

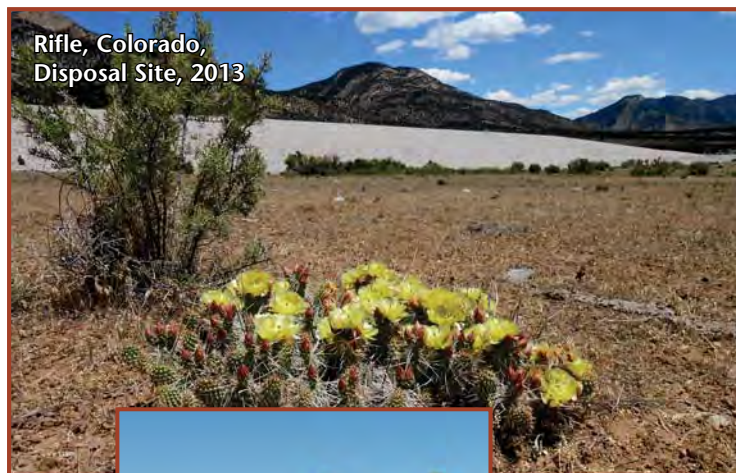


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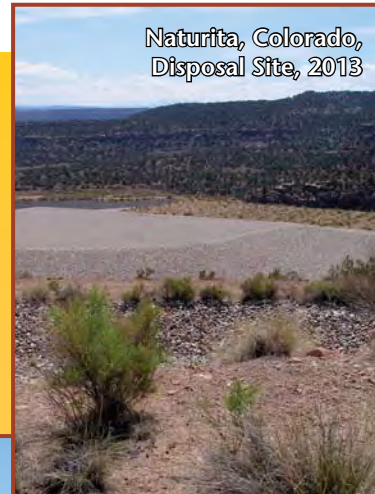
Legacy
Management

2013 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites

March 2014



Rifle, Colorado,
Disposal Site, 2013



Naturita, Colorado,
Disposal Site, 2013



Grand Junction, Colorado,
Disposal Site, 2013



Tuba City, Arizona,
Disposal Site, 2013

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**U.S. Department of Energy
Office of Legacy Management**

**2013 Annual Site Inspection and Monitoring Report
for
Uranium Mill Tailings Radiation Control Act
Title I Disposal Sites**

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Abbreviations

ACL	alternate concentration limit
BLM	U.S. Bureau of Land Management
CFR	<i>Code of Federal Regulations</i>
D ₅₀	mean diameter
DOE	U.S. Department of Energy
EDA	energy dissipation area
EPA	U.S. Environmental Protection Agency
FM	Farm-to-Market Road
GCAP	Groundwater Compliance Action Plan
LM	Office of Legacy Management
LTSP	Long-Term Surveillance Plan
MCL	maximum concentration limit
mg/L	milligrams per liter
NECA	Navajo Engineering and Construction Authority
NMED	New Mexico Environment Department
NRC	U.S. Nuclear Regulatory Commission
PL	photograph location
POC	point-of-compliance
ROW	right-of-way
UBL	upper baseline limit
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978 (88 USC 7901 et seq.)

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Executive Summary

This report, in fulfillment of a license requirement, presents the results of long-term surveillance and maintenance activities conducted by the U.S. Department of Energy (DOE) Office of Legacy Management (LM) in 2013 at 19 uranium mill tailings disposal sites established under Title I of the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978.¹ These activities verified that the UMTRCA Title I disposal sites remain in compliance with license requirements.

DOE operates 18 UMTRCA Title I sites under a general license granted by the U.S. Nuclear Regulatory Commission (NRC) in accordance with Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). As required under the general license, a long-term surveillance plan (LTSP) for each site was prepared by DOE and accepted by NRC. The Grand Junction, Colorado, Disposal Site, one of the 19 Title I sites, will not be included under the general license until the open, operating portion of the cell is closed. The open portion will be closed either when it is filled or in 2023. This site is inspected in accordance with an interim LTSP.

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

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

All of the sites require some degree of routine monitoring and maintenance, which may include groundwater and surface water monitoring, minor erosion control, vegetation control, fence and gate repairs, sign replacement, and minor trash removal. The following nonroutine activities² occurred in 2013:

- Lakeview, Oregon:
 - At the request of NRC, riprap durability monitoring was integrated into the annual gradation monitoring.
- Rifle, Colorado:
 - DOE continues to remove and evaporate pore water from the disposal cell, a task that began in 2001 in response to exceeding the LTSP-required action level.
- Salt Lake City, Utah:
 - Rock riprap quality monitoring.

¹ Congress directed that the Moab, Utah, Processing Site be remediated under Title I of UMTRCA. This site eventually will become the 20th Title I disposal site.

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

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

2013 Summary of UMTRCA Title I Site Actions and Issues

Site	Chapter	Page	Index No.	Actions and Issues
Ambrosia Lake, New Mexico	1	1-6 1-6	1A 1B	Maintenance: deep-rooted shrubs sprayed with herbicide Groundwater monitoring
Burrell, Pennsylvania	2	2-8 2-8	2A 2B	Groundwater monitoring Vegetation management
Canonsburg, Pennsylvania	3	3-7 3-8	3A 3B	Groundwater monitoring Vegetation management
Durango, Colorado	4	4-8 4-8	4A 4B	Maintenance: gap in retention pond fence repaired Groundwater monitoring
Falls City, Texas	5	5-8	5A	Groundwater monitoring
Grand Junction, Colorado	6	6-6 6-6	6A 6B	Maintenance: damaged perimeter sign to be replaced Groundwater monitoring
Green River, Utah	7	7-6	7A	Groundwater monitoring
Gunnison, Colorado	8	8-6	8A	Groundwater monitoring: next scheduled in 2016
Lakeview, Oregon	9	9-6 9-9	9A 9B	Evaluation: riprap gradation and durability monitoring Groundwater monitoring: next scheduled in 2014
Lowman, Idaho	10	10-6	10A	Vegetation monitoring: State-listed noxious weed infestations
Maybell, Colorado	11	11-8 11-8	11A 11B	Maintenance: fence to be repaired Maintenance: perimeter sign to be replaced
Mexican Hat, Utah	12	12-7 12-7	12A 12B	Maintenance: missing radiological sign and warning sign to be replaced Seep monitoring
Naturita, Colorado	13	13-6 13-6 13-6	13A 13B 13C	Maintenance: fence repaired Maintenance: erosion repairs to be performed Groundwater monitoring: next scheduled in 2014
Rifle, Colorado	14	14-8 14-8 14-9	14A 14B 14C	Maintenance: fence repairs to be performed Grazing agreement under consideration Disposal cell pore water monitoring
Salt Lake City, Utah	15	15-6	15A	Riprap degradation monitoring
Shiprock, New Mexico	16	16-7 16-7 16-7	16A 16B 16C	Maintenance: missing sign to be replaced Maintenance: hole in fence to be repaired Maintenance: trash and tumble weed to be removed from fence
Slick Rock, Colorado	17			None
Spook, Wyoming	18	18-5	18A	Maintenance: perimeter sign P10 replaced
Tuba City, Arizona	19	19-6	19A	Groundwater monitoring

1.0 Ambrosia Lake, New Mexico, Disposal Site

1.1 Compliance Summary

The Ambrosia Lake, New Mexico, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on August 21, 2013. The disposal cell was in excellent condition. Deep-rooted shrubs on the disposal cell top slope were treated with herbicide. No other maintenance needs or cause for a follow-up or contingency inspection was identified.

1.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Ambrosia Lake, New Mexico, Disposal Site* (LTSP) (DOE/AL/62350-211, Rev. 1, U.S. Department of Energy [DOE], July 1996) and in procedures that DOE established to comply with the 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 Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 1.4
Follow-Up or Contingency Inspections	Section 7.0	Section 1.5
Maintenance and Repairs	Section 8.0	Section 1.6
Groundwater Monitoring	Section 5.0	Section 1.7
Corrective Action	Section 9.0	Section 1.8

1.3 Institutional Controls

The 288-acre site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1998. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: site markers, survey and boundary monuments, and warning/no-trespassing signs.

1.4 Inspection Results

The site, north of Grants, New Mexico, was inspected on August 21, 2013. R. Johnson and D. Traub of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE office in Grand Junction, Colorado, conducted the inspection. D. Barr, the DOE Office of Legacy Management site manager, attended the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

1.4.1 Site Surveillance Features

Figure 1-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following

subsections. Photographs to support specific observations are identified in the text and in Figure 1-1 by photograph location (PL) numbers.

1.4.1.1 Entrance Gate, Entrance Sign, and Access Road

Access to the site is along a gravel road that crosses private property and leads to the site for approximately 1 mile from New Mexico State Highway 509. There is a locked gate across this road where it leaves Highway 509 because the road continues to private mining and grazing interests that lie east of the site. The gate and access road are privately owned. DOE has been granted permanent access to the site. DOE does not maintain the gate or the access road.

The entrance sign was in good condition (PL-1).

1.4.1.2 Perimeter Signs

The site is not fenced. Seventy perimeter signs, positioned on the site boundary, also were in good condition. Posts for perimeter signs P1 through P15 include mining-restriction-area warning signs.

1.4.1.3 Site Markers

Granite site markers are located near the site entrance and on top of the disposal cell (PL-2). Both site markers were in excellent condition.

1.4.1.4 Survey and Boundary Monuments

Three combined survey and boundary monuments and five additional boundary monuments identify the property corners and boundary. All of the monuments were undisturbed and in good condition.

1.4.1.5 Monitoring Wells

Monitoring wells 0409, 0675, and 0678 were in good condition (PL-3). Gully formation adjacent to monitoring well 0678 appears to be stable, and the well is not impacted by the erosion.

1.4.1.6 Mine Vent

A mine vent shaft, associated with an abandoned underground mine, is within the site boundary in the northern portion of the site. The vent has a casing, which rises approximately 3 feet above the ground, and a spot-welded cover. The vent was secure at the time of the inspection (PL-4). Inspectors will continue to monitor the condition of the vent to ensure that the closure remains secure.

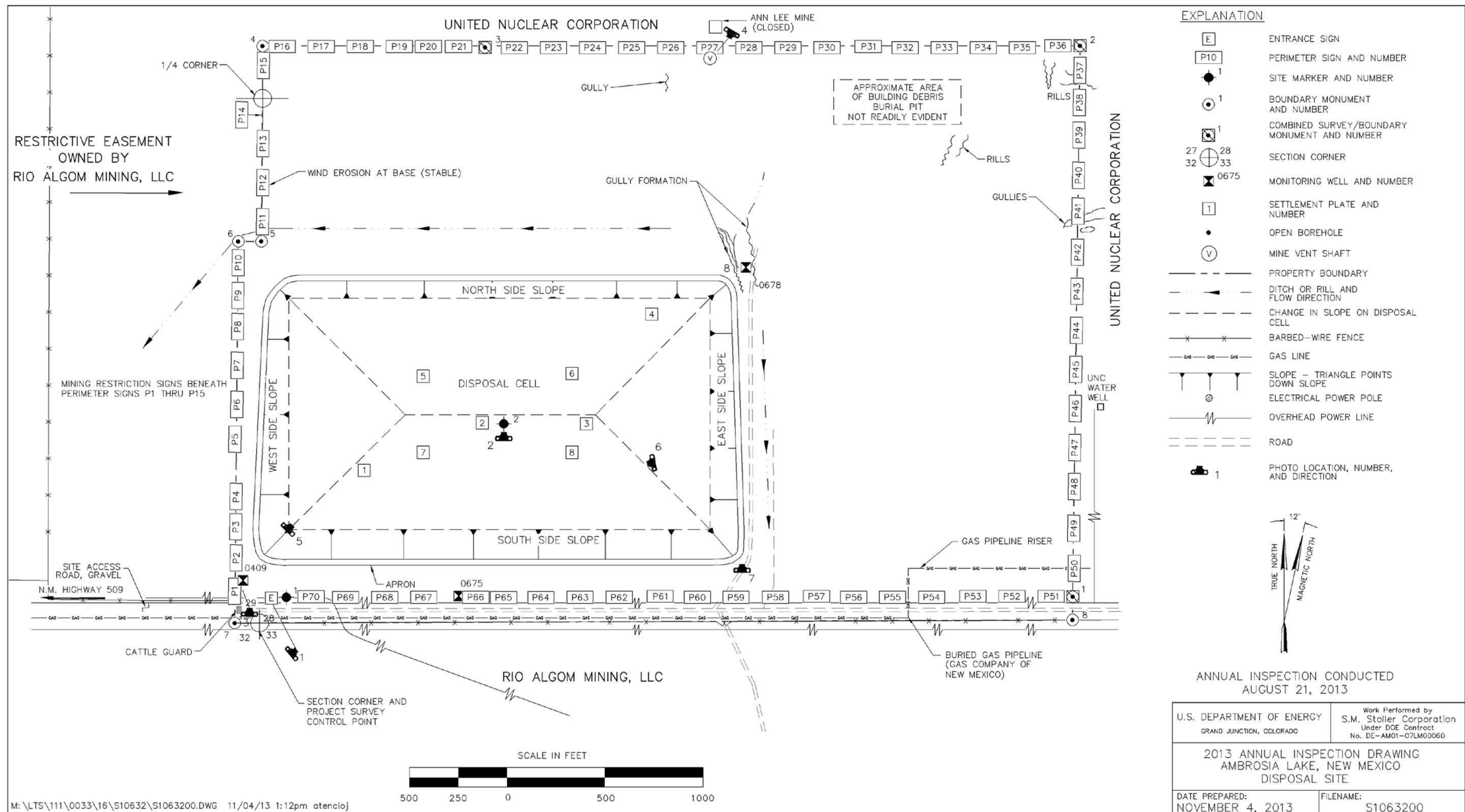


Figure 1-1. 2013 Annual Inspection Drawing for the Ambrosia Lake Disposal Site

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1.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into four inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection: (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 area, inspectors examined specific site surveillance features, such as monitoring wells, boundary monuments, and signs. Inspectors examined each area for evidence of erosion, settling, slumping, or other disturbances that might affect the site’s integrity, protectiveness, or long-term performance.

1.4.2.1 Top of Disposal Cell

The 91-acre disposal cell was completed in 1994. The basalt riprap-covered top slope of the disposal cell was in excellent condition (PL-5). There was no evidence of cracking, slumping, or erosion.

A shallow depression around settlement plate SP-4, near the northeast corner of the disposal cell cover, was first noted during the 1997 inspection and continued to grow in depth and area in subsequent years. The depression was repaired in August 2005. Visual observations during the 2013 inspection indicate that no apparent settlement has occurred since the depression was repaired.

Scattered annual weeds and perennial grasses and forbs are growing on the disposal cell top slope (PL-6). In accordance with the LTSP, deep-rooted shrubs are to be removed from the cell cover. Deep-rooted shrubs were sprayed with herbicide at the time of the inspection.

1.4.2.2 Side Slopes and Apron

The basalt riprap-covered side slopes and apron were in excellent condition and showed no evidence of cracking, settling, slumping, or erosion (PL-7).

1.4.2.3 Graded and Revegetated Area

In general, site vegetation appeared to be healthy. However, some areas are windswept and have little growth, particularly in an area north of the disposal cell where mill tailings had formerly been stockpiled. Revegetation has not progressed sufficiently to sustain grazing.

Rills and gullies within the DOE property north and east of the disposal cell have been monitored for several years. These erosional features do not threaten the disposal cell’s performance or integrity because headward erosion is occurring away from the cell, and there is no significant sedimentation near the cell.

1.4.2.4 Outlying Area

The area within 0.25 mile of the site boundary was inspected. There were no activities in the immediate vicinity that would impact the site.

1.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up or contingency inspections if (1) an annual inspection or other site visit identifies a condition that requires a return to the site to evaluate the condition, or (2) a citizen or outside agency notifies DOE that conditions at the site or in the vicinity of the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

1.6 Maintenance and Repairs

- 1A** Deep-rooted shrubs on the disposal cell top slope were sprayed with herbicide. No other maintenance needs were identified during the inspection.

1.7 Environmental Monitoring

1.7.1 Groundwater Monitoring

- 1B** In accordance with the LTSP, groundwater monitoring is not required at this site because (1) the groundwater is heavily contaminated from underground uranium mining and naturally occurring mineralization, and (2) the uppermost aquifer is of limited use due to its low yield. Consequently, NRC concurred in the application of supplemental standards at the site and the exemption of both compliance and performance groundwater monitoring. However, at the request of the New Mexico Environment Department (NMED), DOE conducts groundwater monitoring as a best management practice.

Monitoring well 0675 is completed in weathered Mancos Shale just below its contact with the overlying alluvium, and monitoring well 0678 is completed in a sandstone unit (Tres Hermanos B unit) of the Mancos Shale. DOE originally agreed to sample these locations once every third year for 30 years; however, annual sampling began in November 2010 at the request of NMED. Monitoring results are provided to NMED and NRC.

DOE installed a new monitoring well (0409) in May 2011 in support of a regional groundwater investigation being conducted by NMED. The well, located on DOE property adjacent to the southwest corner of the disposal cell, is completed in an alluvium-filled paleochannel. The bottom of the well screen is at the contact between the alluvium and sandstone of the Tres Hermanos C unit of the Mancos Shale. The well is dry, which suggests that groundwater is not leaving the southwest portion of the site via alluvium.

1.8 Corrective Action

Corrective action is 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 need for corrective action was identified during the inspection.

1.9 Photographs

Photo Location Number	Azimuth	Photograph Description
PL-1	50	Entrance sign and site marker SMK-1.
PL-2	0	Site marker SMK-2 on disposal cell top.
PL-3	0	Monitoring well 0409.
PL-4	210	Secured mine vent shaft.
PL-5	45	Disposal cell top slope.
PL-6	260	Vegetation on disposal cell top slope.
PL-7	0	Southeast corner apron and east side slope of disposal cell.



AMB 8/2013. PL-1. Entrance sign and site marker SMK-1.



AMB 8/2013. PL-2. Site marker SMK-2 on disposal cell top.



AMB 8/2013. PL-3. Monitoring well 0409.



AMB 8/2013. PL-4. Secured mine vent shaft.



AMB 8/2013. PL-5. Disposal cell top slope.



AMB 8/2013. PL-6. Vegetation on disposal cell top slope.



AMB 8/2013. PL-7. Southeast corner apron and east side slope of disposal cell.

2.0 Burrell, Pennsylvania, Disposal Site

2.1 Compliance Summary

The Burrell, Pennsylvania, Uranium Mill Tailings Radiation control Act (UMTRCA) Title 1 Disposal Site was inspected on December 10, 2013. The inspection was originally scheduled to occur in October. However, the partial government shutdown required that the inspection be rescheduled later in the same calendar year. With the exception of some minor fence damage due to fallen trees, the Burrell site was in excellent condition. No evidence of erosion or slope instability was observed on the disposal cell. No maintenance needs or cause for a follow-up or contingency inspection was identified.

An effective vegetation management program that aligns with requirements in the Long-Term Surveillance Plan (LTSP) remains successful. The continued combination of spot herbicide application and more frequent mowing has greatly reduced the extent of noxious weeds, including teasel, poison hemlock, and common reed. The approach used for control of Japanese knotweed is achieving desired results. The presence of resprouting weeds and rosettes indicates that continued diligence is needed. It is recommended that the spot-spray/mow process continue.

An eco-friendly pilot project for reseeding distressed areas along the southern perimeter fence began in 2009 and continues to be a success. Herbaceous cover in the pilot project area is well established and appears to have reduced reestablishment of noxious weeds following herbicide application. It is recommended that additional seeding be undertaken following herbicide application for noxious weeds sitewide as deemed appropriate.

2.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the U.S. Department of Energy, Burrell Vicinity Property, Blairsville, Pennsylvania*, April 2000 (LTSP) and in procedures that the U.S. Department of Energy (DOE) established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 2-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.3 and 3.4	Section 2.4
Follow-Up Inspections	Section 3.5	Section 2.5
Routine Site Maintenance and Emergency Measures	Section 3.6	Section 2.6
Environmental Monitoring	Section 3.7	Section 2.7
Corrective Action		Section 2.8

2.3 Institutional Controls

The 72-acre site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1994. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: a site marker,

survey and boundary monuments, warning/no-trespassing signs, a site perimeter fence, and locked gates at the site entrances.

2.4 Inspection Results

M. Miller and K. Broberg of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE office in Grand Junction, Colorado, conducted the inspection.

C. Carpenter of the DOE Office of Legacy Management (LM) and M Roberts of NRC also participated in the inspection.

2.4.1 Site Surveillance Features

Figure 2-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and in Figure 2-1 by photograph location (PL) numbers.

2.4.1.1 Entrance Gates, Entrance Signs, and Access Road

Entrance gates were in good condition, and all gates were properly locked. The main gate lock was rusted and difficult to open, and inspectors replaced it with a new LM lock during the inspection. The entrance sign at the front gate was missing, and inspectors attached a new sign during the inspection (PL-1).

An access road leads from Strangford Road, along a DOE right-of-way through the Burrows' property (Tract 201-E) and across DOE's leased crossing over Norfolk Southern Railroad tracks, to the entrance gate in the east end of the chainlink perimeter fence. The access road was easily passable in a sport utility vehicle; however, use of a low-clearance passenger car is not recommended. Slight encroachment of vegetation was observed on the access road.

Local residents historically have used the area along the DOE right-of-way for unpermitted dumping, hunting, target practice, and riding all-terrain vehicles. Personnel associated with commercial interests use the road for access to the railroad tracks and several nearby natural gas wells. Previously, an attempt was made to control access across the right-of-way by maintaining a gate at Strangford Road and installing a guardrail on both sides of the gate. Local residents complained that the guardrail blocked access to parking areas and, consequently, DOE removed several sections. After years of replacing locks and after the gate was damaged beyond repair in 2002, DOE requested NRC concurrence in removing the gate and establishing institutional control for the site at the entrance gate of the perimeter fence. NRC concurred on April 28, 2003, and the gate along Strangford Road was removed in fall 2003.

2.4.1.2 Perimeter Fence and Perimeter Signs

The chain link perimeter fence that encircles the site was replaced in 2007. The fence had minor damage at several locations along the south fence line due to fallen trees (PL-2 thru PL-6).

Several of the fence perimeter signs remain damaged with bullet holes but are serviceable. Bullet holes in the perimeter fence signs were the only evidence of trespass noted during the inspection.

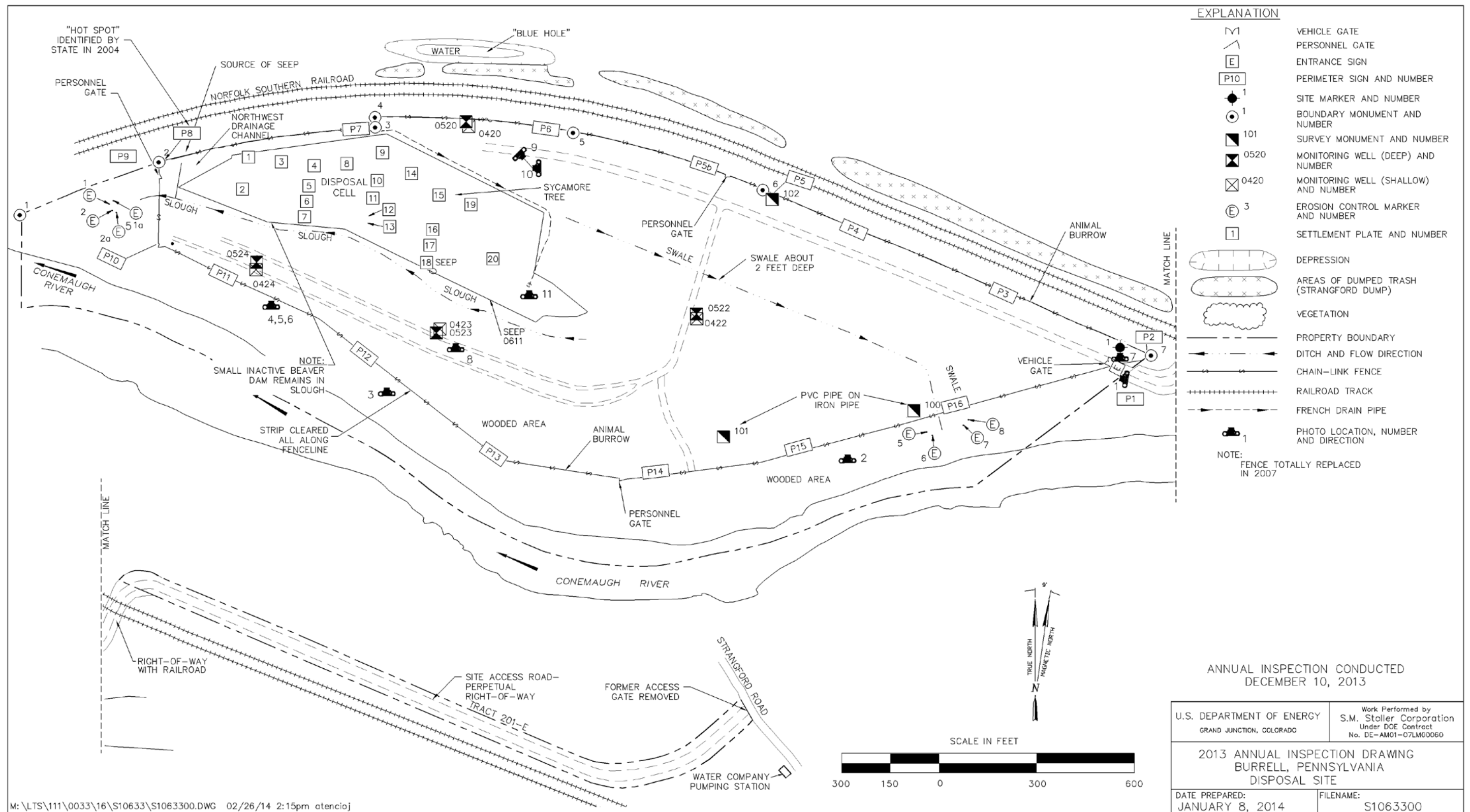


Figure 2-1. 2013 Annual Inspection Drawing for the Burrell Disposal Site

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2.4.1.3 Site Markers

The Burrell site has one site marker. It is located just inside the main entrance gate and was in excellent condition (PL-7).

2.4.1.4 Survey Monuments and Boundary Monuments

There are three survey monuments and seven boundary monuments at the Burrell site. A snowstorm and accumulated snow during the inspection prevented the inspectors from verifying the presence of survey and boundary monuments. Their presence was last verified during the 2012 inspection and a recent Facilities Information Management System (FIMS) site visit.

All three survey monuments (SM-100, SM-101, and SM-102) are located at points on the property that originally afforded a sweeping view of the site during construction. Several years ago inspectors installed tall pieces of white PVC pipe near SM-100 and SM-101 to aid in finding their location. Seven boundary monuments are located along the north perimeter fence.

2.4.1.5 Erosion Control Markers

There are eight erosion control markers at Burrell. A snowstorm and accumulated snow during the inspection prevented the inspectors from verifying the presence of erosion control markers. Their presence was last verified during the 2012 inspection and a recent FIMS site visit.

2.4.1.6 Monitoring Wells

All wells found during the inspection were properly locked (PL-8). The interior of the monitoring wells were not inspected this year. The interiors were last inspected by the water sampling crew in November 2013 and found to be in good shape.

2.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into four inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection: (1) the disposal cell, (2) the area between the disposal cell and site boundary, (3) the site perimeter, and (4) the outlying area.

Within each area, inspectors examined specific site surveillance features, such as monitoring wells, boundary monuments, and signs. Inspectors examined each area for evidence of erosion, settling, slumping, or other disturbances that might affect the site’s integrity, protectiveness, or long-term performance.

2.4.2.1 Disposal Cell

No indications of cell instability were noted by the inspectors (e.g., slumping, bulging, or differential settlement) (PL-9 and PL-10). Rock quality remains good; degradation of the riprap was not evident. No active seeps were found along the south slope of the disposal cell during the inspection.

Vegetation control (including woody vegetation) on the disposal cell is not required for protection of human health and the environment. DOE conducted a screening-level risk

assessment from 1996 to 1997 and determined that plant succession on the disposal cell does not present significant or credible risk to human health or the environment, and evapotranspiration may improve the long-term performance of the disposal cell. NRC suggested that DOE reevaluate the effects of vegetation on cover performance in 10 or 20 years (before 2017) to confirm performance parameters and predictions. A 2008 Vegetation Management Plan prepared for the Burrell site included control of noxious and invasive vegetation on the cell cap to facilitate inspections of the cap. DOE will revisit the issue of vegetation growth on the cell cap within the next 4 years (before 2017). Inspectors will determine if conditions on the cell cap remain protective of human health and the environment as a result of vegetation growth and whether the vegetation interferes with the inspectors' ability to determine cell cap stability.

Trees and large shrubs grow on the top and side slopes of the cell cap. Because of the increasing size of the trees, inspectors are taking circumference measurements of one of the larger trees, a sycamore, during annual inspections. The sycamore is located on the top of the cell cap and had a 14-inch circumference trunk in 2009 and a 16-inch circumference trunk in 2012 (as measured 4.5 feet above the ground). The location of this tree is noted on the inspection map, and the tree is identified with a survey ribbon so that future inspectors can record additional growth.

Although vegetation is allowed to grow on the disposal cell, the cell is sprayed for noxious weeds. Management efforts are effective at limiting the spread of Japanese knotweed, spotted knapweed, and tree of heaven. Other woody species continue to establish, including sycamore, maple, elm, cherry, aspen, and willow. Although control of woody noxious vegetation is progressing well, continued management is recommended. Species requiring control include tree of heaven, amur honeysuckle, and multiflora rose.

2.4.2.2 Area Between the Disposal Cell and Site Boundary

A French drain was installed north of the disposal cell in 1998 to prevent ponding of water next to the cell. The outlet for the French drain is located in the southeast corner of the disposal cell, and was in good condition at the time of the inspection (PL-11).

Inspections dating back to 1998 indicate that prior to installing the French drain, rainwater and snow melt collected off the north side of the disposal cell and entered into a shallow depression along the base of the north slope of the cell. Saturated soil and wetland vegetation (cattails and purple loosestrife) were present in a 3-foot-wide band along this depression. Design drawings indicated that this depression should have drained to the east, but final grading of the area around the northeast corner of the disposal cell left a high spot that prevented drainage from occurring. At the same time that water was ponding just north of the disposal cell, seeps had formed in the south slope of the cell. It was thought that the source of water for these seeps could be the ponded water. The French drain was installed in 1998 to correct this drainage problem, and from the time the drain was installed until the present, no water has been observed flowing from the drain outlet. From 1998 until 2010, no side slope seepage was evident, but in the spring of 2010, a seep was observed on the south side of the disposal cell (Seep 0611). The seep was sampled, and analytical results indicated that none of the constituents in the seep water exceeded maximum concentration limits of constituents listed in 40 CFR 192. Seep 0611 was not flowing during the 2013 inspection.

A small beaver dam remains in the slough south of the disposal cell. The dam appears to remain inactive, as no evidence of recent activity around the dam was observed (e.g., animal tracks, new cuts) during the inspection.

2.4.2.3 Site Perimeter

An active seep is located near the north security fence about 60 feet east of perimeter sign P8 and west of the disposal cell. The seep was flowing during this year's inspection and appeared to have about the same flow as last year. This area will continue to be monitored to determine if the seep poses a threat to the integrity of the disposal cell. Conceivably, the seep could destabilize the nearby railroad embankment. The water for the seep along the fence line appears to be coming from the bluffs north of the railroad tracks.

2.4.2.4 Outlying Area

The area beyond the site boundary was visually examined for signs of erosion, development, and other changes that might affect the site. North of the site, a dirt road parallels the railroad tracks and provides access to a long, narrow wooded area that has been used as an illegal dump in the past. No new fresh piles of trash were observed during the inspection. The dump is not a threat to the disposal site but is an indication of the overall level of activity near the disposal site and may be a predictor of vandalism. For this reason, inspectors will continue to note conditions at the dump.

In 2004, a representative from the Pennsylvania Department of Environmental Protection pointed out to inspectors the presence of a "hot spot" (having gamma radiation levels of 5 millirem per hour) in the rock ballast adjacent to the railroad tracks northeast of perimeter sign P8. After the inspection, DOE checked site records and determined that the area in question was addressed in a Uranium Mill Tailings Remedial Action Project property completion report. Supplemental standards were applied to contamination beneath the tracks because the benefit of removal did not justify the cost, and the contamination did not pose a risk. DOE communicated the results of the records search to the State in late 2004 and discussed the hot spot with State representatives again in 2006. The hot spot is not an area of concern because under current land use the risk is negligible, and land use is stable. The area is marked on the site inspection map for future reference.

2.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No follow-up or contingency inspections were required in 2013.

2.6 Maintenance and Repairs

Routine vegetation management was conducted in 2013 (mowing and herbicide treatments). Nonroutine maintenance or repairs were not required.

2.7 Environmental Monitoring

2.7.1 Groundwater Monitoring

- 2A** In accordance with the LTSP, DOE monitors groundwater at the Burrell site as a best management practice to evaluate the disposal cell's performance. The groundwater monitoring effort consists of eight wells (in four pairs) that are monitored for four target analytes: lead, molybdenum, selenium, and uranium. The revised LTSP stipulates that monitoring be performed every 5 years. DOE last conducted monitoring in 2013. Results for 2013 will be reported in next year's inspection report. The next round of groundwater sampling is scheduled for 2018. Sampling at the Burrell site is coordinated with sampling at the Canonsburg site to improve efficiency and decrease travel costs.

2.7.2 Vegetation Management

- 2B** Vegetation management activities are mostly successful in controlling the extent of invasive species. A combination of spot herbicide application and more frequent mowing is effective, with the exception of purple loosestrife. This species continues to be found in the swale located south and west of the disposal cell and the area between the toe of the north slope of the disposal cell and the French drain. Some additional loosestrife was located east of the disposal cell, in or around the swale that drains to the east. Purple loosestrife is classified as a noxious weed in Pennsylvania.

Other species, such as teasel, poison hemlock, spotted knapweed, and bouncing bet, continue to be controlled. In some areas of heavy infestation, the bare spots left following control resulted in other invasive species moving in. Therefore, it is recommended that seeding activities follow spot herbicide application in areas of heavy infestation. Seeded areas in 2009 and 2010 have established well, and similar mixes can be used to prevent recurrent establishment of noxious weeds.

Wooded areas remained heavily infested with Japanese knotweed. Pursuant to the vegetation management plan, the fence line and access paths remain clear of Japanese knotweed. Additional progress was observed with control of tree of heaven.

As a precautionary measure, a dead sycamore tree in the southwest corner of the fenced area should be felled to prevent it from damaging the perimeter fence.

The spot-spray/mow process across the site should be continued. The vegetation inspection map may be used as a guide for herbicide application, but it is recommended that a complete site walkdown be conducted to ensure adequate coverage. Appropriate seed mix should be broadcast in heavily infested areas following herbicide application.

2.8 Corrective Action

Corrective action is 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 2013.

2.9 Photographs

Photo Location Number	Azimuth	Photograph Description
1	280	Inspectors in front of entrance gate.
2	NA	Tree down on south fence.
3	NA	Tree across southern fence.
4	NA	Damaged fence east of perimeter sign P12.
5	NA	Damaged fence east of perimeter sign P11.
6	NA	Damaged fence east of perimeter sign P11.
7	NA	Inspector at site marker.
8	NA	Inspectors at monitoring well 0423.
9	135	Northeast face of disposal cell.
10	270	Northeast face of disposal cell.
11	NA	French drain outlet.



BUR 12/2013. PL-1. Inspectors in front of entrance gate.



BUR 12/2013. PL-2. Tree down on south fence.



BUR 12/2013. PL-3. Tree across southern fence.



BUR 12/2013. PL-4. Damaged fence east of perimeter sign P12.



BUR 12/2013. PL-5. Damaged fence east of perimeter sign P11.



BUR 12/2013. PL-6. Damaged fence east of perimeter sign P11.



BUR 12/2013. PL-7. Inspector at site marker.



BUR 12/2013. PL-8. Inspectors at monitoring well 0423.



BUR 12/2013. PL-9. Northeast face of disposal cell.



BUR 12/2013. PL-10. Northeast face of disposal cell.

3.0 Canonsburg, Pennsylvania, Disposal Site

3.1 Compliance Summary

The Canonsburg, Pennsylvania, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on December 10, 2013. The 2013 inspection was originally scheduled to occur in October; however, the partial government shutdown required that the inspection be reschedule later in the same calendar year. The Canonsburg site was in excellent condition. No evidence of erosion or slope instability was observed on the disposal cell. No maintenance needs or cause for a follow-up or contingency inspection was identified.

3.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the U.S. Department of Energy Canonsburg Uranium Mill Tailings Disposal Site, Canonsburg, Pennsylvania* (LTSP) (LMS/CAN/S00404-0.0, U.S. Department of Energy [DOE], September 2008) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 3-1 lists these requirements.

Table 3-1. License Requirements for the Canonsburg Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.3	Section 3.4
Follow-Up or Contingency Inspections	Section 3.4	Section 3.5
Maintenance and Repairs	Section 3.5	Section 3.6
Groundwater and Surface Water Monitoring	Section 3.7	Section 3.7
Corrective Action	Section 3.6	Section 3.8

3.3 Institutional Controls

The 34.2-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1996. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: site markers, survey and boundary monuments, warning/no-trespassing signs, a site perimeter fence, and locked gates at the site entrances.

Institutional controls also apply to Area C and former Tract 117, which are southeast of Strabane Avenue. Area C (3.1 acres) was sold and transferred in 2006, and former Tract 117 (0.431 acre) was sold and transferred in 2009; the same private party purchased both. DOE and the Commonwealth of Pennsylvania complied with restrictions on parcel transfers stipulated in UMTRCA and the Cooperative Agreement between DOE and the Commonwealth. The deed for Area C and former Tract 117 establishes restrictions to limit excavation in the areas, prohibits the disturbance of the stream bank, maintains access for monitoring, and prevents the areas from being used for residential purposes.

In 2012 the landowner of Area C and Tract 117 elevated the land surface of both areas through the placement and grading of clean fill material. The elevated land surface is in compliance with institutional controls for the property. DOE owns two groundwater monitoring wells on Area C and Tract 117. The landowner took steps to provide adequate access to the wells and to protect the integrity of the wells by grading the fill in a manner that should not result in surface water pooling around the base of the well pads. Continued adherence to institutional controls will be evaluated during future site inspections.

3.4 Inspection Results

The site, approximately 20 miles southwest of Pittsburgh, Pennsylvania, was inspected on December 10, 2013. M. Miller and K. Broberg of S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE Office of Legacy Management (LM) in Grand Junction, Colorado, conducted the inspection. C. Carpenter of the DOE Office of Legacy Management and M. Roberts of NRC also participated in the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

3.4.1 Site Surveillance Features

Figure 3-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and in Figure 3-1 by photograph location (PL) numbers.

3.4.1.1 Entrance Gates, Entrance Signs, and Access Road

Access to the Canonsburg site is directly off Strabane Avenue. The main entrance gate for the site is located on the southeast corner and was locked. The main entrance sign was in good condition. The main gate lock was replaced with a new LM lock during the site inspection.

3.4.1.2 Perimeter Fence and Perimeter Signs

The security fence was replaced in 2007 and remains in excellent condition, with the exception of the north vehicle gate. The hinge on the north vehicle gate requires minor adjustment (PL-1 and PL-2). A vegetation-free buffer zone is being maintained around the entire site security fence.

An area of erosion under the fence is present along the western edge of the site where the old fence line was located. The area appears to be stable and does not need to be filled in at this time. The area will be checked during future inspections to determine if conditions have changed such as to require some type of maintenance action.

The perimeter security fence has 11 attached signs identifying the site. With the exception of perimeter sign P2, all perimeter signs were in good condition. Perimeter sign P2 is held in place with zip-ties, and covers a small hole in the fence where the original P2 perimeter sign was stolen in 2011.

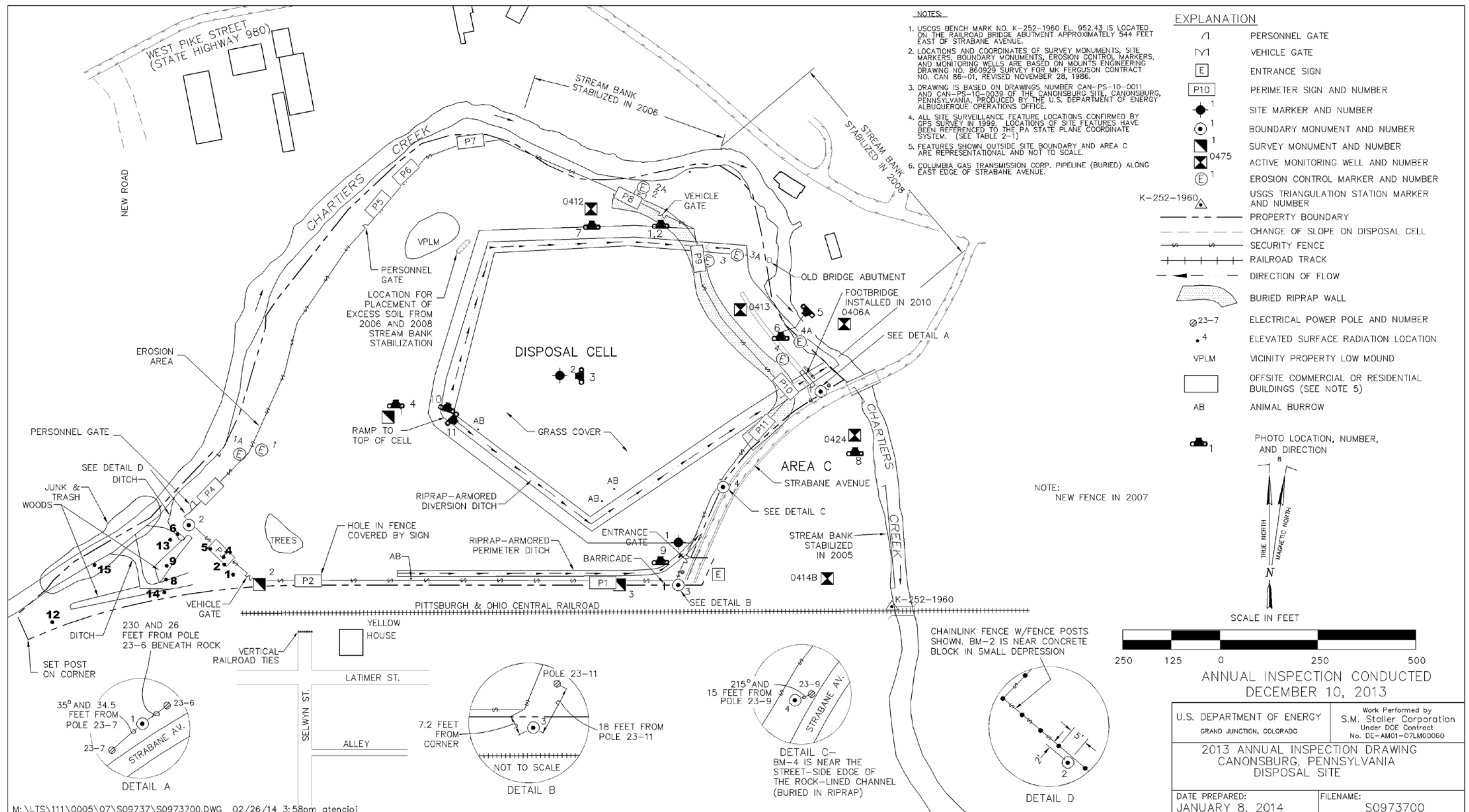


Figure 3-1. 2013 Annual Inspection Drawing for the Canonsburg Disposal Site

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3.4.1.3 Site Markers

The site has two site markers. Both site markers were in good condition (PL-3).

3.4.1.4 Survey Monuments and Boundary Monuments

The site has three survey monuments and four boundary monuments. Survey monument SM-1 was in good condition (PL-4). Snow cover limited verification of other survey and boundary monuments during this inspection. They were verified during the 2012 inspection and also during a recent Facilities Information Management System site visit.

3.4.1.5 Erosion Control Markers

The site has four pairs of erosion control markers; all were in good condition (PL-5 and PL-6).

3.4.1.6 Monitoring Wells

The site has five groundwater monitoring wells—0406A, 0412, 0413, 0414B, and 0424, which are inspected when the wells are sampled.

All monitoring wells were observed to be properly locked during the inspection (PL-7 and PL-8).

3.4.2 Inspection Areas

To ensure a thorough and efficient inspection, inspectors divided the site into five inspection areas (referred to as “transects” in the LTSP): (1) the disposal cell; (2) the grass-covered area surrounding the disposal cell; (3) the diversion channels and perimeter ditches; (4) the site perimeter; and (5) the outlying area.

Within each inspection area, inspectors examined specific site surveillance features, drainage structures, vegetation, and other features. Inspectors also looked for evidence of settlement, erosion, or other modifying processes that might affect site integrity or long-term performance.

3.4.2.1 Disposal Cell

The grass-covered disposal cell was in excellent condition (PL-9). No evidence of erosion or slope instability was observed during the inspection.

Animal burrows occur on the cell cover. Because the buried tailings are overlain by a 36-inch-thick clay layer (radon barrier), an 18-inch-thick rock layer, and a 12-inch-thick topsoil layer, biointrusion down to or through the radon barrier is unlikely. Therefore, such burrows should not pose a risk to cell integrity or public health. Inspectors will continue to monitor the location and significance of burrows each year. Some new burrows were noted on the cell during the 2013 inspection but were not considered to be large enough to identify on the inspection map.

3.4.2.2 Grass-Covered Area Surrounding the Disposal Cell

The Canonsburg site consists primarily of mowed grasses within the perimeter fence and on the disposal cell cap, with seeded fescues and crown vetch present across the site. The “spray and

mow” approach to vegetation management at the site continues to be effective. Noxious weeds within the fenced area are limited to re-sprouting seedlings, which were observed in portions of mowed areas.

A small pedestrian footbridge was installed northeast of the disposal cell in 2010. The footbridge was in excellent condition.

3.4.2.3 Diversion Channels and Perimeter ditches

Rock in the engineered channels and ditches surrounding the disposal cell was in good condition. Rock deterioration does not appear to be a problem. Future inspections will look at rock conditions within the diversion ditch, and indications of poor rock durability will be noted. No indications of poor rock durability were noted in 2013.

No woody vegetation in the channels and ditches was observed (PL-10 and PL-11). Physical removal and spot herbicide applications have been effective at reducing woody vegetation.

3.4.2.4 Site Perimeter

Chartiers Creek is an active, meandering waterway that is only partially restrained on the east end of the disposal site. The creek is slowly cutting into the bank and has required several stream bank stabilization projects.

- **2001:** The Chartiers Creek bank along Area C was reconstructed to stop slumping.
- **2004:** Inspectors found that floodwater had caused erosion damage to the stream bank. Approximately 100 feet of reconstructed stream bank was damaged downstream from the Strabane Avenue Bridge, and 200 feet was damaged upstream from the railroad bridge. Floodwater cut laterally into the bank as much as 6 feet in places. Floodwater scoured behind the riprap and fabric in places. DOE notified NRC, performed a follow-up inspection of the damage, and developed recommendations for creek bank repair along Area C. NRC concurred in the recommendations, and repair work was performed in April 2005.
- **2005:** DOE restored the creek bank profile along Area C by filling scoured areas with riprap. Shrub and forb seed was broadcast to further stabilize the bank with vegetation.
- **2006:** The area between perimeter signs P7 and P8 was stabilized.
- **2008:** The area between perimeter sign P8 and Strabane Avenue Bridge was stabilized. The stabilization work consisted of cutting back the slope of the creek bank and armoring the toe with riprap keyed into bedrock. The riprap was underlain by a geotextile fabric. Above the riprap the slope was protected by stabilization matting and planting of live fascines.
- **2009:** Reseeding and installation of about 40 large (>2-inch caliper) sapling trees took place within the area that was regraded in 2008. Seven patches of trees were installed, consisting of oak, maple, and birch species. All trees were mulched and staked, and disturbed areas were reseeded. The trees were installed under a third party LM grant in conjunction with the 2008 bank stabilization project.
- **2010:** A footbridge was constructed across the riprap-lined diversion ditch to provide safe pedestrian access to the planted area.

The stream bank west of the perimeter fence appears to remain in a stable condition. Bedrock outcrops and mature trees indicate that the bank is stable.

3.4.2.5 Outlying Area

The landowner of Area C and Tract 117 has elevated the ground surface of both areas through the placement and grading of clean fill material. Placement and grading of the fill does not violate land use restrictions.

DOE has two groundwater monitoring wells on Area C and Tract 117 (MW-0424 and MW-0414B, respectively) that are part of the groundwater-monitoring network. DOE ensured ongoing access to these wells through the sale agreements. The private property owner has done a good job of maintaining access to the wells and grading the land surface so that surface water will not collect and pool around the well pads.

3.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

3.6 Maintenance and Repairs

Routine vegetation management was conducted in 2013 (mowing and herbicide treatments). Nonroutine maintenance or repairs were not required.

3.7 Environmental Monitoring

3.7.1 Groundwater Monitoring

3A DOE monitors groundwater and surface water at the Canonsburg site to comply with the requirements in the revised LTSP. The revised LTSP combines the objectives of both the original LTSP (issued in 1995) and the *Ground Water Compliance Action Plan and Application for Alternate Concentration Limits for the Canonsburg, Pennsylvania, UMTRA Project Site* (U0035901, DOE, February 2000; GCAP). Monitoring prescribed in the original LTSP was a best management practice because NRC determined that cell performance monitoring to ensure compliance with remedial actions discussed in Subpart A of 40 CFR 192 was not required since the disposal cell's design was adequate to provide long-term protection of human health and the environment. The GCAP required monitoring for a period of no less than 5 years (through 2004) and up to 30 years (through 2029, which is the estimated time for any contamination present to naturally attenuate). This monitoring period was established to ensure compliance with Subpart B of 40 CFR 192, which applies to contamination related to legacy uranium-processing sites. The Subpart B protection strategy is no remediation in conjunction with the application of an alternate concentration limit for uranium.

In 2012 DOE evaluated the groundwater and surface water monitoring program as required by the revised LTSP. The assessment recommended that following the collection of samples in

2011, the frequency of monitoring be reduced from annually to once every 5 years, for cell performance purposes. DOE received NRC approval for the sampling change in 2012.

Groundwater and surface water sampling was conducted in November 2013. Results for this sampling event will be included in the 2014 Annual Report.

3.7.2 Vegetation Monitoring

3B

An effective vegetation management program that aligns with requirements in the LTSP remains successful. Inspectors continued to use discussions with site maintenance personnel during the inspections to provide lesson learned opportunities to improve the efficiency and effectiveness of site maintenance activities.

The spray-and-mow approach to vegetation management continues to be effective. Noxious weeds within the fenced area are limited to re-sprouting seedlings, which were observed in portions of mowed areas.

Tree of heaven (an invasive tree) has been identified at the site and is being effectively treated for eradication from the site. Because re-sprouts have been observed, continued control of this species and the multiflora rose is recommended, using a basal application of Garlon 4A.

Physical removal and spot herbicide applications have been effective at reducing woody vegetation in the channels and ditches.

3.8 Corrective Action

Corrective action is 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 2013.

3.9 Photographs

Photo Location Number	Azimuth	Photograph Description
PL-1	NA	Damage to vehicle gate near perimeter sign P8.
PL-2	NA	Damage to vehicle gate near perimeter sign P8.
PL-3	270	Inspectors at site marker on cell cap.
PL-4	NA	Survey monument SM-1.
PL-5	225	Erosion control marker 4B.
PL-6	NA	Erosion control marker 4A.
PL-7	NA	Monitoring well 0412.
PL-8	NA	Monitoring well 0412.
PL-9	360	Southeast side of disposal cell.
PL-10	20	Riprap-armored diversion ditch on southwest side of disposal cell.
PL-11	135	Riprap-armored diversion ditch on northwest side of disposal cell.



