U.S. Department of Energy
Grand Junction Office
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Grand Junction, CO 81503

JAN 28 2002

Melvyn Leach, Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety and Safeguards
U.S. Nuclear Regulatory Commission
Mail Stop T8A33
Washington, D.C. 20555-0001

Subject: 2001 Annual Site Inspection and Monitoring Compliance Report for UMTRCA Title I Disposal Sites

Dear Mr. Leach:

Four copies of the 2001 *Annual Inspection and Monitoring Compliance Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites* are enclosed. This report is submitted to comply with reporting requirements of 10 CFR 40.27.

The report covers the annual inspections of the 18 licensed Title I disposal sites and the closed portion of the unlicensed Grand Junction, Colorado, disposal site.

If NRC has comments or questions about this report, please contact me at 970/248-6037.

Sincerely,

Art Kleinrath

Art Kleinrath
Program Manager
Long-Term Surveillance & Maintenance

Enclosures

cc w/o enclosures:
M. Widdop, MACTEC-ERS
Project File LREP 6.3.1 (A. Garcia)

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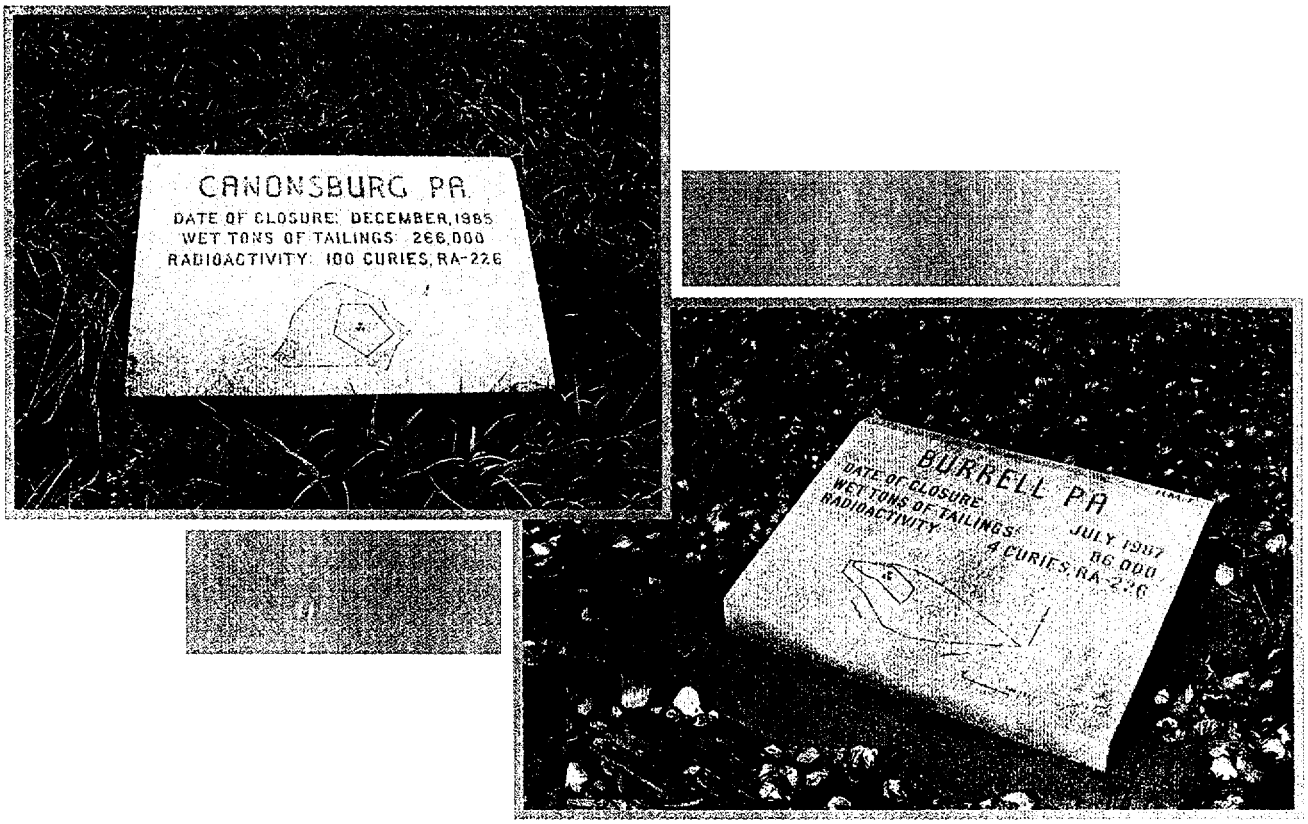
NMSS08
WM-39

GJO–2001–283–TAR
MAC–LREP 6.3.1–4

Long-Term Surveillance and Maintenance Program

2001 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites

January 2002



Work Performed Under DOE Contract No. DE–AC13–96GJ87335 for the U.S. Department of Energy

Long-Term Surveillance and Maintenance Program

2001 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites

January 2002

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

Work Performed Under DOE Contract Number DE–AC13–96GJ87335
Task Order Number MAC 02–06
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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 presents the results of inspections, maintenance, and monitoring by the U.S. Department of Energy (DOE) in 2001 at the 19 uranium mill tailings disposal sites established under Title I of the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978[1]. Results of 2001 activities are compared to license requirements. All UMTRCA Title I disposal sites remain in compliance with license requirements.

DOE operates eighteen UMTRCA Title I sites under a general license granted by the U.S. Nuclear Regulatory Commission at Title 10 *Code of Federal Regulations* Part 40.27. The 19th site, Grand Junction, Colorado, will not be licensed until an open, operating portion of the cell is filled and closed, perhaps in 2023.

The Long-Term Surveillance and Maintenance Program at the DOE Grand Junction, Colorado, Office is responsible for providing stewardship services for these and other DOE disposal and containment sites. These 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.

Site inspections, maintenance, and monitoring are conducted in accordance with site-specific Long-Term Surveillance Plans and procedures established by DOE to comply with license requirements. This report fulfills a specific license requirement. Program plans and inspection results are available on the Internet at **www.gjo.doe.gov**.

As a license condition, each site is inspected annually. The purposes of the annual inspection are to confirm 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 or follow-up inspections and monitoring. Some sites require routine maintenance, but most maintenance is performed as needed.

DOE conducted six nonroutine maintenance activities[2] in 2001:

- Canonsburg, Pennsylvania—reconstructing the eroded streambank along Area C;
- Maybell, Colorado—hardening erosion control structures;
- Slick Rock, Colorado—regrading and revegetating the spoils pile;
- Rifle, Colorado—commencing to extract transient drainage water from within the cell;
- Shiprock, New Mexico—repairing erosion damage to the site periphery; and
- Decommissioning 66 unneeded monitor wells at seven sites.

Results of the annual site inspections and other site 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 site chapter. Minor or incidental activities are described in the individual site chapters.

[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 conducted once or on an as-needed basis.

Site	Chapter	Page	Index No.	Actions and Issues
Ambrosia Lake, New Mexico	1	1–2	1A	Replaced missing perimeter sign.
		1–2	1B	Unneeded monitor wells decommissioned.
Burrell, Pennsylvania	2	2–2	2A	Repaired fence where tree had fallen on it.
		2–2,5,7,8	2B	Implement revised Long-Term Surveillance Plan after U.S. Nuclear Regulatory Commission review and concurrence.
		2–2,3,5	2C	Maintenance: fence, boundary monument, vegetation control.
		2–5	2D	Vegetation encroachment.
		2–6	2E	Ground-water monitoring; no access to two wells.
Canonsburg, Pennsylvania	3	3–2	3A	Two monitor wells destroyed by contractors, one replaced.
		3–5	3B	Maintenance: vegetation control, replace sign.
		3–5	3C	Access needed for monitor wells on Area C.
		3–6	3D	Bank stabilization project completed.
		3–6	3E	Compliance with Ground Water Compliance Action Plan initiated.
		3–6	3F	Ground-water monitoring.
Durango, Colorado	4	4–2	4A	Ongoing vandalism.
		4–2	4B	Unneeded monitor wells decommissioned.
		4–5	4C	Vegetation encroachment.
		4–5	4D	Cell drain remains open during warm season.
		4–6	4E	Ground-water monitoring.
Falls City, Texas	5	5–2	5A	Unneeded monitor wells decommissioned.
		5–2,5	5B	Vegetation encroachment.
		5–5	5C	Maintenance: fence repairs, vegetation control.
		5–6	5D	Ground-water monitoring.
		5–9	5E	Compliance with Ground Water Compliance Action Plan initiated.
Grand Junction, Colorado	6	6–2	6A	Maintenance: fence repairs.
		6–2	6B	Unneeded monitor wells decommissioned.
		6–5	6C	Vegetation encroachment.
		6–7	6D	Ground-water monitoring.
		6–7	6E	Radioactive/PCB waste disposal.
Green River, Utah	7	7–5	7A	Maintenance: replaced missing sign, vegetation control.
		7–5	7B	Ground-water monitoring.
Gunnison, Colorado	8	8–2	8A	Decommissioned unneeded monitor wells.
		8–5	8B	Inspected condition of riprap in test areas.
		8–6	8C	Expansion of County landfill operations.
		8–7	8D	Ground-water monitoring.
Lakeview, Oregon	9	9–2	9A	Vegetation encroachment.
		9–5	9B	Riprap gradation tests continued, riprap size calculation evaluated.
		9–6	9C	Maintenance: fence repairs.
Lowman, Idaho	10	10–2	10A	Vegetation encroachment.
		10–5	10B	Ground-water monitoring.
		10–6	10C	Revised Long-Term Surveillance Plan in preparation.
Maybell, Colorado	11	11–2	11A	Maintenance: replaced missing sign.
		11–2	11B	Re-survey of settlement plates.
		11–5	11C	Hardened erosion control structures.
		11–6	11D	Water level measurements show no local effect.
Mexican Hat, Utah	12	12–2	12A	Maintenance: two sign posts loose.
		12–5	12B	Surface water and ground-water monitoring.
Naturita, Colorado	13	13–5	13A	Vegetation slow to establish.
		13–5	13B	Perpetual easement for associated drainage structures.
		13–5	13C	Ground-water monitoring.
		13–7	13D	Water level in disposal cell.
Rifle, Colorado	14	14–2	14A	Replaced entrance sign.
		14–2	14B	Unneeded monitor wells decommissioned.
		14–5,6	14C	Removal of intracell water.
Salt Lake City, Utah	15	15–1	15A	Access blocked/restored.
		15–2,5	15B	Maintenance: replace perimeter signs, uncover buried monument in 2002.
Shiprock, New Mexico	16	16–2,6	16A	Gravel pit operations.
		16–2	16B	Russian thistle accumulations.
		16–5	16C	Unneeded monitor wells decommissioned.
		16–5	16D	Vegetation encroachment.
		16–6	16E	Investigation of moisture in cell cover.
		16–6	16F	Temporary repair of storm damage.

2001 Summary of UMTRCA Title I Site Issues and Status (continued)

Site	Chapter	Page	Index No.	Actions and Issues
Slick Rock, Colorado	17	17–2	17A	Maintenance: fence repairs.
		17–2	17B	Decommission all seven monitor wells.
		17–5	17C	Establishment of vegetation.
		17–5	17D	Regraded and reseeded spoils pile.
		17–5	17E	Water level measurements (submitted request for concurrence that requirements are met).
Spook, Wyoming	18			No actions or issues.
Tuba City, Arizona	19	19–2	19A	Active ground water remediation activities.
		19–2	19B	Maintenance: fence repair.
		19–2	19C	Vegetation encroachment.
		19–5	19D	Accumulation of windblown sand and Russian thistle.
		19–5	19E	Ground-water monitoring.

End of current text

2001 Annual Compliance Report
Ambrosia Lake, New Mexico, Disposal Site

Compliance Summary

The site, inspected on May 7, 2001, was in excellent condition. DOE decommissioned 20 unneeded monitor wells in 2001. Inspectors replaced one missing perimeter sign. Inspectors identified no additional maintenance requirements and no requirement for a follow-up 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, 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, pages 5–22 and 5–24	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 7, 2001. 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—Access to the site is via a gravel road that leads to the site (and beyond) from New Mexico State Highway 509. The site is reached by traveling east along this road for approximately 1 mile. There is a locked gate across this road where it leaves Highway 509. 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.

1A The entrance and all perimeter signs were in fair condition. Perimeter sign P48 was missing and was replaced by inspectors. Some of the signs have scratches and are starting to weather. No action needs to be taken at this time. Future inspections should 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-two monitor wells were inspected. All wells were secure and in good
1B condition. In September 2001, 20 monitor wells were decommissioned. Two monitor wells remain at the site (see Section 4.0).

Mine Vents—There are two mine vents inside the site boundary. A third vent is just west of the site within DOE's restrictive easement on mining. All three vents are associated with abandoned underground mines now reported to be flooded. All three vents have intact casings and covers.

1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into four areas called transects: (1) the riprap-covered top of the disposal cell, (2) the riprap-covered side slopes and apron of the cell, (3) the graded and revegetated area between the disposal cell and the site perimeter, and (4) the outlying area. Within each transect, specific site surveillance features, such as monitor wells, survey monuments, perimeter signs, and stone site markers, were individually inspected.

Top of Disposal Cell—The top of the disposal cell was found to be in excellent condition. With exception of an area near one displacement monument (i.e., settlement plate), there was no evidence of cracking, settling, slumping, or erosion.

A shallow depression around settlement plate SP–4, first noted during the 1997 inspection, was present and unchanged. There was no indication, such as a high water mark, to suggest that the depression holds water.

Little evidence of plant growth was found on the disposal cell cover.

Side Slopes and Apron—The side slopes and apron are in excellent condition and show no evidence of cracking, settling, slumping, erosion, or significant plant encroachment. 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 noted during previous inspections.

Graded and Revegetated Site Area—In general, site vegetation looks better than vegetation in the surrounding areas. Some areas appear windswept with little growth, while other areas have excellent coverage. Inspectors observed 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 does not appear to be a problem. The perennial grasses planted in the graded areas adjacent to the disposal cell appear to be well established; they are obviously returning each growing season and do not appear to be injured from the grazing.

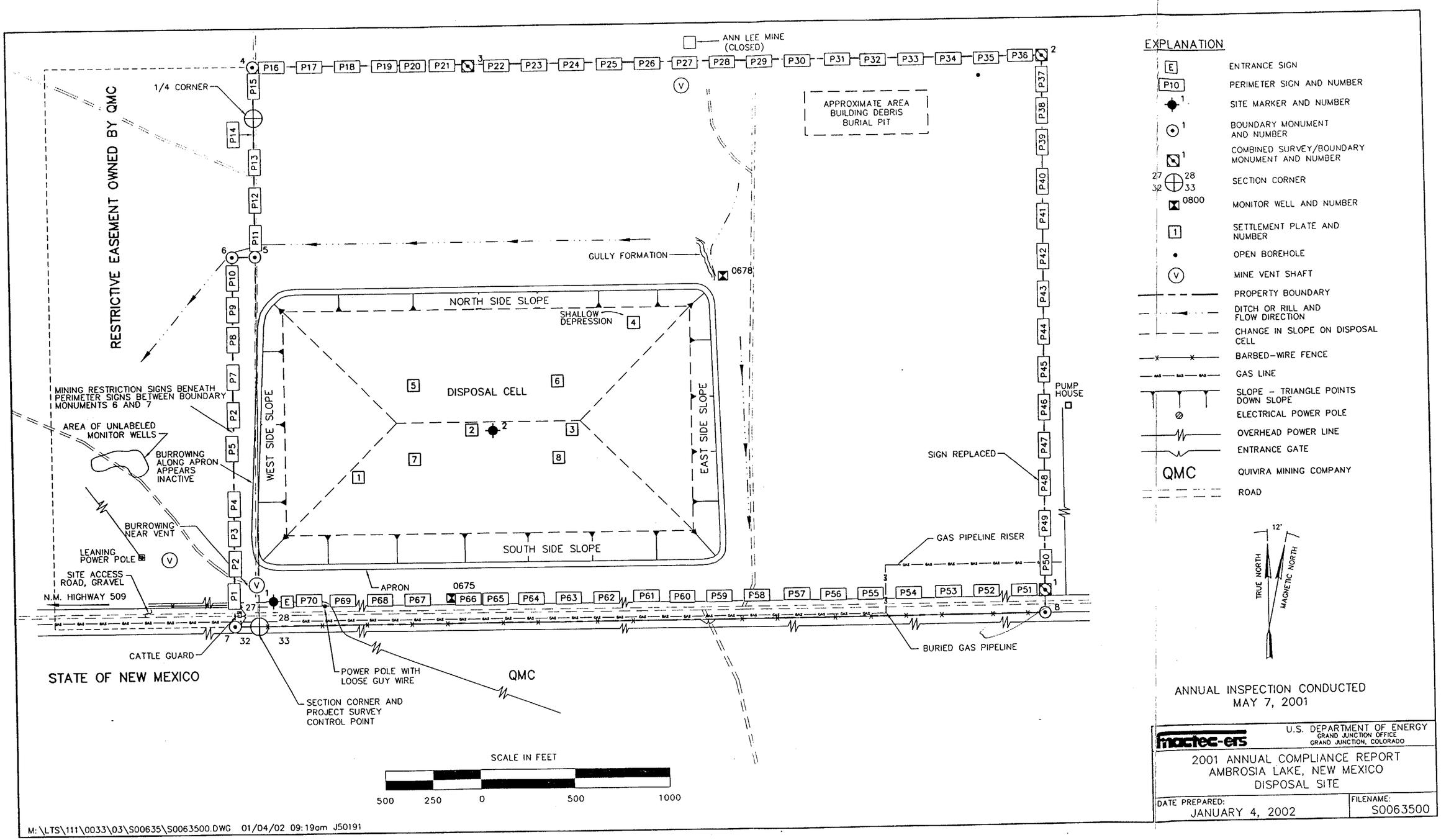


Figure 1–1. 2001 Compliance Drawing for the Ambrosia Lake, New Mexico, Disposal Site

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 and the gullies appear 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 2001.

3.0 Routine Maintenance and Repairs

Inspectors replaced perimeter sign P48.

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 will conduct 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 will sample these locations once every third year for as long as 30 years and evaluate results after every third sampling event.

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 2001.

End of current text

2001 Annual Compliance Report
Burrell, Pennsylvania, Disposal Site

Compliance Summary

The site, inspected on November 1, 2001, was in good condition. Encroachment of vegetation on the disposal cell continues. Ground-water monitoring continues to show the disposal cell is performing as designed. A subcontractor removed a tree that had fallen on the security fence. Inspectors collected a complete set of photographs of site surveillance features for comparison to the baseline photographs taken in 1991. Inspectors identified no requirements for a follow-up 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 *Burrell, Pennsylvania, Vicinity Property Long-Term Surveillance Plan* (DOE/AL/62350–3F, Rev. 2, U.S. Department of Energy [DOE], Albuquerque Operations Office, September 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 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 3.0	Section 1.0
Follow-up or Contingency Inspections	Sections 3.0 and 6.2	Section 2.0
Routine Maintenance and Repairs	Section 6.0	Section 3.0
Ground-Water Monitoring	Section 4.0	Section 4.0
Corrective Action	Sections 4.3 and 6.2	Section 5.0

Compliance Review

1.0 Annual Site Inspection and Report

The site, southeast of Blairsville, Pennsylvania, was inspected on November 1, 2001. Results of the inspection are described below. Features 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—A hard-packed graveled road leads to the site from Strangford Road. From Strangford Road, the access road leads southwest across DOE's right-of-way (Tract 201–E) and across an easement granted by Norfolk Southern Railroad to the site. Ruts in the road were filled in 1999 but are beginning to reappear because of frequent use of the road by the railroad and a natural gas company that has new wells on adjoining property.

The security fence is chain-link with three strands of barbed wire on top. The fence is rusty at many places but remains secure. 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. With one exception, the fence and gates are in
2A good condition. A large (14-inch diameter) hardwood tree had fallen onto the security fence along the southern site boundary; the tree was too large for inspectors to remove. A local subcontractor removed the tree and repaired the fence in December 2001 to restore site access control.

The fence is now 16 to 17 years old. Service life expectancy of the fence in the damp climate along the Conemaugh River is expected to be 25 to 30 years. Locks have to be replaced every 2 to 3 years because of corrosion.

The entrance sign and 17 perimeter signs are hung on the security fence. Many of the perimeter signs along the northern property boundary have been damaged by bullet holes but are legible. No signs needed replacement this year.

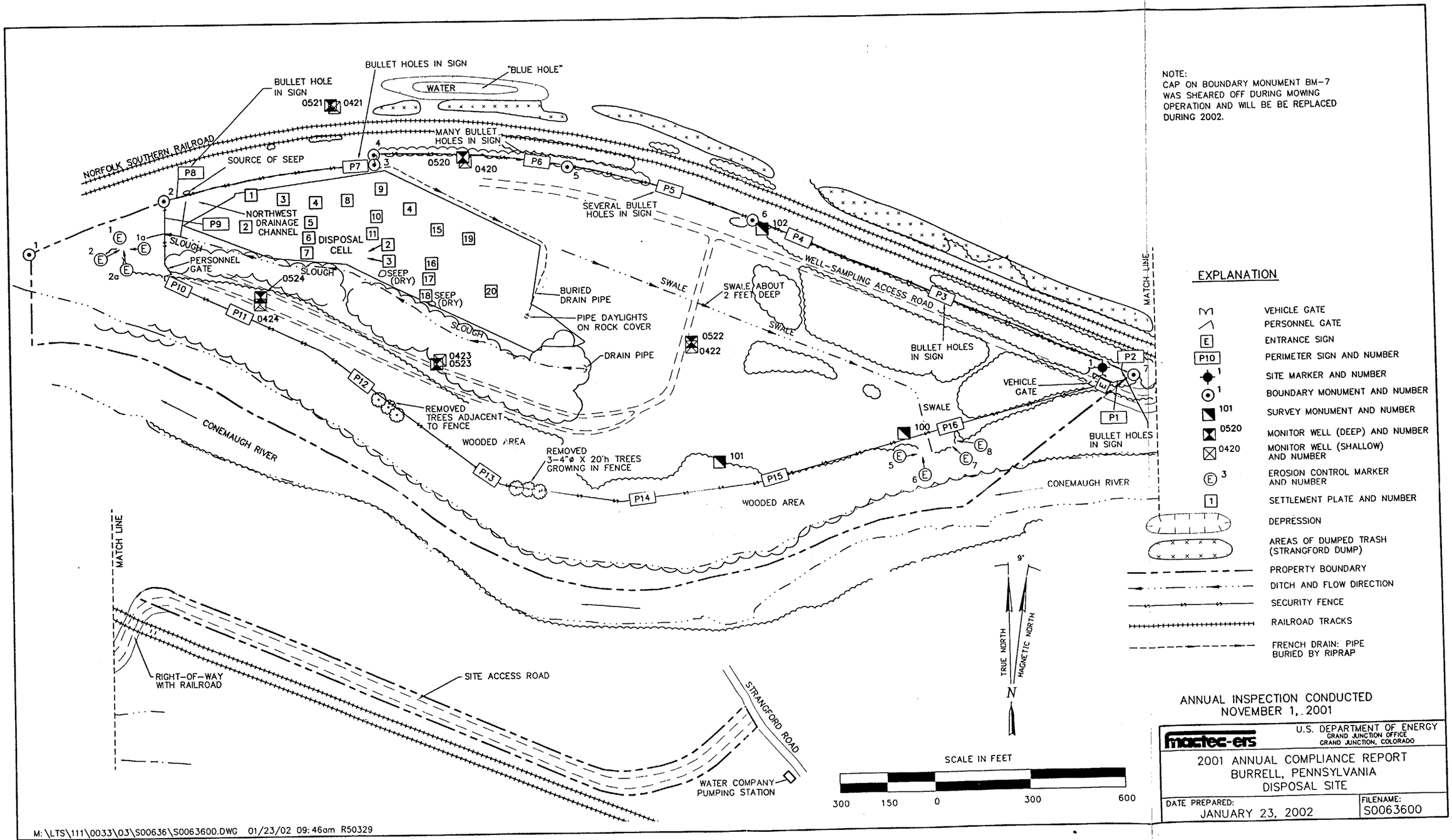
Site Markers and Monuments—The site has one site marker, which is at the east end of the site near the entrance gate. Vegetation around the site marker has to be cleared from time to time.

Other Title I disposal sites have two site markers, and the Long-Term Surveillance Plan states
2B that this site has two markers as well. The revised Long-Term Surveillance Plan, to be implemented upon concurrence of the U.S. Nuclear Regulatory Commission, recognizes the missing site marker as an acceptable variance from DOE's project design.

The site has three survey monuments (SM–100 through SM–102) and seven boundary monuments (BM–1 through BM–7). With one exception, the markers and monuments are
2C undisturbed and in excellent condition, although dense vegetation makes them hard to find. The cap on boundary monument BM–7 was sheared off, apparently when a subcontractor mowed vegetation along the fence lines. The monument will be repaired in 2002.

Four pairs of erosion control markers (ECM–1 and 1a, ECM–2 and 2a, ECM–5 and 6, and ECM–7 and 8) are undisturbed. These markers are in dense stands of Japanese knotweed, where they are difficult to find. Inspectors do not measure to the slope break point because of the subjective nature of this measurement. The monuments are in place and in excellent condition, and no stream bank erosion was evident.

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



NOTE:
CAP ON BOUNDARY MONUMENT BM-7 WAS SHEARED OFF DURING MOWING OPERATION AND WILL BE BE REPLACED DURING 2002.

EXPLANATION

- VEHICLE GATE
- PERSONNEL GATE
- E — ENTRANCE SIGN
- P10 — PERIMETER SIGN AND NUMBER
- 1 — SITE MARKER AND NUMBER
- 1 — BOUNDARY MONUMENT AND NUMBER
- 101 — SURVEY MONUMENT AND NUMBER
- 0520 — MONITOR WELL (DEEP) AND NUMBER
- 0420 — MONITOR WELL (SHALLOW) AND NUMBER
- E 3 — EROSION CONTROL MARKER AND NUMBER
- 1 — SETTLEMENT PLATE AND NUMBER
- DEPRESSION
- AREAS OF DUMPED TRASH (STRANGFORD DUMP)
- PROPERTY BOUNDARY
- DITCH AND FLOW DIRECTION
- SECURITY FENCE
- RAILROAD TRACKS
- FRENCH DRAIN: PIPE BURIED BY RIPRAP

ANNUAL INSPECTION CONDUCTED NOVEMBER 1,. 2001

mactec-ers	U.S. DEPARTMENT OF ENERGY GRAND JUNCTION OFFICE GRAND JUNCTION, COLORADO
2001 ANNUAL COMPLIANCE REPORT BURRELL, PENNSYLVANIA DISPOSAL SITE	
DATE PREPARED: JANUARY 23, 2002	FILENAME: S0063600

Figure 2-1. 2001 Compliance Drawing for the Burrell, Pennsylvania, Disposal Site

Review of real estate records revealed that DOE did not obtain a right-of-entry to cross railroad property for access to upgradient wells 0421 and 0521 north of the railroad tracks. The wells are on private property, and the only route of access is along the railroad right-of-way. The revised Long-Term Surveillance Plan will delete these two wells from the ground-water monitoring network (see Section 4.0, "Ground-Water Monitoring").

1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into four areas called 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 are in excellent condition. There is no evidence of settling, slumping, or other instability on the side slopes.

2D Trees and shrubs continue to establish in the riprap. 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 the performance by reducing moisture in the
2B cover through evapotranspiration. The revised Long-Term Surveillance Plan will allow the vegetation to grow on the disposal cell without further intervention; such growth will not increase risk to public health, safety, or the environment.

Seeps previously found along the base of the south side slope were inspected and observed to be dry. In 1998, a French drain was installed along the northern edge of the disposal cell to improve drainage. It was suspected that water flowing in the seeps came from water in a low-lying area north of the disposal cell. The relationship between the ponded water and the seeps was never clear in all respects, but the reduced and sometimes zero flow in the seeps since the drain was installed suggests that the drain may be diverting water that otherwise would flow beneath the disposal cell to the seeps. The slough at the foot of the disposal cell, fed by normal ground-water flow, 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 issues were evident.

Site Perimeter—As described in the "Specific Site Surveillance Features" on page 2–2, the security fence generally is in good condition but beginning to rust.

2C A 5-foot-wide swath was mowed on both sides of the fence during the annual maintenance in August 2001. Also, dead and entangling vegetation and overhanging and nearby trees were removed to protect the fence and facilitate inspection and repair. The result was a significant improvement insofar as inspection and maintenance are concerned, and will doubtless increase the service life of the fence. 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 not 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 provides access to a pair of monitor wells, 0421 and 0521. This road also provides access to a long, narrow wooded area along the tracks that has been used for illegal dumping. The area is known locally as the Strangford dump. Dumping seems to have decreased over the last few years. Inspectors found no evidence of recent dumping. Township authorities are aware of the problem, but none of the trash has been removed. The dump is not a threat to the disposal site except for the remote possibility that contaminants from the dump might contaminate DOE monitor wells downgradient from the dump. For this reason, inspectors continue to note conditions at the dump.

The "blue hole," a deep depression north of the railroad tracks, contained water. It is occasionally empty, as it was during the 1999 inspection, due to the dry summer.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

Fence maintenance was required in 2001. A survey monument will be repaired in 2002. Corridors to the wells were mowed.

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.

In accordance with the current Long-Term Surveillance Plan, the ground-water monitoring network consists of ten wells (two wells in each of five pairs). The wells are listed in Table 2–2.

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

Monitor Wells	Location
0420 & 0520	Upgradient, or background wells
0421 & 0521	Upgradient, or background wells
0422 & 0522	Crossgradient wells
0423 & 0523	Downgradient wells
0424 & 0524	Downgradient wells

2E As noted in the discussion of monitor wells, DOE did not formally receive access to cross railroad property and sample monitor wells 0421 and 0521. The wells are on private land north of the railroad right-of-way. Because efforts to obtain legal access have been unsuccessful, these

wells were not sampled in 2001. Wells 0420 and 0520 are hydraulically upgradient of the disposal cell and are also within the site boundary. These wells can provide representative
2B upgradient (background) information. Wells 0421 and 0521 will be deleted from the monitoring network, and the Long-Term Surveillance Plan will be revised to show that wells 0420 and 0520 will be sampled to assess background conditions. The 0421/0521 well pair will be decommissioned in 2002.

Each pair of wells consists of a shallow well (400 series), completed in unconsolidated fill and alluvium, and a deeper well (500 series), completed in the shallow bedrock of the Casselman Formation. In addition to the wells, two seeps at the bottom of the south side slope of the disposal cell are also sampled whenever they afford sufficient water.

The wells and seeps are sampled annually in the fall.

Ground-water samples are analyzed for seven target analytes. Tables 2–3 and 2–4 present results of the October 2001 sampling.

Table 2–3. Results of Sampling Alluvial Ground-Water Wells in 2001 at the Burrell, Pennsylvania, Disposal Site

Analyte	Maximum Concentration Limit[a]	Alluvial Ground-Water Sample Location			
		MW–0420 (upgradient)	MW–0422 (crossgradient)	MW–0423 (downgradient)	MW–0424 (downgradient)
Gross alpha	15[b]	1.24[c]	–0.46[c]	1.66[c]	–0.26[c]
Lead	0.05	0.00068[c]	0.00057[c]	0.00062[c]	0.00062[c]
Molybdenum	0.10	0.0019[c]	0.0019[c]	0.0174	0.0056[c]
Nitrate (as NO_3)	44	0.0305[c]	0.0305[c]	0.0305[c]	0.0305[c]
Radium-226	5, combined	0.19	0.08[c]	0.48	0.07[c]
Radium-228		0.23[c]	–0.01[c]	0.24[c]	0.12[c]
Selenium	0.01	0.0003[c]	0.0003[c]	0.0003[c]	0.0003[c]
Uranium	0.044	0.00015[c]	0.0013	0.0133	0.0029

All results are in milligrams per liter (mg/L) except radium-226, radium-228, and gross alpha, which are in picocuries per liter (pCi/L).
[a]Maximum concentration limits are established in 40 CFR 192, Table 1 of Subpart A.
[b]Excludes contributions from uranium and radon-222 decay. Ground water sample results include uranium and radon-222 decay.
[c]Undetected or less than the required detection limit.

