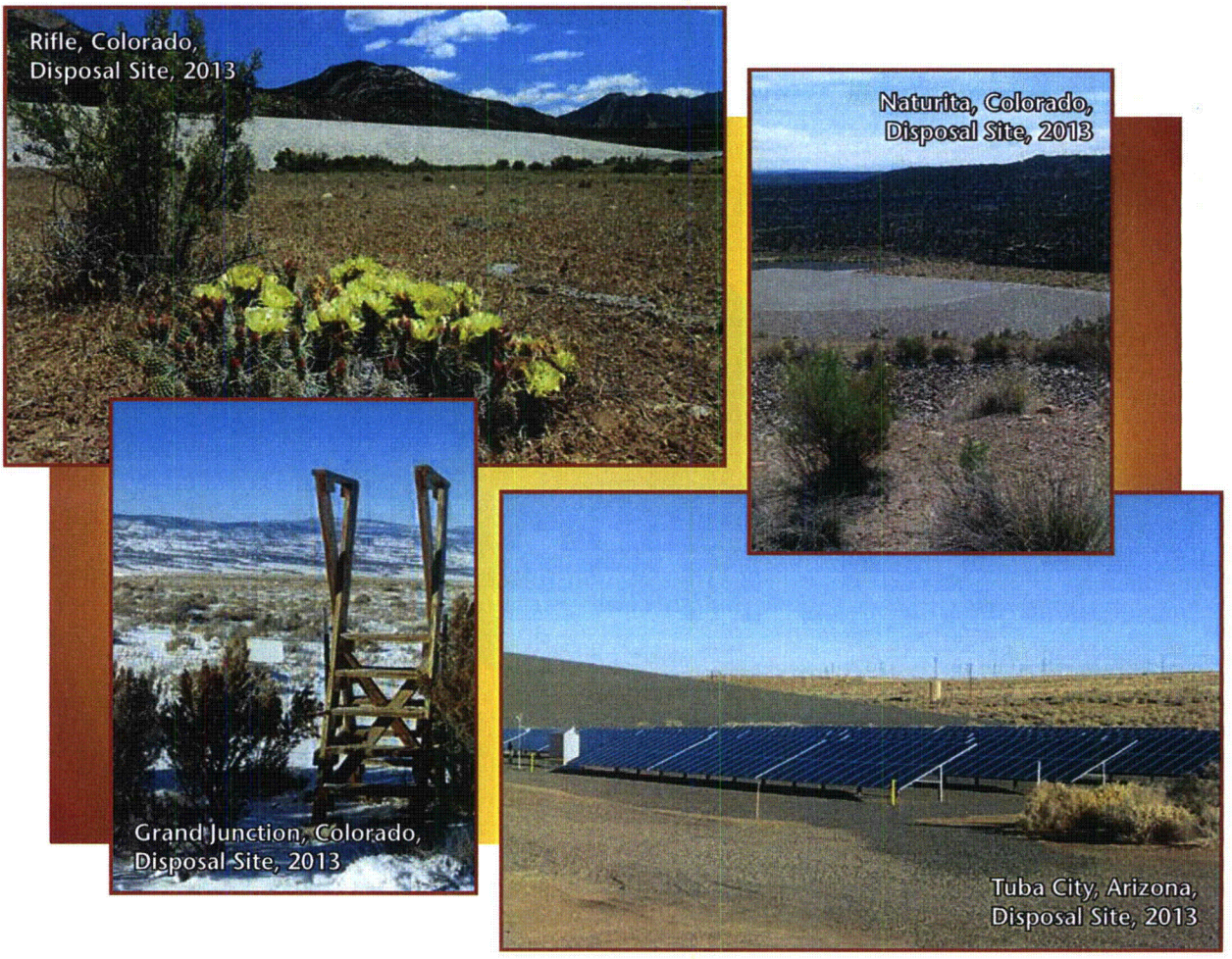
LMS/S010631

U.S. DEPARTMENT OF ENERGY

Legacy Management

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

**March 2014**



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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 | *Code of Federal Regulations* |
| $D_{50}$ | 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 activities[2] 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<br>1-6 | 1A<br>1B | Maintenance: deep-rooted shrubs sprayed with herbicide<br>Groundwater monitoring |
| Burrell, Pennsylvania | 2 | 2-8<br>2-8 | 2A<br>2B | Groundwater monitoring<br>Vegetation management |
| Canonsburg, Pennsylvania | 3 | 3-7<br>3-8 | 3A<br>3B | Groundwater monitoring<br>Vegetation management |
| Durango, Colorado | 4 | 4-8<br>4-8 | 4A<br>4B | Maintenance: gap in retention pond fence repaired<br>Groundwater monitoring |
| Falls City, Texas | 5 | 5-8 | 5A | Groundwater monitoring |
| Grand Junction, Colorado | 6 | 6-6<br>6-6 | 6A<br>6B | Maintenance: damaged perimeter sign to be replaced<br>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<br>9-9 | 9A<br>9B | Evaluation: riprap gradation and durability monitoring<br>Groundwater monitoring: next scheduled in 2014 |
| Lowman, Idaho | 10 | 10-6 | 10A | Vegetation monitoring: State-listed noxious weed infestations |
| Maybell, Colorado | 11 | 11-8<br>11-8 | 11A<br>11B | Maintenance: fence to be repaired<br>Maintenance: perimeter sign to be replaced |
| Mexican Hat, Utah | 12 | 12-7<br>12-7 | 12A<br>12B | Maintenance: missing radiological sign and warning sign to be replaced<br>Seep monitoring |
| Naturita, Colorado | 13 | 13-6<br>13-6<br>13-6 | 13A<br>13B<br>13C | Maintenance: fence repaired<br>Maintenance: erosion repairs to be performed<br>Groundwater monitoring: next scheduled in 2014 |
| Rifle, Colorado | 14 | 14-8<br>14-8<br>14-9 | 14A<br>14B<br>14C | Maintenance: fence repairs to be performed<br>Grazing agreement under consideration<br>Disposal cell pore water monitoring |
| Salt Lake City, Utah | 15 | 15-6 | 15A | Riprap degradation monitoring |
| Shiprock, New Mexico | 16 | 16-7<br>16-7<br>16-7 | 16A<br>16B<br>16C | Maintenance: missing sign to be replaced<br>Maintenance: hole in fence to be repaired<br>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.