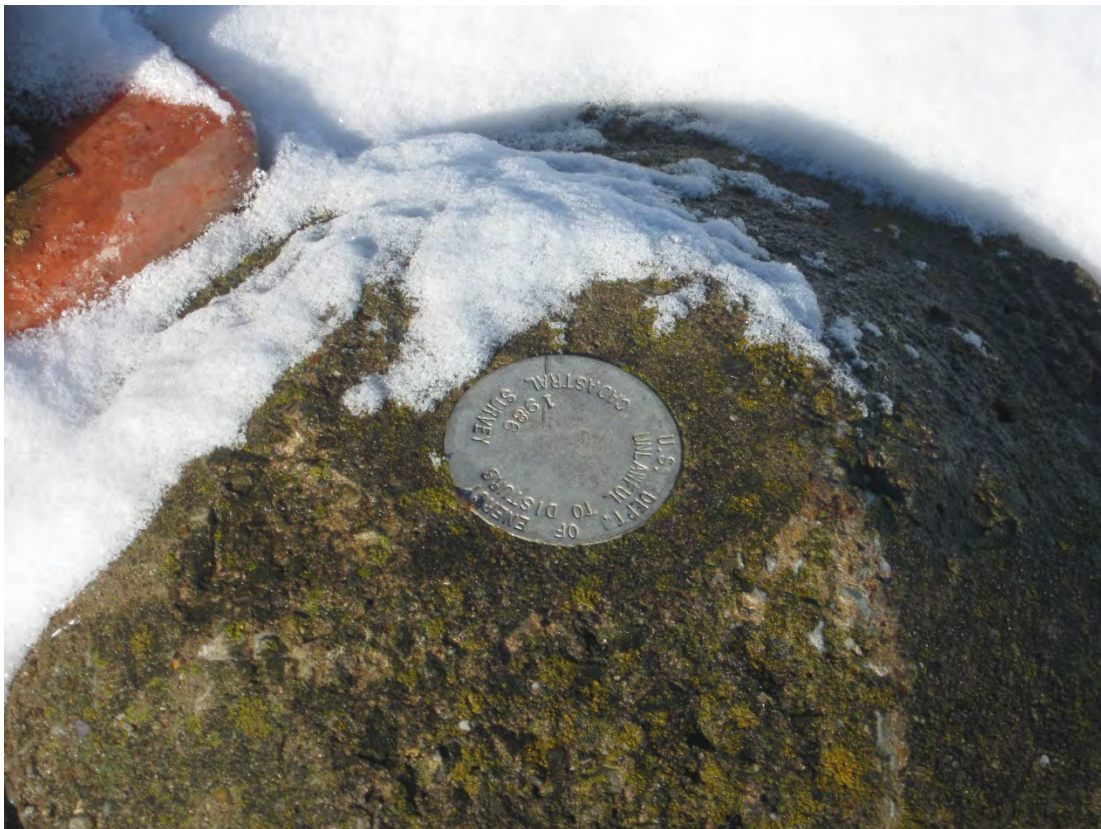
CAN 10/2013. PL-1. Damage to vehicle gate near perimeter sign P8.



CAN 10/2013. PL-2. Damage to vehicle gate near perimeter sign P8.



CAN 10/2013. PL-3. Inspectors at site marker on cell cap.



CAN 10/2013. PL-4. Survey monument SM-1.



CAN 10/2013. PL-5. Erosion control marker 4B.



CAN 10/2013. PL-6. Erosion control marker 4A.



CAN 10/2013. PL-7. Monitoring well 0412.



CAN 10/2013. PL-8. Monitoring well 0412.



CAN 10/2013. PL-9. Southeast side of disposal cell.



CAN 10/2013. PL-10. Riprap-armored diversion ditch on southwest side of disposal cell.



CAN 10/2013. PL-11. Riprap-armored diversion ditch on northwest side of disposal cell.

4.0 Durango, Colorado, Disposal Site

4.1 Compliance Summary

The Durango, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site, inspected on May 21, 2013, was in excellent condition. Vegetation on top of the disposal cell remains healthy, and the top and side slopes remain relatively free of deep-rooted species. A gap in the retention pond fence was repaired. No additional maintenance needs or cause for a follow-up or contingency inspection was identified.

The transient drainage system from the cell has been closed since November 2011. The water level in the retention pond is low. Decommissioning of the retention pond has been delayed, pending an evaluation of uranium concentrations in groundwater from one of the downgradient wells.

In October 2010, the permeable reactive barrier treatment system, buried in the area east of the retention pond, was decommissioned and removed. Revegetation of this area is proceeding successfully, and sediment-control structures continue to prevent offsite sediment discharges.

4.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Durango Disposal Site, Durango, Colorado* (LTSP) (LMS/DUD/S06297-0.0, U.S. Department of Energy [DOE], January 2011) and procedures that DOE established to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 4-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 4.4
Follow-Up or Contingency Inspections	Section 7.0	Section 4.5
Maintenance and Repairs	Section 8.0	Section 4.6
Groundwater Monitoring	Section 5.0	Section 4.7
Corrective Action	Section 5.0	Section 4.8

4.3 Institutional Controls

The 121-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1996. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: site markers, survey and boundary monuments, warning/no-trespassing signs, and a locked gate at the site entrance.

4.4 Inspection Results

The site, southwest of Durango, Colorado, was inspected on May 21, 2013. C. Gauthier, L. Sheader, and D. Depinho of the S.M. Stoller Corporation, the Legacy Management Support

contractor for the DOE office in Grand Junction, Colorado, conducted the inspection. J. Dayvault of the DOE Office of Legacy Management and M. Cosby of Colorado Department of Public Health and Environment attended the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

4.4.1 Site Surveillance Features

Figure 4-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and in Figure 4-1 by photograph location (PL) numbers.

4.4.1.1 Entrance Gates, Entrance Signs, and Access Road

The entrance gate along County Road 212 was locked and in good condition. The older, original entrance gate was locked and in good condition, and the entrance sign was present and in good condition (PL-1).

4.4.1.2 Perimeter Fence and Perimeter Signs

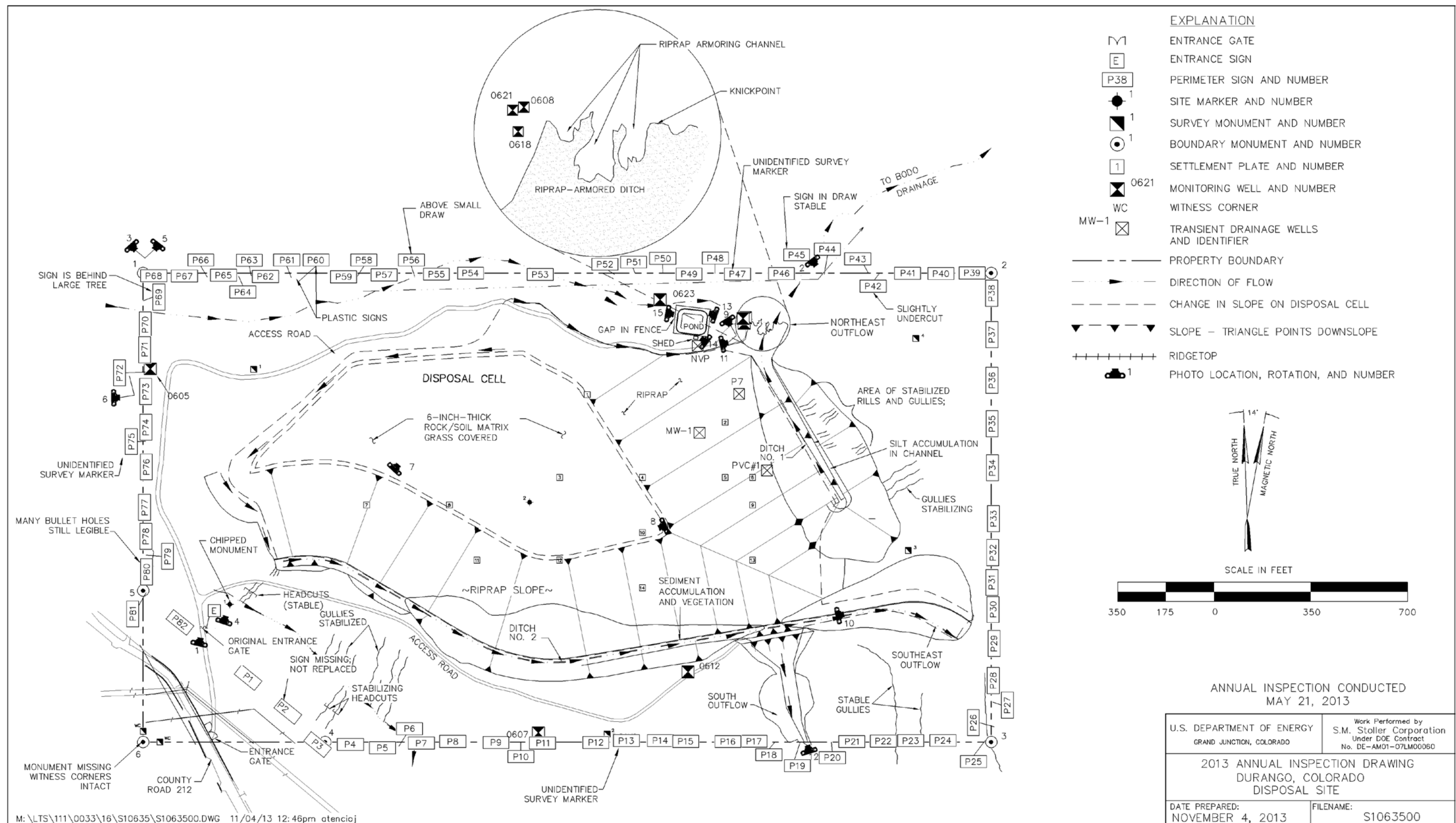
The site is unfenced. Eighty-one perimeter signs mark the site boundary.

Numerous perimeter signs have bullet holes or other markings but remain legible. Perimeter sign P2 has been missing for several years and will not be replaced, as adjacent signs are within sight. In previous years, inspectors noted that the base of perimeter sign P45 was being undercut by erosion; the sign remains stable (PL-2).

Many of the perimeter signs are difficult to find amid the pine trees, thick oak brush, and steep drainages (PL-3). Inspectors used GPS to locate the perimeter signs. All of the perimeter signs were visually located except sign P43 which the inspectors missed in the thick brush. The sign was found during the 2012 inspection; therefore, inspectors did not back track to visually verify.

4.4.1.3 Site Markers

Site marker SMK-1 historically has been superficially pocked from gunfire but has remained legible. During the 2012 inspection inspectors discovered that an additional chip along the bottom edge of the marker had fallen off; however, the information on the face of the marker remains legible, and no new damage was observed (PL-4). SMK-2 remains in excellent condition.



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4.4.1.4 Survey and Boundary Monuments

All survey and boundary monuments are in excellent condition (PL-5) except for BM-3, BM-4, and BM-6, which remain in the same condition as in previous years. Boundary monument BM-3 and two of its reference monuments are situated in a small gully and were threatened by erosion in the past; however, the monuments are now stable. One of the reference monuments for BM-4 has been bent to the ground, and the cap has been removed, but BM-4 is intact. No repair of any of these features is warranted. Boundary monument BM-6 was destroyed prior to the 2004 inspection during construction of a pipeline near the site. It was decided not to replace it because both of its witness corners are present and remain in good condition.

4.4.1.5 Monitoring Wells

Monitoring wells specified in the LTSP (0605, 0607, 0608, 0612, 0618, 0621 and 0623) were locked and in excellent condition (PL-6).

4.4.2 Inspection Areas

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

Within each inspection area, inspectors examined specific site surveillance features, drainage structures, vegetation, and other features. Inspectors also looked for evidence of settlement, erosion, or other modifying processes that might affect site integrity or long-term performance.

4.4.2.1 Top of Disposal Cell

The top of the disposal cell is in excellent condition. Settling, slumping, and erosion were not observed (PL-7).

Vegetation on top of the cell remains healthy, and no deep-rooted species were observed. The LTSP states, “Woody plants and other unwanted plant species may be eliminated from the cover by selective spraying or mechanical removal. Based on a root-to-shoot ratio of 1.0 to 1.0, an unwanted plant species must be removed when its shoot height equals or exceeds 3.5 feet (1.1 meters) from the base of the plant.” Although the aboveground height of dryland alfalfa (*Medicago sativa*) will never exceed the 3.5-foot criterion listed in the LTSP, it is known to be a deep-rooted plant; therefore, this species is also controlled on the disposal cell cover.

Small animal burrows historically have been present in an area southeast of site marker SMK-2. No new burrows were observed during the 2013 inspection.

4.4.2.2 Side Slopes of 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 (PL-8).

In the past, woody species have become established on the cell's side slopes. Once they reach 3 feet in height, they are removed or treated with herbicide. At the time of the 2013 inspection, no woody species over 3 feet in height were observed.

4.4.2.3 Drainage Ditches

Rock-armored drainage ditches are constructed beneath the toe of the side slope on the northwest, south, and east sides of the disposal cell. These ditches direct runoff into natural drainages that carry storm water away from the disposal site. The ditches have sufficient depth and rock protection to carry runoff from a probable maximum precipitation (PMP) event. Erosion and mass wasting occurred in the past on some of the steep slopes above these channels. The eroded sediment was deposited in the rock-armored channel, creating locales favoring plant growth. The sediment deposits and vegetation will not compromise the drainage ditches' performance in a PMP event. Should sediment deposits or excessive vegetation dam a drainage ditch so as to impound water, the deposits or vegetation will be removed. Inspectors saw no evidence of recent accumulations of sediment or vegetation in the ditches (PL-9, PL-10).

The riprap-covered outflow of Ditch No. 1 (PL-11) was designed to erode back to a rock-filled trench and self-armor in the process. The knickpoint was mapped with GPS in 1999. Significant movement of the knickpoint has not occurred since then, and mapping will not be performed again until a change is noted.

The southeast and south outflows spill into steep, natural channels that are also monitored annually. The channels at these locations are armored by riprap and bedrock. Both outflow channels were stable and in good condition at the time of the 2013 inspection (PL-12).

4.4.2.4 Retention Pond Area

The retention pond contains precipitation and transient drainage water from the disposal cell. Because the water level in the disposal cell has dropped, the transient drainage water is no longer being drained to the retention pond. The drain valve has remained closed since November 2011. The water currently in the pond is low and therefore is not being pumped out and dispersed through drip lines onto the pond side slopes to enhance evaporation (PL-13). If precipitation increases the water level, the pumps will be turned on. The pond and evaporation system were planned to be decommissioned in 2008, but decommissioning has been delayed until the source of elevated uranium concentrations in a downgradient well can be determined.

In October 2010, the permeable reactive barrier treatment system, buried in the area east of the retention pond, was decommissioned and removed. Vegetation has established in disturbed areas, and they are considered to be successfully reclaimed.

Animal burrows were noticed near the shed that houses the transient drainage system instrumentation (PL-14). Because of the proximity to the retention pond, these animal burrows will be monitored, and if the burrows pose a threat to the pond integrity, action will be taken to protect the pond.

A chainlink fence surrounds the retention pond. Inspectors found a gap under the fence on the west side (PL-15). The gap was repaired after the inspection.

4.4.2.5 Site Boundary

The site is not fenced. Six boundary monuments and 81 perimeter signs delineate the boundary, with one exception. In the southwest corner of the site, perimeter signs “shortcut” the corner because DOE had originally intended to transfer the corner land parcel to the Colorado Division of Wildlife. Upon further consideration, however, DOE did not transfer the parcel. Hence, the actual boundary of the site is southwest of the perimeter signs on the opposite side of the county road. Before the guardrail and gate along County Road 212 were installed, the public used the area between the county road and the original entrance gate quite heavily. Since installation of the guardrail, use of this area has been minimal except for the destruction and theft of perimeter signs.

Historical rill and gully erosion on the south-facing slope along the southern boundary of the site is stable for the most part. Establishment of vegetation and exposure of resistant bedrock in the gullies are effectively preventing further erosion in most of the gullies. Inspectors noted fresh headcuts in two gullies in the southwest portion of the site in 2006. No noticeable movement in the headcuts has been observed since then, and the gullies appear to be stabilizing with rock and vegetation. These erosional features do not threaten cell integrity but will continue to be inspected.

Two gullies on the north-facing slope, just north of perimeter sign P3 along the southern boundary of the site, appeared to be actively headcutting in 2004. The headcuts, which were approximately 2.5 feet deep at the time of the 2004 visit, have been monitored each year during the annual inspections. No new headcutting has been noted since then. These headcuts do not threaten the cell.

Erosion rills have been noted on the west-facing hillside east of Ditch No. 1 since construction of the disposal site. Inspectors have considered these rills stable since approximately 2000, as most of them now contain perennial vegetation. The hillside appeared stable at the time of the 2013 inspection.

Deeper gullies (1 to 3 feet deep) in the southeast corner of the disposal site appeared to be active in 2008. This area was examined during the 2010 and 2011 inspections, and no new erosion was found. Natural drainages on the steep hillside were vegetated, contained plant litter and rock, and appeared stable. Inspectors will continue to monitor the drainages, although they pose no threat to the integrity of the disposal cell.

4.4.2.6 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. Adjacent land uses primarily include wildlife habitat and recreation. The Colorado Division of Wildlife manages land to the north, west, and east of the site, and the U.S. Bureau of Reclamation manages land to the south. The U.S. Bureau of Reclamation has completed construction of the Animas-La Plata Project, and the reservoir (Lake Nighthorse) is now filled with water. A water intake and pumping plant structure are located at the Animas River on the site of the former raffinate ponds. A pipeline associated with the project is adjacent to County Road 212 and passes just south of the disposal site. Mountain bikers and other recreationists commonly use County Road 212.

4.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

4.6 Maintenance and Repairs

- 4A A gap in the retention pond fence was repaired on July 2, 2013.

4.7 Environmental Monitoring

4.7.1 Groundwater Monitoring

- 4B In accordance with the LTSP, groundwater is monitored at the site to verify the initial performance of the disposal cell. The monitoring network consists of seven wells (Table 4-2 and Figure 4-1). Four wells are completed in the uppermost aquifer (bedrock of the Cliff House Sandstone and the Menefee Formation), including one upgradient background well (0605) and three downgradient point-of-compliance (POC) wells (0607, 0612, and 0621). Three wells are completed in the alluvium, one upgradient (0623) and one downgradient (0608) of the disposal cell. The third alluvial well, monitoring well 0618 (screened to the bottom of the alluvial aquifer), was installed adjacent to well 0608 (screened to 10 feet above the base of the alluvial aquifer) and added to the monitoring network in 2002 as a best management practice, because it intercepts the full, saturated thickness of the alluvial aquifer.

Table 4-2. Groundwater Monitoring Network at the Durango Disposal Site

Monitoring Well	Well Compliance Type	Hydrologic Relationship
0605	Background	Upgradient (uppermost aquifer)
0607	Point-of-Compliance	Downgradient (uppermost aquifer)
0612	Point-of-Compliance	Downgradient (uppermost aquifer)
0621	Point-of-Compliance	Downgradient (uppermost aquifer)
0623	Background	Upgradient (alluvial aquifer)
0608	Best Management Practice	Downgradient (alluvial aquifer)
0618	Best Management Practice	Downgradient (alluvial aquifer)

Groundwater samples are collected annually and analyzed for three indicator parameters: molybdenum, selenium, and uranium. The site-specific standards used for the three indicator parameters are the respective maximum observed background concentrations reported in groundwater samples collected from wells completed in the bedrock aquifer as identified in Table 5-4 of the LTSP. These site-specific standards are provided below in Table 4-3.

*Table 4-3. Site-Specific Groundwater Standards for the Durango Disposal Site,
Based on Background*

Constituent	Standard (mg/L)
Molybdenum	0.22
Selenium	0.042
Uranium	0.077

mg/L = milligram per liter

Note: Site-specific groundwater standards represent the maximum observed background concentrations reported in samples collected from wells completed in the bedrock aquifer (LTSP, Table 5-4).

Uranium, molybdenum, and selenium concentrations in the POC wells in the uppermost aquifer are well below the respective standards, and the site is in compliance with the LTSP.

Though not required for compliance, wells completed in the alluvial aquifer are also monitored. Uranium concentrations in well 0618 have consistently been higher than concentrations in the other wells onsite. To monitor the increased uranium observed in well 0618, wells 0608, 0618, and 0621 have been increased to monthly sampling as weather permits. Uranium concentrations in monitoring well 0618 had increased until 2009 when the well was redeveloped and the purging method and pump materials were evaluated, resulting in a decrease in concentration (0.044 milligram per liter [mg/L]) observed in May 2010. Uranium concentrations rebounded and continued to increase with a peak of 0.235 mg/L in September 2012. Uranium concentrations in well 0618 have decreased since September 2012, but still have an increasing trend overall. Because well 0618 is not a POC well and is not screened in the uppermost aquifer, the concentrations in this well do not affect compliance with the LTSP and do not pose a risk to human health and the environment. However, the potential cause of this increase is being investigated.

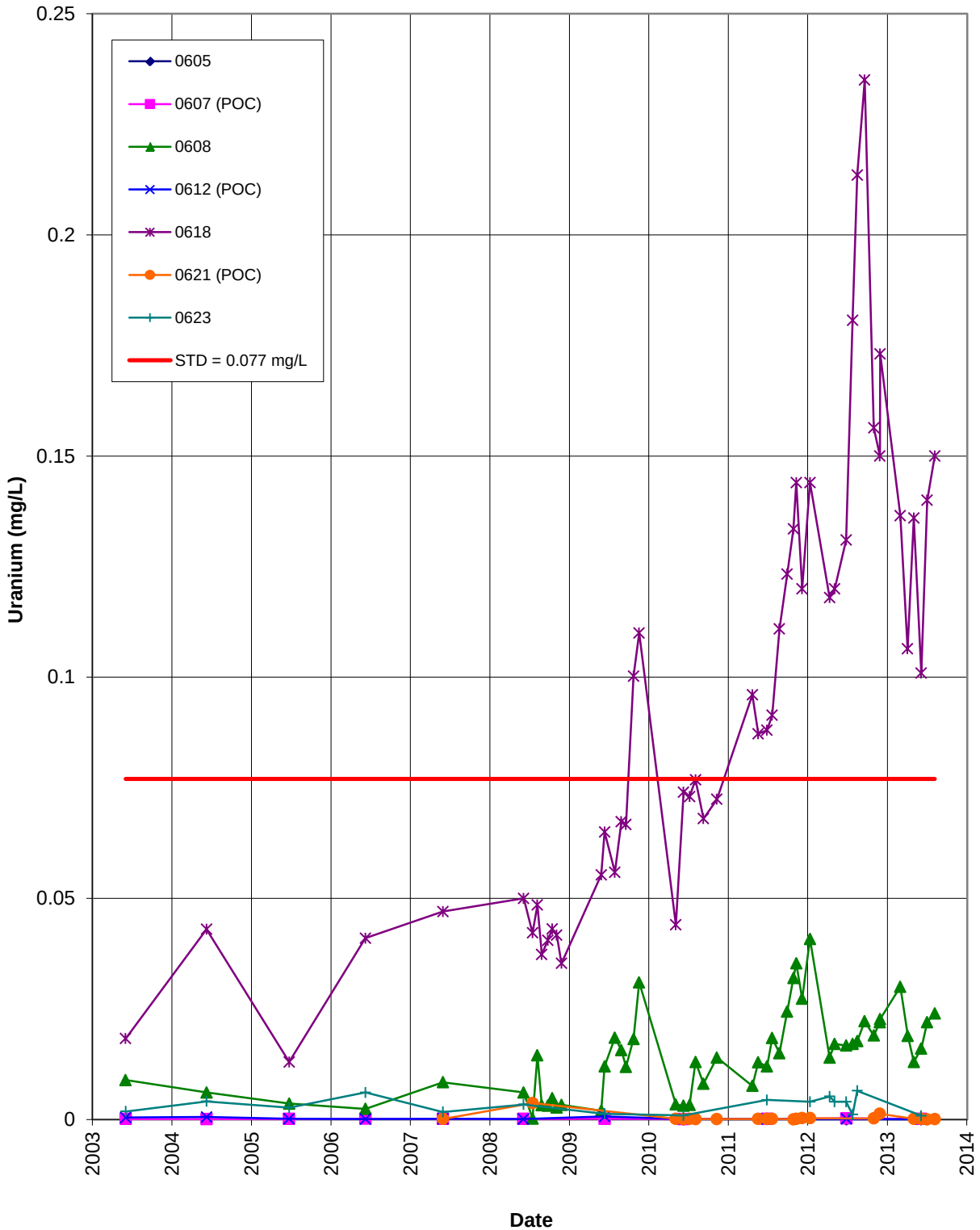


Figure 4-2. Time-Concentration Plot of Uranium in Groundwater at the Durango Disposal Site

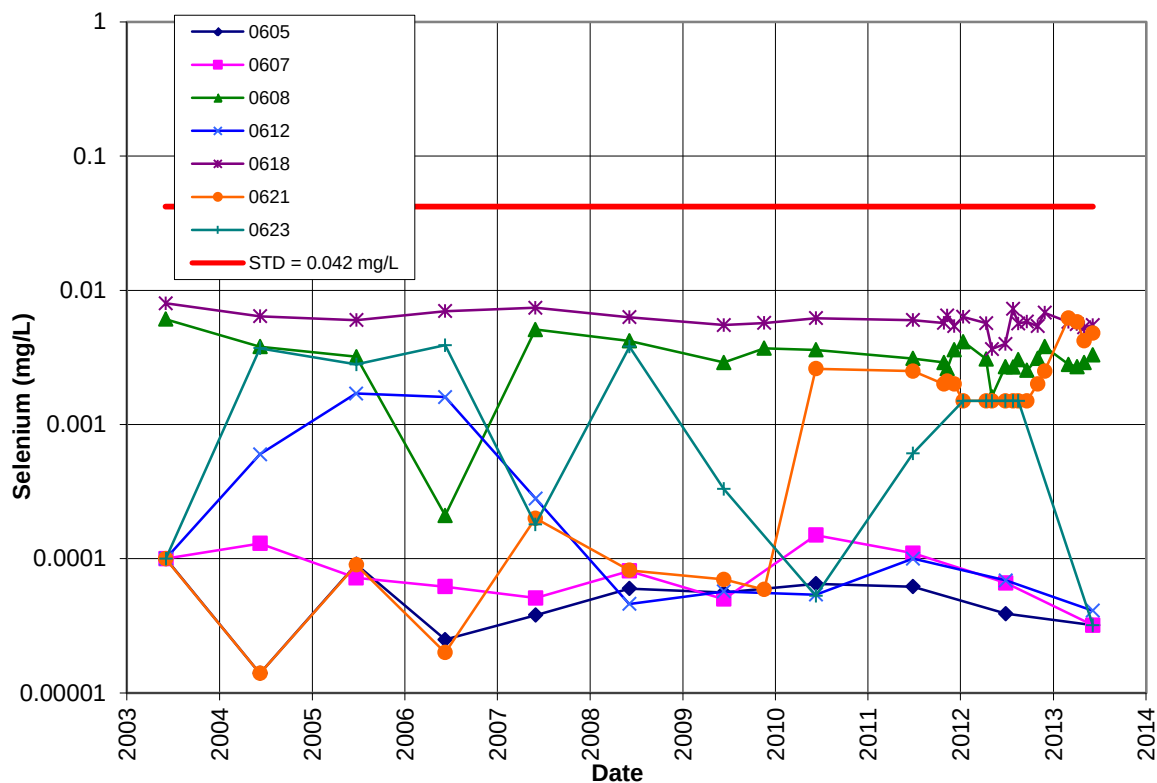


Figure 4-3. Time-Concentration Plot of Selenium in Groundwater at the Durango Disposal Site

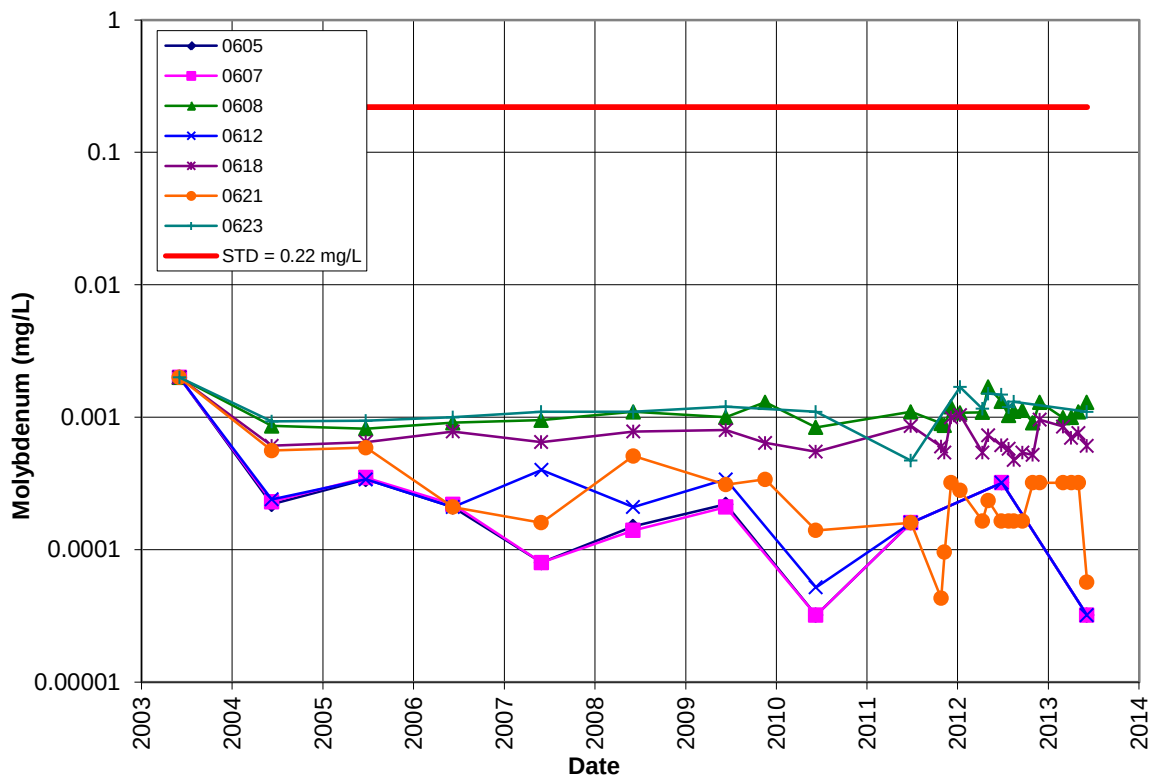


Figure 4-4. Time-Concentration Plot of Molybdenum in Groundwater at the Durango Disposal Site

4.8 Corrective Action

Corrective action is 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 2013.

4.9 Photographs

Photograph Location Number	Azimuth	Description
PL-1	15	Original entrance gate, site marker SMK-1, and perimeter sign E.
PL-2	145	Perimeter sign P45, in draw.
PL-3	140	Perimeter sign P68, showing bullet hole damage.
PL-4	20	Site marker SMK-1, showing damage.
PL-5	220	Boundary monument BM-1.
PL-6	90	Well 0605.
PL-7	45	Disposal cell cover, view to the northeast.
PL-8	250	View of south side slope of disposal cell from the southeast corner of cell top.
PL-9	150	Ditch No. 1 and the east slope of the disposal cell.
PL-10	80	Portion of Ditch No. 2 downslope from disposal cell.
PL-11	80	Northeast outflow, showing erosion areas.
PL-12	345	South outflow, view toward repository.
PL-13	290	Side and liner of evaporation pond.
PL-14	310	Animal burrow under east side (front) of shed. Edge of pond liner is at top of photo.
PL-15	100	Gap under evaporation pond fence, west side.



DUD 5/2013. PL-1. Original entrance gate, site marker SMK-1, and perimeter sign E.



DUD 5/2013. PL-2. Perimeter sign P45, in draw.



DUD 5/2013. PL-3. Perimeter sign P68, showing bullet hole damage.



DUD 5/2013. PL-4. Site marker SMK-1, showing damage.



DUD 5/2013. PL-5. Boundary monument BM-1.



DUD 5/2013. PL-6. Well 0605.



DUD 5/2013. PL-7. Disposal cell cover, view to the northeast.



DUD 5/2013. PL-8. View of south side slope of disposal cell from the southeast corner of cell top.



DUD 5/2013. PL-9. Ditch No. 1 and the east slope of the disposal cell.



DUD 5/2013. PL-10. Portion of Ditch No. 2 downslope from disposal cell.



DUD 5/2013. PL-11. Northeast outflow, showing erosion areas.



DUD 5/2013. PL-12. South outflow, view toward repository.



DUD 5/2013. PL-13. Side and liner of evaporation pond.



DUD 5/2013. PL-14. Animal burrow under east side (front) of shed. Edge of pond liner is at top of photo.



DUD 5/2013. PL-15. Gap under evaporation pond fence, west side.

5.0 Falls City, Texas, Disposal Site

5.1 Compliance Summary

The Falls City, Texas, Uranium Mill Tailings Radiation Control Act (UMTRCA) Disposal Site was inspected on January 23, 2013. The site was in excellent condition and complies with license requirements. Inspectors saw no evidence that institutional controls or deed restrictions had been violated. No maintenance needs or cause for a follow-up or contingency inspection was identified.

The site maintenance subcontractor continues to do an excellent job caring for the site. Hay is harvested (cut and baled) from the site (including the disposal cell cover) providing a beneficial reuse. Two harvests were made in 2012. Discussions in the field with the site maintenance subcontractor during the inspection continue to be used to improve the efficiency and effectiveness of site maintenance activities.

Oil and gas exploration activity around the site continues to increase. A new drilling pad has been installed south of the disposal cell.

Although the U.S. Nuclear Regulatory Commission (NRC) does not require groundwater monitoring at the site, monitoring is conducted as a best management practice. Groundwater was sampled in April 2013 in accordance with the *Long-Term Surveillance Plan for the U.S. Department of Energy Falls City Uranium Mill Tailings Disposal Site, Falls city, Texas* (LTSP) (DOE-LM/1602-2008, U.S. Department of Energy [DOE], March 2008). Uranium concentrations at monitoring well 0891 (completed in the Dilworth aquifer) decreased for the second year in a row in 2013. The concentration measured at monitoring well 0891 in 2013 was 2.5 milligrams per liter (mg/L). In 2011 and 2012 the measured concentration was 2.9 mg/L and 2.7 mg/L, respectively. Water levels measured in 2013 were consistent with those of past years.

5.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the LTSP and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 5-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.3	Section 5.4
Follow-Up or Contingency Inspections	Section 3.4	Section 5.5
Maintenance and Repairs	Section 3.5	Section 5.6
Groundwater Monitoring	Section 3.7	Section 5.7
Corrective Action	Sections 3.6	Section 5.8

5.3 Institutional Controls

The 127-acre disposal site is owned by the United States of America and was accepted under the NRC general license (10 CFR 40.27) in 1997. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the

site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: site markers, survey and boundary monuments, warning/no-trespassing signs, a site perimeter fence, and locked gates at the site entrances.

5.4 Inspection Results

M. Miller, K. Broberg, and D. Traub of the S.M. Stoller Corporation, the Legacy Management Support contractor at the DOE office in Grand Junction, Colorado, conducted the inspection on January 23, 2013. R. Lyssy (maintenance subcontractor for the Falls City site), A. Kleinrath DOE Office of Legacy Management (LM), R. Evans (NRC), K. Tu and M. Pimentel (Uranium and Technical Assessments Section, Radioactive Materials Division, Texas Commission on Environmental Quality) also participated in the inspection.

The purposes of this annual inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

5.4.1 Site Surveillance Features

Figure 5-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs supporting specific observations are identified in the text and in Figure 5-1 by photograph location (PL) numbers.

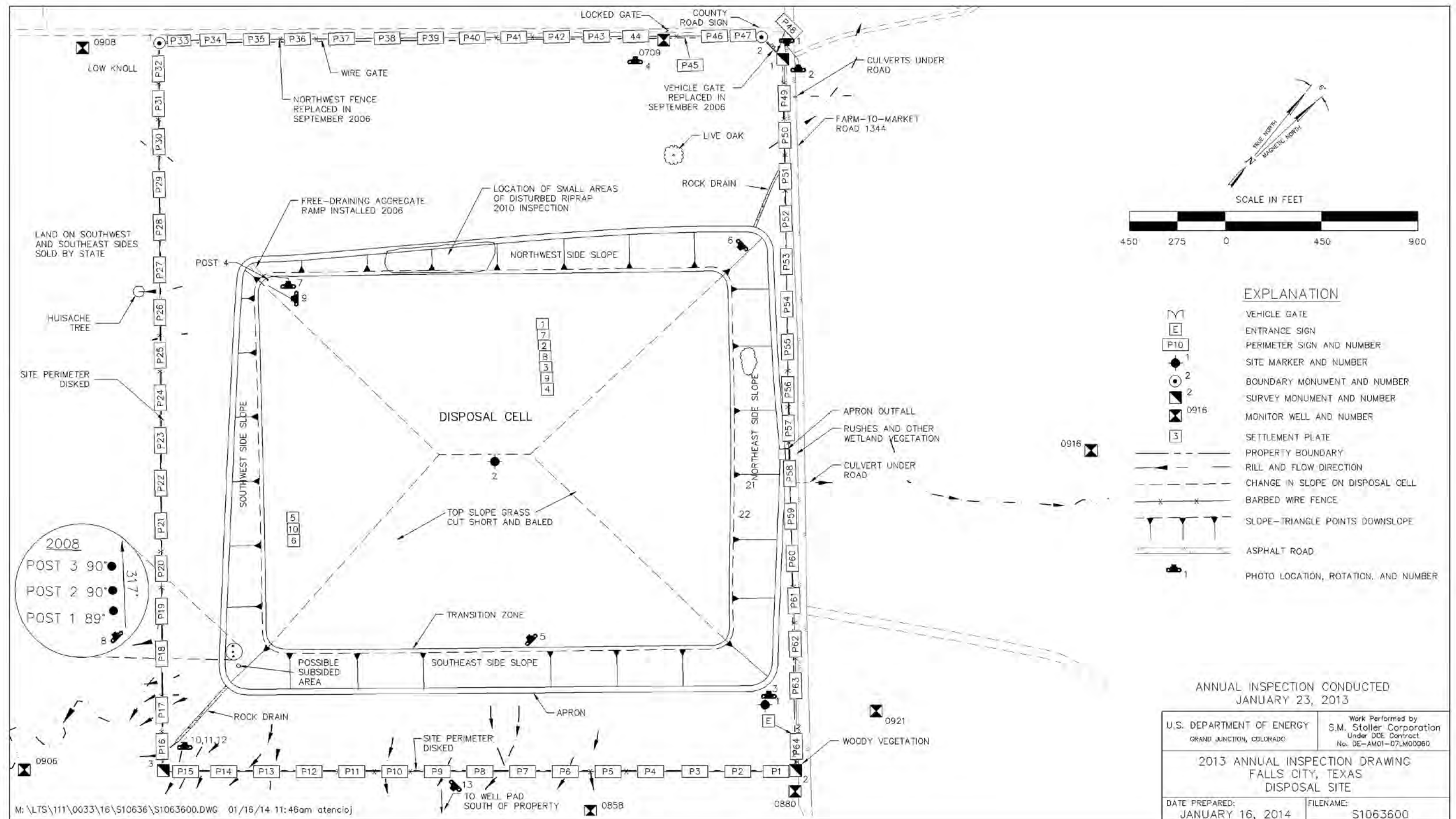
5.4.1.1 Entrance Gates, Entrance Signs, and Access Road

Entrance to the site is directly off of Farm-to-Market Road 1344. The main entrance gate (which was replaced in 2006) and the vehicle gate at the north corner of the site were locked and functional (PL-1). The entrance sign located next to the main entrance gate was in good condition (PL-2).

5.4.1.2 Perimeter Fence and Perimeter Signs

A five-strand barbed wire fence is installed around the disposal site. The fence on the northwest boundary of the site was replaced in 2006. The remainder of the fence was installed when the disposal site was remediated in the mid-1980s. The fence was in good condition. In the west corner of the site (near perimeter sign P33) a 16-foot-long fence panel was replaced with barbed wire in 2010 to provide additional security.

The site has 64 perimeter signs. A few minor maintenance items noted during previous inspections concerning the signs remain, but all of the signs are serviceable and do not require corrective action at this time.



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5.4.1.3 Site Markers

There are two site markers. The marker on top of the disposal cell (SMK-2) was in excellent condition. The marker at the entrance gate (SMK-1) is also in excellent condition (PL-3), but the corners of the concrete base that the marker sits on are cracked. The cracks appear to be unchanged from last year. No corrective action is required at this time to address the cracks.

5.4.1.4 Survey Monuments and Boundary Monuments

Three survey monuments and two boundary monuments situated at the corners of the site were undisturbed and in excellent condition.

5.4.1.5 Monitoring Wells

Monitoring wells in the groundwater-monitoring network were inspected when they were sampled in April 2012. At that time, all sampled wells were secure and in excellent condition. All monitoring wells observed during the inspection were checked to make sure that the protective casings were locked (PL-4).

5.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection: (1) the top and side slopes of the disposal cell, (2) the site perimeter, and (3) the outlying area.

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

5.4.2.1 Top and Side Slopes of the Disposal Cell

The top of the disposal cell was in excellent condition (PL-5). The cell is covered with well-established coastal Bermuda grass. Kleingrass and other species are interspersed. Mr. Lyssy (maintenance subcontractor) typically takes three cuttings of hay each year from the property, which includes the top of the disposal cell. Two harvests of hay were made in 2012.

In past inspections small desiccation cracks were present in the surface of the soil on the top and upper edges of the disposal cell. Desiccation cracks near the surface of a soil profile are common, especially in clayey or loamy soils when soil conditions are dry. No desiccation cracks were observed during this year’s inspection.

Vegetation on top of the cell was dense, and no sparse or barren areas were noted. No areas of ponded water were observed on top of the disposal cell. No areas of settlement were observed.

The side slopes are covered with riprap and were in excellent condition (PL-6). A couple of riprap disturbances (depressions) were observed on the northwest side slope of the disposal cell during the 2010 inspection. As reported in 2010, the disturbances did not appear to compromise the protectiveness of the riprap side slope. Since 2010, no changes have been observed.

No evidence of fractured riprap on the side slopes of the disposal cell was observed during this year's inspection. Previous inspections noted minor amounts of fractured riprap along the side slopes but offered no evidence to suggest that the riprap degradation was pervasive or would diminish erosion resistance. During this year's inspection, photos were taken of riprap at the base of Post 4, near the access ramp on the west corner of the disposal cell (PL-7). Compared to photos taken in earlier years at this location, there is no indication that the riprap is degrading.

In 2007, inspectors noted a possible slight slumping of riprap at the toe of the south corner of the side slope. In 2008 three t-posts were installed in a straight line running at an orientation of 317 degrees. Each post was installed at a vertical pitch of 90 degrees. These three posts provide reference points that are used to assess if the area is undergoing movement. Movement of a post out of line with the other two posts, or the change in pitch of an individual post will indicate possible movement in the area. The three posts remain in the same straight line at which they were installed (i.e., 317 degrees). The vertical pitch of each post remains unchanged, indicating that no movement has occurred (PL-8).

An equipment access ramp to the top of the cell is located at the west corner of the side slope (PL-9). The ramp was installed in 2008 and constructed with clean, angular riprap of progressively smaller sizes to provide a free-draining and stable driving surface that does not encourage vegetation encroachment. The ramp was in excellent condition.

Vegetation management on the cell and side slopes was excellent (PL-10). Much of the vegetation observed during the inspection on the side slopes was either dead or dormant grass. Mr. Lyssy has been subcontracted since 2003 to eradicate the perennial plants from the site, including the disposal cell, riprap apron around the base of the disposal cell, and riprap-lined drainage ditches leading from the disposal cell.

During past inspections small, scattered trees and bushes (greasewood, upland willow, mesquite, and possibly others) were observed in the riprap on the side slopes of the disposal cell. Greasewood and similar species are of particular concern because they are deep-rooted, and could penetrate the radon barrier. DOE anticipates that control of undesirable vegetation on the side slopes will be ongoing, which includes cutting the deep-rooted species at ground level before the woody vegetation gets to be 1 inch in diameter, and applying a systemic herbicide to the stumps. The maintenance subcontractor will continue efforts to eradicate woody vegetation on the side slopes.

5.4.2.2 Site Perimeter

The area between the fence and the toe of the disposal cell is covered with well-established grass, primarily Kleingrass with some coastal Bermuda grass. During most years these areas are cut and baled two or three times. Hay was harvested twice in 2012. When performed on a regular basis, the cutting and baling process is a clean and thorough method of controlling and managing grass at this site and provides a beneficial re-use of the site. Grass is usually left uncut along the fence, along rock drains, and around some of the as-built features such as the site markers.

A Huisache tree is established in the fence line near perimeter sign P27. Huisache aggressively invades south Texas rangelands competing with other plants for water and nutrients. Individual plant treatments offer ranchers a viable tool for brush maintenance. Future inspectors will be aware of its presence and assess whether its abundance is increasing. In 2013, the tree appeared to be unchanged.

Evidence for wild hog burrows were observed along the fence line in some areas. These burrows are filled in by the maintenance contractor as they are located. Other than possibly compromising the integrity of the fence, the burrows are considered to be a minor nuisance at this time.

No water was flowing in the south rock drain during this year's inspection, but water was ponded at the end of the drain (PL-11). No water was observed in the north rock drain. Vegetation is left uncut at the outlets of the rock drains to assist in dissipating the energy of site runoff during storm events (PL-12). Baffling the flow of water at the outlets helps to alleviate soil erosion near the outlet areas during large storms. Tall, thick grass at the drain outlets is therefore considered to be a desirable feature. Vegetation in the apron outfall, located midway along the northeast side slope, is being properly managed.

5.4.2.3 Outlying Area

According to the Texas Water Development Board website, <http://twddb.state.tx>, no new wells were reported to the State in the past year within a 2-mile radius of Site Marker 2.

The area outward from the disposal site for a distance of 0.25 mile was visually inspected, including land that was sold to Alamo Holdings in 2005. A significant increase in oil and gas industry activity continues in the surrounding area. A new well pad was found to be installed south of the disposal cell property (PL-13).

No developments or disturbances that violate deed restrictions at the Falls City facility were observed. The Alamo Holdings parcel is used for occasional livestock grazing and is reverting to native brush land. A private residence just south of the disposal cell sold in 2010.

County Road 202 runs along the northwest side of the property boundary. Until 2011, public access to the road was restricted by a locked gate. As of the 2011 inspection, the road has been open. Removal of the lock and gate has not led to increased vandalism or trespassing at the site.

5.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

5.6 Maintenance and Repairs

A Huisache tree is located near perimeter sign P27. Huisache aggressively invades south Texas rangelands competing with other plants for water and nutrients. Future inspectors will be aware of its presence and assess whether its abundance is increasing.

5.7 Environmental Monitoring

5.7.1 Groundwater Monitoring

5A Although NRC does not require groundwater monitoring at the site, DOE conducts monitoring as a best management practice. Groundwater sampling at the site last occurred in April 2013. As prescribed in the revised LTSP, site groundwater monitoring has two components:

- Monitor groundwater to demonstrate the initial performance of the disposal cell (40 CFR 192, Subpart A).
- Monitor groundwater for plume movement to demonstrate that potential users of groundwater downgradient of the site are not exposed to contamination related to the former processing site (40 CFR 192, Subpart B).

Because supplemental standards apply to the uppermost aquifer at the site, no concentration limits or points of compliance have been established. Groundwater in the uppermost aquifer beneath the site has a U.S. Environmental Protection Agency designation of “limited use” (Class III) because it is not currently or potentially a source of drinking water due to widespread ambient contamination that cannot be cleaned up using methods reasonably employed by public water supply systems (40 CFR 192.11 [e]). Background groundwater quality varies by orders of magnitude in the area because the uppermost aquifer is in a location where uranium mineralization is naturally redistributed. For these reasons, the NRC general license does not require groundwater monitoring at the site.

Two aquifers of interest underlie the site: the shallow Deweesville/Conquista aquifer and the deeper Dilworth aquifer. Because the two aquifers are hydraulically connected, they constitute the uppermost aquifer for regulatory purposes. The Dilworth aquifer is underlain by the Manning Clay, a 300-foot-thick aquitard that isolates the uppermost aquifer from better-quality groundwater in deeper aquifers. Groundwater samples at the site are collected from both the Deweesville/Conquista aquifer and the underlying Dilworth aquifer.

The disposal cell performance monitoring network consists of five monitoring wells (0709, 0858, 0880, 0906, and 0921) that are completed in the uppermost aquifer and sampled as specified in the revised LTSP. Two additional cell performance monitoring wells (0908 and 0916), also completed in the uppermost aquifer, are designated for water level measurements only.

The groundwater compliance monitoring network consists of five monitoring wells (0862, 0886, 0891, 0924, and 0963) that are completed in the uppermost aquifer and sampled annually as specified in the revised LTSP. Figure 5-2 shows the monitoring well networks.

The revised LTSP prescribes continued annual monitoring of the current network of wells through 2010 as a best management practice and reduces the analyte list to total uranium and field measurements of temperature, pH, conductivity, turbidity, alkalinity, dissolved oxygen, and oxidation-reduction potential.

The revised LTSP (which incorporates the Ground Water Compliance Action Plan, March 19, 1998) identifies low pH levels in groundwater as an indicator of the extent and movement of the legacy groundwater plumes. Changes in the baseline geochemical conditions may also indicate leachate movement from the disposal cell into the uppermost aquifer.

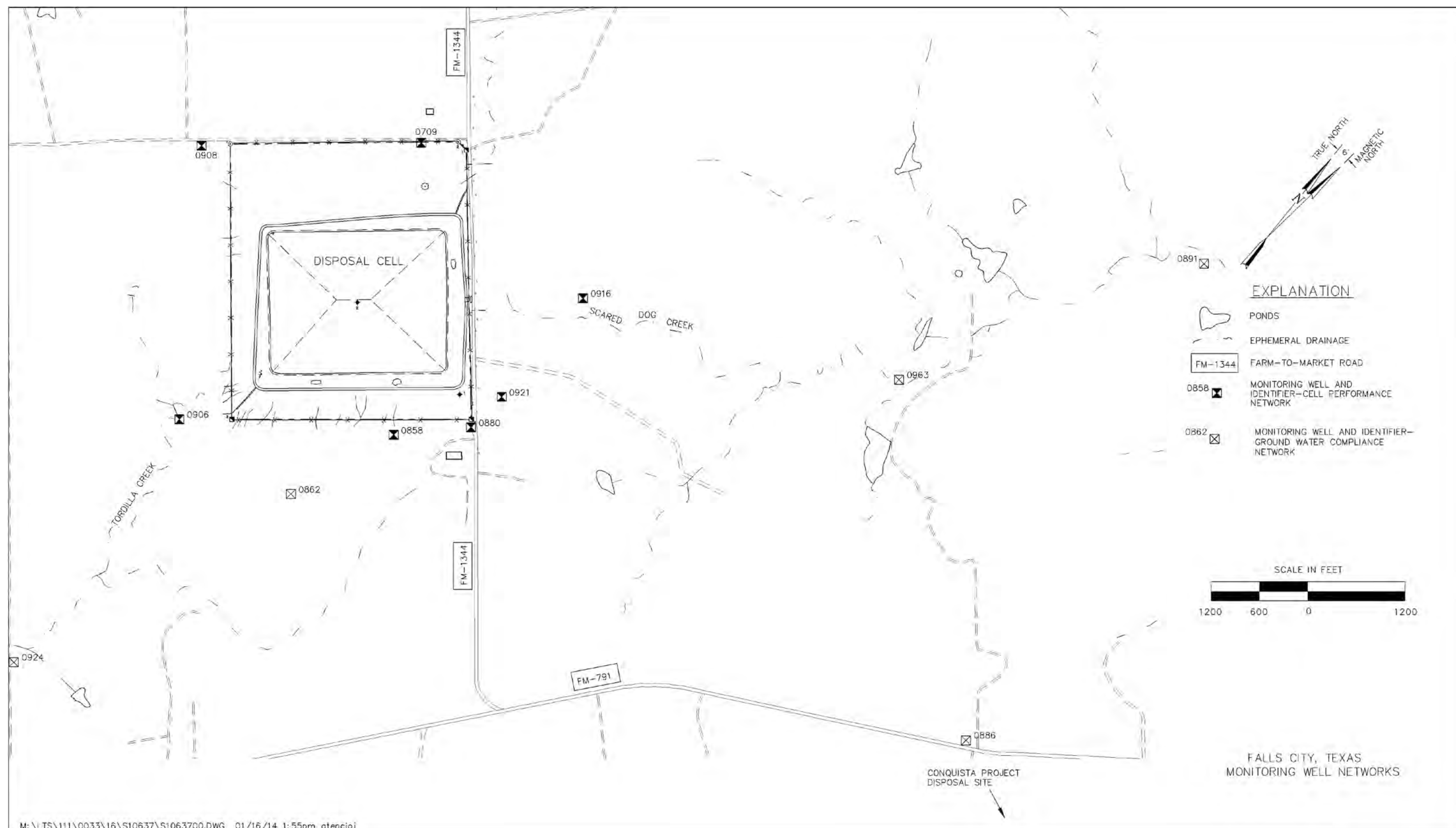


Figure 5-2. Combined Monitoring Well Network at the Falls City Disposal Site

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Tailings pore fluids were lower in pH than background groundwater was. However, because pH levels and other signature contaminants in tailings pore fluids are essentially indistinguishable from processing-related contamination, it is difficult to determine if contamination comes from the disposal cell or from legacy processing activities.