Table 2–4. Results of Sampling Bedrock Ground-Water Wells in 2001 at the Burrell, Pennsylvania Disposal Site

Analyte	Maximum Concentration Limit[a]	Bedrock Ground-Water Sample Location			
		MW–0520 (upgradient)	MW–0522 (crossgradient)	MW–0523 (downgradient)	MW–0524 (downgradient)
Gross alpha	15[a]	0.28[c]	–0.86[c]	1.78[c]	–2.02[c]
Lead	0.05	0.00072[c]	0.00061[c]	0.00063[c]	0.00059[c]
Molybdenum	0.10	0.0019[c]	0.0019[c]	0.0019[c]	0.0019[c]
Nitrate (as NO_3)	44	0.0305[c]	0.0305[c]	0.0856[c]	0.0305[c]
Radium-226	5, combined	0.06[c]	0.02[c]	–0.01[c]	0.08[c]
Radium-228		0.03[c]	0.13[c]	0.19[c]	0.05[c]
Selenium	0.01	0.0003[c]	0.0003[c]	0.0003[c]	0.0003[c]
Uranium	0.044	0.00013[c]	0.0006[c]	0.0011	0.00064[c]

All results are in milligrams per liter except radium-226, radium-228, and gross alpha, which are in picocuries per liter.
[a]Maximum concentration limits are established in 40 CFR 192, Table 1 of Subpart A.
[b]Excludes contributions from uranium and radon-222 decay. Ground water sample results include uranium and radon-222 decay.
[c]Undetected or less than the required detection limit.

In the shallow alluvial wells (400-series wells), the concentrations of gross alpha, lead, nitrate, and selenium continue, as they have in the past, to be below instrument detection limits or required detection limits. Molybdenum and radium-226 were detected in downgradient well 0423 at concentrations an order of magnitude below their respective maximum concentration limits. At well 0424, the result for radium-228 analysis was above the instrument detection limit in 2000 but was below the instrument detection limit in 2001. The uranium concentration at well 0423 was above the detection limit, as in previous years. Historically, uranium concentrations have ranged from 0.0016 to 0.0220 milligrams per liter (mg/L) in samples from well 0423 and from 0.0019 to 0.0025 mg/L in well 0424 samples. The 2001 result for well 0423 is within this range. The result for well 0424 is slightly above this range but still an order of magnitude below the maximum concentration limit. There are no trends in the data.

In the deeper wells, all target analytes except uranium were undetected, or concentrations were less than the instrument detection limit. The uranium concentration was an order of magnitude below its standard at one downgradient well. Again, all results are consistent with previous results and no trends are apparent.

Because (1) concentrations of most target analytes are near or below detection limits,
(2) downgradient uranium values have shown no trend since before cell construction, and
(3) constituent concentrations in ground water downgradient from the disposal cell remain below
2B regulatory limits, DOE concludes that the disposal cell is performing as designed and that annual ground water monitoring is no longer necessary. The revised Long-Term Surveillance Plan will commit DOE to monitor once every 5 years. After each monitoring event, DOE will review the data for trends or significant changes and will, from time to time and with concurrence of the U.S. Nuclear Regulatory Commission, review the need to continue monitoring and may discontinue monitoring or alter the frequency of monitoring again.

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 2001.

2001 Annual Compliance Report
Canonsburg, Pennsylvania, Disposal Site

Compliance Summary

The site, inspected on October 31, 2001, was in excellent condition. The grass is mowed annually and is healthy. Trees and shrubs continue to be cleared from the security fence, diversion channels, and perimeter ditches every 2 to 3 years or as needed. The last major clearing was in 1999 and was not required in 2001. Three perimeter signs were missing. Although Area C is not part of the disposal site, the bank downstream from the site along Chartiers Creek at Area C was eroding. A project to stabilize the erosion was begun in November 2000 and completed in May 2001. The site inspection indicated that efforts to stabilize and revegetate the bank were successful. Two ground-water wells were destroyed and one replaced during the year. Ground-water monitoring showed that uranium concentrations remained above the maximum concentration limit at two of three sampled downgradient wells. In addition to annual grass mowing and other vegetation management, the inspectors identified the need to replace the missing perimeter signs and one monitor well in 2002.

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). These requirements are listed in Table 3–1.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Sections 3.1 and 7.0	Section 1.0
Follow-up or Contingency Inspections	Section 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 Site Inspection and Report

The site, located between the communities of Canonsburg and Houston, Pennsylvania, was inspected on October 31, 2001. Features and photo locations 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.

The site is surrounded by a chain-link security fence with three strands of barbed wire at the top. The fence is generally in excellent condition, although it is beginning to rust. From the far western corner of the site, north along the top of the bank above Chartiers Creek, to near perimeter sign P5, the concrete "boot" at the bottom of several fence posts is exposed. Inspectors have been watching these posts since the site was first inspected in 1990. So far, the exposure of concrete has not increased, and there is no sign of new erosion, slumping, or movement of soil away from the posts. All fence posts are firmly secure.

The entrance gate is at the southeast corner of the site along Strabane Avenue; a personnel gate is in the east fence line near monitor well 0413. The personnel gate has not been used in recent years but appears functional. Padlocks on both gates have to be replaced every 3 to 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 were missing. The remaining signs are mounted on the chain-link fence and are in excellent condition.

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

Erosion control markers along the bank of Chartiers Creek are undisturbed. One of these markers, ECM–4A, was lost to erosion in 1996. No new erosion was noted along the bank during this year's inspection.

Monitor Wells—The ground-water monitoring network consists of six monitor wells: 0406,
3A 0410, 0412, 0413, 0414, and 0424. Monitor well 0414 was destroyed during the Chartiers Creek stream bank stabilization project. A replacement well, 0414A, was installed in May 2001. This well is located approximately 7 feet west and 2 feet north of the destroyed monitor well 0414. Another well, 0406, was destroyed in October 2001 during a sewer installation project unrelated to the disposal site (Figure 3–3); replacement is scheduled for 2002. All remaining wells are secured with a cap-and-pin locking system and a standard padlock. Other than the need to replace corroded padlocks every 3 to 4 years, the wells are in excellent condition.

1.2 Transects

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

Disposal Cell—The disposal cell is a grass-covered knoll in excellent condition. The grass is mowed and mulched annually, most recently in July 2001. There is no evidence of slumping, settling, erosion, or other modifying process.

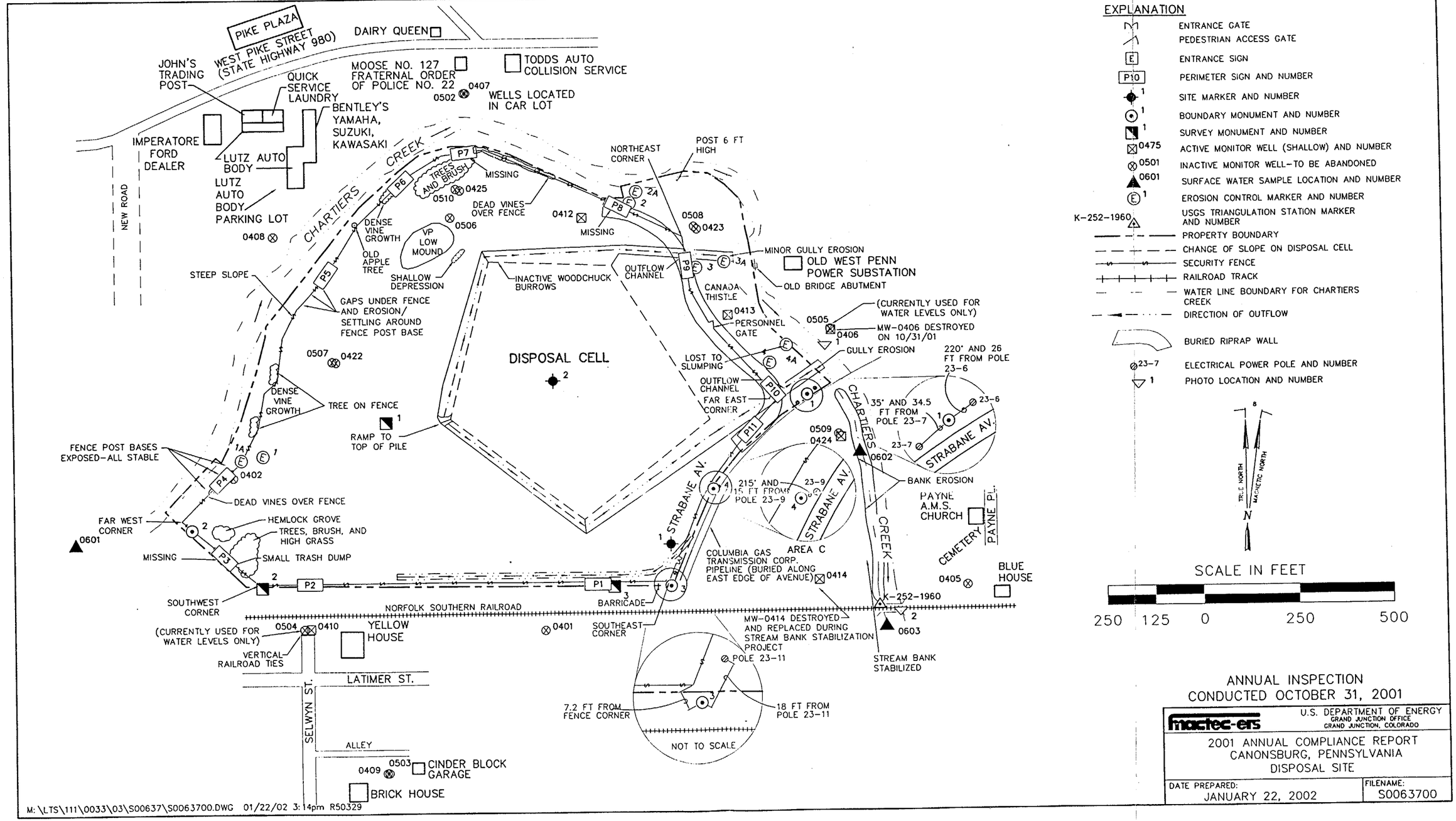


Figure 3–1. 2001 Compliance Drawing for the Canonsburg, Pennsylvania, Disposal Site

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

Vegetation is cleared from the diversion channels and perimeter ditch every 2 or 3 years, or as needed, to ensure their capacity to carry runoff from a large storm event. In 1998, vegetation was treated with herbicide, and in 1999, dead plant material was removed from the channels and ditch. Similar work may be required in 2002.

In 1998, the spillway below the confluence of the eastern diversion channel and the perimeter ditch was rebuilt to correct an erosion problem. The new riprap-covered spillway is functioning as designed and erosion is no longer a problem at this location.

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, is in excellent condition.

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

3B **Site Perimeter**—Annual mowing of the grass does not prevent trees, grass, and heavy brush from growing on and through the security fence. The biomass is considerable and has the potential to damage the fence unless it is removed. 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 action 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 significantly improves the appearance of the site and allows a better inspection of the fence and site perimeter.

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. None was seen; the neighborhood is unchanged.

Area C is a triangular, grass-covered property across Strabane Avenue east of the site. Area C was involved in remedial action and is owned by the Commonwealth of Pennsylvania. It is not part of the disposal site. Pennsylvania may eventually convey Area C to a local government. The commonwealth understands that the deed for Area C, if transferred to the local government, will carry restrictions prohibiting (1) excavation deeper than 6 feet, (2) residential use of the property,
3C and (3) use of the ground water. DOE has not yet been successful in establishing a recorded easement to the wells on Area C. This effort continues.

DOE continues to cut the grass at Area C as a courtesy to the commonwealth.

Over the years since the completion of remedial action, erosion had occurred along the western
3D bank of Chartiers Creek at Area C. To address this problem, DOE reconstructed and revegetated the bank between December 2000 and May 2001. The site inspection indicated that stabilization efforts were successful (Figure 3–4). Grasses have successfully established on the slope of the stream bank, and willow plantings are beginning to take hold.

2.0 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

In addition to annual grass mowing and other measures to manage and control vegetation, inspectors identified the need to replace three perimeter signs and monitor well 0406 in 2002.

4.0 Ground-Water Monitoring

DOE monitors ground water as a best management practice to evaluate contaminant trends in the
3E shallow unconfined aquifer and to comply with the Ground Water Compliance Action Plan
3F approved by the U.S. Nuclear Regulatory Commission in January 2000.

The unconfined aquifer consists of unconsolidated soils, stream deposits, and clean fill. There is remnant contamination, with concentrations below the clean-up standard, in the soils and stream deposits that pre-date remediation.

The ground-water monitoring network consists of six wells (Table 3–2). All wells are completed in the shallow unconfined aquifer.

The original 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 uranium in some wells continues above the maximum concentration limit of 0.044 milligrams per liter (mg/L), DOE continues to monitor annually.

DOE will monitor for at least 5 years (through 2004), or for as long as 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 Original Long-Term Surveillance Plan (DOE 1995)		Sample Locations Ground Water Compliance Action Plan (DOE 2000)	
Six monitor wells:		Four monitor wells:	
0410	Upgradient well	0406	Downgradient well
0406	Downgradient well	0412	Downgradient (POC) well
0412	Downgradient well	0413	Downgradient (POC) well
0413	Downgradient well	0414	Crossgradient (POC) well
0424	Downgradient well		
0414	Crossgradient well		
Three surface water (creek) locations:		One surface water (creek) location:	
0601	Upstream from disposal cell	0602	POE location adjacent to Area C
0602	Adjacent to Area C		
0603	Downstream at railroad bridge		

Note: POC = point of compliance
POE = point of exposure

The Long-Term Surveillance Plan identifies molybdenum and uranium as the target analytes. Under the Ground Water Compliance Action Plan, there are three target analytes: manganese, molybdenum, and uranium. Standards in the form of maximum concentration limits for molybdenum and uranium are established by the U.S. Environmental Protection Agency in 40 CFR 192, Table 1 of Subpart A. There is no standard for manganese. The performance standard adopted by the Ground Water Compliance Action Plan for manganese is the secondary drinking water standard established in 40 CFR 143.3.

Tables 3–3 and 3–4 present results of sampling in 2001.

Table 3–3. Summary of Ground-Water Sample Results at the Canonsburg, Pennsylvania, Disposal Site

			Ground-Water Sample Location					
Analyte	MCL[a]	Year	0410 (up-gradient)	0406 (down-gradient)	0412 (down-gradient)	0413 (down-gradient)	0424 (down-gradient)	0414 (cross-gradient)
Manganese	0.05	1998	2.940	7.960	22.800	2.560	6.540	2.440
		1999	2.690	5.410	20.400	2.140	6.200	1.710
		2000	3.110	0.915	21.100	2.750	5.810	3.120
		2001	3.160	Well Missing	22.300	2.610	6.120	7.010[c]
Molybdenum	0.10	1998	0.001	0.0039[b]	0.0011[b]	0.0034[b]	0.001[b]	0.019
		1999	0.0008[b]	0.0035[b]	0.0008[b]	0.0025[b]	0.0014[b]	0.0108
		2000	0.0004[b]	0.010	0.00047[b]	0.0029[b]	0.0018[b]	0.0168
		2001	0.0019[b]	Well Missing	0.0019[b]	0.0019[b]	0.0019[b]	0.0019[b,c]
Uranium	0.044	1998	0.001[b]	0.0034	0.113	0.140	0.001[b]	0.0441
		1999	0.0002[b]	0.010	0.0544	0.164	0.0002[b]	0.0187
		2000	0.00017[b]	0.0457	0.0536	0.139	0.00021[b]	0.0265
		2001	0.0006[b]	Well Missing	0.0536	0.0914	0.00058[b]	0.0019[c]

All results are in milligrams per liter.
[a]MCL = maximum concentration limit established in 40 CFR 192 for uranium and molybdenum; manganese standard is the secondary drinking water standard from 40 CFR 143.3.
[b]Undetected or less than the required detection limit.
[c]Samples collected from newly installed well 0414A.

Table 3–4. Summary of Surface-Water Sample Results at the Canonsburg, Pennsylvania, Disposal Site

Analyte	MCL[a]	Year	Surface Water Sample Location		
			0601 (upgradient)	0602 (downgradient)	0603 (downgradient)
Manganese	0.05	1998	0.0880	0.0803	0.0746
		1999	0.111	0.0994	0.0847
		2000	0.0673	0.0736	0.0773
		2001	0.0952	0.0038[b]	0.0928
Molybdenum	0.10	1998	0.119	0.112	0.108
		1999	0.0961	0.0987	0.0898
		2000	0.0583	0.101	0.068
		2001	0.0464	0.0398	0.0395
Uranium	0.044	1998	0.001[b]	0.001[b]	0.001[b]
		1999	0.0002[b]	0.0002[b]	0.0002[b]
		2000	0.00056[b]	0.00067[b]	0.00068[b]
		2001	0.00094[b]	0.001	0.0011

All results are in milligrams per liter.
[a]MCL = maximum concentration limit established in 40 CFR 192 for uranium and molybdenum; manganese standard is the secondary drinking water standard from 40 CFR 143.3.
[b]Undetected or less than the required detection limit.

Manganese levels exceed the secondary drinking water standard at all sampled wells by 2 to 3 orders of magnitude. Results from October 2001 are consistent with results from the past 3 years, with one exception. The manganese concentration in well 0414A was higher than in previous years. As noted in Section 3.0, this well was replaced in spring 2001. The concentration increase may be related to installation of the new well.

Manganese concentrations are nearly double the secondary drinking water standard at surface water (Chartiers Creek) sampling locations 0601 and 0603 and are consistent with previous results. The concentration at location 0602, immediately downstream of the stream bank stabilization area, dropped by more than an order of magnitude and is significantly below the standard. The reason for the drop is unknown, but may be due in part to the elimination of bank erosion.

Molybdenum concentrations were below the laboratory reporting limit and significantly below the maximum concentration limits in all ground water samples collected in October 2001.

The concentration of molybdenum in the creek samples, as in the past, was higher than in ground-water samples at the wells. The elevated levels in the creek indicate a significant ambient or upstream source of molybdenum. The disposal cell cannot be a significant contributor of molybdenum. The concentration of molybdenum at all three creek sampling locations was less than reported in the three previous years, and in all cases was below the 0.1 mg/L standard.

Uranium is the analyte of primary concern at this site because of the frequency with which it has exceeded its standard of 0.044 mg/L. Figure 3–2 shows time-concentration plots for uranium. Plots for well 0410, the upgradient well, and 0424, a downgradient well, are not shown because uranium concentrations at these wells are near or below the detection limit.

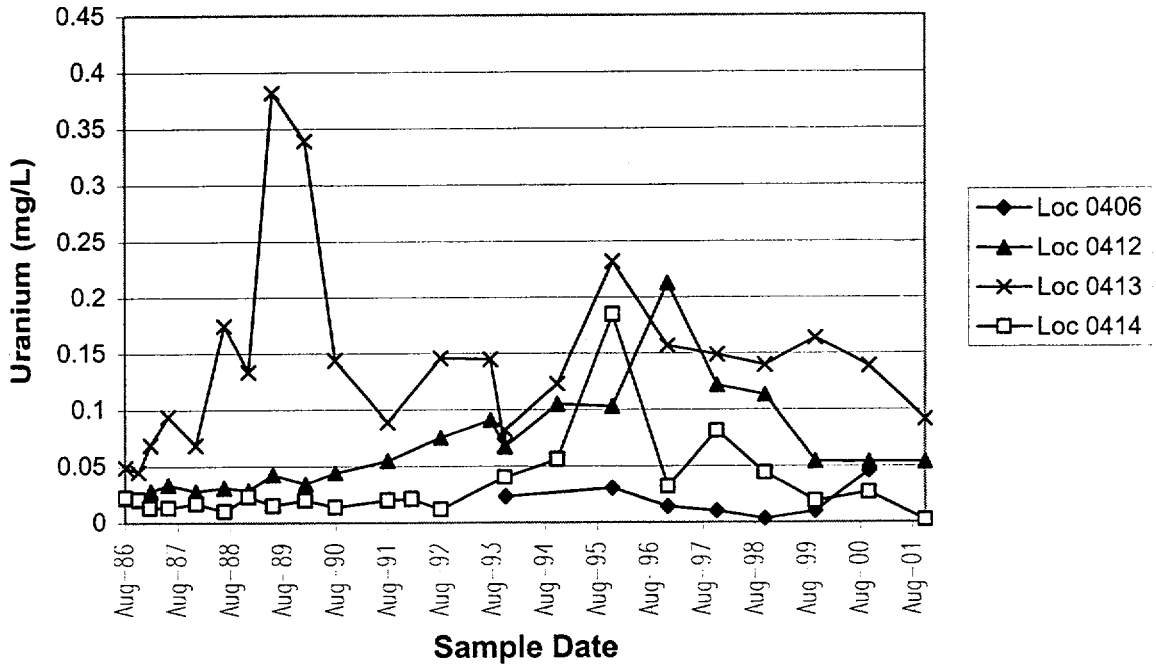


Figure 3–2. Time-Concentration Plot of Uranium in Ground Water at the Canonsburg, Pennsylvania, Disposal Site

In 2001, uranium concentration exceeded the standard at two of the three sampled downgradient wells: 0412 and 0413. All results are consistent with previous results. Although long-term trends in the data are conjectural, short-term trends, since about 1995, may be developing. DOE is cautious on this point because of the wide variations in the historical results (Figure 3–2).

Uranium concentrations have been decreasing since about 1995 at the downgradient wells. The greatest exceedance this year was at well 0413, where the highest levels of uranium have been reported in the past. Uranium concentration was below the required laboratory detection limit at all sampling locations in Chartiers Creek.

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 is apparently favorable for the mobilization of uranium; and (3) high levels of uranium existed in ground water before construction of the disposal cell. These considerations were discussed at length in previous annual reports.

DOE continues to consider the risk associated with uranium in ground water to be negligible because institutional controls prevent access to the ground water, and the uranium levels have no detectable effect on the chemistry of water in Chartiers Creek. Thus, 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 2001.

6.0 Photographs

Table 3–5. Photographs Taken at Canonsburg, Pennsylvania, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	240	Displaced cap of destroyed monitor well 0406
PL–2	355	Stabilized western bank of Chartiers Creek at Area C

PL–1. Displaced Cap of Destroyed Monitor Well 0406

PL–2. Stabilized Western Bank Of Chartiers Creek at Area C

2001 Annual Compliance Report
Durango, Colorado, Disposal Site

Compliance Summary

The site, inspected on June 19, 2001, was in good condition. Vandalism continues to be a problem at the site; signs near the site entrance were stolen or defaced. Ground-water monitoring showed that molybdenum, selenium, and uranium levels remained below the maximum concentration limit in all samples. No requirement for a follow-up 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, pages 6–1 through 6–7	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, pages 5–14 through 5–21	Section 4.0
Corrective Action	Section 5.0, page 5–21	Section 5.0

Compliance Review

1.0 Annual Site Inspection and Report

The site, southwest of Durango, Colorado, was inspected on June 19, 2001. Results of the inspection are described below. Features and photo locations 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 County Road 212, a dedicated and public right-of-way that crosses the southwest corner of DOE property.

The new entrance gate and guard rails along the county road that were installed in October 2000 and the original entrance gate are in good condition.

4A Vandalism of signs continues. The entrance sign and two perimeter signs were completely defaced by gunfire; eight perimeter signs were missing; and sixteen perimeter signs contained bullet holes but were still legible. Damage to the face of the entrance sign had significantly increased since the 2000 inspection (Figure 4–2). The entrance sign was replaced in October 2001.

Several of the stolen perimeter signs had been removed by a method involving a twisting of the sign back and forth and upward along the post. The posts' top caps had been removed and were lying near each of the posts. The caps were replaced to prevent freeze damage to the posts.

Site Markers, Survey and Boundary Monuments—Site markers, survey monuments, and boundary monuments were in excellent condition, with three exceptions.

First, the site marker near the entrance gate (SMK–1) is pocked from gunshot. This damage is superficial, and the marker remains legible. Second, the concrete base of boundary monument BM–3 and two of the reference monuments for BM–3 are threatened by erosion and eventually may be dislodged. These monuments are situated in a small gully at the southeast corner of the site. Inspectors previously placed rocks around the monument to slow erosion. The monuments were stable at the time of this inspection. Third, one of the reference monuments for BM–4 has been bent to the ground, and the cap has been removed (Figure 4–3).

Inspectors located BM–6 on the southwest corner of the site. This monument is located on a steep side slope adjacent to a dry drainage and consists of rebar and a small steel cap labeled with "Newport LS 11664" (Figure 4–4).

Monitor Wells—Monitor wells are locked and in excellent condition. Monitor well 0618 will be
4B sampled in addition to the wells designated in the Long-Term Surveillance Plan. DOE decommissioned eight monitor wells in October 2001.

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 the Disposal Cell—The top of the disposal cell is in excellent condition. Settling, slumping, and erosion were not observed.

At the time of the 2001 inspection, vegetation on the top of the cell was healthy and consisted primarily of seeded grass species—smooth brome, western wheatgrass, blue grama, and galleta grass—and several "volunteer" species, such as yellow sweet clover, gray rabbitbrush, sagebrush, four-wing saltbush, dryland alfalfa, and musk thistle.

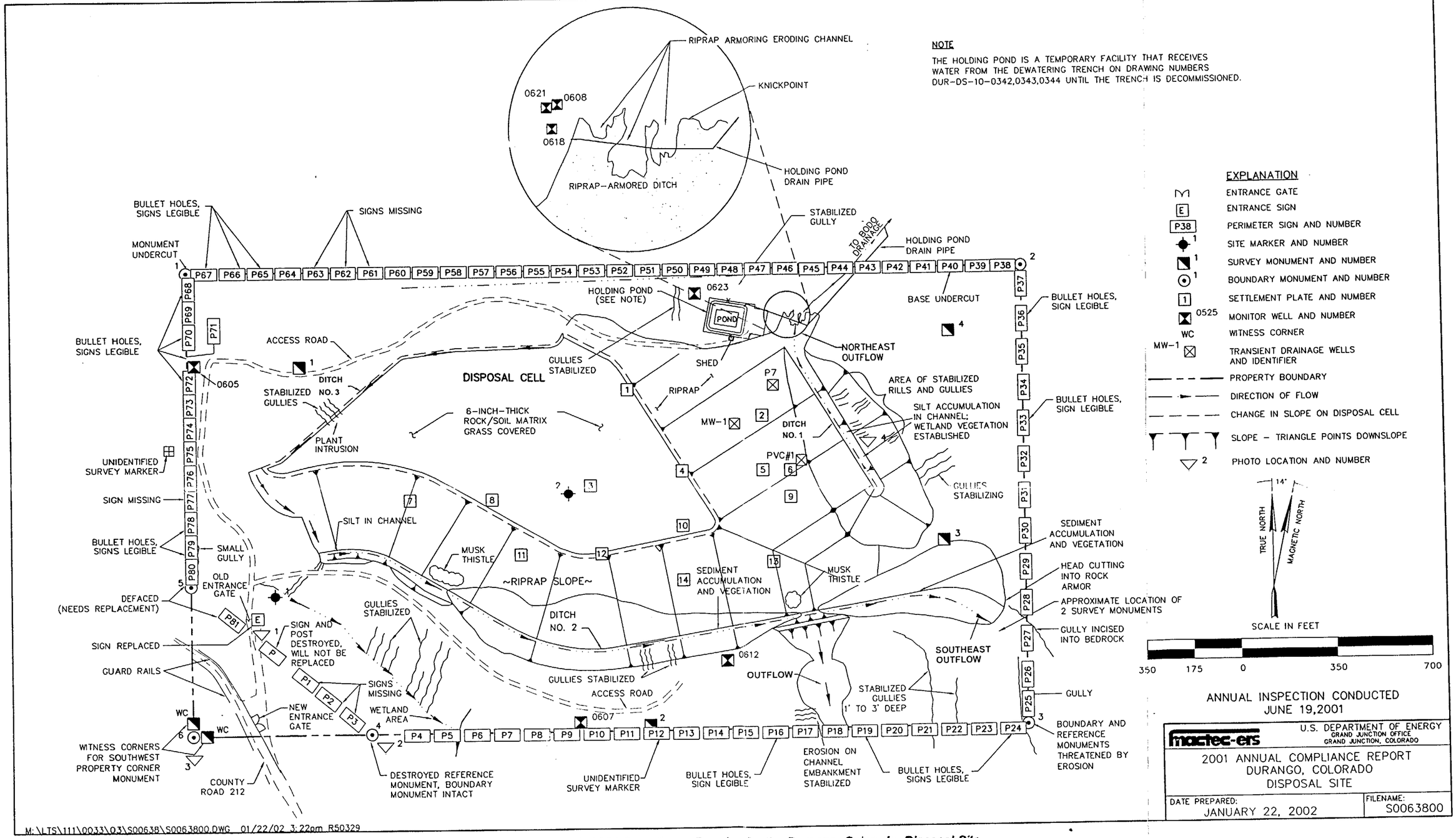


Figure 4–1. 2001 Compliance Drawing for the Durango, Colorado, Disposal Site

4C The types and numbers of deep-rooted species along the edge of the top slope continue to increase. Inspectors noted numerous young plants of narrowleaf cottonwood, boxelder, gray rabbitbrush, and Siberian elm along the top-slope edge. In accordance with the Long-Term Surveillance Plan, DOE will remove deep-rooted plants if they exceed 3.5 feet in height.

Side Slopes of the Disposal Cell—The riprap-covered side slopes of the disposal cell are 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, noted during the 2000 inspection, was observed this year.

Occasional plants of boxelder, musk thistle, bindweed, mullein, smooth brome, foxtail barley, yellow sweet clover, yarrow, mountain mahogany, Siberian elm, narrowleaf cottonwood, gray rabbitbrush, and Ponderosa pine are growing on the side slopes, particularly on the east and southeast sides. PL–4 shows vegetation on the east-facing side slope.

Drainage Ditches—Rock-armored drainage ditches were constructed beneath the toe of the side
4D 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 mass wasting occurred in the past at several places along these channels where the slopes above the ditches are steep, creating locales in the ditch inverts favoring plant growth. At places in Ditch No. 1, moist sediments associated with the colluvial deposits support wetland-type vegetation. Inspectors saw no evidence of recent accumulations of sloughed material in the rock-armored drainage ditches in 2001.

Treatment Cells and Holding Pond Area—The treatment cells and holding pond are in good condition. To prevent wildlife drownings, the inspectors installed a 6-foot-wide piece of chain link fabric on the north slope of the pond. This will allow animals to climb out of the water and up the slick pond liner.

Site Boundary—The site is not fenced. There were no fresh tire tracks, and trash accumulation was less than in previous years.

Previously rutted and disturbed areas at the site entrance were seeded in October 2000. Inspectors observed young grasses and non-noxious annual weeds emerging in these areas.

Tire tracks were observed near boundary monument BM–4 where a reference monument was destroyed. Vehicles can still access the disposal cell site from County Road 212 south of the newly installed guardrails (see "Outlying Area").

Rill and gully erosion on the south-facing slope along the southern boundary of the site appears to have stabilized. Establishment of vegetation in these areas and exposure of resistant bedrock in the gully are effectively preventing further erosion.

Migration of riprap down the steep hill below the outflow of Ditch No. 2 has subsided. Inspectors discovered no areas of new erosion 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. Inspectors observed no activity or development that might affect site integrity.

Four-wheeler tracks were observed in the area between County Road 212 and the overhead transmission line along the south boundary of the site. In addition, recent tire tracks were found between the two-track road beneath the transmission line and boundary monument BM–4 on the site boundary (see "Site Boundary").

2.0 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

No maintenance was required in 2001.

4.0 Ground-Water Monitoring

DOE monitors ground water at this site to verify the initial performance of the disposal cell.

4E The monitoring network consists of six wells: two upgradient and four downgradient wells. DOE will begin sampling well 0618 also because it is screened to the bottom of the alluvial aquifer, whereas the companion well, 0608 is screened to 10 feet above the aquifer bottom.

Wells are sampled annually. Samples are analyzed for standard water quality indicators, field parameters, and three specific analytes: molybdenum, selenium, and uranium. The standards for these three analytes are the maximum concentration limits established by the U.S. Environmental Protection Agency in 40 CFR 192, Table 1 of Subpart A.

Results of monitoring in 2001 are consistent with previous years. Concentrations of all three analytes (molybdenum, selenium, and uranium) continued at very low levels. Most results were less than detection limits.

Molybdenum concentrations were less than the required detection limit at all wells and were more than two orders of magnitude below the standard of 0.1 milligram per liter (mg/L).

Selenium concentrations were above the instrument detection limit at only one well (downgradient well 0608), where it has been detected before. The selenium concentration at this well this year (0.0068 mg/L) was slightly less than the concentration in 2000 (0.0078 mg/L). The standard for selenium is 0.01 mg/L. In the other five wells, concentrations were below the detection limit.

Uranium concentrations were above the detection limit at three wells: upgradient well 0623 and downgradient wells 0608 and 0612. The concentration of uranium at upgradient well 0623 (0.0016 mg/L) was slightly higher than last year (0.0011 mg/L). The concentration at

downgradient well 0608 (0.0098 mg/L) did not change significantly from the 2000 result (0.01 mg/L). The concentration at downgradient well 0612 (0.0016 mg/L) was less than in 2000 (0.0036 mg/L). All detections were at least an order of magnitude below the uranium maximum concentration limit of 0.044 mg/L.

