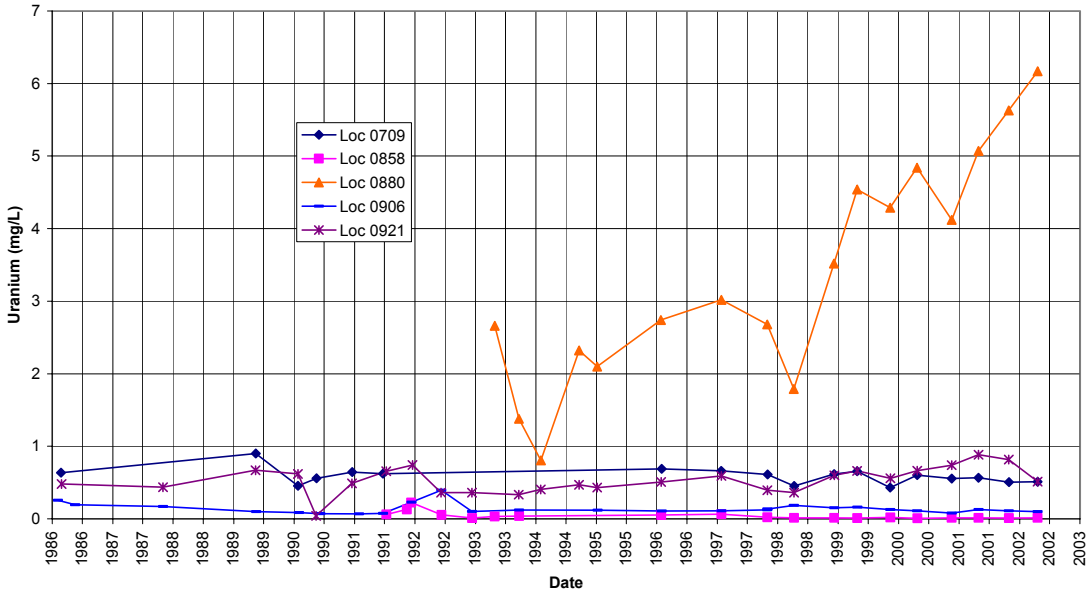


Figure 5−4. Time-Concentration Plots of Uranium in Ground Water at Cell Performance Monitor Well Locations at the Falls City, Texas, Disposal Site

Ground Water Compliance Monitoring—The U.S. Nuclear Regulatory Commission approved the Ground Water Compliance Action Plan for the Falls City site in 1998. The Plan requires monitoring downgradient of the legacy plumes of contaminated ground water through 2003.

Two legacy plumes were identified: (1) a plume east of the site was identified in the Conquista/Deweesville aquifer and the underlying Dilworth aquifer; and (2) a plume underlying the cell and extending to the south was identified in the Conquista/Deweesville aquifer, although elevated concentrations of some analytes had historically been observed in the Dilworth aquifer at well 0862. The plumes were identified where ground water pH exceeded 4.0.

The compliance monitoring network consists of five wells (0862, 0886, 0891, 0924, and 0963). Sample locations were selected on the basis of ground water flow direction from the two plumes. The wells are sampled annually and analyzed for 33 analytes, of which 10 have a standard specified in Table 1 to Subpart A of 40 CFR 192 (Table 5–2). Concentrations of cadmium, selenium, uranium, and activities of radium and gross alpha continue to exceed their respective standards in several wells. Analyte concentrations at most locations remained essentially constant. Plots of pH measurements and uranium concentrations are shown on Figures 5−5 and 5−6.

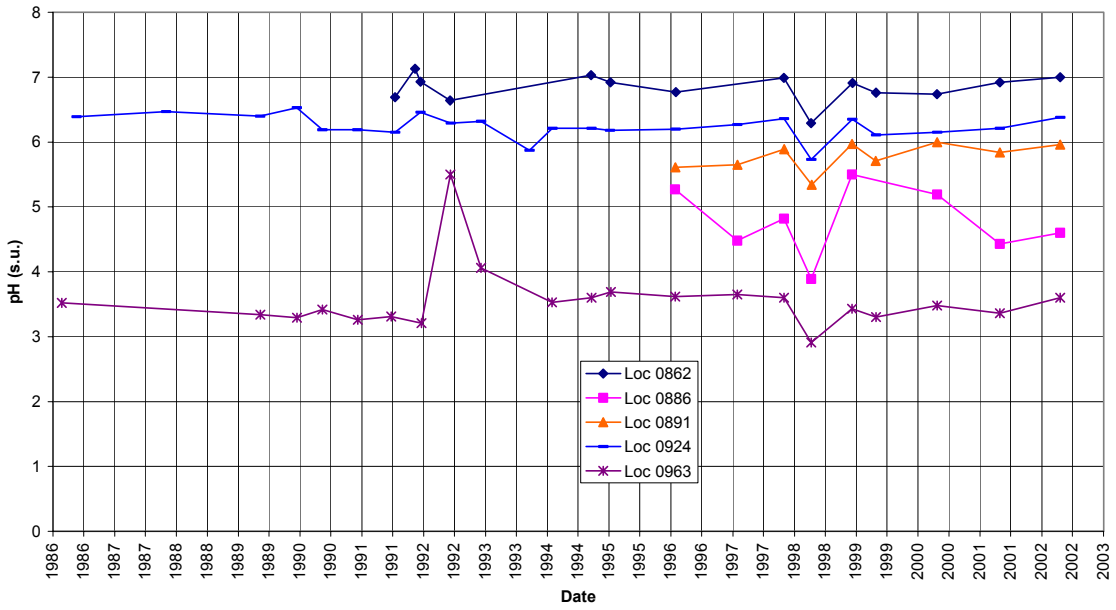


Figure 5−5. Plots of Ground Water pH at Compliance Monitor Well Locations at the Falls City, Texas, Disposal Site

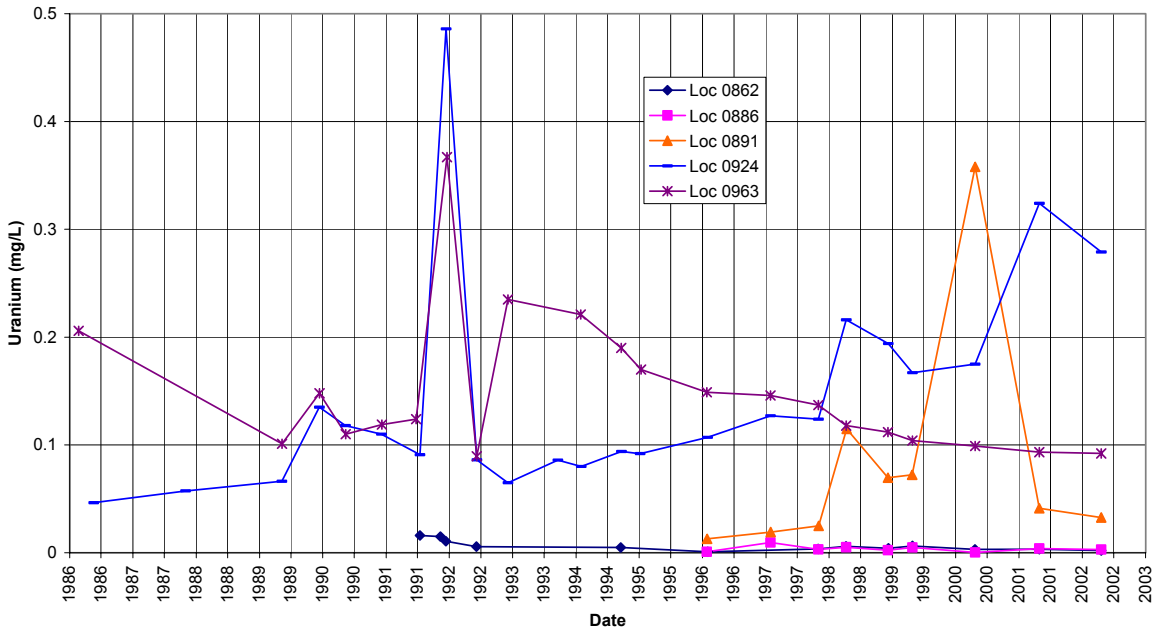


Figure 5−6. Time-Concentration Plots of Uranium in Ground Water at Compliance Monitor Well Locations at the Falls City, Texas, Disposal Site

Ground water levels at the compliance monitoring locations have remained essentially constant since monitoring began. Minor fluctuations in water level are likely caused by seasonal factors affecting recharge rates.

5.0 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 2002.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL−1	215	Woody vegetation on southeast edge of cell top.
PL−2	0	New growth on previously treated vegetation.

PL−1. Woody vegetation on southeast edge of cell top.

PL−2. New growth on previously treated vegetation.

End of current section

2002 Annual Compliance Report
Grand Junction, Colorado, Disposal Site

Compliance Summary

The site, inspected on March 19, 2002, was in excellent condition. The part of the disposal cell that remains open is operated by the Long-Term Radon Management Project 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.

Loose perimeter signs were resecured and missing signs were replaced. Plants, primarily annual weeds, are continuing to encroach on the disposal cell, especially on the south side. The revegetation of the former ramp area on the east side of U.S. Highway 50 is establishing, but is spotty. Inspectors identified no requirement for a follow-up or contingency inspection.

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 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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 3.0	Section 2.0
Routine Maintenance and Repairs	Sections 2.7.3 and 4.0	Section 3.0
Ground Water Monitoring	Section 2.6	Section 4.0
Corrective Action	Section 5.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, south of Grand Junction, Colorado, was inspected on March 19, 2002. Results of the inspection are described below. Features 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.

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, 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.

The drainage ditch along the south side of the access road discharges into an arroyo approximately 600 feet from the site access gate located on U.S. Highway 50. Erosion is occurring at the outfall of the drainage ditch. Because the erosion threatens the integrity of the access road, the outfall of the drainage ditch will be monitored and erosion control measures will
6A be evaluated.

Entrance and Perimeter Signs—The entrance and 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. Metal "Controlled Area" signs and yellow plastic "No Trespassing" signs are secured to the fence in pairs. There are 75 warning sign locations, each about 200 feet apart along the site boundary. Loose metal signs were resecured and missing plastic signs were
6B replaced with metal signs.

Site Marker and Boundary Monuments—Granite site markers will not be installed at this site until the entire disposal cell is closed at the end of the Long-Term Radon Management Project.

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.

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.

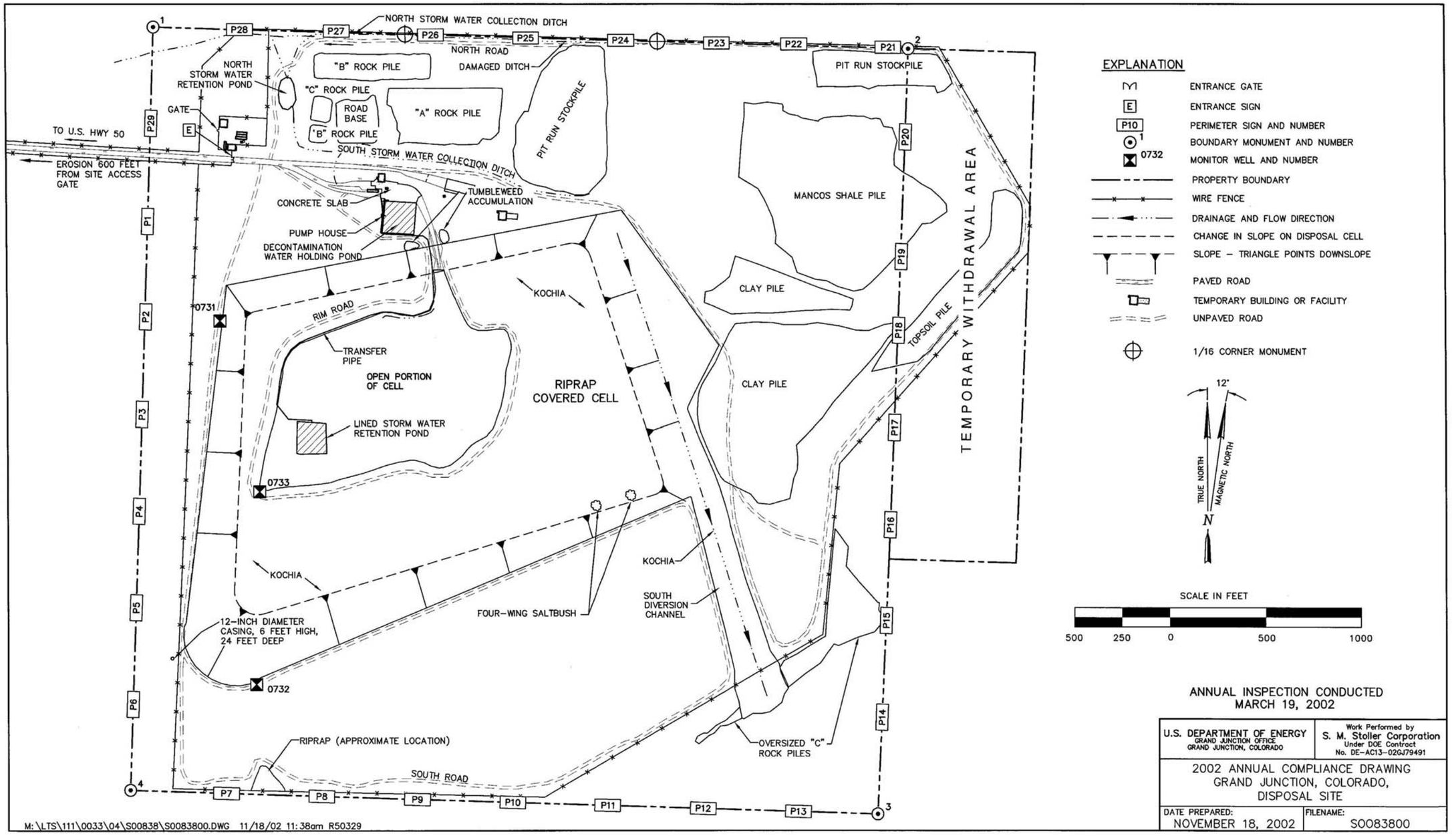


Figure 6–1. 2002 Annual Compliance Drawing for the Grand Junction, Colorado, Disposal Site

Closed Portion of the Disposal Cell—DOE will manage the open 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 for dust control. The pond also reduces leaching through the cell and into the underlying strata.

The top and side slopes of the disposal cell are covered with basalt riprap. The rock was in excellent condition.

Plant encroachment is occurring, mostly on the southeastern part of the disposal cell top. Deep-rooted plants, which were cut back and treated with herbicide in 2001, may change the performance characteristics of the radon/infiltration barrier. This condition needs to be evaluated as part of the work underway by the DOE Long-Term Performance and Cover Monitoring Project to determine if control of these plants is necessary. Until the evaluation is
6C completed, these plants will be controlled. The disposal cell cover will continue to be monitored for plant encroachment; however, no additional plant control was required in 2002.

The riprap-armored side slopes of the disposal cell were in excellent condition. There was very little plant encroachment observed on the side slopes, and there was no evidence of slope instability.

Diversion Structures and Drainage Channels—The south diversion channel is 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. Some minor plant growth, mostly kochia and Russian thistle, exists within the channel. There was not enough plant growth to impede water flow within the channel. The diversion channel was in excellent condition.

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. 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. Minor erosion was previously noted west of the perimeter fence where the north storm water collection ditch ends and water spills down slope into the natural drainage northwest of the disposal site. Erosion did not appear to have occurred since the last inspection; however, the outflow area below the mouth of the north storm water collection ditch should continue to be monitored. The north road crosses the north storm water collection ditch between signs perimeter signs P24 and P25. Tire ruts have caused
6D water to leave the collection ditch and flow down the road. The ditch will be reconstructed at the vehicle crossing 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. Inspectors noted that the ditches showed signs of having conveyed water without overtopping. The ditches did not need maintenance, but at some point they may need to be cleaned out to convey storm water.

Area Between the Disposal Cell and the Site Boundary—In addition to the temporary buildings and structures used by the Long-Term Radon Management Project, 12 discrete stockpiles of rock and soil are located between the disposal cell and the site boundary on the north and east sides of the disposal cell. These materials eventually will be used by the Long-Term Radon Management Project to cover and close the open cell. Rill erosion is occurring on some of the soil stockpiles, but inspectors saw no indication of off-site sediment transport. Natural vegetation is beginning to grow on these stockpiles and eventually will hold the soil in place. If not, the soil stockpiles could be reseeded to help prevent erosion.

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 U.S. Bureau of Land Management. 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. No development or disturbance that could affect the disposal site was observed.

2.0 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

Warning signs on the perimeter fence were resecured or replaced as needed.

4.0 Ground Water Monitoring

DOE monitors ground water to detect seepage from the disposal cell.

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 paleochannels adjacent to the disposal cell (0731 and 0732) and one monitor well in the disposal cell (0733) is monitored to assess performance of the disposal cell and to ensure that any water in the paleochannels is not impacted by seepage from the disposal cell (Figure 6−1). The paleochannel wells are located 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 (0733) is approximately 15 and 35 feet lower (deeper) than water levels in the paleochannels at wells 0731 and 0732, respectively (Figure 6–2). This indicates that ground water cannot seep from the disposal cell to the paleochannels. The disposal cell is designed to shed rainfall and snowmelt efficiently; therefore, variable water levels in the paleochannel wells could be attributed to increased runoff from the cell.

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 2002 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 wells 0732 and 0733, but were below the MCL in well 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 monitor well 0733 (Figure 6−4). Sulfate concentrations continued to be relatively high in all wells, at approximately 6,500 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 well 0733 in the disposal cell. Concentrations of TDS in ground water in the paleochannel wells were around 7,000 mg/L. Uranium concentrations in ground water remained approximately at the MCL of 0.044 mg/L in well 0731, but below the MCL in wells 0732 and 0733 (Figure 6–5).

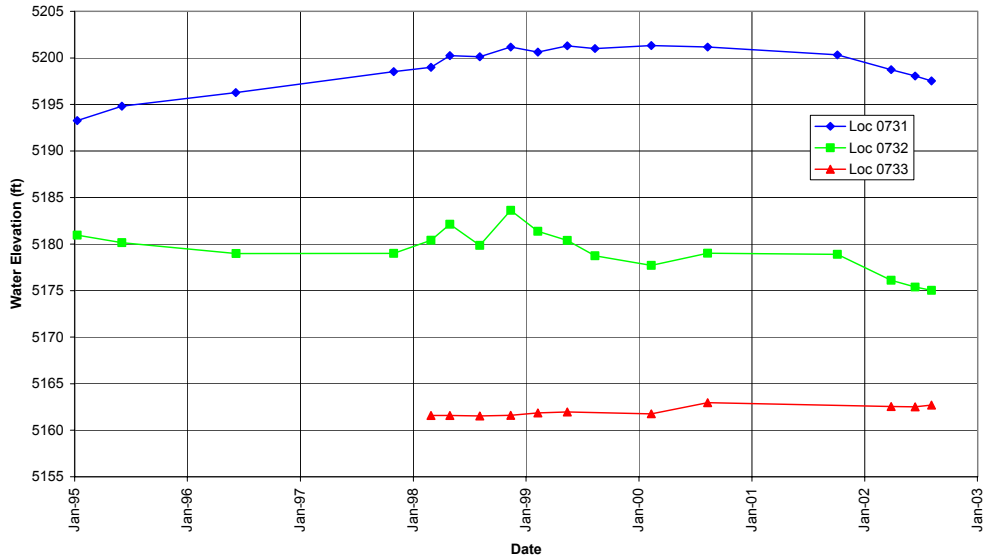


Figure 6−2. Water Level Measurements at the Grand Junction, Colorado, Disposal Site

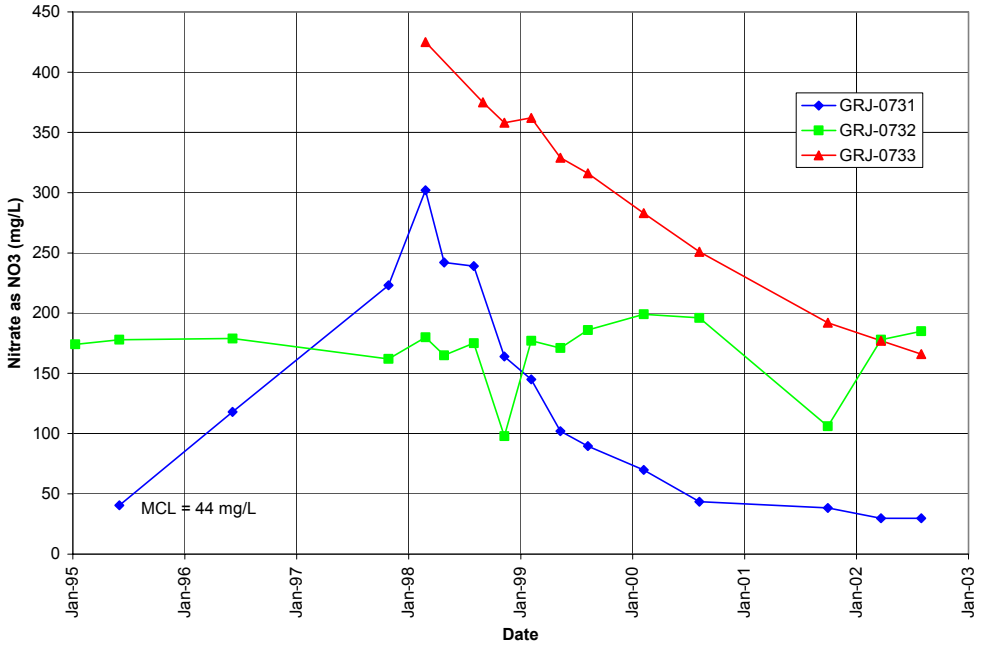


Figure 6−3. Time-Concentration Plots of Nitrate (as NO_3) in Ground Water at the Grand Junction, Colorado, Disposal Site

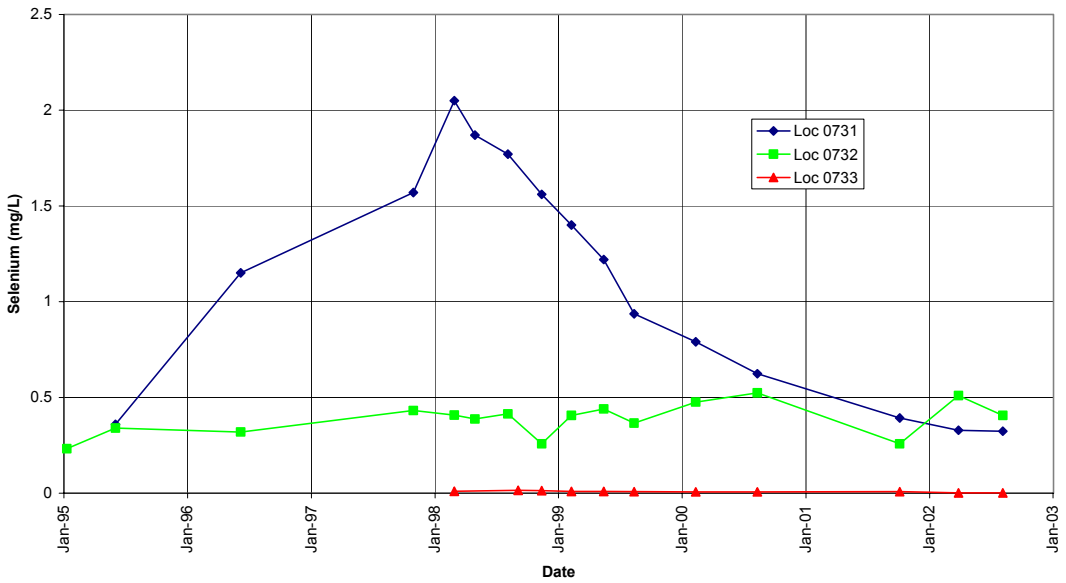


Figure 6−4. Time-Concentration Plots of Selenium in Ground Water at the Grand Junction, Colorado, Disposal Site

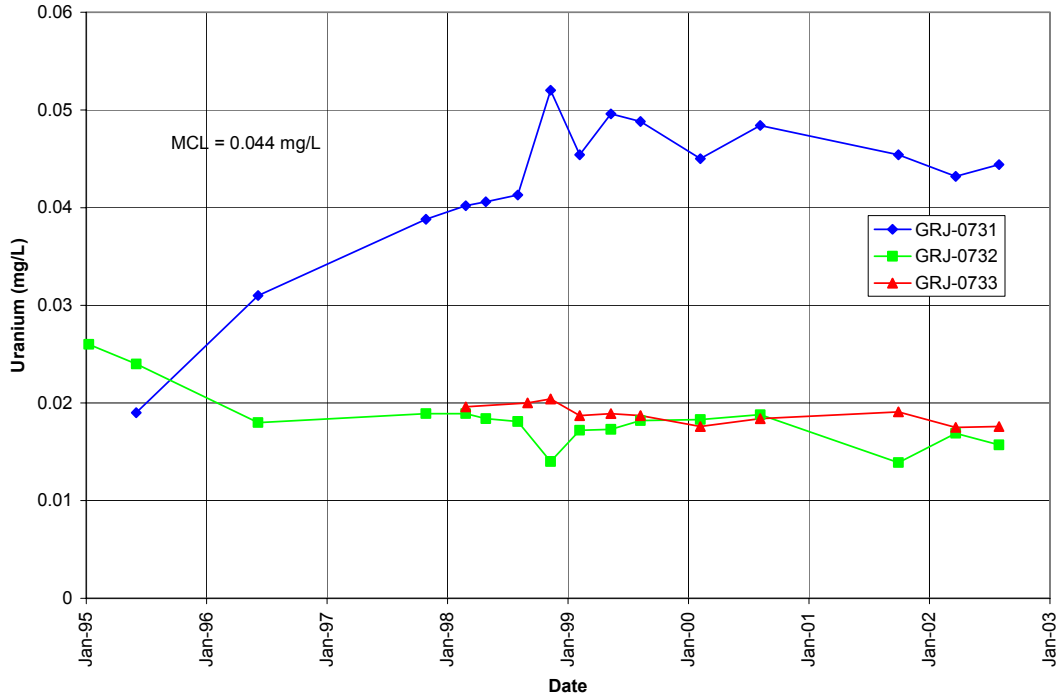


Figure 6−5. Time-Concentration Plots of Uranium in Ground Water at the Grand Junction, Colorado, Disposal Site

PCBs were not detected in ground water in any of the wells. Analysis of PCBs was included because of permitted disposal of a very small amount of PCB-contaminated material in the disposal cell. Because these compounds have low mobility due to their tendency to adsorb to organic carbon, clays, and other materials, they are not expected to migrate into ground water.