DOE has determined that pH and uranium concentrations do not co-vary. This is an indication that other factors contribute to uranium distribution in the uppermost aquifer, such as natural redistribution of uranium in this active ore-forming environment. Therefore, increasing uranium levels at a monitoring location without an attendant drop in pH probably does not indicate movement of processing-related contamination. Groundwater chemistry at monitoring locations near the formation subcrop may also be influenced by residence time as a response to precipitation or changes in oxidation state within the formation. If increases in uranium are sporadic and not accompanied by decreases in pH, DOE concludes that the elevated uranium is naturally occurring. Time-concentration plots for pH and uranium from 1996 through April 2013 are included as Figures 5-3 through 5-6.

Groundwater Quality Monitoring Results — This report considers groundwater monitoring results through April 2013. In 2013, monitoring wells were sampled for uranium and field parameters. Water levels were also measured.

At the cell performance monitoring wells, pH levels have historically been higher than the pH in tailings pore fluids, with no significant upward or downward trends. In 2013, the pH levels for the cell performance wells remained within the historical range with the exception of wells 0858 and 0921. The pH measured at well 0858 in 2013 was 6.19, slightly above the previous high of 6.07. The pH measured at well 0921 in 2013 was 6.20, slightly above the previous high of 6.16 (Figure 5-3).

At the groundwater compliance monitoring wells, pH levels have historically been higher than the pH in the plumes of groundwater contaminated by processing activities, with no significant upward or downward trends except at well 0963, where the pH has historically been lower than at the other locations. In 2012, the pH levels for the compliance monitoring wells remained within the historical range with the exception of wells 0891 and 0924. The pH measured in well 0891 in 2013 was 6.44, slightly above the previous high of 6.37. The pH measured in well 0924 in 2013 was 6.49, slightly above the previous high of 6.42 (Figure 5-4).

In 2013, the uranium concentration at well 0921 was up slightly compared to 2012. This marks the second year of consecutive increases. In 2013, the uranium concentration measured in well 0921 was 2.8 mg/L. The uranium concentration measured in well 0921 in 2011 and 2012 was 1.4 mg/L and 1.7 mg/L, respectively. Overall, in 2013 the uranium concentrations in the cell performance network remained relatively stable at 2.8 mg/L or less, with the exception of well 0880. At well 0880, uranium has varied from a low concentration of 1.38 mg/L in 2008 to a high concentration of 14 mg/L in 2004 (Figure 5-5). Over time, the concentration of uranium in this well has been variable. The pH at this location is lower and has varied more than at other locations in the cell performance monitoring network (Figure 5-3). Water levels are also generally falling at well 0880 (see the following section, “Groundwater-Level Monitoring Results”). These results suggest that the interaction among the disposal cell, the legacy groundwater mound, and processing plumes is still equilibrating. However, monitoring results do not indicate that the disposal cell is contributing to the degradation of the uppermost aquifer. Because the groundwater in the uppermost aquifer is not used as a potable water source near the site, conditions at the site remain protective.

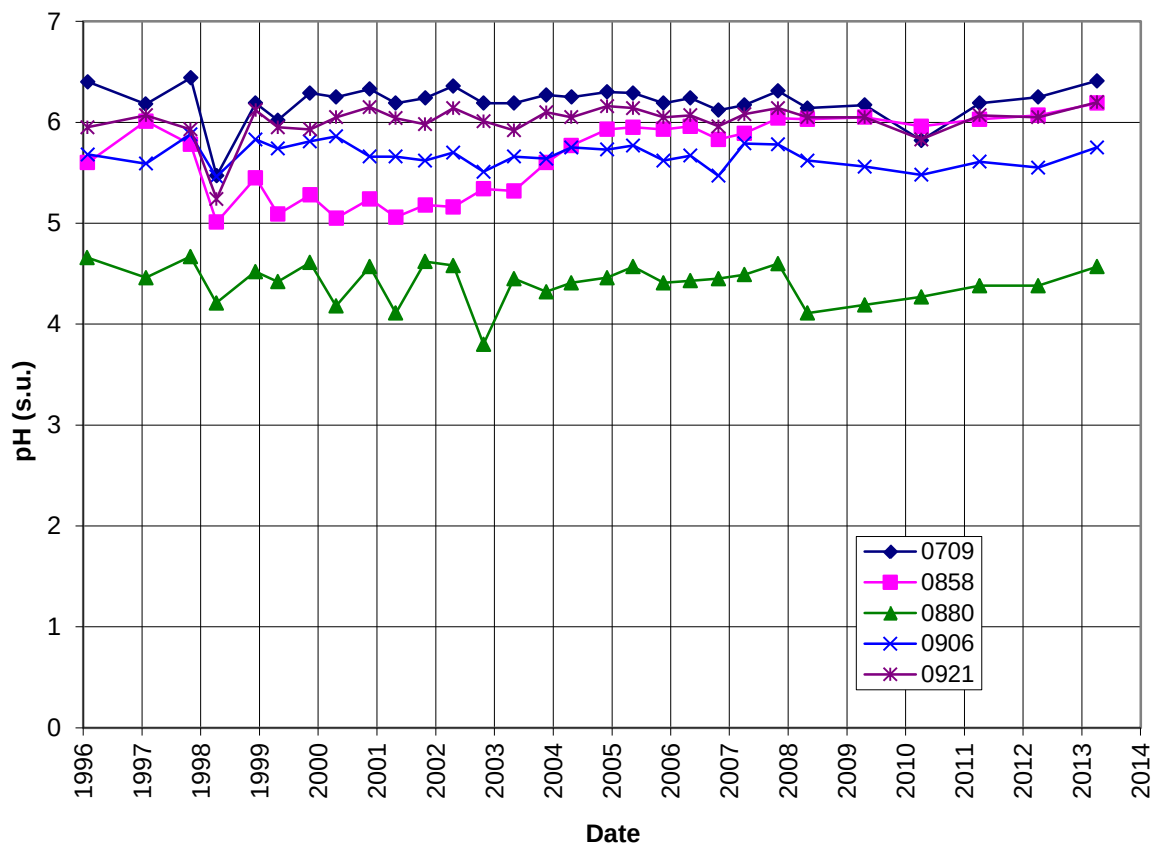


Figure 5-3. pH in Groundwater at Cell Performance Monitoring Locations at the Falls City Disposal Site

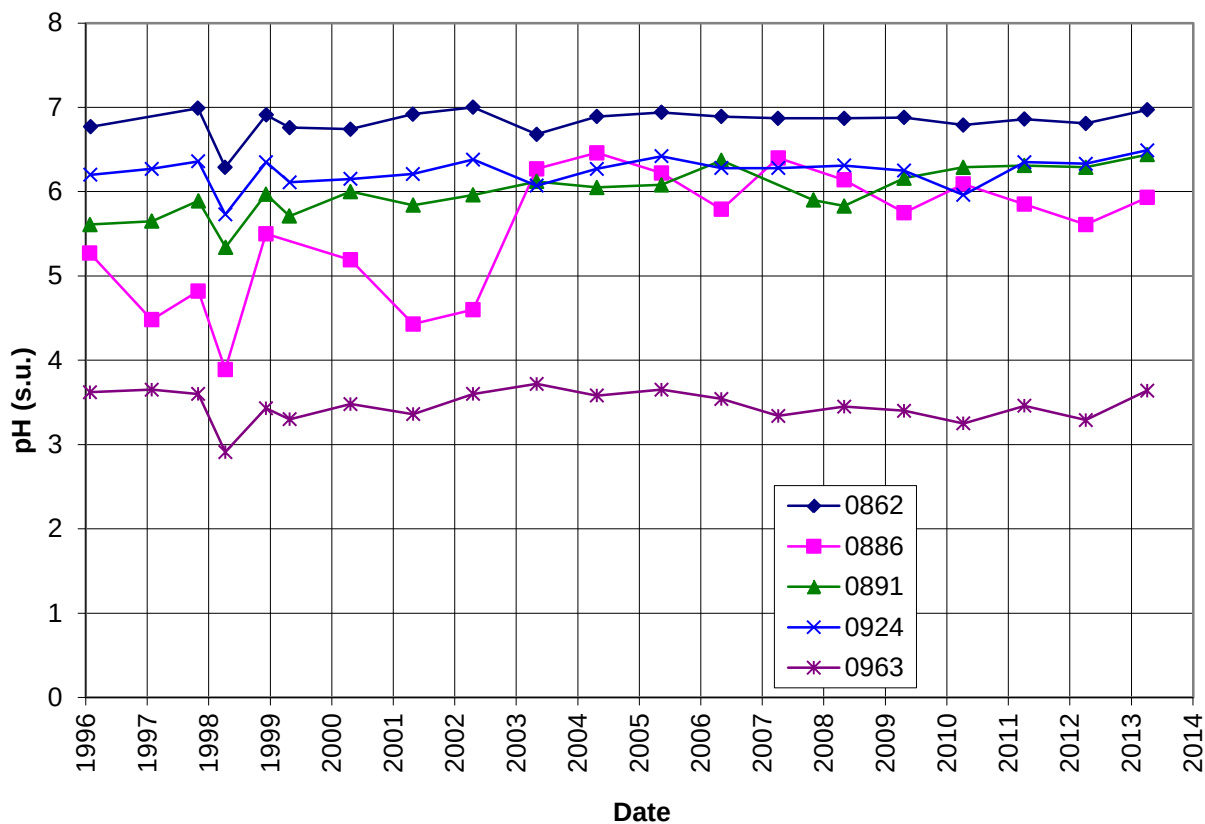


Figure 5-4. pH in Groundwater at Compliance Monitoring Locations at the Falls City Disposal Site

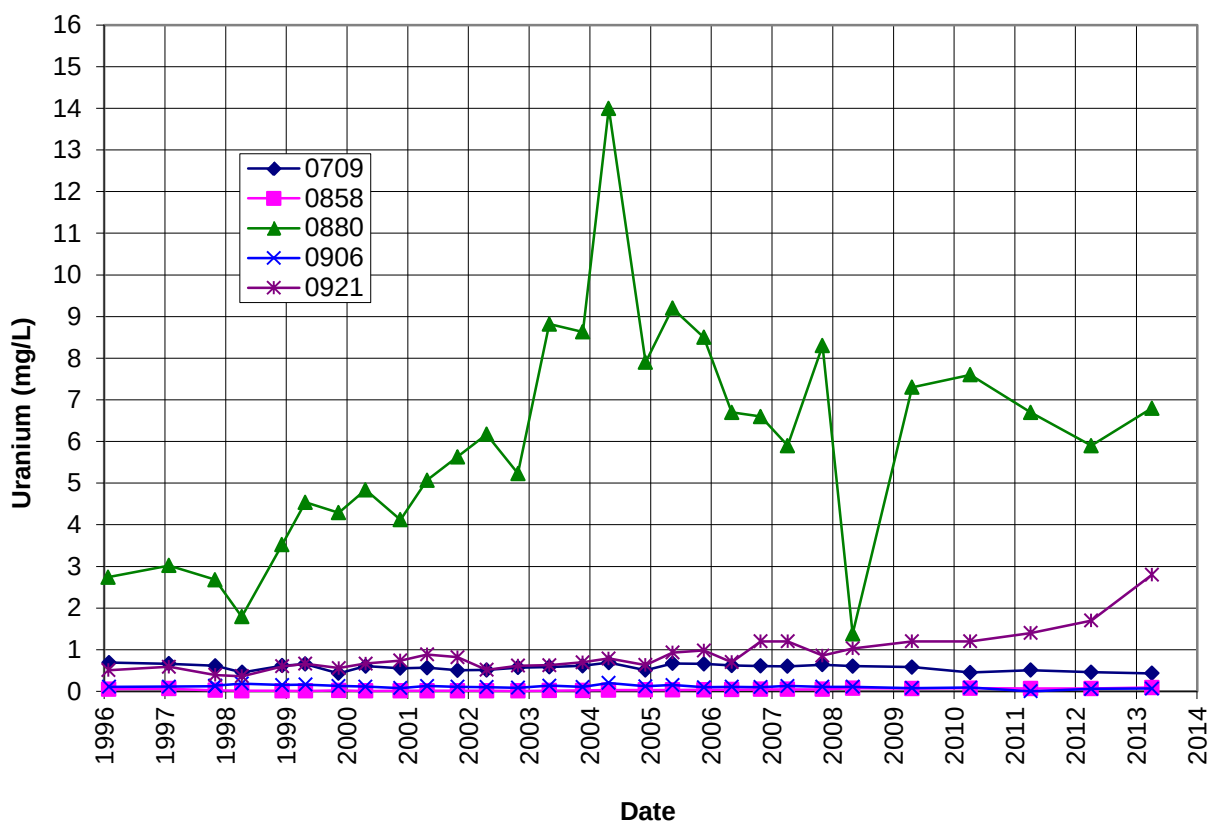


Figure 5-5. Uranium in Groundwater at Cell Performance Monitoring Locations at the Falls City Disposal Site

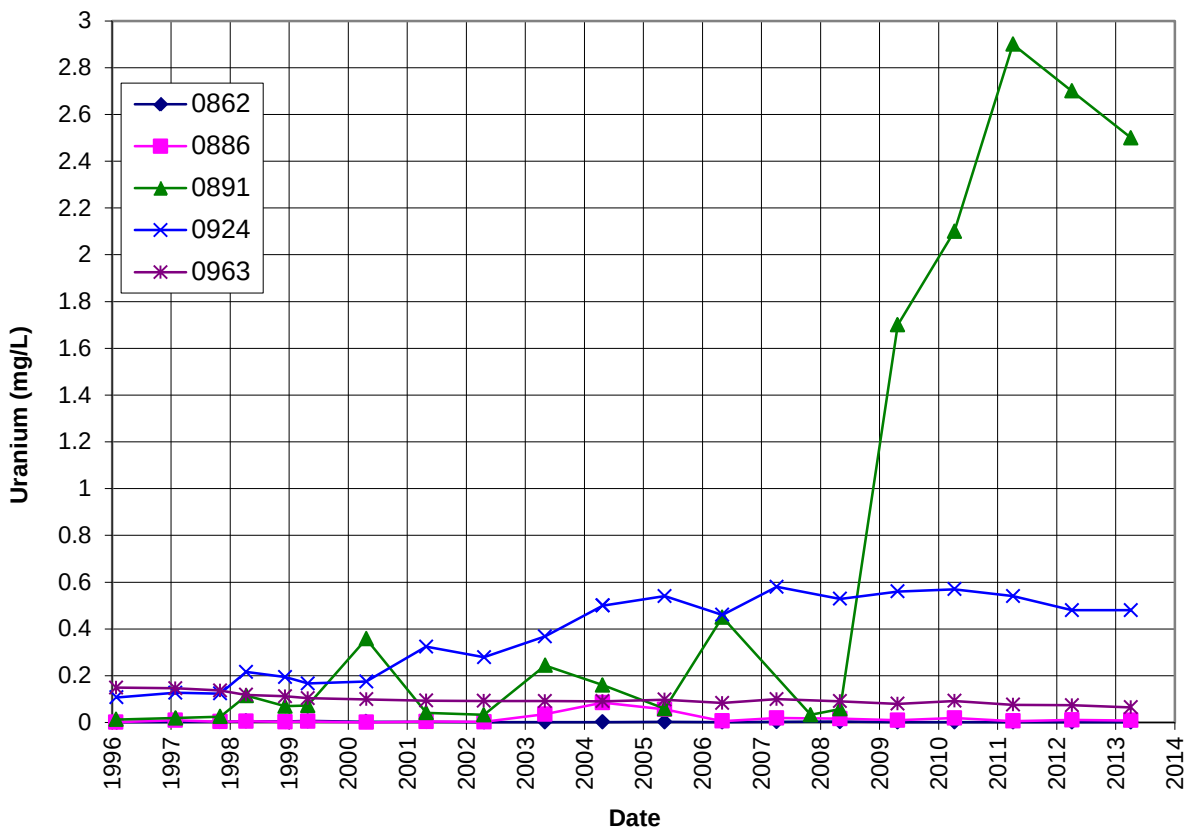


Figure 5-6. Uranium in Groundwater at Compliance Monitoring Locations at the Falls City Disposal Site

The concentration of uranium in groundwater within the compliance monitoring network shows that the uranium concentration trends at monitoring wells 0862, 0886, and 0963 remain stable at low levels (<0.2 mg/L) (Figure 5-6). The increasing uranium concentration trend at well 0924 has leveled off and is fluctuating between 0.5 mg/L and 0.6 mg/L. The uranium concentrations measured at well 0891 in 2009 (1.7 mg/L), 2010 (2.1 mg/L), 2011 (2.9 mg/L), 2012 (2.7 mg/L), and 2013 (2.5 mg/L) are anomalously high compared to historical measurements at the well, but not for the aquifer.

The uranium concentration at well 0891 in 2013 (2.5 mg/L) is down slightly from the concentration measured in 2012 (2.7 mg/L). The maximum uranium concentration measured at monitoring well 0891 in 2011 (2.9 mg/L) is below the maximum concentration reported for the aquifer, which is also the value used in the risk assessment for the Dilworth groundwater (3.04 mg/L). Site-related contamination in the uppermost aquifer at the site poses no risk to human health because the groundwater from this aquifer is not used for human consumption and is designated as limited use. Additionally, a 300-foot-thick aquitard isolates the uppermost aquifer from the better-quality groundwater in deeper aquifers.

Groundwater-Level Monitoring Results—Water levels measured in 2013 in the disposal cell performance network are new lows for each well (Figure 5-7). Since 1996, groundwater levels in the disposal cell performance network wells have fallen slightly. The water level in monitoring well 0906 has fluctuated more than levels in the other wells over the years. Monitoring well 0906 is directly downslope of the disposal cell, and the historical fluctuation may be the result of the infiltration of water shed by and conveyed away from the disposal cell, reflecting variations in annual precipitation. Other contributors that may influence local groundwater levels include (1) the dissipation of the processing-site-related groundwater mound beneath the disposal cell, and (2) the dissipation of transient drainage from the disposal cell.

Two cell performance monitoring wells, 0908 and 0916, are not shown in Figure 5-7. These wells, designated for groundwater-level monitoring only, are completed in the unsaturated zone of the Conquista Sandstone and have been dry since 1996.

In contrast, water levels in the groundwater compliance monitoring network wells have all increased slightly between 1996 and 2013 (Figure 5-8).

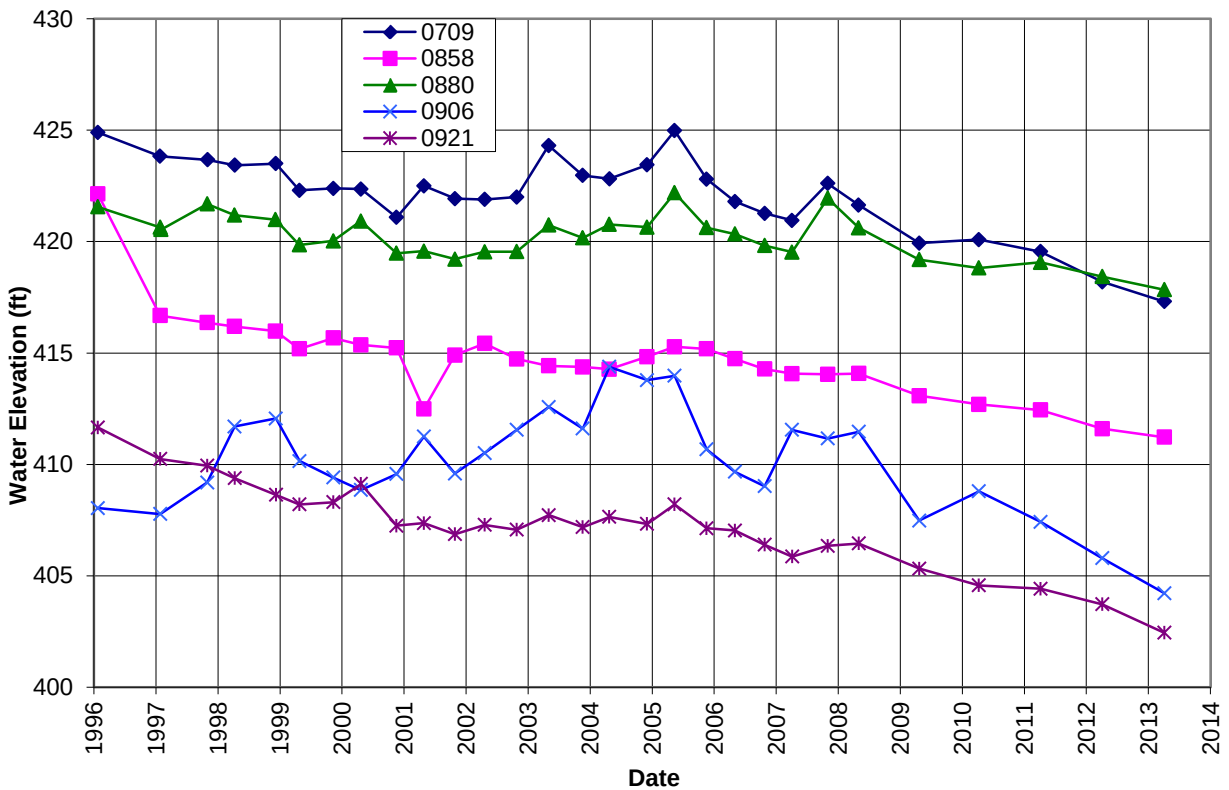


Figure 5-7. Water-Level Measurements at Cell Performance Monitoring Locations at the Falls City Disposal Site

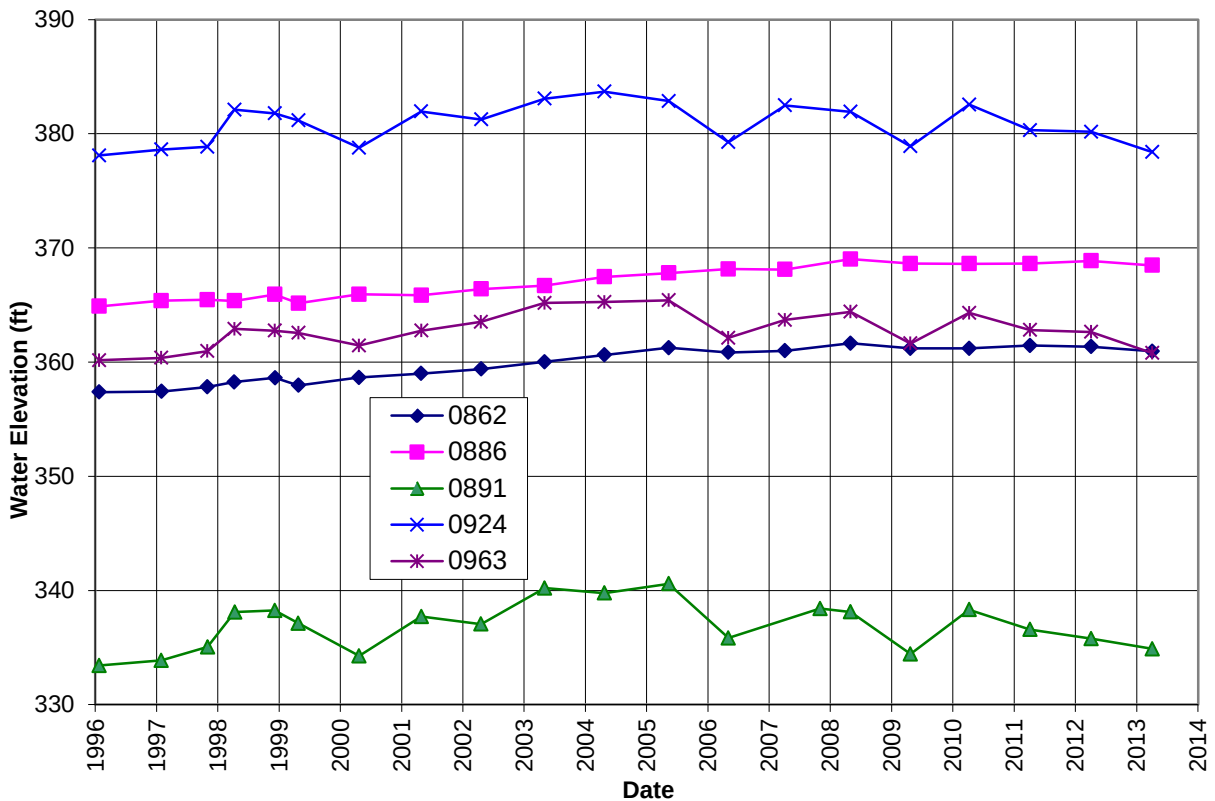


Figure 5-8. Water-Level Measurements at Compliance Monitoring Locations at the Falls City Disposal Site

Evaluation of Groundwater Monitoring—Site-related contamination in the uppermost aquifer at the site poses no risk to human health because groundwater from this aquifer is not used for human consumption and is designated as limited use. Potable water is produced locally from the Carrizo Sandstone that lies 2,000 feet below the surface near the site. Additionally, a 300-foot-thick aquitard isolates the uppermost aquifer from the better-quality groundwater in deeper aquifers.

In 2010, DOE evaluated the groundwater monitoring program at the site, as required every 5 years by the LTSP. Five years of additional groundwater monitoring data (2006 through 2010) at the site were compared to previous data (1996 through 2005). The comparison showed that contaminant concentrations continued to fluctuate in the uppermost aquifer, but the fluctuations in the past 5 years were within the historical range reported for the aquifer in the area of the site. Uranium concentrations at monitoring well 0891 had increased from 2006 through 2010. The concentration of 2.9 mg/L in the sample collected in April 2011 was at an all-time high for the well. The comparison also showed no new unexpected water level changes.

The 2010 evaluation recommended that after the collection of samples in 2011, groundwater monitoring activities at the site be discontinued. It was proposed that DOE would not plug and abandon the 12 monitoring wells at the site until the nearby Title II Conquista site transfers to the DOE Office of Legacy Management. The Conquista site is just south of, and adjacent to, the Falls City site. Upon the Conquista site's transfer to LM, DOE will assess whether a joint monitoring approach is warranted (either as a one-time event or as periodic monitoring). Once NRC approves the recommended monitoring strategy for the Conquista site, wells no longer deemed necessary to a Conquista monitoring effort would be decommissioned following State of Texas guidelines for plugging and abandoning groundwater monitoring wells.

Recommendations made in the 2010 evaluation continue to undergo NRC review.

5.7.2 Vegetation Management

A vegetation management program that aligns with requirements in the LTSP remains effective and successful. Discussions with the site maintenance subcontractor during the inspections continue to provide lessons learned opportunities to improve the efficiency and effectiveness of vegetation management. Harvesting of hay from the site continues and provides a beneficial reuse of the site. Two harvests were made in 2012.

5.8 Corrective Action

Corrective action is 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 2013.

5.9 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	180	Entrance gate, north corner of property.
PL-2	NA	Perimeter sign, north corner of property.
PL-3	270	Site marker, east corner of property.
PL-4	NA	Monitoring well 0709.
PL-5	315	View across top of cell.
PL-6	225	Looking southwest down northwest side slope.
PL-7	NA	Riprap at base of Post 4.
PL-8	317	Posts 1 through 3.
PL-9	270	Ramp on west corner of cell.
PL-10	0	Looking up south corner of cell.
PL-11	NA	Water ponded at outlet of south rock drain.
PL-12	NA	Tall grass at outlet of south rock drain.
PL-13	225	Well pad, off property, south of cell.



FCT 1/2013. PL-1. Entrance gate, north corner of property.



FCT 1/2013. PL-2. Perimeter sign, north corner of property.



FCT 1/2013. PL-3. Site marker, east corner of property.



FCT 1/2013. PL-4. Monitoring well 0709.



FCT 1/2013. PL-5. View across top of cell.



FCT 1/2013. PL-6. Looking southwest down northwest side slope.



FCT 1/2013. PL-7. Riprap at base of Post 4.



FCT 1/2013. PL-8. Posts 1 through 3.



FCT 1/2013. PL-9. Ramp on west corner of cell.



FCT 1/2013. PL-10. Looking up south corner of cell.



FCT 1/2013. PL-11. Water ponded at outlet of south rock drain.



FCT 1/2013. PL-12. Tall grass at outlet of south rock drain.



FCT 1/2013. PL-13. Well pad, off property, south of cell.

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6.0 Grand Junction, Colorado, Disposal Site

6.1 Compliance Summary

The Grand Junction, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on December 10, 2013. A portion of the disposal cell remains open to receive low-level radioactive materials from various sources, and the open cell and its supporting structures and facilities are not included in the annual inspection. The annual inspection includes the closed and completed portion of the disposal cell, the surrounding disposal site, and the immediate outlying area. The disposal cell and all associated surface water diversion and drainage structures were in good condition and functioning as designed. Site surveillance features (gates, fences, roads, boundary monuments, monitoring wells, and signs) were also in good condition. Perimeter sign P17 was damaged by bullets and needs to be replaced. No other maintenance needs were identified, and no follow-up inspection is required.

6.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Interim Long-Term Surveillance Plan for the Cheney Disposal Site Near Grand Junction, Colorado* (LTSP) (DOE/AL/62350-243, Rev. 1, U.S. Department of Energy [DOE], April 1998) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 6-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Sections 3.0 and 6.2	Section 6.4
Follow-Up or Contingency Inspections	Section 3.4	Section 6.5
Routine Maintenance and Repairs	Sections 2.7.3 and 4.0	Section 6.6
Groundwater Monitoring	Section 2.6	Section 6.7
Corrective Action	Section 5.0	Section 6.8

6.3 Institutional Controls

The United States of America owns the 360-acre site. The open portion of the disposal cell is projected to remain open until 2023 or until filled to its design capacity. DOE's Office of Legacy Management (LM) operates the site under authority of House Rule 2967 Section 2(a)(1)(B). Until the disposal cell is closed, it will not be accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27).

Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: boundary monuments, a perimeter fence and gates, and warning/no trespassing signs (perimeter signs) placed along the property boundary.

6.4 Inspection Results

L. Sheader, P. Wetherstein, and S. Woods of S.M. Stoller Corporation, the Legacy Management Support contractor at the LM office in Grand Junction, Colorado, conducted the inspection on December 10, 2013. The purposes of the inspection were to confirm the integrity of visible

features at the site, identify changes in conditions that may affect site integrity, and determine the need, if any, for maintenance or additional inspections and monitoring.

6.4.1 Site Surveillance Features

Figure 6-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and on Figure 6-1 by photograph location (PL) numbers.

6.4.1.1 Entrance Gates, Entrance Signs, and Access Road

The site is located east of U.S. Highway 50, approximately 18 miles southeast of Grand Junction, Colorado. A right-of-way grant on federal land, administered by the U.S. Bureau of Land Management (BLM), extends approximately 1.7 miles between Highway 50 and the site's entrance gate. DOE maintains this right-of-way, including a two-lane asphalt access road. The access road was reconstructed in 2012 and repaired in 2013, and it was in very good condition. A steel double-swing tube gate secured by a lock and chain is located along the highway right-of-way fence. The access gate was locked and in good condition. The fence along the right-of-way was also in good condition. The site entrance gate is a double-swing chain link gate. It is secured by a DOE lock and was in good condition (PL-1). The entrance sign was present and legible.

6.4.1.2 Perimeter Fence and Perimeter Signs

A standard four-strand barbed-wire stock fence surrounds the disposal cell features and operations areas. The fence was functional and in good condition (PL-2). A total of 29 perimeter signs are at regular intervals along the DOE property boundary. The signs are installed on galvanized steel posts set in concrete. Sign P17 had numerous bullet holes and will need to be replaced. Signs P4 and P16 were slightly bent but legible. All of the other signs were in good condition (PL-3).

6.4.1.3 Site Markers

Granite site markers similar to those at other UMTRCA sites will not be installed until the disposal cell is closed.

6.4.1.4 Survey Monuments and Boundary Monuments

The site has four permanent boundary monuments, one at each of the four corners. All of the boundary monuments were located and in good condition (PL-4).

6.4.1.5 Monitoring Wells

The groundwater monitoring network consists of three monitoring wells. All three are inside the site boundary. The well protective casings were locked and in good condition (PL-5). Shrubs surrounding well 0732 had been treated with herbicide to reduce root intrusion into the well. No live shrubs were identified near any monitoring wells in 2013.

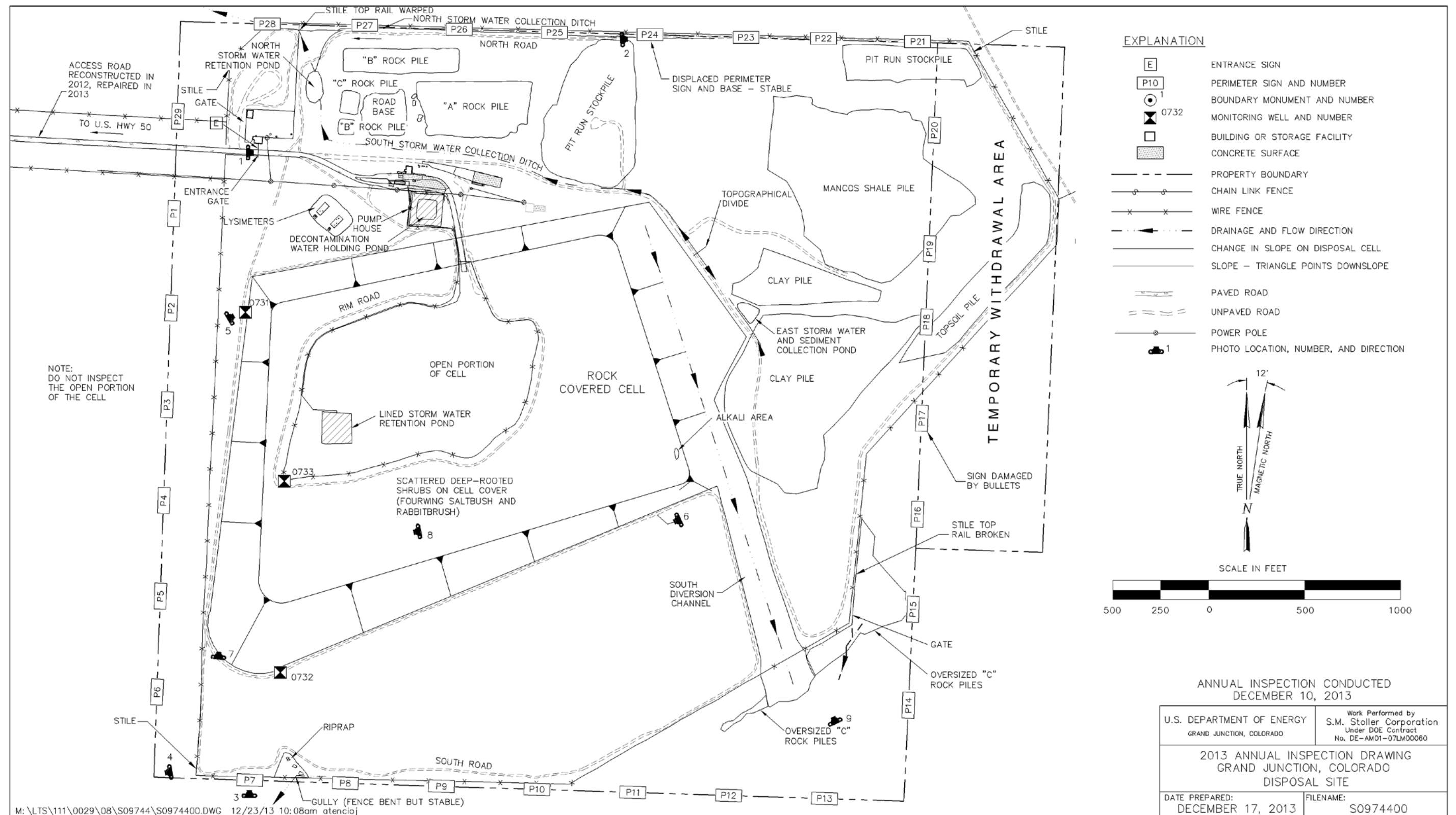


Figure 6-1. 2013 Annual Inspection Drawing for the Grand Junction Disposal Site

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6.4.2 Inspection Areas

To ensure a thorough and efficient inspection, the site is divided into four inspection areas: (1) the closed portion of the disposal cell, (2) diversion structures and drainage channels, (3) the area between the disposal cell and the site boundary, and (4) immediate offsite areas. Inspectors examined each area for evidence of erosion, settling, slumping, or other disturbance that might affect the site's integrity, protectiveness, or long-term performance.

6.4.2.1 Closed Portion of the Disposal Cell

Basalt riprap covers the top and side slopes of the disposal cell. The rock was in good condition with no significant weathering. The disposal cell top and side slopes showed no evidence of settling, slumping, cracking, erosion, or slope instability (PL-6, PL-7).

On the disposal cell cover, numerous areas with alkali deposits have been reported during previous inspections. The deposits are thought to be evaporite minerals, and there is no indication that the alkali areas degrade the performance of the disposal cell. The alkali areas were not observed in 2013 due to light snow cover.

Grasses and weeds were growing on most of the cell cover, and scattered deep-rooted vegetation (primarily fourwing saltbush [*Atriplex canescens*] and rabbitbrush [*Ericameria nauseosa*] shrubs) was also present (PL-8). Historically, shrubs have been periodically treated with herbicide on the cell top. Although treatment is not required by the interim Long-Term Surveillance Plan, DOE will continue to periodically treat shrubs until more is known about the potential effects of vegetation on the cover. Recent studies by DOE and the U.S. Environmental Protection Agency have indicated that evapotranspiration cover designs perform significantly better than the conventional rock-covered compacted soil layer designs (as used at this site) to limit permeability and the percolation of moisture into the disposal cells. A cell cover study area consisting of two lysimeters was constructed at the site in 2007 (not included in the annual inspection; see Figure 6-1) to compare the performance of the existing cover design with a modified evapotranspiration design. Monitoring continues, and DOE will use the results from this study to make long-term surveillance and maintenance decisions at this and similar sites.

6.4.2.2 Diversion Structures and Drainage Channels

The south diversion channel is a large, riprap-armored structure that conveys runoff from the disposal cell into a natural drainage that flows away from the site to the southwest. The diversion channel was in good condition (PL-9). Some plants, including grasses, weeds, and shrubs, grow within the channel. However, the presence of vegetation is not expected to degrade the channel's performance. The discharge area of the channel is armored with large-diameter basalt riprap and was also in good condition.

Other drainage features at the site include north and south storm water collection ditches, the north storm water retention pond, and the east storm water and sediment collection pond (see Figure 6-1). These small drainage features control storm water runoff primarily from the various cover materials stockpiled on the northern and eastern portions of the disposal site property. The north storm water collection ditch also captures storm water run-on from offsite locations. The ditches and ponds were functioning as designed.

6.4.2.3 Area Between the Disposal Cell and the Site Boundary

There are 12 discrete stockpiles of rock and soil between the disposal cell and the perimeter fence on the north and east sides of the site. These materials eventually will be used to cover and close the open cell. Vegetation and surface rocks generally protect the stockpiles from significant erosion.

Most of the flat areas between the disposal cell and the site boundary are vegetated with native shrubs, scant perennial grasses, and annual weeds. Some localized erosion has occurred along the perimeter road, but there are no areas of significant erosion that could threaten the integrity of the cell or site features.

The site boundary lies along the perimeter fence on the north border of the site and outside the perimeter fence on the west, south, and southeast borders of the site. Vegetation outside the fence is similar to vegetation inside the fence, but it is occasionally grazed by livestock.

6.4.2.4 Immediate Off-Site Areas

The area outward from the site for a distance of 0.25 mile was visually inspected. No development or disturbance that could affect the site was observed. On private property immediately west of the site, a land use change is proposed, which would involve installing large evaporation ponds to treat contaminated water. Most of the remaining land surrounding the site is rangeland administered by BLM and used primarily for cattle grazing.

Outside the site's eastern boundary is a 40-acre temporary withdrawal area of federal land administered by BLM. Some of the withdrawal area is included within the perimeter fence and contains materials stockpiles. This area is not included in the interim Long Term Surveillance Plan and therefore is inspected as an offsite area.

6.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) the annual inspection or other site visit reveals a condition that requires a return to the site to further evaluate the condition, or (2) a citizen or outside agency notifies DOE that conditions at the site or in the vicinity of the site are substantially changed.

No need for a follow-up inspection was identified.

6.6 Maintenance and Repairs

- 6A One damaged perimeter sign (P17) will be replaced. No other maintenance needs were identified during the inspection.

6.7 Environmental Monitoring

6.7.1 Groundwater Monitoring

- 6B** Because total dissolved solids in the uppermost aquifer (Dakota Sandstone) beneath the site exceeds 10,000 milligrams per liter (mg/L), the groundwater is designated as “limited use” and supplemental standards apply (40 CFR 192.21 [g]). Under this designation, groundwater monitoring is not required. Confined groundwater in the uppermost aquifer lies approximately 750 feet below ground surface and is geologically isolated from the tailings material by low-permeability mudstones and shales of the Mancos Shale Formation.

In lieu of monitoring groundwater in the uppermost aquifer, as a best management practice DOE monitors groundwater from three monitoring wells. Two wells (0731 and 0732) are completed in (or very near) buried alluvial paleochannels adjacent to the disposal cell, and one monitoring well (0733) is in the disposal cell (Table 6-2). This best-management-practice monitoring is done to assess the disposal cell’s performance and to ensure that seepage (transient drainage) from the disposal cell is not impacting any groundwater in the paleochannels. The paleochannel monitoring wells are along the west (downgradient) edge of the disposal cell and are screened at the interface between the alluvium and shallow Mancos Shale. The third well is in the southwest corner of the open portion of the disposal cell and is used primarily for the measurement of water levels in the deepest part of the disposal cell to demonstrate that the groundwater elevation directly beneath the cell has not risen enough to move laterally into the paleochannels.

Table 6-2. Groundwater Monitoring Network at the Grand Junction Disposal Site

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

6.7.1.1 Groundwater-Level Monitoring

Static water level measurements are obtained from each well before water quality samples are collected (Figure 6-2). In September 2006, a datalogger was installed in each well to obtain water level measurements at 4-hour intervals continuously.

Since 1998, the water level in disposal cell well 0733 has risen approximately 3.2 feet and has remained significantly lower than the water levels in the two paleochannel monitoring wells (0731 and 0732) (Figure 6-2). Water levels within the two paleochannel monitoring wells have decreased approximately 5 feet since 1998. The trends for wells 0731 and 0732 have been decreasing slightly, with level fluctuations that range from 2 to 5 feet. Given these elevations, groundwater at the base of the disposal cell at well 0733 has no potential to migrate to the paleochannels at wells 0731 and 0732.

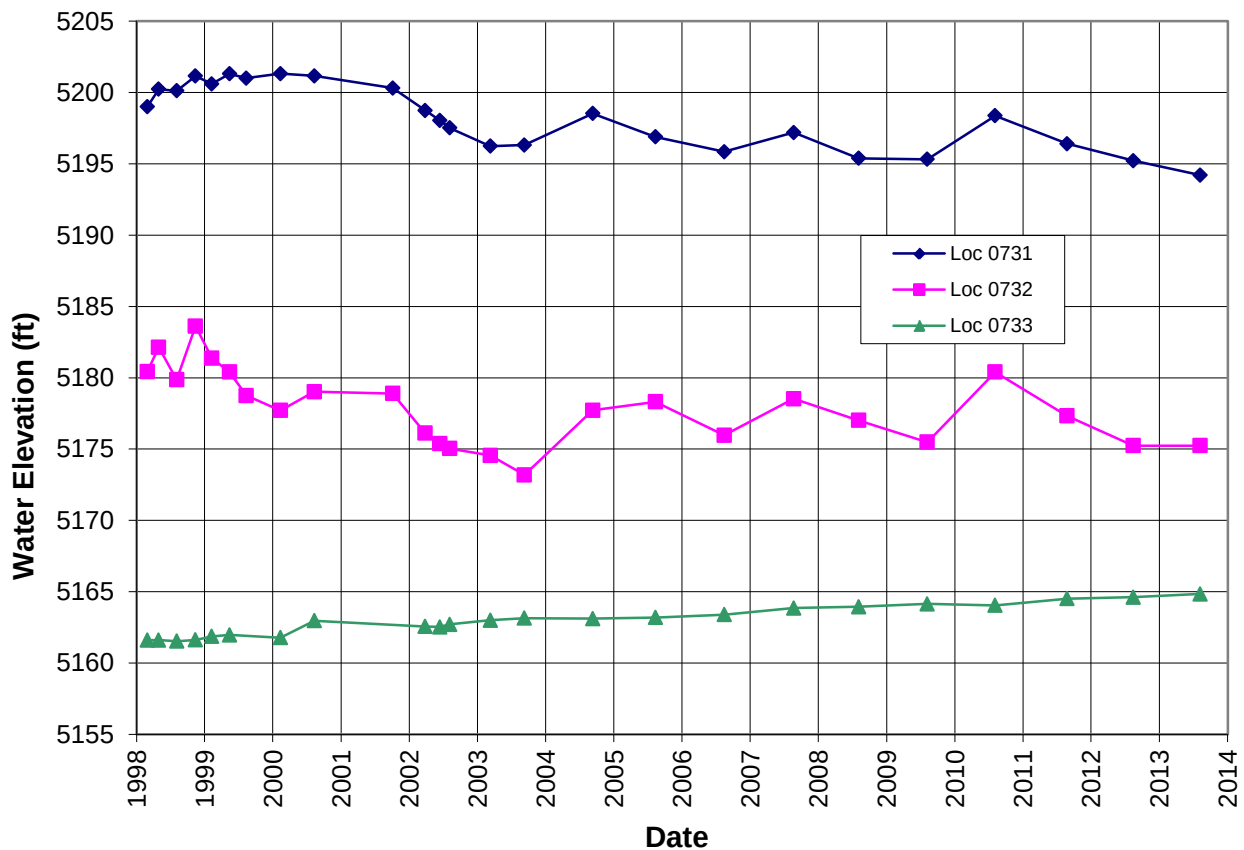


Figure 6-2. Water Level Measurements at the Grand Junction Disposal Site

6.7.1.2 Groundwater Quality Monitoring

Groundwater samples are analyzed for standard field parameters and the following indicator analytes: molybdenum, nitrate, selenium, sulfate, total dissolved solids, uranium, vanadium, and polychlorinated biphenyls. Key indicator analytes are molybdenum, nitrate, selenium, and uranium. In Table 1 to Subpart A of 40 CFR 192, EPA has established maximum concentration limits (MCLs) for these analytes in groundwater (Table 6-3). Time-concentration plots from 1998 through 2013 for three key indicator analytes—nitrate (as nitrogen), selenium, and uranium—are shown on Figures 6-3 through 6-5.

Table 6-3. Maximum Concentration Limits for Groundwater at the Grand Junction Disposal Site

Constituent	MCL ^a (mg/L)
Molybdenum	0.1
Nitrate (as Nitrogen)	10
Selenium	0.01
Uranium	0.044

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

Nitrate (as nitrogen) concentrations in groundwater continued to exceed the MCL of 10 mg/L in the paleochannel monitoring wells (0731 and 0732) through 2013 (Figure 6-3). Concentrations in well 0731, following an initial steep downward trend, remained below the MCL from 2000 through 2004. In 2005 and continuing through 2013, concentrations steadily increased and remain above the MCL. Concentrations in well 0732, though varied, have consistently remained above the MCL since 1998. Concentrations in well 0733 continued a significant downward trend, dropped below the MCL in 2007, and reached a low of 2.3 mg/L in 2013. Historically, the highest concentration of nitrate (96 mg/L) occurred in 1998 from disposal cell well 0733. In 2013, the concentration of nitrate decreased, and the nitrate levels in both paleochannel monitoring wells are very similar: 37 mg/L in well 0731 and 40 mg/L in well 0732.

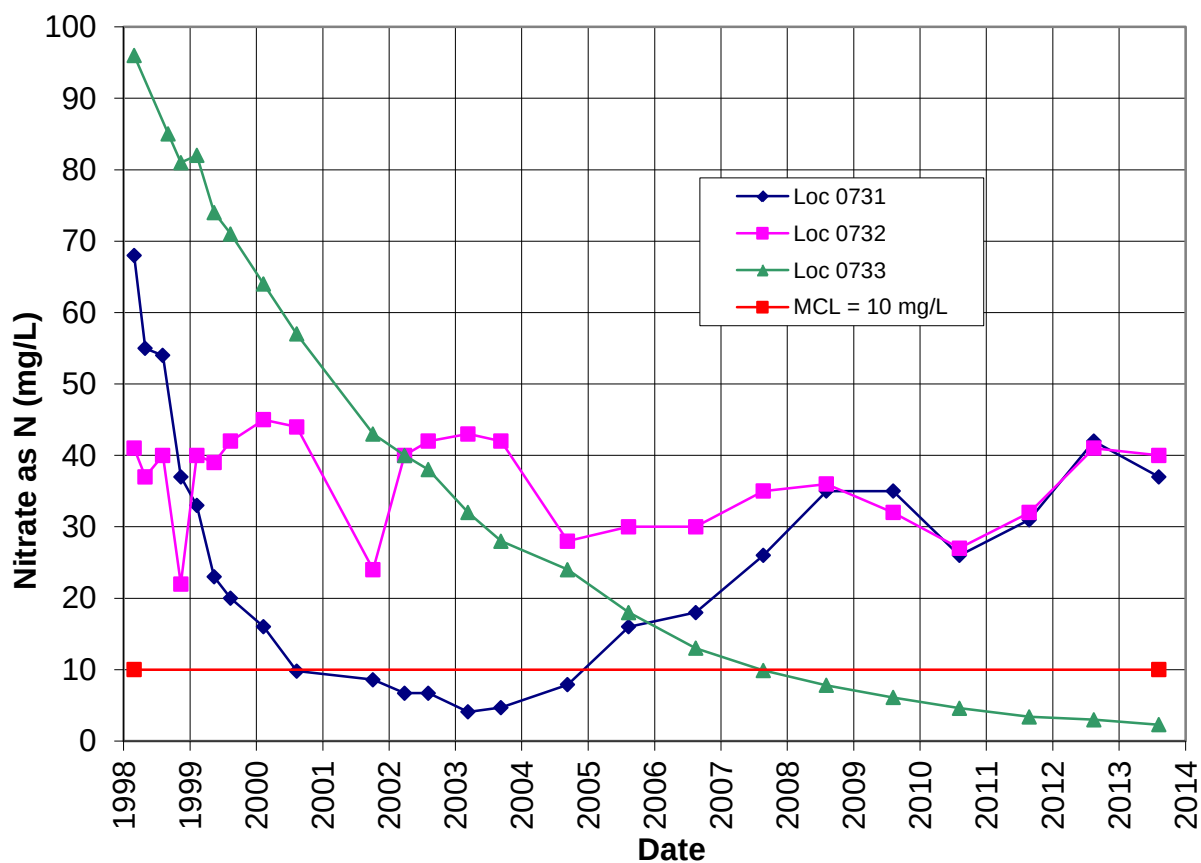


Figure 6-3. Time-Concentration Plots of Nitrate (as Nitrogen) in Groundwater at the Grand Junction Disposal Site

Selenium occurs naturally in the Mancos Shale deposits that underlie the disposal cell, and it may be the cause of the elevated concentrations reported in both paleochannel monitoring wells (0731 and 0732). Selenium concentrations continued to exceed the MCL of 0.01 mg/L in the paleochannel monitoring wells (Figure 6-4). Concentrations in well 0731 displayed a sharp decreasing trend, and the decreasing trend continued until 2003, when a slight upward trend began. Selenium concentrations in well 0731 have decreased slightly in 2013. Concentrations in well 0732 continue to display no trend. In well 0733, the selenium concentration of 0.0043 mg/L remained well below the standard, with no trend evident.