At those wells where one or more of the three analytes was detected, concentrations were below the standards in all cases. The data show no discernable trend and 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 2001.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	355	Defaced Entrance Sign
PL–2	350	Destroyed Reference Monument near BM–4
PL–3	95	Nonregulation Boundary Monument at BM–6
PL–4	305	Vegetation on East Side Slope of Cell

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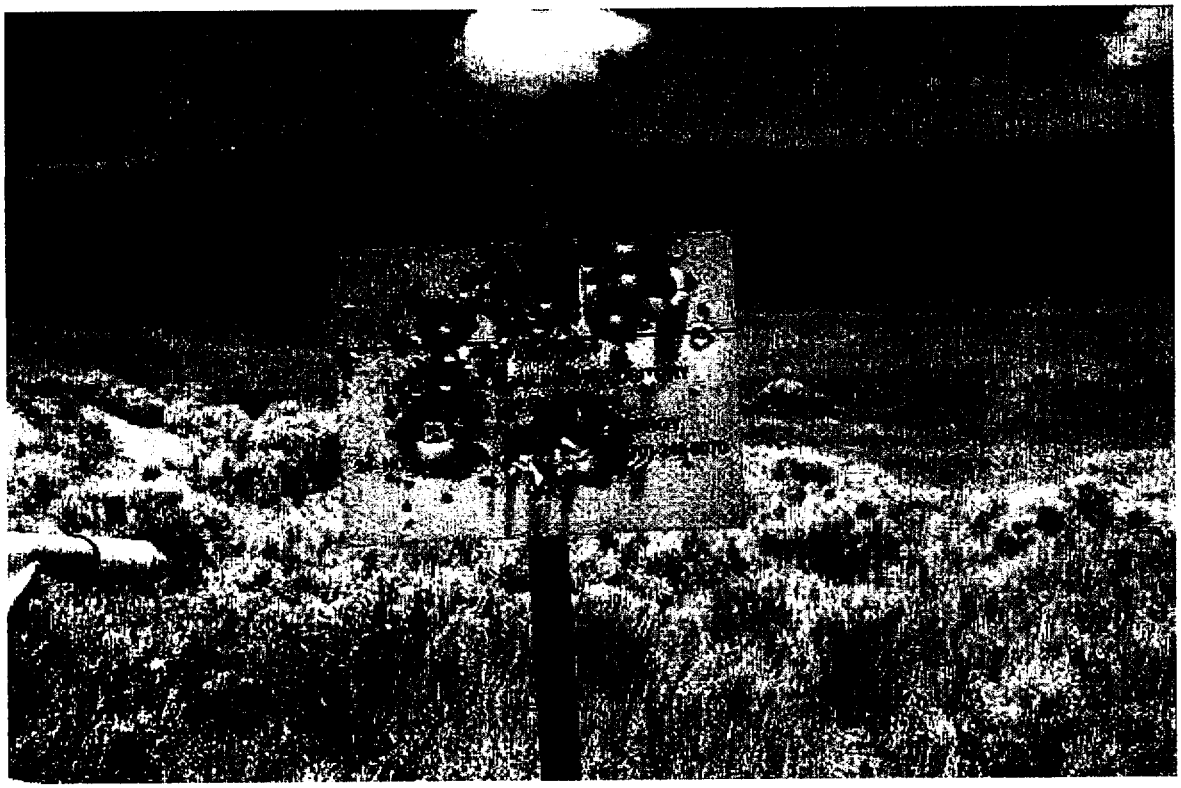

PL–1. Defaced Entrance Sign

PL–2. Destroyed Reference Monument Near BM–4

PL–3. Nonregulation Boundary Monument at BM–6

PL–4. Vegetation on East Side Slope of Cell

2001 Annual Compliance Report
Falls City, Texas, Disposal Site

Compliance Summary

The site, inspected on January 9, 2001, was in excellent condition. Scattered small trees and bushes continue to colonize the side slopes of the disposal cell and require control. Results of ground-water monitoring were consistent with results from previous years and indicate essentially steady-state conditions. Ground water became more acidic (pH decreased) at two wells, but the decrease has been gradual since baseline data were established in the early 1990s. Nothing in the data, such as a sharp or sudden decrease in pH, suggests an increase in leaching from the disposal cell or significant changes to legacy plumes in the underlying aquifers. Other than ongoing management of the grass and side slope vegetation, inspectors identified no requirement for additional maintenance or a follow-up 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 of 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, pages 5–1, 5–20, 5–23 through 5–25, and the GCAP[a]	Section 4.0
Corrective Action	Section 5.0, pages 5–25 and 5–26, and Section 9.0	Section 5.0

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

Compliance Review

1.0 Annual Site Inspection and Report

The site, east of Falls City, Texas, was inspected on January 9, 2001. Results of the inspection are described below. Features and photo 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—The entrance gate, entrance sign, and all 64 perimeter signs along the site boundary were in excellent condition. The fence is in good condition; minor repairs were made. Vandalism of signs, a problem in the past, did not occur this year.

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

Monitor Wells—All monitor wells in the monitoring network were in excellent condition. The monitoring network now includes five wells specified in the Ground Water Compliance Action Plan, in addition to the seven wells identified in the Long-Term Surveillance Plan for cell
5A performance monitoring. All other wells were decommissioned in 2001.

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. Inspectors examined each transect for evidence of erosion, settling, slumping, or other phenomena that might affect site integrity or the long-term performance of the site.

Top and Side Slopes of the Disposal Cell—The top of the disposal cell is covered with well-established coastal Bermuda grass. Small percentages of Kleingrass and other species are interspersed. The grass is cut, bailed, and removed 2 to 3 times a year depending on rainfall. Cutting and bailing is contracted to a local rancher.

5B Along the edge at the top of the disposal cell, there is an occasional small bush or tree that is missed by the mower. This vegetation is cut or treated with herbicide on an annual or as needed basis.

Small trees and bushes have been establishing for several years on the side slopes of the disposal cell (PL–1). Some, like greasewood and palo verde, are deep rooted. The plants give the disposal cell an unkempt appearance. DOE retained a local contractor to remove vegetation from the side slopes on an ongoing basis. Control measures are performed annually or as needed.

The side slopes of the disposal cell are armored with riprap, which overall is in excellent condition. Over the last 2 years, inspectors have noted that a very small percentage (less than 1 percent) of the riprap is cracked or broken (PL–2). It is not clear whether the cracks are recent or just recently noticed. None of the broken pieces appear to be more weathered or less durable than the unbroken rocks. Current assessment is that cracks are the result of stresses induced in the rock during quarrying and are not caused by chemical or physical weathering. Although inspectors will continue to note the condition of the rock, further cracking or breaking of the rock is not expected.

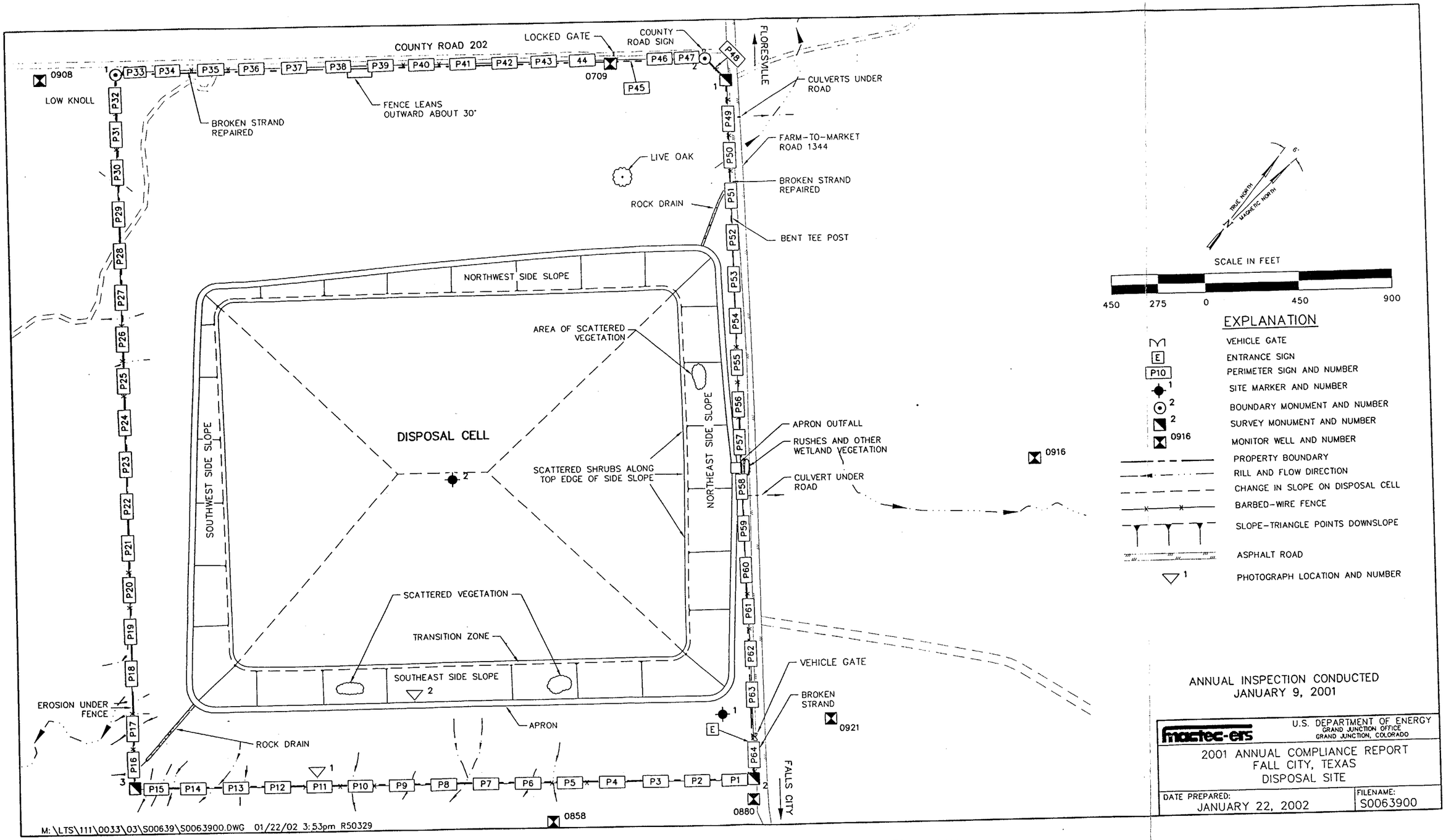

Figure 5–1. 2001 Compliance Drawing for the Falls City, Texas, Disposal Site

Site Perimeter—The area between the toe of the disposal cell and the perimeter fence is covered with well-established grass, primarily Kleingrass but with some coastal Bermuda grass as well. Rill and gully erosion noted in the early 1990s, soon after completion of remedial action, is now stabilized with the successful establishment of this grass.

As on the top of the disposal cell, grass in the perimeter transect is managed by cutting, baling, and removal. For practical reasons, a swath of uncut grass is usually left along the fence and around rock drains and other as-built features. The grass along the fence was burned this year to reduce fire danger.

Except for one mature oak tree north of the disposal cell that was saved during remedial action, there are no trees in the perimeter transect where the grass is cut. Grass cutting appears to be an effective control of these plants.

5B As noted previously, grass is growing in the north and south rock drains. The apron outfall, midway along the northeast side slope, is not yet affected. The rock drains appear to function properly in spite of the grass. The grass may enhance performance of the rock drains by dissipating energy or velocity of runoff.

The stock fence around the site is in good condition. Along the northwest boundary, the fence leans outward above a steep bank, but seems stable in this position and is sufficient to keep cattle and casual intruders out. The fence is aging but serviceable. Broken strands of wire were repaired in 2001.

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.

In spring 1999, the U.S. National Resource Conservation Service replaced terraces and filled gullies on state-owned land southeast of the site. The terraces were removed during remedial action and caused flooding on adjacent private property. Inspectors noted that the terraces and grading appeared to be in good condition. During a ground-water sampling trip in April, terrace revegetation efforts appeared to be successful.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

5C Minor fence repairs, ongoing management of the grass, and control of trees and bushes growing on the disposal cell were required in 2001.

4.0 Ground-Water Monitoring

5D DOE monitors ground water at the Falls City site for two purposes. Ground water is monitored in the uppermost aquifer (for a limited time), as a best management practice, to demonstrate the initial performance of the disposal cell. DOE also monitors ground water downgradient of legacy plumes of contaminated ground water to ensure that users are not exposed to processing-related hazardous materials. Monitor well networks and contaminant plumes are shown on Figure 5–2.

Cell Performance Monitoring—The cell performance monitoring network consists of seven wells completed in the Conquista and Deweesville sandstone units, which together constitute the uppermost aquifer. Wells 0908 and 0916 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. These seven 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 40 CFR 192, Table 1 of Subpart A. Table 5–2 lists the 10 analytes and their standards.

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	0.1 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. 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 2000 and 2001 was essentially unchanged and consistent with previous results for all wells except 0858 and 0880. Seasonal variation in pH continued to be noticeable at most wells. The pH tends to be higher (more neutral) in fall and lower (more acidic) in spring. This seasonal variation was in all cases less than 0.5 standard pH units during 2000 and 2001.

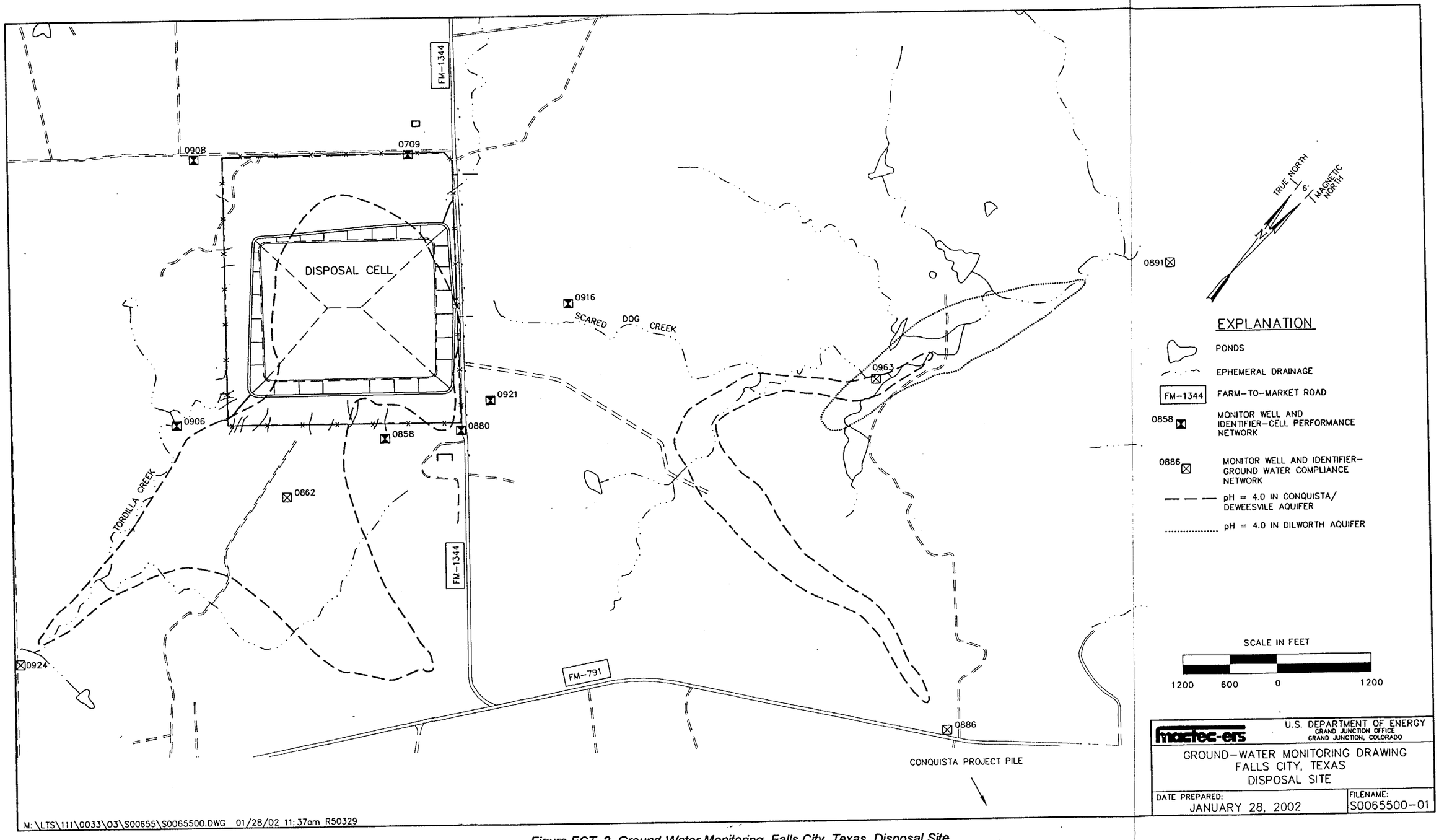

Figure FCT-2. Ground-Water Monitoring, Falls City, Texas, Disposal Site

Ground-water pH at monitor wells 0858 and 0880 has decreased gradually since baseline data were collected. The reason for the decrease is unclear. The decrease may be the result of dissipation of the pre-existing ground water mound and the consequent outward movement of the low-pH plume. Transient drainage from the cell may be contributing low pH fluids to the aquifer. Clearly, nothing in the data, such as a sharp or sudden decrease in pH, suggests excessive leaching from the disposal cell.

Analytical results from 2001 are consistent with previous years' results and what would be expected of ground water contaminated by uranium mineralization. Of the 10 analytes, concentrations of 6 continue to exceed their respective standards, and this is essentially unchanged since the Long-Term Surveillance and Maintenance Program began cell performance monitoring in 1997. These results, summarized in Table 5–3, indicate an essentially steady-state condition.

Table 5–3. Cell Performance Monitoring Analytical Results for 2001 for the Falls City, Texas, Disposal Site

Analyte	Monitor Well Where Concentration Exceeds Standard
Arsenic	0880
Cadmium	0880, 0906, 0921
Selenium	0709, 0858, 0880, 0906, 0921
Uranium	0709, 0880, 0906, 0921
Radium-226+228	0709, 0858, 0880, 0906
Gross alpha	0709, 0880, 0906, 0921

Note: Wells producing samples were 0709, 0858, 0880, 0906, and 0921.

Water level measurements from monitor wells 0709, 0858, 0880, and 0921 indicate that, in general, the elevation of the water table has dropped between 4 feet and 9 feet since the disposal cell was constructed. The water table at well 0906 has been more variable, with periods of falling and rising water levels since that time and no apparent trend.

The water level data indicate that the falling water table in the vicinity of the cell is probably not part of a regional trend but is instead a local effect due to dissipation of the ground water mound beneath the disposal cell.

Monitor well 0906 is located a greater distance from the cell and apparently is influenced by discharge and recharge to Tordilla Creek; therefore, the water table at this location may be influenced more by local hydrogeological conditions than by the mounding of water beneath the disposal cell.

Ground-Water Compliance Monitoring—The U.S. Nuclear Regulatory Commission approved the Ground Water Compliance Action Plan for the Falls City site in 1998, and DOE began a
5E program of ground water compliance monitoring. Beginning in 2001, the Long-Term Surveillance and Maintenance Program assumed responsibility for monitoring downgradient of the legacy plumes of contaminated ground water, as required by the Ground Water Compliance Action Plan, which stipulates that this monitoring will continue through 2003.

Two plumes are identified (see Figure 5–2). The east plume affects the Conquista/Deweesville aquifer and the underlying Dilworth aquifer. The west plume, underlying the cell, also affects the

Conquista/Deweesville aquifer, although elevated concentrations of some analytes had historically been observed in the Dilworth aquifer at well 0862.

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 40 CFR 192, Table 1 of Subpart A (Table 5–2). Results for analytes that exceeded the standard are summarized in Table 5–4.

Table 5–4. Ground-Water Compliance Monitoring Analytical Results for 2001 for the Falls City, Texas, Disposal Site

Analyte (units)	Monitor Well Where Analyte Concentration Exceeded Standard	Zone of Completion[a] and Plume	Result
Cadmium (mg/L)	0886	D/C-west	0.0226
	0963	D/C-east	0.0196
Selenium (mg/L)	0886	D/C-west	0.0513
Uranium (mg/L)	0924	D/C-west	0.324
	0963	D/C-east	0.0934
Radium-226+228 (pCi/L)	0886	D/C-west	24.20
Gross alpha (pCi/L)	0886	D/C-west	57.27
	0924	D/C-west	150.28
	0963	D/C-east	78.11

[a]D/C = Deweesville/Conquista aquifer

Analyte concentrations at most locations remained essentially constant. However, at well 0886, pH has decreased approximately one standard unit over the past 3 years, from 5.5 to 4.4. This decrease has been accompanied by increases in concentrations of cadmium, nitrate, and selenium. Historically, pH at well 0886 has ranged from 3.9 to 5.5, and metals concentrations have changed inversely with changes in pH. Changes in ground-water chemistry at this location might reflect varying degrees of dilution by uncontaminated water and natural buffering by formation materials that will raise pH. This portion of the east plume has extended toward the Conquista Project tailings disposal site, and no ground-water use was identified downgradient from well 0886. However, this plume is not expected to migrate farther but rather to be attenuated by natural processes.

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. Well 0924, completed in the Conquista/Deweesville aquifer, is beyond the influence of the ground-water mound underlying 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 2001.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	0	Reference Photograph of Vegetation on Southeast Side Slope
PL–2	315	Fractured Riprap on Southeast Side Slope

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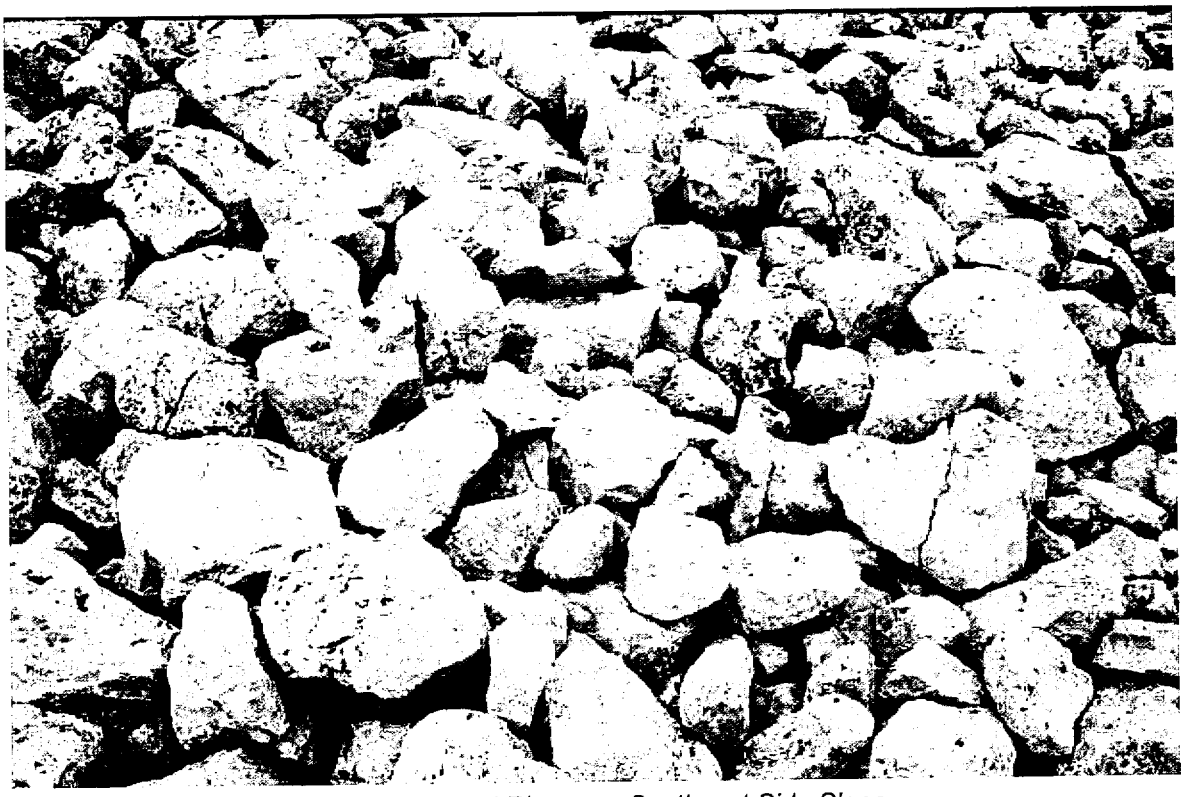
PL–1. Reference Photograph of Vegetation on Southeast Side Slope



PL–2. Fractured Riprap on Southeast Side Slope

2001 Annual Compliance Report
Grand Junction, Colorado, Disposal Site

Compliance Summary

The site, inspected on March 21, 2001, was in excellent condition. Part of the disposal cell remains open. The open part of the cell 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.

Plants are continuing to encroach on the disposal cell, especially on the south side. Perennial species, such as four-wing saltbush, were cut at ground level and the stumps treated with herbicide. Two unneeded monitor wells were decommissioned in 2001. Inspectors identified no additional maintenance requirements and no requirement for a follow-up 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 21, 2001. 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 (BLM) to the site entrance gate. The gate is a double-swing chain link gate in excellent condition, and is secured by a DOE padlock keyed the same as the access gate.

6A The fence along the right-of-way corridor is in good condition; minor repairs were made to the fence in 2001.

Entrance and Perimeter Signs—The entrance and perimeter signs are 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 "No Trespassing" signs are secured to the fence in pairs. There are 75 warning sign locations, each about 200 feet apart along the controlled area boundary. Some of the signs were made of plastic and many were missing. Missing signs were replaced with metal signs. DOE conducts surveys of security and radiation control systems weekly.

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 are in excellent condition.

Monitor Wells—The ground-water monitoring network at this site has three monitor wells. All
6B three are inside the site boundary. The wells are secure and in excellent condition. Two unneeded monitor wells were decommissioned in 2001.

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.

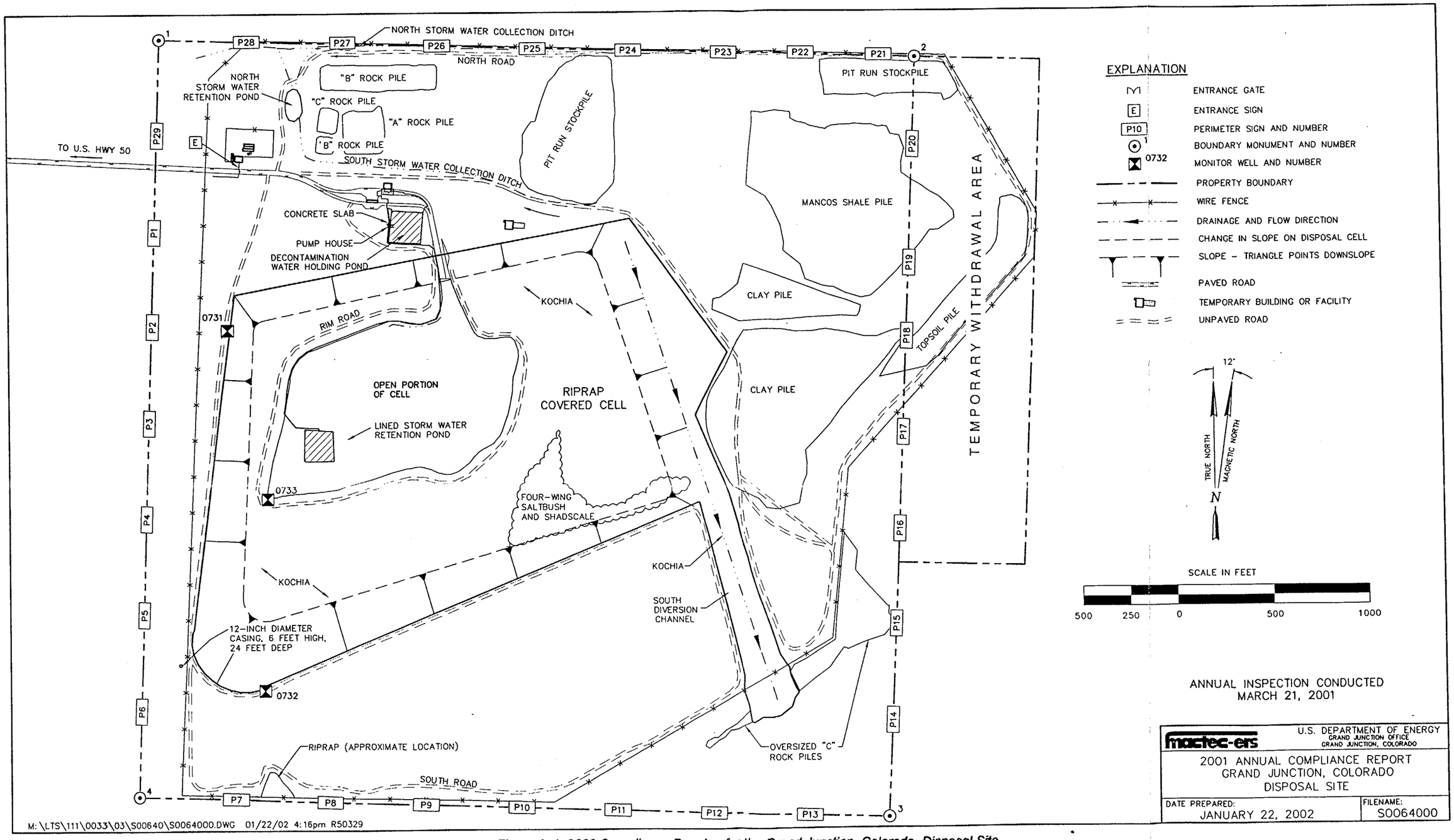


Figure 6–1. 2000 Compliance Drawing for the Grand Junction, Colorado, Disposal Site

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

Closed Portion of the Disposal Cell—The open cell at the disposal site is to accept waste until 2023 or until the cell is filled to its design capacity. The annual inspection required by the Long-Term Surveillance Plan 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, which is used 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 is durable and in excellent condition.

6C Plant encroachment is occurring, mostly on the southeastern part of the top of the disposal cell. Encroaching plants consist primarily of cheat grass, kochia, Russian thistle, halogeton, four-wing saltbush, and shadscale. The grasses are not robust. It appears they sprout and soon die for lack of moisture.

Shadscale and four-wing saltbush are woody perennial plants. Shadscale does not have a deep root system, but four-wing saltbush does. Deep-rooted plants may change the performance characteristics of the radon/infiltration barrier. Because the effect of deep-rooted plants hasn't been predicted at the Grand Junction site, the Long-Term Surveillance and Maintenance Program cut these plants at ground level and treated the stumps with herbicide in 2001.

The riprap-armored side slopes of the disposal cell are in excellent condition. There is very little plant encroachment on the side slopes and no evidence of slope instability.

Diversion Structures and Drainage Channels—The south diversion channel is a large riprap-armored diversion structure that conveys runoff from the disposal cell southeast into a natural drainage that flows away from the site to the southwest. The diversion channel is in excellent condition.

Other drainage features at the site include north and south storm water collection ditches and a storm water retention pond. These 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. The south storm water collection ditch collects on-site storm water from the cover material stockpile areas and other areas across the northern part of the site. This ditch flows west into the north storm water retention pond. A second ditch, rather short, flows south into the north storm water retention pond.

No maintenance was required for these ditches in 2001.

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 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.

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 is in good condition and inspectors saw 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 the BLM. DOE uses the temporary withdrawal area to stockpile cover materials for the progressive and 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 2001.

3.0 Routine Maintenance and Repairs

Minor fence maintenance was required in 2001.

4.0 Ground-Water Monitoring

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

There is no shallow aquifer, in the usual sense, at this site. The disposal cell is constructed on approximately 700 feet of relatively impermeable Mancos Shale. The uppermost aquifer at the site, the Dakota Sandstone, lies beneath this 700 feet of shale. The Dakota Sandstone is not a usable aquifer because of low yield and poor water quality.

Excavation during construction of the disposal cell exposed paleochannels incised into of the Mancos Shale pediment. These paleochannels are filled with unconsolidated to poorly consolidated stream deposits.

6D The monitoring network consists of three wells. Two wells, 0731 and 0732, are screened in paleochannels near the disposal cell. The third well, 0733, is located in the southwest corner of the open cell. The primary purpose of well 0733 is to measure 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. Samples from this well are also analyzed for contaminants.

Wells 0731 and 0732 are downgradient from the disposal cell, and both are screened in paleochannel deposits that are highly permeable relative to the underlying shale. Water level in the disposal cell, measured at well 0733, is approximately 20 and 40 feet lower (deeper) than water levels in the paleochannels at wells 0731 and 0732, respectively. This means that ground water cannot seep from the disposal cell to the paleochannels. Water levels have risen in the paleochannel at well 0731 since measurements began. The disposal cell is designed to shed rainfall and snowmelt efficiently. Therefore, increasing water levels at well 0731 are perhaps due to increased runoff from the disposal cell.