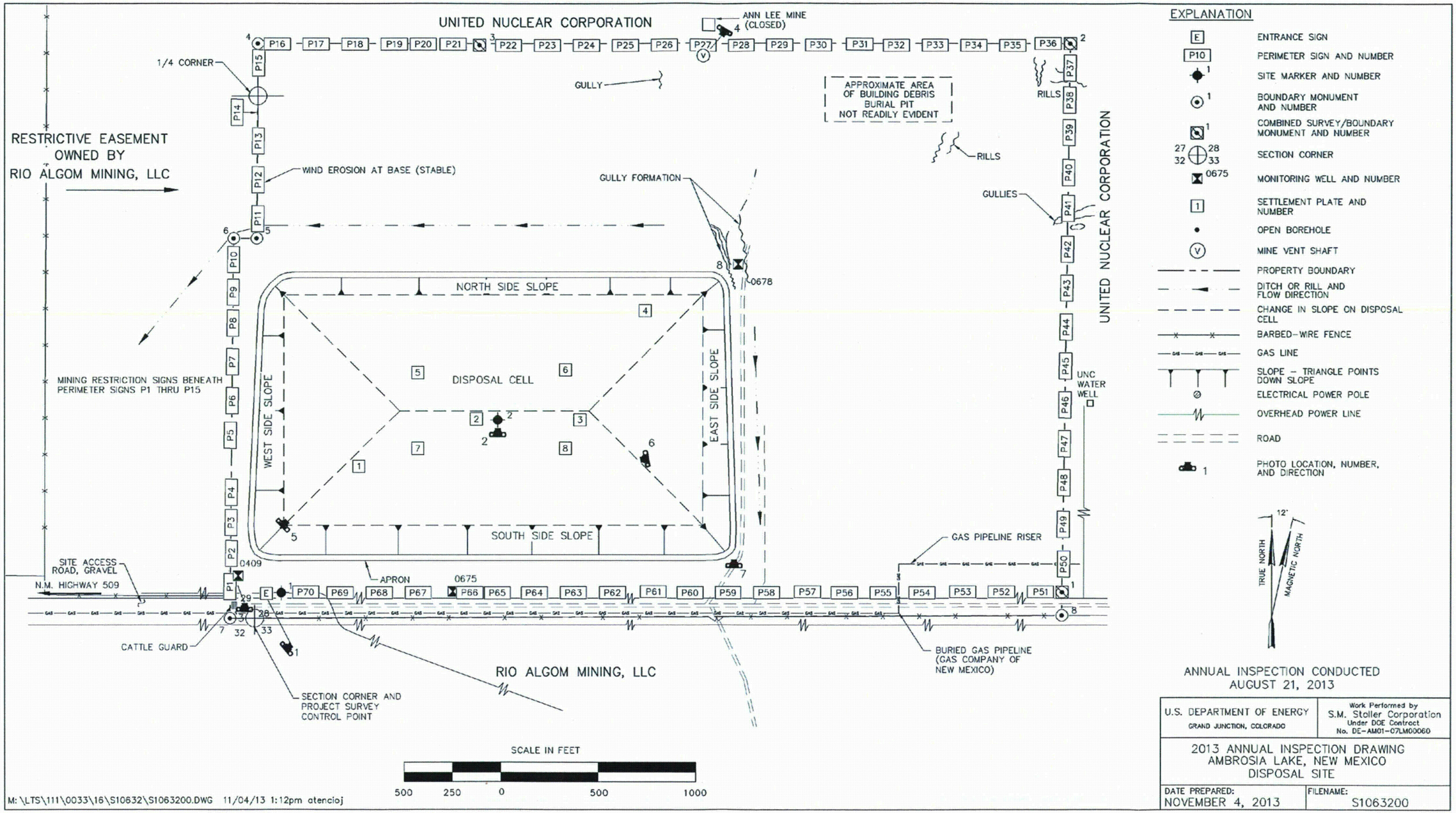


*Figure 1-1. 2013 Annual Inspection Drawing for the Ambrosia Lake Disposal Site*

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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.

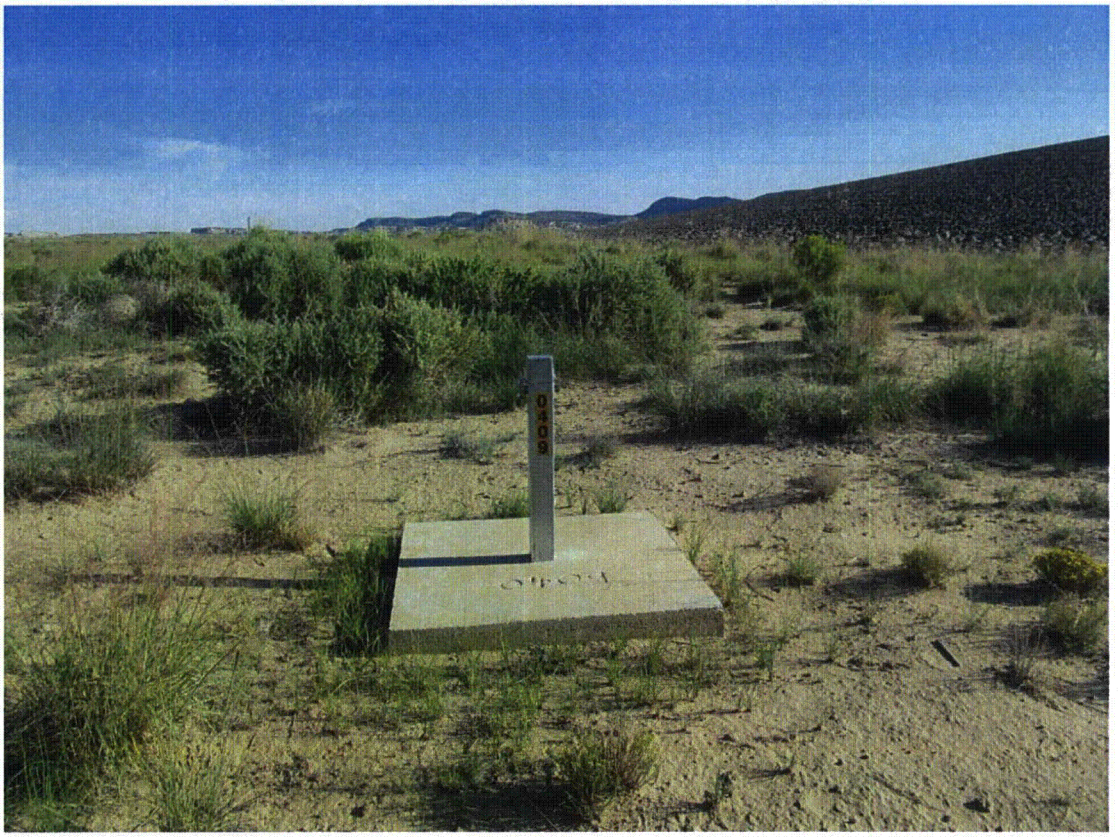
No need for corrective action was identified during the inspection.