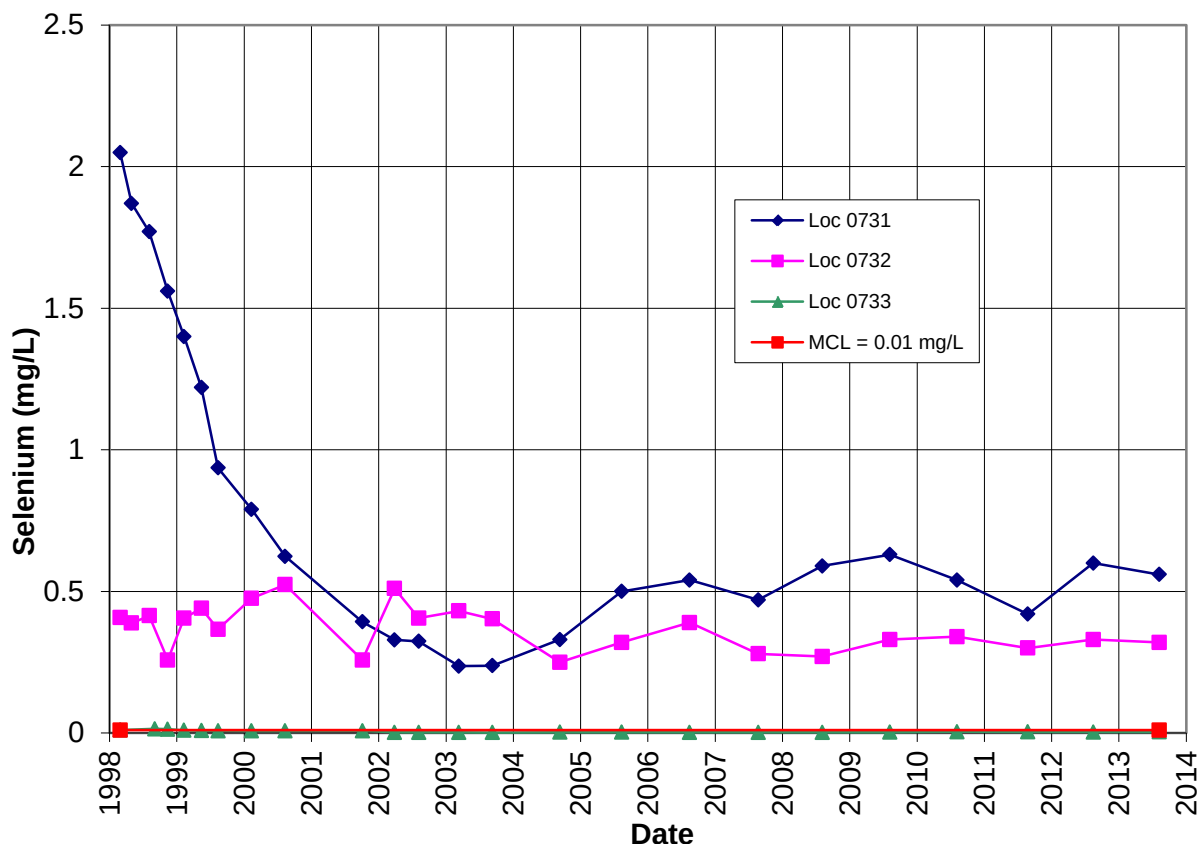


Figure 6-4. Time-Concentration Plots of Selenium in Groundwater at the Grand Junction Disposal Site

Uranium concentrations in groundwater were below the MCL of 0.044 mg/L in paleochannel monitoring wells 0731 and 0732, and were above the MCL in well 0733 (Figure 6-5). Concentrations in well 0731, after an initial increase above the MCL, have been below the MCL since 2003. Concentrations in well 0732 have been below the MCL since 1998 and have remained relatively consistent. Concentrations in well 0733 remained relatively consistent through 2003, at which time an upward trend began, which leveled off at 0.11 mg/L for the 2010 and 2011 sampling events and increased slightly to 0.14 mg/L in 2013.

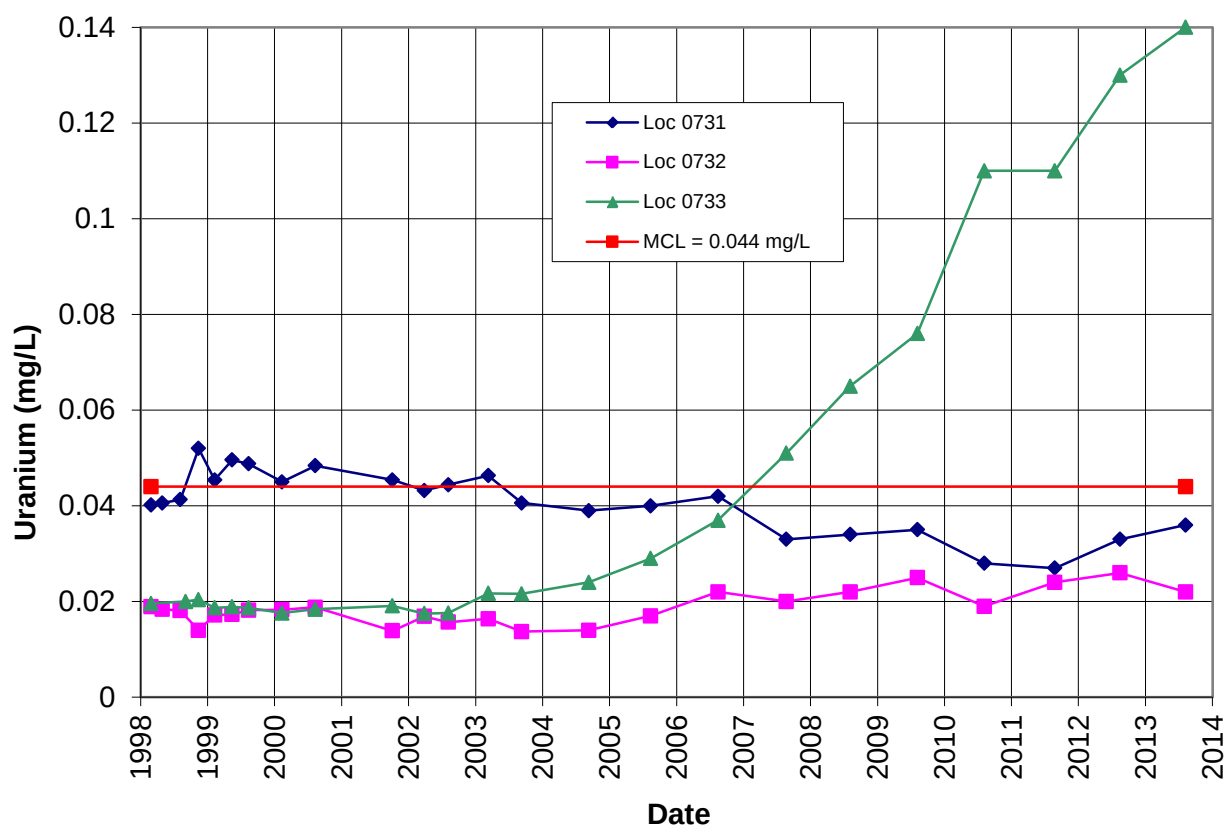


Figure 6-5. Time-Concentration Plots of Uranium in Groundwater at the Grand Junction Disposal Site

6.8 Corrective Action

Corrective action is 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 2013.

6.9 Photographs

Photo Location Number	Azimuth	Photograph Description
PL-1	90	Site entrance gate.
PL-2	85	Perimeter sign P24 and north perimeter fence.
PL-3	0	Perimeter sign P7.
PL-4	260	Boundary Monument 4.
PL-5	60	Monitoring well 0731.
PL-6	245	South slope of disposal cell.
PL-7	5	West slope of disposal cell.
PL-8	260	Southwest portion of disposal cell cover.
PL-9	335	South diversion channel and outlet.



GRJ 12/2013. PL-1. Site entrance gate.



GRJ 12/2013. PL-2. Perimeter Sign P24 and north perimeter fence.



GRJ 12/2013. PL-3. Perimeter Sign P7.



GRJ 12/2013. PL-4. Boundary Monument 4.



GRJ 12/2013. PL-5. Monitoring well 0731.



GRJ 12/2013. PL-6. South slope of disposal cell.



GRJ 12/2013. PL-7. West slope of disposal cell.



GRJ 12/2013. PL-8. Southwest portion of disposal cell cover.



GRJ 12/2013. PL-9. South diversion channel and outlet.

7.0 Green River, Utah, Disposal Site

7.1 Compliance Summary

The Green River, Utah, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on March 25, 2013. The disposal cell was in excellent condition. No maintenance needs or cause for a follow-up or contingency inspection was identified.

7.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Green River, Utah, Disposal Site* (LTSP) (DOE/AL/62350-89, Rev. 2, U.S. Department of Energy [DOE], July 1998) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 7-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 7.4
Follow-Up or Contingency Inspections	Section 7.0	Section 7.5
Routine Maintenance and Repairs	Section 8.0	Section 7.6
Groundwater Monitoring	Section 5.2	Section 7.7
Corrective Action	Section 9.0	Section 7.8

7.3 Institutional Controls

The 25-acre site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1998. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property, a 3,000-foot-radius water-well-drilling restriction, and the following features that are inspected annually: site markers, survey and boundary monuments, warning/no-trespassing signs, and a site perimeter fence.

7.4 Inspection Results

The site, southeast of Green River, Utah, was inspected on March 25, 2013. R. Johnson of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE office in Grand Junction, Colorado, conducted the inspection. R. Bush and T. Vanek of the DOE Office of Legacy Management (LM) and R. Topham of the Utah Department of Environmental Quality attended the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

7.4.1 Site Surveillance Features

Figure 1-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and on Figure 1-1 by photograph location (PL) numbers.

7.4.1.1 Entrance Gates, Entrance Signs, and Access Road

The site can be accessed either from the town of Green River or from U.S. Interstate Highway 70 via a paved road. The access route crosses State land and U.S. Army property. Perpetual access has been granted to DOE through right-of-way agreements with both agencies.

Entrance to the site is through a locked steel gate in the access road right-of-way fence; DOE does not own the gate. Past this gate, a dirt access road maintained by DOE leads across State land to the disposal site. The access road divides at the disposal cell security fence, with one branch entering the enclosure and providing access around the base of the disposal cell and the other providing access around the disposal cell security fence. The access road was in good condition, and no maintenance needs were identified.

An entrance sign is positioned on the site property boundary where the access road enters the disposal site (PL-1). The sign was in excellent condition.

7.4.1.2 Perimeter Fence and Perimeter Signs

The disposal cell is enclosed within a chainlink security fence (PL-2). The chainlink fence is set back between 50 and 250 feet from the site boundary. Two vehicle access gates are at the south and east corners of the fence line, and a personnel gate is at the north corner of the fence line. The security fence and gates were in excellent condition. Four offsite groundwater monitoring system telemetry towers have chainlink security fence enclosures (each with a locked personnel gate) to inhibit vandalism (PL-3); the enclosures were in excellent condition.

Seventeen perimeter signs are positioned on steel posts set in concrete along the unfenced site boundary. Perimeter sign P12 has a bullet dent but is legible. The other signs were in excellent condition.

7.4.1.3 Site Markers

Two granite site markers are on the site. Site marker SMK-1 is on the ground inside the southwest security fence line. Its concrete base has several minor cracks, but repairs are not needed at this time; overall, the site marker was in good condition. Site marker SMK-2, located on the crest of the disposal cell (PL-4), was in excellent condition.

7.4.1.4 Survey Monuments and Boundary Monuments

Eleven boundary monuments and three survey monuments are along the site perimeter. All of the monuments were in excellent condition.

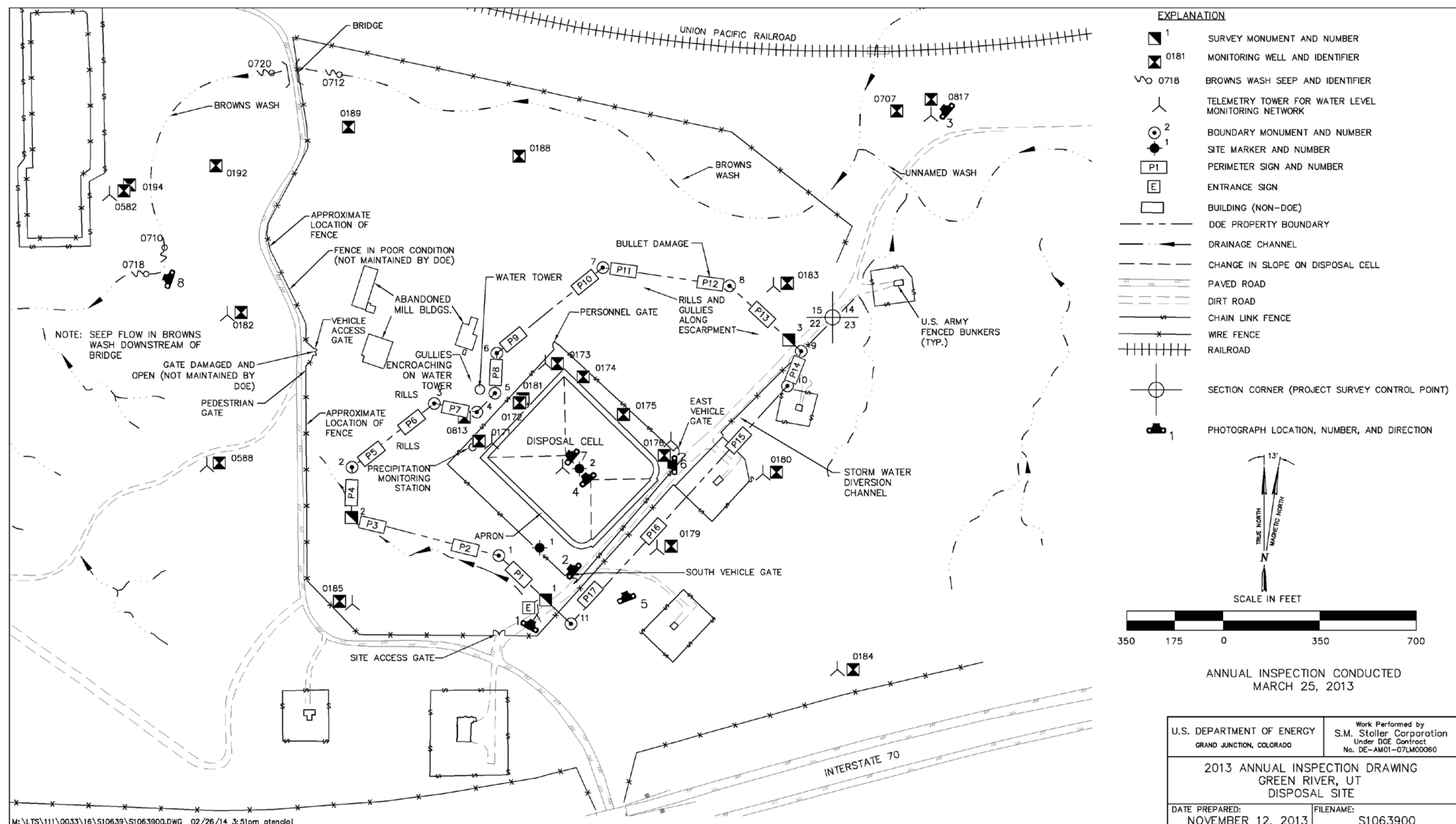


Figure 7-1. 2013 Annual Inspection Drawing for the Green River Disposal Site

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7.4.1.5 Monitoring Wells

Twenty-two groundwater monitoring wells are on or adjacent to the site. A network of 13 telemetry towers has been installed to relay and transmit continuous groundwater-level monitoring data to the DOE office in Grand Junction.

The wells were secure at the time of the inspection, and the visible portions of all wells and telemetry system components were in good condition.

7.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection: (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.

Within each inspection area, inspectors examined specific site surveillance features, drainage structures, vegetation, and other features. Inspectors also looked for evidence of settlement, erosion, or other modifying processes that might affect site integrity or long-term performance.

7.4.2.1 Disposal Cell and Adjacent Area Inside the Security Fence

The 6-acre disposal cell was completed in 1989. The slopes of the disposal cell cover are armored with basalt rock (PL-5). No evidence of any disturbance of the cell surfaces was observed. No vegetation was present on the cell. The quality of the rock is excellent, and the disposal cell cover was in excellent condition. A basalt boulder-filled trench, called an apron, surrounds the disposal cell (PL-6). The apron collects all runoff water from the cell, and the water volume is reduced by evaporation, evapotranspiration through deep-rooted shrubs that grow along the apron, and infiltration into the underlying bedrock through the sides and bottom of the apron. The apron was in excellent condition.

The area between the disposal cell and the security fence consists of the cell perimeter road, several monitoring wells and telemetry towers, and open space. This area was in excellent condition.

7.4.2.2 Site Perimeter Between the Security Fence and the Site Boundary

Rills and gullies are present on the west side of the property but do not encroach on disposal cell structures and currently are not affecting any site surveillance features. Rills and gullies are also present along the escarpment northeast of the disposal cell in the area between boundary monument BM-7 and survey monument SM-3. Maximum gully depth in this area is approximately 3 feet. The rill and gully erosion does not encroach on disposal cell structures but could eventually damage perimeter signs and boundary monuments; therefore, the erosion features in this area will continue to be monitored.

Trespassing occurs on the site from several access points through State land. The barbed-wire stock fence on the surrounding State-owned property provides only minimal security; the fence west of the site is in poor condition, and a gate providing access to the former mill buildings and the DOE site is broken off its hinges. The site is also accessible through remote open access points north and east of the property. DOE property will continue to be monitored for adverse

public use indicated by trash, tire ruts, and vandalism. No adverse impacts were observed on DOE property.

7.4.2.3 Outlying Area

The area extending outward from the site for a distance of 0.25 mile was checked for signs of erosion, development, or other disturbance that might affect site security or integrity. Areas of erosion noted during recent and previous inspections include the natural drainage southwest of the site, and rills and gullies northwest of the water tower. Minor erosion continues but currently does not threaten the integrity of the disposal cell or site surveillance features.

Abandoned buildings and a water tower associated with the former milling activities at the site are northwest and upwind of the DOE property (PL-7). The buildings are in a severe state of disrepair, and debris (e.g., roofing materials, siding, trash) tends to be blown from the buildings onto the DOE property. Accumulation of materials blown onto DOE property was not significant but will continue to be monitored; debris will be removed as necessary.

The inspection also included observation of conditions in Browns Wash. Water was flowing in the channel between the road bridge and the backwater area near the confluence with the Green River (PL-8). The streambed upstream of the bridge was dry, which indicates that the flow downstream of the bridge was from seeps. The backwater area near the mouth of Browns Wash is important because of its potential to be a fish-spawning location. The conditions of Browns Wash channel and the backwater area change substantially after each runoff event as sediment is either scoured or deposited along the channel bottom.

7.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

7.6 Maintenance and Repairs

No maintenance needs were identified during the inspection.

7.7 Environmental Monitoring

7.7.1 Groundwater Monitoring

- 7A In compliance with 40 CFR 192, Subpart A, and as stipulated in the LTSP, the groundwater monitoring network consists of four point-of-compliance (POC) wells northwest of the disposal cell (0171, 0173, 0181, and 0813). Two additional POC wells (0176 and 0179) have been added to the compliance network. The purpose of the monitoring is to evaluate the performance of the disposal cell. Additionally, wells 0188, 0189, 0192, 0194, and 0707, completed in the contaminated but low-yield Browns Wash alluvium, have been added to the groundwater monitoring network as a best management practice. The *Groundwater Compliance Action Plan for the Green River, Utah, Disposal Site* (December 2011; GCAP) adds more best-management-

practice wells. These wells (0182, 0184, 0185, and 0588) are completed in the basal unit of the Cedar Mountain Formation.

Monitoring wells 0171, 0173, 0176, 0179, 0183, 0813, and 0817 are currently providing continuous water level measurements for the contaminated middle sandstone unit of the Cedar Mountain Formation, and wells 0182, 0184, 0185, 0582, and 0588 are providing continuous water level measurements for the formation's uncontaminated basal sandstone unit. A telemetry system was installed at these wells in January 2007 to send data to the LM office in Grand Junction. Wells 0817 and 0582, completed in the middle sandstone unit and basal sandstone unit, respectively, are capped to prevent artesian flow and to allow continuous measurements of the potentiometric surface through pressure transducers.

Based on the evaluation of several years of analytical data and associated risk, the alternate concentration limits (ACLs) listed in Table 7-2 have been proposed in the GCAP. If NRC accepts the GCAP, these proposed ACLs will apply to all POC wells.

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

Constituent	Standard (mg/L)^a	Proposed ACL (mg/L)
Arsenic	0.05	5.0
Nitrate + Nitrite as Nitrogen	10	1,000
Selenium	0.05	5.0
Uranium	0.044	4.4

^a U.S. Environmental Protection Agency maximum concentration limit (40 CFR 192, Table 1).
Key: mg/L = milligrams per liter

Quarterly monitoring of the original four POC wells was conducted from 1998 through June 2007. Risk analyses have determined that there is no unacceptable risk to human health and the environment as a result of site-related contamination in groundwater near the site because the groundwater is not used and because site contaminants do not affect river water quality. Therefore, DOE determined that there was no health or cost benefit associated with continuing quarterly monitoring. Annual monitoring has been implemented instead.

7.7.1.1 Cell Performance Monitoring

Table 7-3 provides the analytical results for the June 2013 sampling event at the proposed POC wells. Time-concentration plots for the four target analytes—arsenic, nitrate, selenium, and uranium—are shown on Figures 7-2 through 7-5.

Table 7-3. 2013 Analytical Results for Point-of-Compliance Wells at the Green River Disposal Site

Monitoring Well	Arsenic (mg/L) ACL = 5.0	Nitrate ^a (mg/L) ACL = 1,000	Selenium (mg/L) ACL = 5.0	Sulfate (mg/L) No ACL	Uranium (mg/L) ACL = 4.4
	Sample Result	Sample Result	Sample Result	Sample Result	Sample Result
0171	0.0013	52	0.14	4200	0.064
0173	0.0026	64	0.037	4900	0.008
0176	0.00029	64	0.75	3900	0.0026
0179	0.00057	17	0.25	3800	0.19
0181	0.0018	67	0.016	6200	0.02
0813	0.13	0.01	0.0012	3600	0.033

^a Nitrate = nitrate plus nitrite as nitrogen
Key: mg/L = milligrams per liter

Arsenic concentrations in groundwater remain below the U.S. Environmental Protection Agency (EPA) maximum concentration limit (MCL) of 0.05 milligram per liter (mg/L) in all POC wells except well 0813, and remain considerably below the proposed ACL of 5.0 mg/L in all POC wells. In well 0813, levels continue to exceed the MCL, as shown on Figure 7-2, but are substantially below the proposed ACL.

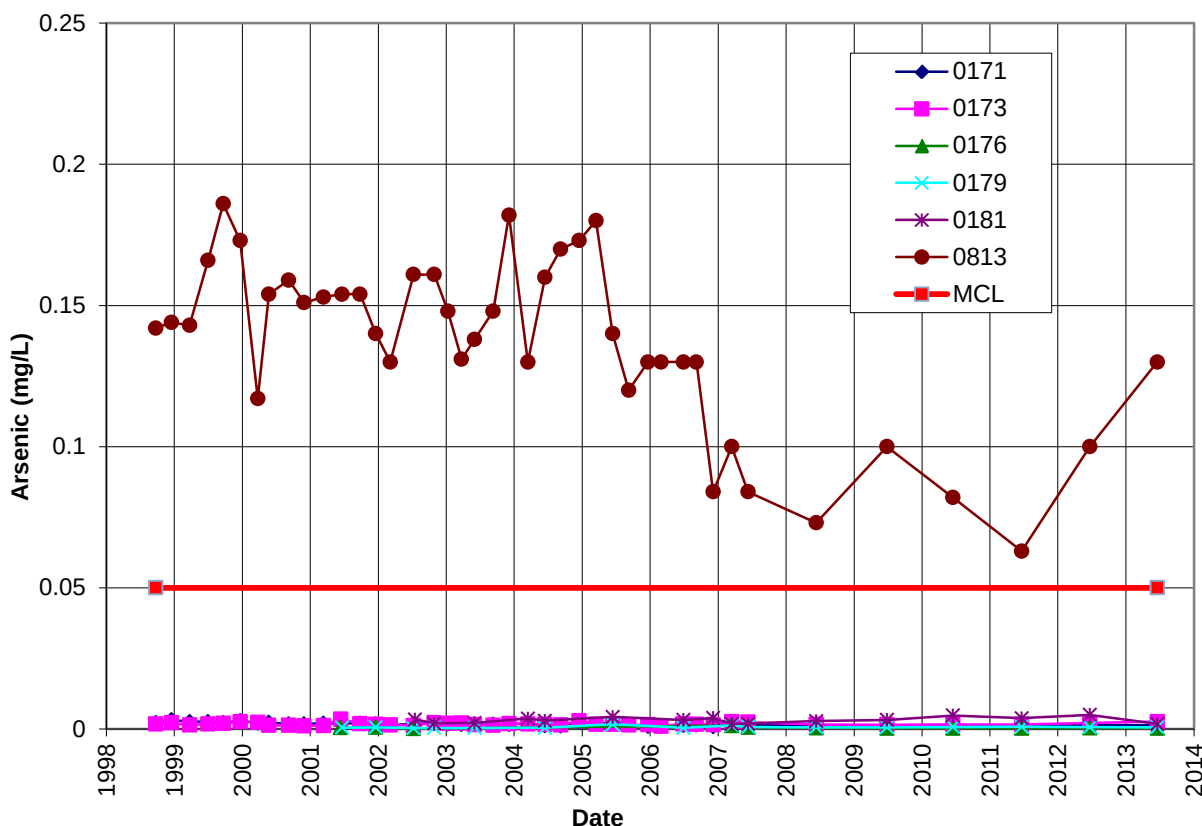


Figure 7-2. Time-Concentration Plots of Arsenic in Groundwater at the Green River Disposal Site

Nitrate concentrations have been measured as nitrate plus nitrite reported as nitrogen since early 2004 (before then, nitrate was reported as NO₃). Concentrations have continued to exceed the EPA MCL of 10 mg/L in all POC wells except well 0813, but they are considerably below the proposed ACL of 1,000 mg/L in all wells (Figure 7-3). Nitrate concentrations in well 0813

continue to be below the laboratory detection limit. Nitrate concentrations in the other wells are similar to previous measurements.

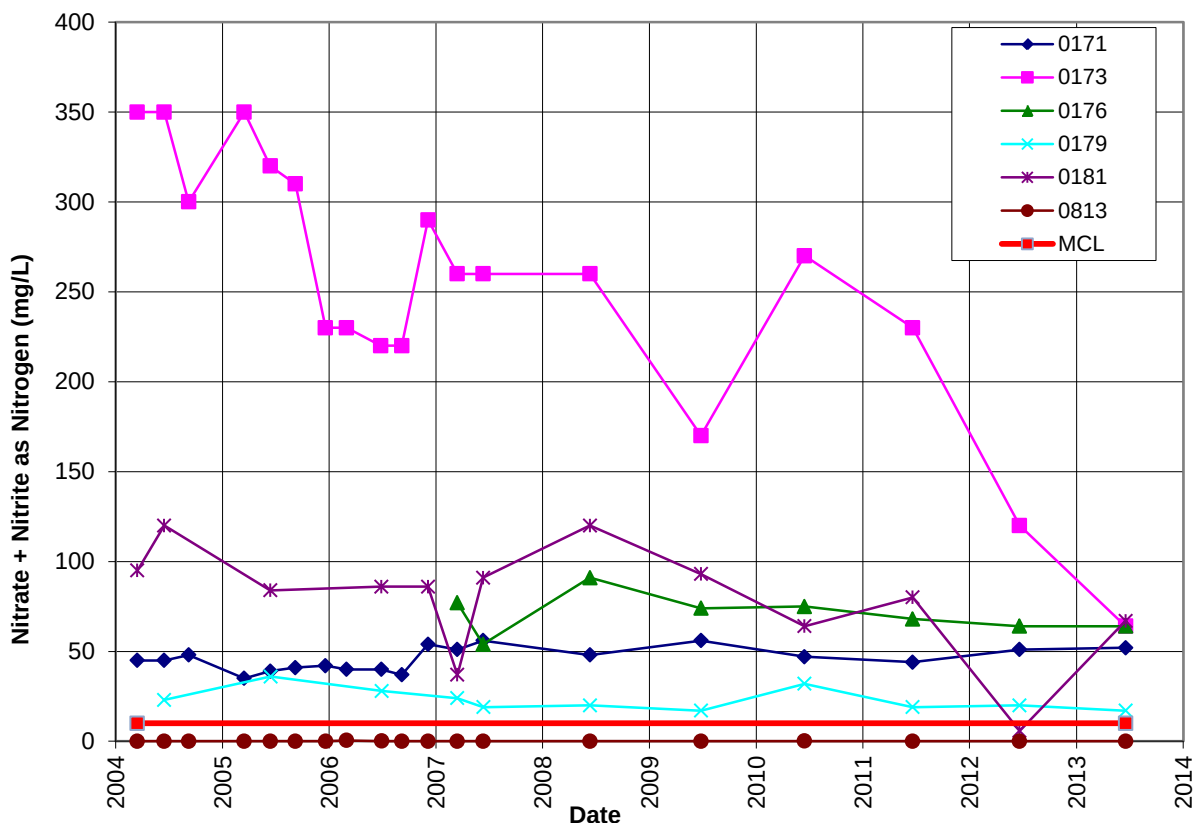


Figure 7-3. Time-Concentration Plots of Nitrate in Groundwater at the Green River Disposal Site

Selenium concentrations in wells 0181 and 0813 remain below the EPA MCL of 0.05 mg/L. Concentrations in the other wells continue to be above the standard but are substantially below the proposed ACL of 5.0 mg/L (Figure 7-4).

Uranium concentrations in groundwater remain below the EPA MCL of 0.044 mg/L in all POC wells except wells 0171 and 0179, and remain considerably below the proposed ACL of 4.4 mg/L in all POC wells. The highest uranium concentrations continue to occur in well 0179 (0.19 mg/L), which is upgradient of the disposal cell. The reason for the elevated concentration of uranium in well 0179 has not been determined, but it may be naturally occurring. At well 0171, concentrations exceed the MCL and indicate an upward trend since 1998 (Figure 7-5). Because uranium is the only constituent of concern that has indicated an upward trend in well 0171, no conclusions regarding the cause of the trend have been reached.

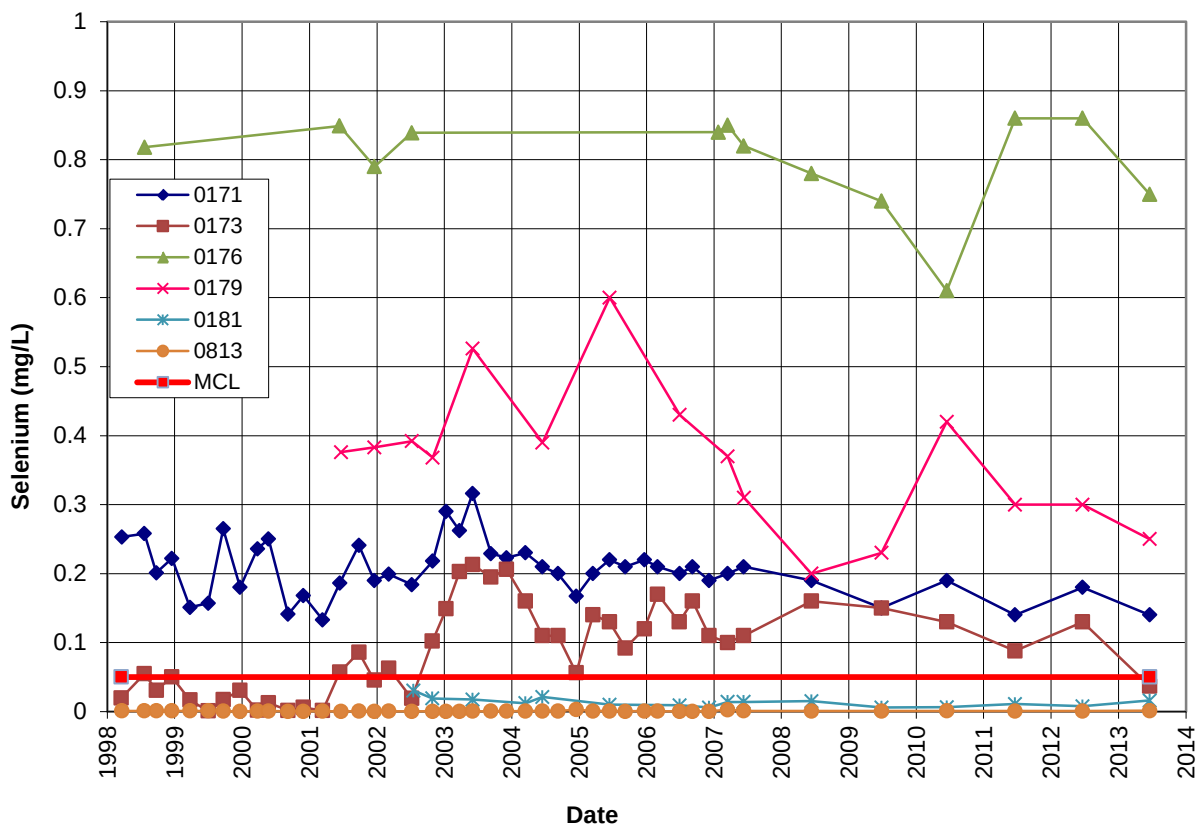


Figure 7-4. Time-Concentration Plot of Selenium in Groundwater at the Green River Disposal Site

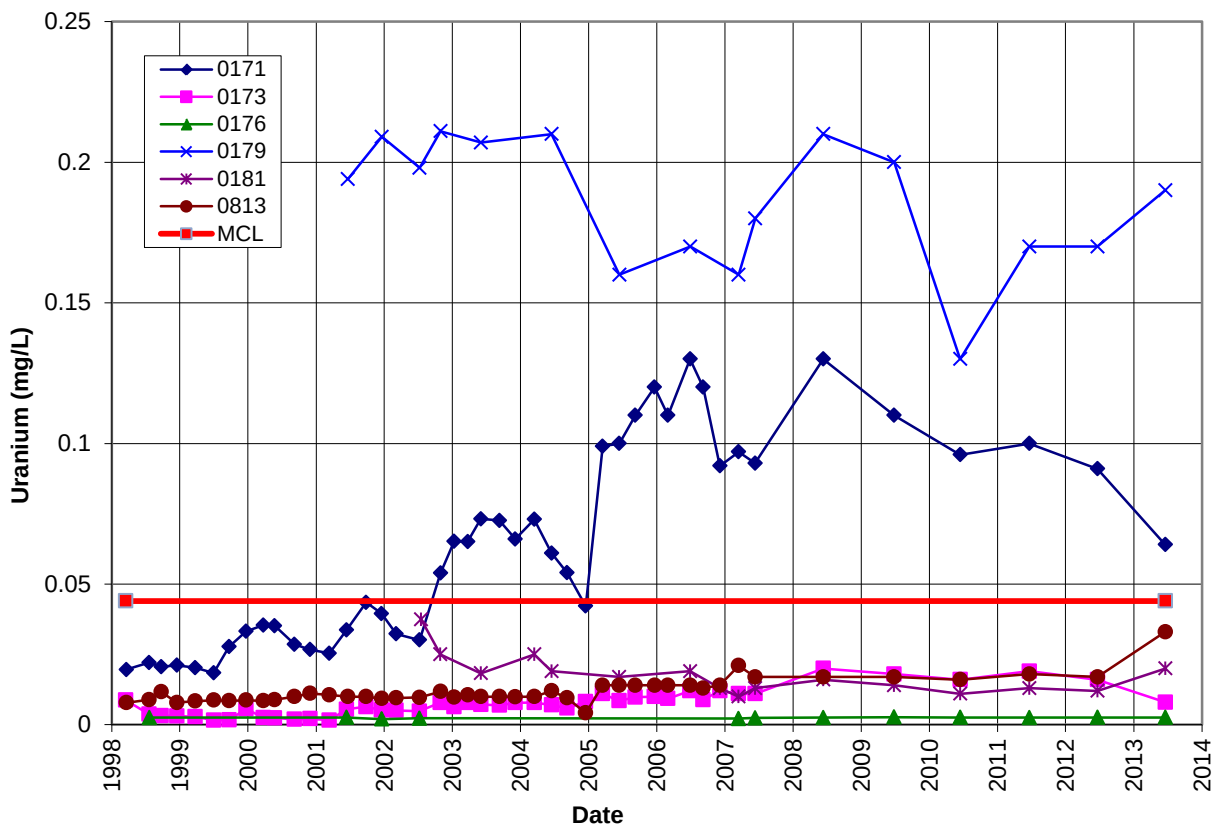


Figure 7-5. Time-Concentration Plot of Uranium in Groundwater at the Green River Disposal Site

7.7.1.2 Groundwater-Level Monitoring

Groundwater levels in several monitoring wells adjacent to the disposal cell have been measured manually since 1991, and continuously with down-hole dataloggers since 1999. Thirteen wells currently have dataloggers, and a telemetry system was installed in 2007 to transmit the continuous water level monitoring data to the LM office in Grand Junction. The purpose of continuous monitoring is to evaluate the hydraulic gradient and flow directions in the two Cedar Mountain Formation aquifers near the disposal cell.

Water level hydrographs of the POC wells, completed in the middle sandstone aquifer, indicate that the groundwater elevation decreased approximately 3 feet overall from 1998 through 2004, and then increased approximately 8 feet between 2004 and 2007. Water levels have decreased approximately 2 to 3 feet since 2007, although slight increases occurred in 2010 and 2011 (Figure 7-6).

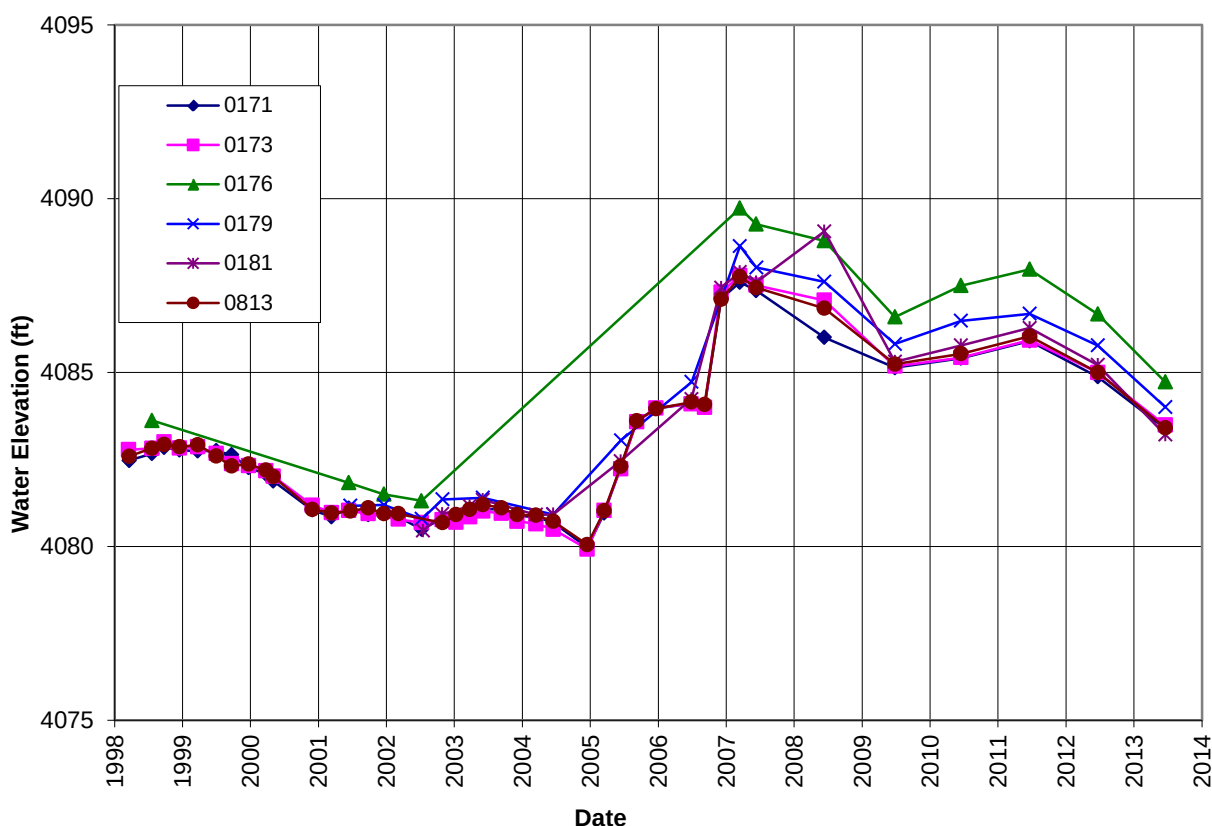


Figure 7-6. Groundwater Elevations at the Green River Disposal Site

The monitoring well locations in the two Cedar Mountain aquifers are not ideal (i.e., no nested well pairs in the upper and lower aquifers) to define both the groundwater flow directions and the hydraulic gradient between the aquifers. However, groundwater elevation data derived from the existing well network are adequate to determine that flow direction in the upper aquifer is toward the west-northwest, while flow direction in the lower aquifer is toward the southwest. The data also suggest that there is a neutral gradient between the two aquifers, therefore neither inducing nor retarding contaminant migration from the contaminated upper aquifer to the uncontaminated lower aquifer.

7.7.1.3 Browns Wash Alluvium Well Monitoring

Table 7-4 provides analytical results for the June 2013 sampling event at the wells completed in the Browns Wash alluvium. Because of the proposed application of supplemental standards, ACLs do not apply to the alluvium groundwater. Contaminants are expected to eventually be flushed out of the alluvium as the groundwater migrates toward the Green River alluvium and the Green River.

Table 7-4. 2013 Analytical Results for the Browns Wash Alluvium Wells at the Green River Disposal Site

Monitoring Well	Arsenic (mg/L)	Nitrate ^a (mg/L)	Selenium (mg/L)	Sulfate (mg/L)	Uranium (mg/L)
0188	0.00023	6.3	0.028	7400	0.072
0189	0.0004	32	0.065	7200	0.32
0192	0.00023	80	0.096	6700	0.45
0194	0.0039	330	0.09	41,000	8.8
0707	0.0003	2.8	0.073	7400	0.026

^a Nitrate = nitrate plus nitrite as nitrogen

Concentrations of arsenic, nitrate, and uranium have been steady in wells 0188 and 0192 but variable in wells 0189 and 0194. The highest arsenic, nitrate, and uranium concentrations were in well 0194. The highest and most variable selenium concentrations have been occurring in well 0192. Generally, the groundwater quality degrades from east (upgradient) to west (downgradient). This condition may indicate that the contaminated alluvium groundwater is gradually moving downgradient.

7.7.1.4 Cedar Mountain Formation Basal Unit Well Monitoring

Table 7-5 provides analytical results for the June 2013 sampling event at the wells completed in the basal unit of the Cedar Mountain Formation.

Table 7-5. 2013 Analytical Results for the Basal Unit of the Cedar Mountain Formation Wells at the Green River Disposal Site

Monitoring Well	Arsenic (mg/L)	Nitrate ^a (mg/L)	Selenium (mg/L)	Sulfate (mg/L)	Uranium (mg/L)
0182	0.0099	0.01	0.000086	620	0.0013
0184	0.0016	0.01	0.00018	650	0.0024
0185	0.0015	0.01	0.000043	490	0.00081
0588	0.01	0.01	0.000046	630	0.00022

^a Nitrate = nitrate plus nitrite as nitrogen

Beginning in 2011, these wells were added to the list of wells that are sampled annually. Data from this sampling will be used to assess any downward migration of contaminants from the middle sandstone to the basal sandstone. Because sulfate is relatively unaffected by natural attenuation, it should be a good indicator of contaminant transport and therefore has been added to the analyte list.

7.7.2 Surface Water Monitoring

According to the site conceptual model, the ultimate point of exposure for groundwater in the middle sandstone unit is the Green River, while exposure to Browns Wash alluvium water is the Green River and Browns Wash backwater. Risk analyses have determined, however, that there are no unacceptable risks to potential receptors (human or ecological) at these locations. As a best management practice, DOE monitors the surface water at these two locations to verify that any contaminated groundwater would not harm ecological receptors in Browns Wash and the Green River. Table 7-6 provides proposed surface water standards in accordance with Utah Rule R317-2, Table 2.14.2.

Table 7-6. Proposed Surface Water Standards for the Browns Wash and Green River Sampling Locations

Constituent	Surface Water Standard (mg/L)
Ammonia as nitrogen	About 0.5 to 1.0 (pH- and temperature-dependent)
Arsenic	0.150 (4-day)
Nitrate + nitrite as nitrogen	4
Selenium	0.0046 (4-day)
Uranium	No standard

A location in the Green River immediately downstream of the mouth of Browns Wash (0846) and a location in the backwater area of Browns Wash (0847) are sampled annually. Historical upgradient Green River sample location 0801 was added in 2012. Table 7-7 provides analytical results for the June 2013 sampling event. To date, no surface water sample results have exceeded the standards, and there is no indication that site contamination has degraded the surface water quality at these locations.

Table 7-7. 2013 Analytical Results for the Surface Water Locations at the Green River Disposal Site

Location	Ammonia as Nitrogen (mg/L)	Arsenic (mg/L)	Nitrate ^a (mg/L)	Selenium (mg/L)	Uranium (mg/L)
0846 (Green River)	ND	0.0013	0.023	0.00047	0.0014
0847 (Backwater)	ND	0.0011	0.14	0.0012	0.0055
0801 (Upgradient Green River)	ND	0.0011	0.041	0.00044	0.0012

^a Nitrate = nitrate plus nitrite as nitrogen

ND = not detected (below laboratory detection limit)

7.8 Corrective Action

Corrective action is 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 2013.

7.9 Photographs

Photo Location Number	Azimuth	Photograph Description
PL-1	30	Site entrance sign.
PL-2	310	Security fence along the southwest side of the disposal cell.
PL-3	310	Enclosed telemetry station at monitoring well 0817.
PL-4	320	Site marker SMK-2 on the disposal cell crest.
PL-5	340	Disposal cell.
PL-6	270	Rock apron around the east corner of the disposal cell.
PL-7	310	Former mill structures northwest of the disposal site.
PL-8	290	Area of seep 0718 at the main Cedar Mountain outcrop area.



GRN 3/2013. PL-1. Site entrance sign.



GRN 3/2013. PL-2. Security fence along the southwest side of the disposal cell.



GRN 3/2013. PL-3. Enclosed telemetry station at monitoring well 0817.



GRN 3/2013. PL-4. Site marker SMK-2 on the disposal cell crest.



GRN 3/2013. PL-5. Disposal cell.



GRN 3/2013. PL-6. Rock apron around the east corner of the disposal cell.



GRN 3/2013. PL-7. Former mill structures northwest of the disposal site.



GRN 3/2013. PL-8. Area of seep 0718 at the main Cedar Mountain outcrop area.

8.0 Gunnison, Colorado, Disposal Site

8.1 Compliance Summary

The Gunnison, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on June 3, 2013. The disposal cell and all associated surface water diversion and drainage structures were in excellent condition and functioning as designed. Six riprap test areas on the cell apron and diversion ditches were visually inspected; no rock degradation was noted when compared to 2012 photos. No maintenance needs or cause for a follow-up or contingency inspection was identified.

8.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Gunnison, Colorado, Disposal Site* (LTSP) (DOE/AL/62350-222, Rev. 2, U.S. Department of Energy [DOE], April 1997) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 8-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.0	Section 8.4
Follow-Up or Contingency Inspections	Section 3.5	Section 8.5
Routine Maintenance and Repairs	Section 5.0	Section 8.6
Groundwater Monitoring	Section 4.1	Section 8.7
Corrective Action	Section 6.0	Section 8.8

8.3 Institutional Controls

The 92-acre site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1997. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: site markers, survey and boundary monuments, warning/no-trespassing signs, a site perimeter fence, and a locked gate at the site entrance.

8.4 Inspection Results

The site, southeast of Gunnison, Colorado, was inspected on June 3, 2013. S. Campbell and R. Johnson of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE Office of Legacy Management, conducted the inspection. D. Steckley of the DOE Office of Legacy Management and M. Cosby, of the Colorado Department of Public Health and Environment attended the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

8.4.1 Site Surveillance Features

Figure 8-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and on Figure 8-1 by photograph location (PL) numbers.

8.4.1.1 Site Access, Entrance Gate, and Entrance Sign

Access to the site is off Gunnison County Road 42 onto U.S. Bureau of Land Management Road 3068 to the site entrance gate. The road to the site is an all-weather gravel road maintained by the U.S. Bureau of Land Management and was in good condition.

The entrance gate is a simple barbed-wire gate in the stock fence that surrounds the site. The entrance gate, located along the south portion of the perimeter fence, was secured by a padlock and chain to the adjoining post and was in good condition (PL-1).

An entrance sign is bolted to a perimeter fence post next to the entrance gate. The sign was in excellent condition.

8.4.1.2 Fence and Perimeter Signs

A three-strand, barbed-wire fence delineates the site; most of it is set along the property boundary. The fence was in good condition (PL-2). Two locked barbed-wire gates—one on the north fence line and the other on the east fence line—provide monitoring-well access. The gates were locked and in good condition.

Forty-five perimeter signs are bolted to the perimeter fence posts. Several perimeter signs have bullet holes but were legible. The other signs were in good condition (P-3).