In 1998, DOE began to sample the two paleochannel wells, 0731 and 0732, semiannually for 5 years; however, these wells were inadvertently sampled only once in 2001. DOE obtains samples from well 0733 when sampling the other two wells.

After the initial 5-year period, the two wells will be sampled annually beginning in 2003. The need to continue monitoring will be evaluated every fifth year after that.

Samples are analyzed for standard field parameters and the following eight analytes, including polychlorinated biphenyls (PCBs). Analytes with maximum concentration limits established in 40 CFR 192, Table 1 of Subpart A are in bold.

molybdenum	sulfate
nitrate	total dissolved solids
PCBs	**uranium**
selenium	vanadium

Results from sampling in 2001 were consistent with results from the past 3 years.

6E PCBs were not detected at any of the wells. Analysis of PCBs was included because of a 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 partition into ground water.

Molybdenum and vanadium concentrations continued to be near or below the required laboratory detection limit and three orders of magnitude below the maximum concentration limit at all wells.

Nitrate concentrations exceed the standard at wells 0732 and 0733. Nitrate at well 0731 was below the standard but does not show a definite trend.

Selenium levels continued to exceed the standard at both downgradient wells and remained below the standard at monitor well 0733.

Sulfate values continued to be fairly high for all wells, exceeding the secondary drinking water standard of 250 milligrams per liter (mg/L) by more than one order of magnitude. High sulfate concentrations are typical of the regional soils, which contain gypsum.

Concentrations of total dissolved solids continued above the 10,000 mg/L cutoff at well 0733. The cutoff is used to define "limited use" ground water. Concentrations were less than the cutoff value at wells 0731 and 0732.

Uranium concentration remained slightly above the 0.044 mg/L standard at well 0731 but below the standard at wells 0732 and 0733. The concentration at monitor well 0731 has been decreasing since 1997, and the concentration at well 0732 has remained generally constant.

Nitrate, selenium, sulfate, total dissolved solids, and uranium concentrations at monitor well 0731 peaked around 1997 and have declined steadily since then. A possible explanation for this decline is the relocation 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 2001 indicated no significant departures from analytical results of previous years.

Analytical results indicate the cell is not degrading water quality in the paleochannels. This is expected because water levels in the paleochannels are significantly higher than in the cell. Consequently, wells 0731 and 0732 probably will not respond to any transient drainage from the cell.

Elevated levels of nitrate, sulfate, and uranium 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. Review by the U.S. Nuclear Regulatory Commission in 1998 supports this assessment.

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 2001.

2001 Annual Compliance Report
Green River, Utah, Disposal Site

Compliance Summary

The site, inspected on March 19, 2001, was in excellent condition. Ground-water monitoring continued in 2001, but data remain inconclusive for determining trends in nitrate, sulfate, and uranium concentrations at the wells. Inspectors identified no significant maintenance requirements and no requirement for a follow-up 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 Site Inspection and Report

The site, south of Green River, Utah, was inspected on March 19, 2001. Results of the inspection are described below. Features and photo 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 hard-packed gravel road that leads south from Green River or north from U.S. Interstate Highway 70. The entrance gate to the site is a tubular steel gate in the stock fence along the gravel 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 are in excellent condition.
The site has one entrance sign and 17 perimeter signs. The signs are on posts along the site boundary. Perimeter sign P6 was missing.

Site Markers and Monuments—The two granite site markers, 11 boundary monuments, and three survey monuments are in excellent condition. Boundary monument BM–3 is located on a steep slope and soil has eroded from the base (PL–1). However, the monument is stable and intervention is not required.

Monitor Wells—The ground-water monitoring network consists of four wells: 0171, 0172, 0173, and 0813. All four wells are northwest of the disposal cell in the downgradient direction. In addition, water levels are monitored in well 0179. These wells are in excellent condition. Other wells at 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 is in excellent condition. The side slopes have a few widely scattered plants, which are annual weeds that die from lack of moisture soon after sprouting. The plants are not considered a problem.

The apron that surrounds the disposal cell is functional and in excellent condition. Small-scale erosion leading into the apron is present along the edge of the channel at the southwest corner of the disposal cell. Inspectors found the erosion unchanged from 2000 and determined that it poses no problem.

In 1999 and 2000, inspectors noted a series of linear cracks running parallel to the apron at the northeastern edge of disposal cell. Inspectors observed that the same cracks were present in 2001. The cracks are approximately 25 feet out from the edge of the apron. They extend for a distance of about 100 feet and are as much as 6 to 10 inches deep. The cracks are attributed to settling of the soil that was backfilled against the apron. The soil was apparently improperly compacted at this location. The cracks are expected to heal with time and pose no threat to the proper functioning of the apron. Healing may occur slowly because of the arid climate.

Site Perimeter between the Security Fence and the Site Boundary—Established vegetation in graded and reseeded areas continues to be sparse, especially northeast and southwest of the disposal cell. The vegetation consists mostly of small desert forbs and grasses that have naturally colonized the area. The density of plants, although sparse, is approaching that which occurs in natural, undisturbed areas around the site.

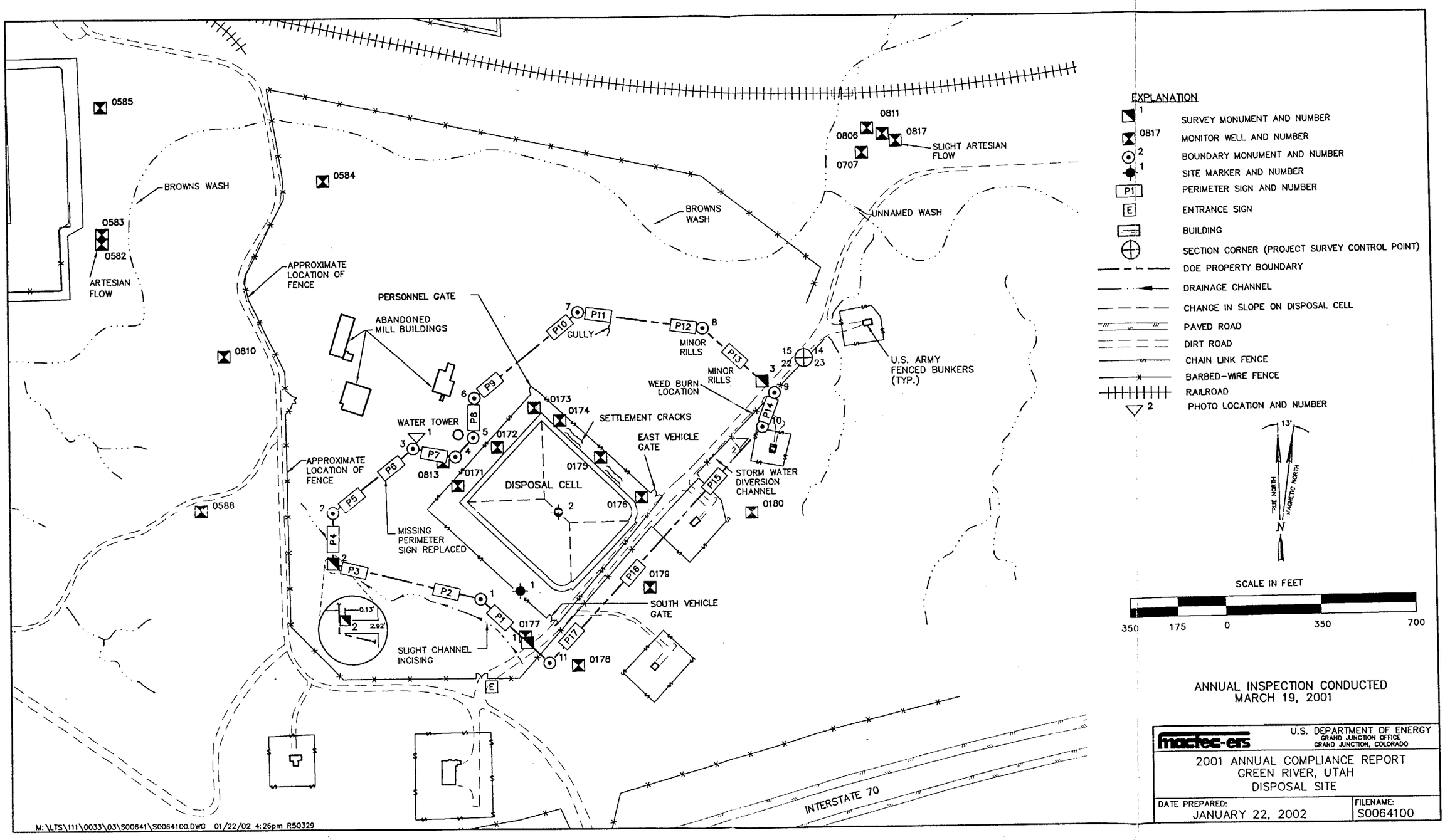


Figure 7–1. 2001 Compliance Drawing for the Green River, Utah, Disposal Site

Rill and gully erosion noted previously on the hillside northeast of the disposal cell does not appear to be increasing. The larger gullies are filled with Russian thistle (tumbleweeds), and vegetation is establishing along the bottom in some of these gullies. These conditions suggest that erosion is stabilizing and poses no threat to the integrity of the disposal cell or any site surveillance features.

Large areas of the site lie outside the security fence that surrounds the disposal cell. DOE has no effective institutional control over these areas. Evidence of trespass has been noted during previous inspections. No new evidence was found in 2001.

Outlying Area—The area outward for a distance of 0.25 mile from the site boundary was 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 2001.

3.0 Routine Maintenance and Repairs

7A A maintenance action from the 2000 inspection recommended that tumbleweeds clogging a culvert located in the storm water diversion, along the southeastern edge of the disposal cell, be removed. During the 2001 inspection, permission was obtained from the Mayor of Green River and the Grand County Fire Marshall to burn the weeds that were blocking the culvert. The weed burning proved to be a safe, successful, and cost effective maintenance action, and all weeds were removed and the culvert was re-opened (PL–2).

Missing perimeter sign P6 was replaced and a rain gauge was installed during a subsequent site visit in 2001. The rain gauge was installed to supplement precipitation data obtained from a meteorological station in the town of Green River for the purpose of evaluating local precipitation data with ground water levels in the site monitor wells.

4.0 Ground-Water Monitoring

7B DOE monitors ground water at four downgradient wells: 0171, 0172, 0173, and 0813. The purpose of monitoring is to evaluate the initial performance of the disposal cell. More specifically, the purpose is to confirm the expectation that concentrations of nitrate, sulfate, and uranium will eventually decrease to levels that existed before construction of the disposal cell.

Ground water beneath the disposal site will likely never be used as a source of potable water because ambient (background) concentrations of total dissolved solids, chloride, and sulfate exceed primary or secondary drinking water standards.

Samples were collected quarterly for 3 years beginning in 1998 with the provision that monitoring requirements would be re-evaluated before sampling in 2001.

Water levels are also measured continuously with down-hole data loggers at downgradient wells 0171 and 0173 and at off-site well 0179.

Ground-Water Quality Monitoring—DOE's assessment of data through 2000 is that trends for nitrate, sulfate, and uranium are developing too slowly to be a basis for a re-evaluation of the monitoring program at this time. DOE continued to sample quarterly in 2001 and will continue to assess ground-water quality at the site.

Results of monitoring in 2001 along with the proposed standards for each monitor well are summarized in Table 7–2. The proposed standards are either the maximum concentration limit established by the U.S. Environmental Protection Agency in 40 CFR 192, Table 1 of Subpart A or background concentrations determined for the specific well during site characterization or baseline studies.

Table 7–2. Results of Ground-Water Monitoring at the Green River, Utah, Disposal Site

Analyte	Year	Sample Location: Well 0171		Well 0172	
		Proposed Standard	Result (range)	Proposed Standard	Result (range)
Nitrate as NO_3	2000	44	166–199	102	1,030–1,370
	2001		117–169		207–1,590
Sulfate	2000	3,334	3,780–4,180	4,985	6,950–8,280
	2001		3,880–4,170		3,290–7,600
Uranium	2000	0.044	0.0267[a]–0.0354	0.067	0.0053[a]–0.0061
	2001		0.0254–0.0435[a]		0.0019–0.0064

Analyte	Year	Sample Location: Well 0173		Well 0813	
		Proposed Standard	Result (range)	Proposed Standard	Result (range)
Nitrate as NO_3	2000	44	31–143	44	0.0314[b] –0.0839[b]
	2001		5–1,220		0.0204[b] –0.0413[b]
Sulfate	2000	4,000	3,730–4,190	4,440	3,740–3,980
	2001		3,650–7,470		3,760–4,010
Uranium	2000	0.044	0.0019[a]–0.0025	0.069	0.0085–0.0111[a]
	2001		0.0014–0.0064[a]		0.010E–0.0106

Notes: All concentrations are expressed in milligrams per liter.
[a]Estimate because of possible interferences.
[b]Undetected or less than the required detection limit.

For unexplained reasons, nitrate concentrations at all wells except 0813 rose noticeably and exceeded proposed standards from 1994 through 1998. In 2001, nitrate concentrations continued above the proposed standards except at well 0813, where values were 3 to 4 orders of magnitude below the proposed standard and very near the laboratory detection limit. Nitrate concentration fluctuates slightly at well 0171, but there is considerable variation in the values for wells 0172 and 0173.

Sulfate concentrations have remained essentially constant at wells 0171 and 0813 since the disposal cell was constructed. Concentrations at wells 0172 and 0173 have increased since 1995. In 2001, concentrations continued above the proposed standards at well 0171, and on most occasions at wells 0172 and 0173. Sulfate level was below the proposed standard at well 0813. Data are insufficient to determine sulfate concentration trends.

Uranium concentrations have been below the standard at all four wells since 1995. In 2001, concentrations continued below the standard at all four wells although they were close to the standard at well 0171. Concentrations of uranium have increased at well 0171 since 1998 but remain fairly constant (and without apparent trend) at the other monitor wells.

Ground-Water Level Monitoring—Water level hydrographs for wells 0171, 0173, and 0179 indicate a drop of approximately 3 feet in all three wells since 1993 (Figure 7–2).

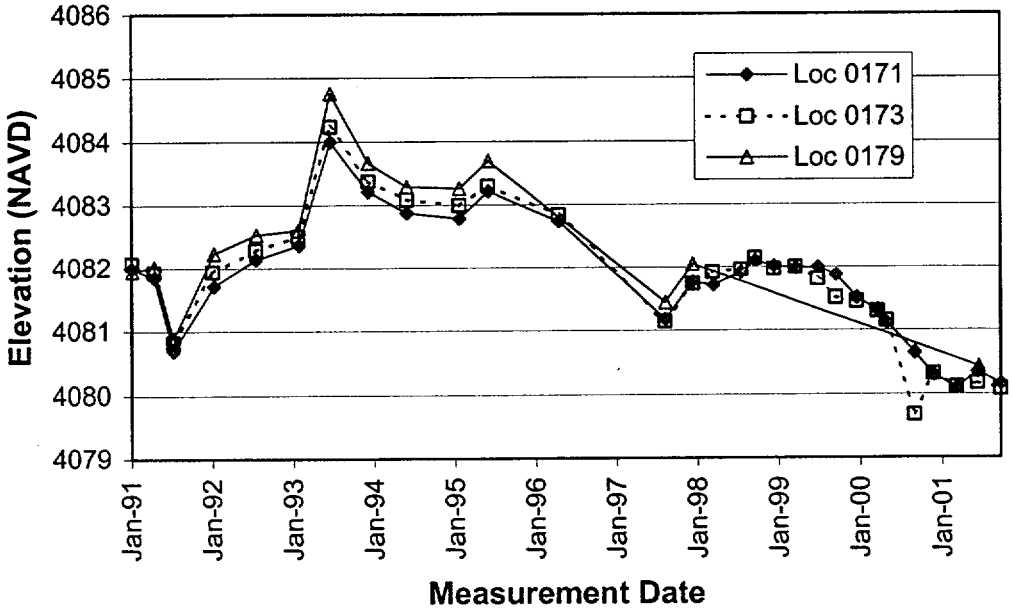


Figure 7–2. Ground Water Levels at the Green River, Utah, Disposal Site

The ground-water gradient in the vicinity of the disposal site is to the west or northwest. However, in the immediate vicinity of the disposal cell, a prevailing direction of flow is difficult to determine because the hydraulic head distribution does not provide a well-defined potentiometric surface. It is probable that hydraulic heads and ground-water flow in the relatively complex hydrostratigraphic units at the site are partially fracture controlled.

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 2001.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	115	Erosion at Boundary Monument BM–3
PL–2	20	Culvert and Storm Water Diversion Channel After Weed Burning

PL–1. Erosion at Boundary Monument BM–3

PL–2. Culvert and Storm Water Diversion Channel After Weed Burning

2001 Annual Compliance Report
Gunnison, Colorado, Disposal Site

Compliance Summary

The site, inspected on August 15, 2001, was in excellent condition. Monitoring of riprap at key locations around the base of the disposal cell continued. Rock in these areas is in excellent condition. Areas of erosion in the west portion and southeast and northeast corners of the site, noted during previous inspections, appear to be stabilizing. The Gunnison County landfill has expanded its boundaries, which now include lands adjoining DOE property on the north and east. During the past year, several new landfill monitor wells and fence lines have been installed in areas adjacent to DOE site surveillance features. Inspectors identified no maintenance requirements and no cause for a follow-up inspection.

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 Report

The site, southeast of Gunnison, Colorado, was inspected on August 15, 2001. Results of the inspection are described below. Features and photo 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, and Entrance and Perimeter Signs—The road to the site is a good, all-weather gravel road maintained by the U.S. Bureau of Land Management. The south

entrance gate is a simple barbed-wire gate in the stock fence that surrounds the site. The gate is secured by a padlock and chain to the adjoining post. The gate is in good condition.

The entrance sign, just east of the entrance gate, and most of the 45 perimeter signs are in excellent condition. Perimeter sign P37 is bent and has cracked paint, but is still legible. The entrance sign and perimeter signs P1, P38, P39, P42, and P44 have bullet holes in them, but all are still legible.

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, are in excellent condition. Survey/boundary monuments, SM–1/BM–1, SM–2/BM–2, and SM–3/BM–3, and eight additional boundary monuments, BM–4 through BM–11, also are in excellent condition.

Monitor Wells—The ground water monitoring network at the disposal cell consists of 16 wells (Table 8–2). Six of the wells are for monitoring cell performance, two for background monitoring, and eight for water level measurements. All are in excellent condition. DOE owned 14 wells that were left from site characterization but were not part of the current monitoring
8A network. In 2001, DOE transferred ownership of one of the unneeded wells (0717) to Gunnison County and decommissioned the other 13 wells.

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

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

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. Transects one through three were inspected by walking a series of traverses. Transect four was inspected visually and by driving to nearby monitor wells.

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

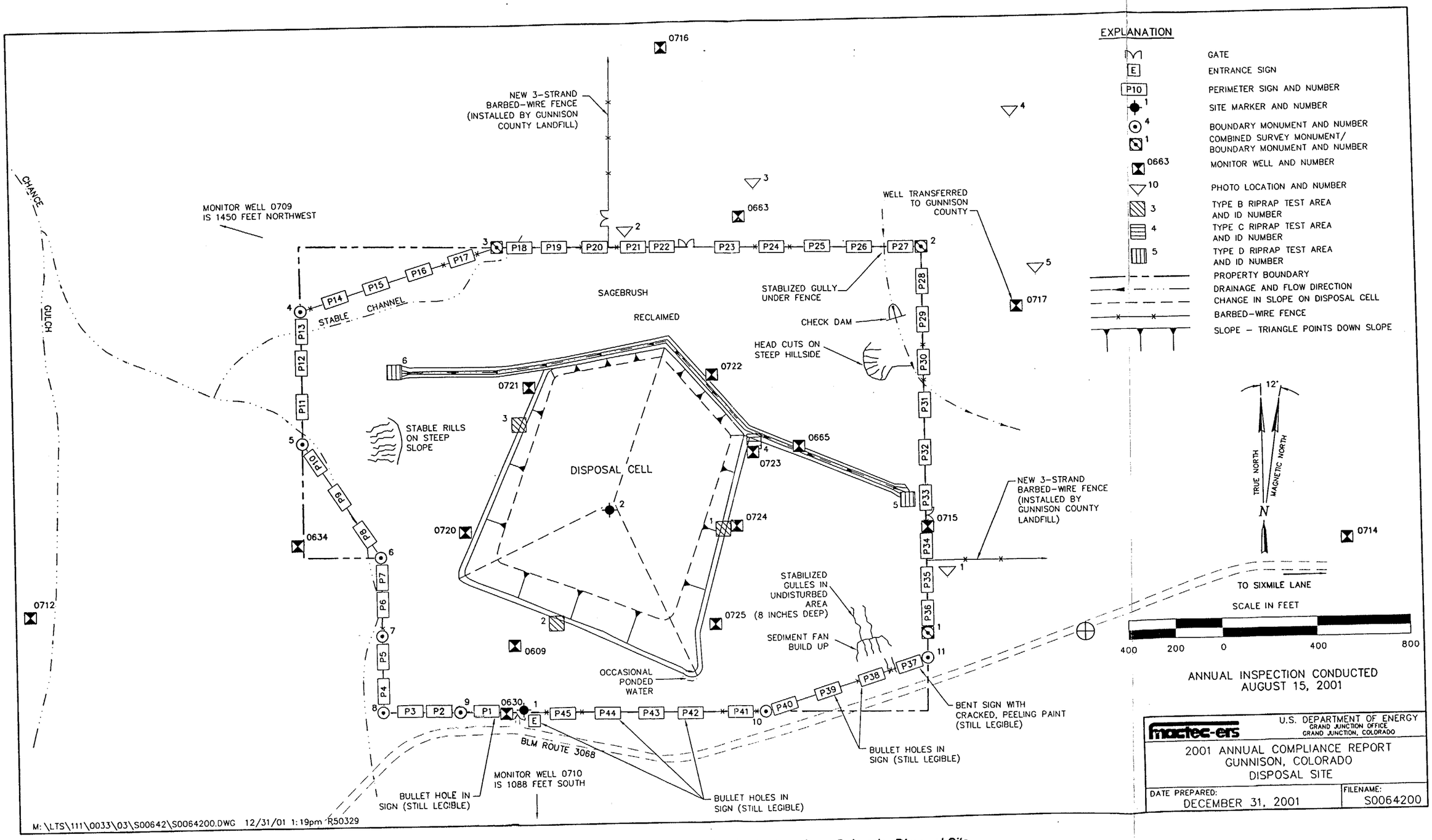


Figure 8–1. 2001 Compliance Drawing for the Gunnison, Colorado, Disposal Site

Top of Disposal Cell—The top of the disposal cell is in excellent condition and shows no evidence of erosion, settling, or slumping. A few isolated plants (Russian thistle, mountain mahogany, slender wheatgrass, and other species) were observed to be randomly distributed over the disposal cell cover; however, these plants do not present a hazard or cause for concern at this time. Several small, isolated patches of Russian thistle were removed at the time of this inspection.

Side Slopes, Apron, and Diversion Ditches—The riprap-covered side slopes, apron, and diversion ditches also are 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 become established here (foxtail barley, meadow foxtail, Kentucky bluegrass, and Baltic rush) indicates that this area retains moisture much of the time. Because the cell is designed to drain to the southeast, water collection in that area does not pose a problem, and any water that ponds there is below the elevation of the tailings. At the time of the inspection, the area was dry.

8B As required by the Long-Term Surveillance Plan, the condition of the riprap in six test areas was inspected and photographed. Each test square, roughly 1 square meter, is in a "critical flow path" location in the diversion channels. Corners of each test square are marked with orange paint. Each square was photographed with the photographer facing approximately north. No degradation of the rock was noted when rock-by-rock comparisons were made with the 1998, 1999, and 2000 inspection photographs. As outlined in the Long-Term Surveillance Plan, annual photographing and comparing of these test plots will be discontinued after the 2002 annual inspection. The Long-Term Surveillance Plan specifies that photographs of the test plots be collected and compared annually for the first 5 years after closure, and then every 5 years thereafter until year 20. DOE will install durable test plot markers in 2002.

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, then reclaimed by planting a seed mix. Undisturbed areas were left in their natural state. At the time of the 2001 inspection, the seeded areas were in excellent condition.

During the 2001 inspection, four areas containing erosional features were investigated. These areas included a gullied area in the southeast corner of the property north of perimeter sign P38, gullied areas in the northeast corner of the property, a drainage channel in the northwest corner of the property, and rills on a steep west-facing slope on the west side of the property.

In the southeast corner, where several 8-inch gullies have formed in the steeper portion of the sideslope, a fan-like accumulation of eroded sediments has formed just below the gullies. Each of these erosional features was in stable condition. Vegetation was becoming established on the steeper portions of the eroded slopes, and additional sediment transport and accumulation from these areas is not expected.

In the northeast corner of the property, a series of deep gullies and headcuts have formed at a natural slope break in the terrain. During the 2001 inspection, and as noted in previous inspections, these gullies appear to be stabilizing with the successful establishment of sagebrush and various grasses. The drainage channels located between perimeter signs P30 and P31 and between P26 and P27 appear to be stable.

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

On the west side of the property, the steep west-facing slope contains numerous rills. Despite the presence of these erosional features, surface rock fragments appear to be stabilizing the slope.

Site Boundary and Outlying Area—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 are in excellent condition. During the 2001 inspection, several developments on lands adjacent to DOE property were observed, none of which are considered to be of any consequence to the integrity of the disposal site.

8C The Gunnison County landfill recently acquired additional lands that adjoin the disposal site boundary to the north and east. During the 2001 inspection, inspectors noted that landfill personnel installed a new 3-strand barbed-wire fence that ties into the DOE site perimeter fence on the east between perimeter signs P34 and P35 (PL–1) and on the north between perimeter signs P20 and P21 (PL–2). A gate has been installed in the new fence east of the disposal site, about 0.25 mile from the eastern property line. DOE will need access through this gate for future environmental monitoring and annual inspection purposes. At the time of the 2001 inspection, inspectors met with employees from the Gunnison County landfill. A DOE padlock and key were given to the landfill foreman who agreed to install the padlock on the new landfill gate.

Also noted during the 2001 inspection was the installation of several new monitor wells (ground water and methane) by the Gunnison County landfill. One of the new landfill wells is located approximately 50 feet north of DOE monitor well 0663 (PL–3). Two additional monitor wells also were installed approximately 800 feet north of well 0717 (PL–4). With the exception of installation of the new landfill fences and monitor wells, there are no active landfill operations within 0.25 mile of the disposal site. The nearest active portion of the landfill is about 0.75 mile northeast of the disposal site. Figure 8–6 shows an appliance disposal area recently opened by the county. This portion of the landfill poses no threat to the DOE disposal site. No other evidence of activity was noted near the site boundary.

2.0 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

DOE performed weed control activities in 2001.

4.0 Ground-Water Monitoring

8D DOE monitors ground water to demonstrate compliance with U.S. Environmental Protection Agency (EPA) ground water protection standards in 40 CFR 192, Table 1 of Subpart A, and to demonstrate that the disposal cell is performing as designed. Wells listed in Table 8–2 are monitored according to the schedule in Table 8–3.

Table 8–3. Ground Water Monitoring Frequency at the Gunnison, Colorado, Disposal Site

Year	Frequency	Time of Year
1997	Semiannually	Fall and early summer
1998–2001	Annually	Early summer
Beyond 2001	Once every 5 years (next sampling is in 2006)	Early summer

The indicator analyte for cell performance at the Gunnison site is uranium. This analyte was selected on the basis of its presence in tailings pore fluid, its relatively high mobility in ground water, and its low concentration in upgradient (background) ground water. The target concentration of uranium is 0.013 milligrams per liter (mg/L). The basis for this value is the maximum observed concentration of uranium in background samples determined before disposal cell construction or in upgradient wells. The EPA maximum concentration limit for uranium is 0.044 mg/L.

Ground water was sampled and water levels were measured in May 2001. The concentration of uranium at background well 0609 was 0.0038 mg/L. The concentration of uranium in the downgradient wells ranged between 0.0017 mg/L and 0.0047 mg/L.

Results from the downgradient wells are consistent with previous years' results (and statistically indistinguishable from those results) and are at least an order or magnitude below the target concentration of 0.013 mg/L for uranium. No trend is apparent in the data over the last 4 years, 1998 through 2001. The disposal cell, completed in 1995, appears to be performing as an effective containment system.

Data from water level measurements show only minor fluctuations in water table elevations since completion of the disposal cell in 1995. Hydraulic head potentials and gradients between wells also have not changed, and ground-water flow directions have remained static. Both chemical analyses and water level measurements indicate essentially steady-state ground water conditions at the 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.

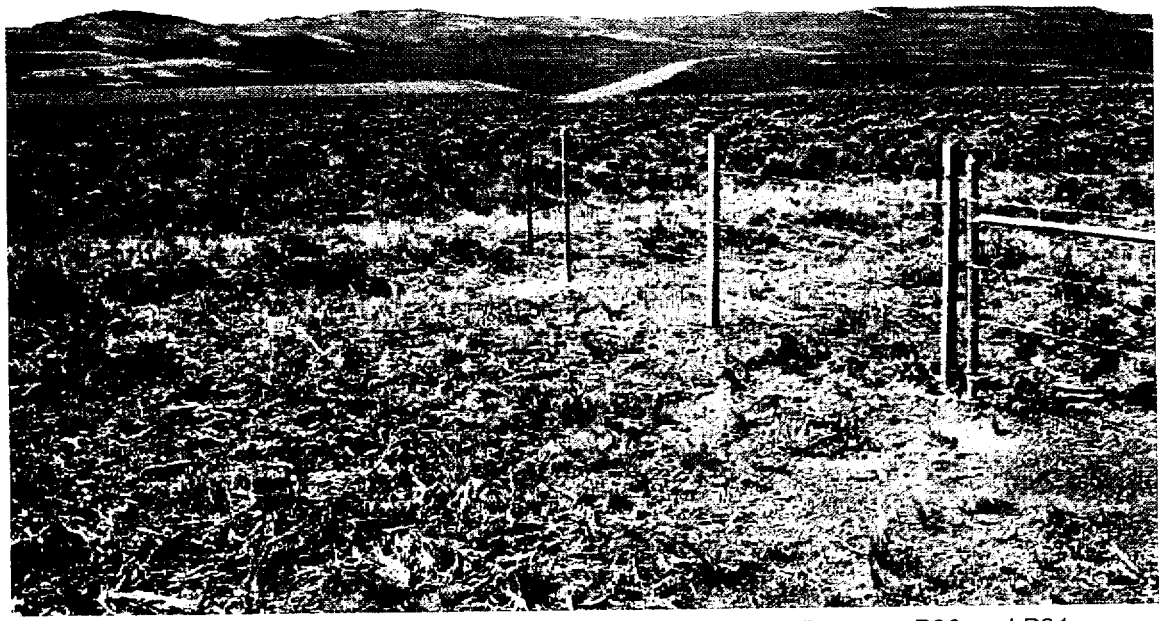
No corrective action was required in 2001.