## 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. |

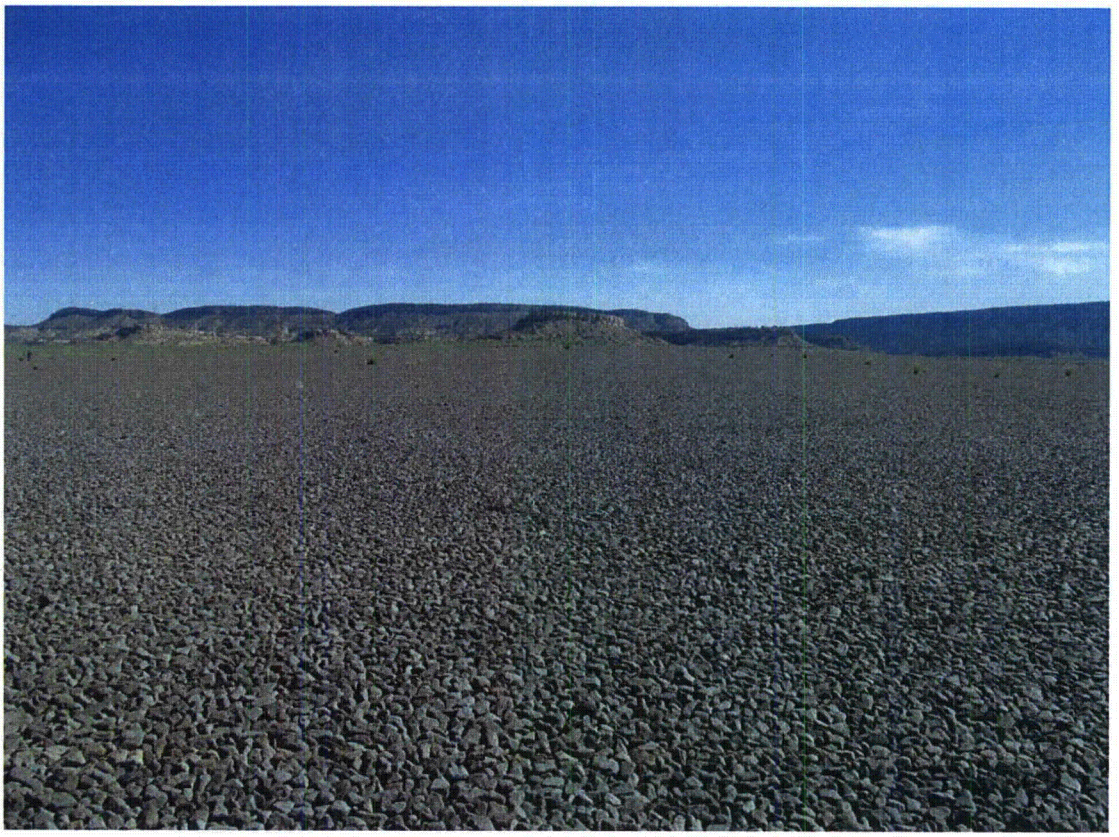
*AMB 8/2013. PL-1. Entrance sign and site marker SMK-1.*