Nitrate, selenium, sulfate, TDS, and uranium concentrations in ground water in monitor well 0731 peaked around 1998 and have declined steadily since then. A possible explanation for this decline is the disturbance of the paleochannel near monitor well 0731, which may have exposed native material to ground water. In comparison, concentrations at monitor well 0732, where the paleochannel was not disturbed, remain generally constant. Sampling in 2002 indicated no significant departures from analytical results of previous years.

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 may have increased moisture in soils, paleochannels, and weathered shale around the disposal cell, which would increase the mobility of nitrate, sulfate, and uranium in these materials.

Monitoring results indicate the disposal cell is not degrading water quality in the paleochannels.
6E This is expected because water levels in the paleochannels are significantly higher than in the cell. Consequently, wells 0731 and 0732 will not be affected by transient drainage from the cell.

5.0 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 2002.

2002 Annual Compliance Report
Green River, Utah, Disposal Site

Compliance Summary

The site, inspected on March 12, 2002, was in excellent condition. Ground water monitoring continued in 2002 for the purpose of evaluating cell performance, trends in contaminant levels, and the relationship between local precipitation and ground water flow. Missing perimeter signs and a cut gate lock were replaced, and a section of state-owned fence was repaired. No additional maintenance was required, and no need was identified for a follow-up or contingency inspection.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 7.0	Section 2.0
Routine Maintenance and Repairs	Section 8.0	Section 3.0
Ground Water Monitoring	Section 5.2	Section 4.0
Corrective Action	Section 9.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, southeast of Green River, Utah, was inspected on March 12, 2002. 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.

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 to the disposal cell, which is enclosed within a chain link fence. The chain link fence is set

back between 50 and 250 feet from the site boundary. Two vehicle access gates are installed in this fence at the south and east corners of the fence line. A personnel gate is at the north corner of the fence line. The road, fence, and gates were in excellent condition.

7A The site has one entrance sign and 17 perimeter signs. The signs are on posts along the site boundary. Perimeter signs P8 and P9 were missing, but replaced by the inspectors.

Site Markers and Monuments—The two granite site markers, 11 boundary monuments, and three survey monuments were in excellent condition. Inspectors noted the erosion around the base of boundary monument BM–3 (PL–1). The rill and gully erosion is attributable to sheet flow from poorly vegetated areas upslope of the monument. Although the integrity of the monument is not in any immediate danger, continued monitoring of erosion will be performed. Remedial measures to divert sheet flow away from the monument will be considered.

Monitor Wells—The ground water monitoring network consists of four point of compliance wells northwest of the disposal cell. An additional well located offsite is used for monitoring aquifer water level. These wells were in excellent condition. Other wells located at and around the site are used by the Uranium Mill Tailings Remedial Action Ground Water Project.

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. Little evidence of plant encroachment could be found on the side slopes of the disposal cell. Several widely scattered plants representing last year's growth were noted; however, they appeared to have died from lack of moisture before reaching maturity. Because these plants are annual weeds that never matured, they are not considered a problem.

The diversion channel along the base of the disposal cell on all sides was in excellent condition. As noted in previous inspections, the small-scale rill erosion at the southwest corner of the disposal cell was inspected and found to be unchanged from last year. This erosional feature is not considered to be a threat to the disposal cell and no further action is required at this time.

Inspectors noted the series of linear cracks running parallel to the northeastern edge of disposal cell, which were first observed in 2000. The cracks are located approximately 25 feet from the edge of the riprap, vary in length, and were approximately 6 to 10 inches deep. Wind blown sediments are filling the cracks, and the cracks do not pose a threat to the integrity of the disposal cell, nor do they warrant any maintenance action. The cracks are believed to be attributable to the settling of the soils that were backfilled against the cell apron.

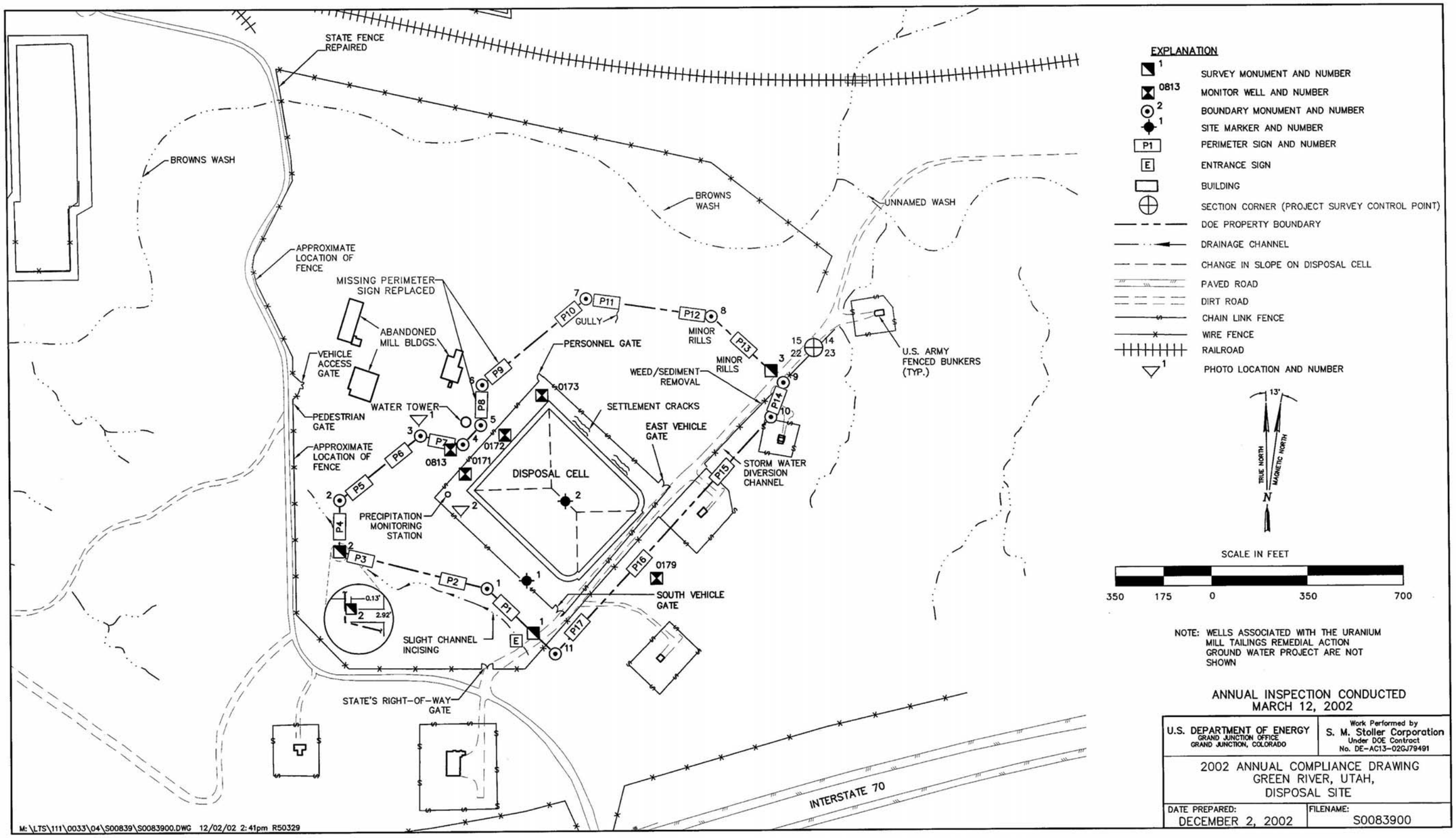


Figure 7–1. 2002 Annual Compliance Drawing for the Green River, Utah, Disposal Site

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, sparse growth is a typical condition of the natural, undisturbed surrounding areas. Natural and seeded plants are expected to continue to slowly colonize the site. There is no need for continued monitoring of vegetation at this site.

Rill and gully erosion noted during previous inspections on the hillside northeast of the disposal cell in the area between boundary monument BM–7 and survey monument SM–3 was unchanged. Maximum rill depth at this location was approximately 12 inches. The gully southeast of BM–7 is the largest erosional feature on this hillside and was mostly filled with tumbleweeds. New vegetation is establishing in the bottom of this gully. Rill and gully erosion appears to be stabilizing, and poses no threat to the integrity of the disposal cell or any site surveillance features.

The entrance to a culvert located in the storm water diversion channel, along the eastern edge of the disposal site, was again clogged with weeds and eroded sediments. The weeds and sediments were removed, effectively opening the culvert inlet. The culvert underlies an entrance road leading to a locked U.S. Army White Sands Missile Range bunker.

In the past, inspectors noted tracks from recreational vehicles on the hillside north of the disposal cell and outside the DOE security fence. With exception of the missing perimeter signs (P8 and P9), no evidence of trespass on DOE property was noted during the 2002 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 site.

Outlying Area—The area extending outward from the site for a distance of 0.25 mile was observed for signs of erosion, development, or other disturbance that might affect site security or integrity. Areas of erosion noted during previous inspections include the natural drainage southwest of the site, several rills near survey monument SM–2, and gullies northwest of the water tower. These erosional features appeared unchanged from previous inspections and currently pose no threat to the integrity of the disposal cell or any site surveillance feature.

Inspectors noted that the State of Utah right-of-way access gate at the south end of the site was secure. The gate provides DOE access to the disposal cell. Earlier in 2002 the gate chain and
7B lock had been cut. DOE resecured the gate at that time and determined that no obvious site vandalism had occurred.

The site access road curves around the southwest corner of the site and continues to the north. A state-owned barbed and wire fabric fence also turns at this corner and continues to the north parallel to the road. The inspectors noted that the vehicle gate in this fence was locked. DOE provided the City of Green River with a key. This gate allows access to the former millsite buildings and to DOE unfenced property north of the disposal cell. A nearby pedestrian gate, while closed, was not locked because the latch had been damaged. The pedestrian gate was secured with a chain and lock.

The state-owned fence continues to the north, then proceeds east. The last 150 feet of the north portion of the wire fabric had been ripped away from the T-post supports, and then pulled around the north corner to the east. Inspectors reattached the fabric.

Abandoned buildings associated with milling activities at the Green River processing site are located upwind (west) of the DOE property. The buildings are in a severe state of disrepair, and debris (e.g., roofing materials, siding, trash) continues to be blown from the buildings onto DOE property. Since the 2000 inspection, inspectors have noted an increase in the amount of trash and debris found on the northern portions of the DOE property and the outlying areas. Accumulation and types of materials blown onto DOE property will be monitored.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

Two missing perimeter signs were replaced, a cut lock on the site access gate was replaced, and a section of fence was repaired.

4.0 Ground Water Monitoring

DOE is currently monitoring ground water in four point-of-compliance wells (0171, 0172, 0173, and 0813) in the uppermost aquifer downgradient from the disposal cell (Figure 7–1). The
7C purpose of the monitoring is to evaluate the initial performance of the disposal cell and to confirm the expectation that concentrations of nitrate, sulfate, and uranium in ground water will eventually decrease to levels that existed before construction of the disposal cell. Ground water samples are collected on a quarterly basis and analyzed for nitrate, sulfate, and uranium. Proposed concentration limits for these constituents were established in the Long-Term Surveillance Plan (1998) and are shown in Table 7–2. Water levels are also measured continuously with down-hole dataloggers at downgradient wells 0171, 0172, and 0173 and off-site well 0179.

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

Monitor Well	Nitrate (as NO_3) (mg/L)	Uranium (mg/L)	Sulfate (mg/L)
0171	44	0.044	3334
0172	102	0.067	4985
0173	44	0.044	4000
0813	44	0.069	4440

Note: Maximum concentration limits from Table 1 to Subpart A of 40 CFR 192 are 44 milligrams per liter (mg/L) for nitrate (as NO_3) and 0.044 mg/L for uranium. Other proposed concentration limits were determined from background levels for specific 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 was submitted to the U.S. Nuclear Regulatory Commission and the State of Utah in June 2001. The report concluded that concentrations were within a reasonable range of compliance relative to the proposed concentration limits. At the time the report was submitted, the investigation of uranium processing-related ground water contamination was in the planning stages, and it was proposed that monitoring of the four point of compliance wells continue on a quarterly basis until that investigation is completed and a site-wide compliance strategy and monitoring program is revised and approved. This effort should be completed in the near future. In the interim, it has been determined that 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 except in well 0813, where values were very near the laboratory detection limit (Figure 7–2). Nitrate concentrations fluctuated slightly in well 0171, but there was considerable variation in the values for wells 0172 and 0173.

Sulfate concentrations in ground water have remained relatively constant in wells 0171 and 0813 since the disposal cell was constructed (Figure 7–3). Concentrations in wells 0172 and 0173 have fluctuated substantially since 1996. Concentrations in 2002 continued above the proposed concentration limits in wells 0171, 0172, and 0173. Sulfate concentration was below the proposed limit in well 0813.

Uranium concentrations in ground water have been below the proposed concentration limits in all four point of compliance wells since 1995 (Figure 7–4). Concentrations of uranium have increased in well 0171 since 1998, but remain fairly constant (and without apparent trend) in the other wells.

Ground Water Level Monitoring—Ground water levels in several monitor wells adjacent to the disposal cell have been measured manually since 1991, and continuously with downhole dataloggers for the past 3 years. Well hydrographs indicate an overall decrease in ground water level of approximately 4 feet since 1993 (Figure 7–5).

DOE installed a precipitation monitoring station (PL–2) in the northwest corner of the secured site in mid-2001. DOE is evaluating the relationship between precipitation and ground water
7D 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 from July 2001 through July 2002, precipitation was minimal (3.05 inches), and there was no obvious correlation with ground water elevations measured by dataloggers in the wells adjacent to the disposal cell (Figure 7–5).

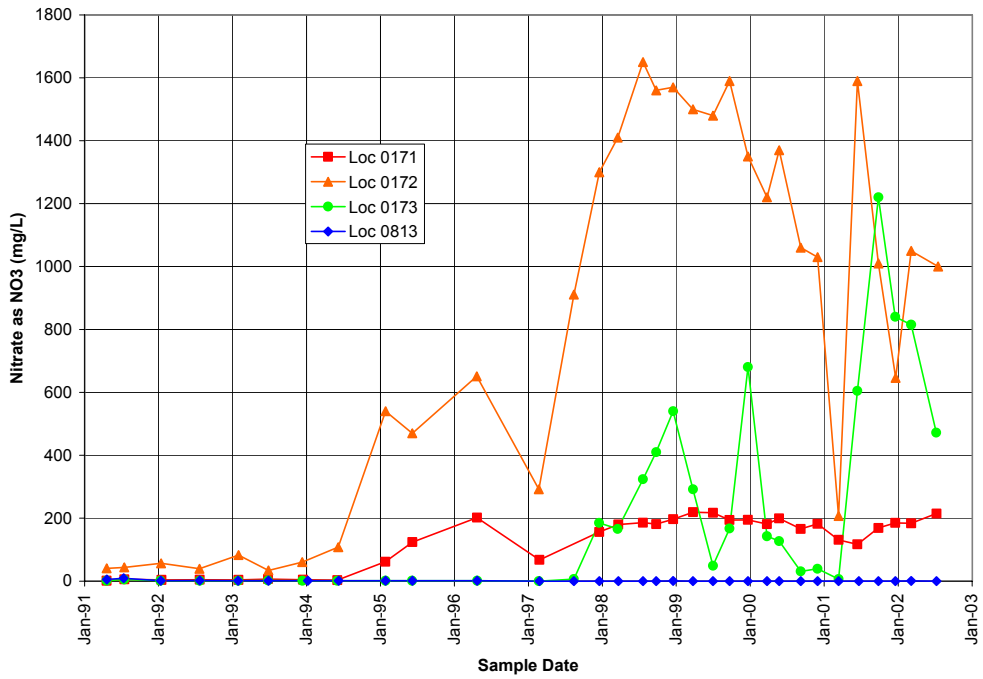


Figure 7−2. Time-Concentration Plots of Nitrate (as NO_3) in Ground Water at the Green River, Utah, Disposal Site

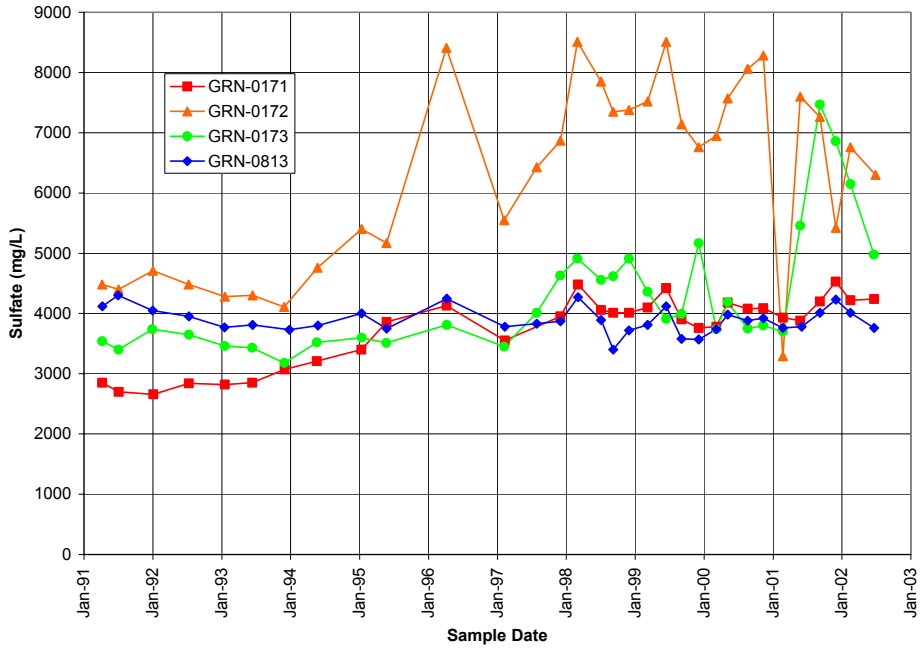


Figure 7−3. Time-Concentration Plots of Sulfate in Ground Water at the Green River, Utah, Disposal Site

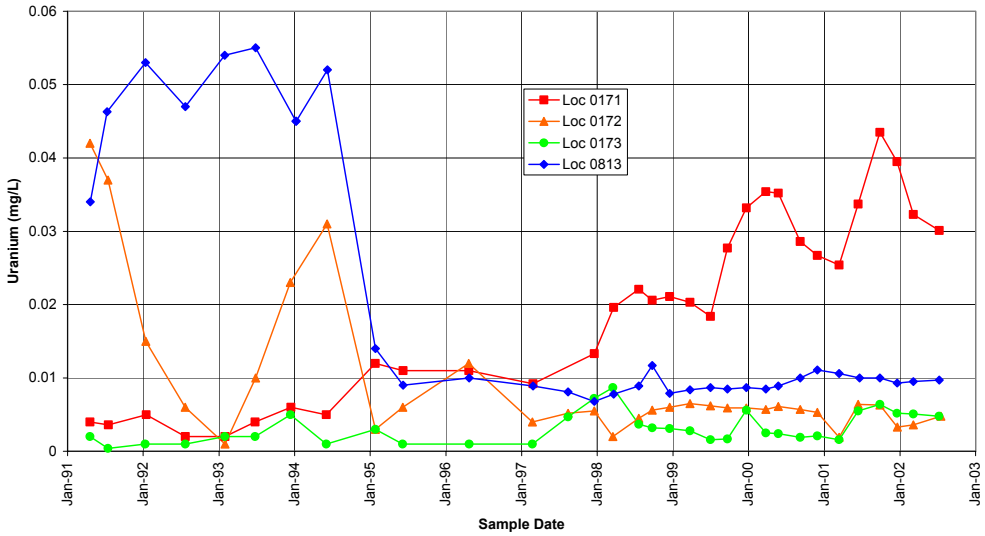


Figure 7−4. Time-Concentration Plots of Uranium in Ground Water at the Green River, Utah, Disposal Site

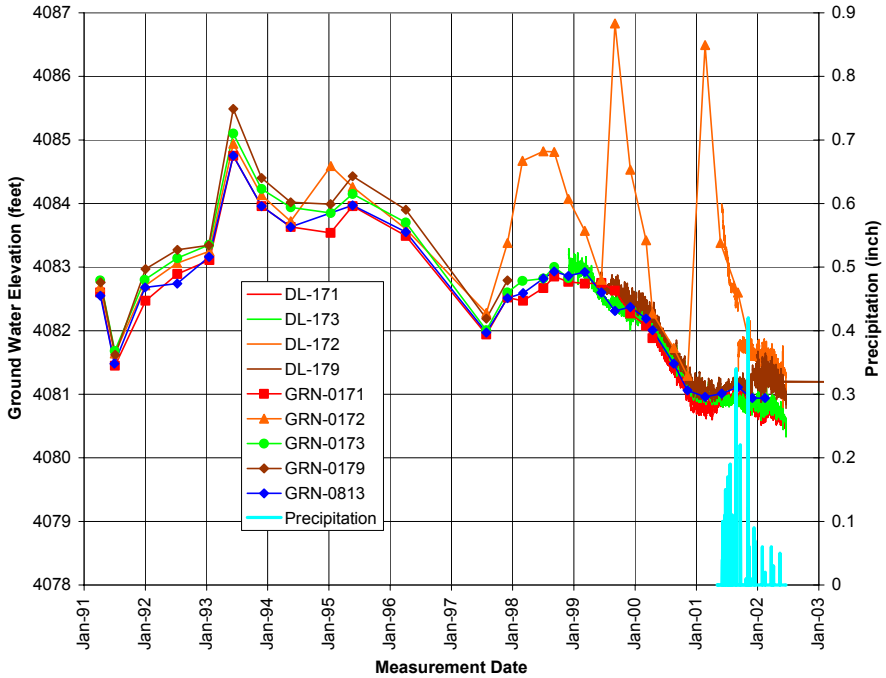


Figure 7−5. Ground Water Elevations and Precipitation at the Green River, Utah, Disposal Site

5.0 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 2002.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	135	Erosion at boundary monument BM–3.
PL–2	100	Precipitation monitoring station.