6.0 Photographs

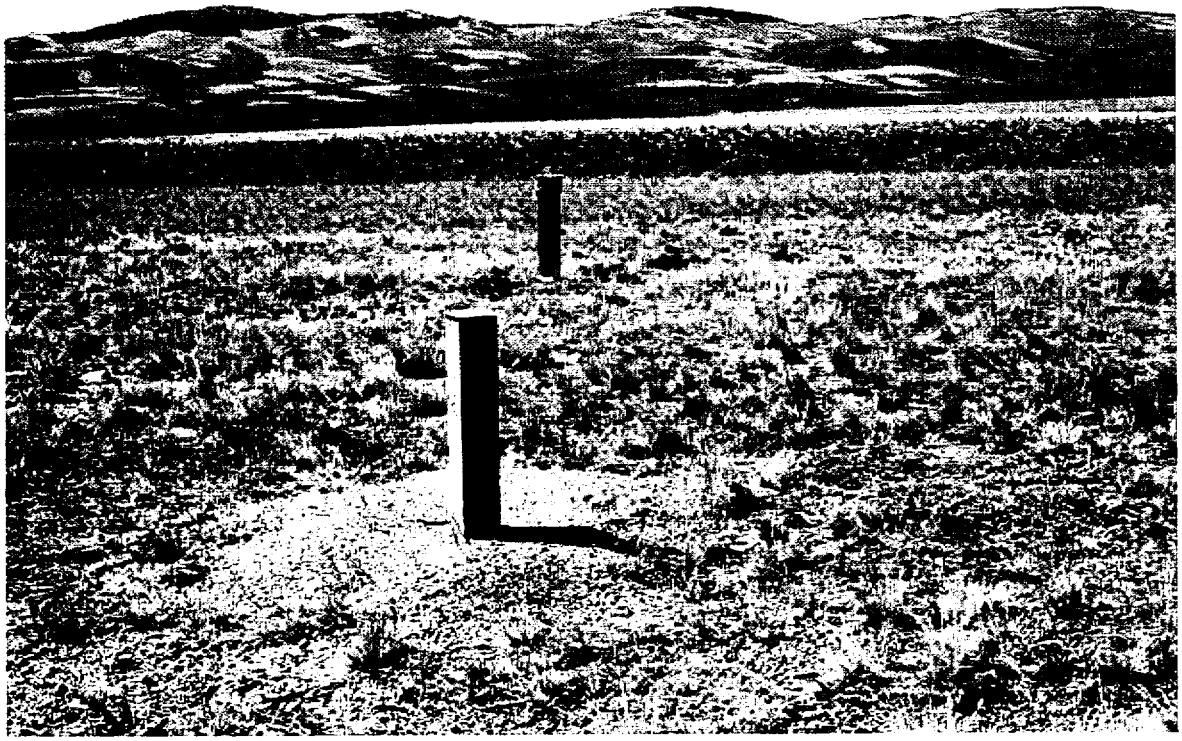
Table 8–4. Photographs Taken at the Gunnison, Colorado, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	330	New Landfill Fence Tied into DOE Perimeter Fence Between P34 and P35
PL–2	210	New Landfill Fence Tied into DOE Perimeter Fence Between P20 and P21
PL–3	180	New Landfill Monitor Well Located Approximately 50 Feet North of Well 0663
PL–4	110	New Landfill Monitor Wells Located Approximately 800 Feet North of Well 0717
PL–5	70	View of New Appliance Scrap/Disposal Area at Gunnison County Landfill Located Approximately 0.75 Mile East of Disposal Site

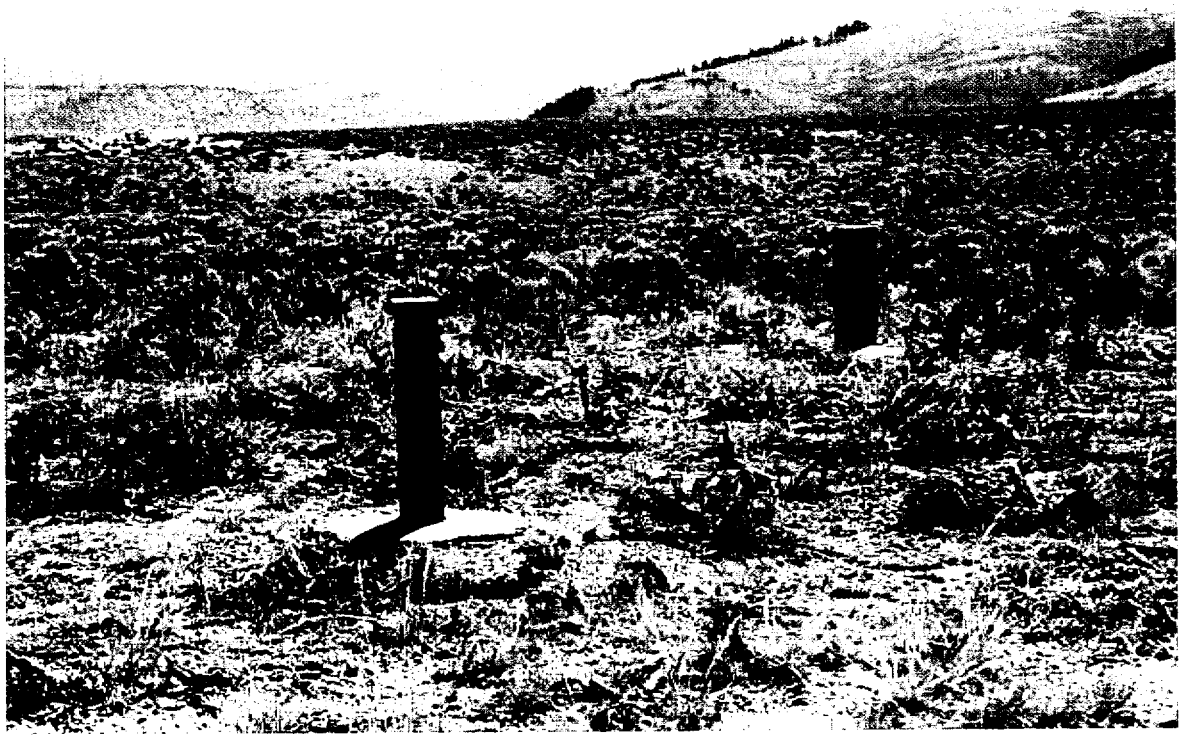
PL–1. New Landfill Fence Tied Into DOE Perimeter Fence Between P34 and P35



PL–2. New Landfill Fence Tied Into DOE Perimeter Fence Between P20 and P21



PL–3. New Landfill Monitor Well Located Approximately 50 Feet North of Well 0663



PL–4. New Landfill Monitor Wells Located Approximately 800 Feet North of Well 0717

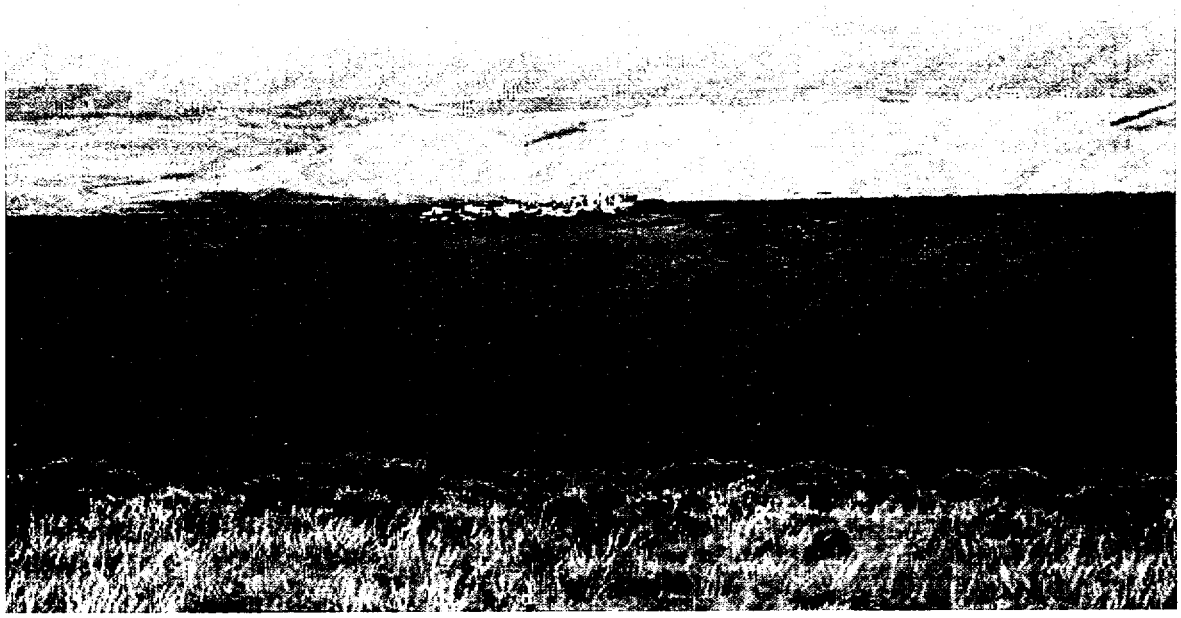


Figure 8–6. View of the New Appliance Scrap/Disposal Area at Gunnison County Landfill Located Approximately 0.75 Mile East of the Disposal Site

2001 Annual Compliance Report
Lakeview, Oregon, Disposal Site

Compliance Summary

The site, inspected on May 31 and June 1, 2001, was in good condition. Results of rock size sampling on the west side slope indicate that the median diameter of the side slope riprap is 2.56 inches, which is below the design criterion of 2.70 inches. Shrub populations in the top slope plant community are spreading and, in time, likely will alter the cover water balance. The Long-Term Surveillance and Maintenance Program's Long-Term Performance Project will continue investigating side slope stability and cover water balance. Ground water monitoring was not required in 2001. Maintenance consisted of minor fence repairs. Inspectors identified no additional maintenance requirements and no requirement for a follow-up 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). These requirements are listed in Table 9–1.

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 Report

The site, northwest of Lakeview, Oregon, was inspected on May 31 and June 1, 2001. Results of the inspection are described below. Features and the photo location (PL) 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, and Signs—The inspection team accessed the site by opening the DOE lock on the cable gate placed across the access road at a cattle guard approximately 0.5 mile east of the site.

The painted surface of the entrance sign has peeled 1 to 2 inches around the edges. Nine of the twelve perimeter signs are in good condition. Perimeter signs P9, P10, and P12 have been damaged by bullet holes and indentations. All signs are still legible and replacement is not warranted.

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

Monitor Wells—The ground-water monitoring network for this site consists of nine monitor wells. 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. Seven additional DOE monitor wells are near the site property but are not part of the compliance-monitoring network. Erosion has undermined the concrete base of well 0513. Otherwise, all wells were locked and in good condition.

1.2 Transects

For inspection, the site was divided into three areas referred to as transects: (1) the top of disposal cell, (2) the side slopes of disposal cell and adjacent drainage channel, aprons, and trench drains, and (3) the site perimeter and outlying area. Inspectors walked each transect and examined as-built features within each.

9A **Top of the Disposal Cell**—The design for the top of the disposal cell has created conditions that favor the growth of deep-rooted plants, including rabbitbrush, sagebrush, and bitterbrush. The top slope was seeded with grasses after construction; sparse cover of relatively shallow-rooted grasses 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 growth of relatively shallow-rooted perennial grasses. Movement of precipitation through the riprap and bedding layers and into the radon barrier favors the growth of shrubs. Many mature rabbitbrush plants and a few mature sagebrush and bitterbrush plants grow on the top of the disposal cell. Shrub density has increased episodically over the past few years and will continue to increase until it approaches or exceeds abundance levels observed in native plant communities adjacent to the site.

Deep-rooted plants have the potential to increase the saturated hydraulic conductivity of the radon barrier, allowing meteoric water to leach contaminants from the encapsulated tailings and into the underlying soil and ground water. Conversely, a mature and diverse shrub-grass plant community has the potential to minimize saturated conditions and, similar to engineered cover designs that rely on evapotranspiration, control unacceptable leaching of tailings contaminants. The Long-Term Performance Project is investigating effects of observed and likely future plant succession on the hydrologic performance of the disposal cell cover.

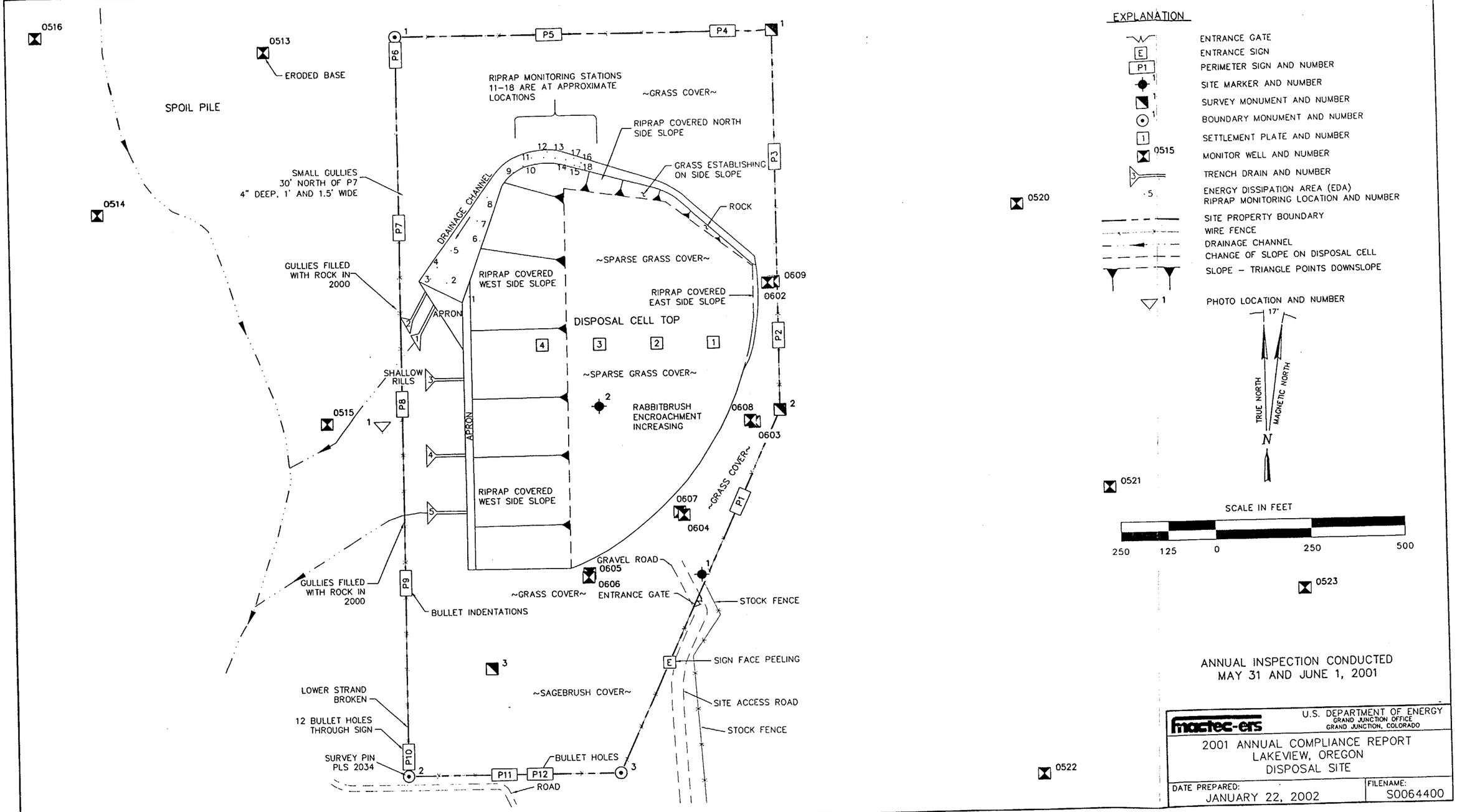


Figure 9–1. 2001 Compliance Drawing for the Lakeview, Oregon, Disposal Site

Leaf-area index, an important plant parameter for estimating evapotranspiration, was measured on the top of the disposal cell and at analog sites that represent a chronosequence of plant succession in 1999, and again on the top slope in 2001. Analog sites represent the potential ultimate stable state of the cell cover if natural processes are allowed to act on the cell without intervention.

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 mid and lower end of the drainage channel is an ongoing concern, because the riprap was sized to withstand the erosive energy of a probable maximum precipitation event. The percentage of crumbling rocks on the surface has increased noticeably since the riprap was placed in 1989.

9B The revised side slope riprap field monitoring procedure was performed for the third year. Particle size distribution (weight percent) by count data was collected at twenty locations. Monitoring results indicated a median diameter range of 2.36 to 2.77 inches at the 95 percent confidence interval, and the side slope riprap median diameter was 2.56 inches, slightly less than the minimum design specification of 2.70 inches.

U.S. Nuclear Regulatory Commission procedures for calculating rock sizes necessary to control runoff erosion were based on the assumption that all precipitation falling on the top slope of the disposal cell would flow down the side slope. In reality, runoff will be less, depending on the top slope water balance. Some water will infiltrate, and vegetation on the top slope will reduce flow rates. The Long-Term Performance Project is investigating more robust methods for calculating rock size requirements. It appears that accounting for the infiltration component may reduce runoff; therefore, a retrofitted design may allow for smaller rock on the side slopes. The Long-Term Performance Project is also investigating evidence of the long-term stability of natural analog slopes.

Ten photograph points for long-term rock monitoring in the energy dissipation area established in 1997, and eight additional photograph points established in 2000, were photographed during this inspection. Only minor rock degradation has been observed since monitoring began at the ten original locations.

Grass encroachment persists in the riprap on the north side slope, in the upper (eastern) part of the drainage channel, and in the energy dissipation area at the lower end of the drainage channel. Relatively sparse plant growth in the drainage channel will not influence the function of the channel and is not considered a problem.

Standing water was absent from the large depression in the energy dissipation area at the lower end of the drainage channel. Trench Drains 1 and 2 extend southwest from this area and appear to be 2 to 3 feet higher than the bottom of the area. Inspectors have seen standing water in the energy dissipation area in the past. This is a concern because submersion may accelerate deterioration of the large riprap due to freeze-thaw processes and swelling of secondary mineralization products (clays).

Site Perimeter and Outlying Area—This transect includes the seeded grass area extending from the disposal cell to the site boundary, the site fence, and the native shrub and grass communities within 0.25 mile surrounding the site.

Gullies that formed in seeded areas extending west of Trench Drains 1, 2, 3, 4, and 5 past the site boundary were filled with rock in 2000; headcutting observed in 2000 in these areas has been curtailed (PL–1). The soil downslope from all five trench drains was dry on the date of the inspection; these areas were saturated during previous inspections.

9C Some loose strands of the south boundary fence were tightened. As in past years, the top and second strands of the barbed-wire fence were loose and entangled in many places, probably caused by mule deer jumping the fence. Inspectors separated the strands. Soil trampling and erosion along the fence north of perimeter sign P7 created a gap below the bottom strand, possibly large enough for a calf to enter. However, there was no evidence of livestock entering the site. If the gap widens in the future, repair of the fence may be necessary.

2.0 Follow-up or Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

DOE performed minor fence repairs in 2001.

4.0 Ground-Water Monitoring

DOE monitors ground water at this site once every 5 years. 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

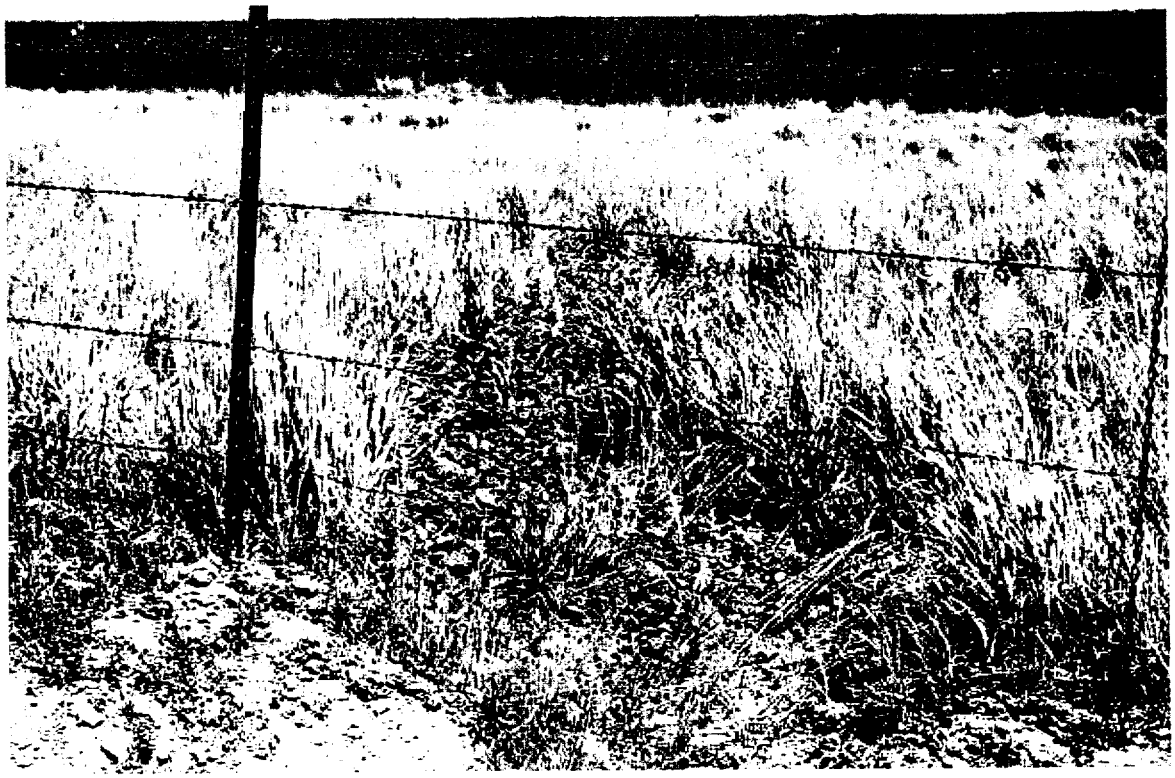
Corrective action is action taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2001.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	80	Rock-Healed Erosion Gully west of Trench Drain 3



PL–1. Rock-Healed Erosion Gully West of Trench Drain 3

2001 Annual Compliance Report
Lowman, Idaho, Disposal Site

Compliance Summary

The site, inspected on October 23, 2001, was in excellent condition. Areas to the north and west of the disposal cell, regraded and seeded in fall 1998, have successfully revegetated. Monitoring of trees and shrubs growing in the riprap and the effectiveness of erosion control channels constructed in 1998 should continue. Ground-water monitoring confirmed previous results that antimony does not occur in concentrations above the laboratory detection limit. Inspectors identified no requirements for maintenance or a follow-up 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, 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 Site Inspection and Report

The site, northeast of Lowman, Idaho, was inspected on October 23, 2001. Results of the inspection are described below. Features and the photo location (PL) 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 about 500 feet north of Idaho State Highway 21. The road is in excellent condition, although grass is beginning to grow along the centerline. A locked gate spans the road about 150 feet from the highway and is in excellent condition. The site is surrounded by U.S. Forest Service land and is unfenced.

One entrance sign and 18 perimeter signs delineate the perimeter of the site. The entrance sign is just inside the site boundary near monitor well 0580. The sign has two bullet holes in it, but is still legible. The 18 perimeter signs are on posts along the site boundary. Other than occasional bullet holes in the entrance sign, all signs are in good condition.

Site Markers and Monuments—The site has two site markers and seven boundary monuments. Three of the boundary monuments are combined survey-boundary monuments (SM–1/BM–1, SM–2/BM–2, and SM–4/BM–4). All markers and monuments are undisturbed and in excellent condition.

Monitor Wells—The monitoring network at the site consists of six monitor wells and one spring. Three of the wells are on site and three 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 are in excellent condition. A seventh well, east of the cell, is unneeded but is 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 slopes of the disposal cell. An apron of larger riprap surrounds the disposal cell on all sides. The riprap is in excellent condition.

No evidence of subsidence, cracking, or differential settlement on the disposal cell was observed.

10A Encroachment of vegetation such as ponderosa pine, redosier dogwood, whortleberry, Norway cinquefoil, common mullein, and bull thistle continues on the top and side slopes of the disposal cell. Many of the larger trees and shrubs were removed in July 2001 during a visit by groundwater samplers. The Long-Term Performance Project currently is evaluating the effect of these plants on the long-term performance of the disposal cell.

Area Between the Disposal Cell and the Site Boundary—The steep slopes east and south of the site are stable with well-established ponderosa pine and grasses. The rills that previously were reported on the slopes immediately north and west of the cell are either stabilized or gone as a result of the erosion control project completed in fall 1998.

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

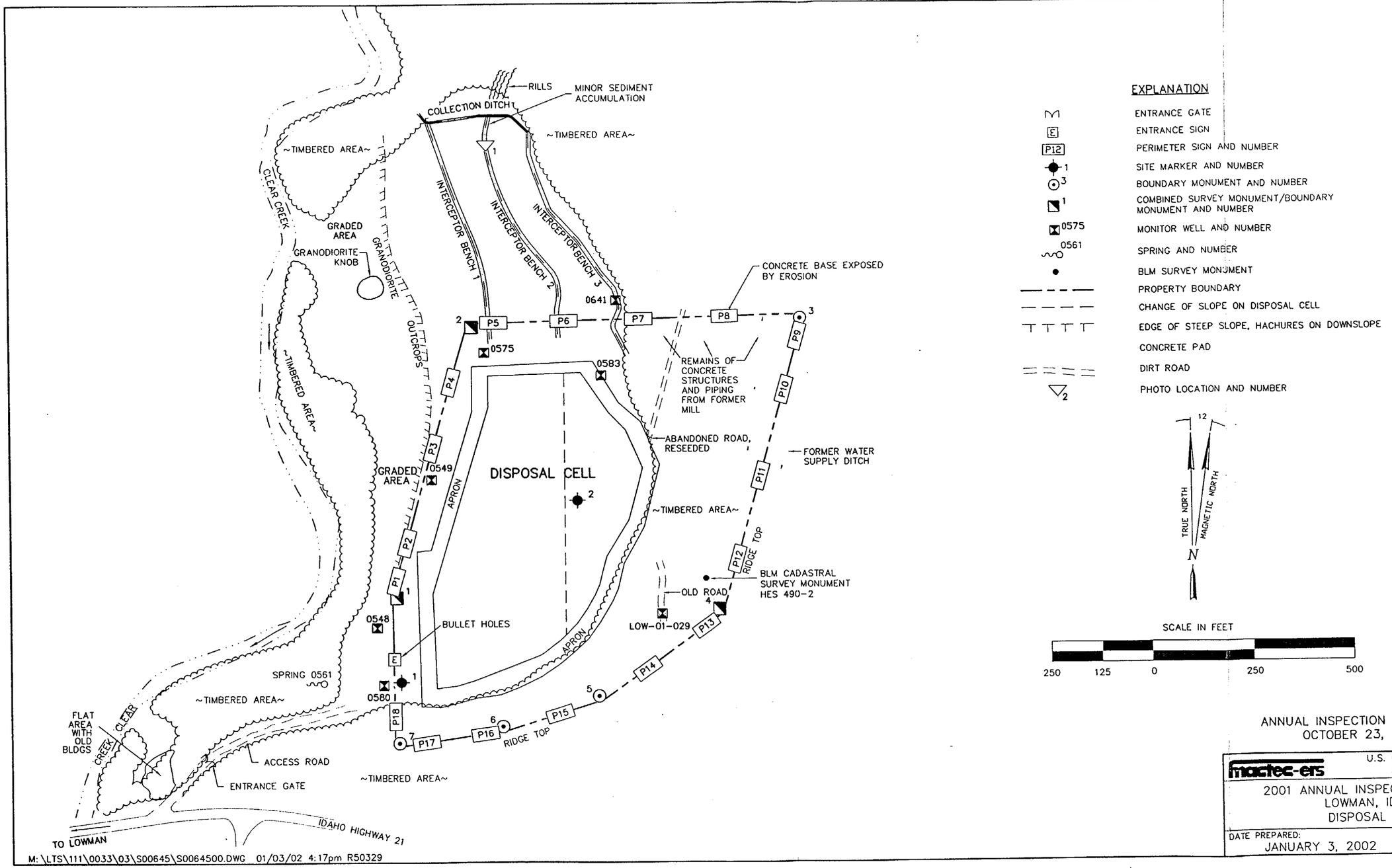


Figure 10–1. 2001 Compliance Drawing for the Lowman, Idaho, Disposal Site

At the time of the 2001 inspection, 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 continue to be effective. Overall, the benches and collection ditch were in good condition. Inspectors noted that a small area of sediment accumulation was present at the north end of Interceptor Bench 2 (PL–1).

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 such as yarrow, penstemon, prairie coneflower, western wheatgrass, bluebunch wheatgrass, and needle-and-thread grass. In addition, volunteer plants of ponderosa pine are establishing in this area.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

No maintenance was required in 2001.

4.0 Ground-Water Monitoring

DOE monitors ground water at this site to verify the initial performance of the disposal cell.

The Lowman site has seven sampling locations:

Well 0583	Upgradient, north of the disposal cell
Well 0641	Upgradient, north of the disposal cell
Well 0548	Downgradient, west of the disposal cell
Well 0549	Downgradient, west of the disposal cell
Well 0575	Downgradient, northwest of the disposal cell
Well 0580	Downgradient, southwest of the disposal cell
Spring 0561	Downgradient, southwest of the disposal cell

The wells and spring are sampled annually.

10B Initial performance of the disposal cell will be verified by monitoring for antimony, whose mean concentration in tailings pore fluids was slightly above the detected maximum background ground-water concentration of 0.007 milligrams per liter.

Results of sampling in 2001 show that antimony was below the laboratory detection limit in all samples, as it has been since 1994. This is true for samples from upgradient (background) locations as well as those from downgradient locations. Results indicate that antimony is not leaching from the disposal cell.

The Lowman site is unique among UMTRCA sites in that the mill used a mechanical process to separate fluvial sands into various concentrates based on density. No chemical processes were

used. Therefore, no process-related chemicals have contaminated the underlying soils and ground water.

Furthermore, the radioactive sands encapsulated in the disposal cell are refractory oxides and silicates known as resistates, which 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 significant antimony to ground water at the site.

10C Results of sampling and analysis for antimony provide more than reasonable assurance 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 2001.

6.0 Photographs

Table 10–2. Photographs Taken at the Lowman, Idaho, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	120	View of Sediment Accumulation Area at the North End of Interceptor Bench 2

PL–1. View of Sediment Accumulation Area at the North End of Interceptor Bench 2

2001 Annual Compliance Report
Maybell, Colorado, Disposal Site

Compliance Summary

The site, inspected on July 24, 2001, was in excellent condition. All fencing was intact and no grazing, other than by wildlife, was evident on site. The inspectors replaced one missing perimeter sign. Gabions, riprap, and cobble have been installed and reinforced to control erosion below the outfalls of Ditch Number 1 and Swale Number 1; no significant runoff events occurred between construction of these modifications and the site inspection. Water level monitoring shows that the water table is continuing to rise on a regional scale. The rise cannot be attributed to any local effect around the disposal cell. Settlement plates were resurveyed, and maximum settlement was 0.06 foot since the 2000 survey. The U.S. Department of Energy (DOE) revised the entrance sign to indicate that the DOE Grand Junction Office now administers the site. The concrete around site marker SMK–2 is spalling and should be sealed. Inspectors identified no additional maintenance requirements and no cause for a follow-up 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, 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. 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 Site Inspection and Report

The site, northeast of Maybell, Colorado, was inspected on July 24, 2001. Results of the inspection are described below. Features and photo locations (PLs) mentioned in this report are shown on Figure 11–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

1.1 Specific Site Surveillance Features

Access, Fence, Gate, and Signs—Access to the site is via County Road 53. The road is graveled, hard packed, and 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 P24. A shallow gully has formed in the bottom of the swale, but the road is passable.

An intact standard stock fence in good condition surrounds the cell. The site fence does not coincide with the site property boundary except at the southwest corner of the site and for a distance along the southern boundary of the site. The property boundary, determined from real estate records, and the actual fence line are shown on Figure 11–1.

The entrance gate is in the perimeter fence at the north end of the site. The tubular metal gate is secured with a DOE padlock and is in excellent condition.

The entrance sign is mounted on a t-post in the fence line near the entrance gate. This sign previously identified the responsible agency as the DOE Albuquerque Office; it was revised to identify the responsible agency as the DOE Grand Junction Office.

There are 24 perimeter signs around the site. On the north, west, and south sides of the site, perimeter signs are on t-posts in the fence line. On the east side of the site, perimeter signs are on the bench about midway between the disposal cell and Johnson Wash and are mounted on steel
11A posts set in concrete. After inspectors replaced one missing perimeter sign at location P4, all signs were in excellent condition.

Site Markers and Monuments—The site has two site markers, four boundary monuments, and two survey monuments. Only two of the boundary monuments, BM–2 and BM–3, are actually on the site boundary, and only one is at a corner. This is a variance from Uranium Mill Tailings Remedial Action Project specifications that require boundary monuments at actual corners. The surface of the concrete base of Site Marker SMK–2 is spalling and should be sealed. All other markers and monuments are in excellent condition.

11B **Settlement Plates**—There are nine settlement plates on top of the disposal cell. Elevations of the settlement plates were resurveyed in August 2001 to detect vertical movement due to consolidation of tailings. Results are presented in Section 6.0 of this report.

Monitor Wells—Numerous wells remain on and around the site. Only four—0601, 0676, 0695, and 0696—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.

Other wells on and around the site are unused and are candidates for decommissioning.