8.4.1.3 Site Markers

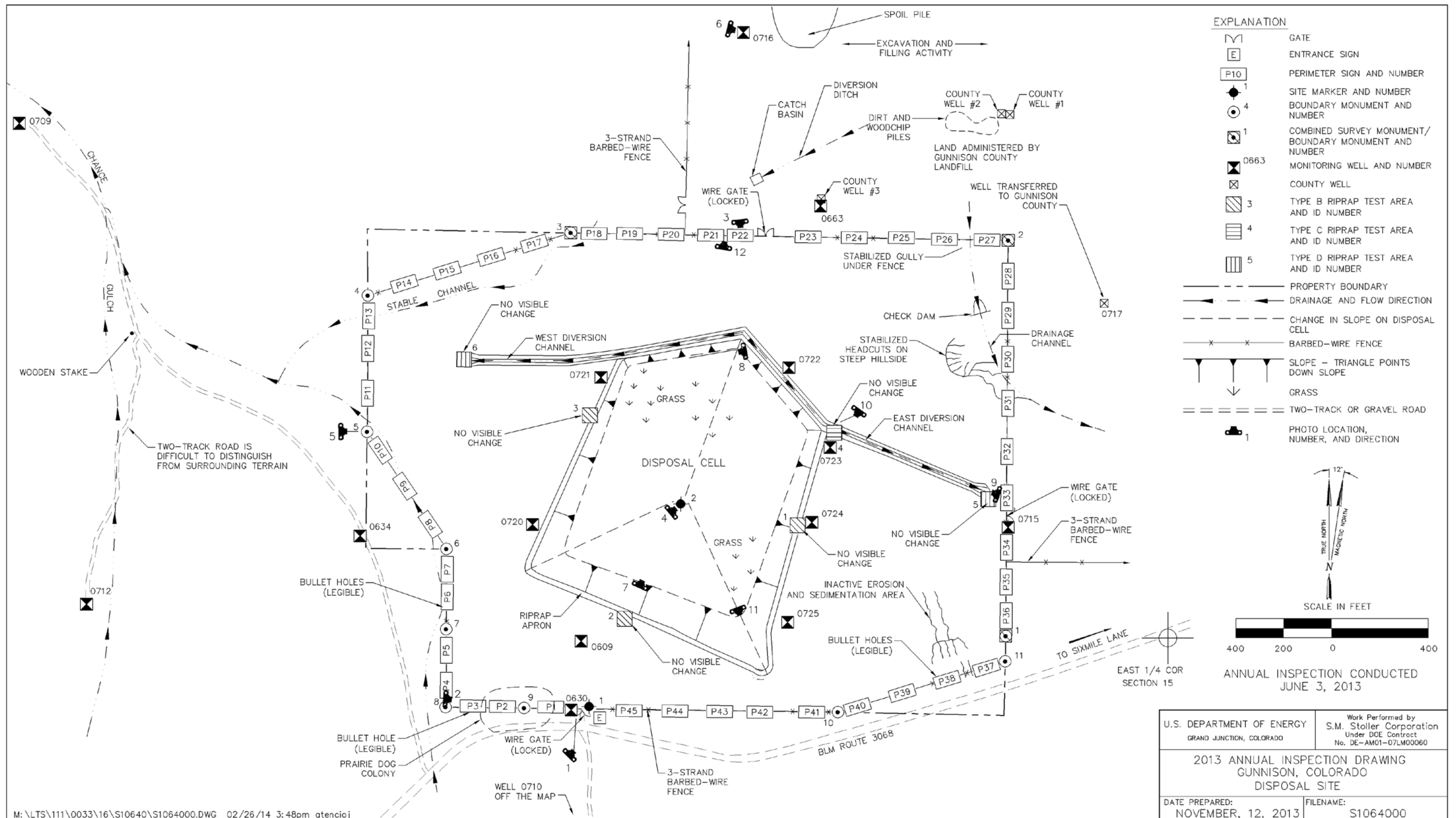
The site has two granite site markers. Site markers SMK-1 (just inside the entrance gate) and SMK-2 (on top of the disposal cell; PL-4) were in excellent condition.

8.4.1.4 Survey Monuments and Boundary Monuments

The three combined 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) were in excellent condition (PL-5).

8.4.1.5 Monitoring Wells

Sixteen wells constitute the groundwater monitoring network for the site. The wells were secure and in excellent condition. The Gunnison County landfill has placed a new overburden spoil pile near monitoring well 0716, which is located on landfill property. The landfill operators have placed concrete barriers to protect the well (PL-6).



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8.4.2 Inspection Areas

To ensure a thorough and efficient inspection, the site was divided into four inspection areas (referred to as “transects” in the LTSP): (1) the top of the disposal cell; (2) the disposal cell side slopes, apron, and diversion channels; (3) the area between the disposal cell and the site boundary; and (4) the outlying area.

Within each area, the inspectors examined specific site-surveillance features, drainage structures, vegetation, and other features. Inspectors examined each area for evidence of erosion, settling, slumping, or other disturbances that might affect the site’s integrity, protectiveness, or long-term performance.

8.4.2.1 Top of the Disposal Cell

The rock-covered top of the disposal cell was in excellent condition (PL-7). There was no evidence of erosion, settling, slumping, or rock degradation. Several isolated patches of grass are randomly distributed over the disposal cell cover; however, these shallow-rooted plants are not a cause for concern.

8.4.2.2 Disposal Cell Side Slopes, Apron, and Diversion Channels

The riprap-covered side slopes, apron, and diversion channels were in good condition (PL-8 and PL-9). No evidence of slumping, settling, rock degradation, or encroachment of vegetation was observed.

The condition of the riprap in six monitoring test areas was visually inspected. The test areas, each approximately 1 square meter in area, are in critical flow path locations in the apron and diversion channels (PL-10). The corners of each monitoring plot are marked with orange paint. The riprap in all of the test areas was in excellent condition. When the rocks were compared to the photos taken of them in 2012, there was no evidence that individual rocks had split or otherwise been degraded. As outlined in the LTSP, annual photographing and comparing of these test areas was performed through 2002; after that, the LTSP requires the test areas to be photographed every 5 years through 2017. The next and final set of photos will be taken in 2017.

Precipitation runoff from the cell occasionally ponds in a low-lying area along the southeast corner of the cell. The riparian-type vegetation that has become established there indicates that the area retains moisture much of the time. Water collection in this area does not pose a problem because the cell is designed to drain to the southeast, and any water that ponds there is below the elevation of the encapsulated tailings material. This location was dry at the time of the inspection (PL-11).

8.4.2.3 Area Between the Disposal Cell and the Site Boundary

There are reclaimed and undisturbed areas between the disposal cell and the site perimeter. Both types of areas were in good condition. No erosion concerns were observed. In general, reclaimed areas have good vegetation coverage, consisting mostly of grass. As expected, shrubs and forbs are much less abundant and less diverse in reclaimed areas than they are in undisturbed areas.

8.4.2.4 Outlying Area

Gunnison County owns the land that adjoins the site boundary to the north and east, and uses the land for a municipal landfill. Landfill operations have encroached to within approximately 400 feet of the northeast corner of the DOE property boundary. A new overburden spoil pile has been placed near monitoring well 0716 (PL-12). Although landfill activities do not appear to threaten the site, future inspections will continue to monitor the level of activity occurring near the DOE property boundaries and site surveillance features (e.g., fences, monitoring wells).

8.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

8.6 Maintenance and Repairs

No maintenance items were identified.

8.7 Environmental Monitoring

8.7.1.1 Groundwater Monitoring

- 8A** DOE monitors groundwater at the site to demonstrate compliance with U.S. Environmental Protection Agency groundwater protection standards in 40 CFR 192.03 and to demonstrate that the disposal cell is performing as designed. The monitoring network consists of 16 wells, including six point-of-compliance (POC) wells to monitor cell performance, two wells to monitor background groundwater quality, and eight wells for water level measurements.

In accordance with the LTSP, groundwater was sampled and water levels were measured annually from 1998 through 2001. Following the 2001 sampling event, the monitoring frequency changed to once every 5 years. The most recent sampling event was in 2011.

The indicator analyte for cell performance at the site is uranium. This analyte was selected on the basis of its presence in tailings pore fluid, its relatively high mobility in groundwater, and its low concentration in upgradient (background) groundwater. The target concentration for uranium is 0.013 milligram per liter (mg/L). The basis for this value is the maximum observed concentration of uranium in background samples determined before long-term surveillance and maintenance activities began. The maximum concentration limit for uranium that the U.S. Environmental Protection Agency established in Table 1 to Subpart A of 40 CFR 192 is 0.044 mg/L.

Table 8-2. Active Monitoring Wells at the Gunnison Disposal Site

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

Groundwater at the site was sampled in May 2011. The concentrations of uranium in samples collected at background wells 0609 and 0716 were 0.0038 mg/L and 0.0022 mg/L, respectively. The concentrations of uranium in samples collected from POC wells ranged between 0.001 mg/L and 0.005 mg/L, which is consistent with historical results. Uranium results from the POC wells were an order of magnitude below the action level of 0.013 mg/L, indicating that the disposal cell continues to perform as an efficient containment system. The groundwater will be sampled again in 2016.

8.8 Corrective Action

Corrective action is 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 2013.

8.9 Photographs

Photo Location Number	Azimuth	Photograph Description
PL-1	45	Site entrance gate.
PL-2	95	Site perimeter fence looking east from boundary monument BM-8.
PL-3	175	Perimeter sign P22 and the disposal cell.
PL-4	50	Site marker SMK-2 on top of the disposal cell.
PL-5	90	Boundary monument BM-5.
PL-6	105	Monitoring well 0716 protected by concrete barriers.
PL-7	25	Top of the disposal cell and the Gunnison County landfill in the background.
PL-8	260	Northwest side of the disposal cell and the west diversion channel.
PL-9	290	View upgradient of the east diversion channel.
PL-10	215	Riprap test area No. 4 in the east diversion channel.
PL-11	160	Southeast corner of the disposal cell (no runoff water accumulation).
PL-12	10	New spoil pile at the Gunnison County landfill.



GUD 6/2013. PL-1. Site entrance gate.



GUD 6/2013. PL-2. Site perimeter fence looking east from boundary monument BM-8.



GUD 6/2013. PL-3. Perimeter sign P22 and the disposal cell.



GUD 6/2013. PL-4. Site marker SMK-2 on top of the disposal cell.



GUD 6/2013. PL-5. Boundary monument BM-5.



GUD 6/2013. PL-6. Monitoring well 0716 protected by concrete barriers.



GUD 6/2013. PL-7. Top of the disposal cell and the Gunnison County landfill in the background.



GUD 6/2013. PL-8. Northwest side of the disposal cell and the west diversion channel.



GUD 6/2013. PL-9. View upgradient of the east diversion channel.



GUD 6/2013. PL-10. Riprap test area No. 4 in the east diversion channel.



GUD 6/2013. PL-11. Southeast corner of the disposal cell (no runoff water accumulation).



GUD 6/2013. PL-12. New spoil pile at the Gunnison County landfill.

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9.0 Lakeview, Oregon, Disposal Site

9.1 Compliance Summary

The Lakeview, Oregon, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected August 27 and 28, 2013. Other than some ongoing concern with erosion-control rock riprap degradation, the disposal cell was in good condition. No additional maintenance needs or cause for a follow-up or contingency inspection was identified.

The U.S. Department of Energy (DOE) has been evaluating the condition of the riprap to ensure continued long-term protection of the cell from erosion during a severe precipitation event. The degradation of the rock riprap, observed at the site since the mid-1990s, has been monitored as part of the annual inspections to determine the mean diameter (D_{50}) value of the riprap on the west side slope. The D_{50} value obtained by the annual gradation monitoring measures the number of rocks retained per sieve size. The D_{50} value measured during the 2013 gradation monitoring is 2.70 inches, which falls within the original D_{50} design size range of 2.7 to 3.9 inches for the Type B side slope riprap, as specified in the *Long-Term Surveillance Plan for the Collins Ranch Disposal Site, Lakeview, Oregon* (LTSP) (DOE/AL/62350-19F, Rev. 3, DOE, August 1994). The 2013 D_{50} value is 0.04 inch smaller than the value of 2.74 inches measured during the gradation monitoring in 2012.

9.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the LTSP and in procedures that DOE established to comply with the 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 Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.1	Section 9.4
Follow-Up or Contingency Inspections	Section 7.0	Section 9.5
Routine Maintenance and Repairs	Section 8.0	Section 9.6
Groundwater Monitoring	Section 5.3	Section 9.7
Corrective Action	Section 9.0	Section 9.8

9.3 Institutional Controls

The 40-acre site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1995. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: site markers, survey and boundary monuments, warning/no-trespassing signs, a site perimeter fence, and locked gates at the site entrances.

9.4 Inspection Results

The site, northwest of Lakeview, Oregon, was inspected on August 27 and 28, 2013. A. Houska, C. Goodknight, and D. Nordeen of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE Office of Legacy Management in Grand Junction, Colorado, conducted the inspection. J. Dayvault of the DOE Office of Legacy Management, D. Engstrom of the Oregon Department of Energy, and Z. Cruz and M. Meyer of NRC attended the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring. Rock gradation monitoring of the erosion control rock riprap on the west side slope is also conducted as part of the inspection at the site.

9.4.1 Site Surveillance Features

Figure 9-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and on Figure 9-1 by photograph location (PL) numbers.

9.4.1.1 Entrance Gates, Entrance Signs, and Access Road

Access to the site is gained by traveling a gravel road that heads west off County Road 2-16B. DOE was granted a perpetual easement on the approximately 1.2 mile access road between the county road and the DOE property boundary. A locked gate across the access road on the adjacent privately owned land limits access to the site. The site access road is a gravel-surfaced road in good condition, as shown in PL-1.

The site gate and the pedestrian gate were locked and in good condition. The site's entrance sign was in good condition and clearly visible. No recent indication of vandalism was observed at the site during the inspection.

9.4.1.2 Perimeter Fence and Perimeter Signs

The 12 perimeter signs were in good condition and clearly visible from outside the site, with the exception of perimeter sign P2, which was partially blocked by vegetation. The vegetation will be removed during a 2014 site visit.

The site boundary fence is generally in good condition, but some loose and broken wire strands, and two loose t-posts were noted. Tightening and maintenance of the fence will likely be performed during 2014, as will some removal of vegetation near, and involved in, the fence line (PL-2).

9.4.1.3 Site Markers

The two site markers—SMK-1, located near the site entrance, and SMK-2 on top of the disposal cell—are in good condition (PL-3).

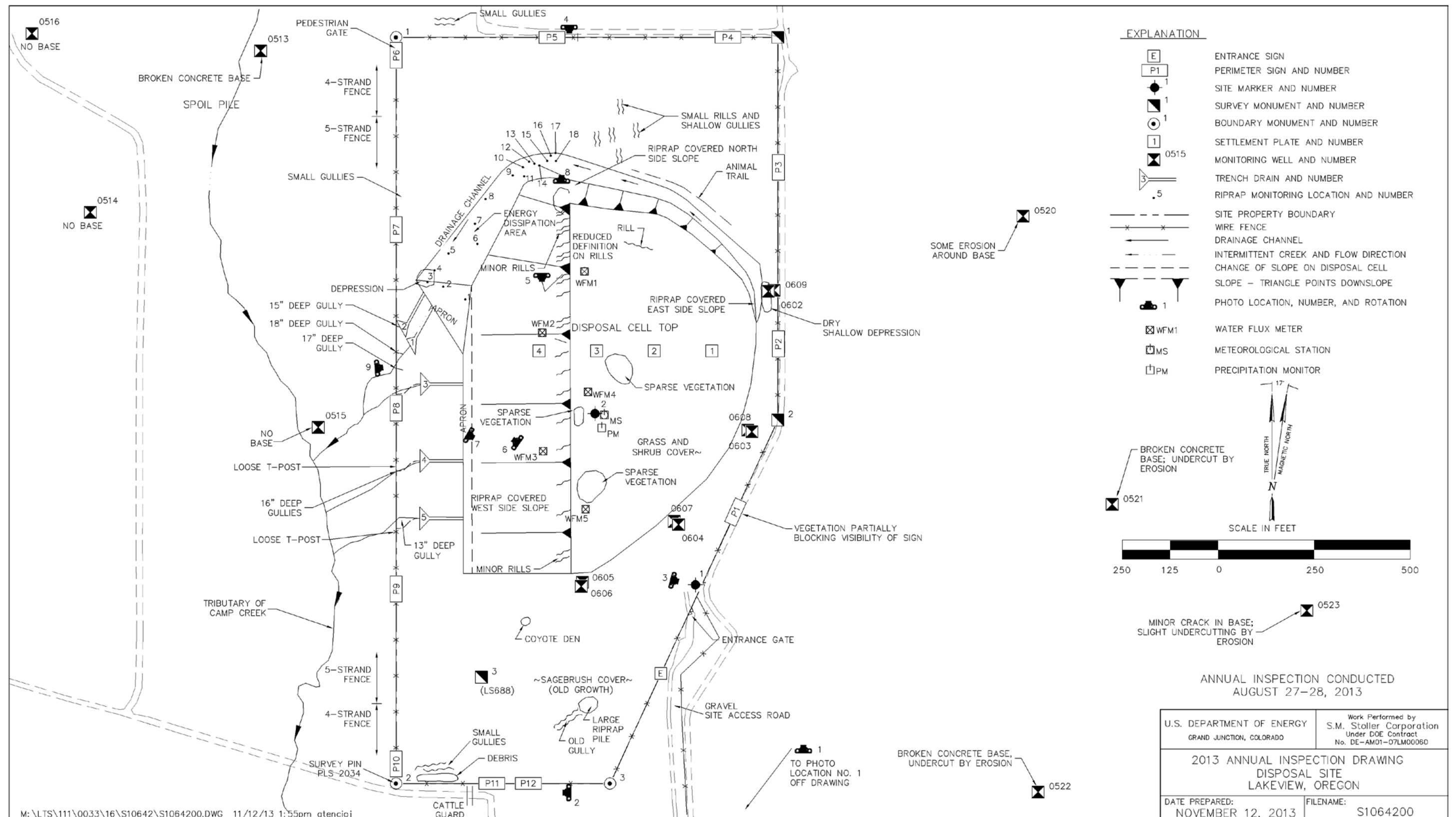


Figure 9-1. 2013 Annual Compliance Drawing for the Lakeview Disposal Site

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9.4.1.4 Survey Monuments and Boundary Monuments

The three survey monuments and three boundary monuments are in good condition.

9.4.1.5 Monitoring Wells

The groundwater monitoring network comprises eight onsite point-of-compliance wells (four monitoring well pairs: 0602/0609, 0603/0608, 0604/0607, and 0605/0606) located east and south of the cell and one upgradient compliance well (0515) located offsite to the west of the disposal site. All nine wells were inspected and observed to be locked, labeled, and in good condition.

Seven additional DOE-owned monitoring wells (0513, 0514, 0516, 0520, 0521, 0522, and 0523) are on privately owned property near the site but are not part of the groundwater compliance monitoring network. These wells were also inspected and observed to be locked and labeled, but in fair condition. Of the five offsite wells with concrete surface pads, three are cracked or broken and had some soil undercutting from water and wind erosion.

9.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection: (1) the top of the disposal cell; (2) the side slopes of the disposal cell and adjacent drainage channel, aprons, and trench drains; and (3) the site perimeter and the outlying area. PL-4 provides a good overview of the site layout.

Within each area, inspectors examined specific site surveillance features, drainage structures, vegetation, and other features. Inspectors examined each area for evidence of erosion, settling, slumping, or other disturbances that might affect the site’s integrity, protectiveness, or long-term performance.

9.4.2.1 Top of Disposal Cell

At the time of cell construction, the entire cell top slope was covered in 12 inches of Type A riprap, and 4 inches of soil was placed over the riprap. The soil was included to allow for a grass cover to be established, which would help minimize the visual impacts of the cell. The design for the top of the disposal cell has created conditions that favor the growth of deep-rooted plants by the movement of precipitation through the riprap, bedding, and compacted soil (radon barrier) layers. Grasses and forbs (rabbitbrush, sagebrush, and bitterbrush plants) growing on the top of the disposal cell have gradually increased over the years, and areas of deeper-rooted wheatgrasses have spread. Some sparsely vegetated areas still remain on the top of the disposal cell. In general, the vegetation at the site appeared to be drier than in previous years, which would be expected given the drought conditions in the region during the past year.

Riprap was observed through the soil on the top slope in numerous small areas during the inspection. The areas ranged in size from approximately 4 inches to 1.5 feet. These areas are intermittently located across the top slope and are likely caused by the soil infilling into the riprap void spaces below. No structural or cell performance concerns are associated with the riprap becoming visible on the top slope.

The beginning development of soil checkerboard erosion patterns was observed sporadically in some of the more sparsely vegetated areas on the top slope; no changes were noted during this year's inspection. This minor erosion pattern could indicate that water on the top slope is attempting to channelize, or it could be associated with the soil settling into the riprap voids beneath the soil. No structural or cell performance concerns are associated with this condition because the riprap rock cover is continuous beneath the top-slope soil cover, the slope crests, and the side slopes. However, future inspections will monitor this condition.

The contact boundary between the cell top and side slopes was inspected and generally appears stable and uniform except at the northernmost corner of the side slopes, where some soil has been transported off the top slope, allowing for some grass to establish at the top of the side slopes. Approximately 25 minor erosion rills previously noted at the site along the top of the west side slope appeared to be reduced in depth and definition during this inspection. The crest of the west side slope is shown on PL-5. The extent of rilling on the west side slope will continue to be monitored during future annual inspections. No structural or cell performance concerns are associated with the minor encroachment of the grass onto the side slope or the presence of the minor rills because the riprap rock cover is continuous beneath the top-slope soil cover, the slope crests, and the side slopes.

No evidence of active animal burrowing on the top slope or evidence of cell settlement, displacement, or slumping was observed during the inspection.

9.4.2.2 Side Slopes and Adjacent Drainage Channel, Apron, and Trench Drains

Deterioration of the basalt riprap at the site is probably due to physical weathering and chemical processes. The extent of rocks crumbling on the surface appears to have increased in the mid-1990s, and inspections will continue to include rock monitoring. No evidence of cell settlement, displacement, or slumping was observed.

- 9A** Addendums to the LTSP commit DOE to annually determining the D_{50} value of the west side slope riprap through gradation monitoring to ensure that the riprap is large enough to protect the disposal cell from a major precipitation event. This gradation monitoring method measures the number of rocks retained per sieve size. In 2013, the gradation monitoring was performed for the 17th consecutive year, as shown in PL-5, PL-6, and PL-7. With NRC's consent, an additional sieve size (1 inch) has been included in the monitoring since 2009. Sampling locations are randomly selected before each monitoring event. Particle size distribution by count data were collected at 20 random locations, and approximately 25 rocks were sampled at each location. An evaluation of the rock size measurement data indicates that the west side slope riprap D_{50} is 2.70 inches with a 95 percent confidence interval between 2.45 and 2.96 inches. The 2013 D_{50} value is 0.04 inch smaller than the value of 2.74 inches measured during the 2012 gradation monitoring. Figure 9-2 is a graph that shows the results of the gradation monitoring since 1997. As shown on the graph, the downward curve of D_{50} values appears to have somewhat leveled off over the past 10 years. Earlier results appear to indicate a gradual overall decrease in the cover rock D_{50} size.

The annual photographic monitoring of the 18 photograph points for long-term rock monitoring was conducted in the energy dissipation area (EDA). PL-8 shows the rock at monitoring point location 14. Minor rock degradation has been observed since monitoring began at the original 10 photograph locations established in 1997 and at the eight additional locations established in

2000. The rock type used in the EDA and drainage channel areas is much more homogeneous than the varied rock types used on the side slopes, and appeared in good condition.

Water previously observed at times in the large depression in the EDA at the lower end of the drainage channel was absent. Water is potentially a concern because inundation may accelerate deterioration of the large riprap by the freeze-thaw process, although the rocks used in the EDA are apparently not as susceptible to freeze-thaw as other rock types present on the cell.

Minor amounts of grass have encroached on the riprap on the side slopes, on the upper (eastern) part of the drainage channel, on the EDA at the lower end of the drainage channel, and on the western apron area. The relatively sparse plant growth in the drainage channel will not affect the function of the channel and is not considered a problem. A few small bushes were observed this year in the upgradient portion of the drainage channel, but their presence will not obstruct water flow. This vegetation is routinely evaluated at each inspection. Should the potential for flow obstruction become a concern in the future, maintenance activities would be performed. An area of dense, long grass exists near trench drains 1 and 3, which suggests wetter conditions would be periodically expected in this area due to the runoff control features' normal fluctuations. No ponded water was observed. Some sporadic areas of soil cracking were observed in the areas west of the trench drains, but the grasses covering this area are dense and provide erosion protection.

9.4.2.3 Site Perimeter and Outlying Area

This area includes the seeded grass area extending from the disposal cell to the site boundary, the site fence, and the area within 0.25 mile surrounding the site.

Gullies that formed in seeded areas extending west of trench drains 1 through 5 were filled with rock in 2000. Although the rock has generally arrested the headcutting that was proceeding from the Byers property onto the DOE property, some minor headcutting is still evident, although it did not appear to be recent. Several small gullies have formed in heavily grazed areas downslope of the fence line onto the Byers property and were identified during previous inspections, as shown in PL-9. No indication of recent erosion was observed. Although no repairs were warranted at the time of the inspection, minor maintenance will likely be performed in this area during 2014.

Small gullies were identified in past years along the southern side of the site inside the fence. These gullies are located downhill of an inclined road that intersects the fence line near a cattle guard and probably represent overflow along the road during rain events. This area has not shown evidence of recent erosion. No maintenance is required in this area.

Several small rills and shallow gullies were observed onsite in the area north of the cell where grass reestablishment has been limited but appear unchanged from the 2012 inspection. No maintenance is required in this area, but the area will be monitored during future inspections.

The landowner had cleared an open trail area along the exterior of the south and southeast site fence since the previous inspection.

LAKEVIEW TYPE B RIPRAP

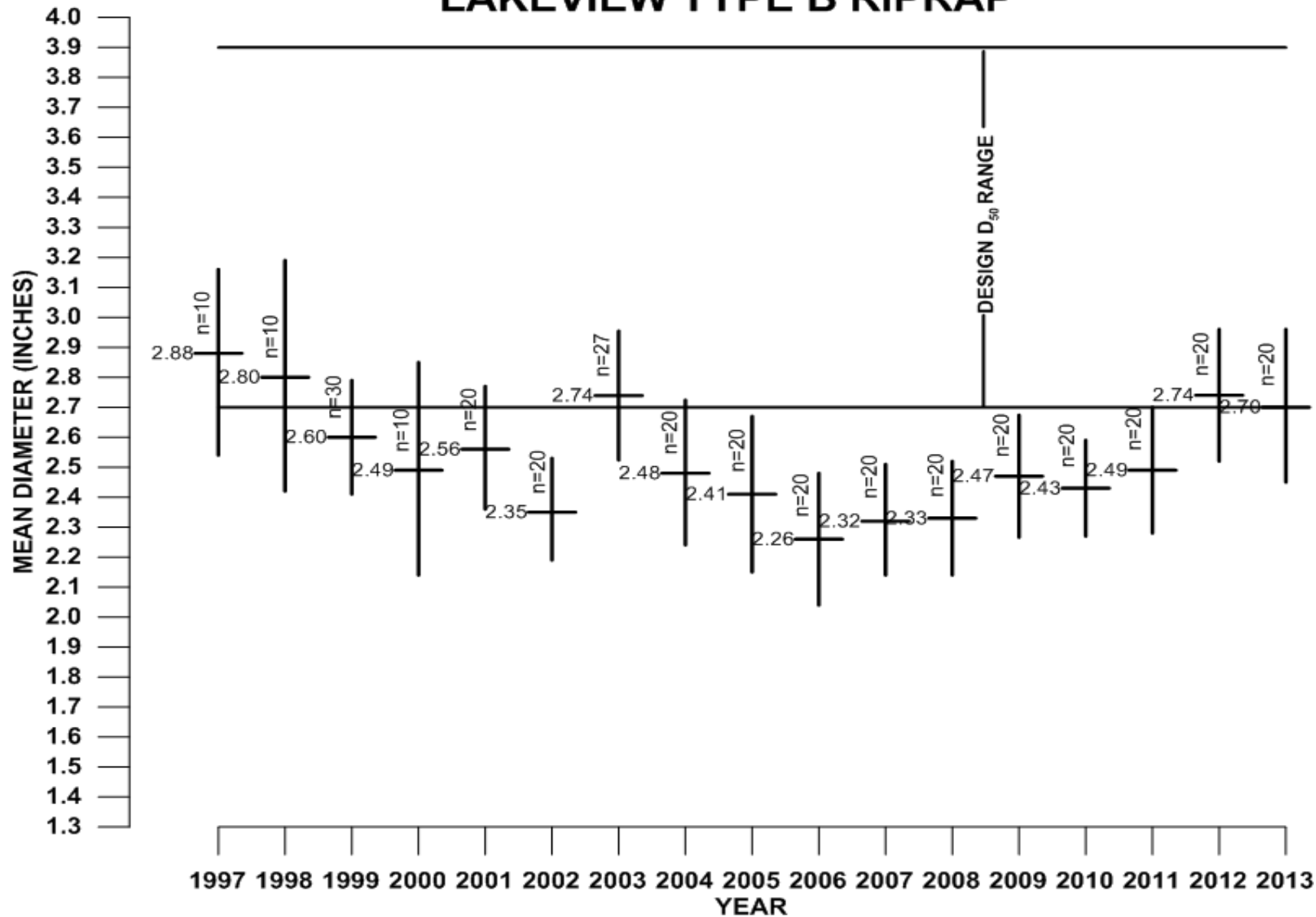


Figure 9-2. Riprap Gradation Monitoring

9.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

9.6 Maintenance and Repairs

No extensive maintenance needs were identified during the inspection.

9.7 Environmental Monitoring

9.7.1 Groundwater Monitoring

- 9A** DOE monitors groundwater quality in the uppermost aquifer at this site once every 5 years to demonstrate that the disposal cell is not leaching contaminants. No groundwater monitoring was performed in 2013. The most recent sampling event was performed in 2009. Constituents analyzed every 5 years include arsenic, cadmium, and uranium. Maximum concentration limits established by the U.S. Environmental Protection Agency in Table 1 to Subpart A of 40 CFR 192 are 0.05 milligram per liter (mg/L) for arsenic, 0.01 mg/L for cadmium, and 0.044 mg/L for uranium. Concentrations of these constituents detected in the monitoring wells were well below their respective limits in 2009. They also were consistent with sampling results from 2004 and remained within the historical range. Based on the monitoring results to date, there is no indication of any degradation of groundwater in the vicinity of the site. The next cell performance groundwater monitoring is scheduled for 2014. Results from that event will be included in the Annual Site Inspection and Monitoring Report.

9.8 Corrective Action

Corrective action is 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 2013.

9.9 Photographs

Photograph Location Number	Azimuth	Description
PL-1	N/A	Gravel site access road. View to north.
PL-2	270	View to west along south fence line. Shrub involvement with fence shown.
PL-3	105	Site marker SMK-1 near entrance gate.
PL-4	180	View to south across site from north site fence. North and west rock side slopes, and energy dissipation area are shown.
PL-5	180	View to south from intersection of top slope and west side slope. Rock monitoring being conducted on west side slope.
PL-6	305	Rock monitoring on west side slope with NRC and State of Oregon representatives observing. View to west.
PL-7	120	NRC and DOE representatives on west side slope.
PL-8	N/A	Riprap photo-monitoring location 14 in EDA.
PL-9	85	Gullying at west fence line showing erosion around fence stake.



LKV 8/2013. PL-1. Gravel site access road. View to north.



LKV 8/2013. PL-2. View to west along south fence line. Shrub involvement with fence shown.



LKV 8/2013. PL-3. Site marker SMK-1 near entrance gate.



LKV 8/2013. PL-4. View to south across site from north site fence. North and west rock side slopes, and energy dissipation area are shown.



LKV 8/2013. PL-5. View to south from intersection of top slope and west side slope. Rock monitoring being conducted on west side slope.



LKV 8/2013. PL-6. Rock monitoring on west side slope with NRC and State of Oregon representatives observing. View to west.



LKV 8/2013. PL-7. NRC and DOE representatives on west side slope.



LKV 8/2013. PL-8. Riprap photo-monitoring location 14 in EDA.



LKV 8/2013. PL-9. Gullying at west fence line showing erosion around fence stake.

10.0 Lowman, Idaho, Disposal Site

10.1 Compliance Summary

The Lowman, Idaho, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on July 16, 2013. The disposal cell was in excellent condition. Erosion was again noted on adjacent state-owned property and reported to the state representatives who attended the inspection. Steep areas to the north and west of the disposal cell remain stable and vegetated. An ongoing concern at this site is the control of noxious weed populations; five species of noxious weeds were present during the annual inspection and are being controlled with herbicide or biocontrol insects. No additional maintenance needs or cause for a follow-up or contingency inspection was identified.

10.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the U.S. Department of Energy Lowman, Idaho, (UMTRCA Title I) Disposal Site* (LTSP) (DOE-LM/GJ771-2005, Revision 2, January 2005) and in procedures that the U.S. Department of Energy (DOE) established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 10-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.3	Section 10.4
Follow-Up or Contingency Inspections	Section 3.4	Section 10.5
Maintenance and Repairs	Section 3.5	Section 10.6
Groundwater Monitoring	Section 3.7	Section 10.7
Corrective Action		Section 10.8

10.3 Institutional Controls

The 18-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1994. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site consist of federal ownership of the property, warning/no trespassing signs (referred to as perimeter signs) placed along the property boundary, and a locked gate across the access road that leads to the site from Idaho State Highway 21. Verification of these institutional controls is part of the annual inspection, and the results are included in this report. The site is not fenced, but the topography and forest vegetation prevent vehicle access around the access gate or along the site perimeter.

10.4 Inspection Results

D. Traub and L. Sheader of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE office in Grand Junction, Colorado, conducted the inspection on July 16, 2013. M. Kautsky, of the DOE Office of Legacy Management also attended the inspection.

C. Cody and D. Nygard, both of the Idaho Department of Environmental Quality, were on site during the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

10.4.1 Site Surveillance Features

Figure 10-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and in Figure 10-1 by photograph location (PL) numbers.

10.4.1.1 Entrance Gate, Entrance Sign, and Access Road

The site is at the end of a hard-packed gravel road about 650 feet north of Idaho State Highway 21. The road is in excellent condition. A locked gate spans the road about 150 feet from the state highway and is in excellent condition (PL-1).

10.4.1.2 Perimeter Fence and Perimeter Signs

Eighteen perimeter signs delineate the perimeter of the site. The 18 perimeter signs are on steel posts along the site boundary. Bullet holes previously have been identified in perimeter signs P2, P3, and P15, and the entrance sign near site marker 1. Bullet indentations have been identified on perimeter sign P13. These signs remain legible and do not need to be replaced.

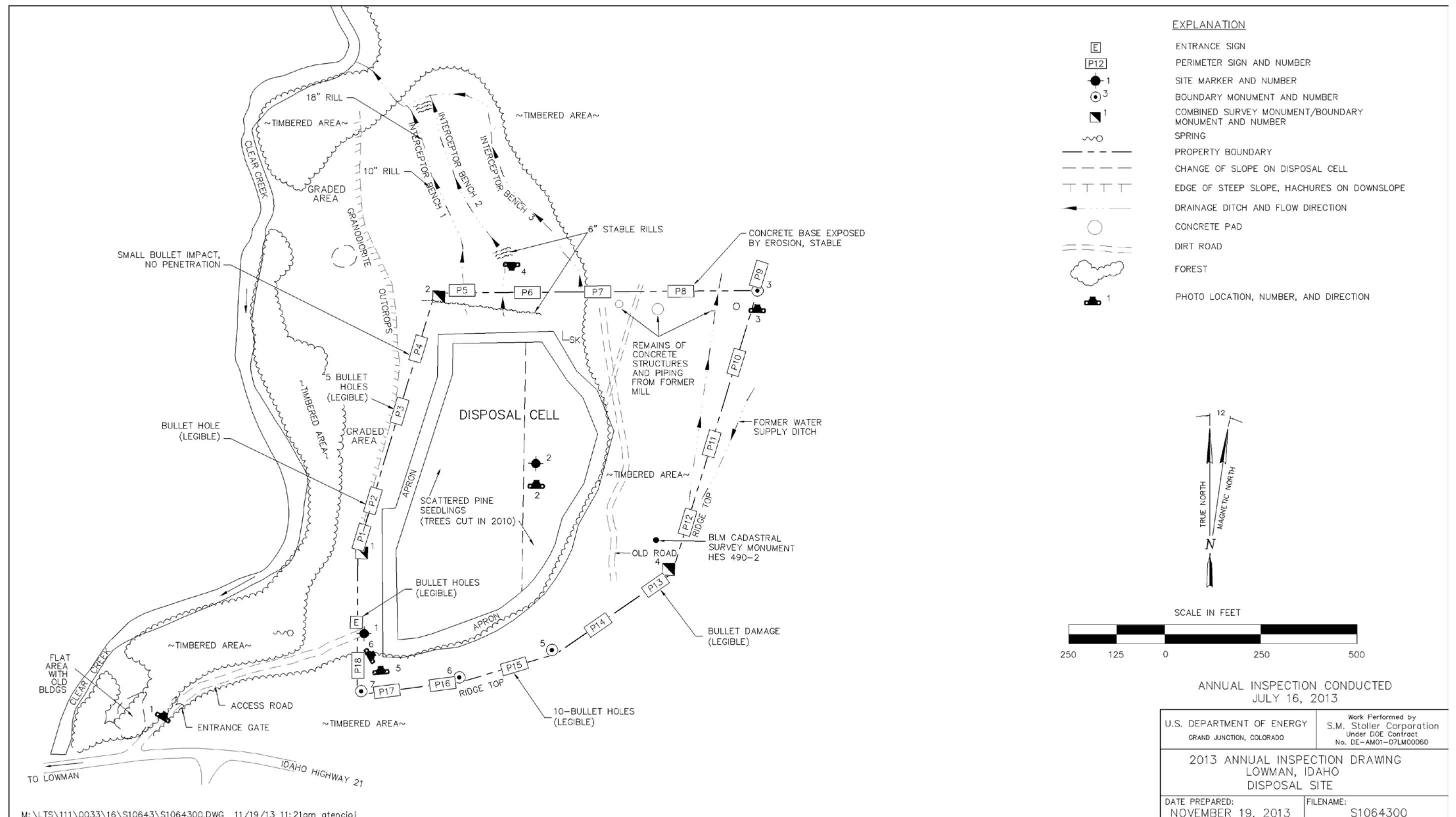
Ponderosa pine saplings are encroaching on perimeter sign P1 and making it less visible. Several years ago trees near the sign were cut to enhance visibility.

10.4.1.3 Site Markers

Two site markers are present at the site. The first, SMK-1, is just inside the site's southwest boundary. The second, SMK-2 (PL-2), is on top of the disposal cell. Both markers are in excellent condition.

10.4.1.4 Survey Monuments and Boundary Monuments

Seven monuments define the site boundary. Three are combined survey and boundary monuments (SM-1/BM-1, SM-2/BM-2, and SM-4/BM-4) and four are boundary monuments (BM-3, BM-5, BM-6, and BM-7). Steel t-posts are installed next to the survey and boundary monuments (with the exception of BM-3 [PL-3], which is immediately adjacent to perimeter sign P9) to allow inspectors to locate the monuments more easily in the field. All are in excellent condition.



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10.4.1.5 Monitoring Wells

Groundwater monitoring is no longer required at the site according to the revised LTSP (January 2005). All seven wells were decommissioned in August 2006 in accordance with State of Idaho groundwater protection requirements.

10.4.2 Inspection Areas

The site is divided into three inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection: (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.

Within each area, inspectors examined the specific site surveillance features for evidence of settlement, erosion, slumping, or other processes that might affect the site’s integrity, protectiveness, or long-term performance.

10.4.2.1 Top and Side Slopes of the Disposal Cell

The disposal cell was completed in 1991. Basalt riprap armors the top and west-facing side slope of the disposal cell. An apron of larger riprap surrounds the disposal cell on all sides. The riprap is in excellent condition (PL-4, PL-5, and PL-6). No evidence of instability, such as subsidence, slumping, or cracking, was observed on any of the cell surfaces.

Vegetation encroachment continues on the top and side slopes of the disposal cell. Encroachment is a natural process operating at this location and will be allowed to continue in accordance with the LTSP. However, trees large enough to damage the disposal cell cover if knocked down by storms are routinely removed. No large trees are currently growing on the cover.

10.4.2.2 Area between the Disposal Cell and the Site Boundary

The steep slopes east and south of the site are stable and vegetated with well-established ponderosa pines and grasses. The slopes north and west of the site that were highly disturbed during site remediation are currently stable and well vegetated.

10.4.2.3 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 and campsites are located.

The U.S. Forest Service manages the areas east and south of the site, and those areas remain relatively unchanged from previous inspections. Erosion of drainage channels west of the DOE site was pointed out to inspectors from the Idaho Department of Environmental Quality during the 2012 inspection and again during the 2013 visit. The area along Idaho Highway 21 east of the site does not indicate any new development.

10.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No follow-up or contingency inspections were required in 2013.

10.6 Maintenance and Repairs

Other than the erosion identified on state land north of the cell, no maintenance needs were identified.

10.7 Environmental Monitoring

10.7.1 Vegetation Monitoring

10A Infestations of six state-listed noxious weed species have been present historically on and adjacent to the site:

- Dalmatian toadflax—this weed has been treated with herbicide annually since 2003. In 2008 DOE purchased and released *Mecinus janthinus*, a stem-boring weevil that targets this species. Few Dalmatian toadflax plants persist on the site, and this species is considered to be controlled by the insect.
- Spotted/diffuse knapweed—this weed has also been treated with herbicide annually since 2003. Knapweed plants are not abundant, but they occur throughout the site and will continue to be controlled with herbicide.
- Canada thistle—not found on the site since 2011, several plants were identified on the disposal cell in 2013. They will be controlled with herbicide.
- Rush skeletonweed—this species was present on and near the site in small numbers in 2013, and individual plants were heavily grazed. They will be controlled with herbicide.
- Oxeye daisy—several infestations of oxeye daisy are present on the site and have been treated with herbicide since 2010. Additional treatment is planned in 2013.
- Hoary alyssum—this weed was not identified on the site during the 2013 inspection.

The County has targeted and treated sulfur cinquefoil and medusahead, which have also been found on the site. Locations of these weeds, as well as one location of bull thistle, will be reported to the County for control.

10.8 Corrective Action

Corrective action is 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 2013.

10.9 Photographs

Photograph Location Number	Azimuth	Description
PL-1	60	Entrance gate.
PL-2	0	Site marker 2 on cell top.
PL-3	15	Boundary marker 3 at perimeter sign 9.
PL-4	180	General site view from north to south.
PL-5	10	General site view from south to north.
PL-6	60	General site view from south-southwest to north-northeast.



LOW 7/2013. PL-1. Entrance gate.



LOW 7/2013. PL-2. Site marker 2 on cell top.



LOW 7/2013. PL-3. Boundary marker 3 at perimeter sign 9.



LOW 7/2013. PL-4. General site view from north to south.



LOW 7/2013. PL-5. General site view from south to north.



LOW 7/2013. PL-6. General site view from south-southwest to north-northeast.

11.0 Maybell, Colorado, Disposal Site

11.1 Compliance Summary

The Maybell, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on August 6, 2013. The disposal cell and all associated diversion and drainage structures were in good condition and functioning as designed. No significant change was noted to the erosion that has occurred directly downgradient of the outlets to Swale No. 1 and Diversion Channel No. 1; the riprap continues to be protective. No deep-rooted plants were found growing on the disposal cell during this year's inspection. Perimeter signs P5, P6, and P25 have bullet holes but remain legible. Perimeter sign P1 remains missing and needs to be replaced; however, it is not of immediate concern, as several additional perimeter warning signs along this side of the site are visible from the road. A broken top strand in the perimeter fence at two locations needs repair. Nine boundary monuments determined to have been placed incorrectly north and northwest of the site should be removed and three new monuments installed along the correct property boundary that coincides with the perimeter fence line in this portion of the site.

During the inspection, no activity was noted in the surrounding area that raises concern about the integrity of the site, and no cause for a follow-up or contingency inspection was identified.

11.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Maybell, Colorado (UMTRCA Title I) Disposal Site, Moffat County, Colorado* (LTSP) (DOE-LM/1605-2008, U.S. Department of Energy [DOE], Revision 4, April 2008) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 11-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.3	Section 11.4
Follow-Up or Contingency Inspections	Section 3.5	Section 11.5
Routine Maintenance and Repairs	Section 3.6	Section 11.6
Groundwater Conditions	Section 2.5	Section 11.7
Corrective Action	Section 3.6	Section 11.8

11.3 Institutional Controls

The 251-acre site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license at 10 CFR 40.27 in 1998. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site, as defined by DOE Policy 454.1, consist of federal ownership of the property, a site perimeter fence, warning/no-trespassing (perimeter) signs along the property boundary, and a locked gate at the

site entrance. Verification of these institutional controls is part of the annual inspection. Inspectors found no evidence that these institutional controls were ineffective or violated.

11.4 Inspection Results

S.C. Hall and C. Bahrke of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE office in Grand Junction, Colorado, conducted the inspection on August 6, 2013. J. Nguyen of the DOE Office of Legacy Management, M. Cosby (Colorado Department of Public Health and Environment), Robert Evans (NRC), and D. Ravelojaona (Stoller) also attended the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

11.4.1 Site Surveillance Features

Figure 11-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and in Figure 11-1 by photograph location (PL) numbers.

11.4.1.1 Site Access Road

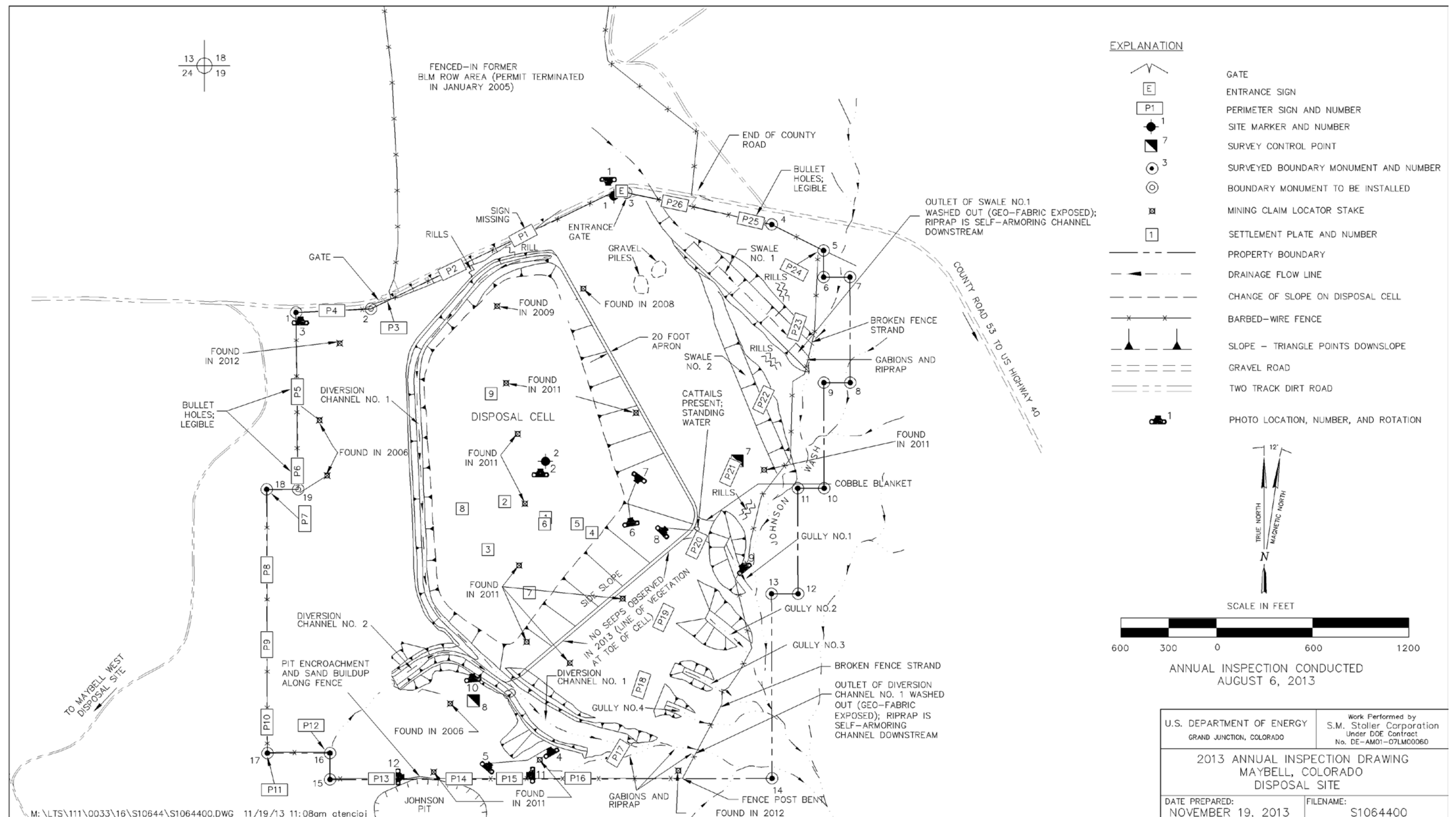
Access to the site is via County Road 53 which runs north off U.S. Highway 40 approximately 8 miles east of Maybell, Colorado. The road is graveled, hard packed, and in good condition. County Road 53 ends at an unlocked gate near the northeast corner of the site (approximately 3 miles from U.S. Highway 40). From that point the road continues west as a dirt two-track directly north of the site. This road continues through a second unlocked gate and past an abandoned open-pit uranium mine, known as the Rob Pit, to the Maybell West UMTRCA Title II disposal site.

Because the access road to the Maybell site is a county road, Moffat County performs maintenance up to that point. From that point to the Maybell West site, DOE is responsible for road maintenance under a U.S. Bureau of Land Management (BLM) right-of-way (ROW) permit. No road maintenance was necessary in 2013.

11.4.1.2 Gates and Fencing

Two gates are located in the perimeter fence along the north boundary of the site. One is considered the site entrance gate and is located adjacent to the site marker and entrance sign. The second gate is located directly west of perimeter sign P3 in the northwest corner of the property. Both gates are standard tubular metal stock gates and were locked and in good condition.

A standard four-strand barbed-wire stock fence surrounds the disposal cell and drainage structures. The site is located in wintering grounds frequented by big game animals (primarily pronghorn, deer, and elk) and is also surrounded by open range used to graze cattle. As a result, minor damage to the perimeter fence occurs periodically. Maintenance of the perimeter



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fence was performed in 2009 and 2011; several breaks, loose wires, and a bent post were repaired, and a lower strand was added to the fence where it crosses Gullies No. 1, 2, 3, and 4 to keep cattle from accessing the site. This modification appears to have been successful in preventing cattle from accessing the site. With the exception of broken top strands at two locations, the fence was in good condition.

11.4.1.3 Signs

The entrance sign, located near the entrance gate and mounted on a t-post in the fence line, had a couple of bullet holes but remains legible (PL-1).

The site has 26 perimeter signs. On the north, west, and south sides of the site, perimeter signs are mounted on t-posts in the perimeter fence. On the east side of the site, perimeter signs are mounted on steel posts set in concrete and are located inside the property boundary approximately midway between the disposal cell and the perimeter fence. Several of the perimeter signs along the dirt road north and west of the site have bullet holes, but remain legible. Perimeter sign P1 along the dirt road is missing and needs to be replaced. The remaining signs were in good condition.

11.4.1.4 Site Markers

Two standard granite site markers are located onsite. Site marker SMK-1 is located near the entrance gate, and SMK-2 is located on top of the disposal cell (PL-2); both were in good condition.

11.4.1.5 Survey and Boundary Monuments

Two survey monuments are located onsite. Survey monument SM-7 is on the bench above Johnson Wash just north of perimeter sign P21, and survey monument SM-8 is south of the disposal cell on the bench above Diversion Channel Number 2. Both survey monuments were in good condition.

Originally, four boundary monuments were used to define the property. Because these four monuments did not adequately represent the site property boundary, nineteen additional monuments were installed in September 2002 to better define the boundary. A 2008 real property assessment identified an error in the property boundary along the north and northwest portion of the site. The assessment determined that the property boundary, as it was depicted following the 2002 land survey, did not match the legal description included in the BLM permanent withdrawal for the site. The correct property boundary along the north and northwest portion of the site follows the perimeter fence line. As a result, the site base map was corrected and the LTSP was revised and submitted to NRC for acceptance. Because of this error, the nine incorrectly placed boundary monuments should be removed north and northwest of the site, and three new monuments should be installed along the correct property line (i.e., the fence line). All boundary monuments checked were observed to be in good condition (PL-3).

11.4.1.6 Settlement Plates

Nine settlement plates were installed on the disposal cell top during construction to detect any significant settlement resulting from slimes (i.e., fine-grained wet tailings) that were placed in

the south central part of the cell. The former tailings slimes were compacted before completion of the radon barrier, but the potential for additional consolidation and possible stress to the radon/infiltration barrier still existed.