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

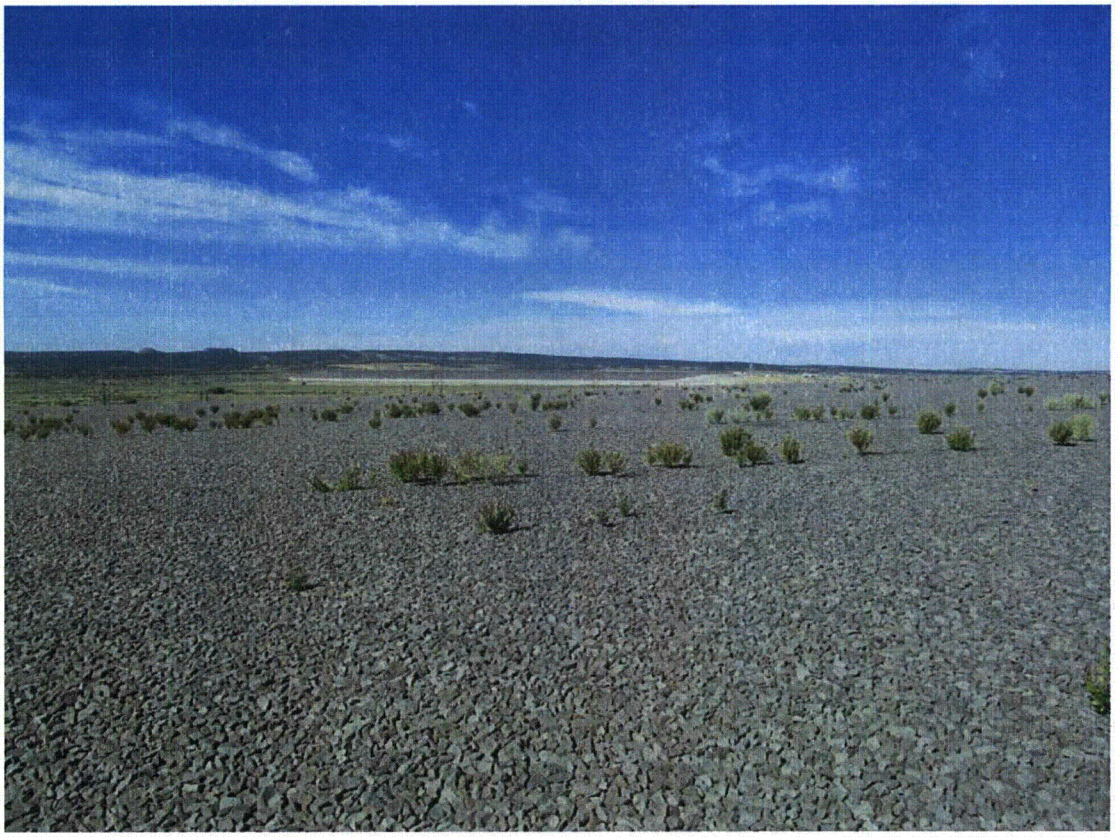



*AMB 8/2013. PL-3. Monitoring well 0409.*

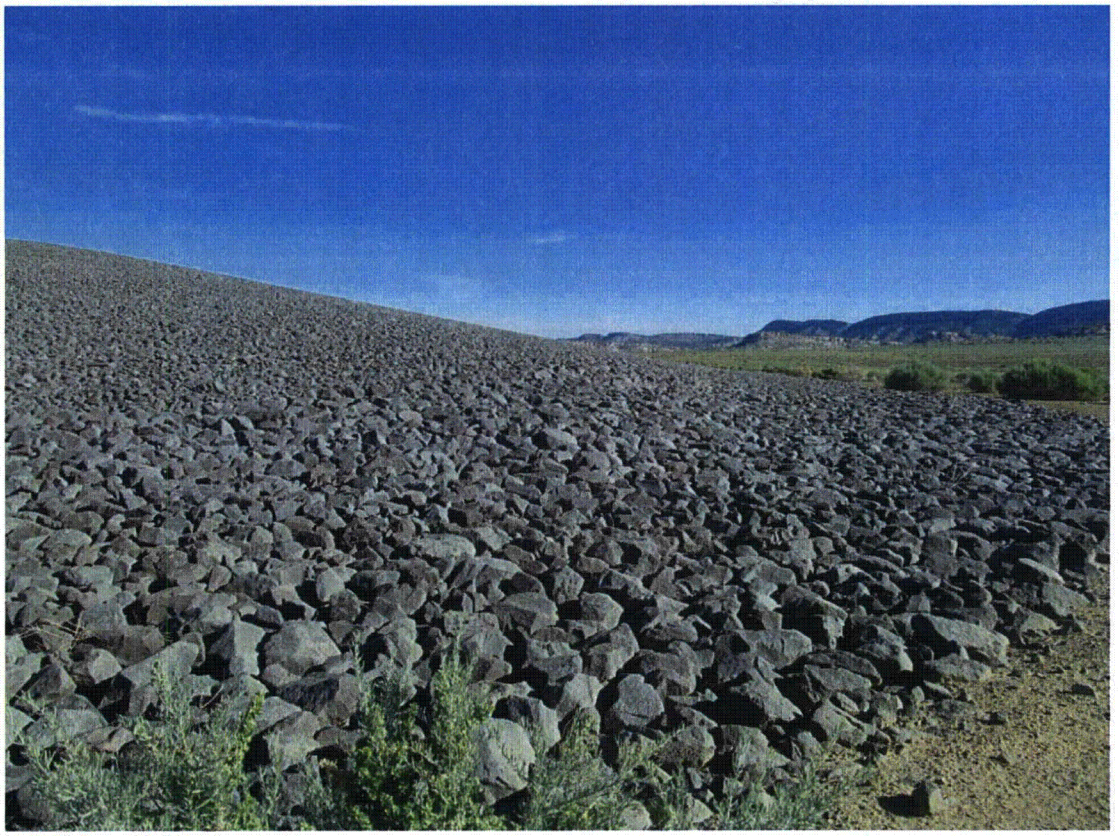
*AMB 8/2013. PL-4. Secured mine vent shaft.*



*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.