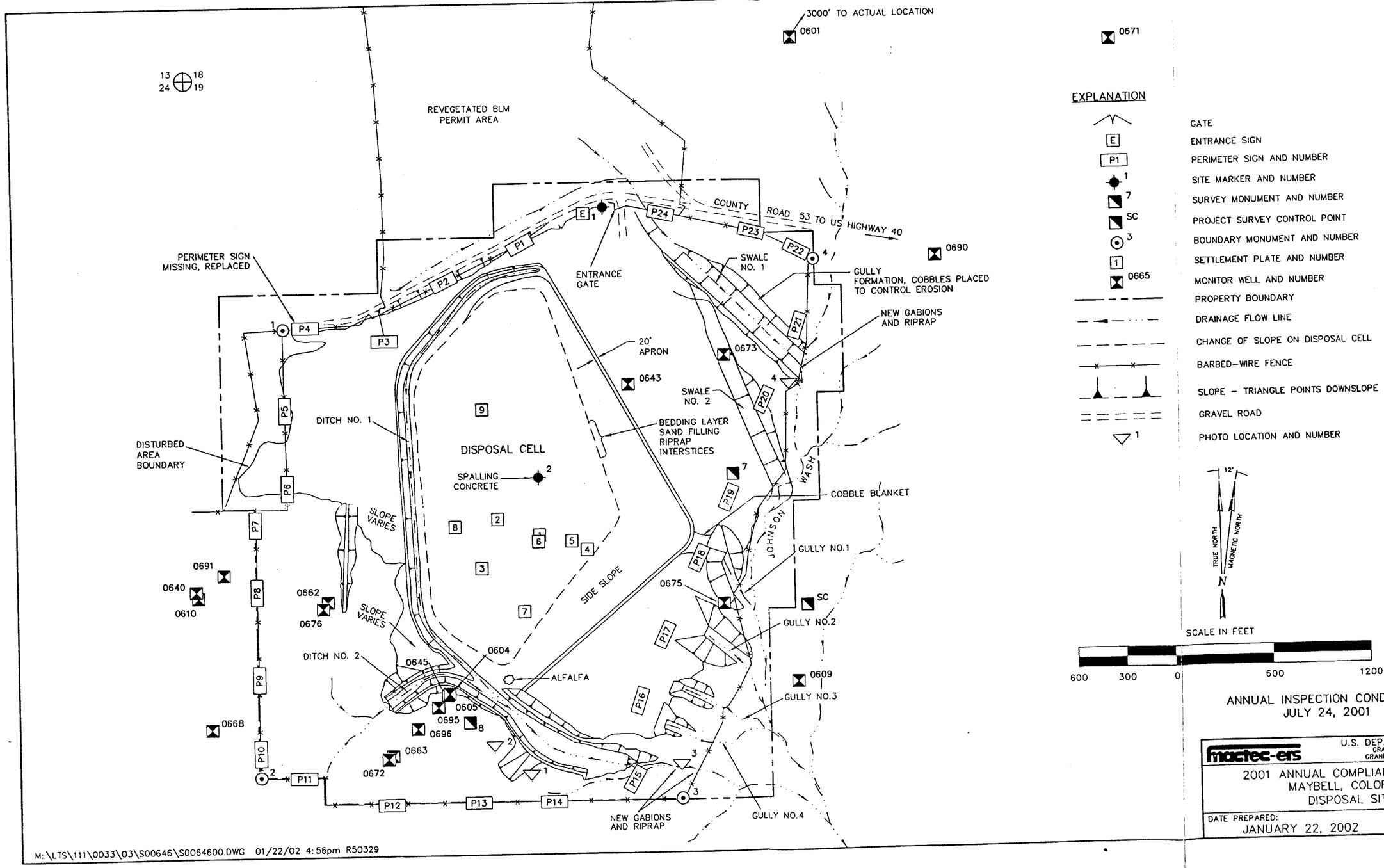


Figure 11–1. 2001 Compliance Drawing for the Maybell, Colorado, Disposal Site

1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas referred to as transects: (1) the disposal 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 is in excellent condition. The side slopes appear stable. There is no evidence of slumping or settling 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. The inspectors did not have the means to excavate into the bedding layer to confirm that the full thickness of riprap was present.

A patch of alfalfa was observed in an area that was identified in the Long-Term Surveillance Plan as having a potential for seeps, but no moisture was evident on the surface and the vegetation may be coincidental.

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. Wildlife is abundant.

Significant erosion occurred east of the disposal cell. The erosion is associated with the four numbered gullies and the outfall downslope from the end of the riprap in Ditch Number 1. All gullies and the outfall drain into Johnson Wash.

In fall 2000, gabions were installed in Ditch Number 1, and additional riprap was placed along the course of the ditch. Spring runoff water ponded behind the gabions and created new channels
11C around the end of the erosion control structures. In spring 2001, additional large riprap was placed at the ends of the gabions to prevent end-around flow, and in the channel to dissipate energy and prevent scour (PL–1 and PL–2). Additional riprap was placed along the unarmored lower reaches of the ditch and at the property line where the ditch empties into Johnson Wash (PL–3).

Also in 2001, the outfall of Swale Number 1 was hardened with a gabion and additional large riprap that will serve to slow runoff velocities and trap sediment (PL–4). A cobble blanket was also placed along Swale Number 1 to control erosion that had occurred in 2000. The 2001 site inspection indicated that a gully has formed west of the cobble blanket.

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

A follow-up inspection was conducted in spring 2001 to evaluate the effectiveness of erosion control improvements to Ditch Number 1 that were implemented in fall 2000. Observations of continued erosion led to additional erosion control measures for Ditch Number 1 and for Swale Number 1 described above.

3.0 Routine Maintenance and Repairs

DOE replaced one missing perimeter sign in 2001.

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.

However, 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 1 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 November 2001 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.

11D Water levels continue to rise at a similar rate at all measuring stations. Slopes of the hydrographs in Figure 11–2 are remarkably parallel. Data from background well 0601 are of primary interest. They show that rising water levels are regional, at least in their major component, 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 perhaps of decadal or longer-term duration.

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 2001.

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. Still, further consolidation could occur.

Nine settlement plates were installed in the disposal cell. DOE will survey elevations on these settlement plates for a period of 5 years (through 2003). The purpose of the surveys is to detect any significant settlement.

Results of the resurvey in August 2001 are provided in Table MAY–2.

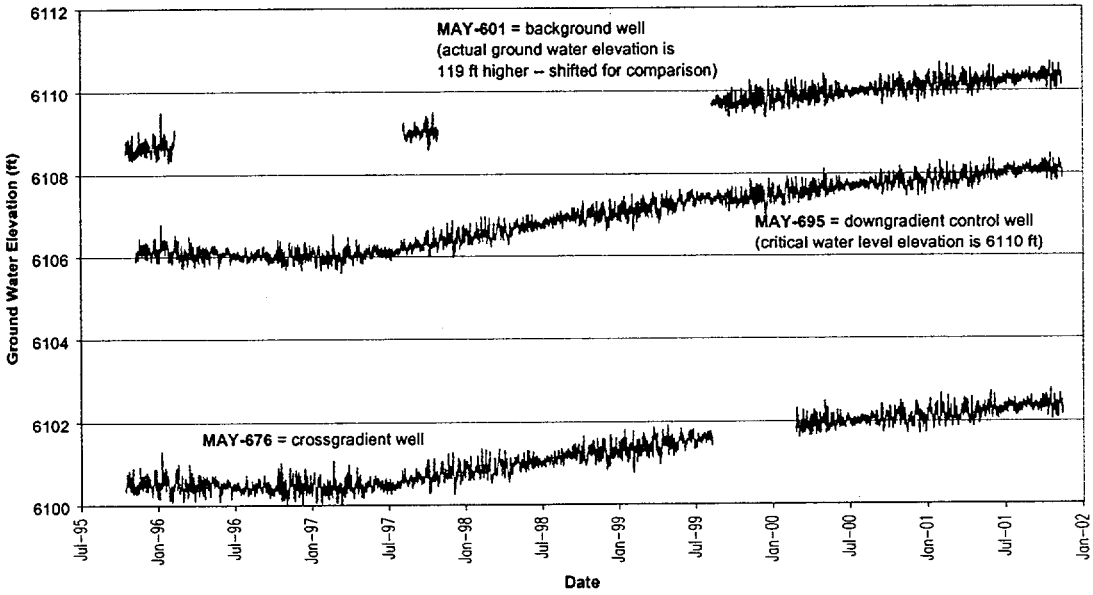


Figure 11–2. Water Level Measurements at the Maybell, Colorado, Disposal Site

Table 11–2. Results of Settlement Plate Survey in 2001, Maybell, Colorado, Disposal Site (elevation in feet Above mean sea level)

Settlement Plate Location	Surveyed Elevation August 23, 2001	Elevation August 31, 2000	Difference in Elevation (ft)
SP–1	6,243.59	6,243.65	–0.06
SP–2	6,236.98	6,237.03	–0.05
SP–3	6,231.52	6,231.58	–0.06
SP–4	6,251.48	6,251.52	–0.04
SP–5	6,249.17	6,249.22	–0.05
SP–6	6,243.17	6,243.23	–0.06
SP–7	6,236.86	6,236.89	–0.03
SP–8	6,229.56	6,229.60	–0.04
SP–9	6,241.16	6,241.17	–0.01

Differences in elevation shown in Table 11–2 indicate that minimal settlement has occurred at all measuring stations. The greatest change in elevation, a difference of 0.06 foot, occurred at settlement plates SP–1, SP–3, and SP–6. These measuring stations are located in the south central part of the disposal cell (Figure 11–1), where tailings are deepest; the slimes were placed; and the greatest consolidation would be expected.

7.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	30	Riprap Armoring for Ditch Number 1 Gabion
PL–2	110	Additional Riprap Armoring in Ditch Number 1
PL–3	90	Riprap Armor in Ditch Number 1 at Fence Line
PL–4	10	Erosion Protection Pear the Property Line Along Swale Number 1

PL–1. Riprap Armoring for Ditch Number 1 Gabion

PL–2. Additional Riprap Armoring in Ditch Number 1

PL–3. Riprap Armor in Ditch Number 1 at Fence Line

PL–4. Erosion Protection N ear the Property Line Along Swale Number 1

2001 Annual Compliance Report
Mexican Hat, Utah, Disposal Site

Compliance Summary

The site, inspected on September 25, 2001, was in excellent condition. However, minor amounts of native soil and rock continue to slough onto the south apron. The condition of the unstable boundary monument, first observed in 1998, has not worsened. Several perimeter signs have become unstable because of erosion at the base. All other improvements are in excellent condition, and the site remains secure. No cause for a follow-up inspection was identified.

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 Site Inspection and Report

The site, south of Mexican Hat, Utah, was inspected on September 25, 2001. Results of the inspection are described below. Features and photo 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 land of the Navajo Nation.

A high-quality, barbed-wire fence with a chain link entrance gate surrounds the site. The fence and gate were in excellent condition.

12A This site has 43 perimeter signs and one entrance sign. All signs are 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) has significant erosion and is very unstable. The post holding perimeter sign P27 is bent but remains stable.

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

Boundary monument BM–11 is situated on a steep soil and rock slope, and soil has eroded from around the downhill side of the concrete base. This monument did not move when tested; its condition has not worsened since it was first noted three years ago.

Monitor Wells—There are four ground-water monitor wells near the site. Installation of the fourth well, under the Uranium Mill Tailings Remedial Action Ground Water Project in November 2000, verified that the uppermost aquifer was isolated from shallow perched water by an aquitard and an upward hydraulic gradient. All wells were secure and in good condition.

1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into four areas called 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.

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

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-colored country rock and soil (the "scree slope") along the south apron does 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. Some larger pieces of sandstone (up to 12 inches in diameter) have rolled down the cliff face and out onto the riprap apron, as noted during previous inspections. 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 scree slope.

There is no evidence of plant growth on the side slopes. Minor plant growth is evident in the north and west riprap-armored diversion ditches. Russian thistle was observed growing in the southwest diversion ditch. Inspectors saw no evidence of creep, settling, erosion, burrowing, or other degradation in this transect.

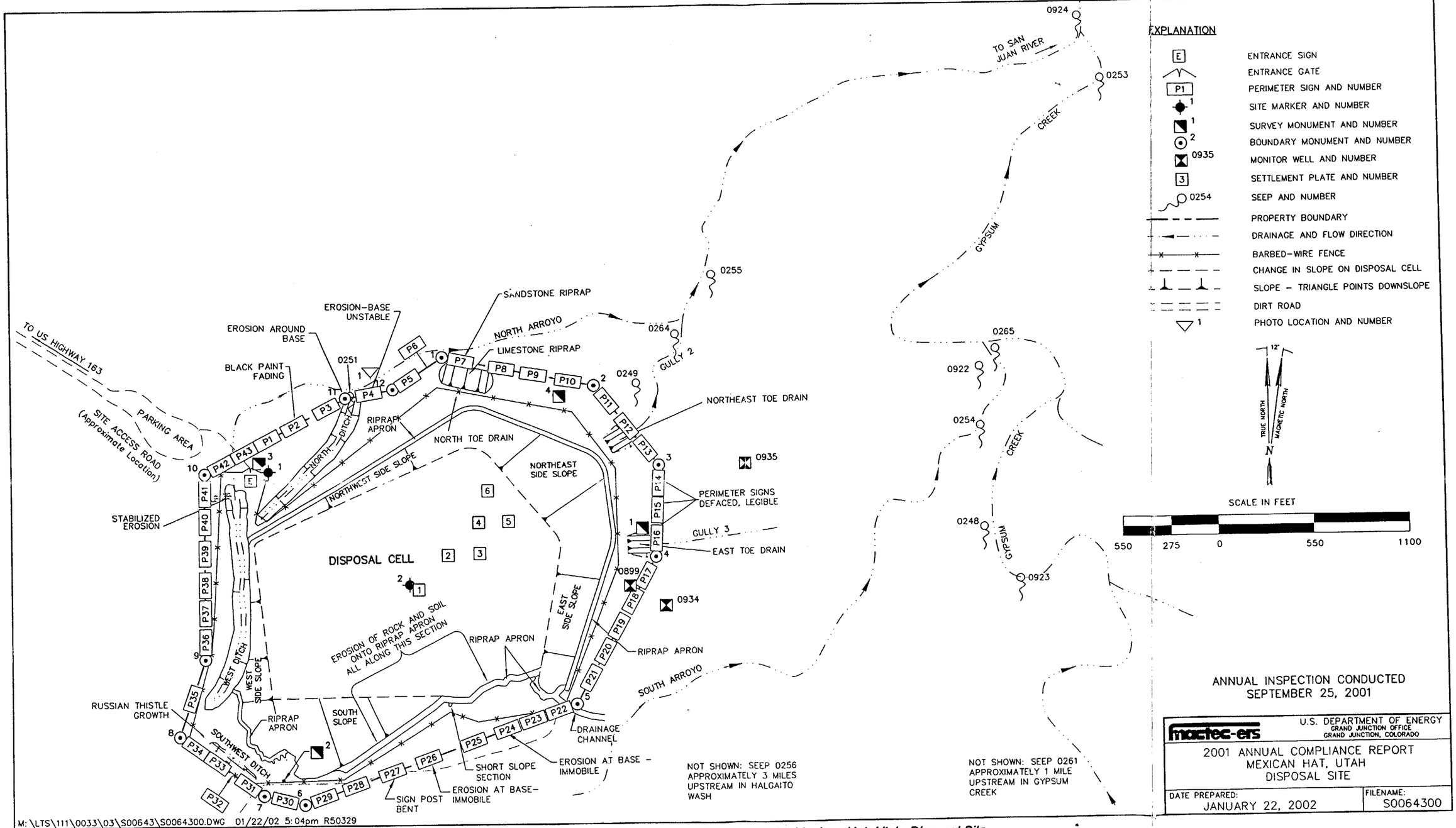


Figure 12–1. 2001 Compliance Drawing for the Mexican Hat, Utah, Disposal Site

Area Between the Disposal Cell and the Site Boundary—During the 2001 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.

No vandalism or evidence of intrusion was noted.

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

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

No maintenance was conducted in 2001.

4.0 Ground-Water Monitoring

DOE monitors nearby seeps at the request of the Navajo Nation; this monitoring is not required under the Long-Term Surveillance Plan. Seep volume is low and does not constitute a water resource. The uppermost aquifer is not affected by the cell or by historical processing activities because of an effective aquitard and an upward hydraulic gradient.

Ground water is monitored at six seeps near the site. Six additional seeps are also monitored as a
12B best management practice. Two of the seeps, 0256 and 0261, are upgradient. Samples from these two seeps are taken to be representative of upgradient or background ground water. All seeps are along North Arroyo and Gypsum Creek, north and east of the disposal site, respectively.

Currently, DOE samples the seeps quarterly. Often, many of the seeps do not contain enough water to collect a sample. Eleven seeps yielded at least one sample in 2001, but only seven seeps yielded a sample on all four occasions during the period November 2000 through August 2001. (For the purposes of each annual report, samples collected in the fourth quarter of the previous year are included in the current year's report.)

Results of quarterly sampling for three target analytes—nitrate, sulfate, and uranium—are presented in Table 12–2. Maximum concentration limits (MCLs) were established by the U.S. Environmental Protection Agency in 40 CFR 192, Table 1 of Subpart A.

Table 12–2. Results of Quarterly Sampling at Seeps, Mexican Hat, Utah, Disposal Site[a]

Analyte	MCL	Date	Seeps 0256 Upgradient	0261 Upgradient	0248	0251	0253
Nitrate (as NO_3)	44	1998–2000	[b]	[b]	183–252	395–2260	16.2–128
		2001	[b]	[b]	245–393	285–946	16–161
Sulfate	None	1998–2000	1,890–3,260	3,100–3,950	2,460–3,240	1,530–5,650	2,600–4,280
		2001	2,250–2,750	2,710–3,590	2,680–4,010	614–3,370	2,170–3,390
Uranium	0.044	1998–2000	0.0192–0.0302	0.0119–0.0377	0.411–0.676	0.449–2.1	0.017–0.466
		2001	0.0309–0.0461	0.007–0.0374	0.566–0.779	0.0126–0.885	0.073–0.391

Analyte	MCL	Date	Seeps 0255	0265	0264	0922	0923	0924
Nitrate (as NO_3)	44	1998–2000	391–911	76.9–159	416–1,110	132–199	5.43[c]	50.7–103
		2001	273–380	101–166	376–533	171–188	1.02[c]	73–116
Sulfate	None	1998–2000	2,620–4,810	2,430–3,630	2,770–6,310	2,880–3,400	2,320–3,850	2,720–3,770
		2001	2,900–3,540	3,610–4,290	2,750–3,320	2,980–3,130	1,460–6,000	2,570–3,130
Uranium	0.044	1998–2000	0.643–1.37	0.164–0.36	0.698–2.16	0.334–0.397	0.0155–0.0327	0.19–0.403
		2001	0.662–0.833	0.361–0.584	0.664–0.898	0.372–0.418	0.0165–0.0282	0.332–0.367

[a]Values reported in ranges (from lowest to highest) for the year(s). When only one value is given, the seep was dry on three of four sampling events except as noted. All results are in milligrams per liter.
[b]Undetected or less than the required detection limit.
[c]Other results undetected or less than the required detection limit.

Nitrate concentrations vary widely from seep to seep, and at the same seep from time to time. In 2001, nitrate values ranged from below the required laboratory detection limit (<0.1 milligram per liter [mg/L]) at the two background seeps to more than 900 mg/L.

The one anomalously high nitrate value, 946 mg/L, was from seep 251 sampled in November 2001. This same seep yielded similar anomalously high values when previously sampled in the month of November. There is no evident cause for the high nitrate values. Two observations are possibly significant: (1) by February in each of the past 3 years, nitrate concentrations had dropped significantly to more normal values for downgradient seeps, and (2) except for August 2001, seep 251 has not had sufficient amounts of water in the spring and summer to collect samples (the concentration in August 2001 was 285 mg/L). Seasonal fluctuation of the flow rate at the seep may be a contributing factor but probably, by itself, does not account for the increased concentrations of nitrate in November samplings. Nitrate concentrations exceeded the standard of 44 mg/L (as NO_3) at all downgradient seeps on all sampling occasions with two exceptions. The nitrate value was below the standard at seep 253 when sampled in August 2001 and at seep 923 in February and May 2001.

Sulfate concentrations at upgradient and downgradient seeps are in the 2,000 mg/L to 6,000 mg/L range and have remained essentially constant for several years. The source of sulfate is likely gypsum in the source rock siltstones, mudstones, and shales. Downgradient concentrations of sulfate are not significantly different from sulfate concentrations at the upgradient seeps.

With the exception of seep 923, uranium concentrations exceeded the standard of 0.044 mg/L at all downgradient seeps and at upgradient seep 256 in November 2000 and February 2001. It was below the standard at seep 261 for all samples. This condition has remained consistent since sampling began in 1985.

Results of monitoring in 2001 appear consistent with historical results at each seep. Conditions with respect to the three target analytes appear essentially steady state. No trends of increase in concentrations are evident that would suggest degradation of the disposal cell cover.

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 2001.

6.0 Photographs

Table 12–3. Photographs Taken at the Mexican Hat, Utah, Disposal Site

Photograph Location Number	Azimuth	Description
PL–1	120	Erosion Around Perimeter Sign P4

End of current text

PL–1. Erosion Around Perimeter Sign P4

2001 Annual Compliance Report
Naturita, Colorado, Disposal Site

Compliance Summary

The site, inspected on July 11, 2001, was in excellent condition. A small amount of borrow material was removed from within the site boundary and was reseeded at the time of the inspection. There is no significant erosion in areas adjacent to the site. Water level measurements at the standpipe in the disposal cell show the bottom of the disposal cell is essentially dry. Inspectors identified no requirement for maintenance or a follow-up inspection.

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 Site Inspection and Report

The site, west of the former community of Uravan, Colorado, was inspected on July 11, 2001. 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 is by Montrose County Road EE22 that leads from Colorado State Highway 141 at the former site of Uravan. The road is graveled, hard packed, and in good condition.

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

The site has 23 perimeter signs and one entrance sign. Perimeter signs are on galvanized steel posts approximately 5 feet inside the perimeter fence. All signs are in excellent condition.

Site Markers and Monuments—There are two site markers, three survey monuments, and 14 boundary monuments. The site boundary has 17 corners. Fourteen of the 17 corners are marked with boundary monuments. The other three corners are marked by the survey monuments. All markers and monuments are undisturbed and in excellent condition.

Monitor Wells and Standpipe—The ground-water monitoring network has five wells: BR95–1, BR95–2, BR95–3, CM93–1, and CM93–2. All wells are locked and in excellent condition. A capped PVC standpipe is near the northeastern edge of the disposal cell; the PVC casing and cap are both in good condition.

1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into five areas referred to as transects: (1) the top and side slopes of the disposal cell, (2) the toe drain, (3) the interceptor trench, (4) the area between the drains and the site boundary, and (5) the outlying area.

Top of Disposal Cell and Side Slopes—The top and side slopes of the disposal cell are covered with rock in excellent condition. Inspectors saw no evidence of subsidence, differential settlement, slumping, or other modifying process.

Toe Drain—A U-shaped toe drain surrounds the disposal cell. The toe drain diverts runoff to the east and southeast away from the cell. The drain is armored with rock and in excellent condition. The west branch of the toe drain exits through a channel quarried in the wall of the former Burbank Pit (sandstone quarry) before it empties into Hieroglyphic Canyon. The east branch of the toe drain exits through the adjacent UMETCO Title II disposal site and into culverts beneath County Road EE22. Toward the end of remedial action, the culverts were reconstructed to improve drainage and appear to be functioning properly.

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 is in excellent condition, but because there are no culverts under the road, the county road may be susceptible to erosion.

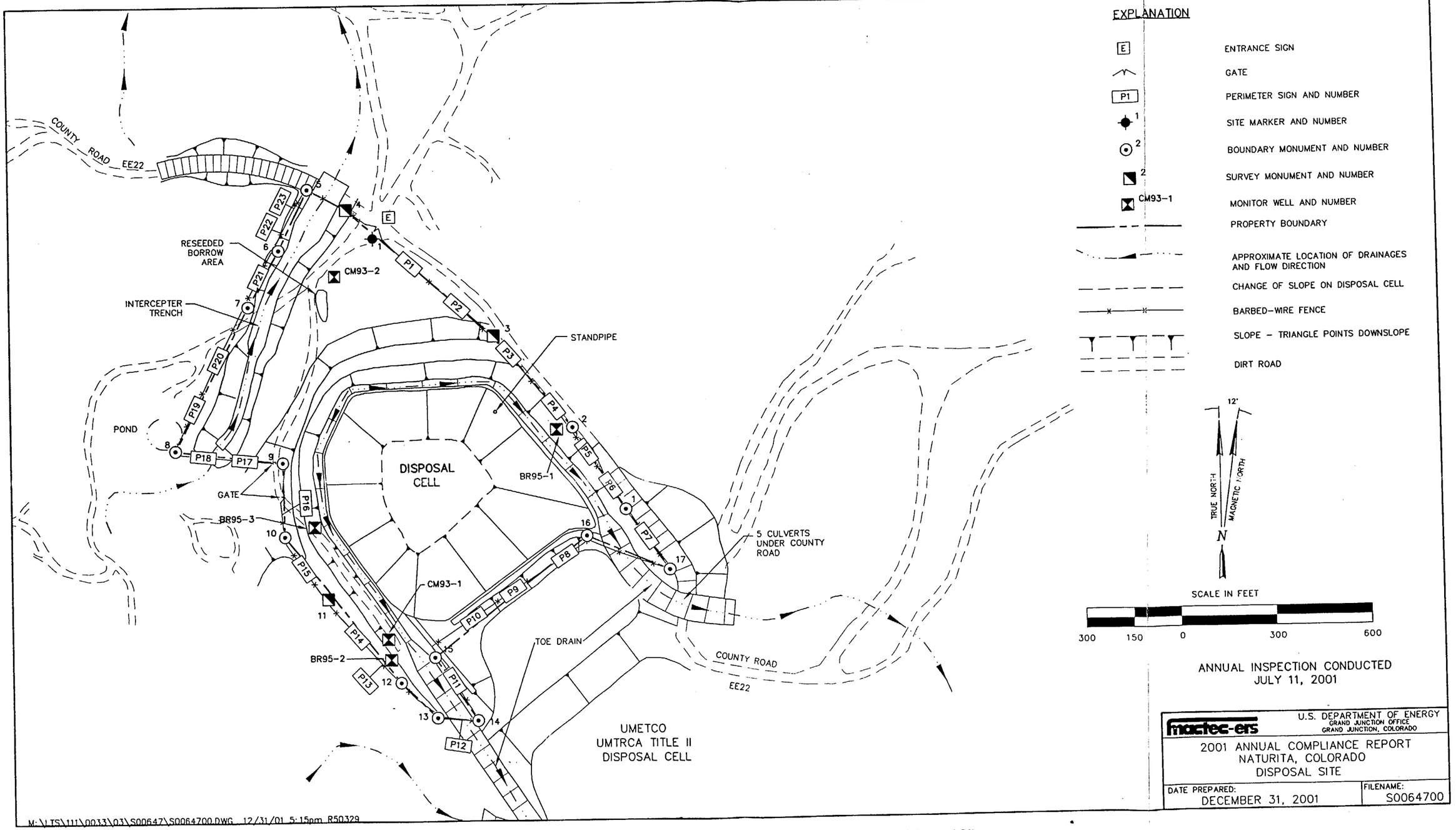


Figure 13–1. 2001 Compliance Drawing for the Naturita, Colorado, Disposal Site

13A **Area Between the Drains and the Site Boundary.**—Grass and shrub density has increased, but much of the cover still consists of annual weeds, primarily kochia. The success of revegetation may not be evident for several years and will be dependent on moisture.

Stopes and adits from the Cotter Corporation mine were located northwest of the cell on the embankment above the access road leading to the monitor wells. The DOE Grand Junction Office Uranium Lease Management group closed these in 2001. A minor quantity of soil was borrowed from within the site boundary for this operation, resulting in disturbance of the revegetated area. The disturbed area was reseeded shortly after completion of the reclamation work.

Generally, this area is stable and no erosion was observed.

Outlying Area—The area outward for a distance of about 0.25 mile from the site boundary was visually inspected. The area is highly disturbed by former mining activities and subsequent remedial action. UMETCO continues remedial action activities on the east side of County Road EE22. UMETCO's completed Title II disposal cell abuts the Naturita site on the southeast. Other than UMETCO's work, which is complementary to remedial action by DOE, no development or other disturbance was observed.

13B DOE generated a legal description of the off-site portions of the toe drains. These will be used to secure a perpetual easement for these structures.

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

No maintenance was required in 2001.

4.0 Ground-Water Monitoring

13C **Monitor Wells**—DOE monitors ground-water chemistry and water levels at this site to demonstrate the initial performance of the disposal cell. The strategy is to meet maximum concentration limits established by the U.S. Environmental Protection Agency at 40 CFR 192, Table 1 of Subpart A, or background levels at a point-of-compliance monitor well in the uppermost aquifer downgradient from the disposal cell. The uppermost aquifer is the Wingate Sandstone Formation that lies approximately 600 feet beneath the disposal cell. The Wingate is hydrologically isolated from surface water and the disposal cell by unsaturated sandstone and relatively impermeable shale layers (Salt Wash Member of the Morrison Formation and the Summerville Formation).

Monitor wells BR95–1, BR95–2, and BR95–3 are screened at the relatively shallow contact between the Salt Wash Member and the Summerville Formation, above the Wingate aquifer. If contamination is detected at this horizon, and if the contamination is shown to be related to the

disposal cell, DOE will begin to sample two additional wells (CM93–1 and CM93–2) screened in the uppermost aquifer (Wingate).

DOE will monitor in the first, third, and fifth years after licensing. The site was licensed in 1999, so monitoring was performed in 2000 and will occur again in 2002 and 2004. The need to continue monitoring will be evaluated in 2004. The indicator or target analytes are arsenic, molybdenum, and uranium.

Wells BR95–2 and BR95–3 were sampled in 1997, 1998, and 2000. Well BR95–1 has yet to be sampled because there is an insufficient volume of water in the well. Sample results are presented in Table 13–2. Ground water at the Salt Wash/Summerville contact is known to be elevated in uranium because of local mineralization and mining activities. An indication of the intrinsic mineralization of this water is the high levels of uranium (Table 13–2) in seep waters approximately one-half mile north of the disposal cell. The seep, which is cross-gradient from the disposal cell, represents discharge of ground water from the Salt Wash/Summerville contact. Seep data are provided by UMETCO.

Water levels were measured in wells BR95–1, BR95–2, and BR95–3 in 1997, 1998, and 2000. No trends were discernable.

Wells CM93–1 and CM93–2 were sampled in May 1997. Arsenic concentrations were 0.0071 and 0.0059 milligrams per liter (mg/L), respectively. Molybdenum and uranium concentrations were below the laboratory reporting limit.

Table 13–2. Indicator Analyte Concentrations in Ground Water at the Naturita, Colorado, Disposal Site

Analyte	Maximum Concentration Limit	Sample Date	SEEP–1	BR95–2	BR95–3
Arsenic	0.05	3/97	–	0.001[a]	0.001[a]
		9/97	–	0.001[a]	–
		2/98	–	0.001[a]	–
		8/98	–	0.001[a]	0.0051
		11/00	–	0.00037[a]	0.0024[a]
		10/00	0.0071	–	–
		04/01	0.007	–	–
Molybdenum	0.1	3/97	–	0.0104	0.0309
		9/97	–	0.0102	–
		2/98	–	0.0107	–
		8/98	–	0.0067[a]	0.0186
		11/00	–	0.0046[a]	0.0188
Uranium	0.044	3/97	–	0.0429	0.0133
		9/97	–	0.0427	–
		2/98	–	0.0386	–
		8/98	–	0.0382	0.0249
		11/00	–	0.0443	0.0212
		10/00	2.00	–	–
		04/01	2.59	–	–

[a]Undetected or less than the required detection limit.
All concentrations are expressed in mg/L. "–" indicates the well was not sampled, presumably because not enough water was present after purging the well.

13D **Standpipe**—The disposal cell is designed so that transient drainage will move downward into the underlying, unsaturated sandstone and no water will accumulate or pool in the footprint of the disposal cell. A standpipe was installed in the northeastern part of the disposal cell to monitor water pooling. Water levels in this standpipe will be measured when ground water is sampled at the three monitor wells in 2002 and 2004. Results of water level measurements to date, including the measurement in November 2000, are shown on Figure 13–2.