PL–1. Erosion at boundary monument BM–3.

PL–2. Precipitation monitoring station.

End of current section

2002 Annual Compliance Report
Gunnison, Colorado, Disposal Site

Compliance Summary

The site, inspected on August 8, 2002, was in excellent condition. Monitoring of riprap durability at key locations around the base of the disposal cell continued. Rock in each test area was in excellent condition and identification markers were installed at each test area. A small patch of Canada thistle, a state-listed noxious weed, was present at one of the decommissioned well sites and was treated with herbicide. Because of this year's severe drought, reseeded areas along the former Chance Gulch and Tenderfoot Mountain haul roads have not yet successfully revegetated. A missing perimeter sign will be replaced and the entrance sign will be relabeled. No cause for a follow-up or contingency inspection was identified.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 3.5	Section 2.0
Routine Maintenance and Repairs	Section 5.0	Section 3.0
Ground Water Monitoring	Section 4.1	Section 4.0
Corrective Action	Section 6.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, southeast of Gunnison, Colorado, was inspected on August 8, 2002. 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.

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 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.

The entrance sign, just east of the entrance gate, was in good condition; however, it identifies the DOE Albuquerque, New Mexico, Operations Office as the responsible agency. The sign will be updated to indicate the Grand Junction Office as the responsible agency. Perimeter sign P1 was
8A missing and will be replaced. Perimeter sign P37 was bent and has cracked paint, but was still legible. The entrance sign and perimeter signs P38, P39, P42, and P44 have bullet holes in them, but all were still legible. The other perimeter signs were in good 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—Both granite site markers, SMK–1 just inside the south entrance gate and SMK−2 on the top of the disposal cell, were in excellent condition. The three combination survey/boundary monuments and the eight boundary monuments were in excellent condition.

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

Fourteen other monitor wells were decommissioned and their locations were reclaimed during 2001. All but one of the former well sites were in good condition. Newly germinated Canada
8B thistle plants—a state-listed noxious weed—were observed at a former well site located near perimeter sign P42. Herbicide was applied at this location during September 2002 to prevent the spread of this plant.

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.

Top of Disposal Cell—The top of the disposal cell was in excellent condition. There was no evidence of erosion, settling, or slumping. A few 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 (PL–1).

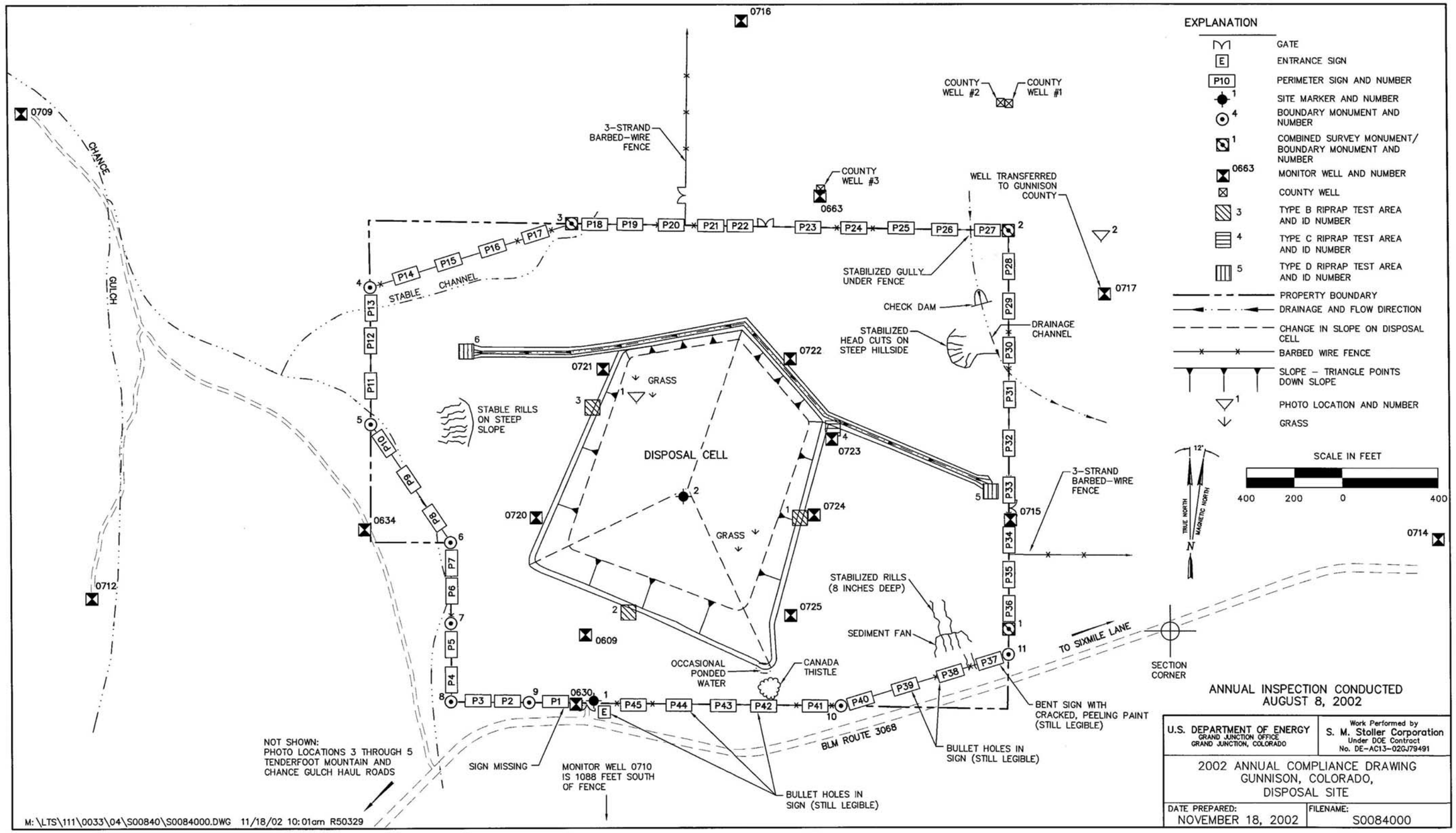


Figure 8–1. 2002 Annual Compliance Drawing for the Gunnison, Colorado, Disposal Site

Side Slopes, Apron, and Diversion Ditches—The riprap-covered side slopes, apron, and diversion ditches were in excellent condition. 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 as the cell is designed to drain to the southeast, and any water that ponds is below the elevation of the tailings. At the time of the inspection, this area was dry.

The Long-Term Surveillance Plan requires annual inspections of the condition of the riprap in six test areas for the first 5 years after cell closure (through 2002), and every fifth year thereafter until the twentieth year (2017). Each 1-square-meter test area is in a critical flow path location in
8C the diversion channels. The final annual inspection, conducted in 2002, indicated no observable rock degradation when rock-by-rock comparisons were made with previous inspection photographs. A durable marker consisting of a rebar covered with a white plastic pipe was installed on the northeast corner of each test area during the 2002 inspection. These markers will assist in locating and determining the correct orientation of the test areas when they are photographed at 5-year intervals beginning in 2007.

Area Between the Disposal Cell and the Site Boundary—Both seeded and undisturbed (natural) areas occur between the disposal cell and the site perimeter. During surface remediation, areas were disturbed by construction activities, regraded, and then reclaimed by planting a seed mix. Undisturbed areas were left in their natural state. At the time of the 2002 inspection, the seeded areas were in excellent condition.

During the 2002 inspection, four areas of the site containing erosional features were investigated: rills in the southeast 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 corner, several rills have formed in the steeper portion of the slope, and a delta-like accumulation of eroded sediments has formed just below the gullies. Each of these erosional features was inspected and found to be in stable condition. Vegetation is becoming established on the steeper portions of the eroded slopes, and sediment transport and accumulation from these areas is not expected.

In the northeast, a series of deep gullies and headcuts formed at a natural slope break in the terrain. These gullies appeared to be stabilizing with the successful establishment of sagebrush and various grasses. The drainage channel crossing the northeast corner of the site was stable.

In the northwest, a drainage channel tributary to Chance Gulch was investigated. The channel was stable and in good condition.

On the west, the steep west-facing slope contains numerous rills. Surface rock fragments are stabilizing the slope.

The steep topography of these areas makes them susceptible to erosion. Site investigators will continue to monitor for signs of increased erosion or any other indications of slope instability.

Outlying Area—Gunnison County owns a municipal landfill adjoining the disposal site boundary on the north and east. In 2001, the county installed several fences and three monitor wells in these areas. A gate was installed in the new fence east of the disposal site, approximately 0.25 mile from the eastern property line. Because DOE requires access through this gate for environmental monitoring and annual inspection purposes, the landfill foreman has agreed to secure the gate with a DOE padlock.

At the time of the inspection, no active land filling operations had occurred within 0.25 mile of the disposal site. The nearest active portion of the landfill is located approximately 0.75 mile northeast of the disposal site. An appliance disposal area opened in 2001, but it poses no threat to the DOE disposal site (PL−2). No other evidence of activity was noted near the site boundary.

Inspectors assessed 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 U.S. Bureau of Land Management right-of-way permit requires successful revegetation of both haul roads. Several areas along the haul roads were reseeded in October 2000 to meet U.S. Bureau of Land Management's vegetation success criteria for species diversity. Vegetative cover in the reseeded areas was sparse and composed primarily of two annual weeds, Russian thistle and kochia (PL–3 through PL–5). Because the Gunnison area experienced severe drought conditions during 2002, the reseeded areas had not improved since the last inspection. The success of reestablishing vegetation in these areas will continue to be monitored.

2.0 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

No maintenance other than weed control was required in 2002.

4.0 Ground Water Monitoring

DOE monitors ground water at the Gunnison disposal site to demonstrate compliance with U.S. Environmental Protection Agency ground water protection standards in 40 CFR 192, and to 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 has been sampled on an annual basis from 1998 through 2001, and will be sampled once every 5 years thereafter. No ground water sampling was required in 2002; the next sampling event is scheduled for 2006. The indicator analyte for cell performance is uranium. Analytical results over the past 5 years 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 Gunnison, Colorado, Disposal Site

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

5.0 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 2002.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description of Photograph
PL–1	20	Patch of grass on top of cell.
PL–2	60	View of appliance scrap/disposal area at Gunnison County landfill.
PL–3	180	Chance Gulch reseeded area; looking south at second patch from road.
PL–4	0	Tenderfoot Mountain haul road; looking north at Reseed Area 3.
PL–5	0	Tenderfoot Mountain haul road; looking north at Reseed Area 2.

PL–1. Patch of grass on top of cell.

PL–2. View of appliance scrap/disposal area at Gunnison County landfill.

PL–3. Chance Gulch reseeded area; looking south at second patch from road.

PL–4. Tenderfoot Mountain haul road; looking north at Reseed Area 3.

PL–5. Tenderfoot Mountain haul road; looking north at Reseed Area 2.

End of current section

2002 Annual Compliance Report
Lakeview, Oregon, Disposal Site

Compliance Summary

The site, inspected on May 21 and 22, 2002, was in good condition. A revised Long-Term Surveillance Plan, which includes a recalculated design criterion for the median diameter of the side slope riprap, is pending U.S. Nuclear Regulatory Commission (NRC) concurrence. Results of the fourth annual gradation test on the west side slope indicate that the median diameter of the riprap remains substantially above the recalculated design criterion. Ground water monitoring was not required in 2002. The entrance sign was illegible and later replaced, and minor fence repairs were performed. No other maintenance was required, and no need was identified for a follow-up or contingency inspection.

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 Grand Junction Office to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27).
9A 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 1.0
Follow-up or Contingency Inspections	Section 7.0	Section 2.0
Routine Maintenance and Repairs	Section 8.0	Section 3.0
Ground Water Monitoring	Section 5.3	Section 4.0
Corrective Action	Section 9.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, northwest of Lakeview, Oregon, was inspected on May 21 and 22, 2002. 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.

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 of 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 that is in place across the access road at a cattle guard located approximately 0.5 mile east of the site.

9B A barbed wire boundary fence encompasses the site. Strands of the fence that were loose or broken were repaired.

9C The painted surface of the entrance sign had peeled away and the sign was illegible (PL–1). As a temporary measure, inspectors wrote the Grand Junction Office contact telephone number on the entrance sign; the sign was later replaced. Nine of the twelve perimeter signs were in good condition. Perimeter signs P9, P10, and P12 have been damaged by bullets; however they were still legible so replacement is not yet warranted.

Site Markers and Monuments—The two site markers, three survey monuments, and three boundary monuments were in excellent condition. Two of the survey monuments, SM−1 and SM−2, are located on property corners.

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.

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. Although the top slope was seeded with grasses, the sparse cover is a consequence of the thin (nominal 4-inch-thick) topsoil layer. The low water-storage capacity of the topsoil layer will continue to limit perennial grass growth under current climatic conditions. Movement of precipitation through the riprap and bedding layers and into the radon barrier favors the growth of shrubs. Many mature rabbitbrush plants and a few mature sagebrush and bitterbrush plants grow on the top of the disposal cell. Shrub density likely will increase until it approaches or exceeds population levels in native plant communities adjacent to the site.

9D 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. The Long-Term Surveillance and Maintenance Program is currently conducting an investigation of how biointrusion affects permeability of the radon barrier. The study is expected to be completed by spring 2003.

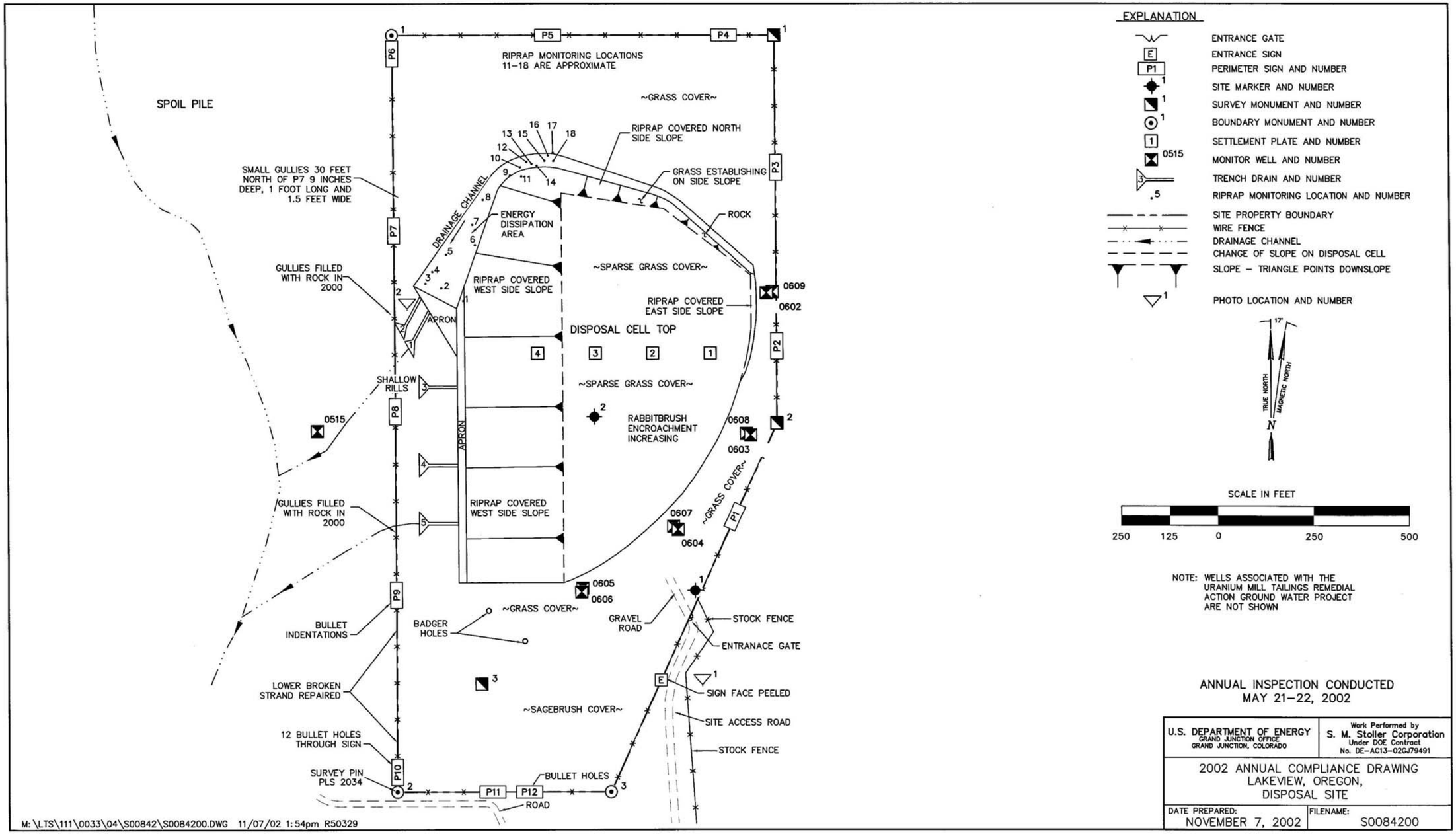


Figure 9–1. 2002 Annual Compliance Drawing for the Lakeview, Oregon, Disposal Site

Side Slopes of the Disposal Cell and Adjacent Drainage Channel, Aprons, and Trench Drains—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.

A side slope riprap gradation test was performed for the fourth year. Data were collected at 20 locations, and results indicated that the median diameter (D_{50}) of side slope riprap was 2.35 inches. The original design specified a D_{50} of 2.7 inches.

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.

To determine if the riprap degradation posed a risk for cell erosion, potential runoff from the disposal cell was reanalyzed using the U.S. Army Corps of Engineers Hydrologic Modeling
9E System computer program that is currently accepted by the NRC. Based on this analysis, the recalculated D_{50}—the minimum rock diameter necessary to protect the disposal cell during a probable maximum precipitation event—is 1.8 inches. This recalculation is included in the revised Long-Term Surveillance Plan that is pending NRC concurrence.

The measured D_{50} of 2.35 inches is substantially greater than the recalculated design criterion. 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 mitigate the problem, as necessary.

Eighteen locations selected for long-term rock monitoring in the drainage channel were photographed. Identification numbers were repainted where needed. No discernable rock degradation was observed since monitoring began at the ten original locations established in 1997 or at the eight additional locations established in 2000.

Grass encroachment persists in the riprap on the north side slope and in the drainage channel. Relatively sparse plant growth in the drainage channel will not influence the function of the channel and is not considered a problem.

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 nearly arrested the headcutting that was proceeding from the Collins Ranch property onto the DOE property (PL–2). The headcuts, if allowed to grow, could enable cattle to enter the site. There was no evidence of livestock on the site.

The native grass and shrub communities within 0.25 mile of the site boundary were unchanged.

2.0 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

DOE replaced the entrance sign, performed minor fence repairs, and repainted some rock monitoring identification numbers in 2002.

4.0 Ground Water Monitoring

DOE monitors ground water at this site once every 5 years. Eight point of compliance wells (four monitor well pairs: 0602/0609, 0603/0608, 0604/0607, and 0605/0606) are located east of the cell; the upgradient well (0515) is 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.

5.0 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 2002.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	270	Unreadable entrance sign.
PL–2	270	Headcutting under west boundary fence.

PL–1. Unreadable entrance sign.

PL–2. Headcutting under west boundary fence.

End of current section

2002 Annual Compliance Report
Lowman, Idaho, Disposal Site

Compliance Summary

The site, inspected on August 21, 2002, was in excellent condition. Areas to the north and west of the disposal cell, regraded and seeded in fall 1998, have successfully revegetated. Trees and shrubs sprouting in the riprap of the cell cover can be allowed to grow without increased risk to the public health, safety, or the environment. DOE will continue to control noxious weeds at the site. Inspectors identified no cause for maintenance or a follow-up or contingency inspection.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 7.0	Section 2.0
Routine Maintenance and Repairs	Section 8.0	Section 3.0
Ground Water Monitoring	Section 5.3	Section 4.0
Corrective Action	Section 9.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, northeast of Lowman, Idaho, was inspected on August 21, 2002. Results of the inspection are described below. Features and the 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.

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, although grass was growing along the centerline. 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 site boundary. The entrance sign is just inside the site boundary near monitor well 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. New bullet holes were identified in perimeter signs P3 and P15. These signs were legible and do not need to be replaced. Other than bullet holes in the entrance sign, P3, and P15, all 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, is also 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), located southeast of the cell, is unneeded but was secure.

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.

Encroachment of vegetation continues on the top and side slope of the disposal cell. Many of the larger trees and shrubs were removed in July 2001. In 2002, the Grand Junction Office Long-Term Performance Project conducted column leach studies to evaluate the effect of these plants on the long-term performance of the disposal cell. The hard rock material contained in the
10A Lowman disposal cell is generally insoluble and resistant to leaching. Water infiltrating the cell through spaces around root systems will not result in release of contaminated leachate to the environment. The natural plant community succession can be allowed to proceed without increased risk to the public health, safety, or the environment. However, DOE will cut larger trees as needed to prevent damage to the riprap armor by blowdown.