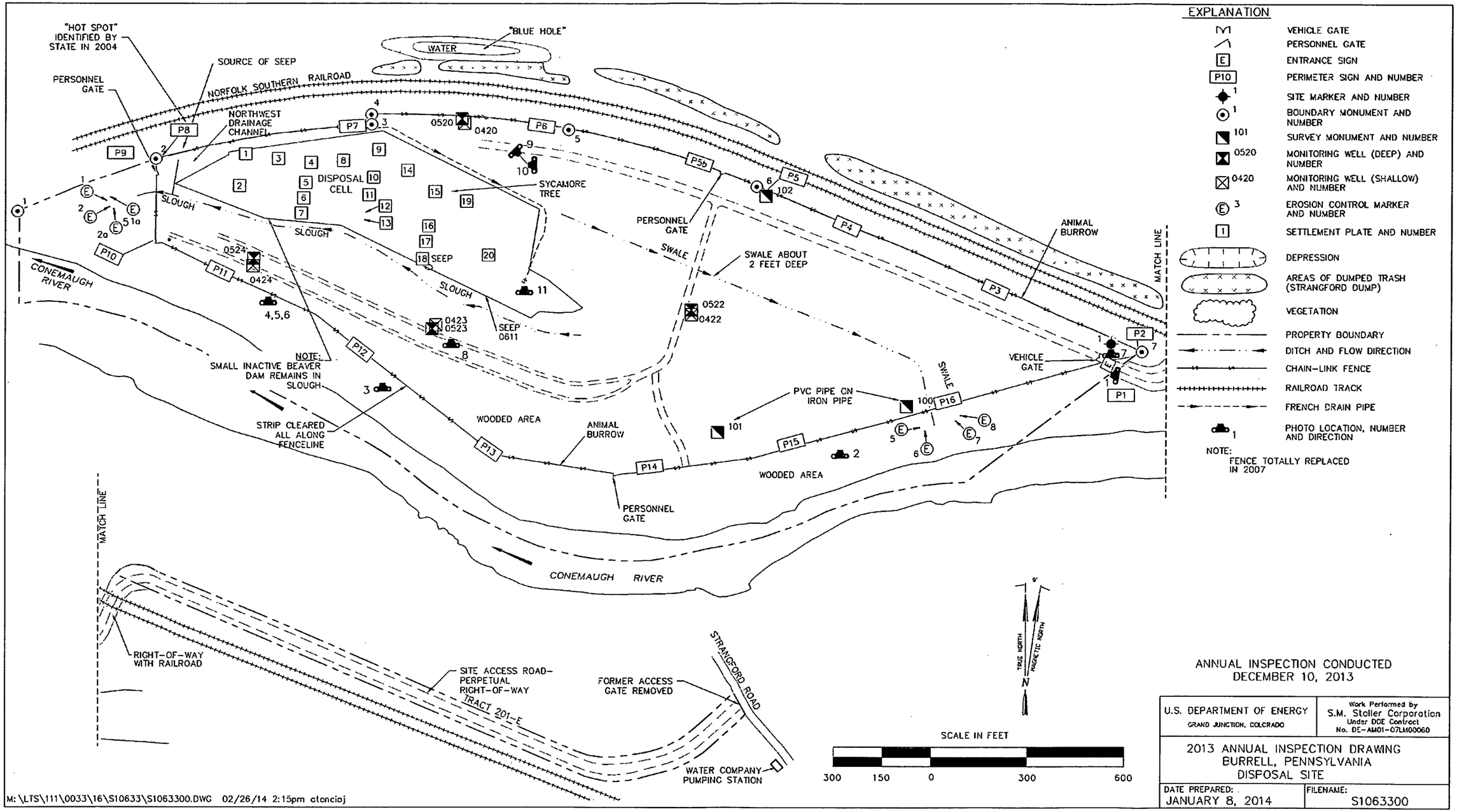



*Figure 2-1. 2013 Annual Inspection Drawing for the Burrell Disposal Site*

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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 loosetrife. 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 loosetrife 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.

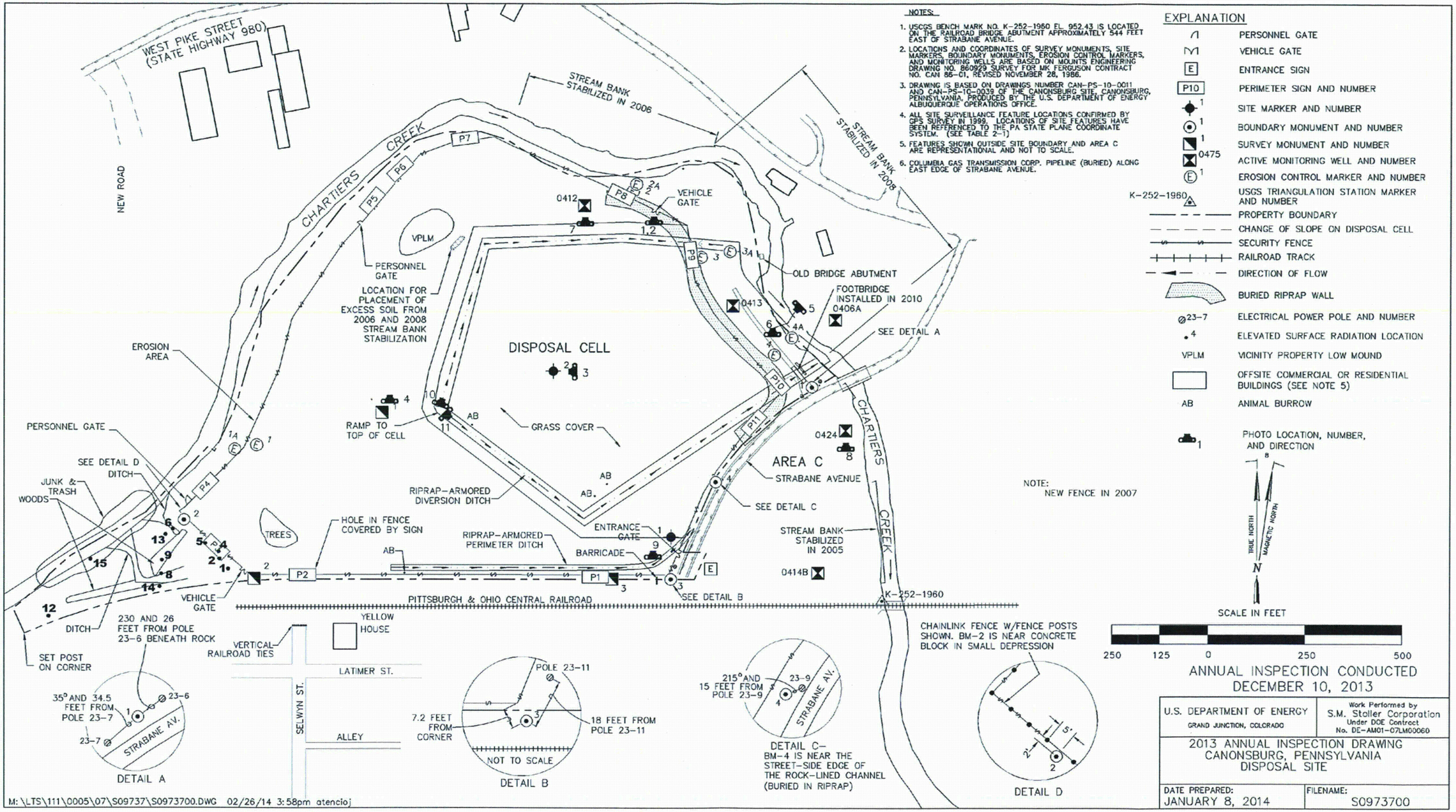


*Figure 3-1. 2013 Annual Inspection Drawing for the Canonsburg Disposal Site*

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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.