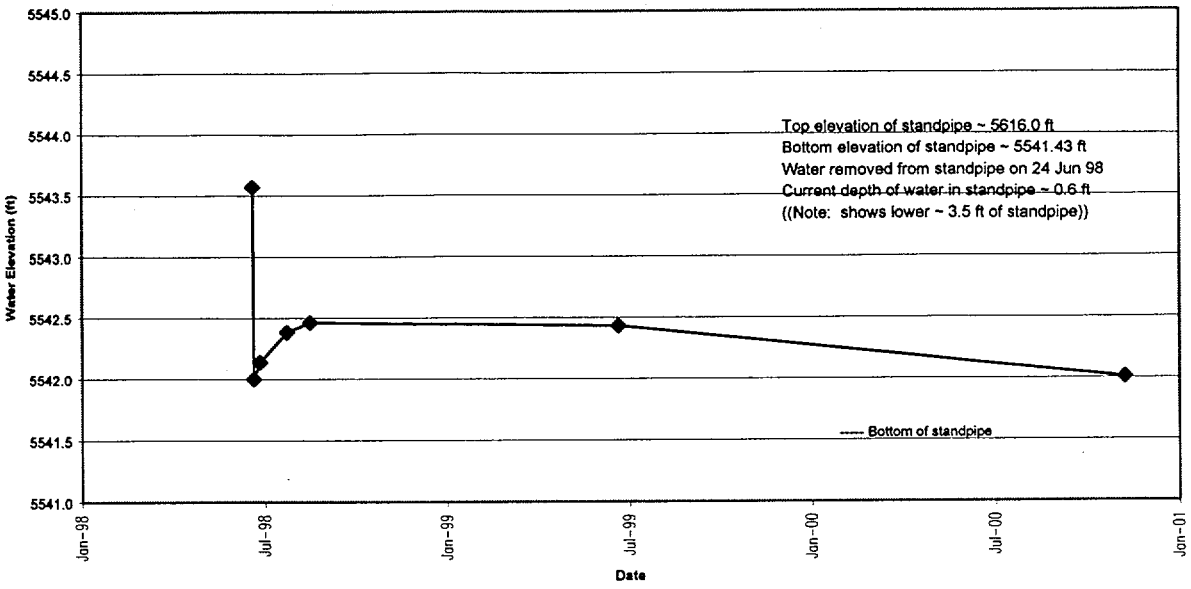


Figure 13–2. Water Elevation in Standpipe in the Naturita, Colorado, Disposal Cell

Because the standpipe was not part of the disposal cell design and was never intended to be a permanently installed standpipe/well suitable for water-level measurements, details of the construction of the standpipe are uncertain. The bottom of the standpipe may rest in a concrete footing, and the standpipe may not be perforated all the way to the bottom of the pipe, and therefore could trap water. The standpipe was pumped dry in June 1998 to discern if the water in the standpipe was trapped or if it is an indication of the water table at the base of the cell. As Figure 13–2 shows, within a few months the water level recovered from an elevation of 5,542.5 feet to 5,543.0 feet. The water level was essentially unchanged a year later in July 1999. Since the July 1999 measurement, the water level has dropped to an elevation of 5,542.0 feet (0.6 feet of standing water) recorded in November 2000. Inspectors will continue to measure water levels in the standpipe; the next scheduled measurement is in 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 2001.

End of current text

2001 Annual Compliance Report
Rifle, Colorado, Disposal Site

Compliance Summary

The site, inspected on August 7, 2001, was in excellent condition. Rock covering the disposal cell and toe ditch is undisturbed and in excellent condition. Revegetation of disturbed areas adjacent to the cell has been successful. Erosion at the outlet of the toe ditch and in three arroyos south of the disposal cell is occurring, as anticipated. Rock placed above these areas is dropping into the eroding channels to prevent, or at least slow, further erosion. Rills noted during previous inspections east of the disposal cell appear to have stabilized with the establishment of vegetation.

During 2001, water levels measured in the standpipes on the disposal cell approached the 6,016-foot (ft) action level. DOE constructed an evaporation pond, installed a pump in standpipe MW–2, and, in late August 2001, began pumping water from the standpipe into the evaporation pond. Since pumping began, average water levels in the standpipes have dropped 4 to 6 inches. DOE replaced the entrance sign. No other maintenance was required and no requirement for a follow-up inspection was identified.

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 Site Inspection and Report

The site, north of Rifle, Colorado, was inspected on August 7, 2001. Results of the inspection are described below. Features and photo 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, Fence, Gate, and Signs—Access to the site is by an improved gravel road that leads from Colorado State Highway 13.

Most of the site is unfenced, bounded instead by steep slopes above and deep ravines on both east and west sides. Downslope from the disposal cell, there is a barbed-wire stock fence about halfway between the southern edge of the toe ditch and the southern boundary of the site. Constructed to keep livestock off graded and reseeded areas, the fence extends to the edges of the deep ravines that bound the site on the east and west. At the time of the 2001 inspection, inspectors saw no evidence of recent grazing by livestock, although wildlife sign was abundant.

The entrance gate in the fence, consisting of a pair of tubular metal gates hinged to galvanized steel posts, is secured by a chain and padlock. The fence and the gate are in excellent condition.

14A The site has 26 perimeter signs and one entrance sign. Perimeter signs are not situated along the site boundary but are along the edge of the disposal cell. Except for several signs containing a few bullet holes, all perimeter signs are in excellent condition. Inspectors replaced the entrance sign because it was riddled with bullet holes.

Markers and Monuments—Two site markers, three survey monuments, and 15 boundary monuments are located on the site. Boundary monuments are installed at corners along the irregular site boundary. Because of rough terrain, boundary monuments are set at only 15 of the 20 corners. The remaining corners—BM–8, BM–9, BM–13, BM–17, and BM–20—are marked by wooden stakes only. All markers and monuments were undisturbed and in excellent condition at the time of the inspection.

Standpipes—Three standpipes—MW–1, MW–2, and MW–3—are located on the south side slope of the disposal cell. Data loggers are installed in MW–2 and MW–3 to measure water levels. MW–1 is not monitored because it is shallow and usually dry. Standpipes are in excellent condition.

14B **Monitor Wells**—All nine monitor wells were decommissioned in 2001.

1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas called transects: (1) the disposal cell (including interceptor trench and toe ditch), (2) the area between the disposal cell and the property boundary areas, and (3) the outlying area.

Disposal Cell—The disposal cell, including the interceptor trench at the top and toe ditch at the bottom (along the downslope edge of the disposal cell), is in excellent condition. The cell and toe ditch are armored with rock. Inspectors found no plant encroachment in rock-armored areas.

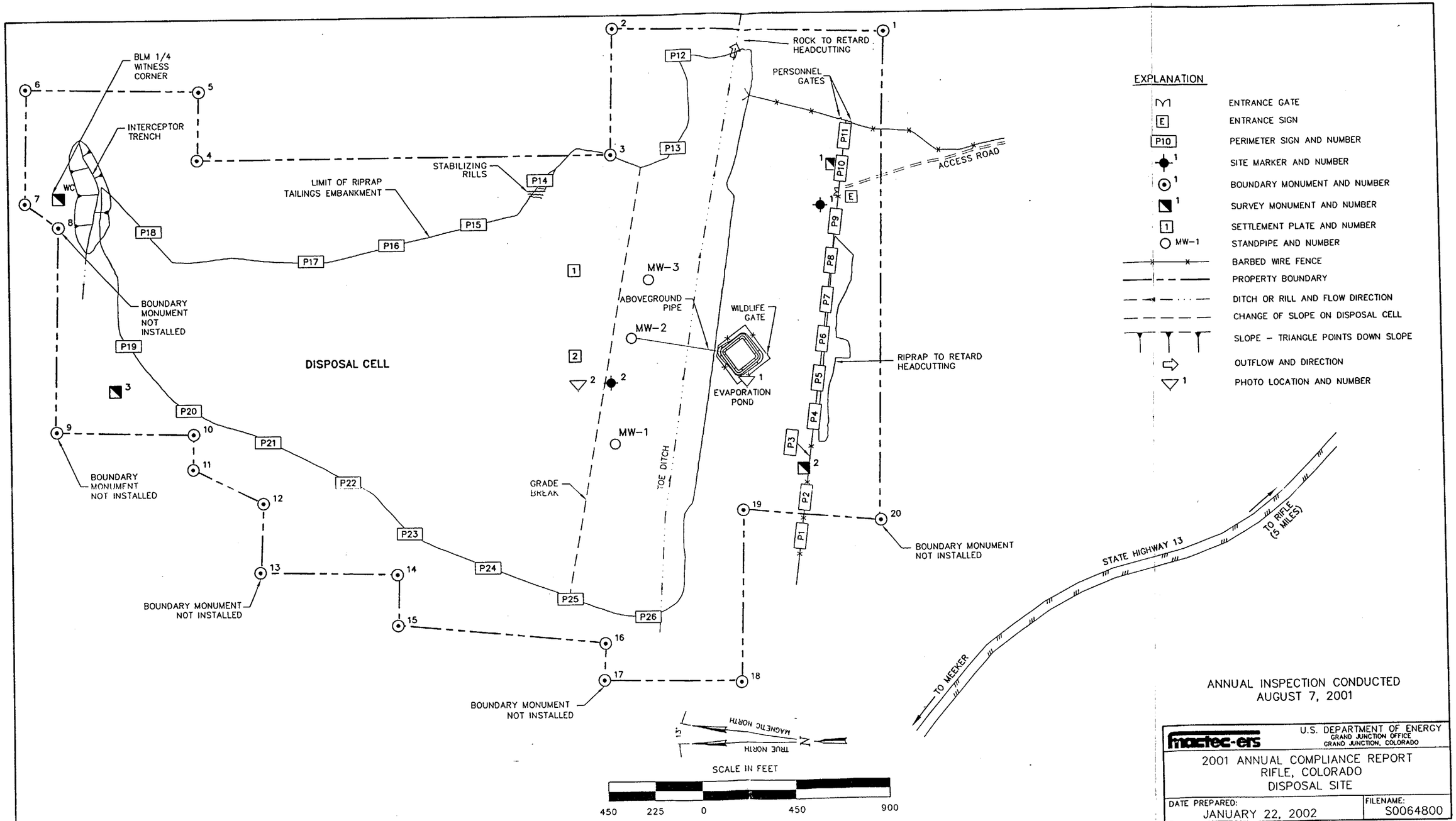


Figure 14–1. 2001 Compliance Drawing for the Rifle, Colorado, Disposal Site

The interceptor trench at the top of the disposal cell was constructed to divert storm water away from the disposal cell and into the ravine on the west side of the site. The trench is not armored with rock. It is designed to erode through shallow colluvium to bedrock, and this is occurring as anticipated.

The toe ditch on the south end of the cell is armored with the same rock that protects the disposal cell. The ditch diverts runoff from the disposal cell off site to the east. As anticipated, erosion is occurring in the channel below the toe ditch outlet. Bedrock is now exposed below the outlet, and rock placed along the bottom of the outlet is dropping to protect the channel from further erosion.

Area Between the Disposal Cell and the Site Boundary—Disturbed areas around the edges of the disposal cell were reseeded in 1996. The vegetation, primarily grasses, is in excellent condition.

Three large arroyos are in the large reclaimed area south of the disposal cell. 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 regraded areas east of the disposal cell are coming to grade and stabilizing with the establishment of vegetation.

14C In August 2001, DOE completed construction of an evaporation pond in the area south of the disposal cell between the disposal cell and stock fence. Photos PL–1 and PL–2 show the pond during construction and upon completion. A submersible pump was installed in standpipe MW–2 and was connected to the evaporation pond by an aboveground, 1-inch-diameter polyethylene pipe. Section 4.0 of this report discusses details of the project.

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

2.0 Follow-Up and Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

DOE replaced the entrance sign in 2001.

4.0 Ground-Water Monitoring

Ground-water monitoring 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 3,800 feet of low-permeability siltstones.

DOE does, however, monitor water levels in the disposal cell at two standpipes: MW–2 and

14C MW–3. Monitoring is conducted to ensure that water within the disposal cell does not rise above an elevation of 6,018 ft. The disposal cell was constructed with a berm or earthen embankment beneath the cover at the southern (downslope) end. A liner extends part way up on the inside of the berm to an elevation of 6,020 ft. 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 of 6,016 feet.

When average water levels (as calculated using linear regression) in MW–2 approached the action level in August 2001, DOE installed a pump in standpipe MW–2, constructed an evaporation pond, and began pumping from the standpipe to the pond. Since then, water levels have slowly dropped 4 to 6 inches. Water level measurements for 2001 are shown on Figure 14–2. The linear regression trend line is superimposed on each hydrograph.

DOE intends to remove approximately one million gallons of water from the cell. This volume is calculated to reduce water levels approximately 2.5 feet. At that time, pumping will be stopped, and water levels will be monitored to ensure they remain at or below the 6,014-ft elevation. If water levels again rise, pumping will resume. DOE will monitor water levels with data loggers 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.

No corrective action was required in 2001.

6.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	290	Construction of Evaporation Pond
PL–2	180	Completed Evaporation Pond

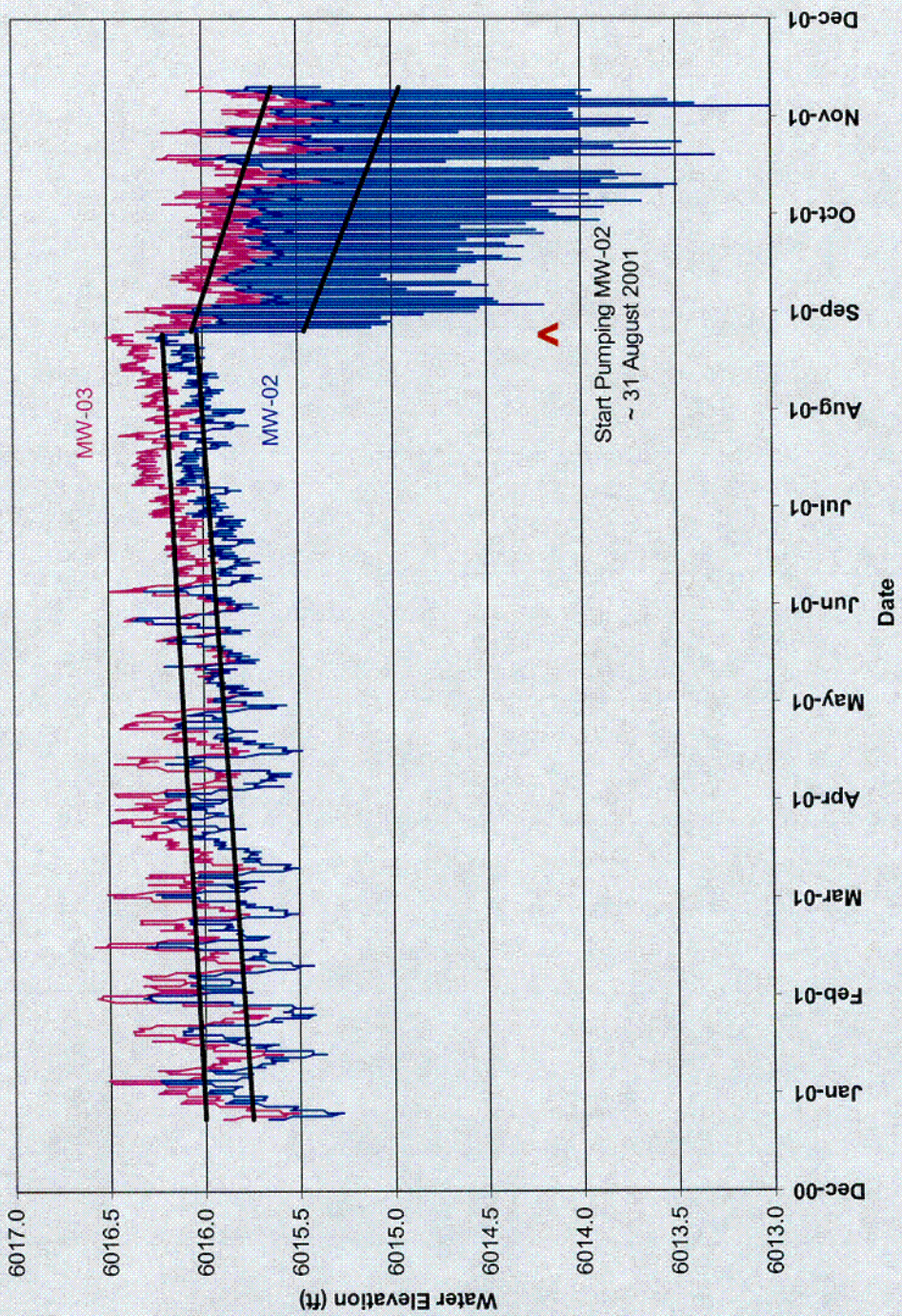


Figure 14–2. Water Levels in Standpipes MW–2 and MW–3 During 2001

C01

PL–1. Construction of Evaporation Pond

PL–2. Completed Evaporation Pond

2001 Annual Compliance Report
Salt Lake City, Utah, Disposal Site

Compliance Summary

The site, inspected on October 22, 2001, was in good condition. Inspectors found that access to the site along the recovered easement had been blocked. During a follow-up inspection, Envirocare of Utah, Inc. (Envirocare), the adjacent landowner, agreed to work with DOE to realign the access route and restore unimpeded access to the disposal site. Twelve faded perimeter signs were replaced. Envirocare will uncover a buried boundary monument. Ground-water monitoring is not required at this site. Inspectors identified no requirement for additional follow-up inspections.

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 Site Inspection and Report

The site, 85 miles west of Salt Lake City, Utah, was inspected on October 22, 2001. Results of the inspection are described below. Features 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

15A **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 and then along a recorded perpetual

easement to DOE property. Envirocare established a restricted haul route along the west and north sides of the disposal site, which blocked the easement. To restore access to the site, Envirocare will provide unimpeded access to the south side of the DOE property and install a new vehicle gate.

The original chain link entrance gate is topped with three strands of barbed wire and is in good condition. The gate is secured by a padlock and chain. The site entrance sign is in satisfactory condition.

15B DOE replaced all perimeter signs on the west, south, and east boundaries because the existing signs were nearly illegible because of fading.

Site Markers and Monuments—Both granite site markers were in excellent condition. Three of
15B the four boundary monuments were found and were in good condition. Boundary monument BM–3 was buried by several feet of fill, but will be uncovered by Envirocare in January 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 belong to Envirocare.

In late 2000, Envirocare informed DOE that all monitor wells on the DOE property were to be abandoned; however, as of December 2001, none of the wells had been abandoned. All 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 called 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.

Inspectors examined each transect for evidence of erosion, settling, slumping, or other phenomena that might affect site integrity or the long-term performance of the site.

Top and Side Slopes of the Disposal Cell—The top and side slopes of the disposal cell are armored with riprap and are in excellent condition. Inspectors found no evidence of settling, slumping, or instability on the side slopes, and no encroachment of vegetation anywhere in this transect.

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.

The security fence is set inside the property boundary by distances of 13 to 114 feet. It is in good condition.

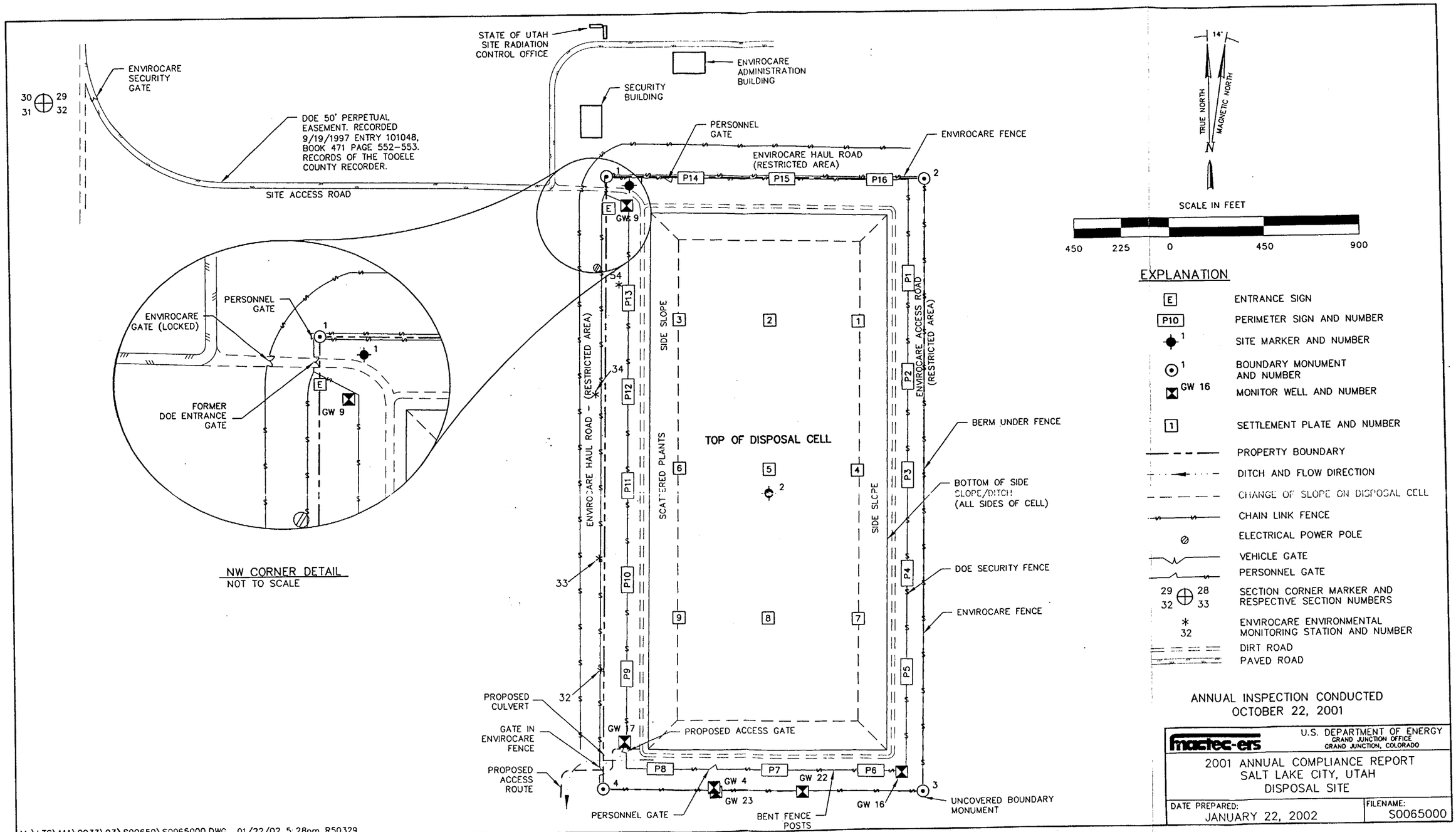


Figure 15–1. 2001 Compliance Drawing for the Salt Lake (South Clive), Utah, Disposal Site

Outlying Area—This transect extends from the Envirocare fence to 0.25 mile beyond the site boundary. Outside the site boundary are a variety of features and activities managed by Envirocare. On the east side of the site, incoming wastes are unloaded from rail cars and transferred to haul trucks. Disposal cells are in the process of being built or closed on the south and west sides of the site. Directly to the south is a low-level radioactive waste disposal cell, 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 constructing a new disposal cell for Class A low level wastes. With the exception of a corridor on the southwest corner of DOE's disposal site where site access will be 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 2001.

3.0 Routine Maintenance and Repairs

15B Many of the perimeter signs were of an older design, with red lettering on a yellow background. Signs P1, P2, P3, P4, P11, and P12 were faded but still legible, whereas signs P5, P6, P7, P8, P9, and P10 were so faded they were no longer legible. All signs were replaced in December 2001.

A section of the security fence between BM–1 and the northern personnel gate was becoming overgrown with greasewood and four-wing saltbush. These will be cut 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, no ground-water monitoring is required by the Long-Term Surveillance Plan. (Envirocare has a monitoring requirement and reports the data to the State of Utah.)

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 2001.

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2001 Annual Compliance Report
Shiprock, New Mexico, Disposal Site

Compliance Summary

The site, inspected on June 20, 2001, was in good condition at the time of the inspection. Vegetation encroachment into the riprap cover continues to be a concern at this site; however, the amount of vegetation present this year was significantly less than in recent years. Annual weeds along the side slopes and cover were sprayed on June 1, 2001. At the time of the inspection, the target species were showing signs of significant damage. Russian thistle (tumbleweed) and trash buildup along the site perimeter fence continues and is an ongoing maintenance issue at this site. Seven wells that are no longer required for monitoring were decommissioned in 2001. A significant rainstorm on July 14, 2001, necessitated a follow-up inspection and repairs to the perimeter fence and the floodplain access gate.

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 Site Inspection and Report

The site, south of Shiprock, New Mexico, was inspected on June 20, 2001. Results of the inspection are described below. Features and photo locations (PLs) mentioned in this report are shown on Figure 16–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

1.1 Specific Site Surveillance Features

16A **Access Road, Fence, Gates, and Signs**—All three entrance 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, E1, E2, E3, and E4, also were in good condition. Access to the main entrance gate is gained by traveling through the gravel pit operated by the Navajo Engineering and Construction Authority (NECA). Previously, NECA allowed DOE to keep a lock on the gate leading through the gravel pit area. The DOE lock has been removed from the gate by NECA; however, NECA officials provided DOE with a key to their padlock for future access.

16B The security fence along the perimeter was examined and found to be in good condition. As noted, tumbleweeds and windblown trash continue to accumulate along certain portions of the site perimeter fence and necessitate removal every 2 to 3 years. Trash and weeds were last removed from the perimeter fence in April 1999. Based upon recent site observations and the June 2001 site inspection, removal of trash and weed accumulations from the site security fence is recommended.

Inspectors noted several locations around the perimeter fence where animals (most likely dogs and coyotes) have crawled beneath the chain link fence fabric or underneath the access gates (PL–1). The openings are sufficiently large to allow access by a small child. Although there is currently no evidence of unauthorized trespass, future inspections should continue to monitor these potential access points for signs of human entry.

Sixteen pairs of perimeter signs (one pictorial sign; one standard sign with text) 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. SMK–1 is just inside the old (west) entrance gate and SMK–2 is on top of the disposal cell. Although there is some minor cracking in the concrete around the base of SMK–1, both markers are in good condition.

16B Due to weed accumulations along the fence lines and the site perimeter, not all boundary monuments could be located during the 2001 inspection. There is no evidence; however, that the monuments have been disturbed or damaged. DOE will verify the locations of all boundary monuments during the 2002 site inspection. All three survey monuments were in good condition.

The four sets of erosion control markers along the terrace, E1/E1A, E2/E2A, E3/E3A, and E5/E5A, were inspected. All markers were in good condition and were not threatened by erosion along the terrace escarpment.

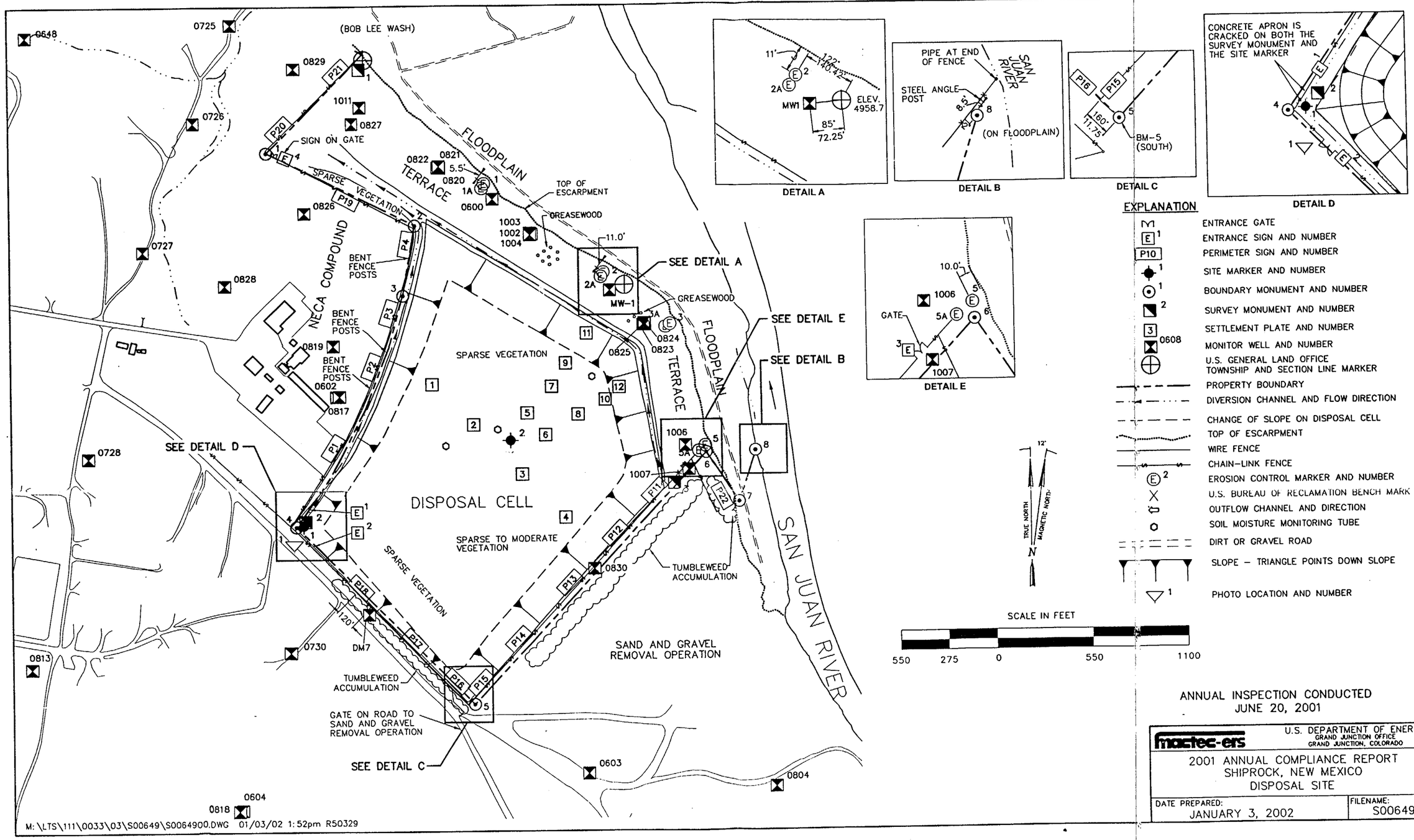


Figure 16–1. 2001 Compliance Drawing for the Shiprock, New Mexico, Disposal Site

Monitor Wells—Ground-water monitoring is not required at this site, so monitor wells are not included in the annual site inspection. Inspectors note the condition of the various wells, however, during the inspection. (The Uranium Mill Tailings Remedial Action Ground Water Project uses many of the wells.)

Monitor wells 1, 0600, 0602 (located on the NECA facility adjacent to the site), and 0603 (located southeast of the disposal cell and adjacent to the gravel pit operations) were in good condition. Monitor well 0821 (located on the terrace escarpment) was unlocked. Inspectors locked the well. The UMTRA Ground Water Project has installed numerous additional monitor wells on the site and in the area as part of the ground water compliance effort for the site.

16C Seven unneeded monitor wells were decommissioned in 2001.

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, diversion channels, and outflow channel; (2) the terrace and site perimeter; and (3) the outlying area, including the fenced borrow-pit area west of the disposal cell and the NECA gravel pit south of the disposal cell.

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

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

16D Significant concentrations of vegetation have been noted during past inspections on the top and the east, northeast, and northwest side slopes. Although vegetation in these areas has been significantly reduced from past years, these areas were sprayed on June 1, 2001 in a continuing effort to reduce seed sources and to control future plant encroachment on the disposal cell. During the 2001 inspection, plant response (i.e., curling, burning, etc.) to the recent herbicide application was evident. In keeping with DOE's commitment to the Navajo Nation, DOE will continue to monitor vegetation growth and apply herbicide to the annual weeds and woody plants as necessary. No new tamarisk plants were observed in this transect.

The diversion channels around the base of the disposal cell (on all sides except the southeast) were in good condition. The quantity of vegetation in the northwest diversion channel was greatly reduced from that observed during previous inspections.

All site drainage is ultimately directed toward the outflow channel at the northeast corner of the site. Rock cover in the outflow channel is in good condition. Sparse vegetation (primarily kochia and Russian thistle) was noted in the outflow channel; however, it is not anticipated that it will affect the channel's performance.

16E DOE completed an investigation of moisture and hydraulic conductivity in the compacted soil layer of the cell cover. Results indicate that this layer is saturated and has variable hydraulic conductivity values, some of which exceed design criteria. DOE is investigating the degree of saturation through the impounded waste as follow-on work.

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.

16A **Outlying Area**—A sand and gravel pit operated by NECA is located immediately southeast of the disposal cell. Gravel is being excavated along the terrace escarpment immediately south of the disposal cell. During the 2001 inspection the situation was basically the same. Investigators were able to navigate to the eastern entrance gate around the large piles of crushed gravel. The monitor well sampling crews that support the UMTRA Ground Water Project also use this entrance.

2.0 Follow-Up or Contingency Inspections

A follow-up inspection was required after a significant storm event that occurred on July 14, 2001.

3.0 Routine Maintenance and Repairs

No maintenance was identified during the 2001 inspection. Control of Russian thistle and tamarisk, and removal of dead Russian thistle from the fence line, will be performed as necessary.

4.0 Nonroutine Maintenance and Repairs

16F The following nonroutine maintenance tasks were performed in late August 2001 due to the storm event of July 14, 2001, that produced approximately 2 inches of precipitation:

- A section of washed-out boundary fence around the disposal site was temporarily repaired to restore site access control;
- The Bob Lee Wash entrance gate to the floodplain had to be moved due to bank erosion; and
- Perimeter fencing for the Bob Lee and Many Devil's Washes was re-established.