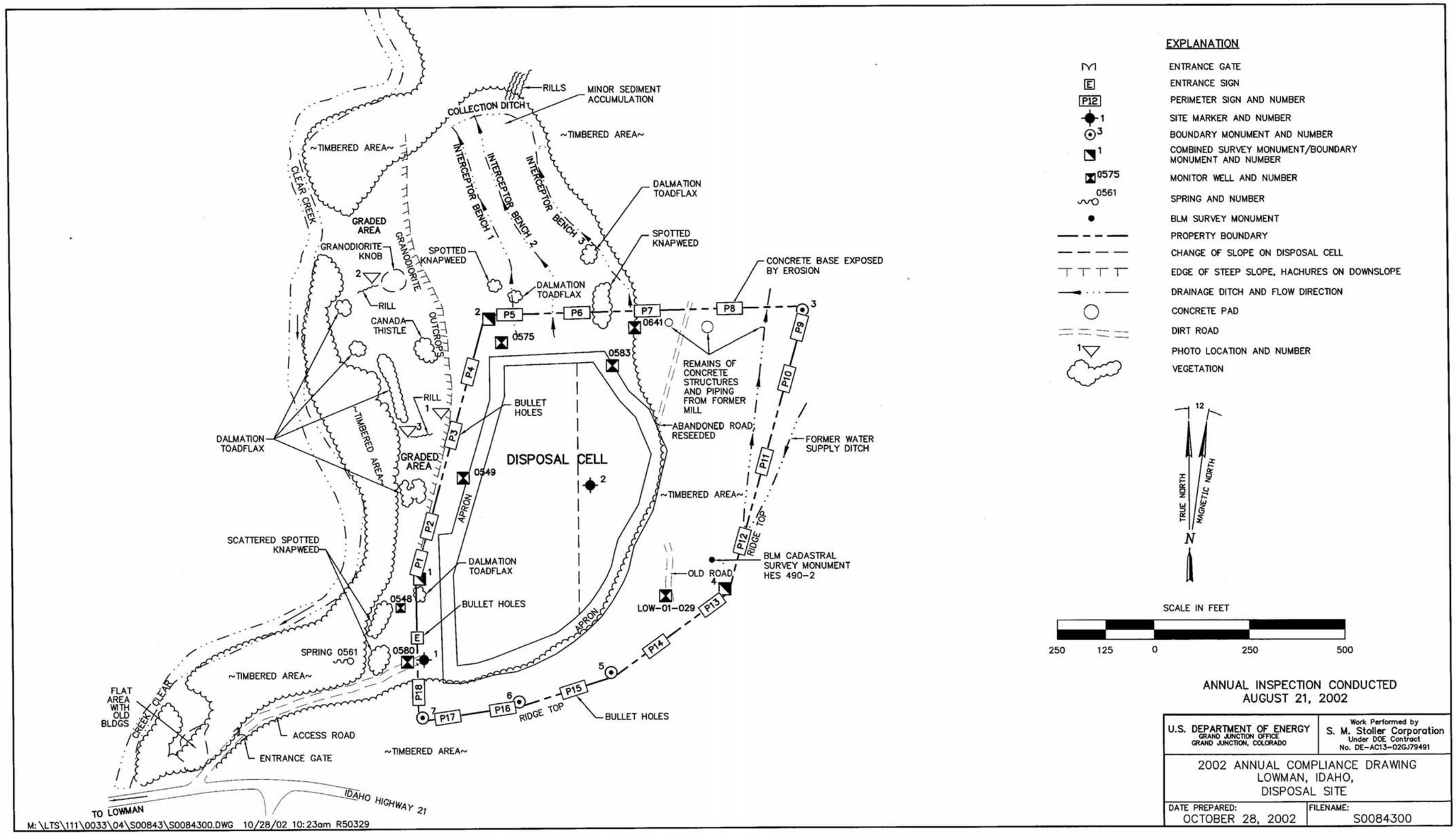


Figure 10–1. 2002 Annual Compliance Drawing for the Lowman, Idaho, Disposal Site

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; DOE will continue to monitor this area for erosion.

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 area east and south of the site is U.S. Forest Service land and was unchanged.

The interceptor benches, collection ditch, and vegetation were effectively controlling soil erosion in the revegetated area. Repairs made to the interceptor benches and collection ditch from the early 1999 washouts remain effective. Overall, the benches and collection ditch were in good condition. In 2001, inspectors noted that a small area of sediment accumulation was present at the north end of Interceptor Bench 2. Inspectors visited this area again in 2002 and found it to be in acceptable condition. This area will continue to be monitored to ensure that sediment buildup does not cause storm runoff to concentrate and erode the interceptor bench. Small rills that carry runoff from the timbered area into the east end of the collection ditch will be monitored because they could deepen and cut a new channel adjacent to the present collection ditch.

The revegetation effort on the slopes north and west of the disposal cell has been successful. Although some small areas are dominated by cheatgrass, an annual weedy species, most of the revegetated area supports healthy stands of desirable perennial species and volunteer plants of ponderosa pine.

A silt fence was erected in 1998 along the west side of the erosion control project (PL−1). Vegetation has successfully established upgradient of the fence. Two erosion rills near the silt fence, one west of the granodiorite knob (PL−2) and one west of perimeter sign P3 (PL−3). These rills do not affect the integrity of the disposal cell.

Infestations of dalmation toadflax, spotted knapweed, and Canada thistle were found west and
10B north of the disposal cell. These state-listed noxious weeds will be controlled through application of herbicide.

Concrete structures and piping from the former mill remain in an area northeast of the disposal cell. Inspectors evaluated this area to determine if a personal injury hazard exists or if the piping was part of a well system that may need to be closed. The inspectors determined that the small amount of debris present does not constitute a significant personal injury hazard. No standing water was observed in the piping and no wells exist.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

No maintenance was required in 2002.

4.0 Ground Water Monitoring

DOE monitors ground water at this site 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	
0583	Upgradient, north of cell	0561	Downgradient, southwest of cell
0641	Upgradient, north of cell		
0548	Downgradient, west of cell		
0549	Downgradient, west of cell		
0575	Downgradient, northwest of cell		
0580	Downgradient, southwest of cell		

DOE samples the wells and spring annually. Well 0549 was dry at the time of the 2002 sampling, and no sample was collected.

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

August 2002 sampling results show 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 (0.002 mg/L) was detected in well 0548, and the maximum upgradient concentration (0.004 mg/L) was detected in well 0583. Results indicate that antimony is not leaching from the disposal cell.

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.

10C Results of sampling and analysis for antimony provide evidence that antimony will not leach from the disposal cell in detectable concentrations. Therefore, there is no technical basis to continue monitoring. A revision to the Long-Term Surveillance Plan that will delete the monitoring requirement is in preparation.

5.0 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 2002.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL−1	305	Silt fence along the west side of the erosion control project.
PL−2	270	Erosion rill below silt fence near granodiorite knob.
PL−3	60	Erosion rill below silt fence near perimeter sign P3.

PL−1. Silt fence along the west side of the erosion control project.

PL−2. Erosion rill below silt fence near granodiorite knob.

PL−3. Erosion rill below silt fence near perimeter sign P3.

End of current section

2002 Annual Compliance Report
Maybell, Colorado, Disposal Site

Compliance Summary

The site, inspected on August 5, 2002, was in excellent condition. The site did not have boundary monuments at all property corners as specified in Uranium Mill Tailings Remedial Action Project guidelines. Therefore, the property was surveyed in 2002 based on real estate records, and boundary monuments were set at all property corners. Minor fence repairs were performed near the northeast corner of the property. Additional riprap was placed to control erosion near the northeast corner of the property. Deep-rooted plants on the cell top and in a drainage ditch were cut and treated with herbicide. Settlement plates were resurveyed, and no settlement was detected. Inspectors identified no additional maintenance requirements and no cause for a follow-up or contingency inspection.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 5.0	Section 2.0
Routine Maintenance and Repairs	Section 4.0	Section 3.0
Ground Water Monitoring	Section 2.6	Section 4.0
Corrective Action	Section 5.0	Section 5.0
Settlement Plate Monitoring	Section 3.5.2	Section 6.0

Compliance Review

1.0 Annual Inspection and Report

The site, northeast of Maybell, Colorado, was inspected on August 5, 2002. Results of the inspection are described below. Features and the photograph location (PL) 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.

1.1 Specific Site Surveillance Features

Access, Fence, Gate, and Signs—Access to the site is via County Road 53. The gravel road was in good condition. County Road 53 ends near the northwest corner of the site. From that point, a track continues to the northwest past an abandoned open pit mine (Robb Pit) to the UMETCO Maybell UMTRCA Title II site.

A drainage swale crosses the county road between the entrance gate and perimeter sign P26. A shallow gully has formed in the bottom of the swale, but the road was passable.

A standard 3-strand barbed wire stock fence in good condition surrounds the cell. The site fence is set inside the property boundary except where it coincides with the boundary at the southwest corner of the site and for a distance along the southern boundary of the site. A portion of the
11A fence near boundary monument BM–4A had been cut prior to the 2002 inspection; the strands were repaired and stretched.

The tubular metal entrance gate is located in the perimeter fence line along the north side of the site. It was locked and in excellent condition. The entrance sign, mounted on a t-post in the fence line near the entrance gate, was secure and legible.

There are 26 perimeter signs around the site, and all were in good condition and legible. Prior
11B site drawings indicated 24 signs based on as-built drawings, but 26 signs were verified by a global positioning system survey in 2002.

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 has hairline fractures that could lead to spalling and will be sealed in 2003. All other markers and monuments were in excellent condition.

At the time of the 2002 inspection, four boundary monuments (shown as BM–1A through BM–4A on Figure 11–1) were present along the property boundary. Only one boundary monument (BM–2A) is at a corner, and one (BM–1A) is at a fence corner but not on the property boundary. This configuration was at variance with Uranium Mill Tailings Remedial Action Project specifications that require boundary monuments at actual property corners. Therefore, the property was resurveyed in September 2002 based on real estate records, and 23 new boundary monuments were installed—BM–1 at a section line and the remainder (BM–2 through BM–23)
11C on property corners. The resurveyed property boundary and all 27 boundary monuments are shown on Figure 11–1.

Settlement Plates—There are nine settlement plates on top of the disposal cell. Elevations of the settlement plates were resurveyed in May 2002.

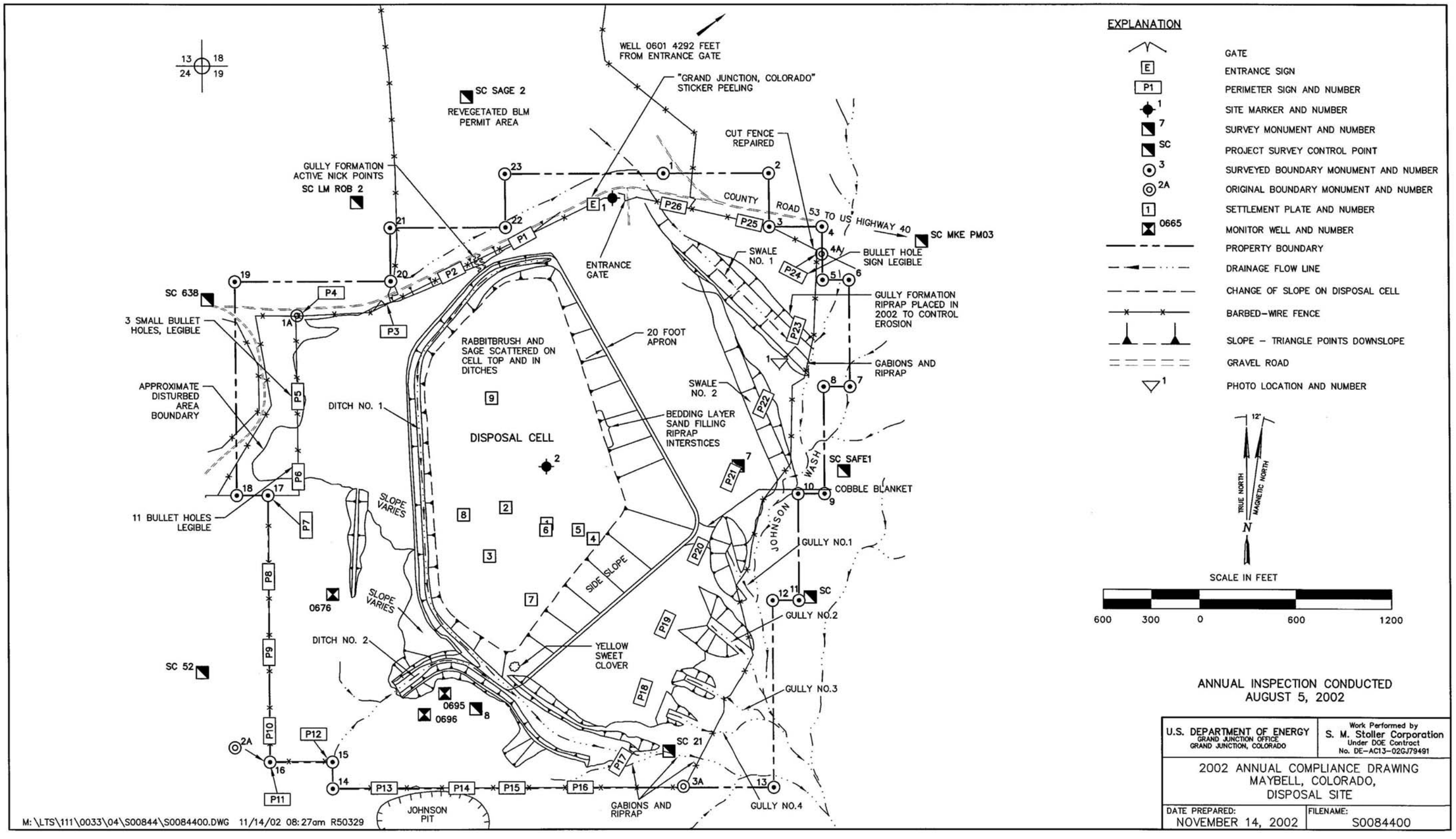


Figure 11–1. 2002 Annual Compliance Drawing for the Maybell, Colorado, Disposal Site

Monitor Wells—Four monitor wells are in the Long-Term Surveillance and Maintenance Program monitoring network. All four wells contain data loggers. Water level is the only parameter monitored at these wells.

In 2002, the LTSM Program decommissioned 18 monitor wells that had been left on the site by
11D the remedial action contractor. Eleven monitor wells remain on the adjacent Ross property, to which DOE did not maintain access. Mr. Ross requested that ownership of these wells be transferred to him. Three wells remain on the Simones property south of the DOE property. The State Engineer reassigned ownership of these wells to the property owner during the time when DOE did not maintain access agreements to the wells. DOE will consider transferring ownership of the wells on the Ross and Simones properties to the respective property owners and execute a hold harmless agreement and acceptance of all future responsibility for the wells with the recipients.

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. The rock was in excellent condition. There was no evidence of slumping or settling on the cell top or on the side slopes. Along the east intersection of the side slope and top slope, bedding sand was observed in the interstices of the large riprap.

11E Some plants were observed on the cell top, including the deep-rooted species tamarisk and rabbitbrush. Tamarisk was observed in Ditch Number 1, also. The tamarisk and rabbitbrush were cut and treated with herbicide.

No moisture was evident on the surface at locations (east and southeast side slopes) identified in the Long-Term Surveillance Plan as areas of potential seeps.

Other Areas On Site—Establishment of vegetation in graded and disturbed areas between the disposal cell and the site boundary is progressing. Inspectors found no evidence of livestock on site. Evidence of wildlife was abundant.

The outfalls below the four numbered gullies north of the Ditch Number 1 appeared to be stable.
11F Additional erosion had occurred where the riprap was placed in previous years on the north bank of Swale Number 1, and more riprap was placed in the Swale Number 1 outlet and on the north bank in spring 2002 (PL–1). These locations were self-armoring and may stabilize.

Outlying Area—The area outward for a distance of 0.25 mile from the site boundary was visually inspected. No erosion, development, or other disturbance was seen.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

A portion of fence near boundary monument BM–4A was repaired. Additional riprap was placed in Swale Number 1.

4.0 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 monitoring is not required.

As a best management practice, and for a limited time, DOE monitors water levels at selected wells. The purpose for monitoring water levels is to detect a rise in water level that could be due to drainage from the disposal cell.

Four wells are used for these water level measurements. Monitor well 0601, the upgradient or background well, is approximately 0.8 mile northeast of the site. Monitor well 0676, a crossgradient well, is west of the disposal cell. Monitor wells 0695 and 0696 are downgradient wells south of the disposal cell; well 0696 is a backup to well 0695.

Water levels are monitored by data loggers installed in each well. Data are downloaded quarterly. Water level measurements through October 3, 2002, are shown in Figure 11–2. Breaks in two of the hydrographs are due to data logger malfunction. Measurements are not shown for backup monitor well 0696.

Water levels continue to rise at a similar rate in all wells. Data from background well 0601 indicate that rising water levels are regional and cannot be related to any local effect around the disposal cell. A regional rise in water level can reasonably be attributed to long-term precipitation patterns.

5.0 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 2002.

6.0 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.

11G Results of the August 2000 baseline resurvey and the May 2002 survey are provided in Table 11–2. Elevation changes between 2000 and 2002 were insignificant. If no significant settlement occurs, DOE will complete a 5-year requirement for annual surveys in 2004.

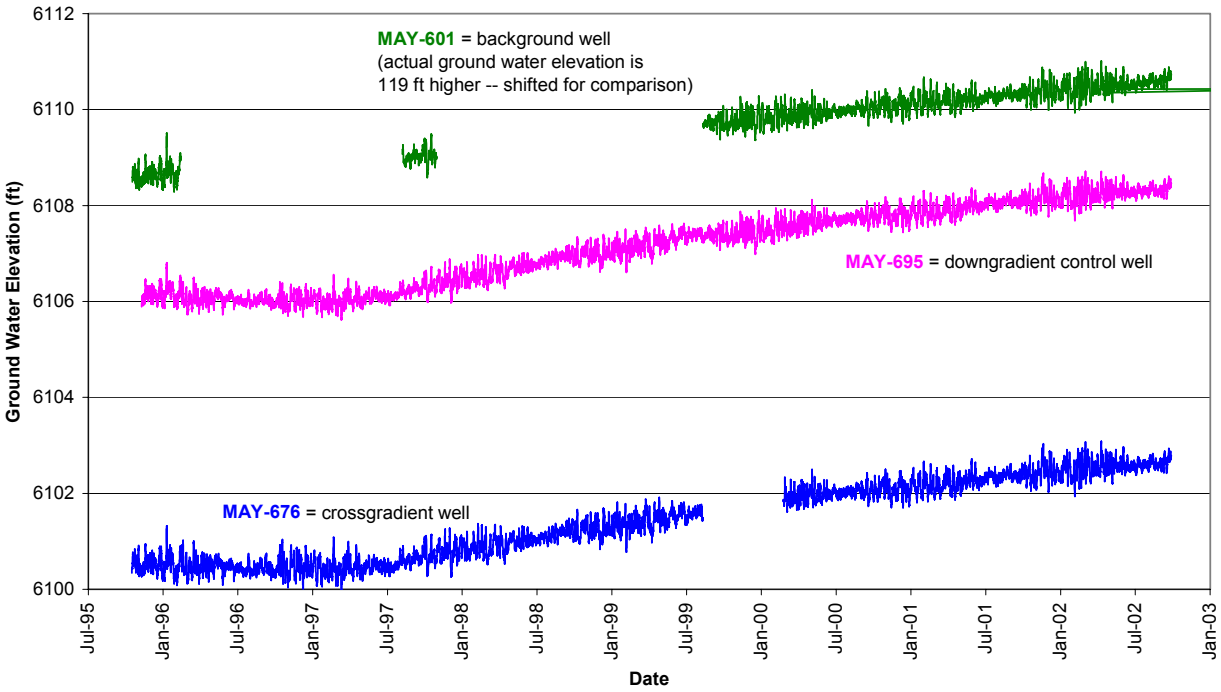


Figure 11–2. Water Level Measurements at the Maybell, Colorado, Disposal Site

Table 11–2. Results of the 2002 Settlement Plate Survey at the Maybell, Colorado, Disposal Site (elevation in feet above mean sea level)

Settlement Plate Location	Surveyed Elevation May 7, 2002	Baseline Elevation August 31, 2000	Difference in Elevation (feet)
SP–1	6,243.59	6,243.65	-0.06
SP–2	6,236.99	6,237.03	-0.04
SP–3	6,231.55	6,231.58	-0.03
SP–4	6,251.51	6,251.52	-0.01
SP–5	6,249.20	6,249.22	-0.02
SP–6	6,243.18	6,243.23	-0.05
SP–7	6,236.89	6,236.89	0.00
SP–8	6,229.59	6,229.60	-0.01
SP–9	6,241.20	6,241.17	+0.03

7.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	20	Erosion protection rock installed on the north side of Swale Number 1.

PL–1. Erosion protection rock installed on the north side of Swale Number 1.

End of current section

2002 Annual Compliance Report
Mexican Hat, Utah, Disposal Site

Compliance Summary

The site was inspected on September 9, 2002; overall, the site was in good condition and remains secure and protective. A severe summer storm event occurred the day before the inspection and runoff from adjacent lands damaged the riprap at the south end of the west diversion ditch. A follow-up inspection by a geotechnical engineer was performed to evaluate the extent of damage and provide a recommendation for repair. The bases of a perimeter sign and a boundary monument were eroded and will be repaired. All other improvements were in excellent condition.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 3.4	Section 2.0
Routine Maintenance and Repairs	Section 5.0	Section 3.0
Ground Water Monitoring	Section 4.3	Section 4.0
Corrective Action	Section 6.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, south of Mexican Hat, Utah, was inspected on September 9, 2002. 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.

1.1 Specific Site Surveillance Features

Access, Fence, Gate, and Signs—The site, reached by a short dirt road from U.S. Highway 163, is on Navajo Nation land. DOE secured access to the site through a perpetual Custody Access Agreement signed by the Navajo Nation.

A high quality, barbed wire fence with a chain link entrance gate surrounds the site. A loose wire on the south fence was tightened; otherwise, the fence and gate were in excellent condition.

There are 43 perimeter signs and one entrance sign. All signs were legible. Although perimeter signs P24 and P26 have erosion at the concrete bases as noted in previous years, they remain stable. Perimeter sign P4 (PL–1) appeared unstable as approximately 3 feet of the concrete base was exposed and will be resecured or relocated.

Site Markers and Monuments—The two site markers, four survey monuments, 12 boundary monuments, and six settlement plates were in good condition.

Rocks had been placed over the permanent site marker on the cell but the marker was undamaged.

Boundary monument BM–11 (PL–2) is situated on a steep soil and rock slope, and soil has eroded from around the downhill side of the concrete base. The monument was stable but it will be resecured or reference monuments will be installed.

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

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 site boundary; and (4) the outlying area.

Top of Disposal Cell—The top of the riprap-armored disposal cell was in excellent condition. The inspectors saw no evidence of differential settling, cracking, erosion, or burrowing.

Side Slopes and Diversion Ditches—Inspectors saw no evidence of 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 appear to have increased significantly during the past year; the accumulation remains approximately 18- to 24-inches high against the base of the vertical face of native rock. 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 slope. A baseline photograph (PL–3) was taken at a reference location established this year to determine trends. A photograph will be taken for the record annually until conditions stabilize.