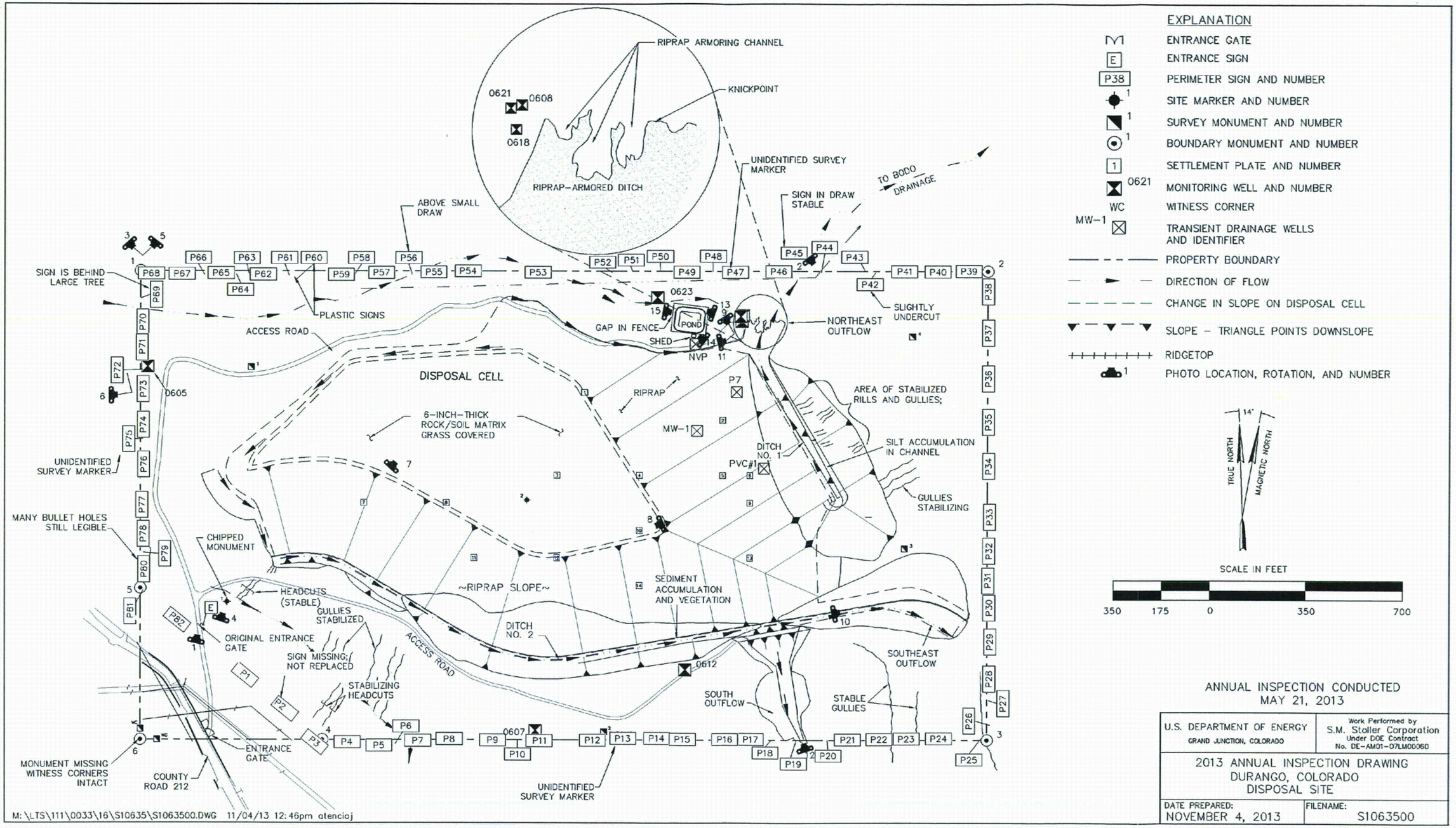


*Figure 4-1. 2013 Annual Inspection Drawing for the Durango Disposal Site*

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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.