DOE will redirect the outflow channel, harden the channel, and make permanent repairs to the fence in 2002.

5.0 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.

6.0 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.

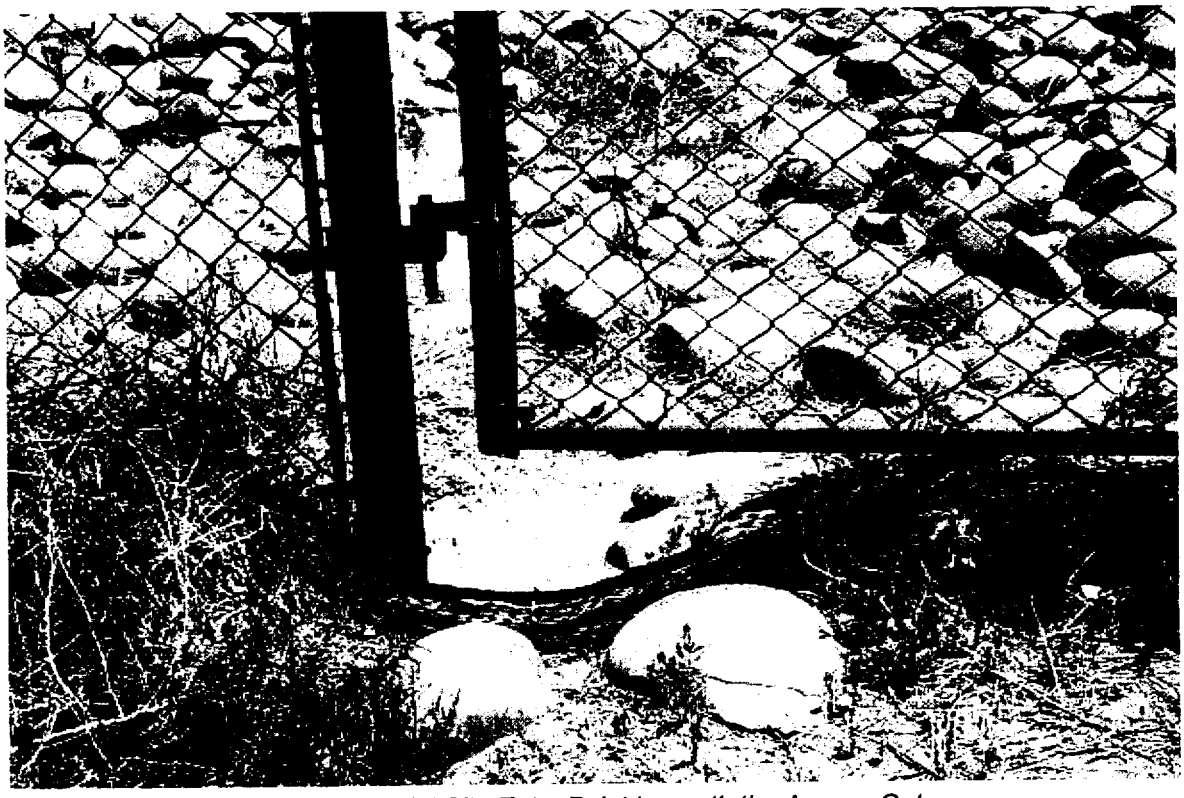
No corrective action was required in 2001.

7.0 Photographs

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

Photograph Location Number	Azimuth	Description
PL–1	50	Potential Site Entry Point beneath the Access Gate

End of current text



PL–1. Potential Site Entry Point beneath the Access Gate

2001 Annual Compliance Report
Slick Rock, Colorado, Disposal Site

Compliance Summary

The site, inspected on July 12, 2001, was in excellent condition. Vegetation around the disposal cell, although somewhat weedy, has become well established, and erosional features noted in previous inspections are continuing to stabilize. A small portion of the wire fence surrounding the cell was repaired during the site inspection. There is no requirement to monitor ground water, so the seven monitor wells at the site were decommissioned. The U.S. Department of Energy (DOE) has fulfilled its obligation to monitor water levels at two standpipes until water levels are at or below an elevation of 5,838 feet for three consecutive quarters. Water levels have been below the 5,838-feet datum since April 1999. Accordingly, both standpipes will be decommissioned when regulator concurrence is received. DOE recountoured and reseeded the spoils pile because slopes were originally left too steep to establish vegetation. Inspectors identified no requirement for additional maintenance or a follow-up inspection.

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, 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 Site Inspection and Report

The site, northeast of Slick Rock, Colorado, was inspected on July 12, 2001. Results of the inspection are described below. Features and photo locations (PLs) mentioned in this report are shown on Figure 17–1. Numbers in the left margin of this report refer to items summarized in the Executive Summary table.

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 is in excellent condition.

17A The entrance gate is a wire gate secured with a chain and a DOE padlock. 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 the fence; the middle two strands are barbed wire. Inspectors noted that the two middle wires were missing in a section of fence near perimeter sign P5. With the exception of this section, the fence and gate were in excellent condition. Inspectors replaced the missing barbed wire strands during the inspection.

The entrance sign, inside the stock fence just east of the entrance gate, is in excellent condition. Thirty-two perimeter signs, designated P1 through P32, are spaced at approximately 200-foot intervals around the site. The signs, attached to steel posts set in concrete, are set 5 feet inside the site boundary. As reported in 1998, 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.

17B **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, installed in the cell during construction, are secure and in good condition.

1.2 Transects

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

Disposal Cell—The top of the disposal cell is roughly pentagonal. Five side slopes descend at a maximum grade of 20 percent. At the base of the side slopes, a rock-filled key trench encircles the disposal cell. The key trench is as much as 5 feet deep and 20 feet wide. South and downslope from the disposal cell, an apron extends for 50 to 200 feet beyond the key trench. All side slopes, the key trench, and the apron are in excellent condition.

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

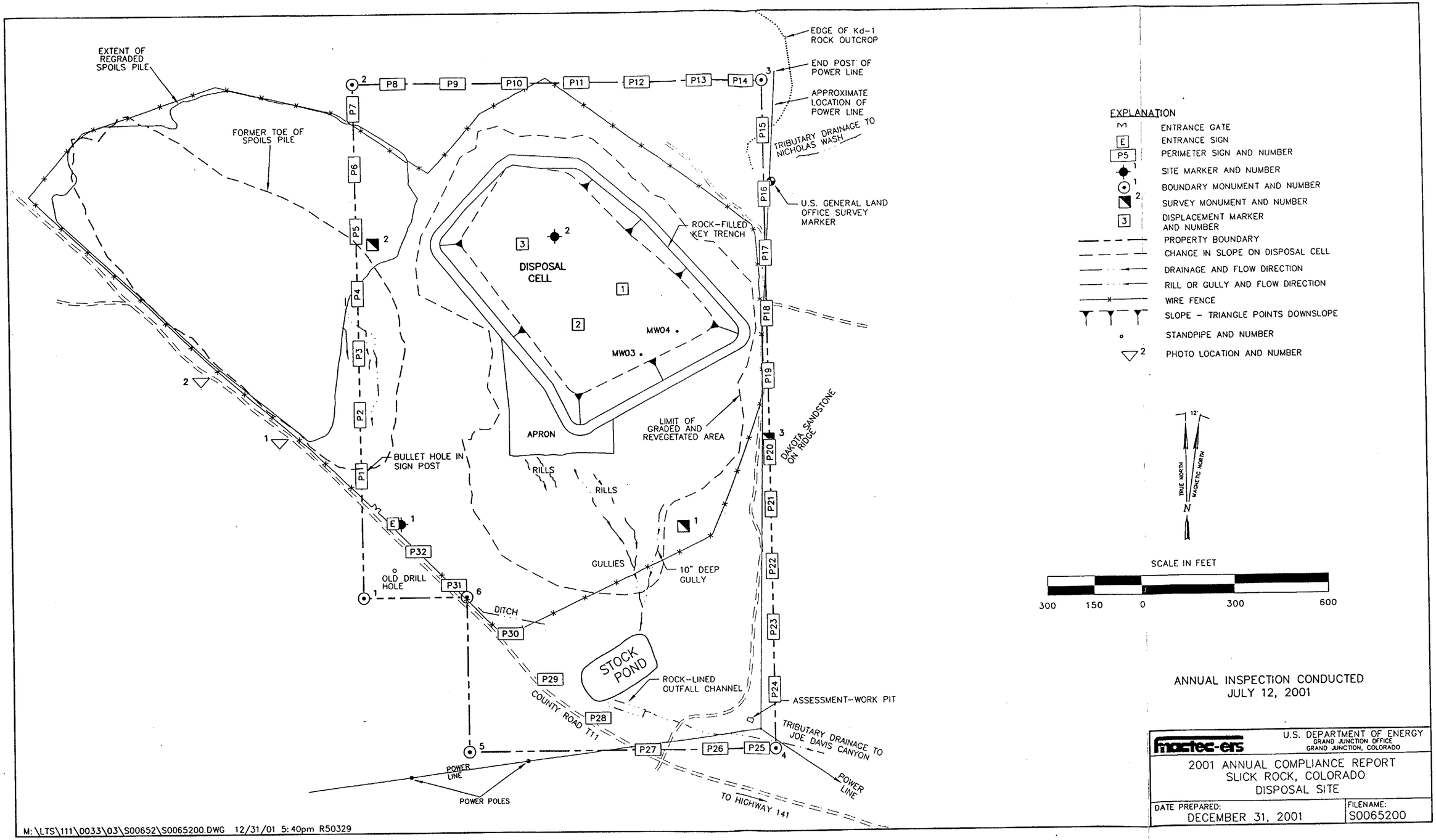


Figure 17–1. 2001 Compliance Drawing for the Slick Rock, Colorado, Disposal Site

Area Between the Disposal Cell and the Site Boundary—The area around the disposal cell includes a stock pond, graded and reseeded areas, and the stock fence that surrounds the site.

Runoff from the disposal cell flows south into the stock pond. Overflow from the stock pond empties into Joe Davis Canyon. The outflow channel below the pond is lined with rounded cobbles for a short distance. The pond, which was dry at the time of the inspection, and the outflow channel were in excellent condition.

17C Reseeded areas had approximately 15 percent cover by four-wing saltbush. The north, west, and southwest sections had a dense understory of Russian thistle and cheatgrass; the east and southeast sections of the reseeded area had an understory of more desirable perennial species such as thickspike wheatgrass, Indian ricegrass, small burnet, sand dropseed, and scarlet globemallow.

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 stabilizing slowly, as indicated by the rounded edges and establishment of vegetation in the bottom of the rills.

Outlying Area—Except for an area immediately south of the site entrance, no new disturbance in outlying areas was noted. This disturbed area south of the site entrance had been used by a geophysical company as a storage/parking area for geophysical equipment. As a result, the area has been denuded of vegetation. The northern one-third of the disturbed area is on DOE-owned land, and the southern two-thirds is on land managed by the U.S. Bureau of Land Management within DOE's right-of-way permit. This disturbance will be discussed with BLM during the on-site right-of-way permit inspection.

17D In September of 2001, the 50-feet-high spoils pile west of the disposal site was recontoured, landscaped, and reseeded (PL–1 and PL–2).

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

DOE performed minor fence repairs in 2001.

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.

17E DOE monitors water levels in two standpipes, MW–03 and MW–04, in the southeastern part of the disposal cell. The standpipes are used to measure the water level in the lowest part of the disposal cell against the possibility that the water level might rise and contaminate two

permeable sandstone beds exposed in the sidewall of the disposal cell. The lowermost of the two sandstone beds, referred to as Kd–1, is at an elevation of 5,838 feet. The upper bed is the Dakota Sandstone formation.

Data from data loggers installed in both standpipes are downloaded quarterly. Water-level measurements began in June 1998 (Figure 17–2). At that time, water levels were less than 1 foot above the 5,838-feet datum. Since then, water levels have dropped below the 5,838-feet datum and are continuing to drop. Most recently, in July 2001, water levels in both standpipes were measured at elevations between 5,835.7 and 5,835.9 ft. (Noise or oscillations in the Figure 17–2 hydrograph result from variations in atmospheric pressure. Breaks in the hydrograph are due to malfunctioning data loggers. New equipment was installed after each failure.)

DOE's obligation, as stated in the Long-Term Surveillance Plan, is to monitor water levels until water levels in both standpipes are continuously at or below the 5,838-feet datum for three consecutive quarters. The hydrograph in Figure 17–2 clearly shows water levels in both standpipes have been below the 5,838-foot datum since April 1999. Therefore, the monitoring requirement is fulfilled, and the project is considered closed out. DOE will decommission the standpipes upon concurrence of the U.S. Nuclear Regulatory Commission.

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 2001.

6.0 Photographs

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

Photograph Location Number	Azmith	Description
PL–1	330	Recontouring of the Spoils Pile in Progress
PL–2	350	Recontoured, Landscaped, and Reseeded Former Spoils Pile

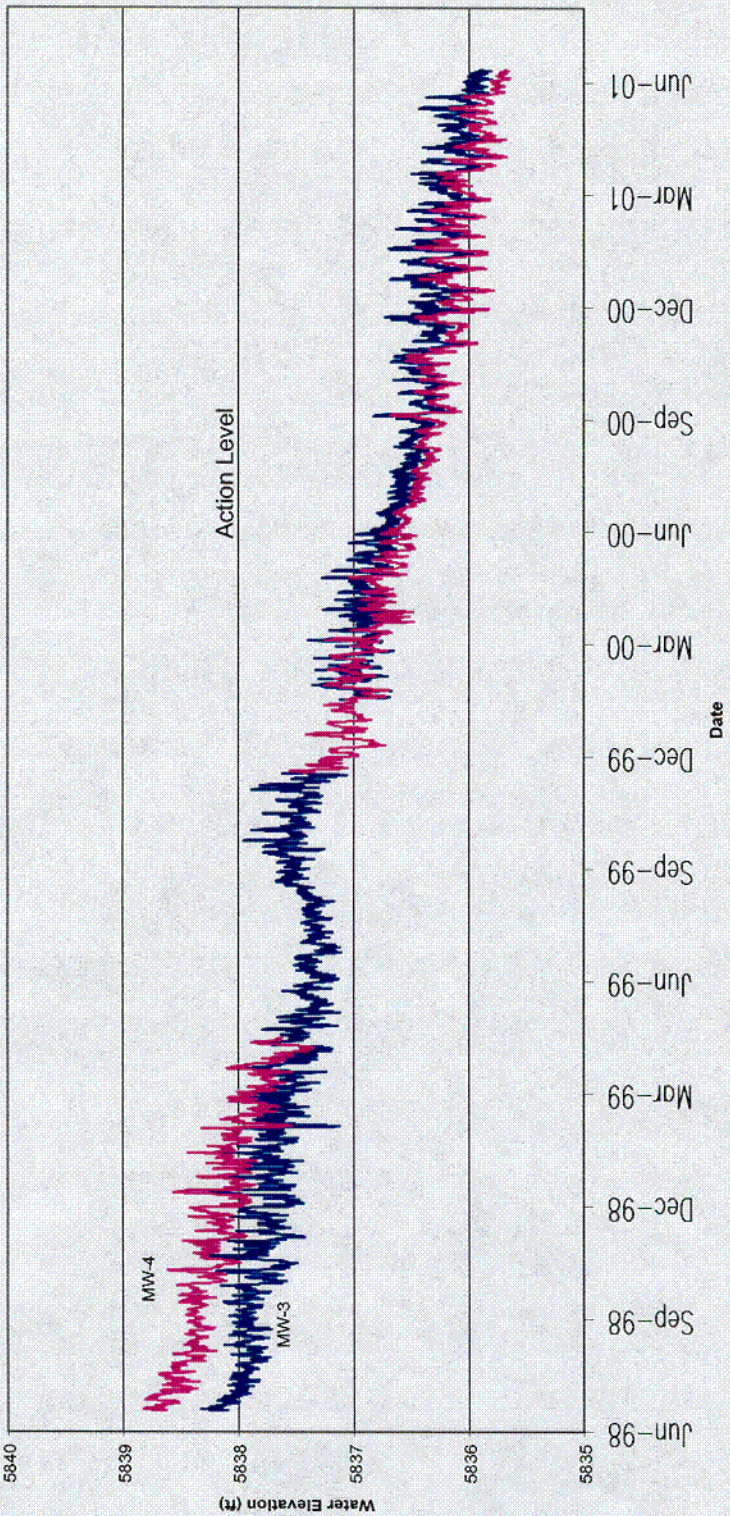


Figure 17–2. Water Levels at MW–03 and MW–04 at the Slick Rock, Colorado, Disposal Cell

C02

PL–1. Recontouring of the Spoils Pile in Progress

PL–2. Recontoured, Landscaped, and Reseeded Former Spoils Pile

PL–1. Recontouring of the Spoils Pile in Progress

PL–2. Recontoured, Landscaped, and Reseeded Former Spoils Pile

2001 Annual Compliance Report
Converse County (Spook), Wyoming, Disposal Site

Compliance Summary

The site, inspected on June 4, 2001, 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. Ground-water monitoring is not required at this site. Inspectors identified no requirements for maintenance or a follow-up 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 Site Inspection and Report

The site, in north central Converse County, Wyoming, was inspected on June 4, 2001. Results of the inspection are described below. Features and photo locations (PLs) mentioned in this report are shown on Figure 18–1.

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 is passable but may be difficult to traverse in wet weather.

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. All signs are in excellent condition.

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

Monitor Wells—Post-remediation ground-water monitoring was never required at this site. All DOE monitor wells (35) and piezometers (2) were decommissioned in compliance with state requirements prior to 2001. An on-site water supply well was not decommissioned. The well and the ground water it intercepts belong to DOE as the current surface landowner, but historically the adjacent landowner, Hornbuckle Ranch, has used the well for irrigation and for watering livestock. DOE is developing an agreement that will establish DOE ownership of the well and provide Hornbuckle Ranch access to the well at no cost or liability to DOE.

1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas called transects: (1) the disposal site, (2) the site boundary, 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 is in excellent condition. There is 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.

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

A power line and three transformers on a platform remain on site for power to the water supply well. Hornbuckle Ranch has historical use of the well, and the ranch and Pacific Power and Light (PP&L) Company have a right-of-way agreement that survives the change of ownership to DOE. DOE contacted PP&L to determine if the transformers contain polychlorinated biphenyls (PCBs). PP&L did not offer a definitive answer because transformer serial numbers were not provided, but indicated that the transformers probably do not contain PCBs.

Site Perimeter—The site perimeter is 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.

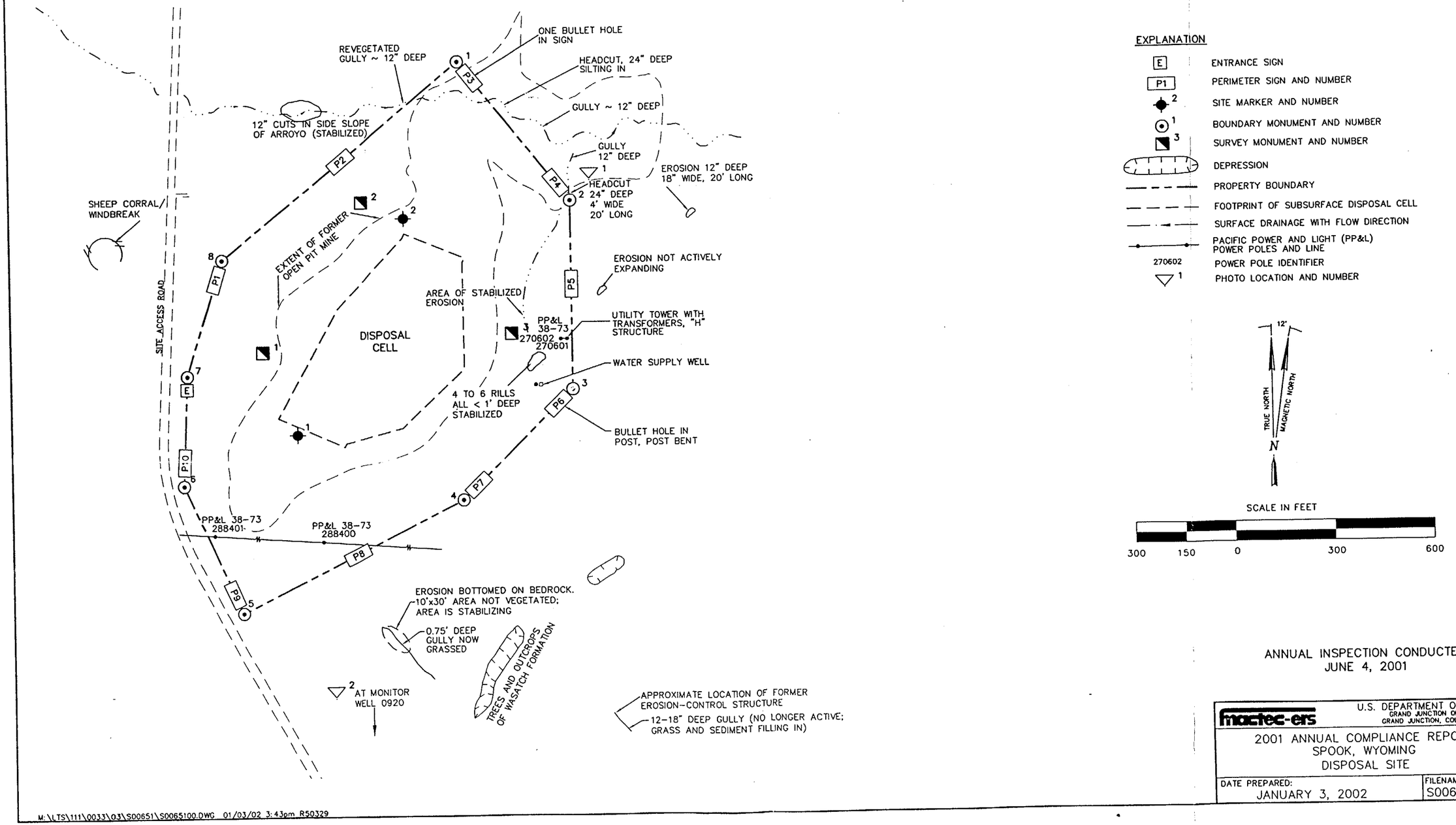


Figure 18–1. 2001 Compliance Drawing for the Spook, Wyoming, Disposal Site

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. A gully near perimeter sign P4 exhibited headcutting (PL–1). This active location and formerly active areas will continue to be monitored.

Decommissioned monitor well locations were inspected. Vegetation is establishing on the disturbed areas and no erosion was observed (PL–2).

2.0 Follow-Up or Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

No maintenance was required in 2001.

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 2001.

6.0 Photographs

Table 18-2. Photographs Taken at the Converse County (Spook), Wyoming, Disposal Site

Photograph Location Number	Azimuth	Description
PL-1	330	Gully Near Perimeter Sign P4
PL-2	180	Restored Location of Former Monitor Well 0920

End of current text

PL-1. Gully Near Perimeter Sign P4

PL-2. Restored Location of Former Monitor Well MW–0920

2001 Annual Compliance Report
Tuba City, Arizona, Disposal Site

Compliance Summary

The site, inspected on September 24, 2001, was in good condition. The areas on the riprap-covered top and side slopes invaded by weedy plants are slowly increasing in size with time, although a significant change from 2000 was not noted. Sand accumulation and plant density on the rock apron along the south toe of the disposal cell and in the drainage ditches appears to be unchanged from last year and does not prevent these features from functioning as designed. The Long-Term Performance Project is evaluating long-term effects of sand accumulation and the plant growth, 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 appears to be progressing. A broken bracket was replaced on the security fence. Results of ground water monitoring show little variation from results reported in 2000. No other maintenance was required, and no requirement was identified for a follow-up 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 Actions	Section 9.0	Section 5.0

Compliance Review

1.0 Annual Site Inspection and Report

The site, east of Tuba City, Arizona, was inspected on September 24, 2001. 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.

19A 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 Plan. These 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 is in excellent condition and secured by a lock.

19B 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. Inspectors noted that a bracket supporting the three strands of barbed wire along the top of the fence in the southeast corner had been broken. This bracket was later replaced and the wire reattached.

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. Some signs have bullet holes or dents, but all are fully legible.

Markers and Monuments—Two granite site markers, one near the entrance gate and the other on top of the disposal cell, are 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. The set back is typically around 10 feet. All monuments are undisturbed and in excellent condition.

Monitor Wells—A myriad of monitor, injection, and extraction wells have been installed on and around this site. Most are associated with UMTRA Ground Water Project ground-water remediation activities and were therefore not included in the annual inspection. The seven wells in the LTSM Program ground-water monitoring network were inspected and are in excellent condition.

1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into three areas called 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 is in excellent condition. Inspectors discovered no evidence of slumping, settling, or instability on the top or side slopes of the disposal cell.

19C Scattered patches of kochia, Russian thistle, and other annual weeds persist on the top and south side slope of the disposal cell. Smaller and fewer patches of these weeds also remain on the west and north side slopes. The number of plants is slowly increasing, encouraged perhaps by deposition of windblown sand and soil. Inspectors continue to monitor changes in plant cover with photographs, which are taken from selected vantage points on an annual basis.

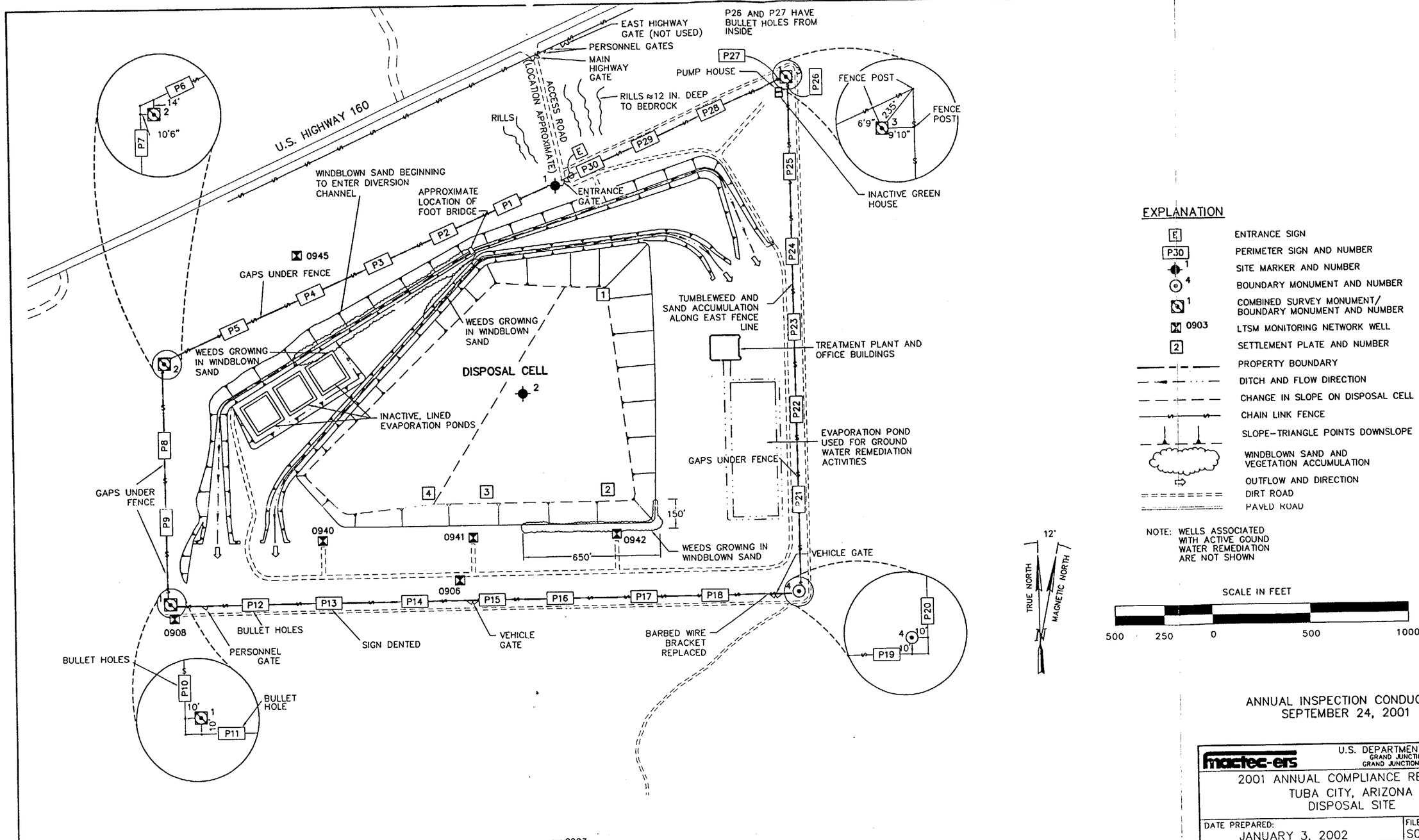


Figure 19–1. 2001 Compliance Drawing for the Tuba City, Arizona, Disposal Site

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 is evaluating 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 that 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 2001 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 remains unchanged since the 2000 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 and Contingency Inspections

No follow-up or contingency inspections were required in 2001.

3.0 Routine Maintenance and Repairs

DOE performed a minor fence repair in 2001.

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.

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)

Results of sampling in 2001 are compared with results from 2000 in Table 19–3.

Molybdenum concentration did not exceed the 0.1 milligram per liter (mg/L) standard in samples from any wells in 2001. Except at well 0906, molybdenum concentrations have not varied significantly in the last 15 years. Samples from well 0906 typically have had higher and more variable molybdenum concentrations than samples from other wells. In 2001, the molybdenum concentration in the sample from well 0906 was an order of magnitude lower than it was in 2000, when it exceeded the maximum concentration limit.

In 2001, 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 2000 and 2001, no significant increases or decreases in concentrations were observed in samples from any wells, although concentrations varied considerably—by more than two orders of magnitude—from well to well.

Consistent with historical data, selenium concentrations exceeded the 0.01 mg/L standard in 2001 in samples from all wells except background well 0945 and off-site, downgradient well 0903.

Table 19–3. 2001 Ground-Water Sampling Results at the Tuba City, Arizona, Disposal Site

Well	Year	Molybdenum MCL = 0.1 mg/L	Nitrate (as NO_3) MCL = 44 mg/L	Selenium MCL = 0.01 mg/L	Uranium MCL = 0.044 mg/L
0903	2000	0.0004[a]	50.800	0.002[a]	0.0026
	2001	0.0008[a]	54	0.002[a]	0.0023
		0.003[a]	54	0.0022[a]	0.0017
0906	2000	0.101	1,960	0.145	0.835
		0.0219	1,460	0.0286	0.916
	2001	0.0216	1,490	0.0198	0.806
		0.003[a]	1,440	0.0196	0.934
0908	2000	0.0004[a]	681	0.0142	0.104
	2001	0.00031[a]	564	0.0136[b]	0.0998
		0.003U	610	0.0169	0.111
0940	2000	0.0024[a]	2,220	0.107	0.588
		0.0053[a]	1,890	0.0939	0.573
	2001	0.0011[a]	2,230	0.118	0.669
		0.003[a]	2,150	0.118	0.643
0941	2000	0.0248	265	0.0182	0.118
		0.0283	319	0.0284	0.134
		0.0582	370	0.0377	0.274
	2001	0.0278	349	0.0278	0.138
		0.0293	353	0.0285	0.141
		0.0244	396	0.0387[b]	0.116
		0.0189	436	0.0827	0.103
0942	2000	0.0272	1,490	0.0344	0.273
		0.0247	1,480	0.0333	0.284
	2001	0.0271	1,410	0.0329	0.281
		0.0206	1,380	0.0725	0.251
0945	2000	0.0014[a]	5.96	0.0015[a]	0.0019
		0.0015[a]	8.3	0.003[a]	0.0027
	2001	0.0018[a]	11	0.0023[a]	0.0025
		0.003[a]	11.1	0.0023[a]	0.0015

Note: All concentrations are expressed in milligrams per liter (mg/L); MCL = maximum concentration limit established in 40 CFR 192, Table 1 of Subpart A.
[a]Undetected or less than the required detection limit.
[b]Spike sample recovery not within control limits.

Selenium values have remained fairly consistent in samples from all wells except 0906 and 0940. In samples from well 0906, selenium concentrations were near or below the 0.01 mg/L standard between 1988 and 1992, after which they consistently exceeded the standard. In samples from well 0940, concentrations increased in the first three sampling events after the well was installed in 1995 and then leveled off.

In 2001, uranium concentrations exceeded the 0.044 mg/L standard in 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. In samples from well 0906, uranium concentrations historically have been high but appear to be decreasing.

Ground-water quality downgradient of the former millsite is degraded with respect to all four of the target analytes except molybdenum, which had a concentration in 2000 that exceeded background but was below the 0.1 mg/L standard) at one downgradient well, 0906. Overall ground-water quality did not change significantly between 2000 and 2001. Ground water contamination remains from historical ore-processing operations at the 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 2001.