A severe storm passed through the Mexican Hat area on September 8, 2002, causing water from
12A impervious areas south and west of the disposal cell to flow into the west diversion ditch. Municipal trash, tumbleweeds, and sediment were carried onto the site and became lodged in the security fence and diversion ditch riprap. Water depths in the ditch reached about 3 feet as indicated by the high water mark on the ditch sides. A 40-foot long by 3-foot wide section of

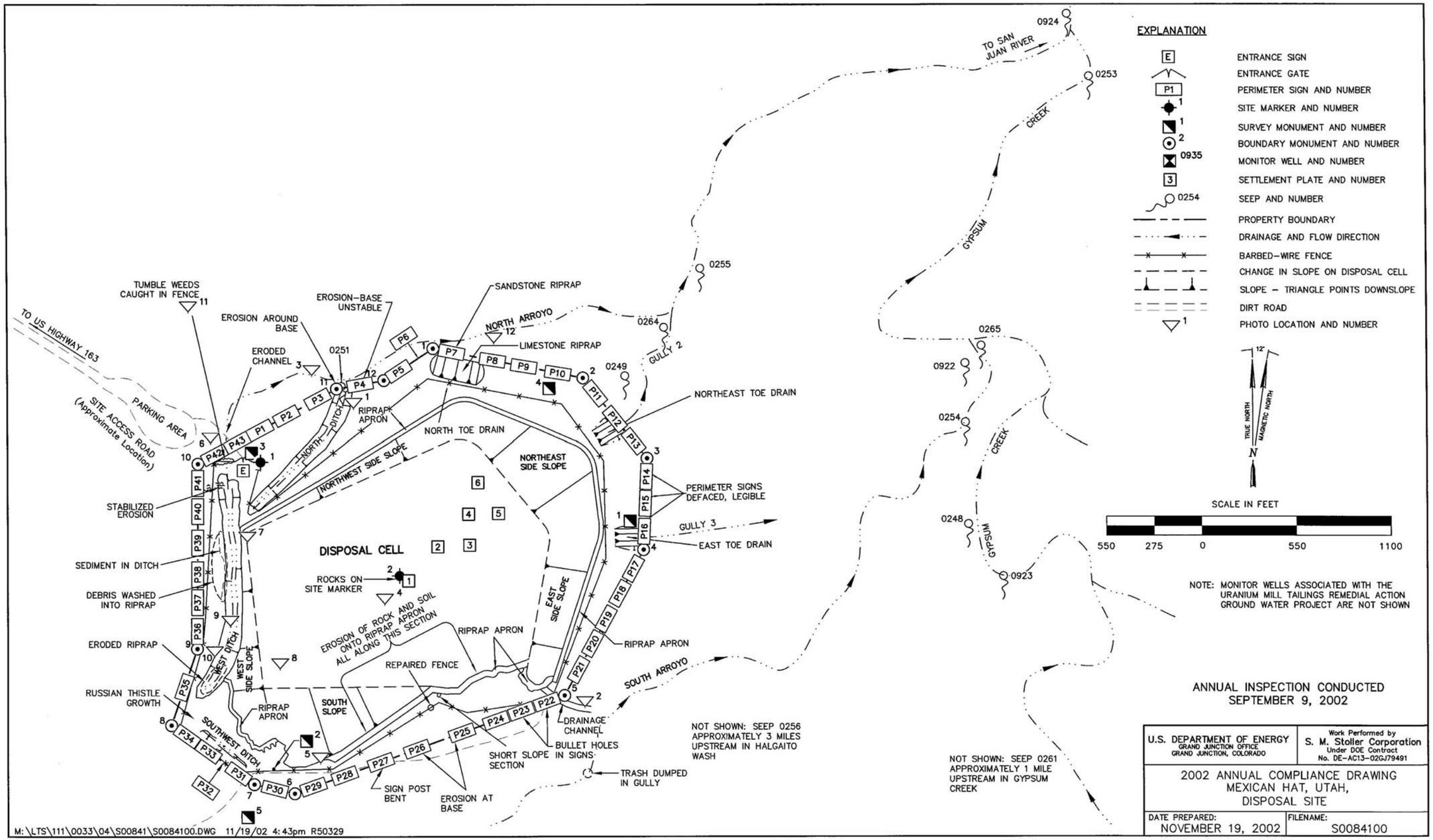


Figure 12–1. 2002 Annual Compliance Drawing for the Mexican Hat, Utah, Disposal Site

riprap at the south end of the ditch slumped to the bottom of the slope (PL–4). Erosion also occurred in the soft bedrock where the west ditch exits into the north arroyo. Inspectors saw no other evidence of creep, settling, erosion, burrowing, or other degradation in this transect.

Area Between the Disposal Cell and the Site Boundary—During the 2002 inspection, erosion previously noted near perimeter sign P41 appeared unchanged. The slope at this location is approaching a stable condition and intervention is not warranted. Other slopes around the disposal cell remain stable, with abundant rock exposures at the surface of the slopes and only minor accumulations of loose material or scree at the toe of the slopes. The only evidence of intrusion was the placement of rocks on the cell site marker.

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 the debris left by the storm. Water was flowing from the riprap bordering the north arroyo and the seeps were covered with a thick layer of sediment.

2.0 Follow-Up or Contingency Inspections

12B A follow-up inspection by a geotechnical engineer was performed to evaluate the extent of damage caused by the storm. The recommendation is to rebuild the eroded portion of the diversion channel per original design.

3.0 Routine Maintenance and Repairs

Other than tightening a loose fence wire, no maintenance or repairs were conducted in 2002.

4.0 Ground Water Monitoring

Ground water in the uppermost aquifer is not affected by the 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.

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; however, DOE agreed to monitor all of the seeps shown on Figure 12–1 on a quarterly basis, when flowing sufficiently, since 1998 at the request of the Navajo Nation. Based on a 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 will sample the six seeps identified in the
12C Long-Term Surveillance Plan (seeps 0251 and 0264 along North Arroyo, and seeps 0248, 0254, 0261, and 0922 along Gypsum Creek) in February 2003 in accordance with the Long-Term Surveillance Plan.

Results of quarterly sampling for three target analytes—nitrate, sulfate, and uranium—are shown on Figure 12−2 through 12−4. Maximum concentration limits of 44 milligrams per liter (mg/L) for nitrate (as NO_3) 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 3 years and have declined substantially from greater than 2,000 mg/L to less than 500 mg/L (Figure 12−2). Nitrate concentrations have remained relatively stable in the Gypsum Creek seeps for the past 3 years ranging from 150 to 400 mg/L. Concentrations in the background seep remain below 1.0 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 (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 3 years.

Results of monitoring in 2002 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.

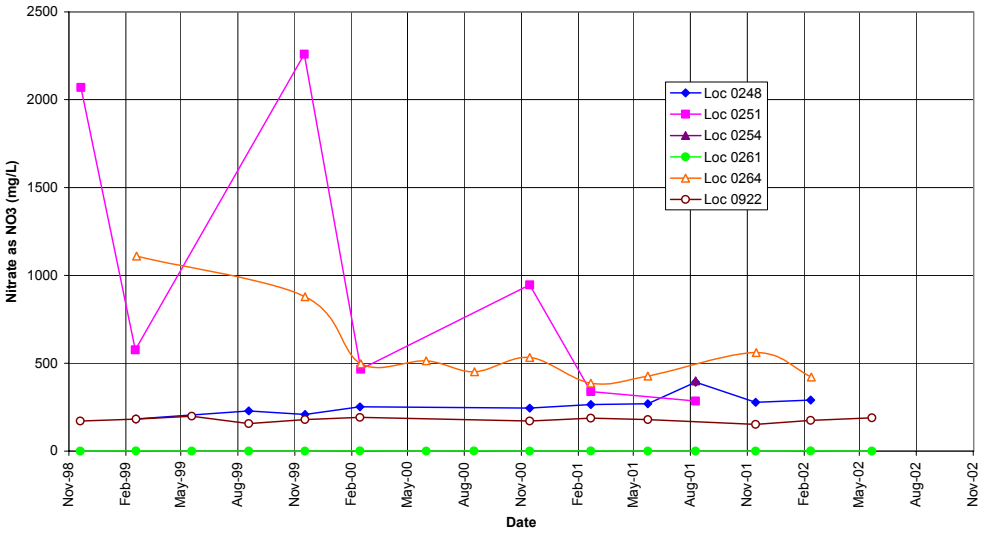


Figure 12–2. Time-Concentration Plots of Nitrate (as NO_3) in Seep Water at the Mexican Hat, Utah, Disposal Site

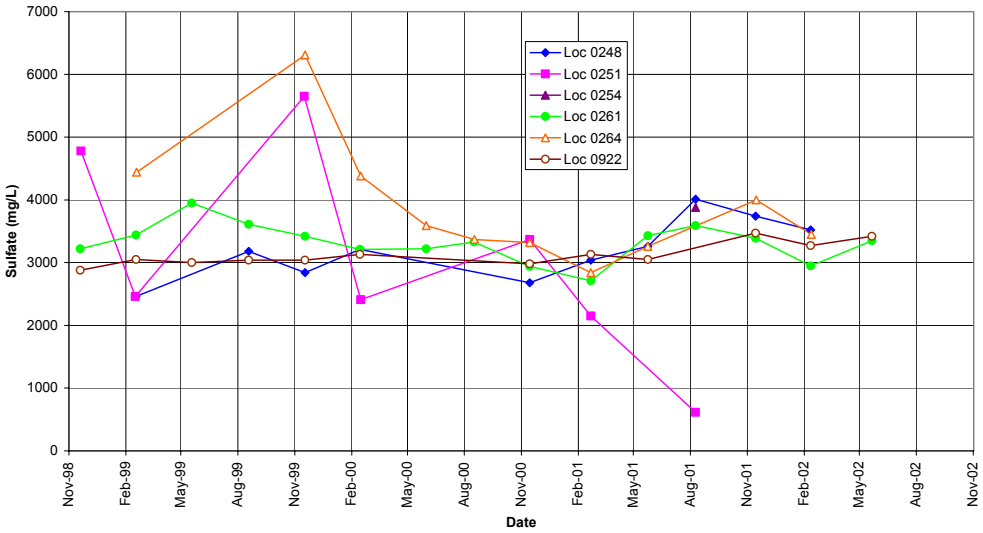


Figure 12–3. Time-Concentration Plots of Sulfate in Seep Water at the Mexican Hat, Utah, Disposal Site

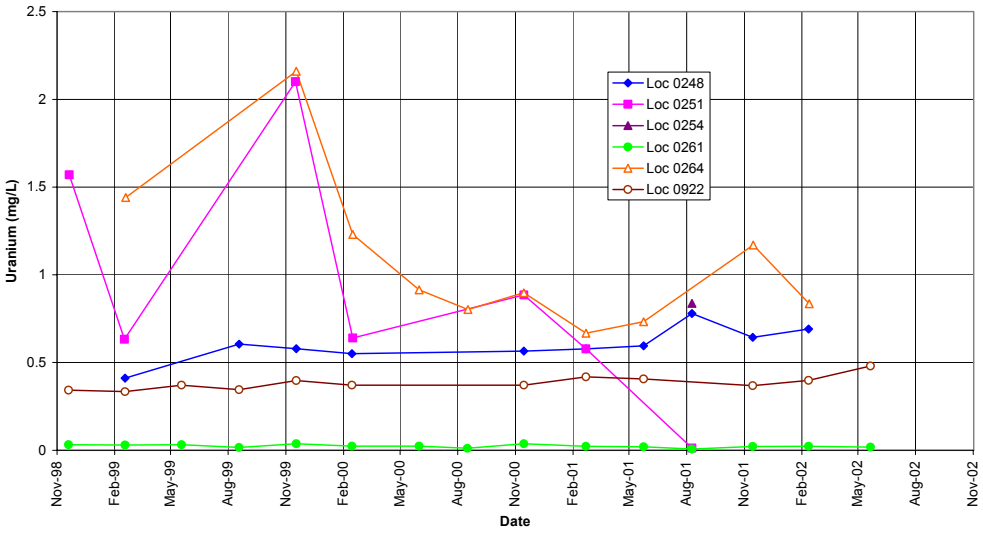


Figure 12–4. Time-Concentration Plots of Uranium in Seep Water at the Mexican Hat, Utah, Disposal Site

5.0 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 2002.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	70	Erosion around perimeter sign P4.
PL–2	160	Erosion around boundary monument BM–11.
PL–3	0	Rock and soil accumulation on south apron.
PL–4	270	Rock that moved in the south end of west ditch during storm event.

PL–1. Erosion around perimeter sign P4.

PL–2. Erosion around boundary monument BM–11.

PL−3. Rock and soil accumulation on south apron.

PL–4. Rock that moved in the south end of west ditch during storm event.

End of current section

2002 Annual Compliance Report
Naturita, Colorado, Disposal Site

Compliance Summary

The site, inspected on July 9, 2002, was in excellent condition. The standpipe formerly located on the northeast slope of the disposal cell was decommissioned. Revegetation of graded and disturbed areas north of the disposal cell has succeeded and the storm water discharge permit has been closed. Russian knapweed persists at the site and was treated with herbicide. Inspectors found no need for additional maintenance or a follow-up or contingency inspection at this site.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 3.4	Section 2.0
Routine Maintenance and Repairs	Section 4.0	Section 3.0
Ground Water Monitoring	Section 2.6.2	Section 4.0
Corrective Action	Section 5.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, west of the former community of Uravan, Colorado, was inspected on July 9, 2002. Results of the inspection are described below. Features 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.

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. Other than resecuring a fence post, 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. All signs were in excellent condition.

Site Markers and Monuments—Two granite site markers identify the Naturita site. Site marker SMK−1 is set just inside and left of the entrance gate, and site marker SMK−2 is located on the disposal cell in the south-central portion of the top slope. Both 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 located in place 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.

Standpipe—In accordance with provisions of the Long-Term Surveillance Plan, the standpipe
13A located on the northeast slope of the disposal cell was decommissioned in June 2002.

Monitor Wells—The ground water monitoring network has five wells. All wells were locked and in excellent condition.

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 trench; (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. Inspectors saw no evidence of subsidence, differential settlement, slumping, or other modifying process.

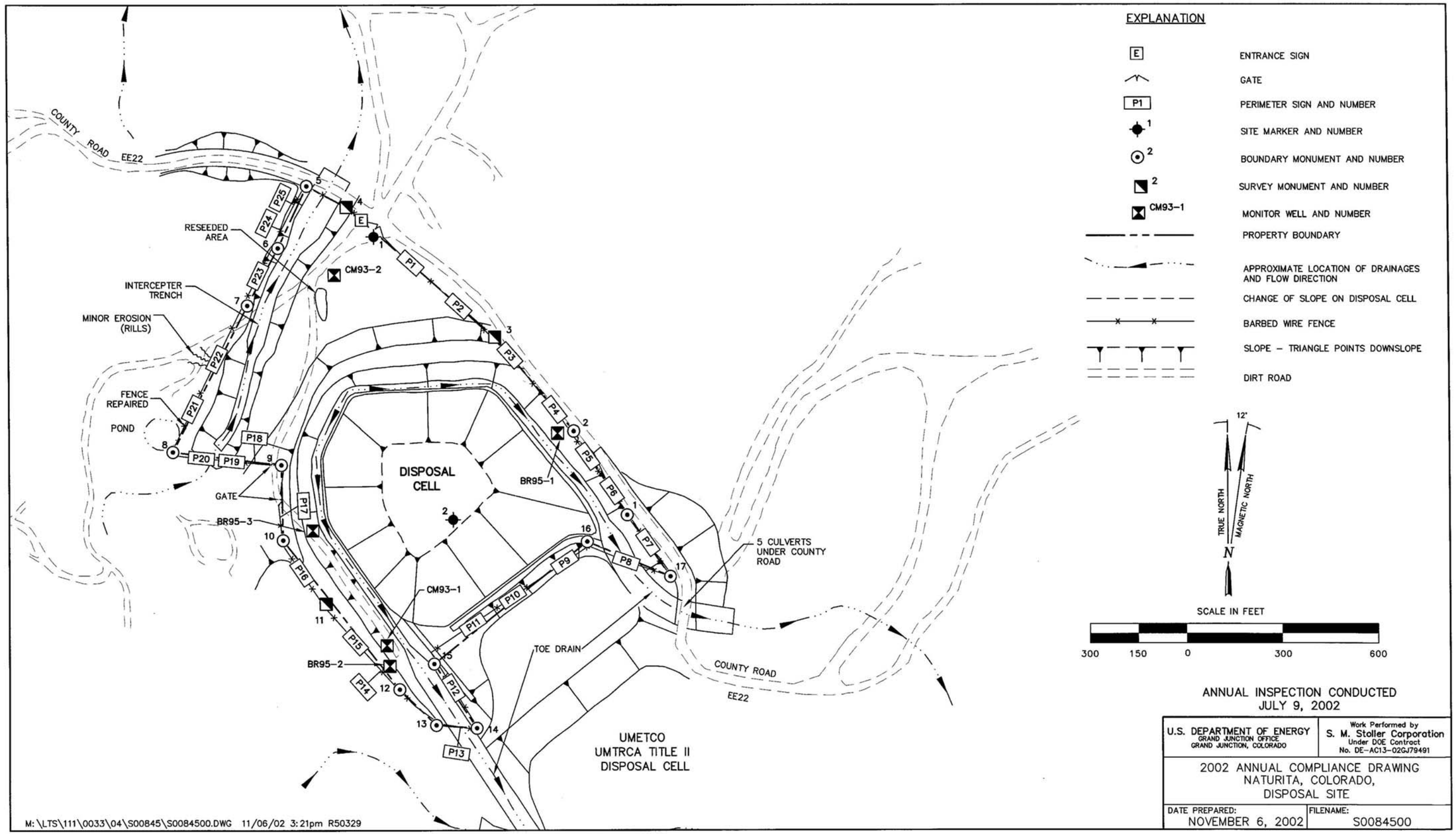


Figure 13–1. 2002 Annual Compliance Drawing for the Naturita, Colorado, Disposal Site

Toe Drains and Outlets—Two riprap-filled toe drains collect water from the cell side slopes and divert it to the southeast. The toe drain on the 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. The eastern toe drain exits through the adjacent UMETCO UMTRCA Title II disposal site and crosses beneath County Road EE22 through five culverts. Both toe drains were in good condition.

13B The process is underway to make the U.S. Bureau of Land Management right-of-way permits for these toe drains perpetual; currently, the permits are set to expire in 2004.

Interceptor Trench—There is a rock-armored interceptor trench northwest of the disposal cell. This trench diverts storm water runoff from a large up-slope catchment area off site to the north. Water leaving the interceptor trench flows across County Road EE22. The trench was in excellent condition, but because there are no culverts under the road, the county road may be susceptible to erosion.

Reclaimed Areas—The disturbed area north of the disposal cell and south of the interceptor channel was seeded at construction completion. Grass and shrub density has increased, but much
13C of the cover still consists of annual weeds, primarily kochia. The cover percentage conforms to specifications for closing the storm water discharge permit, which addresses restored areas on the site and on the Club Mesa borrow area to the north. The storm water discharge permit was closed with regulator concurrence.

Inspectors found Russian knapweed along the east side of the site, which is a state-listed noxious
13D species that DOE, as landowner, must control. Although the knapweed was sprayed with herbicide in September 2001, knapweed was identified during the 2002 inspection in many of the same areas in which it grew in 2001. Additional spraying was conducted in 2002, and knapweed will continue to be monitored.

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 disposal cell across County Road EE22 east of the site. UMETCO's completed Title II disposal cell abuts the UMTRCA Title I disposal cell on the southeast.

During site construction, cover materials were obtained from the Club Mesa borrow area immediately northwest of the disposal site. Minor erosion on the Club Mesa borrow area, resulting from the natural processes of reestablishing a drainage swale, has stabilized. Revegetation of the borrow area conforms to the state requirements and, as mentioned previously, the storm water discharge permit for this site has been closed out.

No development or disturbance was observed within 0.25 mile of the site boundary that would negatively affect the disposal site.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

Minor fence repair was conducted during the 2002 inspection. Herbicide was applied to identified areas of Russian knapweed after the 2002 inspection was completed. No other maintenance was required in 2002.

4.0 Ground Water Monitoring

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. Monitor wells are to be sampled every other year after licensing of the site (1999). The wells were sampled in 2002. The need for continued monitoring will be evaluated in 2004. Indicator analytes are arsenic, molybdenum, and uranium.

13E

Concentrations of arsenic in ground water in all three monitor wells were below 0.005 milligrams per liter (mg/L) and well below the MCL of 0.05 mg/L. Concentrations of molybdenum in ground water were below 0.02 mg/L (MCL is 0.1 mg/L).

Uranium concentrations in ground water (Figure 13−2) ranged from 0.022 to 0.117 mg/L (MCL is 0.044 mg/L). Concentrations have remained relatively stable in wells BR95−2 and BR95−3 at approximately 0.040 and 0.020 mg/L, respectively, and were at 0.117 mg/L in BR95−1 (BR95−1 has been sampled only one time because another dry well was mistaken for the actual location in the past). Concentrations of uranium in this range are not unexpected at the contact between the Salt Wash Member and the Summerville Formation. Uranium mineralization is present in the Salt Wash Member. An indication of the intrinsic mineralization of this ground water is the high level of uranium (2.59 mg/L in April 2001) in seep water approximately 0.5 mile north of the disposal cell. The seep is cross gradient from the disposal cell and represents discharge from the Salt Wash/Summerville contact.

Water levels have been measured in these wells since 1997 and remain relatively stable.

Monitor wells CM93−1 and CM93−2 in the uppermost aquifer were sampled in May 1997 and concentrations of all indicator analytes were at or near detection limits (i.e., below respective MCLs).

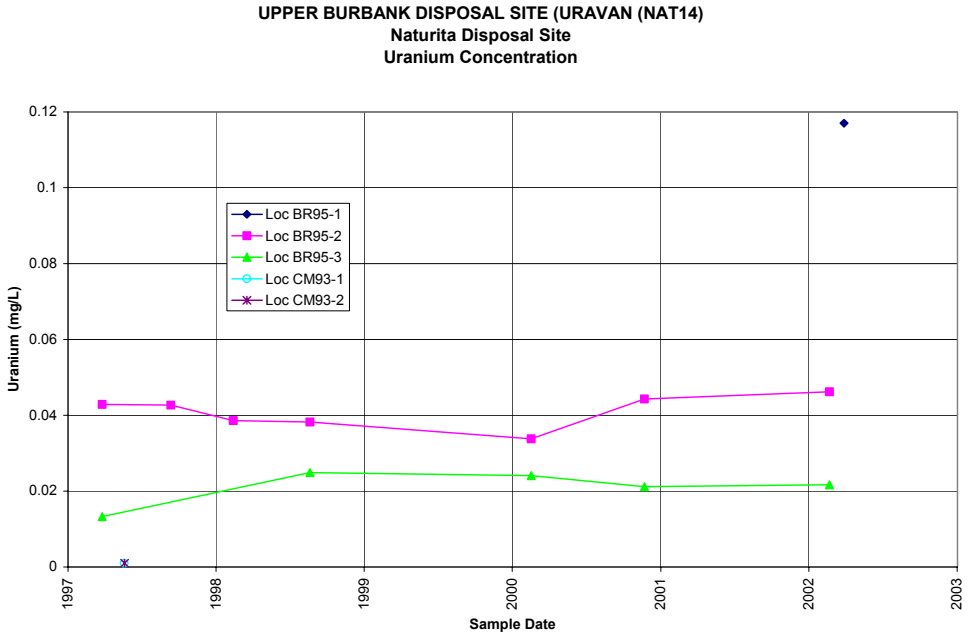


Figure 13−2. Time-Concentration Plots of Uranium in Ground Water at the Naturita, Colorado, Disposal Site

Standpipe – The Long-Term Surveillance Plan stipulates that DOE will monitor water levels in the standpipe in the northeast part of the disposal cell to ensure that water is not accumulating in the footprint of the cell. Water levels have been measured in the standpipe since July 1998 and have steadily decreased from a maximum depth of 12 inches in August 1998 to 5 inches in February 2002. The Long-Term Surveillance Plan states that if the water level in the standpipe remains essentially static at 12 inches or declines, monitoring will be discontinued and the standpipe decommissioned. The criterion has been met and the U.S. Nuclear Regulatory Commission and the Colorado Department of Public Health and Environment were notified in April 2002 of DOE's intent to decommission the standpipe. The standpipe was decommissioned in June 2002.

5.0 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 2002.

End of current section

2002 Annual Compliance Report
Rifle, Colorado, Disposal Site

Compliance Summary

The site, inspected on August 6, 2002, was in good condition. A steel fence and gate were installed across the access road to discourage trespassing, and there was no evidence of trespass beyond the gate at the time of the inspection. A missing perimeter sign was replaced, and the entrance sign had been vandalized and will be replaced in 2003. Continued erosion at the outlet of the toe ditch and in three arroyos south of the disposal cell was evident; however, rocks placed above these areas have been dropping into the eroding channel and are gradually forming an armor layer to inhibit or prevent erosion. Vegetation in reclaimed areas was stressed due to drought conditions. The water level elevation in the cell is being drawn down as required by the Long-Term Surveillance Plan and currently is at an acceptable elevation; however, the solar-powered pump was not operating at the time of the inspection. The pump was repaired the next day and normal pumping operations resumed. No other maintenance was necessary, and there was no requirement for a follow-up or contingency inspection.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 3.4	Section 2.0
Routine Maintenance and Repairs	Section 4.0	Section 3.0
Ground Water Monitoring	Section 2.6 and Appendix	Section 4.0
Corrective Action	Section 5.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, north of Rifle, Colorado, was inspected on August 6, 2002. 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.

1.1 Specific Site Surveillance Features

Access Road, Gates, Fence, and Signs—The site is reached by driving north on an improved gravel road from State Highway 13. In 2002, a steel fence and swinging gate (PL–1) 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 there was no evidence of trespass beyond the gate.

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.