From 2000 through 2004, in accordance with the LTSP, DOE conducted annual land surveys of the settlement plates and presented the results in the annual compliance report to NRC. The annual land surveys verified that no significant settlement had occurred on the disposal cell top. Therefore, having met the 5-year post-construction settlement survey requirement stipulated in the LTSP, DOE notified NRC and discontinued the annual land surveys of the settlement plates. Surveying of the settlement plates will resume if visual observations of the disposal cell during the annual inspections indicate a cause for concern.

11.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three inspection areas (referred to as transects in the LTSP) to ensure a thorough and efficient inspection: (1) the disposal cell; (2) other areas inside the site boundary; and (3) the site perimeter and outlying areas.

Within each area, inspectors examined the specific site surveillance features for evidence of settlement, erosion, slumping, or other processes that might affect the site's integrity, protectiveness, or long-term performance.

11.4.2.1 Disposal Cell

The disposal cell covers approximately 66-acres of the approximately 250-acre disposal site property (PL-4 and PL-5). The roughly pentagonal disposal cell measures about 1,600 feet (ft) by 2,400 ft and is located in the center of the site. The above-grade disposal cell rises to a height of approximately 30 ft and is capped with an approximately 7 ft thick multiple-component cover. The cover consists of a 1.5 ft thick radon/infiltration barrier directly over the tailings, overlain by a 4 ft thick compacted soil layer for protection from freeze-thaw cycles, a 0.5 ft thick bedding layer to promote drainage, and an 8- to 12-inch-thick layer of riprap to prevent erosion of the underlying materials. The side slopes of the disposal cell are at a 20 percent grade to create a stable slope, and the top of the disposal cell has a 3 percent grade to promote drainage toward the west.

The disposal cell showed no evidence of settlement, slumping, erosion, or rock degradation (PL-6 and PL-7). In 2008 two slight depressions were thought to have been noted on the disposal cell top between settlement plates 6 and 7; these depressions could not be identified in subsequent inspections, including during the 2013 inspection. At the time, these areas were thought to be a result of inconsistencies in grade that occurred during cell construction and not from settlement of the underlying materials. Inspections will continue to include visual monitoring of this area to determine if any settlement of the disposal cell is actually occurring.

Minor accumulations of various shallow-rooted plants were observed on the disposal cell top and side slopes. No deep-rooted plants were found growing on the disposal cell in 2013 (growth of deep-rooted plants on the disposal cell is controlled in accordance with the LTSP). Noxious weeds found onsite continued to be treated with herbicide in 2013. The effectiveness of this treatment has become evident over time.

The LTSP advises inspectors to look for seeps on the east and southeast side slopes of the disposal cell because slimes were encapsulated in this portion of the cell. In 2013, no seeps were observed at the toe of the disposal cell in this area. However, cattails continue to be observed growing at this location (PL-8), indicating the presence of moisture that is likely the result of repeated surface runoff from the cell rather than from seepage from the cell; standing water has been observed in this area during past inspections and was noted again in 2013. In 2003, a sample of the evaporites from this location was collected for laboratory analysis; no constituents attributable to the cell contents were reported to be present. Observation of this area will continue.

11.4.2.2 Other Areas Inside the Site Boundary

The final surface conditions at the Maybell disposal site are a combination of rock armoring and contouring to achieve the necessary surface water drainage control and erosion protection to satisfy design longevity requirements. Other revegetated surfaces at the site have been planted with a mix of native and adaptive grasses to provide soil stability. Vegetation diversity and density in graded and disturbed areas between the disposal cell and the site boundary continues; no noxious weeds were observed. Abundant signs of wildlife are present onsite and in the surrounding area.

The rock-armored diversion channels, swales, and gullies were in good condition (PL-9 and PL-10). Erosion directly downgradient of the outlets to Diversion Channel No. 1 and Swale No. 1 that has exposed the underlying geo-fabric had not changed significantly. Riprap placed within the outlets continues to provide protection against headcutting. This erosion presents no threat to the integrity of the disposal cell but monitoring of it will continue. Minor rills noted adjacent to Swale No. 1 and Gully No. 1 continue to stabilize due to self-armoring and increased vegetation growth. There was no evidence of any significant new erosion or sediment moving offsite into Johnson Wash. Gabions and riprap installed in 2000, and reinforced in 2001 and 2002, to control erosion in drainage structures east of the cell continue to remain effective.

In 2006, lode mining claim locator stakes were first discovered onsite inside the perimeter fence. Additional locator stakes were found onsite in the years following, including several on the disposal cell in 2011. Two more stakes were found onsite in 2012. No additional stakes were found in 2013. BLM has informed DOE that these stakes were not actual claims, rather they were what are referred to as lode mining claim locators; the precursor to an actual claim. If claims were to be filed, they would be considered “nuisance claims,” as protections pursuant to the NRC general license for the disposal site appear to preclude any surface or subsurface activity that would jeopardize the disposal cell and its associated drainage control structures (10 CFR 40.27[d]).

11.4.2.3 Site Perimeter and Outlying Areas

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

Directly south of the site is a former open-pit uranium mine referred to as the Johnson Pit (PL-11). Over time, slumping of the pit wall resulted in the pit encroaching several feet onto what is now DOE property. This encroachment presents no threat to the integrity of the disposal

cell and occurred prior to reclamation and transfer of the site to DOE for long-term surveillance and maintenance. Continued observation will be performed to ensure that any additional sloughing of the pit wall does not damage the perimeter fence that runs along the south property line. This encroachment is visually monitored annually and periodically documented with photographs to determine if any further slumping of the pit wall is occurring. In 2013, there was no evidence of any additional encroachment of the pit onto the site. However, windblown sand continues to accumulate along the northern crest of the pit wall along the fence line (PL-12).

In September 2004 DOE received written concurrence from BLM that the ROW reservation directly north of the site had revegetated successfully and that the permit for the reclaimed reservation area has been relinquished. At the request of a local rancher (who holds a BLM grazing permit for the area surrounding the site), the fenced-in former ROW area is being used occasionally for livestock management. In 2013, it was observed that vegetation in former ROW area continued to be well established and there was no evidence of overgrazing.

11.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for follow-up or contingency inspections was identified during the inspection.

11.6 Maintenance and Repairs

- 11A Repair of a broken top strand of barbed-wire at two locations in the perimeter fence on the east side of the site is needed. The fence remains functional. This minor fence repair will be performed sometime in the future when additional repairs warrant action.
- 11B Perimeter sign P1 is missing and will be replaced in the future. It is not of immediate concern, as several additional perimeter warning signs are along this side of the site and are visible from the road.

Maintenance in 2013 consisted of treating noxious weeds.

11.7 Environmental Monitoring

11.7.1 Groundwater Monitoring

Groundwater at this site is contaminated as a result of widespread, naturally occurring uranium mineralization and mining activities not related to onsite legacy uranium-ore processing and disposal operations. The groundwater in the area is designated “limited use,” a designation given to groundwater that is not a current or potential source of drinking water because it contains widespread ambient contamination that cannot be cleaned up by methods reasonably employed in public water systems (40 CFR 192.11 [e] [2]). Supplemental standards established in 40 CFR 192.21 (g) have been applied to groundwater at the site, and groundwater quality monitoring is not required.

Groundwater level monitoring was conducted in accordance with the LTSP from November 1995 through March 2004 to determine if transient drainage from the disposal cell was interacting with the local groundwater system. In 2004, following the required 5-year monitoring period, water-level measurements were discontinued because there was no evidence that transient drainage was interacting with the local groundwater system near the disposal cell. By letter dated January 5, 2005, NRC concurred with this conclusion and agreed that groundwater level monitoring was no longer needed. In May 2006, the four remaining monitoring wells at the site were decommissioned in accordance with State of Colorado requirements. In November 2007, the LTSP was revised to reflect regulatory concurrence to discontinue water level monitoring, and the revised document was submitted to NRC for acceptance.

11.8 Corrective Action

Corrective action is 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 need for corrective action was identified in 2013.

11.9 Photographs

Photo Location Number	Azimuth	Photograph Description
PL-1	180	Site entrance sign; disposal cell in background.
PL-2	NA	Site marker No. 2.
PL-3	NA	Boundary monument No. 1.
PL-4	330	Southwestern portion of the disposal cell; confluence of Diversion Channels No. 1 and 2 in foreground.
PL-5	40	Southeastern portion of the disposal cell; Diversion Channel No. 1 in foreground.
PL-6	350	Northeastern edge of the disposal cell top.
PL-7	215	Southeastern edge of the disposal cell top.
PL-8	45	Cattails growing adjacent to the base of the east side slope of the disposal cell; standing water within apron in foreground.
PL-9	320	Armored Gully No. 1; disposal cell in background.
PL-10	355	Confluence of Diversion Channels No. 1 and 2.
PL-11	270	Perimeter fence along southern property boundary; north end of Johnson Pit in background.
PL-12	90	Windblown sand accumulation along the south perimeter fence at crest of the northern wall of the Johnson Pit; encroachment of pit in background.



MAY 8/2013. PL-1. Site entrance sign; disposal cell in background.



MAY 8/2013. PL-2. Site Marker No. 2.



MAY 8/2013. PL-3. Boundary Monument No. 1.



MAY 8/2013. PL-4. Southwestern portion of the disposal cell; confluence of Diversion Channels No. 1 and 2 in foreground.



MAY 8/2013. PL-5. Southeastern portion of the disposal cell; Diversion Channel No. 1 in foreground.



MAY 8/2013. PL-6. Northeastern edge of the disposal cell top.



MAY 8/2013. PL-7. Southeastern edge of the disposal cell top.



MAY 8/2013. PL-8. Cattails growing adjacent to the base of the east side slope of the disposal cell; standing water within apron in foreground.



MAY 8/2013. PL-9. Armored Gully No. 1; disposal cell in background.



MAY 8/2013. PL-10. Confluence of Diversion Channels No. 1 and 2.



MAY 8/2013. PL-11. Perimeter fence along southern property boundary; north end of Johnson Pit in background.



MAY 8/2013. PL-12. Windblown sand accumulation along the south perimeter fence at crest of the northern wall of the Johnson Pit; encroachment of pit in background.

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12.0 Mexican Hat, Utah, Disposal Site

12.1 Compliance Summary

The Mexican Hat, Utah, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on April 2, 2013. The disposal cell was in excellent condition. The cell condition was unchanged from the previous year. Minor fence repair was performed near the beginning of the north diversion channel in 2012. A slight rockslide near perimeter sign P22 loosened fence strands, and fence repair was completed in 2012. At the time of the 2013 inspection, only perimeter sign P20 needed replacement due to bullet holes. Vandalism continues, as indicated by new bullet holes in P20. No additional maintenance needs or cause for a follow-up or contingency inspection was identified.

12.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Mexican Hat, Utah, Disposal Site* (LTSP) (DOE/AL/62350-207, Rev. 2, U.S. Department of Energy [DOE], June 1997) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 12-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Sections 3.3 and 3.4	Section 12.4
Follow-Up or Contingency Inspections	Section 3.5	Section 12.5
Routine Maintenance and Repairs	Section 3.6	Section 12.6
Groundwater Monitoring	Section 3.7	Section 12.7
Corrective Action	Section 3.6	Section 12.8

The inspection was also performed in accordance with approved recommendations presented in the seep monitoring evaluation report (*Resolution of Seep and Ground Water Monitoring at the Mexican Hat, Utah, UMTRCA Title I Disposal Site*, March 2006; resolution document). Annual assessment of six designated seeps was conducted during the inspection. Qualitative descriptions of the seeps included photographic documentation for yearly comparisons. In accordance with the resolution document, no samples were collected for analysis, since no significant increase of seepage or changes were observed.

12.3 Institutional Controls

The United States of America holds the 119-acre disposal site in trust for the Bureau of Indian Affairs; the Navajo Nation retains title to the land. DOE and the Navajo Nation executed a Custodial Access Agreement that conveys to the federal government title to the residual radioactive materials stabilized at the repository site and ensures that DOE has perpetual access to the site. UMTRCA authorized DOE to enter into a Cooperative Agreement (DE-FC04-85AL26731) with the Navajo Nation, and required it to be in place before bringing the site under the general license. The purpose of the Cooperative Agreement was to perform remedial actions at the former processing sites. The site was accepted under the U.S. Nuclear Regulatory

Commission general license (10 CFR 40.27) in 1997. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site.

Institutional controls at the site include federal custody of the disposal cell and the following features that are inspected annually: site markers, survey and boundary monuments, warning/no-trespassing signs, a site perimeter fence, and a locked gate at the site entrance.

12.4 Inspection Results

The site, south of Mexican Hat, Utah, was inspected on April 2, 2013. J. Gillespie and M. Plessinger of the S.M. Stoller Corporation, the Legacy Management Support contractor for DOE's Office of Legacy Management in Grand Junction, Colorado, conducted the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

12.4.1 Site Surveillance Features

The locations of site surveillance features are shown on Figure 12-1. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and on Figure 12-1 by photograph location (PL) numbers.

12.4.1.1 Site Access, Entrance Gate, Access Road, and Entrance Sign

The site is accessed via a short unmarked dirt road off U.S. Highway 163 that ends at a graded parking area. Erosion continues to occur along the dirt road, but the site continues to be accessible.

The entrance sign at the gate is in excellent condition (PL-1).

12.4.1.2 Fence and Perimeter Signs

A barbed-wire perimeter fence is located between the disposal cell features and the site boundary and was in good condition. Periodically, the fence is damaged by livestock or erosion and requires repair. Erosion has increased the spacing between the lowest strand and the ground surface between perimeter signs P37 and P40. An additional strand of non-barbed (wildlife-friendly) wire was added in 2010 and was in good condition. Erosion continues to migrate up to the end of the west diversion channel at perimeter signs P42 and P43 but is not a concern at this time.

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The site has 43 perimeter sign locations, and each location has a pair of signs: an upper property ownership sign and a lower radioactive materials disposal site (warning sign). The remaining perimeter signs were present and legible, although several are damaged by bullet holes or have been bent because wildlife rubbed against them. The area of perimeter signs P20 through P24 continually receives bullet damage, as evidenced at perimeter sign P20 (PL-2).

12.4.1.3 Site Markers

Two granite site markers are on the site. Site marker SMK-1 is on the ground inside the southwest security fence line. Its concrete base has several minor cracks, but repairs are not necessary at this time. Overall, the site marker was in good condition (PL-3). Site marker SMK-2, located at crest of the disposal cell, was in excellent condition (PL-4).

12.4.1.4 Survey Monuments and Boundary Monuments

The four survey monuments and 12 boundary monuments were inspected. All survey and boundary monuments were in good condition.

12.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into four inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection: (1) the riprap-covered disposal cell top; (2) the riprap-covered side slopes, toe drains, aprons, and diversion channels; (3) the area between the cell and the site boundary (perimeter signs and fencing); and (4) the outlying area (drainages and observation of seeps).

Within each area, inspectors examined specific site surveillance features, such as the entrance gate and sign, survey and boundary monuments, perimeter signs and fences, and site markers. Inspectors examined each area for evidence of erosion, settling, slumping, or other disturbances that might affect the site’s integrity, protectiveness, or long-term performance.

12.4.2.1 Disposal Cell and Adjacent Area Inside the Security Fence

The top of the disposal cell is in excellent condition (PL-5, PL-6, and PL-7). Inspectors found no evidence of differential settling, cracking, erosion, or burrowing. All visible components of the disposal cell and cover were functioning as designed. No vegetation was growing on top of the disposal cell.

12.4.2.2 Side Slopes, Toe Drains, Aprons, and Diversion Channels

The disposal cell side slopes, toe drains, aprons, and diversion channels were in excellent condition and functioning as designed.

The sloughing of red country rock and soil along the south apron (PL-8) has not increased during the past year. Because the apron in this area is immediately adjacent to the base of the steep rocky cliff face along the southern edge of the disposal cell cover, it is expected that a certain amount of sediment and unstable rock from the cliff face will, over time, continue to fall onto the apron. This area has been inspected for several years with little or no change being observed from year to year. As a best management practice, inspectors will continue to monitor this area.

Areas offsite and upgradient continue to erode and transport sediment onto the site and into the west diversion channel (PL-9). The sediment accumulation has promoted the growth of vegetation in the channel, including perennial grasses and annual weeds; however, the sediment and vegetation are not affecting the performance of these drainage structures.

Though present in the arroyos outside the site, one tamarisk plant was observed on the site during the inspection in the west diversion channel west of the cap. Its growth will be monitored, and removal of the plant may be necessary during the next scheduled maintenance effort. Tamarisk control will continue on the site.

12.4.2.3 Site Perimeter Between the Security Fence and the Site Boundary

Minor erosional rills and gullies continue to form along the western edge of the site boundary primarily upgradient of and between boundary monuments BM-7 and BM-8. This is an expected natural process and a result of the site stabilizing and coming to equilibrium with the outlying areas. Erosion in these areas will continue to be monitored, but it is not a concern unless it damages the perimeter fence or impacts the performance of the west storm water diversion channel.

Scattered trash (broken glass, bottles, cans, cardboard, and paper containers) is accumulating in the more accessible portions of the site where vehicle access is available. The most noticeable accumulations of trash continue to be along the entrance road and in the parking area, the areas on DOE property along the perimeter fence between perimeter signs P31 and P42, and the southern portion of the site between perimeter signs P22 and P27. Periodic trash removal may be necessary to maintain the integrity of the perimeter fence and to keep trash from entering the fenced area.

Tumbleweeds and trash continue to accumulate along the west and southwest sections of the perimeter fence, primarily between perimeter signs P31 and P42. However, this accumulation does not appear to be damaging the fence.

Trespassing just inside the disposal site property boundary (outside the perimeter fence) occurs in the same areas where trash accumulations are noted, as evidenced by vehicle and all-terrain vehicle tracks. Vandalism has increased, as indicated by new bullet holes in several perimeter signs. This is expected to be an ongoing problem at the site.

12.4.2.4 Outlying Area

The area surrounding the site was visually inspected for signs of erosion, development, or other disturbance that might affect site integrity or security. As discussed above, trash continues to accumulate primarily in areas immediately adjacent to the site property boundary. No other changes were observed.

12.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

12.6 Maintenance and Repairs

- 12A The damaged P20 perimeter sign will need to be replaced. A warning sign was recommended for Seep 254 during the 2012 inspection; however, flash floods that occur periodically in this drainage would damage the sign, and placing the warning sign is no longer recommended.

12.7 Environmental Monitoring

Visible inspection of the monitored seeps is performed in accordance with the approved recommendations presented in the seep monitoring evaluation report (the resolution document). Six designated seeps are assessed annually to determine if conditions have changed significantly to warrant sampling.

In accordance with approved recommendations presented in the resolution document, inspectors conduct annual visual assessments of seep flows at the six designated seep locations. No significant increases in water flow or conditions at the seeps were noted; therefore, no sampling and analysis or evaluation is justified at this time. The seeps are primarily the result of perched water that leaked from the former processing site tailings pond for many years and, to a lesser degree, the result of transient drainage from the wet tailings placed in the disposal cell. Signs warning against drinking the water remain posted at the seep locations. The seeps had no flow during the 2013 inspection due to the drought conditions in the region.

- 12B All seeps observed during the site inspection are listed in the LTSP except seep 0264, which replaced seep 0249 in 1995 because seep 0249 had insufficient flow for sampling. Historically, minimal flow is observed only at seep 0248; however, this year the area was only moist, and only dripping water was observed. The remaining seeps were all dry, with no indication of recent moisture. Some evaporites were observed, but the soil beneath was dry. Gypsum Creek sediments were moist, and there was limited exposed flowing water in the drainage. Table 12-2 provides observations and qualitative descriptions of seep flows, along with a reference to photographic documentation.

Table 12-2. Observations and Descriptions of Seeps at the Mexican Hat Disposal Site

Seep Location Number	Drainage	Photo Numbers	Observations and Descriptions of Seep Flow (Qualitative)
0248	Gypsum Creek	PL-10	Moist adjacent rock face; soils moist but no flow or pooling in the immediate area.
0251	North Arroyo	PL-12	Dry; no evidence of seep soil present; no observed flow. Minimal vegetation—primarily tamarisk (very little other riparian vegetation).
0254	South Arroyo	PL-11	Dry; no flow, or moist soil present where standing pool of water usually exists from recent rain events. Very little riparian vegetation besides tamarisk. Location is not posted.
0264	North Arroyo	PL-13	Dry; no flow.
0922	South Arroyo	PL-14	Dry; no change from previous year's inspection.

12.8 Corrective Action

Corrective action is 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 2013.

12.9 Photographs

Photo Location Number	Azimuth	Photograph Description
PL-1		Site entrance sign.
PL-2		Perimeter sign P20 with bullet holes.
PL-3		Site marker SMK-1.
PL-4		Site marker SMK-2.
PL-5		South slope.
PL-6		North toe drain/northeast side slope
PL-7		Across cell top to the southwest.
PL-8		Northeast toe drain.
PL-9		West side slope.
PL-10		Seep 248 dripping conditions; no standing water.
PL-11		Seep 254 dry conditions.
PL-12		Seep 251 dry conditions.
PL-13		Seep 264 dry conditions.
PL-14		Seep 922 dry conditions.



HAT 4/2013. PL-1. Entrance sign.



HAT 4/2013. PL-2. Perimeter sign P20 with bullet holes.



HAT 4/2013. PL-3. Site marker SMK-1.



HAT 4/2013. PL-4. Site marker SMK-2.



HAT 4/2013. PL-5. South slope.



HAT 4/2013. PL-6. North toe drain/northeast side slope.



HAT 4/2013. PL-7. Across cell top to the southwest.



HAT 4/2013. PL-8. Northeast toe drain.



HAT 4/2013. PL-9. West side slope.



HAT 4/2013. PL-10. Seep 248 dripping conditions; no standing water.



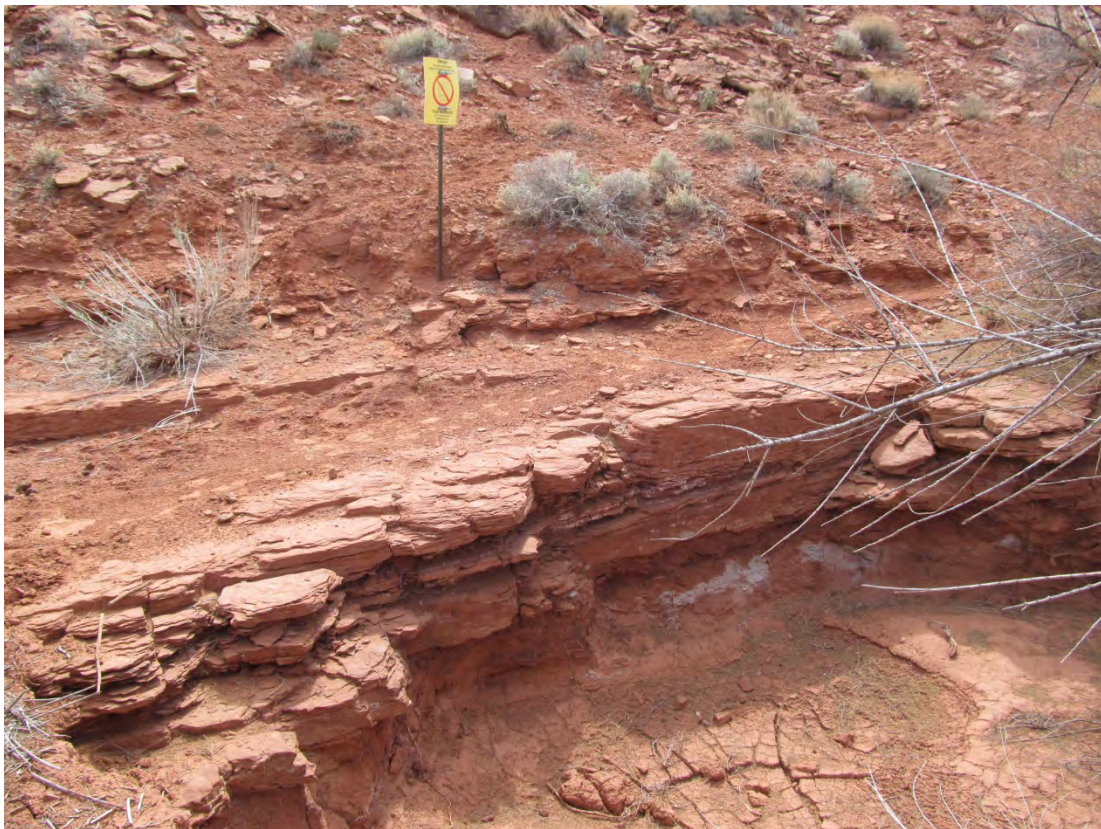
HAT 4/2013. PL-11. Seep 254 dry conditions.



HAT 4/2013. PL-12. Seep 0251 dry conditions.



HAT 4/2013. PL-13. Seep 0264 dry conditions.



HAT 4/2013. PL-14. Seep 922 dry conditions.

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13.0 Naturita, Colorado, Disposal Site

13.1 Compliance Summary

The Naturita, Colorado, Uranium Mill Tailings Radiation Control Act Title I Disposal Site was inspected on May 14, 2013, and was in excellent condition. Maintenance needs identified during the inspection were loose and broken fence wires at several locations on the perimeter fence and repair of minor erosion of the access road. The wires were repaired in October 2013, and the erosion will be repaired before the next annual inspection. No additional maintenance needs or cause for a follow-up inspection was identified.

13.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Upper Burbank Disposal Cell, Uravan, Colorado* (LTSP) (DOE/AL/62350B250, Revision 1, July 1999) and in procedures that the U.S. Department of Energy (DOE) established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 13-1 lists these requirements.

Table 13-1. License Requirements for the Naturita Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 13.4
Follow-Up or Contingency Inspections	Section 7.0	Section 13.5
Routine Maintenance and Repairs	Section 8.0	Section 13.6
Groundwater Monitoring	Section 5.2	Section 13.7
Corrective Action	Section 9.0	Section 13.8

13.3 Institutional Controls

The 26.65-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1999. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: a site perimeter fence, warning/no trespassing signs (referred to as perimeter signs) placed along the property boundary, and a locked gate at the entrance to the site access road.

13.4 Inspection Results

D. Traub and L. Sheader of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE office in Grand Junction, Colorado, conducted the inspection along with M. Kautsky, of the DOE Office of Legacy Management. R. Evans, senior health physicist with NRC, attended this year's inspection to conduct an observational site visit. M. Cosby of the Colorado Department of Public Health and Environment accompanied the inspectors. J. Nguyen the DOE site manager for the Slick Rock site also attended.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

13.4.1 Site Surveillance Features

Figure 1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and on the drawing by photograph location (PL) numbers.

13.4.1.1 Entrance Gate, Entrance Sign, and Access Road

Access to the Naturita disposal site is off State Highway 141 south of Uravan up Hieroglyphic Canyon along Montrose County Road EE22. Road EE22 borders the site on the east.

The entrance gate consists of a locked pair of tubular metal gates that hang on galvanized steel gateposts. Two other metal gates allow access to monitoring wells adjacent to the west side of the cell. The gates are in good condition. The disposal cell access road along the northwest side of the site descends through the shale and sandstone units in the Salt Wash Member of the Morrison Formation (PL-1). As is indicated in photo PL-2, erosion of the access road bed has occurred at the upper gate on the access road. The erosional rill will be filled and drainage rechanneled before the next inspection.

13.4.1.2 Perimeter Fence and Perimeter Signs

Perimeter signs (PL-3) mounted on steel posts are set approximately 5 feet inside the perimeter fence. One perimeter sign (P2) has had three bullet holes for the past several years but remains legible. The other 24 perimeter signs and the entrance sign are in good condition.

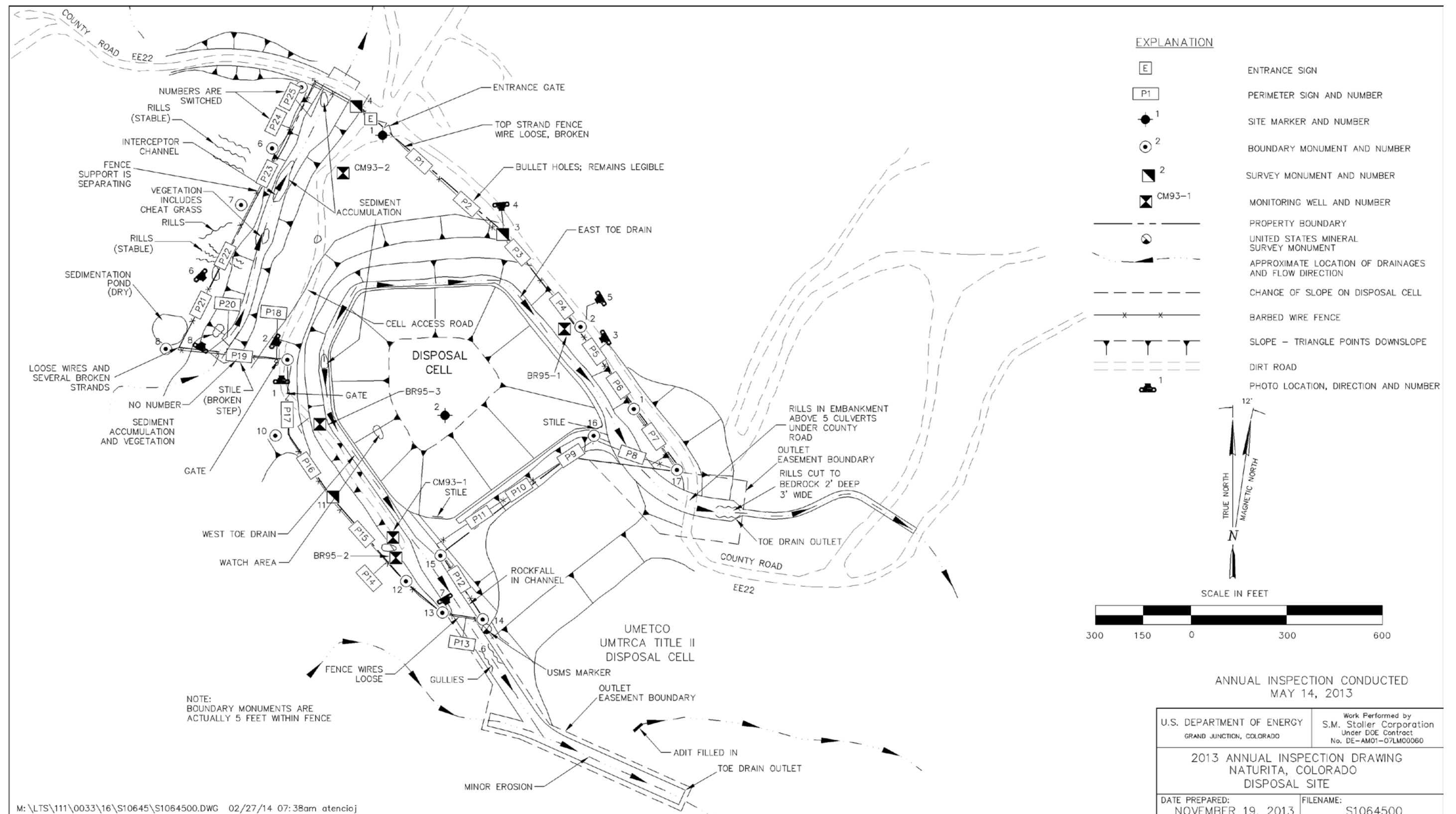
A barbed-wire stock fence encloses the site. The fence is in good condition except for several sections with broken and loose strands along the north perimeter and a section just south of the entrance gate. Evidence that elk frequent the area was detected near the broken fences. Fence wire strands were repaired in October 2013.

13.4.1.3 Site Markers

Two granite site markers identify the Naturita disposal site. Site marker SMK-1 (PL-4) is set just inside and left of the entrance gate; site marker SMK-2 is located on the disposal cell in the south-central portion of the top slope. Both markers were undisturbed and in good condition.

13.4.1.4 Survey Monuments and Boundary Monuments

Boundary monuments BM-1 through BM-17 (BM-2/PL-5) mark the property corners. Survey monuments SM-3, SM-4, and SM-11, represent boundary monuments BM-3, BM-4, and BM-11. Both survey and boundary monuments are located with the same precision and serve the same purpose of marking the boundaries for the site. Survey monuments were installed early during site construction for survey control; boundary monuments were installed after



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completion of construction. The boundary monuments and the survey monuments are undisturbed and in good condition. Boundary monument BM-9, which was not located during the 2012 inspection, was found under brush during this inspection and is in good condition.

13.4.1.5 Monitoring Wells

Monitoring wells BR95-1, BR95-2, and BR95-3 were completed at the contact of the Salt Wash Member of the Morrison Formation and the Summerville Formation, which forms an aquitard above the Wingate Sandstone. Wells CM93-1 and CM93-2 were completed in the Wingate Sandstone, which is the uppermost aquifer at the site. Well CM93-2 was missing the lock; otherwise, all monitoring wells were in good condition. The lock was replaced in October 2013.

13.4.2 Inspection Areas

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

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

13.4.2.1 Top Slope and Side Slopes

Rock covers the 2-acre top of the disposal cell and the approximately 8 acres of side slopes. The rock is rounded, with larger rock on the side slopes than on the top. The rock-covered surfaces are in excellent condition (PL-6) and show no signs of disturbance except on the southwest side of the top surface. This is an area that had a standpipe removed several years ago, and the slightly irregular surface is the result of this activity. A small area on the southwest side of the disposal cell was noted as being slightly higher than the surrounding cell sides. This area, which may be a feature left from final rock placement, will be observed in future inspections to verify that it is not changing. No other degradation or vegetation was evident on the cell.

13.4.2.2 Toe Drains and Toe Drain Outlets

Two riprap-filled toe drains collect water from the cell side slopes and divert it to the southeast. The toe drain on the west and southwest sides of the cell exits through a channel quarried through the wall of the Burbank Pit, into Hieroglyphic Canyon, and finally to the San Miguel River (PL-7). Some sediment has accumulated in the upper end of the west toe drain, allowing scattered plants to grow. Farther down this drain, beyond the lined portion, water is beginning to erode the softer bedrock. A knickpoint has formed at the intersection of shale and overlying sandstone units within the Salt Wash Member of the Morrison Formation. This occurrence is not a threat to the performance of the cell. Several years ago, a boulder rolled off the slope from County Road EE22 along the eastern side of the site into the drain near perimeter sign P4, but is not a threat to cell performance. This area will be watched in future inspections for additional rock movement. During the 2013 inspection, there was still just one boulder in the drain.

13.4.2.3 Interceptor Channel

A riprap-armored interceptor channel, upgradient and northwest of the disposal cell, diverts storm water and snowmelt run-on to the northeast under County Road EE22. Some erosion has occurred outside the property uphill from perimeter sign P23 and between perimeter signs P22 and P23, resulting in deposition of sediment in the channel (PL-8). The channel is in excellent condition, however, and the current sediment accumulation and associated vegetation do not impair the function of the channel.

13.4.2.4 Outlying Area

The site boundary and the area within 0.25 mile of the site boundary have been highly disturbed by mining, quarrying, reclamation, and road building. Numerous weeds, none noxious, have been observed on the Title II cell just to the southeast of the Title I cell.

As noted last year, the most significant disturbance in an outlying area is the Umetco reclamation of a large borrow area northwest of the DOE disposal site. Sediment could erode off this disturbed region during heavy rains, and the area will probably be a source of new, possibly noxious, weed growth. During previous inspections, the majority of the noxious weeds noted were immediately adjacent to the northwest boundary. Inspectors at the DOE disposal site will monitor this area for the next few years. Umetco (DOW Chemical) has completed most Uranium Title II remedial action and is preparing for the transfer of the site to DOE's Office of Legacy Management.

13.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

13.6 Maintenance and Repairs

- 13A** Broken and loose fence strands near the entrance gate and along the northern perimeter were repaired in October.
- 13B** Erosion repair is needed; the gravel roadbed of the access road has washed out in a small gully near the upper double gates on the cell access road.

The padlock on monitoring well CM93-2 was replaced in October.

13.7 Environmental Monitoring

13.7.1 Groundwater Monitoring

- 13C** Groundwater monitoring was not conducted in 2013. Groundwater monitoring was last performed in July 2012 and will be conducted again in 2014.

Groundwater Monitoring Strategy—In accordance with the LTSP (beginning in 2000), DOE has monitored groundwater at the site every 2 years as a best management practice to demonstrate the initial performance of the disposal cell; the last sampling event was in July 2012. The compliance strategy is to not exceed maximum concentration limits (MCLs) established in Table 1 to Subpart A of 40 CFR 192 or background levels in a point-of-compliance (POC) well (CM93-2) in the uppermost aquifer (Wingate Sandstone) downgradient of the disposal cell. The Wingate Sandstone lies approximately 600 feet beneath the disposal cell and is hydrologically isolated from the surface by unsaturated sandstone of the Salt Wash Member of the Morrison Formation and relatively impermeable shale layers (aquitard) of the Summerville Formation.

Groundwater monitoring is performed in three shallower monitoring wells (BR95-1, BR95-2, and BR95-3), completed at the contact between the Salt Wash Member and the Summerville Formation, to provide early warning of possible migration of contaminants. If contamination suspected to be related to the disposal cell is observed at this horizon, DOE will sample two deeper wells (CM93-1 and CM93-2) screened in the Wingate Sandstone. Indicator analytes are arsenic, molybdenum, and uranium. Wells CM93-1 and CM93-2 were last sampled in May 1997, with concentrations of all indicator analytes at or near detection limits and well below the respective MCLs.

Groundwater Monitoring Evaluation—In the last several annual compliance reports, DOE has reported the following four major findings based on the historical groundwater monitoring results. First, the uppermost aquifer is hydrologically isolated from the surface by an aquitard consisting of unsaturated sandstone and relatively impermeable shale layers. Second, historical monitoring has demonstrated that contamination does not occur within the uppermost aquifer. Third, naturally occurring uranium mineralization affects water quality within the surface formation on which the disposal cell is constructed. And finally, concentrations of indicator compounds have remained essentially static since the onset of sampling (arsenic and molybdenum concentrations remain 1 to 2 orders of magnitude less than their respective MCLs).

Based on these findings, DOE concluded that continued sampling and analysis of the BR-series wells would provide little useful data for evaluating cell performance and that, in accordance with the LTSP, the groundwater monitoring program at the site could be terminated. On October 31, 2013, DOE sent a letter to NRC providing details on DOE's decision to cease groundwater monitoring at the Naturita disposal cell (Notification to Terminate Groundwater Monitoring at the Naturita, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Site).

13.8 Corrective Action

Corrective action is 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 needs were identified during the inspection.

13.9 Photographs

Photo Location Number	Azimuth	Description
PL-1	30	Access road west of cell.
PL-2	210	Erosion on access road near upper gate.
PL-3	240	Perimeter sign P5. Signs are numbered for location reference.
PL-4	175	Monument near site entrance gate.
PL-5	240	Boundary monument number BM-2, typical boundary monument.
PL-6	135	View of disposal cell from west-northwest.
PL-7	150	View of drainage channel looking southeast.
PL-8	30	View of interceptor channel looking east-northeast.



NAD 5/2013. PL-1. Access road west of cell.



NAD 5/2013. PL-2. Erosion on access road near upper gate.



NAD 5/2013. PL-3. Perimeter sign P5. Signs are numbered for location reference.



NAD 5/2013. PL-4. Monument near site entrance gate.



NAD 5/2013. PL-5. Boundary monument number BM-2, typical boundary monument.



NAD 5/2013. PL-6. View of disposal cell from west-northwest.



NAD 5/2013. PL-7. View of drainage channel looking southeast.



NAD 5/2013. PL-8. View of interceptor channel looking east-northeast.

14.0 Rifle, Colorado, Disposal Site

14.1 Compliance Summary

The Rifle, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on June 6, 2013. The disposal cell and all associated surface water diversion and drainage structures were in good condition and functioning as designed. Minor erosional rills observed in previous years show minor new erosion. They do not immediately threaten the cell and will be monitored during future inspections. Vegetation on the cell is minimal, consisting of small patches of weeds, mostly prickly lettuce (*Lactuca serriola*), minor grasses, and four small pinyon pine (*Pinus edulis*) saplings are growing on the side slope of the cell. A single tamarisk shrub (*Tamarix ramosissima*) was noted in the rock-covered drainage along the southeast side of the site. Vegetation around the disposal site was heavily grazed for the second consecutive year, and much of it was brown from lack of moisture since early spring. An analysis of options to address the increased grazing by cattle on the site will be prepared. Options range from fencing the site entirely to removal of existing barbed wire fences: a grazing lease would require totally fencing the site.

Pore water continues to be removed from the disposal cell to maintain the water level below the action level (6,016 feet above mean sea level). This water is removed from one standpipe, MW-03, in the toe of the cell and sent to the evaporation pond. Standpipe MW-02, which was pumped in previous years, contains little water and is no longer being pumped. The two old pumps in MW-03 were replaced with a new pump in 2012. Standpipe MW-03 was pumping during the inspection. A formal inspection and evaluation, along with any needed repairs, of the pond liner is planned before the next inspection.

Although minor repairs to fencing are needed, no cause for a follow-up or contingency inspection was identified.

14.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Estes Gulch Disposal Site near Rifle, Colorado* (LTSP) (DOE/AL/62350-235, Rev. 1, U.S. Department of Energy [DOE], November 1997) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 14-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.0	Section 14.4
Follow-Up or Contingency Inspections	Section 3.4	Section 14.5
Routine Maintenance and Repairs	Section 4.0	Section 14.6
Groundwater Monitoring	Section 2.6 and Appendix	Section 14.7
Corrective Action	Section 5.0	Section 14.8

14.3 Institutional Controls

The 205-acre disposal site is owned by the United States of America and was accepted under U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1998. The site is managed in accordance with requirements for UMTRCA Title I sites. DOE, as the licensee, is responsible for the site's custody and long-term care. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: access-control fencing, warning/no-trespassing signs along the disposal cell boundary, and a locked gate at the entrance to the site.

14.4 Inspection Results

R. Dayvault and L. Sheader of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE Office of Legacy Management in Grand Junction, Colorado, conducted the inspection. R. Bush of the DOE Office of Legacy Management attended the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

14.4.1 Site Surveillance Features

Figure 14-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and in Figure 14-1 by photograph location (PL) numbers.

14.4.1.1 Entrance Gates, Entrance Signs, and Access Road

The site is accessed by driving northwest of Rifle for 5 miles on State Highway 13 and turning northeast on an improved gravel road. A perpetual right-of-way across U.S. Bureau of Land Management (BLM) property provides access to the site. Two locked gates are installed on the access road—a lower gate closer to State Highway 13 that limits public access to the site, and farther up the hill, a second tubular metal gate at the site perimeter. The access road, entrance gates, and entrance sign were in good condition.

14.4.1.2 Perimeter Fence and Perimeter Signs

The barbed-wire perimeter fence was damaged at the time of the inspection. The fence extends to the edge of steep-sided arroyos that bound the site on the east and west and act as a deterrent for easy access to the site. The barbed-wire personnel gate at the southeast corner of the site was open (PL-1), and some bent fence posts and broken/loose wires were found in many places along the fence. Cattle had heavily grazed inside the site boundary and around the perimeter of the cell. A comparison between vegetation inside the fence enclosing the evaporation pond (where no grazing had been done) and outside the fence shows the extent of grazing (PL-2 and PL-3). Cattle trails were visible around the site in several locations (PL-4). Cattle were observed slightly offsite to the south and were being herded by wranglers (PL-5). Section 1.4.2.3 discusses cattle grazing issues further. Other signs of deer and elk grazing in the revegetated areas adjacent to and inside the disposal cell site boundary were identified, as has been historically recorded.

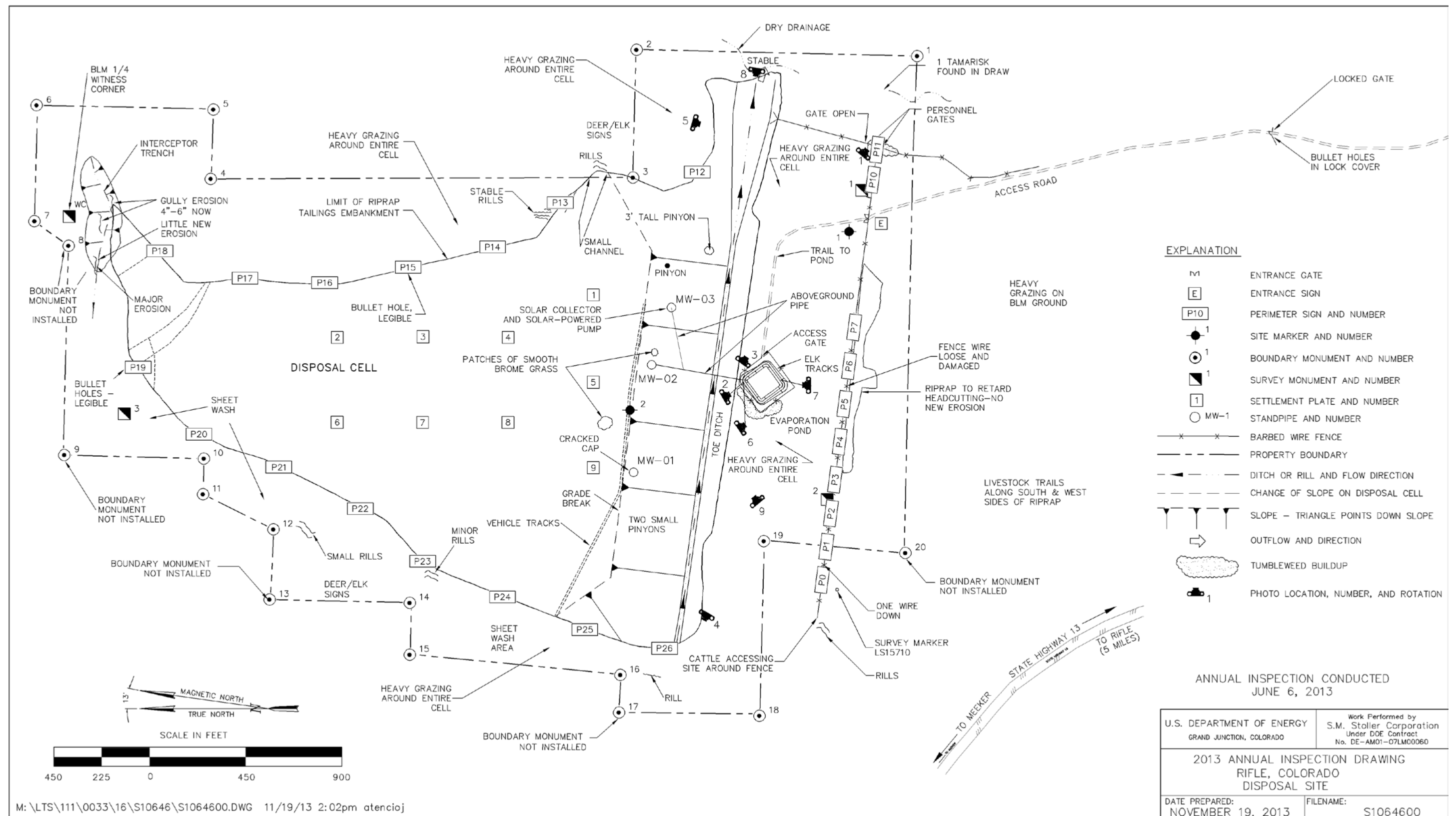


Figure 14-1. 2013 Annual Inspection Drawing for the Rifle Disposal Site

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All perimeter signs are legible, although a few have bullet holes; they will continue to be monitored for signs of further vandalism. No new bullet holes were observed.

14.4.1.3 Site Markers

Two granite site markers, one just inside and left of the entrance gate (SMK-1) and the other on the disposal cell (SMK-2), were in good condition.

14.4.1.4 Survey Monuments and Boundary Monuments

There are three survey monuments and 15 boundary monuments at this site. Boundary monuments are set at corners along an irregular site boundary. According to the LTSP, 20 corner monuments were set along the site boundary; however, previous field investigations indicated that only 15 monuments were actually set because of the rough terrain. Consequently, boundary monument locations BM-8, BM-9, BM-13, BM-17, and BM-20 were only marked with wooden laths and are not included as part of the annual inspection. Several of the survey and boundary monuments at this site are difficult to locate because deadfall and underbrush obscure them, or steep terrain makes accessing them dangerous. All survey and boundary monuments inspected were in good condition .

14.4.1.5 Standpipes

Three standpipes (MW-01, MW-02, and MW-03) are located on the south side slope of the disposal cell and were in good condition. These standpipes were installed during cell construction to monitor water levels in the toe of the cell. Dataloggers with remote data transfer systems (i.e., telemetry) powered by solar panels were installed in MW-02 and MW-03 to measure water level fluctuations. Standpipe MW-03 is equipped with a solar-powered pump so that water may be removed and discharged to a lined evaporation pond directly south of the cell. Water was flowing into the evaporation pond as shown in PL-6. The small-diameter, plastic, surficial water line from MW-03 to the pond was in good condition, as were the two solar panels that power the pump.

14.4.1.6 Evaporation Pond

An evaporation pond was constructed adjacent to the cell in 2001 to receive water pumped from standpipes MW-02 and MW-03. A datalogger, also with a remote data transfer system, measures water-level fluctuations in the evaporation pond. The evaporation pond continues to function as designed because water in the pond is evaporating as fast as, or faster than, influent arrives. Water had only been running into the pond for about a week, and considerable effluorescence and algal growth were observed in the pond. A meteorological station was also installed alongside the pond several years ago and is functioning normally. The lined pond, surrounding security fence, and locked gate were in good condition. The pond liner has been in operation for 12 years. One small hole was observed in the liner (PL-7). Before the next inspection, a detailed inspection of the exposed pond liner will be conducted by a subcontractor experienced in this work. Any required patches or mending will also occur at that time.

Possible elk tracks were observed inside the evaporation pond fence boundary, but the grass and forbs inside the fence were only lightly grazed. The two one-way gates allowing ingress and egress to this region were checked and were in good working condition. How an elk could gain

access to the inside of the evaporation fence remains unknown. No tracks or impressions from tracks were observed on the exposed liner.

14.4.2 Inspection Areas

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

Within each area, inspectors examined specific site-surveillance features, drainage structures, vegetation, and other features. Inspectors also looked for evidence of settlement, erosion, or other modifying processes that might affect the site’s integrity or long-term performance.

14.4.2.1 Disposal Cell and Interceptor Trench

Rock armor, consisting of river cobbles and boulders, covers the 71-acre disposal cell and generally remains in excellent condition overall. No evidence of subsidence, differential settling, or slumping was found. Surveys conducted to detect any movement of the cover rock in three dimensions were discontinued in 2011 after 5 years of surveys revealed no issues.

During the 2010 inspection, it was noted that a few cobbles or boulders showed signs of frost action and had begun to crack. Degradation of a few cobbles and boulders was also noted during the 2013 inspection and will continue to be monitored. This is not considered a major concern because most of the rock on the cell consists of very tough igneous and metamorphic river cobbles and boulders that should last for the expected life of the cell. However, if increased rock degradation becomes apparent, one or more study plots will be established.

Two visible green areas on the cell top and side slope are patches of grass (smooth brome). Foxtail barley also occurs. Because these plants like moist places in this region of the country, they may indicate where near-surface moisture is concentrated within the cell.

As observed in 2012, only small, isolated patches of annual weeds or annual grasses were found on the remainder of the cell top, and these were mostly brown; no deep-rooted plants or noxious weeds were observed in these areas.

A revegetated interceptor trench was constructed at the top of the disposal cell to protect the cell from storm-water and snowmelt run-on. The trench diverts water to the arroyo west of the site. Significant erosion occurred during a major rain event in 2005, and repairs to the lower section of the interceptor trench were undertaken later that year. In November 2005, rocks were moved into the eroded channel (directly above the drop-off into a major drainage), and the erosion was stabilized. Minor new erosion was observed in 2013 where the diversion trench plunges into a large canyon to the west of the site (PL-8).