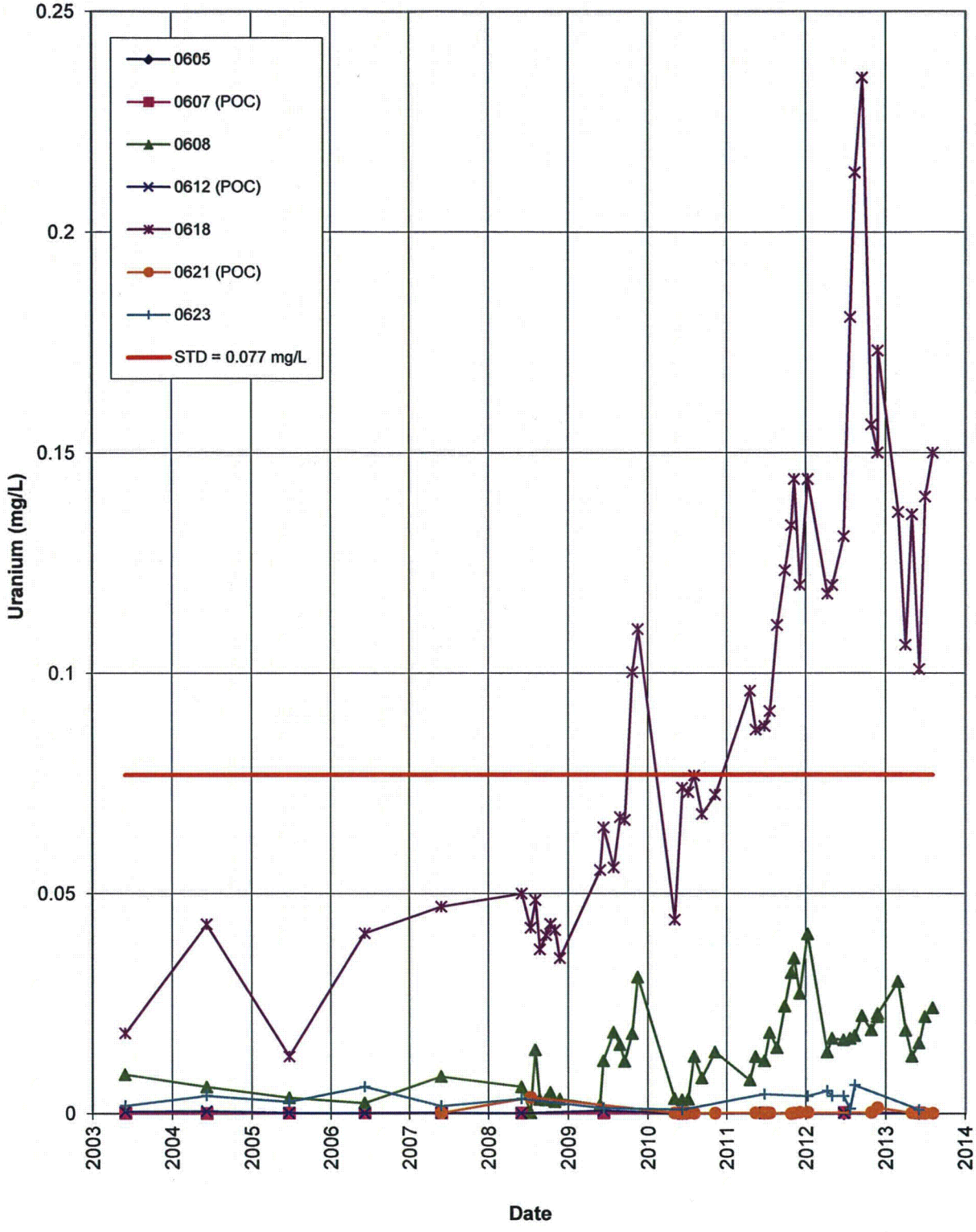



*Figure 4-2. Time-Concentration Plot of Uranium in Groundwater at the Durango Disposal Site*

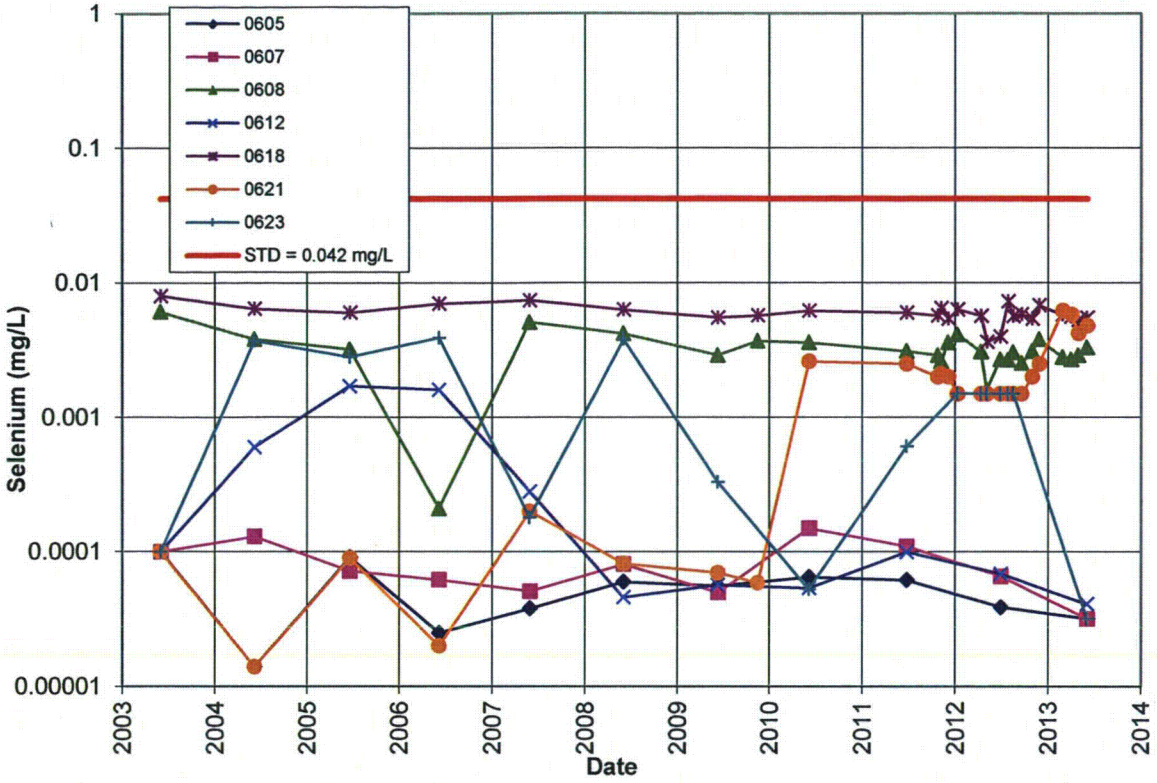



*Figure 4-3. Time-Concentration Plot of Selenium in Groundwater at the Durango Disposal Site*