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 extends to the edge of steep-sided arroyos that bound the site on the east and west. Previous fence improvements continue to successfully prevent cattle from entering and grazing near the cell. There was evidence of wildlife (elk and deer) grazing in the revegetated areas adjacent to the disposal cell.

The entrance sign was damaged from a shotgun blast and is barely legible. This sign will be replaced in 2003. Perimeter signs P5 and P19 had new bullet holes but were legible. Perimeter sign P11 was missing and was replaced at the time of the inspection. Vandalism to the signs apparently was done prior to installation of the locked gate on the access road.

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 set at only 15 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 were not included as part of the annual inspection. All survey and boundary monuments that were inspected were found to be in good condition. Some of the monuments on the north and east side of the cell were not visited during this 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. Data loggers 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. Data loggers 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. Due to damage by freezing, the wellhead was insulated and repairs were made to the discharge pipe in January 2002. The solar collector was in excellent condition at the time of the inspection; however, the pump was not operating properly. Repairs were made to the pump the day after the site inspection.

14B

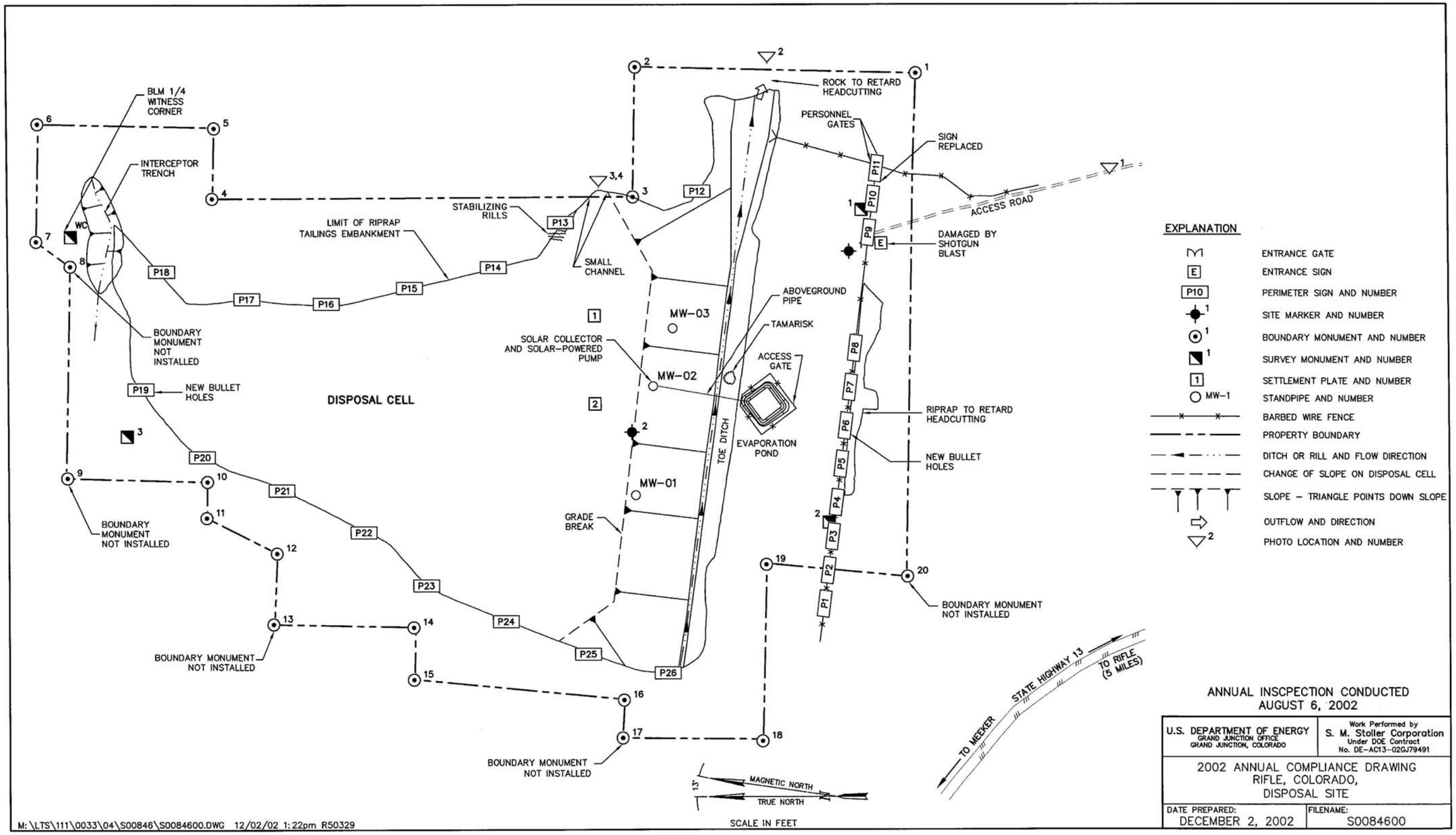


Figure 14–1. 2002 Annual Compliance Drawing for the Rifle, Colorado, Disposal Site

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.

Monitor Wells—Ground water monitoring is not required at the Rifle disposal site. The reclaimed sites of nine monitor wells decommissioned in 2001 were in good condition.

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 covers the 71-acre disposal cell. The rock was in excellent condition. There was no evidence of erosion, differential settlement, slumping, cracking, or other phenomenon that might affect cell integrity. Inspectors found no plant encroachment in rock-armored areas.

An interceptor trench was constructed upslope of the disposal cell to protect the cell from storm-water and snowmelt runoff. The trench diverts water to the arroyo west of the site. The trench was designed so that if erosion occurred below the outfall of the trench it would be halted by bedrock. Erosion is occurring, but currently is limited to the colluvial materials above the bedrock.

Toe Ditch and Toe Ditch Outlet—The toe ditch runs along the downslope (south) edge of the disposal cell. The toe ditch 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. Significant plant encroachment is not occurring in the toe ditch; however, a single tamarisk plant was growing in the toe ditch below MW–02. This plant was cut and the stalk treated with herbicide to prevent tamarisk from becoming established.

Minor erosion, anticipated in the design, has occurred in the channel at the outlet below the toe ditch (PL–2). Bedrock is now exposed at the outlet. Rock placed at the bottom of toe ditch outlet is dropping into the eroding channel and gradually forming an armor layer to inhibit erosion.

Reclaimed Areas—Disturbed areas around the edges and south of the disposal cell were reseeded in 1996. The vegetation, primarily grasses, was stressed and in dormant condition due to drought conditions. Limited cattle grazing occurred in the spring of 1998, but apparently not since then.

In the reclaimed area south of the disposal cell, there are three large arroyos. To prevent headward migration of these arroyos toward the disposal cell, a rock apron was placed between the stock fence and the head-cuts in these arroyos. 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 appeared to be
14C stable. However, the runoff collected by the rills travels downhill along the interface between the riprap and the adjacent reclaimed soil area. A small channel that currently averages about 1 foot wide and less than 1 foot deep has formed and has exposed some of the gravel bedding material (PL–3 and PL–4). The scoured channel extends approximately from perimeter sign P13 to boundary monument BM–3. This 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.

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. Inspectors observed no activity or development that might affect the site or the long-term performance of the disposal cell.

Revegetated land managed by the U.S. Bureau of Land Management (BLM) directly south of the disposal cell was inspected. During construction of the cell, DOE was granted a Temporary Withdrawal Permit by BLM to use this area for topsoil storage. DOE seeded this area along with other reclaimed areas. Cheat grass, an undesirable range species, became the predominant vegetation in this area and DOE reseeded the area in 1999 at the request of BLM. The next two annual inspections indicated the dominance of cheat grass and Russian thistle over the seeded
14D species in the reseeded area. All plants were dormant at the time of the 2002 inspection due to drought conditions. It is unlikely that BLM will close the Temporary Withdrawal permit until revegetation of this area with desirable species is successful.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

In 2002, DOE insulated the wellhead, repaired the discharge pipe, repaired the malfunctioning pump in standpipe MW–02, and replaced a missing perimeter sign.

4.0 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 because the disposal cell is geologically isolated from the first useable aquifer by approximately 3,800 feet of low-permeability siltstones, shales, and sandstones.

DOE does, however, monitor water levels in the disposal cell at standpipes MW−02 and MW−03. Monitoring is conducted to ensure that water within the disposal 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. A liner 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, the Long-Term Surveillance Plan established an action level for pumping of 6,016 feet.

When average water levels (as calculated using linear regression) in MW–02 approached the action level in August 2001, DOE installed a pump in this standpipe, constructed an evaporation pond, and began pumping from the standpipe to the pond. Since then, a total of 488,000 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 is approximately 5 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 minor irregularities in the datalogger lines shown on the graph (most obvious in MW–03) are related to variations in atmospheric pressure (as shown during the period of measurement from April through June 2002), with elevated atmospheric pressure causing depressed water levels. The increase in elevations in late May 2002 for MW–02 is a result of a resurvey of the measuring point and adjustment of the datalogger readings.

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.

5.0 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 taken late in 2001 with the installation of the evaporation pond and subsequent dewatering of the cell. This action has lowered the water level to an acceptable elevation and precludes the disposal cell liner from overtopping.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	335	New fence and gate across access road.
PL–2	275	Erosion at toe ditch outlet.
PL–3	305	Developing channel near perimeter sign P13; upslope view.
PL–4	180	Developing channel near perimeter sign P13; downslope view.

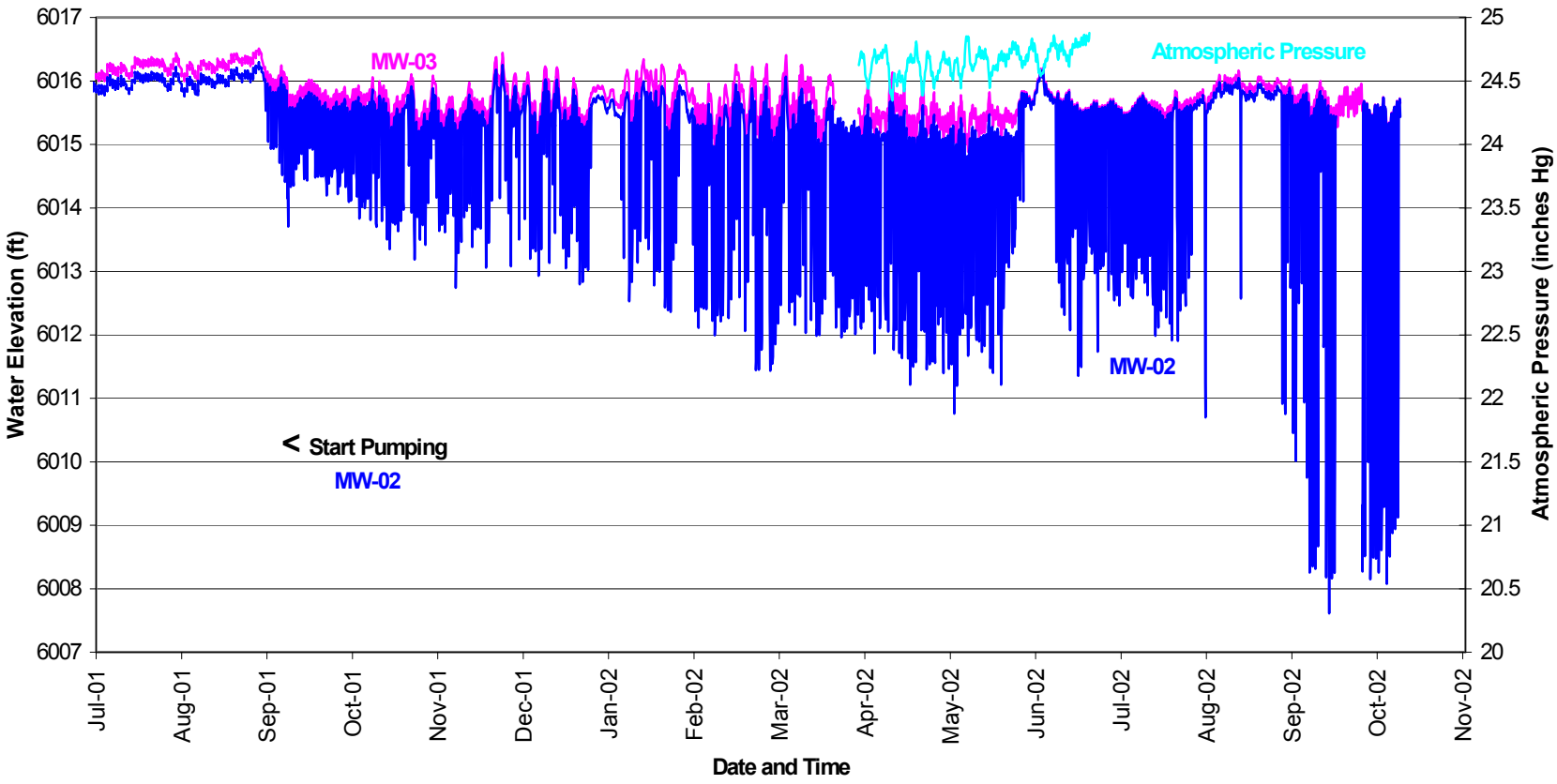
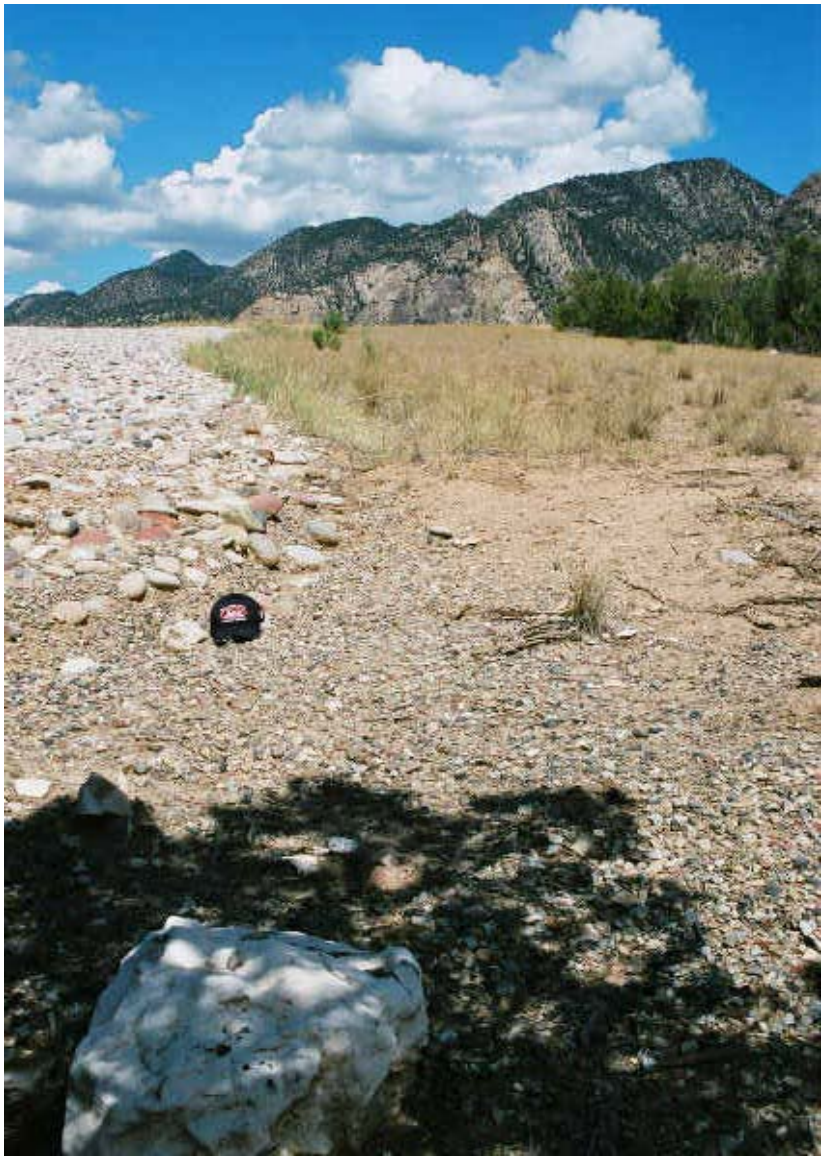


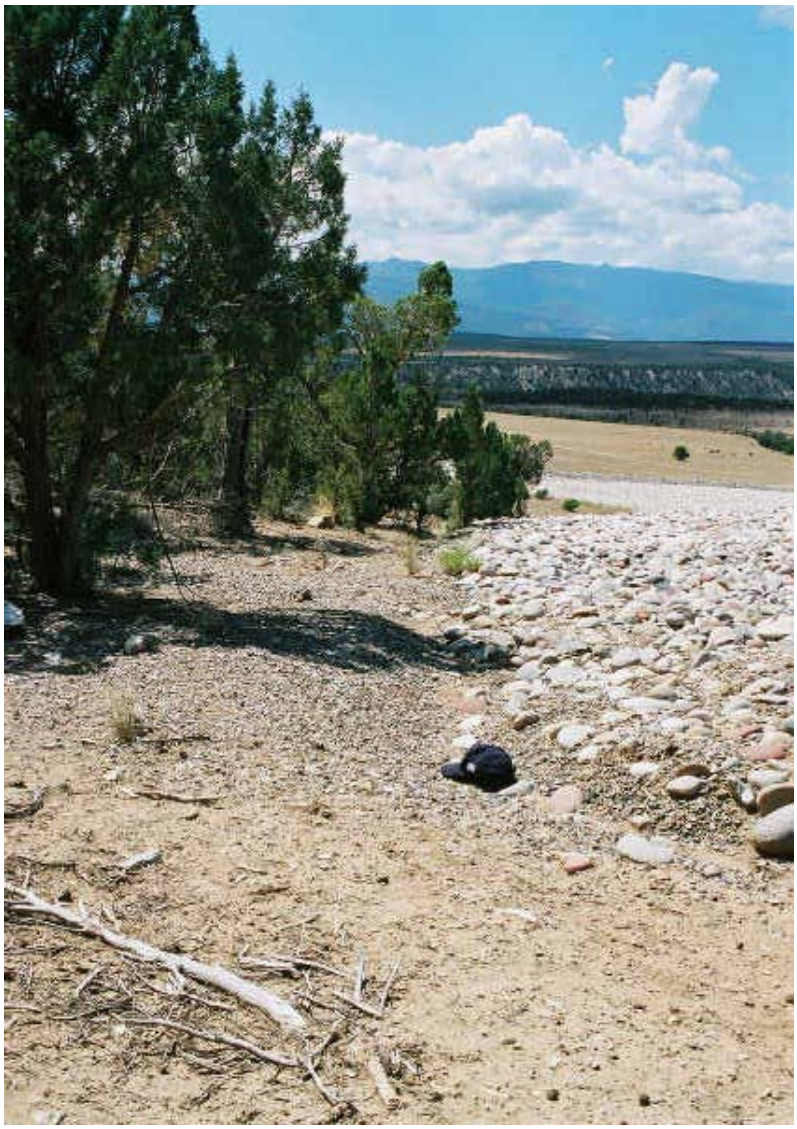
Figure 14−2. Water Levels in Standpipes MW−02 and MW−03 at the Rifle, Colorado, Disposal Site

PL–1. New fence and gate across access road.

PL–2. Erosion at toe ditch outlet.



PL–3. Developing channel near perimeter sign P13; upslope view.



PL–4. Developing channel near perimeter sign P13; downslope view.

End of current section

2002 Annual Compliance Report
Salt Lake City, Utah, Disposal Site

Compliance Summary

The site, inspected on May 20, 2002, was in good condition. Because of continuing activities on the adjacent Envirocare of Utah, Inc., (Envirocare) property, access to the disposal cell site is not unimpeded. Envirocare established a new access route to the southwest corner of the site and installed new entrance gates at that location. 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 uncovered two boundary monuments, removed two cross fences on DOE property, and moved the entrance sign to the relocated site entrance. Ground water monitoring is not required at this site. No maintenance was necessary, and there was no requirement for a follow-up or contingency inspection.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 3.4	Section 2.0
Routine Maintenance and Repairs	Section 5.0	Section 3.0
Ground Water Monitoring	Section 4.0	Section 4.0
Corrective Action	Section 6.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, 85 miles west of Salt Lake City, Utah, was inspected on May 20, 2002. Results of the inspection are described below. Features and the photograph location (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.

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 cell site. Inspectors pass through this gate and must then sign in with Envirocare's security guard in a building near the northwest corner of the disposal cell.

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

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

Envirocare installed new entrance gates through their fence and DOE's fence at the southwest
15B 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 was relocated by Envirocare from the former entrance gate to the new entrance gate (PL–1). All perimeter signs were present and in good condition.

Site Markers and Monuments—Both granite site markers were in excellent condition. Two of the four boundary monuments were found and were in good condition. Boundary monuments BM–3 and BM–4 were buried by several feet of fill by Envirocare's site activities, but were uncovered by Envirocare in May 2002.

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, as of May 2002, none of the wells had been abandoned, but were properly secured at the time of the inspection.

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.

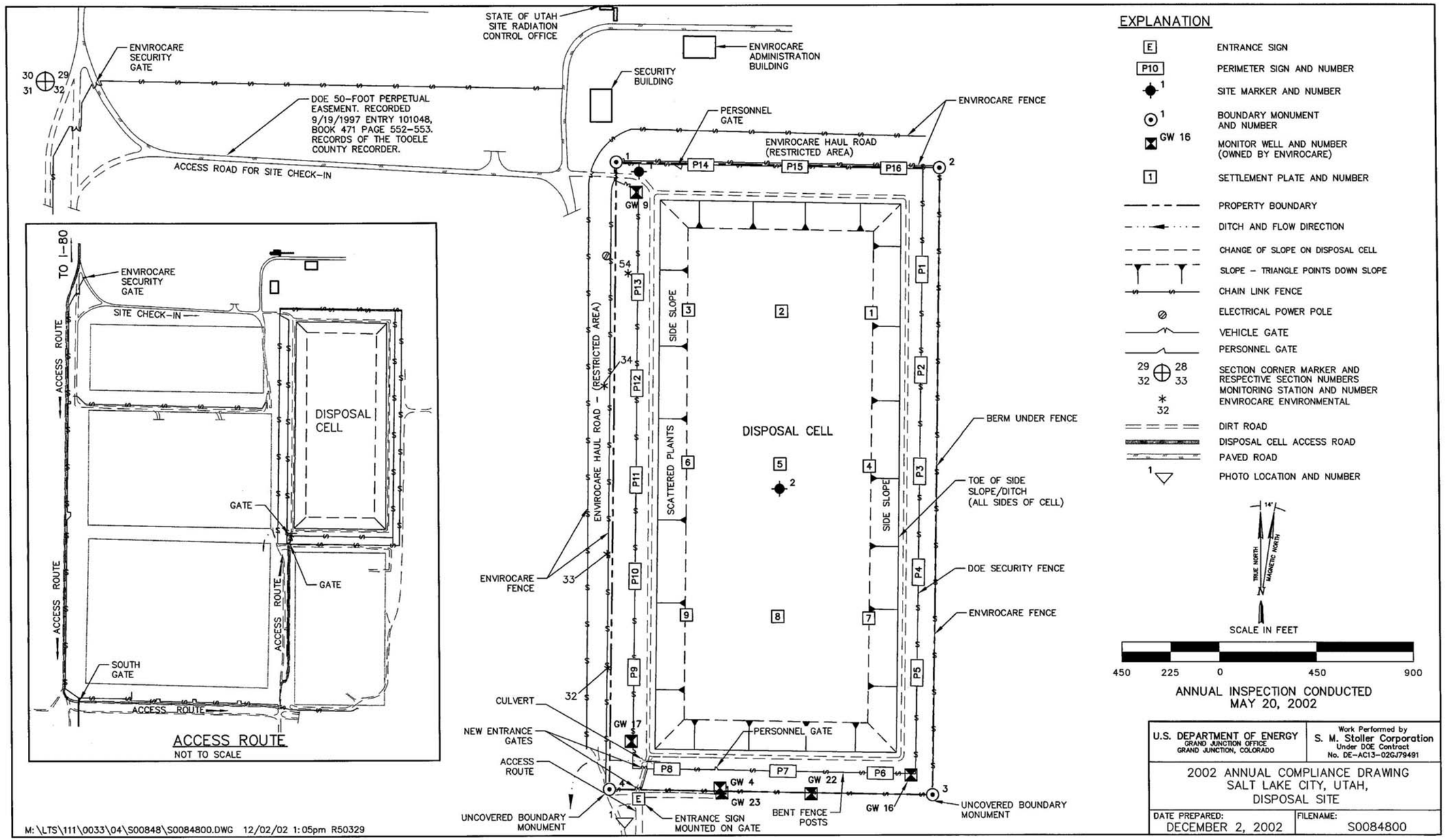


Figure 15–1. 2002 Annual Compliance Drawing for the Salt Lake (South Clive), Utah, Disposal Site

Top and Side Slopes of the Disposal Cell—The top and side slopes of the disposal cell are armored with riprap and were in excellent condition. Inspectors found no evidence of settling, slumping, or instability on the side slopes. A small area of dead annual weeds was observed at the grade break from the top to the side slope about one-quarter of the way south of the northwest top corner; however, no green plants were seen.