14.4.2.2 Toe Ditch and Toe Ditch Outlet

A toe ditch runs along the downslope (south) edge of the disposal cell and is armored with the same rock that protects the disposal cell. The toe ditch diverts surface runoff from the disposal cell offsite to the east. As observed during previous inspections, small shrubs and trees and minor weeds are still growing around the perimeter of the rock-covered cell. For example, four

small pinyon trees are growing on the lower part of the cell near the toe drain ditch but are not large enough to be of concern. Minor rabbitbrush, bindweed, and mullein were found in areas around the perimeter of the toe ditch and outlet. A single small tamarisk was observed in the eastern end of the toe ditch. This vegetation will be monitored and controlled as necessary in the future.

Tumbleweeds have often collected in the southeastern end of the toe ditch. Minor accumulation was evident during the 2013 inspection. This area will continue to be monitored next year to determine the need for removal.

Minor erosion, anticipated in the design, is still evident in the channel at the outlet below the toe ditch. Bedrock is now exposed in this area. Rock previously placed in the outlet to stabilize the erosion continues to drop into the eroded area (self-armoring). Comparisons with a photograph taken during the 2003 inspection indicate that no new erosion has occurred during the past several years. This was still the case in 2013, and little new erosion was found. Cattle tracks were numerous in this outlet where it intersects a drainage to the south. Apparently, standing water had existed in this area during the recent past. Several tamarisk were observed downstream of the toe drain during the 2013 inspection.

14.4.2.3 Onsite Reclaimed Areas

Disturbed areas around the edges and south of the disposal cell were reseeded in 1996 and, overall, have been successfully reclaimed. The vegetation is composed primarily of desirable grasses and shrubs.

During the past several years, inspectors had found no evidence of cattle or sheep grazing within the site boundaries, only evidence of deer and elk grazing. This changed dramatically in 2012 when heavy grazing by cattle was observed. This year, vegetation was heavily grazed again by cattle. This was described in the Perimeter Fence section of the report (14.4.1.2). Prickly pear cactus were ungrazed by the cattle and were in full bloom (PL-9).

Fence and fence post damage are associated with the cattle grazing. Barbed-wire fence strands were broken near P1 and loose in other places. T-posts were bent in several locations but straightened during the inspection. Because of the increased impacts of cattle grazing on the site during the past 2 years, a white paper will be developed and will discuss potential impacts to the site and options for addressing this situation. Colorado is a fence-out state, and as such, recommendations must consider the possibility and usefulness versus expense of fencing the entire site, if no onsite grazing is to be allowed. Establishing a grazing agreement with the permittee is another option (this option will require fencing). DOE has contacted the BLM grazing permittee and will hold additional discussions with him.

Three arroyos are present in the reclaimed area south of the disposal cell. A rock apron was placed between the stock fence and the headcuts in these arroyos to prevent headward migration toward the disposal cell. As erosion has migrated into the rock apron, the rock has self-armored the arroyos and effectively stabilized them from further erosion. This process, which has been ongoing for a number of years, continued very little in 2012. This area will continue to be monitored.

Rills noted during previous inspections in the vicinity of perimeter sign P13 were still stable in 2013. The runoff collected by the rills flows along the interface between the riprap and the adjacent reclaimed soil area. The runoff has scoured a small channel that currently averages about 1 foot wide and less than 1 foot deep, exposing some of the gravel bedding material. A comparison with photographs taken the last several years at this location indicates that the channel has not changed. While this feature is not threatening the integrity of the disposal cell at this time, continued observation during subsequent site inspections is warranted.

During the 2010 inspection, a new rill was noted along the southwest side of the property, extending from about perimeter sign P1 and then down a hill. This feature is not currently affecting the integrity of the cell, and no new erosion was evident in 2013. This area will continue to be examined during future inspections.

14.4.2.4 Outlying Area

The area beyond the site for a distance of 0.25 mile was visually inspected for signs of erosion, development, or other disturbance. The primary land use in the area is grazing and wildlife habitat. Extensive grazing had occurred on this area. A personnel gate located along the southeast fence and on BLM land was open and served as a major thoroughway for cattle to the flat ground south of the site (see PL-5). Tumbleweed buildup against east fences was moderate; it is a constant problem and will continue to be monitored. No activity or development was observed that might affect site integrity or the long-term performance of the disposal cell.

The reinforced tubular gate and barbed wire fence about 1,700 feet south of the site access gate were in good condition. This was installed several years ago to prevent access by vandals that were accessing the site.

14.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No specific follow-up inspection is planned, although fence mending, an assessment of the impacts and recommendations about grazing, and an assessment of the evaporation pond liner are planned before the next inspection.

14.6 Maintenance and Repairs

14A Fence repairs will be performed before the next inspection.

14B DOE has identified the BLM grazing permittee for this area and will hold discussions with him to determine if a grazing agreement should be established or if any other agreement or restraint associated with grazing should be pursued.

14.7 Environmental Monitoring

14.7.1 Groundwater Monitoring

Monitoring of groundwater quality is not required at this site because groundwater in the uppermost aquifer is classified as limited use, and the disposal cell is geologically isolated from the first usable aquifer by approximately 3,800 feet of low-permeability siltstones, shales, and sandstones. The nine monitoring wells that had been at the site were decommissioned in 2002.

14.7.2 Disposal Cell Pore-Water-Level Monitoring

- 14C In accordance with the LTSP, DOE continues to monitor pore water levels from transient drainage in the disposal cell at standpipes MW-02 and MW-03, installed at the downgradient end of the cell on the south side slope. An action level elevation of 6,016 feet was established in the LTSP for pumping the pore water from the cell to a lined evaporation pond. This monitoring is performed to ensure that water does not rise above a geotextile liner that was installed in the toe of the cell at an elevation of 6,020 feet.

Pumping from standpipes MW-02 and MW-03 began when water levels reached an action level of 6,016 feet above sea level in 2001. In December 2003, a solar-powered pump (similar to the one in MW-02) was installed in MW-03, and a plastic aboveground water line was plumbed into the existing water line to increase the amount of water being removed from the disposal cell. Pumping from both standpipes continued until September 2006, when it was determined that MW-02 could not sustain prolonged pumping due to consistent lack of sufficient recharge. Although pumping at MW-02 was discontinued at that time, the datalogger remains, and water-level monitoring at this standpipe continues. After cessation of pumping at MW-02, the pump in MW-03 was lowered about 9 feet to near the bottom of the well so that it could pump for longer periods and produce more water. The pump from MW-02 was removed and installed in MW-03 in August 2008.

Pumps were turned on in late May 2013 and were operating normally during the time of the inspection, pumping 2 to 3 gallons per minute from MW-03. This is generally consistent with active pumping rates recorded the last several years.

Datalogger information for the 2013 reporting period indicates that pore water levels in both standpipes were consistently below the 6,016-foot action level (Figure 14-2). As observed historically, levels were highest during late fall and winter, when pumping is discontinued (in 2013, maximum water levels in MW-02 and MW-03 were 6,014.6 feet and 6,015.3 feet, respectively). Water levels then declined to between 6,013 feet and 6,014 feet in the summer during pumping. For the 2013 pumping season, pumping started on May 31, 2013, and ceased on October 3, 2013. According to the LTSP requirement, pumping will continue until the water levels in the standpipes stabilize at an elevation of 6,014 feet or lower.

14.8 Corrective Action

Corrective action is 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.

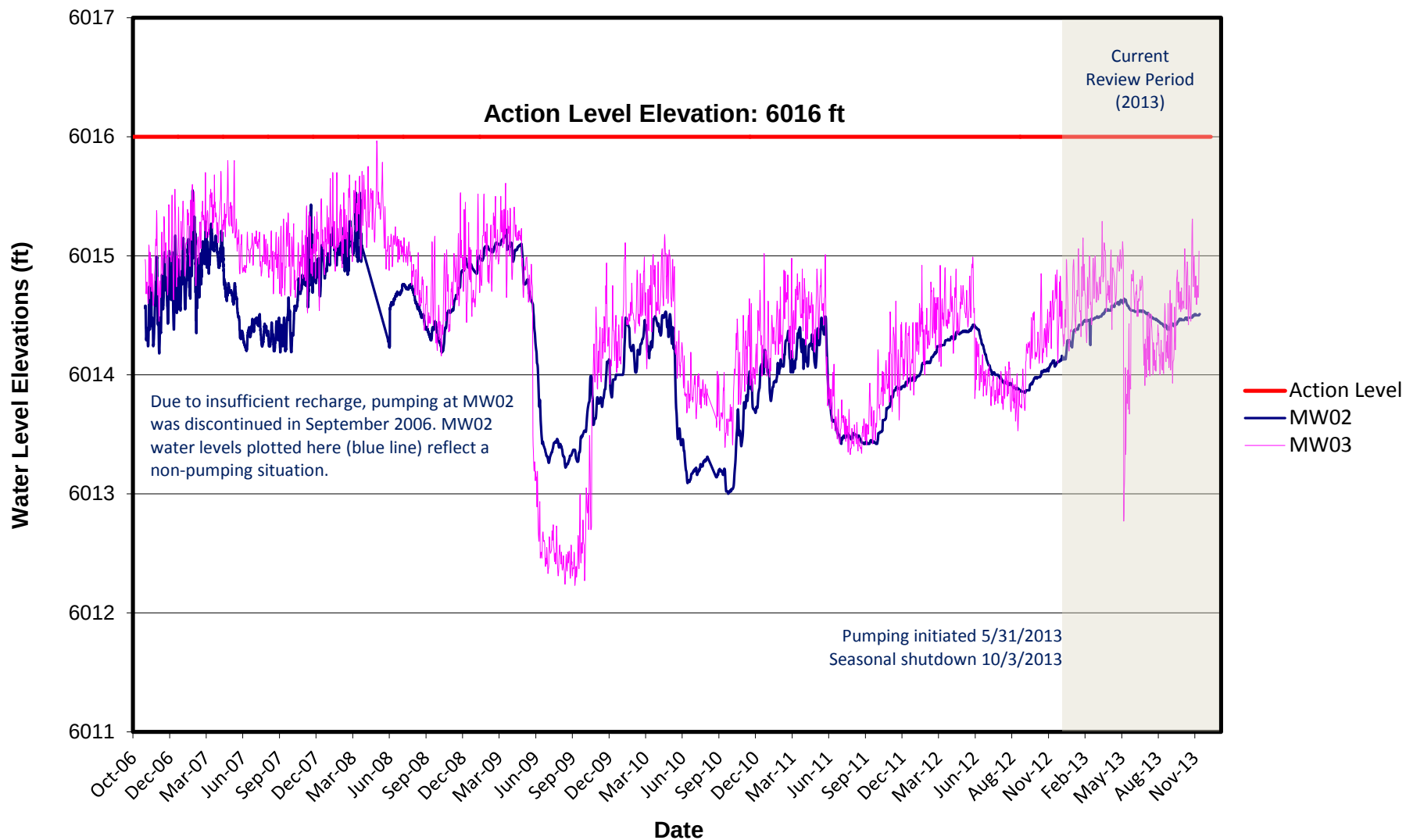


Figure 14-2. Disposal Cell Pore Water Levels in Standpipes MW-02 and MW-03 at the Rifle Disposal Site

The LTSP establishes that corrective action will be taken if the water level in the disposal cell reaches 6,016 feet in elevation. In 2001, when the action level of 6,016 feet was reached, corrective action was initiated with the installation of the cell dewatering system and associated evaporation pond. This continued corrective action has maintained the water level at an acceptable elevation (below the action level) and prevents water from overtopping the disposal cell liner. Dewatering of the cell continued in 2013 and will continue in 2014 and beyond.

No other corrective action was required in 2013.

14.9 Photographs

Photograph Location Number	Azimuth	Description
PL-1	130	Open personnel gate near perimeter sign P11.
PL-2	150	Vegetation within evaporation pond fence.
PL-3	125	Vegetation outside evaporation pond fence.
PL-4	300	Livestock trail along rock riprap cell cover.
PL-5	195	Wranglers driving cattle in outlying area, south of perimeter fence.
PL-6	145	Evaporation pond with low water level.
PL-7	NA	Small hole in evaporation pond liner.
PL-8	280	Evidence of cattle at toe ditch runoff point.
PL-9	50	Prickly pear cactus with cell in background; other vegetation grazed heavily.



RFL 6/2013. PL-1. Open personnel gate near perimeter sign P11.



RFL 6/2013. PL-2. Vegetation within evaporation pond fence.



RFL 6/2013. PL-3. Vegetation outside evaporation pond fence.



RFL 6/2013. PL-4. Livestock trail along rock riprap cell cover.



RFL 6/2013. PL-5. Wranglers driving cattle in outlying area, south of perimeter fence.



RFL 6/2013. PL-6. Evaporation pond with low water level.



RFL 6/2013. PL-7. Small hole in evaporation pond liner.



RFL 6/2013. PL-8. Evidence of cattle at toe ditch runoff point.



RFL 6/2013. PL-9. Prickly pear cactus with cell in background; other vegetation grazed heavily.

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15.0 Salt Lake City, Utah, Disposal Site

15.1 Compliance Summary

The Salt Lake City, Utah, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site, inspected on March 26, 2013, was in good condition. Observations of the rock quality monitoring stations performed during this inspection indicate very little change from the previous year. No waste debris or indication of windblown or spillover contamination from EnergySolutions adjacent radioactive waste disposal operations was noted. Radiological survey measurements performed during the 2012 inspection indicated that no windblown contamination was present. No maintenance needs or cause for a follow-up or contingency inspection was identified.

15.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the South Clive Disposal Site, Clive, Utah* (LTSP) (DOE/AL/62350-228, Rev. 2, U.S. Department of Energy [DOE], September 1997) and procedures that DOE established to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27. Table 15-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.0	Section 15.4
Follow-Up or Contingency Inspections	Section 3.4	Section 15.5
Routine Maintenance and Repairs	Section 5.0	Section 15.6
Groundwater Monitoring	Section 4.0	Section 15.7
Corrective Action	Section 6.0	Section 15.8

15.3 Institutional Controls

The 100-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1997. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: site markers, boundary monuments, warning/no-trespassing signs, a site perimeter fence, and locked gates at the site entrances.

15.4 Inspection Results

The site, 85 miles west of Salt Lake City, Utah, was inspected on March 26, 2013. J. Gillespie and D. Atkinson of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE Office in Grand Junction conducted the inspection. J. Nguyen, of the DOE Office of Legacy Management, and R. Topham and C. Bishop, of the Utah Department of Environmental Quality, attended. EnergySolutions provided an escort, J. Hill, accompanied by the chief engineer, D. Booth, and a radiation technician to perform spot checks of the cap surface even though this is not required until the 2014 inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

15.4.1 Site Surveillance Features

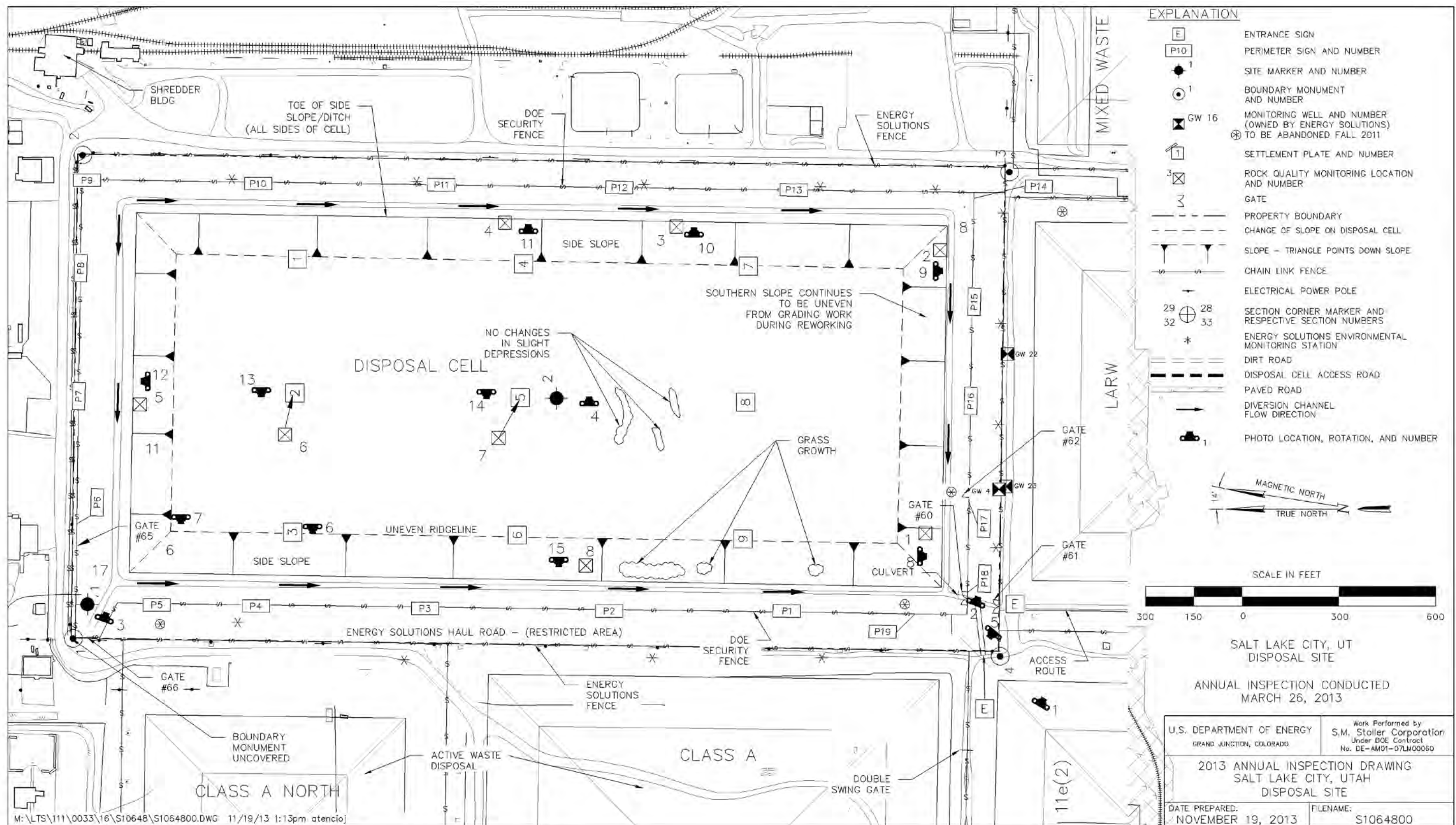
Figure 15-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and on Figure 15-1 by photograph location (PL) numbers.

15.4.1.1 Entrance Gates, Entrance Signs, and Access Road

Access to the site is on paved and graded roads to the EnergySolutions facility in Clive, Utah. The DOE disposal site is completely surrounded by EnergySolutions' active radioactive waste disposal operations. A perpetual right-of-way easement is in place that ensures DOE and its representatives continued access across EnergySolutions' property to the site. All personnel entering the EnergySolutions facility must sign in at the security building near the northwest corner of the site.

Because EnergySolutions' radioactive waste disposal activities surround the site, posted radiological control areas have to be crossed to access the site. EnergySolutions, therefore, requires inspectors and other site visitors to receive a radiological hazard awareness briefing, sign in on a Radiological Work Permit, and be issued a dosimeter before entering the site. Typically, the escort provided by EnergySolutions is also a health physics technician. Following the inspection, personnel and equipment are scanned upon leaving the radiological control area. Prior to leaving the EnergySolutions facility, inspectors and other visitors are again monitored for any radiological surface contamination with a personnel contamination monitor. Hardhats, safety glasses, and leather work boots are also required on EnergySolutions' property.

Access to the DOE disposal cell is via a route across EnergySolutions' property to the southwest corner of the site. Four locked gates provide access to the DOE disposal cell; one in the southwest corner of the chainlink perimeter fence that EnergySolutions maintains around the entire DOE property and three in the interior security fence DOE maintains around the disposal cell (two in the northwest corner and one in the southwest corner). The EnergySolutions escort admits inspectors through their perimeter gate in the southwest corner. DOE provides EnergySolutions access to the entire disposal site to perform, as needed, periodic maintenance activities through a signed access agreement and license. EnergySolutions is to notify DOE anytime access to the site is needed.



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15.4.1.2 Perimeter Fence and Perimeter Signs

The exterior EnergySolutions fence was in good condition.

The DOE interior fence (PL-1), site entrance sign (PL-2), and all perimeter warning signs were present and in good condition. Decal number designations (1 through 18) have been placed on the outward-facing side of all perimeter signs to correspond with the numbered designations on the site map.

15.4.1.3 Site Markers

Both of the granite site markers were in excellent condition (PL-3 and PL-4). Site marker SMK-1 is etched from windblown sand and dirt, but it is legible. EnergySolutions removed vegetation to clear the area surrounding SMK-1.

15.4.1.4 Survey Monuments and Boundary Monuments

All four boundary monuments were observed to be in good condition. The EnergySolutions protective casings at all four of the locations (PL-5) appeared to be working well for protection from surrounding earth-moving activities.

15.4.1.5 Monitoring Wells

Supplemental standards based on limited use groundwater (40 CFR 192.21[g]) were applied to the groundwater in the uppermost aquifer underlying the site. The groundwater under the site was classified as limited use because of excessive total dissolved solids concentrations (greater than 10,000 milligrams per liter [mg/L]) that occur naturally in the uppermost aquifer. Consequently, in accordance with the LTSP, no groundwater monitoring is required at the site.

Four groundwater monitoring wells that belong to EnergySolutions are located on DOE property. All four wells were properly abandoned in 2011. Abandonment reports are on file at the Utah Department of Environmental Quality and with the DOE Office of Legacy Management.

15.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection: (1) the disposal cell (including the riprap-covered top and side slopes, diversion channels, and outflow channel), (2) the terrace area north and northeast of the disposal cell, and (3) the outlying area.

Within each area, the inspectors examined specific site surveillance features, drainage structures, vegetation, rock quality monitoring plots, and other features. Inspectors examined each area for evidence of erosion, settling, slumping, or other disturbances that might affect the site’s integrity, protectiveness, or long-term performance.

15.4.2.1 Disposal Cell, Diversion Channels, and Outflow Channel

Inspectors walked the perimeter road that surrounds the base of the disposal cell and traversed the top and side slopes of the disposal cell. The crest (PL-6) of each side slope was inspected in order to provide a vantage point to view the planes of both the side slopes and the top of the

disposal cell (PL-7). The riprap was in good condition, and no evidence of erosion or slumping of the side slopes was observed. Several slight depressions in the riprap have been observed during previous inspections along the slopes of the cell, and they appear to have been created by the heavy equipment tracks during installation of the riprap. These depressions continue to be monitored to ensure that settlement is not occurring.

- 15A A minor portion of the riprap, approximately 1 percent (the percentage determined using eight square-meter grids installed during the 2010 inspection), showed signs of weathering (PLs-8, 9, 10, 11, 12, 13, 14, and 15). The rock type was consistent, and the weathering effects were all similar. The material weathering does not pose a problem at this time, due to the estimated low percentage observed, but the eight square-meter grids have been permanently located as illustrated on the figure and will continue to be monitored during future inspections.

No deep-rooted plants were found growing on the top or side slopes of the cell.

Nine settlement plates are located on the cell top; several were inspected and found to be in good condition. Surveying of the settlement plates was conducted for several years following cell construction, but it is no longer required. EnergySolutions subcontracts Aero-Graphics geospatial services in Salt Lake City to perform lidar surveys of each of their cells. The lidar survey provides topographic relief with a 1-foot-contour interval for each of the cells.

The 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 perimeter road was in good condition. All surface water diversion channels were operating and in good condition during the 2013 inspection.

15.4.2.2 Terrace Area North and Northeast of Disposal cell

A variety of features and ongoing waste disposal activities managed by EnergySolutions surround the site. The most obvious waste disposal activities are occurring directly west of the site, where a Class A (low-level radioactive waste) disposal cell is being capped. On the northeast and east sides of the site, incoming wastes are unloaded from railcars and transferred to haul trucks; decontamination facilities are also present. Directly to the south is a completed low-level radioactive waste disposal cell, to the southwest is an 11e(2) waste disposal cell, and to the southeast is an operating mixed-waste treatment and disposal facility. Administration, security, and maintenance buildings lie directly to the north-northwest. A shredding facility, rotary dump, and railroad spur delivery loop are located to the northwest.

15.4.2.3 Outlying Area

The site perimeter transect extends from the security fence to 0.25 mile beyond the site boundary. This transect includes the EnergySolutions perimeter fence, the enclosed area between the two fences, the outflow channel, and monitoring wells. All features were in good condition.

All areas surrounding DOE's property are restricted due to radiological hazards resulting from the waste disposal activities conducted by EnergySolutions. However, EnergySolutions ensures perpetual access to the site and enforces personnel radiological protection procedures.

15.4.2.4 Cursory Scanning for Spillover and Windblown Radioactive Surface Contamination

Radiological surveys for spillover and windblown radioactive contamination are generally performed onsite every other year during the inspection due to concerns regarding the ongoing radioactive waste disposal activities that EnergySolutions conducts adjacent to the site. Survey measurements include taking dose rate measurements at random locations across the site, and the collection of smears that are subsequently analyzed for removable alpha/beta contamination. In addition, EnergySolutions maintains several surface soil radiological monitoring and sampling stations, and performs routine scanning onsite, just inside the DOE property boundary.

A radiological survey was performed in 2010 as part of the inspection by an EnergySolutions radiological technician and again during the 2012 inspection. Results of both surveys were below the DOE *Radiological Control Manual* limits. A prior radiological survey in 2007 also resulted in measurements below DOE *Radiological Control Manual* limits, which indicates that spillover and windblown radiological contamination does not currently appear to be an issue onsite. EnergySolutions performs periodic walkthroughs of the site to remove any windblown debris. The next radiological survey is scheduled for 2014.

15.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

15.6 Maintenance and Repairs

No maintenance needs were identified during the inspection.

15.7 Environmental Monitoring

15.7.1 Groundwater Monitoring

In accordance with 40 CFR 192.21(g), groundwater at the site qualifies for supplemental standards. Groundwater is classified as limited use due to naturally occurring concentrations of total dissolved solids that exceed 10,000 mg/L in the uppermost aquifer. Consequently, the LTSP does not require groundwater monitoring at the site. The groundwater monitoring wells were abandoned in 2011, and the abandonment reports are filed at the Utah Department of Environmental Quality.

15.8 Corrective Action

Corrective action is 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 2013.

15.9 Photographs

Photo Location Number	Azimuth	Description
PL-1		Southwest corner from outside fence surrounding the cell.
PL-2		Entrance sign on inside fence at Gate 60.
PL-3		Site marker SMK-1.
PL-4		Site marker SMK-2.
PL-5		Boundary monument BM-4.
PL-6		UDEQ personnel illustrating unevenness of the ridge construction along the top of the west slope.
PL-7		Across the cap from the west slope.
PL-8		Rock Degradation Plot No. 1.
PL-9		Rock Degradation Plot No. 2.
PL-10		Rock Degradation Plot No. 3.
PL-11		Rock Degradation Plot No. 4.
PL-12		Rock Degradation Plot No. 5.
PL-13		Rock Degradation Plot No. 6.
PL-14		Rock Degradation Plot No. 7.
PL-15		Rock Degradation Plot No. 8.



SLD 3/2013. PL-1. Southwest corner from outside fence surrounding the cell.



SLD 3/2013. PL-2. Entrance sign on inside fence at Gate 60.



SLD 3/2013. PL-3. Site marker SMK-1.



SLD 3/2013. PL-4. Site marker SMK-2.



SLD 3/2013. PL-5. Boundary monument BM-4.



SLD 3/2013. PL-6. UDEQ personnel illustrating unevenness of the ridge construction along the top of the west slope.



SLD 3/2013. PL-7. Across the cap from the west slope.



SLD 3/2013. PL-8. Rock Degradation Plot No. 1.



SLD 3/2013. PL-9. Rock Degradation Plot No. 2.



SLD 3/2013. PL-10. Rock Degradation Plot No. 3.



SLD 3/2013. PL-11. Rock Degradation Plot No. 4.



SLD 3/2013. PL-12. Rock Degradation Plot No. 5.



SLD 3/2013. PL-13. Rock Degradation Plot No. 6.



SLD 3/2013. PL-14. Rock Degradation Plot No. 7.



SLD 3/2013. PL-15. Rock Degradation Plot No. 8.

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16.0 Shiprock, New Mexico, Disposal Site

16.1 Compliance Summary

The Shiprock, New Mexico, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on May 28, 2013. The disposal cell and all associated surface water diversion and drainage structures remained in good condition.

No settling, slumping, erosion, animal intrusion, riprap deterioration, or other such disturbance was evident on the top and side slopes of the cell. Five open research pits on the cell top were covered in the fall of 2012, and these areas were in good condition. Also on the cell top, vehicle ruts were visible as were several small depressions caused by subsided historical piezocone pits. No significant changes were observed since the 2012 inspection. One woody plant was growing on the cell top, and several were growing on the northwest side slope. Diversion channels and the outflow channel were in good condition. Vegetation in the channel was sparse and is not expected to obstruct drainage flow. No new erosion was evident along the terrace escarpment. No significant changes in land use associated with outlying areas were identified. The offsite portion of the outflow channel remained functional and in good condition.

All three of the site's entrance gates were intact. All perimeter signs were present, legible, and in good condition. Site structures and monuments were intact except for erosion control marker 5A, which had been bent by a vehicle but remains functional. Minor site maintenance is necessary. One pictorial entrance sign was missing from the northwest gate. Sediment had accumulated under the southwest gate, which can make the gate difficult to open. The perimeter fence, damaged in places, was functional except for one area near perimeter sign P14 that requires repair. The mesh had been cut, creating a hole that allows site access. Trash and tumbleweeds have accumulated in places along the perimeter fence. No other maintenance needs or cause for a follow-up or contingency inspection was identified.

16.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Shiprock Disposal Site, Shiprock, New Mexico* (LTSP) (DOE/AL/62350-60F, Rev. 1, U.S. Department of Energy [DOE], September 1994) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 16-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 16.4
Follow-Up or Contingency Inspections	Section 7.0	Section 16.5
Maintenance and Repairs	Section 8.0	Section 16.6
Groundwater Monitoring	Section 5.0	Section 16.7
Corrective Action	Section 9.0	Section 16.8

16.3 Institutional Controls

The 105-acre disposal site is held in trust by the U.S. Bureau of Indian Affairs. The Navajo Nation retains title to and ownership of the land. The site was accepted under U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1996. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the site (referred to as site-specific security measures in the LTSP) include federal custody of the disposal cell and its engineered features, and the following features that are inspected annually: site markers, survey and boundary monuments, warning/no-trespassing signs, a site perimeter fence, and locked gates at the site entrances.

16.4 Inspection Results

L. Sheader and M. Kastens of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE office in Grand Junction, Colorado, conducted the inspection on May 28, 2013. D. Steckley of the DOE Office of Legacy Management, L. Benally and D. Lee of the Navajo Abandoned Mine Lands/Uranium Mill Tailings Remedial Action (AML/UMTRA) Department, and D. Miller of the S.M. Stoller Corporation also participated in the inspection.

The purposes of the annual inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

16.4.1 Site Surveillance Features

Figure 16-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and on Figure 16-1 by photograph location (PL) numbers.

16.4.1.1 Entrance Gates, Entrance Signs, and Access Roads

Three gates allow entrance to the site: the east gate (the current main entrance gate near the terrace escarpment), the northwest gate (an auxiliary access gate), and the southwest gate (the former entrance gate). Near each gate, entrance signs are placed in pairs, one text and one pictorial (PL-1). The pictorial sign was missing from the northwest gate. The remaining entrance signs were in good condition; on the signs, contact information for the DOE and the Navajo AML/UMTRA Department was correct. The east and northwest gates were intact and functional. Sediment continually accumulates along the bottom of the southwest gate, which can make the gate difficult to open. Access to the main (east) entrance gate is gained by traveling through a gravel pit. All access roads were in good condition.

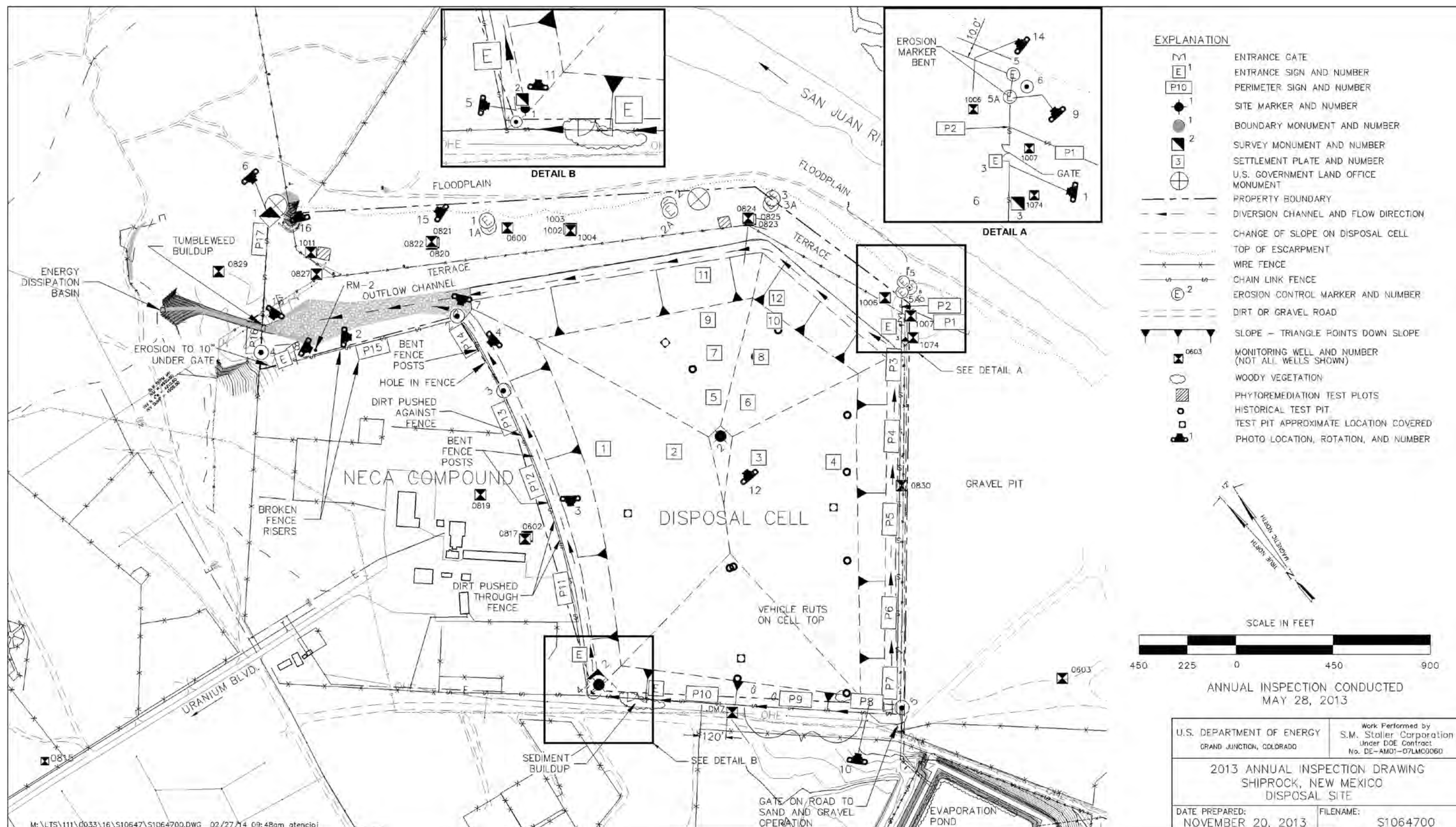


Figure 16-1. Annual Inspection Drawing for the Shiprock Disposal Site

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16.4.1.2 Perimeter Fence and Perimeter Signs

As observed in previous years, the perimeter fence was damaged in many areas (PL-2). Damaged fence sections reported in previous years include bent posts and bent fence fabric between perimeter signs P11 and P12, dirt mounded against the fence and a section of bent fence near P13, bent posts near P14, a broken fence riser near P15, and fence risers separated from posts between P15 and P16. New damage consists of two areas where dirt was pushed through the fence between P11 and P12 (PL-3) and a hole cut in the fence near P14 (PL-4). The hole requires repair. Other damaged fence sections will continue to be monitored.

Trash and tumbleweeds continually accumulate in many places along the perimeter fence, including a section of fence across the outflow channel. Accumulations large enough to represent a fire hazard or increase the possibility of damage to the fence will be removed. Inspectors placed rocks in several gaps beneath the fence that were potentially large enough to allow site access.

Seventeen pairs of signs, designated P1 through P17, each pair consisting of one pictorial sign and one sign with text, are located on the fence around the perimeter of the site. All perimeter signs were in good condition and showed no evidence of vandalism.

16.4.1.3 Site Markers

Site marker SMK-1, located just inside the southwest gate, and site marker SMK-2, located on top of the disposal cell, were both in good condition. Minor cracks in the concrete base of SMK-1 were sealed in May 2003 and have not changed significantly (PL-5).

16.4.1.4 Survey Monuments and Boundary Monuments

All three survey monuments (SM-1, SM-2, and SM-3) were located and in good condition. The concrete was cracked at SM-1 (PL-6), but the crack did not threaten the integrity of the marker. Eight boundary monuments were originally installed at the site. Inspection of monument BM-7 was discontinued in 1999 because it is located offsite, on the unsafe, steep embankment below the terrace. Inspection of monument BM-8, also located beyond the site's boundary, was discontinued in 2003. Because they are offsite, inspection of these monuments will not resume. In winter 2013, the remaining six onsite boundary monuments were surveyed and uncovered as necessary. In accordance with the LTSP, reference posts were installed by each monument to facilitate future inspections (PL-7). In 2001, monument BM-1 was lost to flooding. Its reference monuments (RM-1, installed in 2003, and RM-2 [PL-8], installed in 2013) were both present and in good condition.

16.4.1.5 Erosion Control Markers

The four pairs of erosion control markers along the edge of the terrace escarpment (1, 1A, 2, 2A, 3, 3A, 5, and 5A) were in good condition except for marker 5A near the east entrance gate. This marker was previously damaged by a vehicle, but it is still functional and does not require repair (PL-9). Erosion control markers 4 and 4A are not inspected. They were installed on the terrace east of the disposal site, in the gravel pit. Markers 5 and 5A replaced Markers 4 and 4A.

16.4.1.6 Monitoring Wells

In accordance with the LTSP, cell performance monitoring of groundwater is not required at the site. Onsite wells are associated with separate groundwater restoration activities and are not included in the annual inspection.

16.4.2 Inspection Areas

To ensure a thorough and efficient inspection, the site is divided into three areas (referred to as “transects” in the LTSP): (1) the disposal cell including the riprap-covered top and side slopes, diversion channels at the base of the cell, and the outflow channel; (2) the terrace area north and northeast of the disposal cell; and (3) the outlying area, which includes the fenced evaporation pond south of the disposal cell and the gravel pit southeast of the disposal cell.

Within each inspection area, inspectors examined specific site-surveillance features, drainage structures, vegetation, and other features. Inspectors also looked for evidence of settlement, erosion, or other modifying processes that might affect site integrity or long-term performance.

16.4.2.1 Disposal Cell, Diversion Channels, and Outflow Channel

The riprap-covered top and side slopes of the cell were in good condition (PL-10). No evidence of settling, slumping, erosion, animal intrusion, riprap deterioration, or other significant disturbance was found. Five open research pits, described in previous annual inspection reports, were covered in fall 2012, and these areas were also in good condition. Piezocones associated with a different research project were installed on the cell cover in the past (*2004 Annual Inspection Report for the Shiprock, New Mexico, UMTRCA Title I Disposal Site*). Some of the filled piezocone pits have subsided slightly, forming conical depressions in the cover. As previously reported, the surface of the cell was covered with vehicle ruts. The condition of the depressions and vehicle ruts is monitored annually and had not changed significantly since the 2012 inspection. These features will continue to be monitored and photographed to document any changes. Inspectors noted the locations and species of plants as stipulated in the LTSP. Several small woody shrubs were growing on the northwest side slope of the disposal cell (PL-11), and one small shrub was observed on the cell top. Sediment has accumulated in the rock cover in several places (PL-12), but this is a natural, expected process.

Diversion channels around the base of the disposal cell were in good condition and contained little vegetation. Non-woody plants were growing in the outflow channel, and woody vegetation was growing on the banks of the channel; neither is likely to obstruct flow. However, tumbleweeds and trash have accumulated along the perimeter fence where it crosses the outflow channel and could potentially obstruct large flows (PL-13).

16.4.2.2 Terrace Area

The terrace area is located north and northeast of the disposal cell along the top of a steep escarpment. Little vegetation grows on the terrace (PL-14). The escarpment, approximately 300 feet from the eastern edge of the disposal cell, is prone to slumping (PL-15). No new erosion was evident in 2013 (PL-16). The LTSP states that the base of the terrace escarpment should be inspected for signs of seepage. Seeps were identified during early site inspections. However, this

is no longer part of annual inspection procedures because the seeps are now being monitored under the groundwater compliance strategy for the site.

Northern and southern phytoremediation test plots have been maintained on the terrace since 2006. These plots are used for groundwater restoration studies and are not included in the annual inspection.

16.4.2.3 Outlying Area

A gravel pit is located immediately southeast of the disposal cell. No significant changes in land use associated with the gravel pit or with other outlying areas near the disposal cell were identified.

The offsite portion of the outflow channel was functional and in good condition. Several previously repaired areas remained in good condition. Fences and warning signs posted in Bob Lee Wash are maintained under the groundwater compliance strategy and are not examined during the annual inspection.

16.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified in 2013.

16.6 Maintenance and Repair

Based on results of the 2013 annual inspection, most maintenance items identified during the 2012 inspection have been addressed.

The following items will be addressed before the 2014 inspection:

- 16A** 1. Replace the pictorial sign missing from the northwest entrance gate.
- 16B** 2. Repair the hole in the perimeter fence near P14.
- 16C** 3. Remove accumulations of tumbleweeds and trash from the perimeter fence if accumulations are large enough to represent a fire hazard or potentially damage the fence.

Because of the sparse vegetation surrounding the disposal site and the arid, windy climate of the region, annual maintenance is expected to include removing accumulations of sediment and debris along the perimeter fence and gates. The location and severity of accumulations will vary from year to year, and annual recommendations for specific areas to be addressed will continue.

16.7 Environmental Monitoring

16.7.1 Groundwater Monitoring

Wells along the terrace and at offsite locations are associated with groundwater restoration and are not included in the annual inspection because monitoring is not required by the LTSP. Wells are inspected and maintained by sampling teams during regularly scheduled sampling events.

In 2002 DOE constructed an 11-acre lined evaporation pond near the disposal cell. Although the LTSP does not require monitoring of the pond facilities, the evaporation pond area is inspected for general condition and security during annual inspections. At the time of the 2013 inspection, the chainlink security fence was intact and functional (although damaged in places), no damage to the pond liner was evident, and the pond was partially filled with water.

16.7.2 Vegetation Monitoring

Noxious weeds are actively managed at all DOE-controlled sites. At the Shiprock site, two noxious species have been found: halogeton (*Halogeton glomeratus*) and saltcedar (*Tamarix ramosissima*). In a 1999 letter to the Navajo UMTRA Department, DOE also committed to spraying annual weeds (consisting primarily of kochia [*Bassia scoparia*] and Russian thistle [*Salsola tragus*]) on the disposal cell top at the Shiprock site. No significant populations of noxious or annual weeds were observed growing on the disposal cell top or terrace area during the 2013 inspection. Small quantities of halogeton were growing on the terrace. On the steep slopes of the escarpment, some annual weeds, halogeton, and saltcedar were growing. Saltcedar is also found offsite at the bottom of the outflow channel where the channel meets Bob Lee Wash.

Control of vegetation is not recommended at the site in 2013 because infestations of halogeton are too limited to warrant treatment, weeds present on the escarpment slopes are too inaccessible to treat, and woody vegetation present on the disposal cell is not excessive.

16.8 Corrective Action

Corrective action is 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 2013.

16.9 Photographs

Photograph Location Number	Azimuth	Description
PL-1	320	Entrance sign at main access gate.
PL-2	110	Damaged fence line near perimeter sign P15.
PL-3	220	Dirt pushed under fence between P11 and P12.
PL-4	270	Hole cut into fence near perimeter sign P14.
PL-5	140	Site marker SMK-1.
PL-6	180	Survey monument SM-1.
PL-7	235	Boundary monument 2 with reference post.
PL-8	160	Reference monument RM-2, installed in 2013.
PL-9	n/a*	Erosion marker ECM-5A, bent but functional.
PL-10	50	Southeast slope of disposal cell.
PL-11	45	Northwest slope of disposal cell showing vegetation.
PL-12	n/a*	Sediment deposition on cell top.
PL-13	255	Fence across outflow channel with debris buildup.
PL-14	350	Terrace, view north-northeast.
PL-15	345	Terrace escarpment pedestaling; piping was also observed.
PL-16	30	View down repaired section of escarpment; no new erosion.

*The azimuth is not given because the photo was taken at close range.



SHP 5/2013. PL-1. Entrance sign at main access gate.



SHP 5/2013. PL-2. Damaged fence line near perimeter sign P15.



SHP 5/2013. PL-3. Dirt pushed under fence between P11 and P12.



SHP 5/2013. PL-4. Hole cut into fence near perimeter sign P14.



SHP 5/2013. PL-5. Site marker SMK-1.



SHP 5/2013. PL-6. Survey monument SM-1.



SHP 5/2013. PL-7. Boundary monument 2 with reference post..



SHP 5/2013. PL-8. "Reference monument RM-2, installed in 2013.



SHP 5/2013. PL-9. Erosion marker ECM-5A, bent but functional.



SHP 5/2013. PL-10. Southeast slope of disposal cell.



SHP 5/2013. PL-11. Northwest slope of disposal cell showing vegetation.



SHP 5/2013. PL-12. Sediment deposition on cell top.



SHP 5/2013. PL-13. Fence across outflow channel with debris buildup.



SHP 5/2013. PL-14. Terrace, view north-northeast.



SHP 5/2013. PL-15. Terrace escarpment pedestaling; piping was also observed.



SHP 5/2013. PL-16. View down repaired section of escarpment; no new erosion.

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17.0 Slick Rock, Colorado, Disposal Site

17.1 Compliance Summary

The Slick Rock, Colorado, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on May 14, 2013, and was in good condition. The rock-covered top and side slopes of the disposal cell are in excellent condition. The site access road, entrance gate, fence, and site markers were in good to excellent condition. There are several minor erosional features on the site that have not increased in size since the last inspection, and there are active rills in areas west and south of the cell. Preexisting rills and gullies were inspected near perimeter signs P2, P3, and P5. Other rills occur southeast of the disposal cell and north of the retention pond. However, due to their locations, none of these erosional features pose a hazard to the disposal cell or are cause for concern. They will continue to be monitored. No maintenance needs or cause for a follow-up or contingency inspection was identified

17.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Burro Canyon Disposal Cell, Slick Rock, Colorado*, (LTSP) (DOE/AL/62350-236, Rev. 0, U.S. Department of Energy [DOE], May 1998) and procedures that DOE established to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 17-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Sections 3.0 and 6.2	Section 17.4
Follow-Up or Contingency Inspections	Section 3.4	Section 17.5
Routine Maintenance and Repairs	Section 4.0	Section 17.6
Groundwater Monitoring	Sections 2.5 and 2.6	Section 17.7
Corrective Action	Section 5.0	Section 17.8

17.3 Institutional Controls

The 62-acre disposal site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission (NRC) general license (10 CFR 40.27) in 1998. The site is managed in accordance with requirements for UMTRCA Title I sites. DOE, as the licensee, is responsible for the site's custody and long-term care. Institutional controls at the site include federal ownership of the property and the following features that are inspected annually: site markers, survey and boundary monuments, warning/no-trespassing signs, and a locked gate at the site entrance.

17.4 Inspection Results

D. Traub and L. Sheader of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE office in Grand Junction, Colorado, conducted the inspection on May 14, 2013. J. Nguyen and M. Kautsky of the DOE Office of Legacy Management, and M. Cosby of the Colorado Department of Public Health and Environment accompanied the

inspectors. R. Evans, senior health physicist with NRC attended this year's inspection to conduct an observational site visit.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

17.4.1 Site Surveillance Features

Figure 17-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and in Figure 17-1 by photograph location (PL) numbers.

17.4.1.1 Entrance Gate, Entrance Sign, and Access Road

Site access is by an improved gravel and dirt road maintained by San Miguel County. The road is in good condition. Soil erosion under the fence along the county road continues to be monitored.

The entrance to the site is through a barbed-wire gate that is secured with a DOE lock.

17.4.1.2 Perimeter Fence and Perimeter Signs

The stock fence around the site is strung with four strands of wire with spacers. The top and bottom strands are smooth wire to allow wildlife to pass over and under, and the middle two strands are barbed wire. The stock fence and the entrance gate are in good condition. In several places around the perimeter, the top strand of the fence has been slightly stretched down by deer or elk.

Thirty-two perimeter signs, designated P1 through P32, are spaced at approximately 200-foot intervals around the site. The signs, attached to steel posts set in concrete, are 5 feet inside the site boundary. All signs are in good condition, although some checking of the printed overlay is beginning to appear on several signs.

17.4.1.3 Site Markers

The two granite site markers, SMK-1 near the entrance gate and SMK-2 on the north-central part of the disposal cell, are in excellent condition. Erosion near SMK-1 is being monitored and may require remedial work if heavy rainfalls occur and erosion of the surrounding soil continues (PL-1).

17.4.1.4 Survey Monuments and Boundary Monuments

Six boundary monuments define the corners of the site boundary. Survey monument 2, which was not found during the 2012 inspection, had been located under 4 inches of soil during a return visit. Soil was covering most of the monument (brass benchmark) during the 2013 inspection, but a t-post had been placed to mark the location of the monument (PL-2). This monument was set in the bottom of a drainage channel and will be prone to soil coverage. Three displacement markers remain on top of the cell but are not monitored (PL-3). All boundary and survey monuments were in excellent condition.

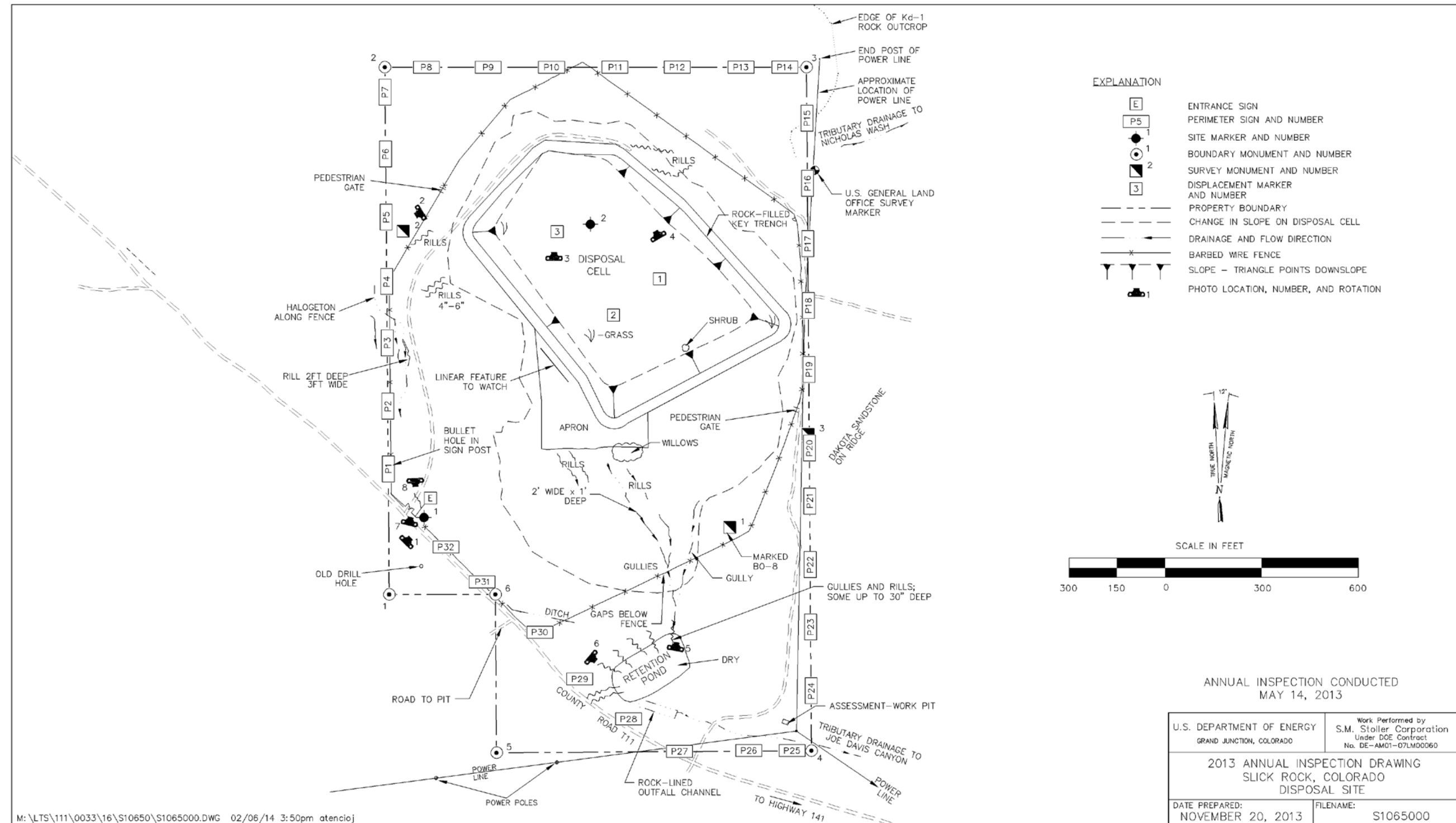


Figure 17-1. 2013 Annual Inspection Drawing for the Slick Rock Disposal Site

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17.4.2 Inspection Areas

To ensure a thorough and efficient inspection, the site was divided into three areas (referred to as “transects” in the Long-Term Surveillance Plan): (1) the rock-covered top of the disposal cell, including side slopes, key trench, and apron; (2) the area between the disposal cell and the site boundary, including the retention pond and the stock fence; and (3) the outlying area.