Area Between the Disposal Cell and the Site Boundary—Inspectors examined the area between the toe of the disposal cell and the security fence. No evidence of slumping, settling, or significant vegetation encroachment was seen.

Cross fences on either side of the new southwest entrance access road prevented access to the area between the security fence and Envirocare's fence. The cross fences were removed by Envirocare as requested by the inspectors.

Outlying Area—This transect extends from the Envirocare fence to 0.25 mile beyond the site boundary. Outside the site boundary are a variety of features and activities managed by Envirocare. On the east side of the site, incoming wastes are unloaded from rail cars and transferred to haul trucks. Disposal cells are in the process of being built or closed on the south and west sides of the site. Directly to the south is a low-level radioactive waste disposal cell, and to the southwest is a waste disposal cell containing 11e.(2) material regulated under the Atomic Energy Act of 1954. Directly to the west, Envirocare is filling a newly constructed Class A disposal cell with low level wastes. 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.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

No maintenance was required in 2002.

4.0 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.

5.0 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 2002.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL−1	0	New entrance gate and entrance sign on Envirocare's south fence.

PL−1. New entrance gate and entrance sign on Envirocare's south fence.

End of current section

2002 Annual Compliance Report
Shiprock, New Mexico, Disposal Site

Compliance Summary

The site, inspected on June 27, 2002, was in good condition. Vegetation encroachment on the riprap-armored cover continues. Although efforts to control annual weed species at this site have been successful, woody shrub growth in the storm water diversion channel continues to increase, and needs to be controlled. Runoff from storms in July 2001 and September 2002 caused erosion downstream of the riprap-armored portion of the outflow channel, undermined the fence at several locations, and washed away a boundary monument. DOE will make repairs to these features. Inspectors saw no cause for a follow-up or contingency inspection.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 7.0	Section 2.0
Routine Maintenance and Repairs	Section 8.0	Section 3.0
Ground Water Monitoring	Section 5.0	Section 4.0
Corrective Action	Section 9.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, south of Shiprock, New Mexico, was inspected on June 27, 2002. 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.

1.1 Specific Site Surveillance Features

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

The security fence along the site perimeter was in fair condition. Inspectors noted several locations around the fence where sheet erosion has removed enough material from beneath the chain link fabric to allow access into the site by animals or humans. Inspectors noted that animals (most likely dogs, coyotes, etc.) are using these openings to crawl beneath the chain link fence fabric. The largest openings are between boundary monuments BM−1 and BM−3. Although there was no evidence of trespass, the openings are potential access points for humans and will be filled.

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. During the June 2002 inspection, significant tumbleweed and trash accumulation was observed along the westernmost fence line near boundary monument BM−5 (PL−1) and near the main entrance gate near boundary monument BM−6.

During a thunderstorm in July 2001, approximately 2 inches of rain fell in 2 hours, and another
16A 3.3 inches of rain fell over a 2-day period in September 2002. Erosion caused by runoff from these storm events damaged a portion of fence near boundary monument BM–1. The fence will be repaired when the erosion damage is repaired.

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. The four entrance signs were in good condition. The telephone number for the Navajo Nation Uranium Mill Tailings Remedial Action Office on entrance sign E4 (northwest corner) was incorrect and was updated in October 2002.

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

Site Markers and Monuments—The two site markers, SMK–1 and SMK–2, were examined. Site marker SMK–1 is just inside the old (west) entrance gate and site marker SMK–2 is on top of the disposal cell. Although there was some minor cracking in the concrete around the base of SMK–1, both markers were in good condition.

Erosion resulting from the July 2001 storm washed away boundary monument BM–1. DOE will
16B replace the missing monument when the erosion damage is repaired. All other boundary monuments were located and found to be in good condition.

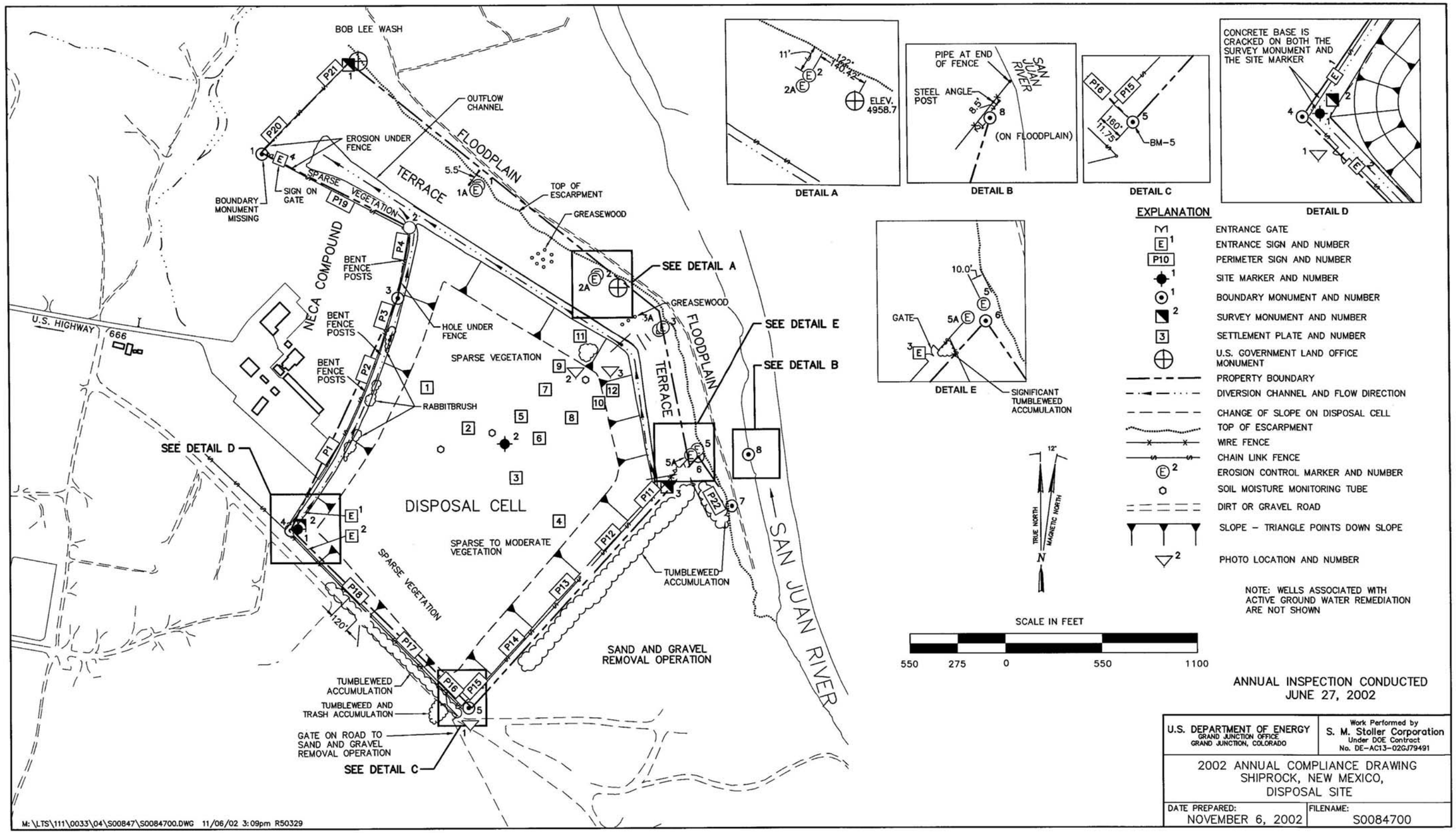


Figure 16–1. 2002 Annual Compliance Drawing for the Shiprock, New Mexico, Disposal Site

The four sets of erosion control markers on the terrace and the three survey monuments were in good condition.

Monitor Wells—Ground water monitoring is not required for long-term stewardship at this site. Monitor wells for ongoing ground water remediation activities, located in and around the site, are not included in the annual inspection.

1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the main tailings 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 including the fenced borrow-pit area west of the disposal cell and the gravel pit south of the disposal cell.

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.

Inspectors observed locations on top of the disposal cell rock cover where the riprap had been pulled back and piezocones installed (PL−2). Vehicle tracks associated with this activity also were evident on top of the disposal cell. The piezocones had been removed by the time of the inspection, and the riprap was replaced after the inspection.

Significant vegetation growth has been noted during past inspections on the top and the east,
16C 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. Although efforts to control annual weed species at this site have been successful, inspectors noted the population of woody shrubs growing in the storm water diversion channel continues to increase (PL−3). DOE will continue to monitor vegetation growth and will apply herbicide to the annual weeds and woody plants as they appear. No new tamarisk plants were observed in this transect.

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. Sparse vegetation was noted in the outflow channel; however, it is not anticipated that the vegetation will adversely affect the channel's performance.

The July 2001 storm event scoured a hole measuring approximately 15 feet wide by 4 feet deep beyond the riprap-armored portion of the outflow channel (in area of boundary monument
16D BM−1). The hole was filled with pit run material as a temporary measure; the fill was washed away during the September 2002 storm and again was filled. DOE will extend and armor the outflow channel to prevent further erosion in this area.

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. The edge of the terrace escarpment is inspected for slope retreat (mass wasting). No erosion of the terrace or escarpment was evident.

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

A fenced depression, from which radon barrier material was borrowed, is located across the public road southwest of the disposal cell. As part of on-going ground water remediation efforts at the Shiprock disposal site, DOE began construction of a lined, spray-evaporation pond at the borrow area in 2002. At the time of the inspection, there were no concerns or issues associated with this area. Although ground water treatment activities are not within the scope of the stewardship requirements of the disposal facility, construction of this treatment facility adjacent to the disposal cell and related activities will be monitored.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

In 2002, DOE made temporary repairs related to storm damage, mobilized a contractor to make permanent repairs to storm-damaged features, and corrected the contact phone number for the Navajo Nation on the sign at the northwest gate.

4.0 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.

5.0 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.

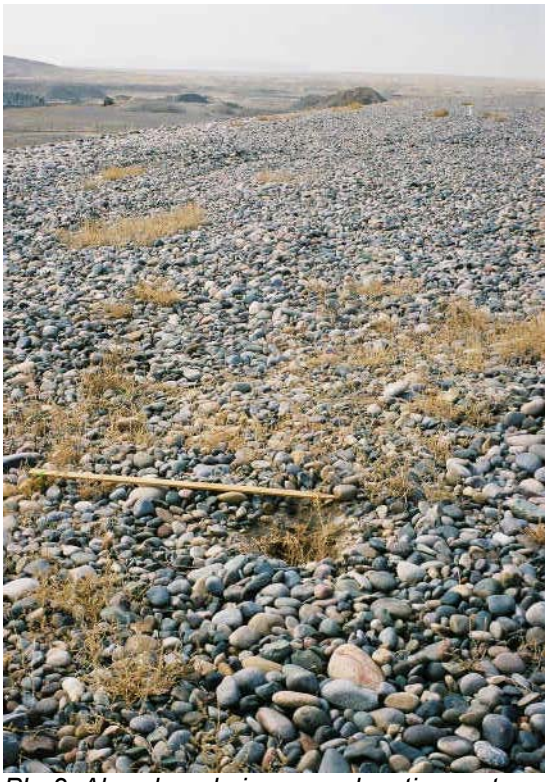
No corrective action was required in 2002.

6.0 Photographs

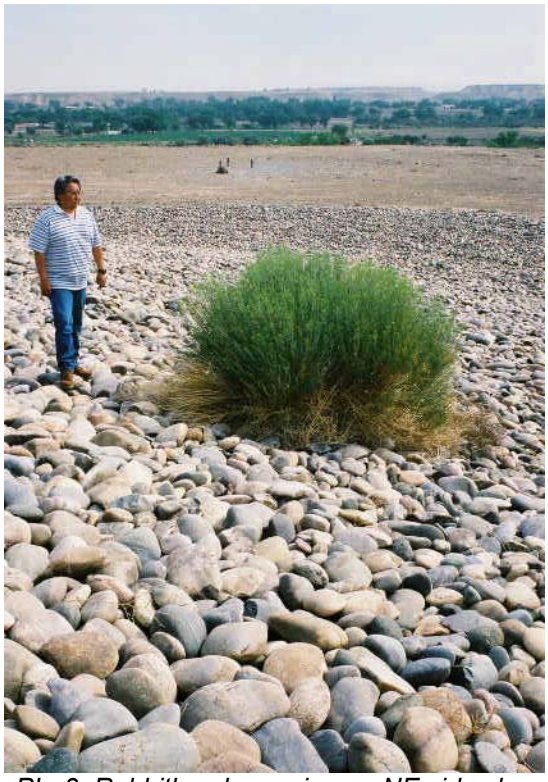
Table 16–2. Photographs Taken at the Shiprock, New Mexico, Disposal Site

Photograph Location Number	Azimuth	Description
PL−1	355	Trash and tumbleweed accumulation near boundary monument BM−5.
PL−2	110	Abandoned piezocone location on top of disposal cell cover.
PL−3	330	Rabbitbrush growing on NE side slope.

PL−1. Trash and tumbleweed accumulation near boundary monument BM−5.



PL−2. Abandoned piezocone location on top of disposal cell cover.



PL−3. Rabbitbrush growing on NE side slope.

End of current section

2002 Annual Compliance Report
Slick Rock, Colorado, Disposal Site

Compliance Summary

The site, inspected on July 10, 2002, was in excellent condition. Vegetation around the disposal cell has become well established, and the erosional features noted in previous inspections are continuing to heal. Inspectors found infestations of noxious weeds on the site and treated them with herbicide. Wire strands along the perimeter fence had been broken in several places and were repaired. No need for a follow-up or contingency inspection was identified.

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 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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 3.4	Section 2.0
Routine Maintenance and Repairs	Section 4.0	Section 3.0
Ground Water Monitoring	Sections 2.5 and 2.6	Section 4.0
Corrective Action	Section 5.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, northeast of Slick Rock, Colorado, was inspected on July 10, 2002. Results of the inspection are described below. Features and the photograph location (PL) 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.

1.1 Specific Site Surveillance Features

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

The wire entrance gate was secured with a DOE lock. The stock fence around the site is strung with four strands of wire with spacers. The top and bottom strands are smooth wire to allow wildlife to pass over and under, and the middle two strands are barbed wire. Wires were broken in several sections of the fence by game animals, and subsequently were repaired. With the
17A exception of these sections, the fence and gate were in excellent condition.

The entrance sign inside the stock fence just east of the entrance gate was in excellent condition. Thirty-two perimeter signs, designated P1 through P32, are spaced at approximately 200-foot intervals around the site. The signs, attached to steel posts set in concrete, are 5 feet inside the site boundary. The signpost at P1 has a bullet hole, and the sign at P32 has a bullet hole and is bent. Other than these minor blemishes, inspectors found the perimeter signs to be 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.

Monitor Wells—The Long-Term Surveillance Plan does not require ground water monitoring at the disposal site. The seven monitor wells at the disposal site were decommissioned in 2001. Two standpipes were installed in the disposal cell during cell construction to monitor declining water levels in the cell as transient drainage progressed. The Long-Term Surveillance Plan stipulated that water levels would be monitored until levels in both standpipes were continuously at or below the 5,838-foot datum for three consecutive quarters. Water levels were consistently
17B below that datum from April 1999 through July 2001. In accordance with provisions of the Long-Term Surveillance Plan, DOE decommissioned both standpipes in June 2002. Steel t-posts mark the former locations of the standpipes.

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 the retention pond and the graded and reseeded areas. Surface drainage from the disposal cell flows south into the retention pond, which is constructed in a channel tributary to Joe Davis Canyon. An outflow channel below the pond is lined with rounded cobblestones for a short distance. The pond, which was dry at the time of the inspection, and outflow channel were in excellent condition.

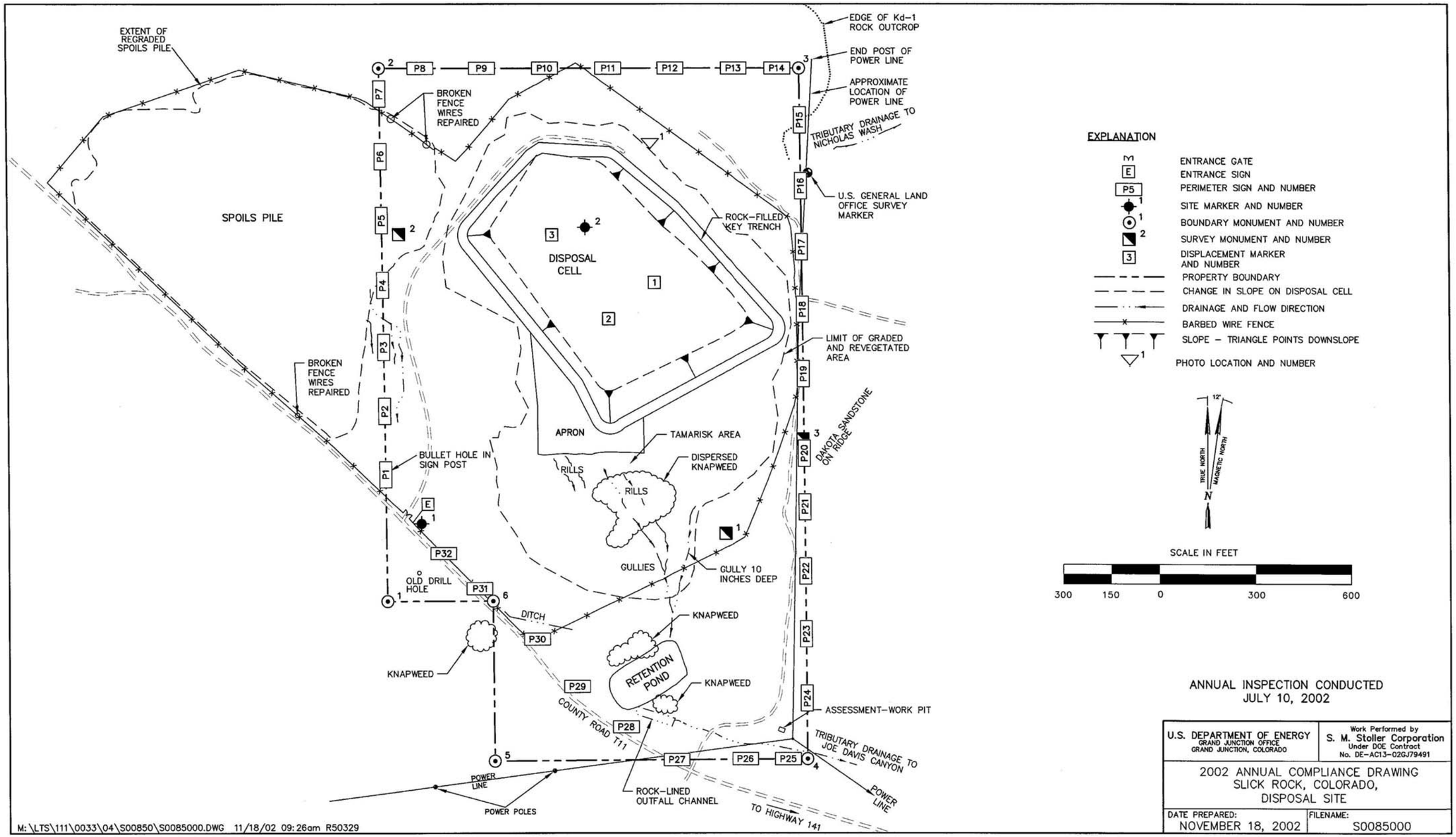


Figure 17–1. 2002 Annual Compliance Drawing for the Slick Rock, Colorado, Disposal Site

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. Reseeded areas had approximately 20 percent cover by four-wing saltbush and, on the north, west, and southwest portions, an understory of Russian thistle and cheatgrass. The east and southeast portions of the reseeded area had an understory of more desirable perennial species. Photograph PL−1 shows vegetative cover on the northeast side of the cell.

Inspectors also found infestations of three noxious weeds—tamarisk, Russian knapweed, and
17C halogeton. Tamarisk plants occur primarily below the rock apron. Because they were treated with herbicide in March and July 2001, few new plants had sprouted by the time of the 2002 inspection. These new plants were treated during the 2002 inspection. Inspectors contacted the San Miguel County Weed Control officer, who traveled to the site in August 2002 and sprayed for both knapweed and halogeton. Additional treatments are planned for spring 2003.

As noted during previous inspections, rills and a few gullies are present downslope from the disposal cell apron (between the apron and retention pond) and along the western boundary between perimeter signs P2 and P4. The rills appear to be healing slowly, as indicated by the rounded edges and establishment of vegetation in the bottom of the rills. These erosional features should continue to be monitored.

Outlying Area— During construction of the disposal cell, the material excavated from the site became 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, encompasses the spoils pile and the former staging area adjacent to the site entrance. The permit allowed DOE temporary access to cross and use U.S. Bureau of Land Management-managed land for construction activities. One of the stipulations of 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.

As expected, after only one season of growth and a drought period, the regraded areas were not well vegetated. The total plant cover of 5 percent consisted entirely of Russian thistle, a non-noxious annual weed. No erosional features have developed in the regraded areas. The U.S. Bureau of Land Management right-of-way permit may be closed when the spoils pile and former staging area are successfully revegetated.

Except for DOE's regrading work, no new disturbance in outlying areas was noted.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

DOE performed minor fence repairs and treated noxious weeds in 2002.

4.0 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.

5.0 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 2002.

6.0 Photographs

Table 17−2. Photograph Taken at the Slick Rock, Colorado, Disposal Site

Photograph Location Number	Azmith	Description
PL−1	100	Revegetated area on northeast side of cell.

PL−1. Revegetated area on northeast side of cell.

End of current section

2002 Annual Compliance Report
Converse County (Spook), Wyoming, Disposal Site

Compliance Summary

The site, inspected on June 24, 2002, was in excellent condition. The access road north of the Dry Fork of the Cheyenne River, although still passable, is becoming overgrown from lack of use. Healthy vegetation has established in the reseeded areas and erosion appears to have stabilized on the disposal site. A transformer platform and power line still service a water supply well that remains on the site, but the electricity meter has been removed. DOE executed an agreement allowing the adjacent landowner continued access to the well and use of the ground water. Ground water monitoring is not required at this site. Inspectors identified no requirements for maintenance or a follow-up or contingency inspection.

Compliance Requirements

Requirements for the long-term surveillance and maintenance of the Converse County (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 Grand Junction Office 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 Converse County (Spook), Wyoming, Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 1.0
Follow-up or Contingency Inspections	Section 7.0	Section 2.0
Routine Maintenance and Repairs	Section 8.0	Section 3.0
Ground Water Monitoring	Section 5.2	Section 4.0
Corrective Action	Section 9.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, in north central Converse County, Wyoming, was inspected on June 24, 2002. Results of the inspection are described below. Features mentioned in this report are shown on Figure 18–1. The number in the left margin of this report refers to an item summarized in the Executive Summary table.

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 a wire 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. Perimeter sign P3 had a bullet hole but was legible. The post for perimeter sign P6 was bent and had a bullet hole; its sign had fallen to the bottom of the post and was resecured by the inspectors. All other signs were in excellent condition.

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

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

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 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, except for the sagebrush being less prevalent or mature in the disturbed areas, the vegetation is indistinguishable from that which grows naturally on the surrounding hills and valleys.

Minor gully erosion continues on site, although most gullies have stabilized. No action is justified at this time because of natural stabilization and revegetation processes; however, these features will continue to be monitored.

The site perimeter is not fenced, and the adjacent landowner, Hornbuckle Ranch, manages the grazing on DOE property. The range appeared to be healthy and not overgrazed.

A water supply well 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 well has not been used recently as

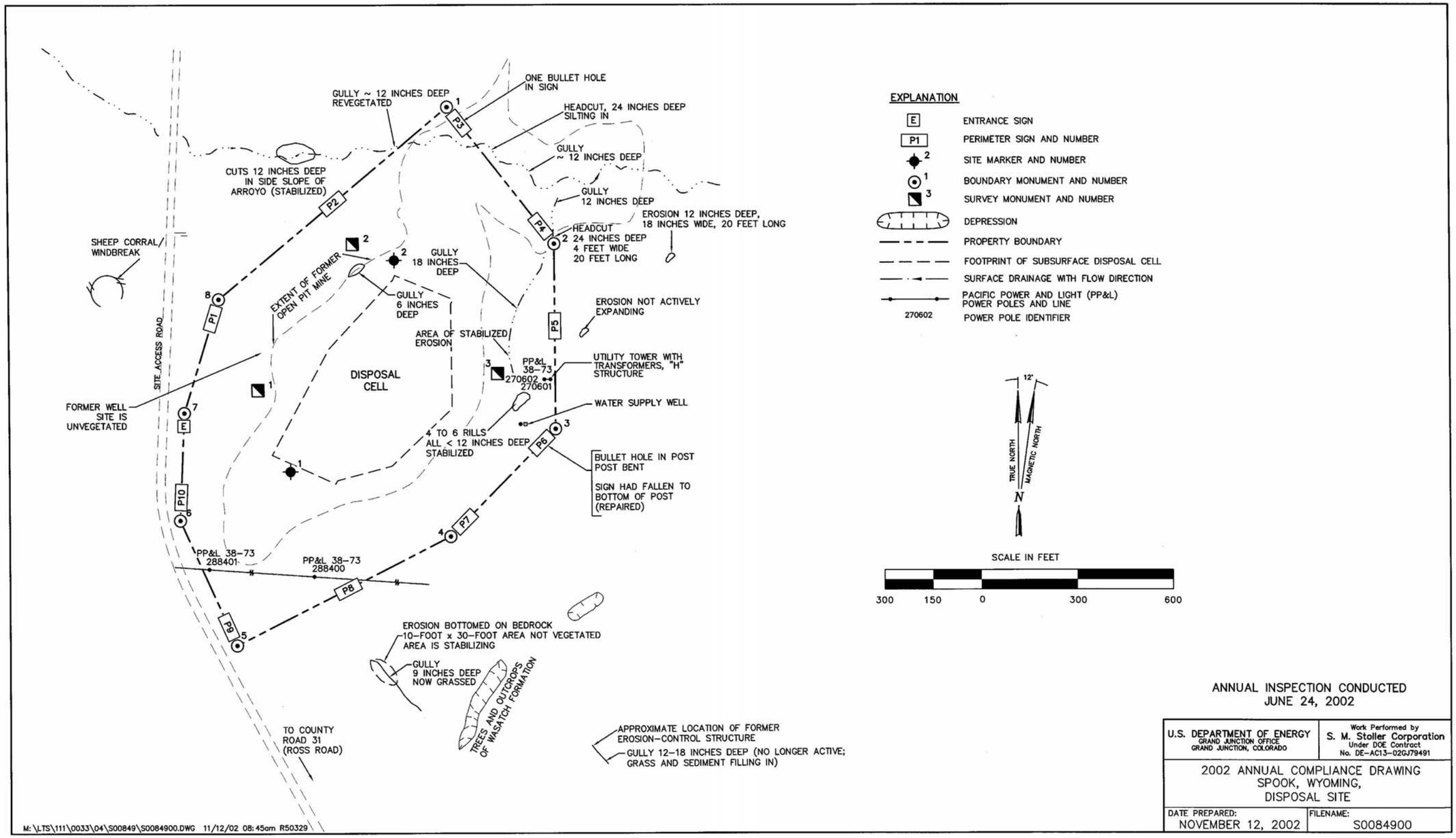


Figure 18–1. 2002 Annual Compliance Drawing for the Spook, Wyoming, Disposal Site

18A indicated by the removal of the electricity meter. 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 survives the change of ownership to DOE.

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. Erosion continues to occur in a gully near perimeter sign P4. This active location and formerly active areas will continue to be monitored.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

Other than resecuring a perimeter sign, no maintenance was required in 2002.

4.0 Ground Water Monitoring

Ground water monitoring is not required at this site because the uppermost aquifer is a Class III aquifer of limited use, and supplemental standards have been applied to ground water.

5.0 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 2002.

End of current section

2002 Annual Compliance Report
Tuba City, Arizona, Disposal Site

Compliance Summary

The site, inspected on September 10, 2002, was in excellent condition. Plant abundance on the cover and side slopes had significantly decreased 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. The Long-Term Performance Project 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. Revegetation of areas adjacent to the disposal cell disturbed by ground water remediation activities has been slow but appeared to be progressing. Results of ground water monitoring showed little variation from results reported in 2001. No maintenance was required, and no need was identified for a follow-up or contingency inspection.

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 Grand Junction Office 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 1.0
Follow-up or Contingency Inspections	Section 7.0	Section 2.0
Routine Maintenance and Repairs	Section 8.0	Section 3.0
Ground Water Monitoring	Section 5.2	Section 4.0
Corrective Action	Section 9.0	Section 5.0

Compliance Review

1.0 Annual Inspection and Report

The site, east of Tuba City, Arizona, was inspected on September 10, 2002. Results of the inspection are described below. Features 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 at the site, such as office buildings, evaporation ponds, water treatment plant, and a network of extraction and injection wells, are not described in the Long-Term Surveillance
19A Plan. These features are associated with active ground water remediation activities conducted by the Uranium Mill Tailings Remedial Action (UMTRA) Ground Water Project. The annual inspection does not include these features or structures.

1.1 Specific Site Surveillance Features

Access Road, Fence, Gate, and Signs—A short, hard-packed and graveled track 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 and secured by a lock.

The security fence around the site is chain link with three strands of barbed wire at the top. With one exception, the security fence was intact and in good condition at the time of the annual inspection. The bracket supporting the three strands of barbed wire at the west end of the entrance gate was broken and will be replaced.

One entrance sign and 30 perimeter signs are located 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 fully legible.

The Navajo Abandoned Mine Lands office phone number at the site entrance sign was updated with the current phone number: (800) 871-6982.

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. Approximately 3 inches of sand had to be removed to locate boundary monument BM−3; however, 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.

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.

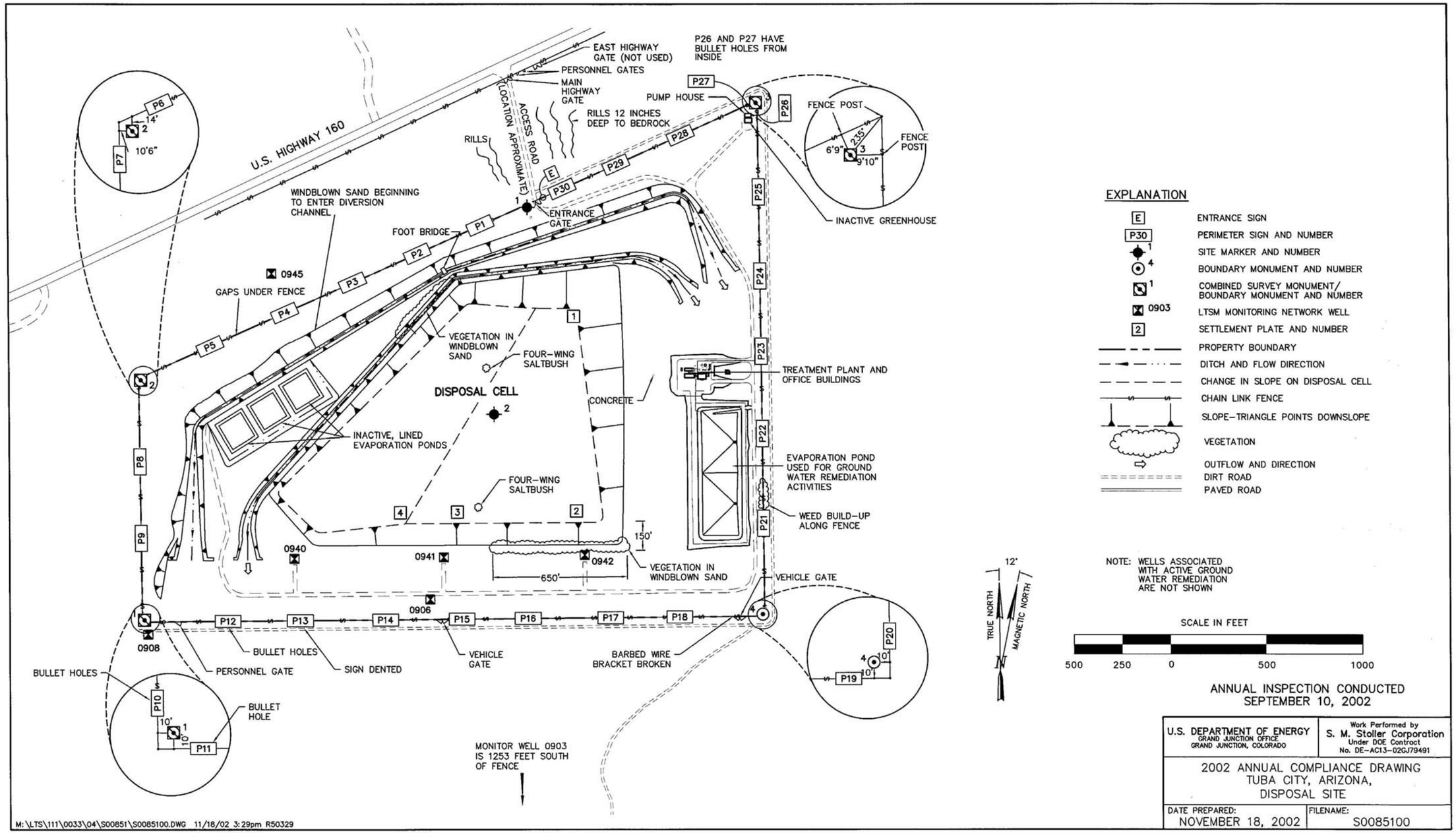


Figure 19–1. 2002 Annual Compliance Drawing for the Tuba City, Arizona, Disposal Site

Patches of dead kochia and Russian thistle were seen on the south side slope and top slope of the cell. A few patches of these weeds were present on the west and north side slopes. The reduced quantity of annual weeds when compared with previous years was likely due to drought conditions during the 2002 growing season. Inspectors continue to monitor changes in plant cover with photographs, which are taken from selected vantage points on an annual basis.

19B During the past summer, woody plants on the cell, primarily four-wing saltbush, were cut and their stumps treated with herbicide. The removal effort was effective because only two small plants were noted growing on the cell.

19C Although annual accumulation is small, sand continues to accumulate on the south rock apron, where it fills interstices in the riprap. This has encouraged establishment of shrubs and perennial grasses in the rock apron. Neither the sand nor the plants appear to compromise the erosion protection. However, the Long-Term Performance Project continues to evaluate the long-term effect of these plants, particularly the deep-rooted plants, on the disposal cell and the rock apron.

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 and that it progresses toward a condition typical of the surrounding native plant community.

19D 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 2002 inspection, neither tumbleweed nor sand accumulation was considered significant enough to require maintenance.

Two rock-lined drainage channels are constructed 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 2001 inspection and does not interfere with the channels' drainage function.

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. Some areas south of the disposal cell have recently been disturbed by UMTRA Ground Water Project activities. These areas may be subject to erosion and will be monitored.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2002.

3.0 Routine Maintenance and Repairs

Woody plants on the cell were cut and their stumps were treated with herbicide.

4.0 Ground Water Monitoring

19E DOE monitors ground water to compare current conditions with 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 will likely mask contamination that might leach from the disposal cell.

Pursuant to the Long-Term Surveillance Plan, DOE monitors seven wells (Table 19–2) 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_3), 0.01 mg/L for selenium, and 0.044 mg/L for uranium. Time-concentration plots 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
0903	Downgradient, off site
0906	Downgradient, baseline
0908	Downgradient, baseline
0940	Downgradient, disposal cell boundary
0941	Downgradient, disposal cell boundary
0942	Downgradient, disposal cell boundary
0945	Upgradient, baseline (background)

Sample results from 2002 indicate that ground water quality downgradient of the former millsite is degraded with respect to three of the four target analytes (nitrate, selenium, and uranium). Overall ground water quality did not change significantly between 2001 and 2002.

Molybdenum concentrations did not exceed the 0.1 milligram per liter (mg/L) standard in samples from any well in 2002. Except at well 0906, molybdenum concentrations have not varied significantly in the last 15 years (Figure 19–2). Samples from well 0906 typically have had higher and more variable molybdenum concentrations than samples from other wells.

In 2002, the concentration of nitrate (as NO_3) exceeded the 44 mg/L standard in samples from all monitor wells except well 0945, the background well. Between 2001 and 2002, 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).

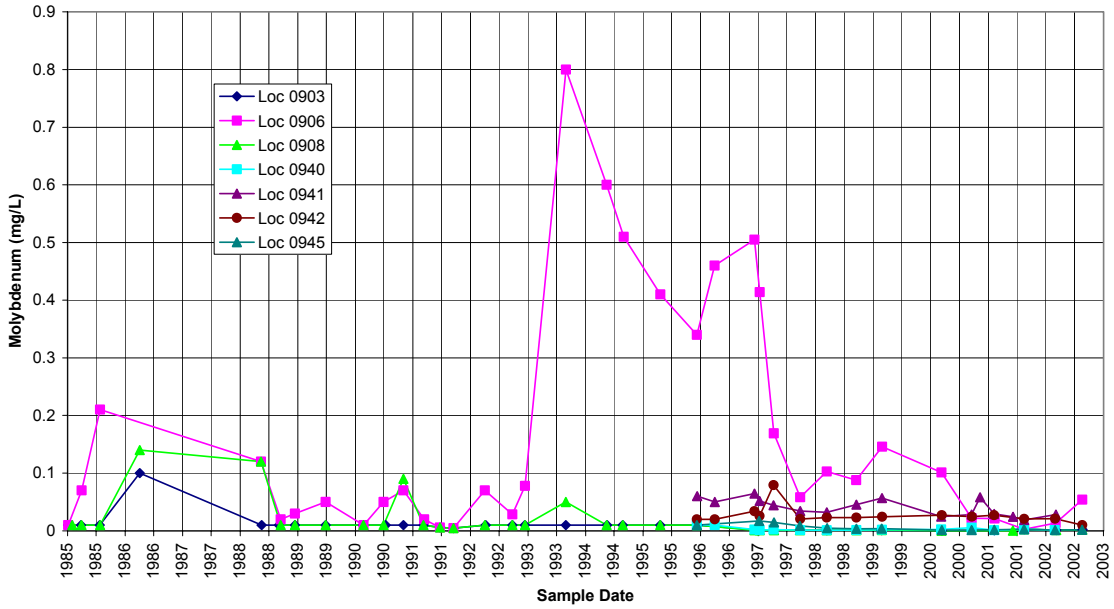


Figure 19–2. Time-Concentration Plots of Molybdenum in Ground Water at the Tuba City, Arizona, Disposal Site

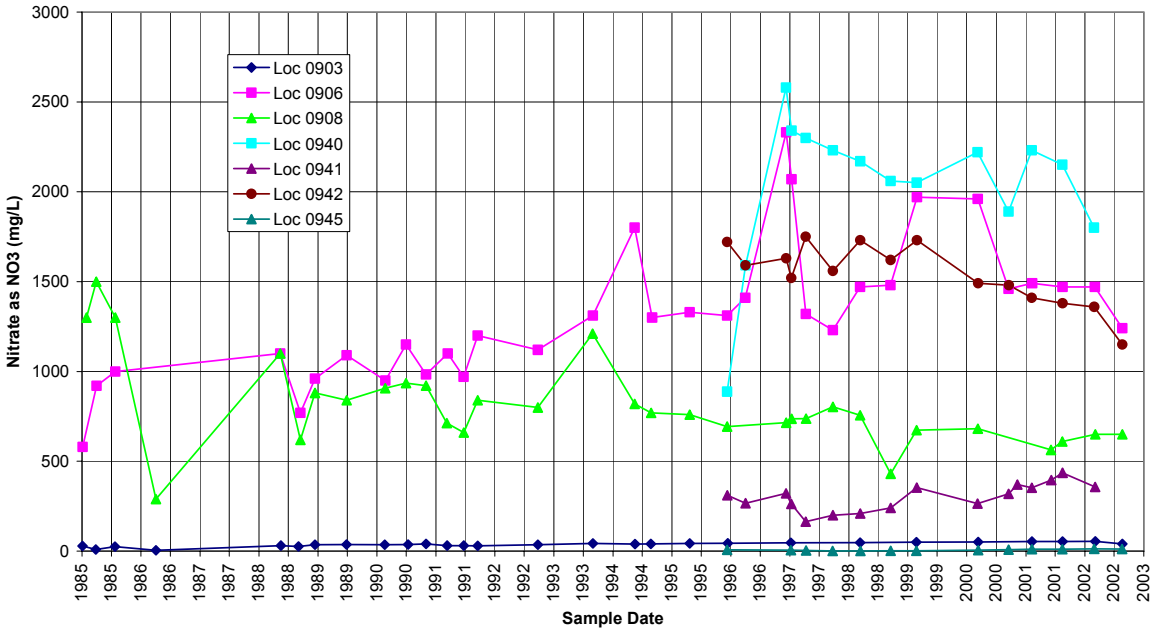


Figure 19–3. Time-Concentration Plots of Nitrate (as NO_3) in Ground Water at the Tuba City, Arizona, Disposal Site

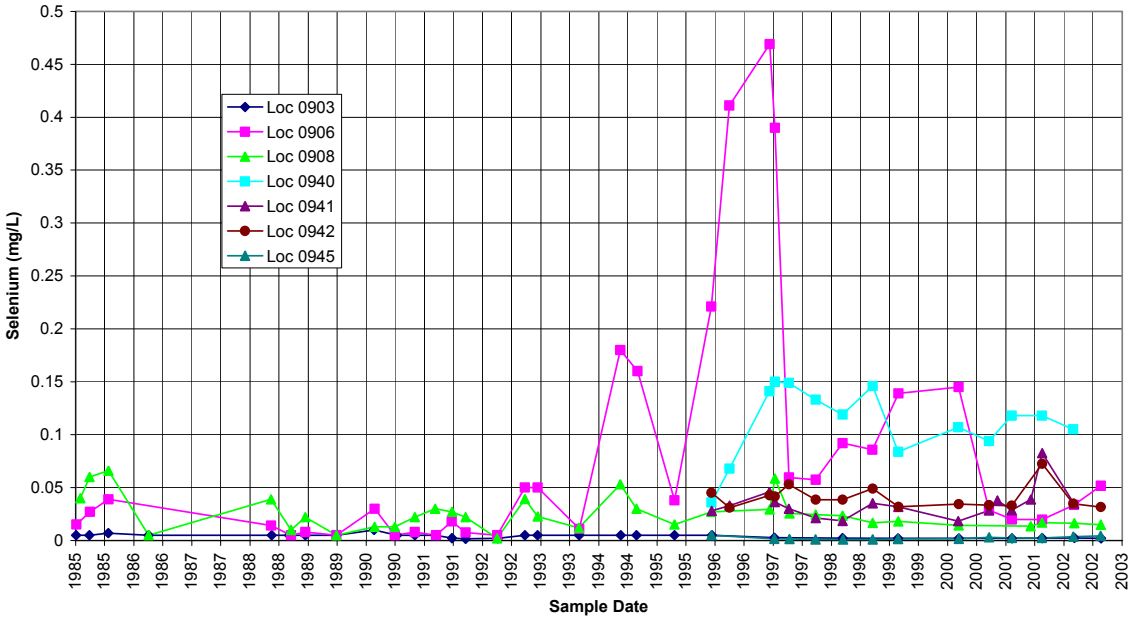


Figure 19–4. Time-Concentration Plots of Selenium in Ground Water at the Tuba City, Arizona, Disposal Site

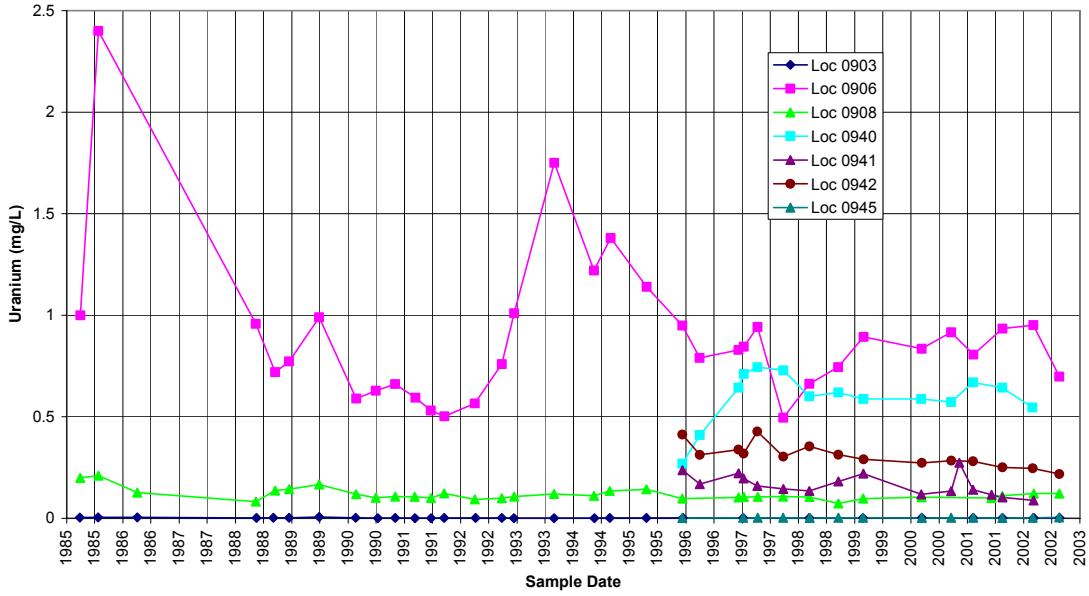


Figure 19–5. Time-Concentration Plots of Uranium in Ground Water at the Tuba City, Arizona, Disposal Site

Consistent with historical data, selenium concentrations exceeded the 0.01 mg/L standard in 2002 in samples from all wells except background well 0945 and off-site, downgradient well 0903. Selenium values have remained fairly consistent in samples from all wells except 0906 and 0940 (Figure 19–4).

Uranium concentrations exceeded the 0.044 mg/L standard in 2002 samples from all wells except background well 0945 and off-site, downgradient well 0903. Concentrations have remained fairly constant over time in samples from all wells except 0906 and 0940 (Figure 19−5).

5.0 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 2002.

End of current section