Inspectors examined each area for evidence of erosion, settling, slumping, or other disturbance that might affect site integrity or the long-term performance of the site. Within each area, the inspectors examined specific site-surveillance features, drainage structures, vegetation, and other features. Inspectors also looked for evidence of settlement, erosion, or other modifying processes that might affect site integrity or long-term performance.

17.4.2.1 Disposal Cell, Key Trench, and Apron

Rock covering the disposal cell, key trench, and apron is rounded cobble- and pebble-sized material. The rock is in excellent condition (PL-4). No evidence of settling, slumping, or erosion was seen on any of the rock-covered surfaces of the disposal cell. An area in the rock apron was observed to possibly have a linear feature that may indicate erosion under the rock. The feature was described as possibly 2 to 3 inches deep, 2 feet wide, and about 50 feet in length. No phreatophytes or other deep-rooted plant species were observed on the surface of the cell.

The top of the disposal cell is roughly pentagonal. Five side slopes descend from the disposal cell top at a maximum grade of 25 percent and are covered with riprap. At the base of the side slopes is a key trench that encircles the disposal cell. The key trench is as much as 5 feet deep and 20 feet wide and filled with riprap. South and downslope from the disposal cell, an apron of riprap extends for 50 to 200 feet beyond the key trench. All side slopes, the key trench, and the apron are in excellent condition.

17.4.2.2 Area Between the Disposal Cell and the Site Property Boundary

The area around the disposal cell includes the retention pond. Surface drainage from the disposal cell flows south into the retention pond, which is constructed in a channel tributary to Joe Davis Canyon. An outflow channel below the pond is lined with rounded cobblestones for a short distance. The pond, which was dry at the time of the inspection, and outflow channel are in good condition. Some of the gullies on the northwest side of the retention pond are as deep as 36 inches (PL-5), but they do not present a hazard to the disposal cell or to any site features, so action is not warranted at this time. These erosional features will continue to be monitored during future inspections.

Noxious weeds have been sprayed annually since 2005. The noxious weeds will continue to be treated with herbicide as necessary.

As noted during previous inspections, rills have formed downslope from the disposal cell apron, between the apron and retention pond. These rills did not show evidence of recent runoff events such as sedimentation and soil loss during the 2013 inspection and do not present a hazard to the disposal cell. Future inspections will include monitoring the rills to determine if additional actions are warranted.

Inspectors have also monitored the size of rills east of perimeter signs P2 and P3 over the last several years. In 2008 the largest rill was noted to be approximately 2 feet wide by 2 feet deep, twice as deep as what was noted in 2007. No increase in size was noted during the 2013 inspection.

17.4.2.3 Outlying Area

The natural, undisturbed areas outside the disposal site support grass and scattered piñon and juniper trees. The primary land use is grazing. Steep hillsides north and northeast of the site slope eastward into Nicholas Wash. Areas north and northeast of the site also are routinely used for recreation such as hunting, four-wheeling, and firewood cutting. No disturbances or evidence of land use changes in the outlying areas were noted. During the 2013 inspection, mining claim stakes noted in 2012 were present adjacent to the boundary on the northwest corner of the site.

17.5 Follow-up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

17.6 Maintenance and Repairs

The 2013 inspection found no fence breaks or erosion requiring remediation. All noxious weed infestations that were mapped during this inspection and any other infestations will be treated by a licensed herbicide applicator during the summer or fall.

During a site visit in late September with DOE, NRC, and contractor staff, erosion was noted where the county road drains into the retention pond. Heavy rainfall earlier in September had eroded the rock armor such that the channel was cutting back toward the county road. In November this channel was armored with larger, angular rock to repair and prevent further erosion. While equipment was at the site, the short culvert under the cell access road just inside the site gate was replaced with a longer culvert with a larger diameter to allow for safer access during wet conditions. Photos 6, 7, and 8 (Repair Work Photo) show the repairs.

17.7 Environmental Monitoring

There are no monitoring wells and no groundwater monitoring at the Slick Rock disposal cell.

17.8 Corrective Action

Corrective action is 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 2013. The erosion repair and culvert replacement noted above were not regarded as a corrective actions regarding cell integrity.

17.9 Photographs

Photograph Location Number	Azimuth	Description
PL-1	315	Site marker near entrance gate, erosion.
PL-2	330	Survey monument 2 area, photo from July 2012.
PL-3	NA	Displacement marker 3.
PL-4	315	DOE site inspector atop cell.
PL-5	150	Erosion at northwest corner of retention pond.
PL-6	175	Retention pond channel after November repair work. (Repair Work Photo)
PL-7	0	Culvert before replacement. (Repair Work Photo)
PL-8	180	Culvert after November repairs. (Repair Work Photo)



SRK 5/2013. PL-1. Site marker near entrance gate, erosion



SRK 5/2013. PL-2. Survey Monument 2 area, photo from July 2012.



SRK 5/2013. PL-3. Displacement marker 3.



SRK 5/2013. PL-4. DOE site inspector atop cell.



SRK 5/2013. PL-5. Erosion at northwest corner of retention pond.



SRK 11/2013 PL-6 Retention pond channel after November repair work.



SRK 11/2013 PL-7 Culvert before replacement



RK 11/2013 PL-8 Culvert after November repairs

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18.0 Spook, Wyoming, Disposal Site

18.1 Compliance Summary

The Spook, Wyoming, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site, inspected on June 25, 2013, was in excellent condition. No maintenance needs or cause for a follow-up or contingency inspection was identified.

18.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Final Long-Term Surveillance Plan for the Spook, Wyoming, Disposal Site* (LTSP) (DOE/AL/350215.0000, Rev. 0, U.S. Department of Energy [DOE], January 1993) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 18-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 18.4
Follow-Up or Contingency Inspections	Section 7.0	Section 18.5
Routine Maintenance and Repairs	Section 8.0	Section 18.6
Environmental Monitoring	Section 5.0	Section 18.7
Corrective Action	Section 9.0	Section 18.8

18.3 Institutional Controls

The 14-acre site is owned by the United States of America and was accepted under the U.S. Nuclear Regulatory Commission general license (10 CFR 40.27) in 1993. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site include federal ownership of the property and the following features that are inspected annually: site markers, survey and boundary monuments, and warning/no-trespassing signs.

18.4 Inspection Results

D. Traub and R. Johnson of the S.M. Stoller Corporation, the Legacy Management Support contractor for the DOE Office of Legacy Management in Grand Junction, Colorado, conducted the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

18.4.1 Site Surveillance Features

Figure 18-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in

the following subsections. Photographs to support specific observations are identified in the text and in Figure 18-1 by photograph location (PL) numbers.

18.4.1.1 Entrance Sign and Access Road

Access to the site, northwest of Douglas, Wyoming, is via Highway 93 to County Road 31 onto the Hornbuckle Ranch road. Site access is maintained through perpetual easements across the Hornbuckle Ranch. The road to the site is graded and hard-packed. The road was in good condition, and the site was accessible. The entrance sign was in good condition.

18.4.1.2 Perimeter Fence and Perimeter Signs

The site is unfenced and defined by 10 perimeter signs. Perimeter sign P10 that had been damaged by wind was replaced during the 2013 inspection (PL-1).

18.4.1.3 Site Markers

Site marker SMK-2 was in excellent condition (PL-2). The concrete base of site marker SMK-1 is damaged due to spalling but is stable; no changes were observed from the previous year.

18.4.1.4 Survey Monuments and Boundary Monuments

The eight boundary monuments and three survey monuments are in excellent condition. Some wind erosion has exposed the concrete support at the BM-6 monument (PL-3). This will be monitored and evaluated for repair during the next inspection.

GPS data collected in 2012 confirmed that the boundary monuments and perimeter signs are located outside of the DOE property boundary. The adjacent landowner has been notified that the monuments and signs are on his property. This is not of concern to him, and the monuments and signs will remain where they are.

18.4.1.5 Monitoring Wells

Groundwater monitoring is not required at this site. DOE abandoned all monitoring wells in October 2000 and closed out the permits.

18.4.2 Inspection Areas

In accordance with the LTSP, the site is divided into three inspection areas (referred to as “transects” in the LTSP) to ensure a thorough and efficient inspection: (1) the disposal cell, (2) the site perimeter, and (3) the outlying area.

Within each area, the inspectors examined specific site surveillance features, vegetation, and other features. Inspectors examined each area for evidence of erosion, settling, slumping, or other disturbances that might affect the site’s integrity, protectiveness, or long-term performance.

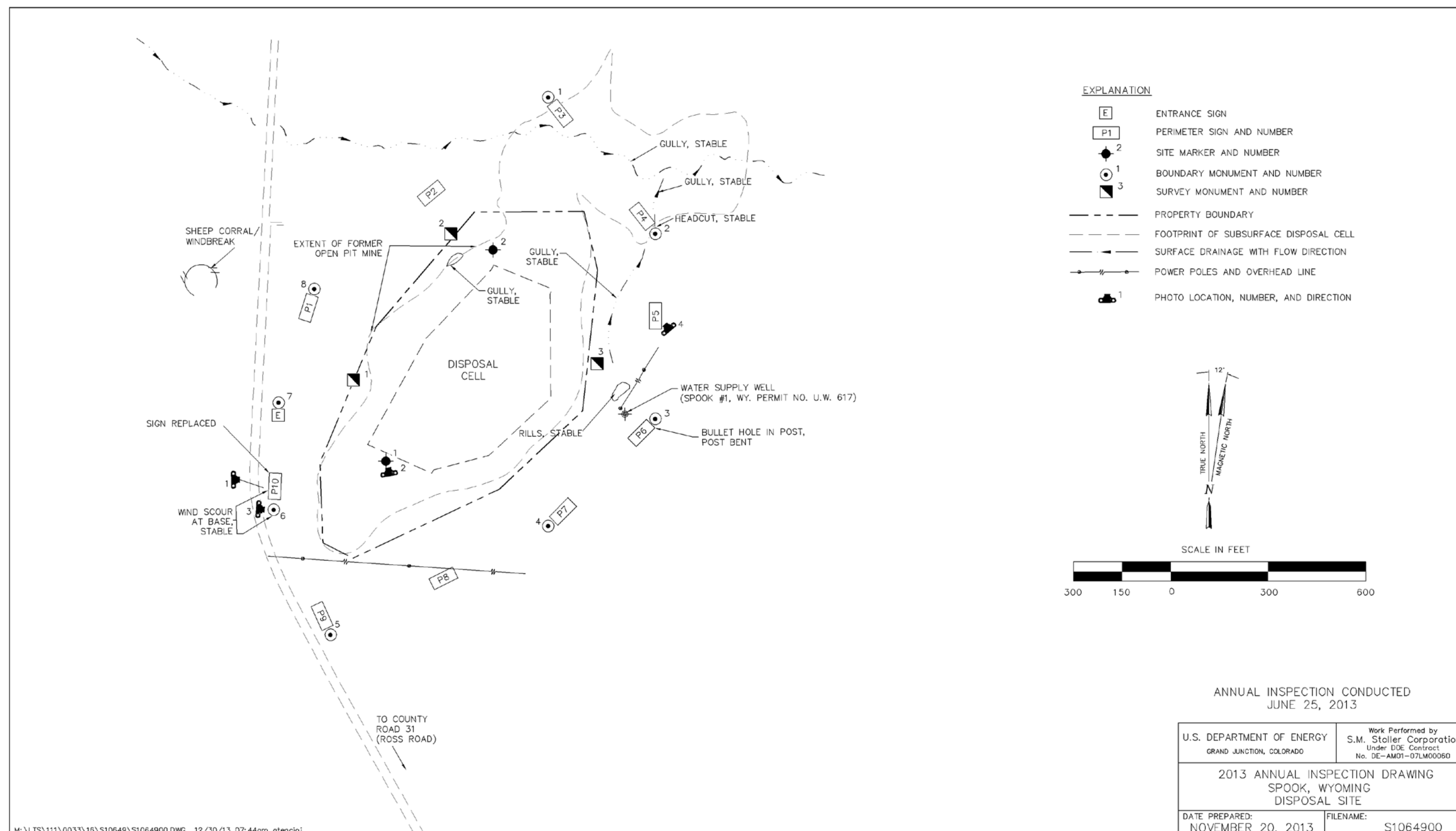


Figure 18-1. 2013 Annual Compliance Drawing for the Spook Disposal Site

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18.4.2.1 Disposal Cell

The site is unique among Title I sites in that tailings were encapsulated in the bottom of an open pit mine and covered with 40 to 60 feet of clean fill and topsoil. Therefore, many of the observations and concerns routinely associated with above-grade disposal cells—such as the quality of the riprap, the stability of side slopes, or the presence of deep-rooted plants (biointrusion) above the radon barrier—do not apply to this site. The surface of the 5-acre disposal cell, completed in 1989, was in excellent condition. No evidence of settling was observed over the former mine pit. Vegetation across the cell, consisting of grasses and forbs, appears healthy and is indistinguishable from that growing on the surrounding hills and valleys. The same species are present, and the overall health and density of vegetation are similar (PL-4).

18.4.2.2 Site Perimeter

This area was in excellent condition. The perimeter of the site is indistinguishable from the adjacent open range.

18.4.2.3 Outlying Area

The area beyond the site boundary for a distance of about 0.25 mile was examined for erosion, disturbance, change in land use, or other features of possible concern. The access road has frequent truck traffic to service and maintain the oil wells in the area. Even though oil field activity has greatly increased near the site, no evidence of trespassing or vandalism was observed.

Several minor rills and gullies are near the site, and they appeared to be stable. The erosion is not harming the function of the cell cover or other site features, and it is not a concern at this time.

18.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

18.6 Maintenance and Repairs

- 18A** No maintenance needs were identified during the inspection other than the previously mentioned erosion at boundary monument BM-6. Perimeter sign P10 was replaced during this inspection.

18.7 Environmental Monitoring

18.7.1 Groundwater Monitoring

Groundwater in the uppermost aquifer at this site is contaminated as a result of widespread, naturally occurring uranium mineralization. The aquifer is of limited use because its yield is marginal and because it cannot be cleaned up by methods reasonably employed in public water systems. Therefore, in accordance with 40 CFR 192.21 (g), supplemental standards have been applied to the site, and groundwater monitoring is not required.

18.8 Corrective Action

Corrective action is 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 needs were identified during the inspection.

18.9 Photographs

Photograph Location	Azimuth	Description
PL-1	90	New perimeter sign P10.
PL-2	0	Site marker SMK-2.
PL-3	95	Boundary monument BM-6.
PL-4	320	Perimeter sign P5 and northeast portion of the site.



SPK 6/2012. PL-1. New perimeter sign P10.



SPK 6/2012. PL-2. Site marker SMK-2.



SPK 6/2012. PL-3. Boundary monument BM-6.



SPK 6/2012. PL-4. Perimeter sign P5 and northeast portion of the site.

19.0 Tuba City, Arizona, Disposal Site

19.1 Compliance Summary

The Tuba City, Arizona, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on April 3, 2013. The disposal cell and all associated surface water diversion and drainage structures were in excellent condition and functioning as designed. No maintenance needs or cause for a follow-up or contingency inspection was identified.

19.2 Compliance Requirements

Requirements for the long-term surveillance and maintenance of the site are specified in the *Long-Term Surveillance Plan for the Tuba City, Arizona, Disposal Site* (LTSP) (DOE/AL/62350-182, Rev. 0, U.S. Department of Energy [DOE], October 1996) and in procedures that DOE established to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). Table 19-1 lists these requirements.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 6.0	Section 19.4
Follow-Up or Contingency Inspections	Section 7.0	Section 19.5
Routine Maintenance and Repairs	Section 8.0	Section 19.6
Groundwater Monitoring	Section 5.2	Section 19.7
Corrective Action	Section 9.0	Section 19.8

19.3 Institutional Controls

The U.S. Bureau of Indian Affairs holds the 145-acre disposal site in trust. The Navajo Nation retains title to the land. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. The U.S. Nuclear Regulatory Commission (NRC) required DOE to enter into Cooperative Agreement DE-FC04-85AL26731 with the Navajo Nation to perform remedial actions at the former processing sites before bringing the site under the general license. DOE and the Navajo Nation executed a Custodial Access Agreement that conveys to the federal government title to the residual radioactive materials stabilized at the repository site and ensures that DOE has perpetual access to the site.

The site was accepted under NRC general license (10 CFR 40.27) in 1996 for compliance with 40 CFR 192, Subpart A. Institutional controls at the site include federal custody of the disposal cell and its engineered features and the following features that are inspected annually: site markers, survey and boundary monuments, warning/no-trespassing signs, a site perimeter fence, and locked gates at the site entrances.

19.4 Inspection Results

The site, located east of Tuba City, Arizona, was inspected on April 3, 2013. J. Gillespie and M. Plessinger of the S.M. Stoller Corporation, the Legacy Management Support contractor at the

DOE office in Grand Junction, Colorado, conducted the inspection. K. Starr, of the DOE Office of Legacy Management and N. Honie of the Hopi Nation attended the inspection.

The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

19.4.1 Site Surveillance Features

Figure 19-1 shows the locations of site surveillance features. Inspection results and recommended maintenance activities associated with site surveillance features are included in the following subsections. Photographs to support specific observations are identified in the text and in Figure 19-1 by photograph location (PL) numbers.

Many structures and features at the site—including an office building, a water treatment plant, a solar water-heating system, a solar photovoltaic system, evaporation ponds, an extensive network of extraction and monitoring wells, and a treated water infiltration system—are associated with the active treatment of contaminated groundwater, which began in mid-2002 and is ongoing. The purpose of the active groundwater remediation is to mitigate contamination resulting from former uranium-ore processing that occurred at the site. These activities are not addressed in the LTSP, however, because they are not related to the long-term disposal and stabilization of encapsulated contaminated materials. Therefore, associated features are not included in the annual inspection and are only addressed herein as they relate to site integrity or safety concerns.

19.4.1.1 Entrance Gates, Entrance Signs, and Access Road

The site is accessed directly from U.S. Highway 160. Perpetual access to the site is granted by the Custodial Access Agreement. A gate in a fence on the highway right-of-way allows access to the site along a gravel access road; the site entrance gate is at the perimeter security fence. The access gate, road, and entrance gate to the site were in good condition. The gates were open at the time of the inspection because of ongoing groundwater remediation operations at the site. The entrance signs posted on both gates were in good condition.

19.4.1.2 Perimeter Fence and Perimeter Signs

The security fence around the site perimeter was in good condition.

Perimeter signs are posted in pairs at regular intervals around the site perimeter. Each sign pair, secured to a metal post, consists of a “No Trespassing” sign with a radioactive materials trefoil symbol and a schematic sign with a diagram of the disposal cell (also identified by the radioactive materials trefoil symbol) and the site boundary. All of the signs were in good condition.

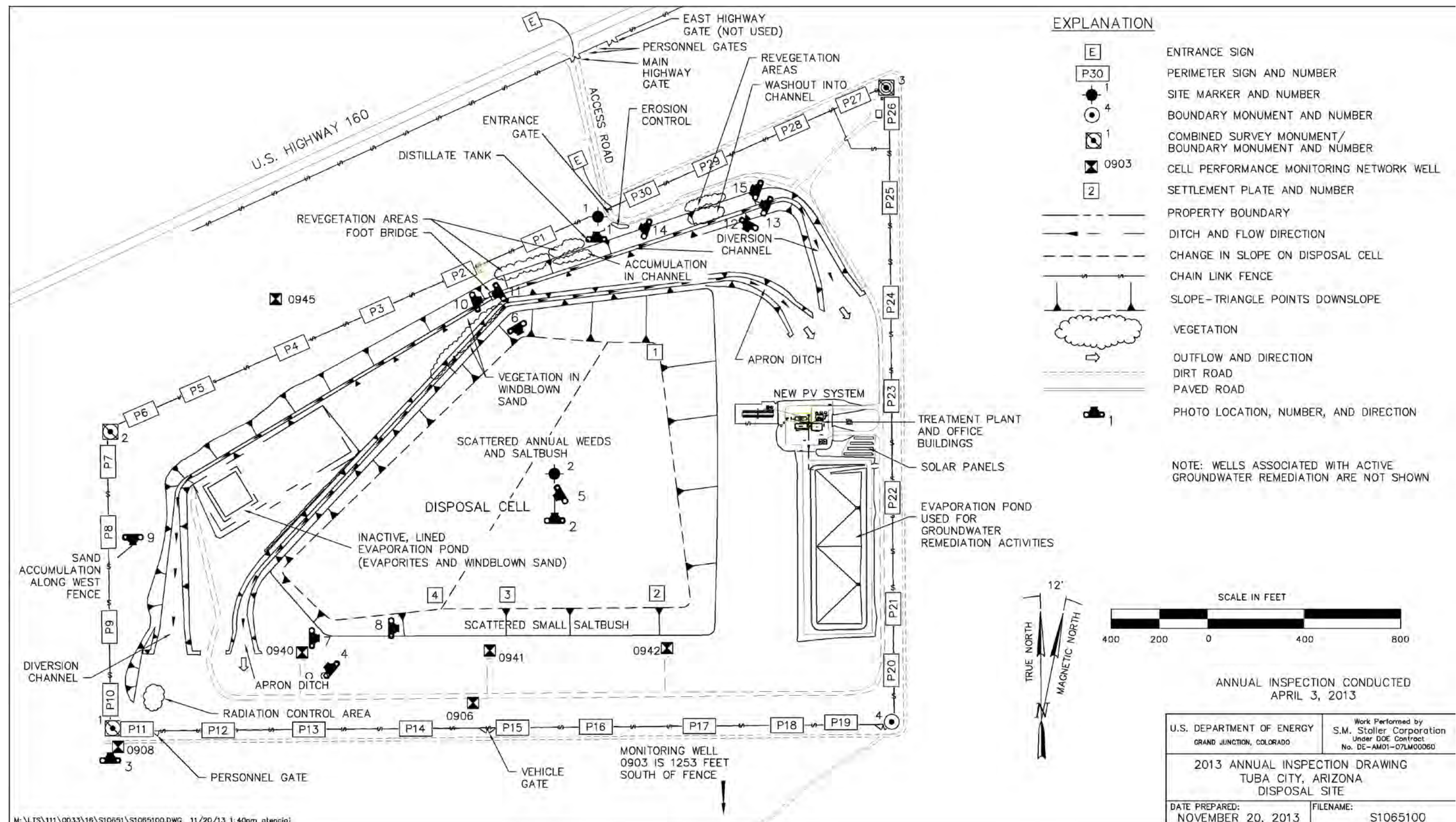


Figure 19-1. 2013 Annual Inspection Drawing for the Tuba City Disposal Site

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19.4.1.3 Site Markers

The two granite site markers, one just inside and to the right of the entrance gate (PL-1) and the other on top of the disposal cell (PL-2), were in good condition.

19.4.1.4 Survey Monuments and Boundary Monuments

The survey and boundary monuments that were observed were in good condition (PL-3). Boundary monument BM-1, at the southwest corner of the site, was buried by windblown sand.

19.4.1.5 Monitoring Wells

Seven wells constitute the cell performance monitoring network: 0903, 0906, 0908, 0940 (PL-4), 0941, 0942, and 0945. Five wells inside and immediately adjacent to the site were in good condition and locked. Monitoring well 0903, located about 0.25 mile south of the disposal cell, was not inspected.

19.4.2 Inspection Areas

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

Within each inspection area, inspectors examined specific site surveillance features, drainage structures, vegetation, and other features. Inspectors examined each area for evidence of erosion, settling, slumping, or other disturbances that might affect the site’s integrity, protectiveness, or long-term performance.

19.4.2.1 Disposal Cell

The disposal cell is covered with riprap to control erosion. The rock cover material was in excellent condition and showed no signs of deterioration. No evidence of differential settlement or slumping was observed, and all visible components of the disposal cell and cover were in excellent condition (PL-5 and PL-6).

In accordance with the LTSP, deep-rooted vegetation, primarily saltbush, is removed from the cell cover or controlled to prevent potential penetration of the radon barrier. Periodic application of herbicide has been very effective in controlling deep-rooted vegetation growth on the cell cover. Only a few small shrubs were noted during the 2013 inspection. Scattered patches of grass and annual weeds also grow on the cell top and side slopes; however, these shallow-rooted plants are not a concern. Windblown sand continues to accumulate on the rock-covered surfaces, providing a favorable environment for plant growth.

Sand accretion and vegetation encroachment are still evident at several locations along the south side slope of the disposal cell. Photographs are taken at these locations annually to document changes in sand accretion and vegetation conditions (PL-7 and PL-8). The gradually increasing vegetation coverage likely indicates that sand accumulation on the rock-covered slope continues to increase.

19.4.2.2 Area Between the Disposal Cell and the Site Boundary

The apron drainage ditch at the base of the disposal cell and the diversion channel, both located along the north and northwest sides of the cell, were in good condition. Windblown sand deposition continues to be monitored at the site because unstable dunes in outlying areas can contribute to sand accumulation along fence lines (PL-9), in diversion channels (PL-10 and PL-11), and in the rock cover of the disposal cell. Sand accretion and vegetation encroachment have been checked annually since 2001 in the diversion channel and apron drainage ditch on the north and northwest sides of the cell (PL-12 and PL-13). The sand tends to periodically accumulate and scour. The accumulations are not adversely affecting the performance of these drainage features.

Erosion control at the distillate tank (PL-14) and two revegetation areas (PL-15) also to control erosion on the north side of the diversion channel near the distillate tank were in good condition.

Two of the three evaporation ponds located near the northwest side of the disposal cell were removed in 2007, and the area was reclaimed and seeded with a native vegetation seed mix. Although the area is scoured by wind, perennial vegetation continues to establish. The remaining pond is retained as a backup for the main evaporation pond located on the east side of the site.

19.4.2.3 Outlying Area

The area beyond the site boundary for a distance of about 0.25 mile was examined for erosion, disturbance, change in land use, and other features of possible concern. No changes were observed.

19.5 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) an annual inspection or other site visit reveals a condition that must be reevaluated during a return to the site, or (2) a citizen or outside agency notifies DOE that conditions at the site are substantially changed.

No need for a follow-up or contingency inspection was identified during the inspection.

19.6 Maintenance and Repairs

No maintenance needs were identified during the inspection.

19.7 Environmental Monitoring

19.7.1 Groundwater Monitoring

- 19A In accordance with the LTSP, DOE monitors groundwater to compare current conditions to baseline post-construction (disposal cell) groundwater quality at the site. Groundwater quality beneath and downgradient of the disposal cell has been degraded by contamination from former uranium-processing activities. This preexisting milling-related groundwater contamination might mask any contamination leaching from the disposal cell and limits the effectiveness of normal point-of-compliance groundwater monitoring as a reliable indicator of cell performance (40 CFR 192, Subpart A).

In lieu of point-of-compliance monitoring, for this annual report, groundwater monitoring is performed in accordance with Section 5.2.2 of the LTSP and is defined as *evaluative monitoring*. The purpose of this evaluative monitoring is to (1) assess trends in groundwater quality in the uppermost aquifer, (2) monitor the downgradient extent of contamination in groundwater, and (3) analyze the impacts of transient drainage and surface runoff. Preexisting milling-related groundwater contamination at the site is currently undergoing active remediation (40 CFR 192, Subpart B). The progress of groundwater remediation is evaluated annually, separately from this compliance evaluation.

In accordance with the LTSP, seven compliance wells (Table 19-2) are monitored for four target analytes: molybdenum, nitrate (nitrate + nitrite, reported as nitrogen), selenium, and uranium. The seven wells used for evaluative monitoring of cell performance are a subset of the larger groundwater remediation monitoring well network. Because of the preexisting groundwater contamination, provisional upper baseline limits (UBLs) are used as the main criteria for assessing the results of evaluative monitoring. As shown in Table 19-3, these UBLs are higher than corresponding UMTRCA maximum concentration limits (MCLs), as MCLs are not considered appropriate for evaluating disposal cell performance.

Table 19-2. Groundwater Monitoring Network at the Tuba City Disposal Site

Monitoring Well	Hydrologic Relationship	Monitoring Frequency
0903	Downgradient (Offsite)	Annually
0906	Downgradient	Semiannually
0908	Downgradient	Semiannually
0940 ^a	Downgradient	Semiannually
0941	Downgradient	Semiannually
0942	Downgradient	Semiannually
0945	Upgradient (Background)	Annually

^a Between August 2004 and February 2010, it was not possible to obtain a sample from well 0940 because of an insufficient volume of water (reason for data gaps in Figures 19-2 through 19-5).

Table 19-3. Provisional Upper Baseline Limits for Groundwater at the Tuba City Disposal Site

Constituent	Provisional UBL (mg/L) ^a	MCL (mg/L)
Molybdenum	0.14	0.10
Nitrate (as Nitrogen)	311 ^b	10 ^c
Selenium	0.05	0.01
Uranium	1.17	0.044

^a As documented in the 1996 LTSP.

^b 311 mg/L (for nitrate as nitrogen) was calculated based on the 1,379 mg/L UBL for nitrate as NO₃.

^c 10 mg/L (for nitrate as nitrogen) is equivalent to the 44 mg/L MCL for nitrate (as NO₃) cited in the LTSP.
mg/L = milligrams per liter

Evaluative groundwater monitoring in 2013 was conducted in February (for those wells sampled semiannually) and in August (all wells; see Table 19-2). Figures 19-2 through 19-5 show the time-concentration plots for the four target analytes, along with corresponding UBLs and MCLs.

Sample results from the 2013 evaluative monitoring indicate that groundwater quality immediately downgradient of the former mill site (in wells 0940, 0941, 0942, 0906, and 0908) is still degraded relative to concentrations of nitrate, selenium, and uranium in the background well (0945). This is not the case for distal downgradient well 0903, approximately 1,250 feet south of the site perimeter. Concentrations of all four analytes in well 0903 are comparable with those measured in the upgradient (background) well 0945 and below corresponding UBLs (and, except for nitrate, MCLs).

Figure 19-2 shows the time-concentration plot for molybdenum—in this graph, data are plotted in logarithmic scale (base 10), given the differences in magnitude between results for immediately downgradient wells and those for more distal wells. As has been the case since 2004, molybdenum concentrations in groundwater were below both the 0.1 milligram per liter (mg/L) MCL and the 0.14 mg/L UBL in all wells (Figure 19-2). Molybdenum in westernmost wells 0908 and 0940, and in well 0903, has been comparable to background.

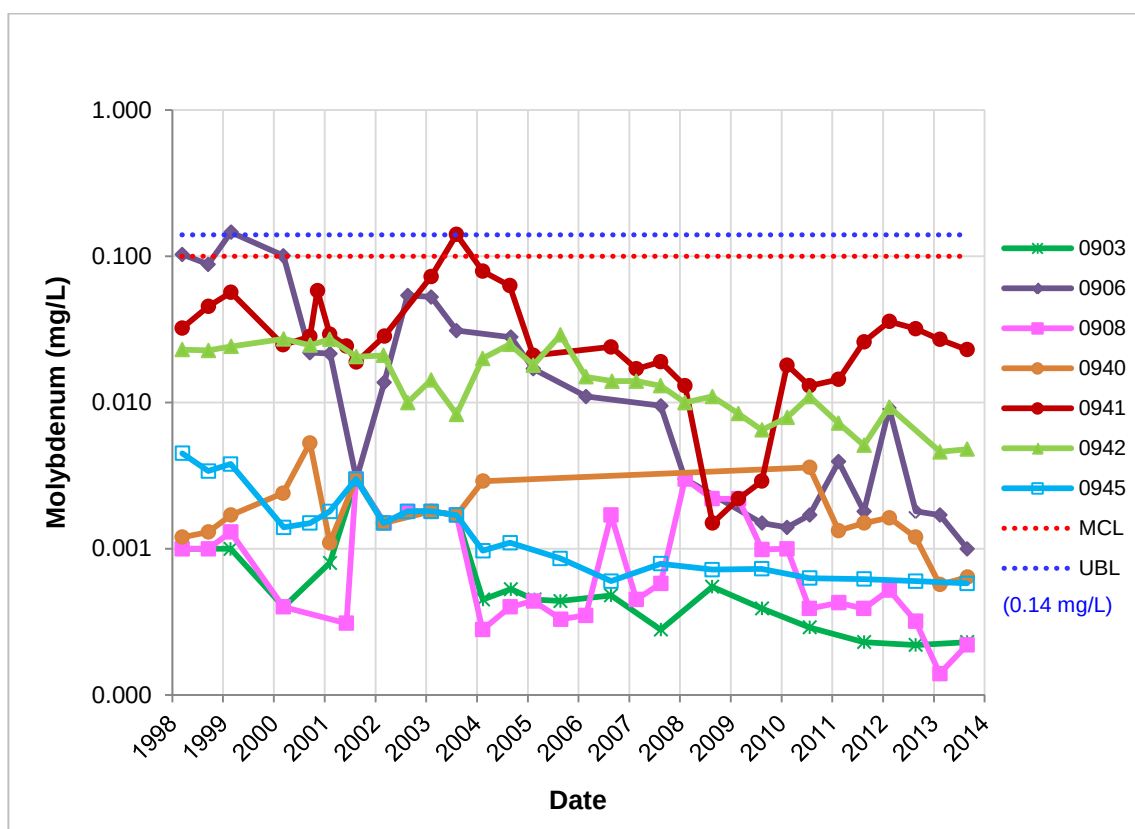


Figure 19-2. Time-Concentration Plots of Molybdenum in Groundwater at the Tuba City Disposal Site

Since 1998, nitrate concentrations in all evaluative monitoring wells except 0903 (offsite distal) and 0945 (background) have exceeded the 10 mg/L MCL by an order of magnitude or more (Figure 19-3). Exceedances of the 311 mg/L UBL have only been observed at wells 0906 (currently 390 mg/L), 0942 (last exceedance in August 2008), and 0940 (currently 430 mg/L). Nitrate concentrations in well 0941 have increased fairly steadily from 47 mg/L in March 1998 to 310 mg/L (August 2013 result), essentially equal to the UBL. Well 0941 is centrally located within a dense extraction well network, so historical pumping in this area may account for some (or all) of this observed increase. Apart from decreases in nitrate in well 0942, trending is not apparent in remaining wells. Nitrate concentrations in offsite downgradient well 0903, although slightly above background and occasionally exceeding the MCL, are still well below the UBL.

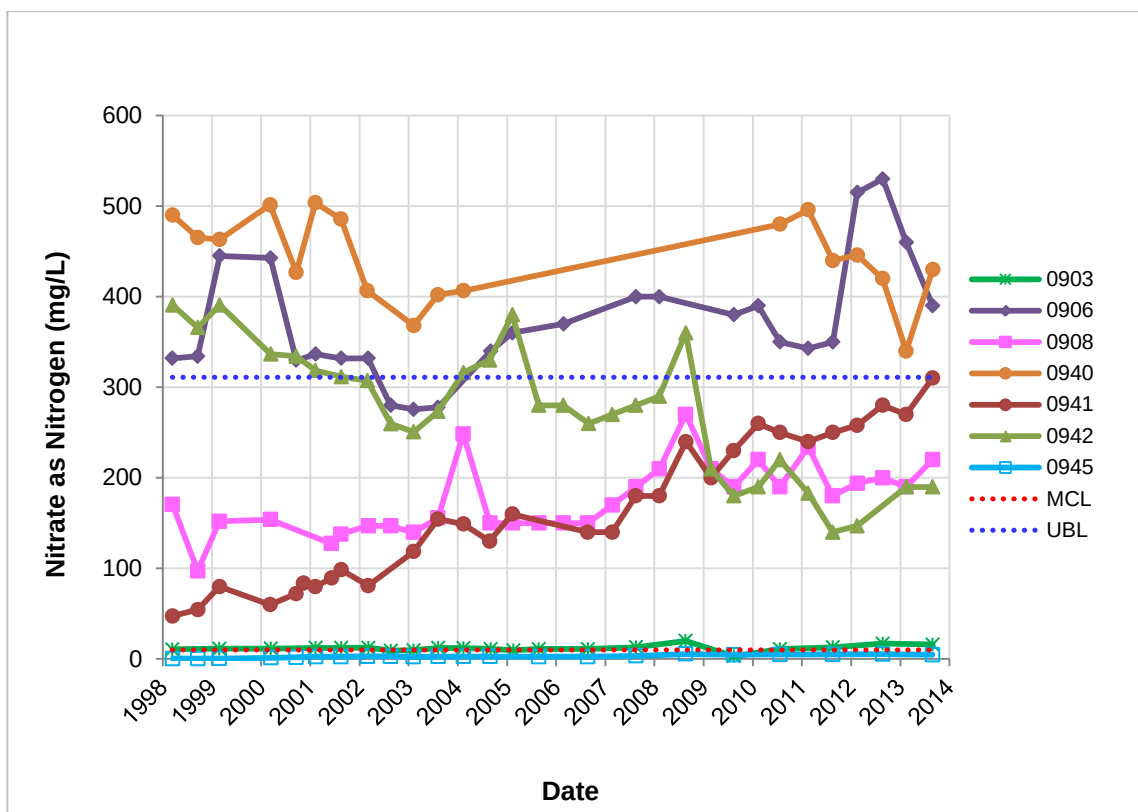


Figure 19-3. Time-Concentration Plots of Nitrate in Groundwater at the Tuba City Disposal Site

Selenium concentrations have historically exceeded the 0.01 mg/L MCL in all wells except offsite downgradient well 0903 and background well 0945 (Figure 19-4). Concentrations have exceeded the 0.05 mg/L UBL only in wells 0940, 0941, and 0942, immediately downgradient of the disposal cell. As observed for nitrate, selenium concentrations have increased in well 0941 from 0.018 mg/L in 1998 to 0.09–0.13 mg/L in recent years. Fluctuations in concentrations in wells 0940–0942 and 0906 since 2010 may be due to the previous (October 2010 to September 2011) shutdown of the treatment plant and subsequent resumption of pumping. Selenium concentrations in southernmost well 0903 have consistently been below both the UBL and the MCL and, since late 2004, below levels measured in background well 0945.

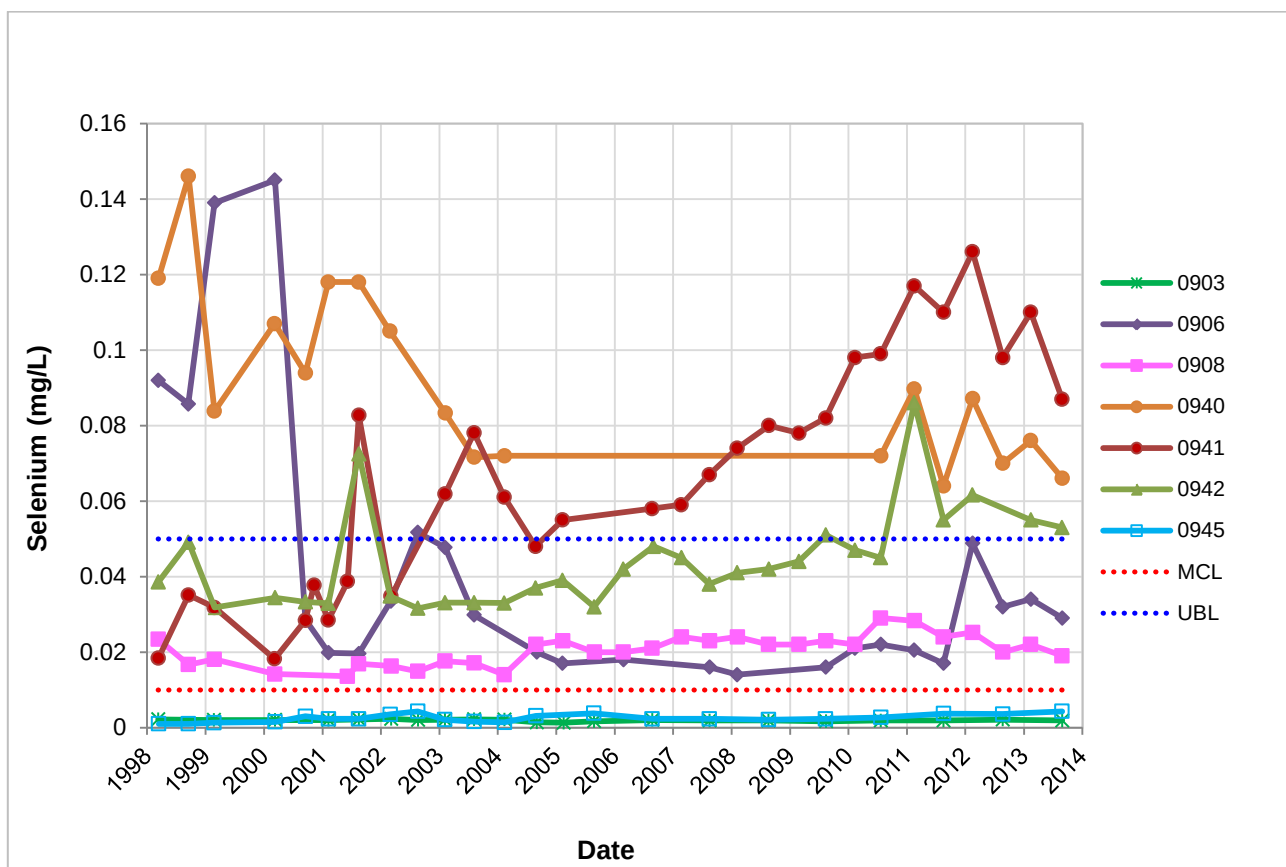


Figure 19-4. Time-Concentration Plots of Selenium in Groundwater at the Tuba City Disposal Site

In 2013, uranium concentrations in groundwater exceeded the 0.044 mg/L MCL but remained below the 1.17 mg/L UBL in all onsite downgradient wells and in well 0908. This has been the case historically, as shown in Figure 19-5. Concentrations in the upgradient well 0945 and offsite downgradient well 0903 remain below the MCL. As observed for nitrate and selenium, uranium concentrations in central downgradient well 0941 have increased gradually since 2007 (from about 0.08 mg/L to 0.2 mg/L). A similar, although not as steady, increase is apparent for well 0942. Uranium concentrations in well 0906 have fluctuated greatly at times, perhaps due to pumping of the extraction wells.

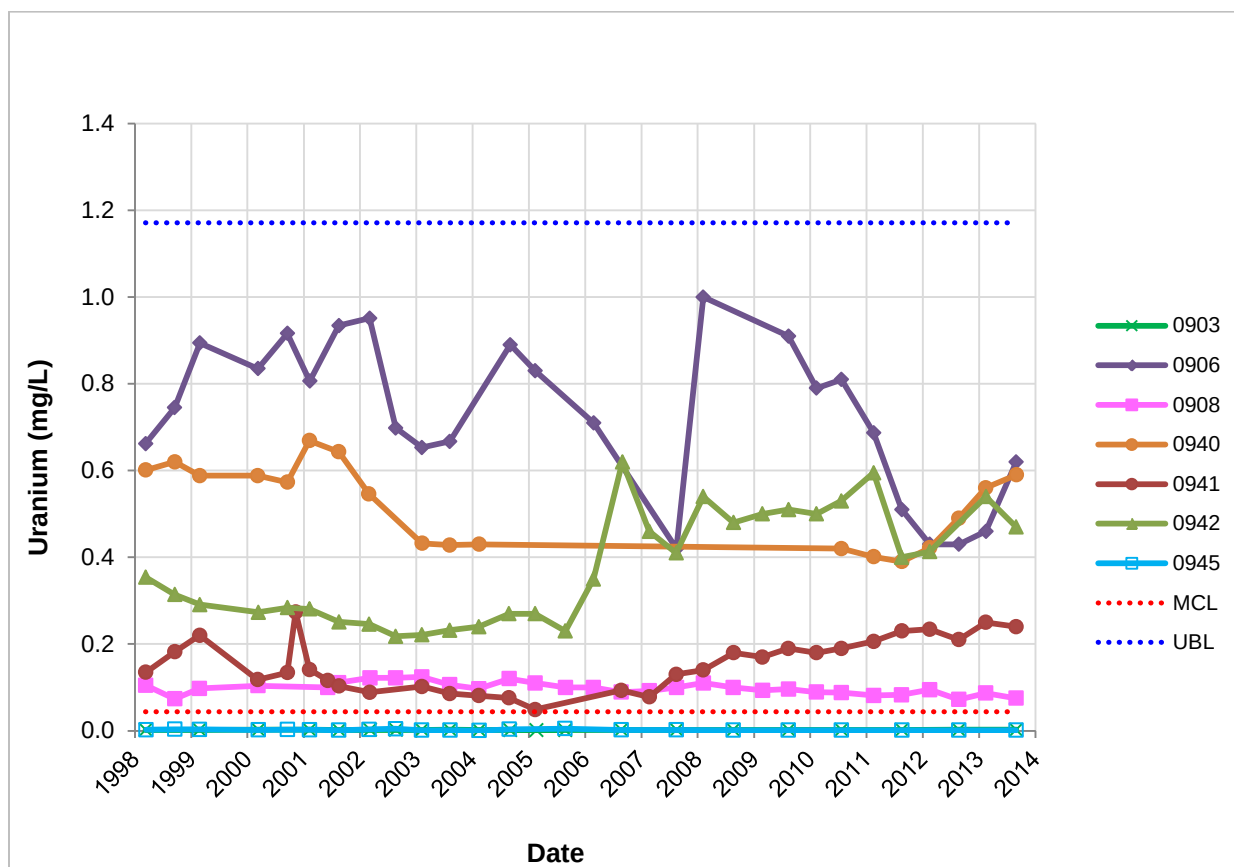


Figure 19-5. Time-Concentration Plots of Uranium in Groundwater at the Tuba City Disposal Site

19.8 Corrective Action

Corrective action is 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.

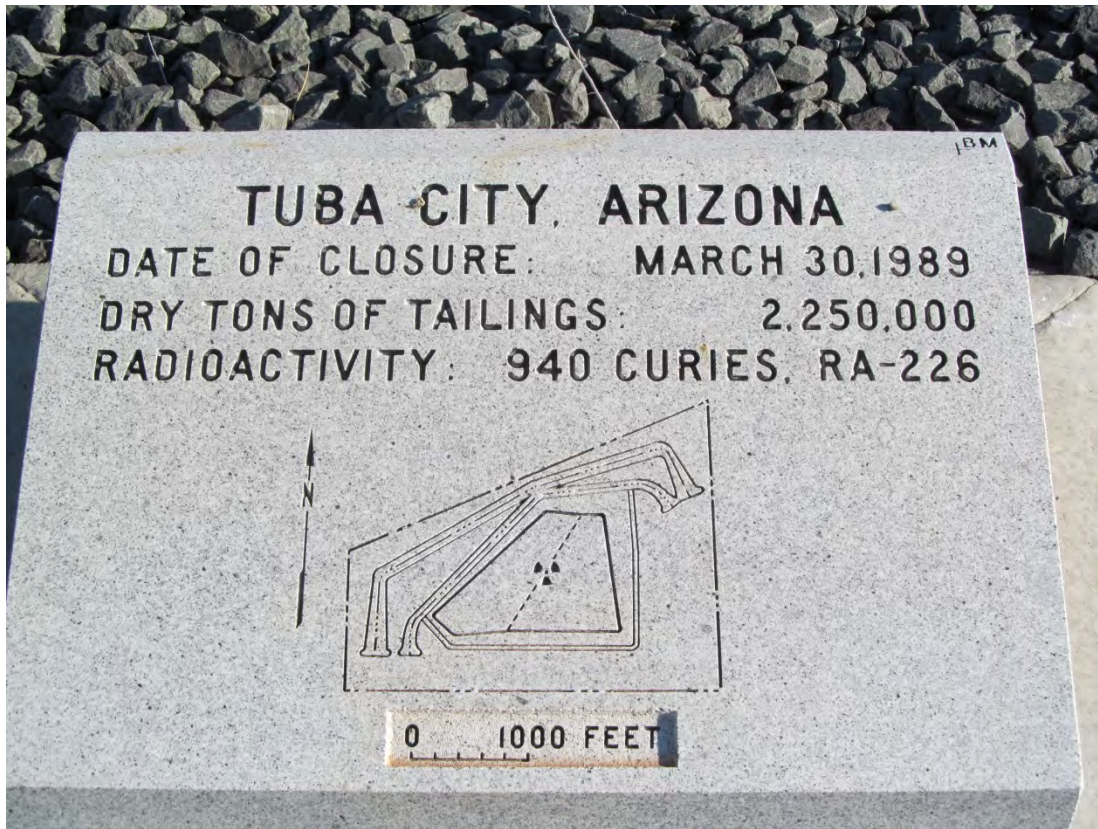
No corrective action was required in 2013.

19.9 Photographs

Photo Location Number	Azimuth	Photograph Description
PL-1	0	Site marker SMK-1.
PL-2	0	Site marker SMK-2.
PL-3	0	Benchmark No. 1 southeast corner.
PL-4	310	Well cluster at 0940.
PL-5	240	Southeast across cell top from SMK-2.
PL-6	150	Southeast across cell top.
PL-7	90	South slope with minor salt brush.
PL-8	90	East along south slope.
PL-9	180	Sand accumulation along west boundary fence.
PL-10	70	East of footbridge showing sediment in channel.
PL-11	240	West of footbridge showing sediment in channel.
PL-12	210	Washout and revegetation area.
PL-13	295	West along base of channel (revegetation and washout).
PL-14	290	Erosion control at distillate tank.
PL-15	290	Revegetation areas (two approximately 30 × 250 feet).



TUB 4/2013. PL-1. Site marker SMK-1.



TUB 4/2013. PL-2. Site marker SMK-2.



TUB 4/2013. PL-3. Benchmark No. 1 southeast corner.



TUB 4/2013. PL-4. Well cluster at 0940.



TUB 4/2013. PL-5. Southeast across cell top from SMK-2.



TUB 4/2013. PL-6. Southeast across cell top.



TUB 4/2013. PL-7. South slope with minor salt brush.



TUB 4/2013. PL-8. East along south slope.



TUB 4/2013. PL-9. Sand accumulation along west boundary fence.



TUB 4/2013. PL-10. East of footbridge showing sediment in channel.



TUB 4/2013. PL-11. West of footbridge showing sediment in channel.



TUB 4/2013. PL-12. Washout and revegetation area.



TUB 4/2013. PL-13. West along base of channel (revegetation and washout).



TUB 4/2013. PL-14. Erosion control at distillate tank



TUB 4/2013. PL-15. Revegetation areas (two approximately 30 × 250 feet).

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