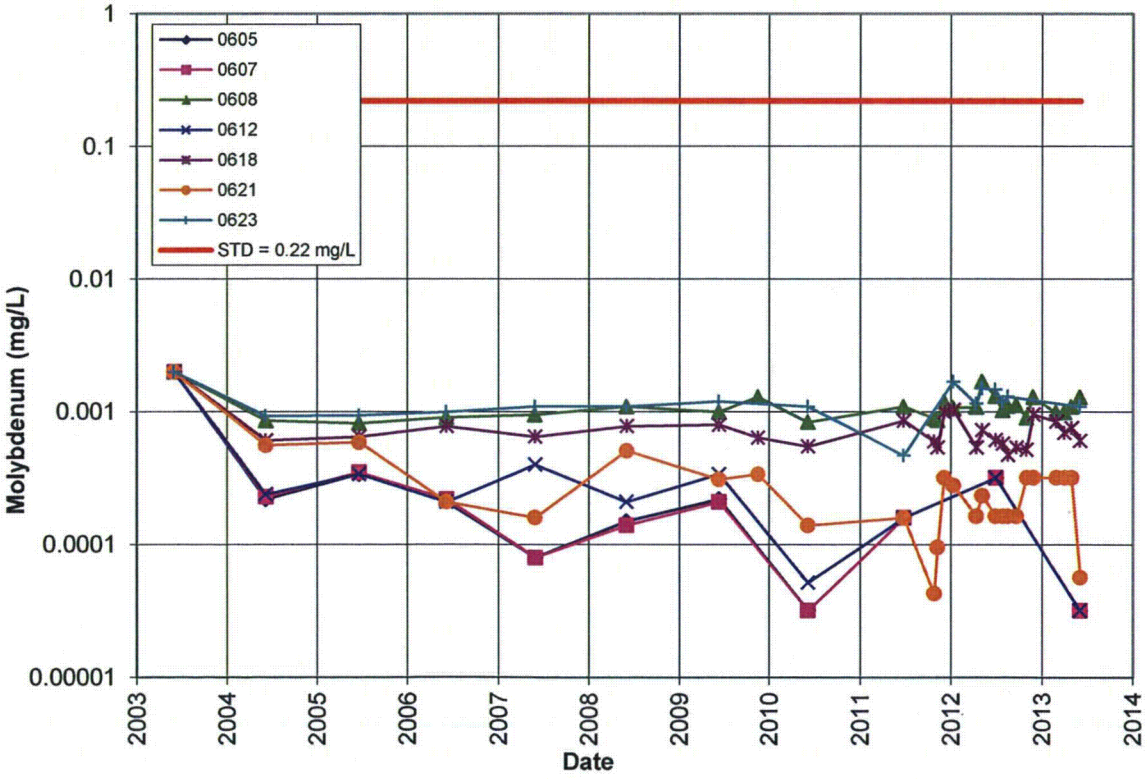



*Figure 4-4. Time-Concentration Plot of Molybdenum in Groundwater at the Durango Disposal Site*

## 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.

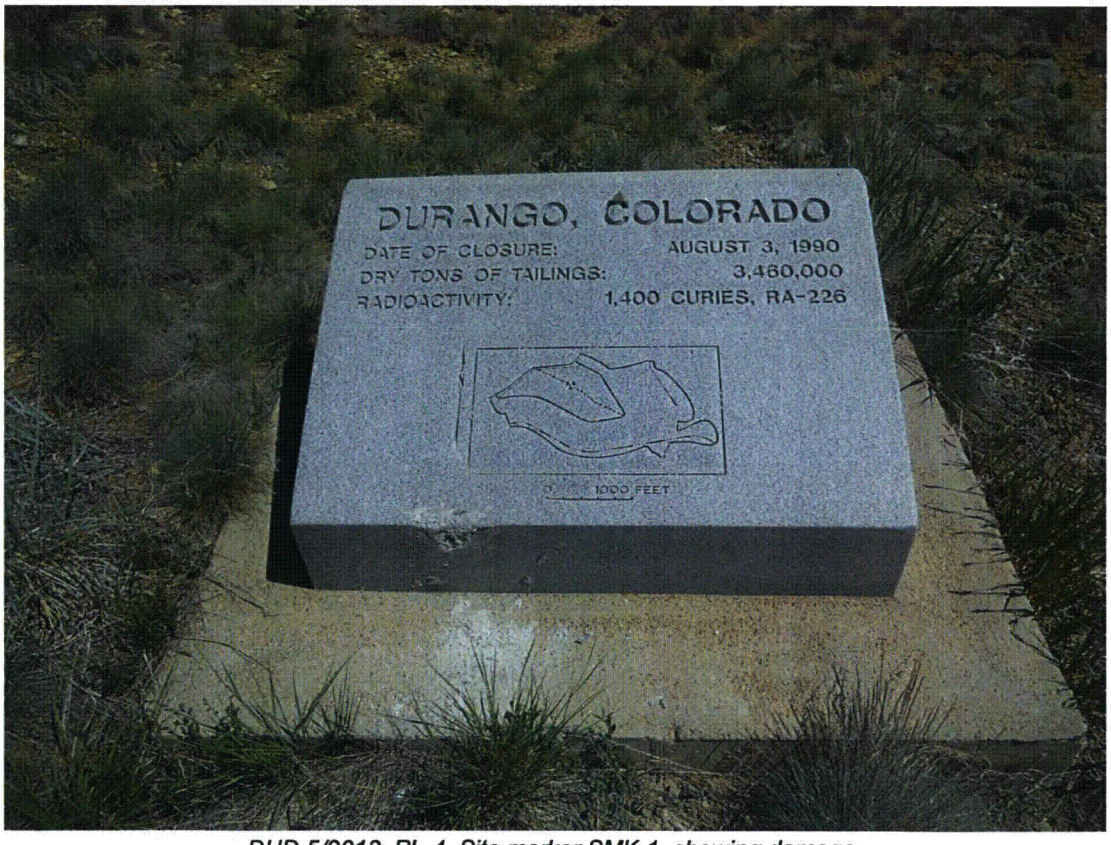
## 4.9 Photographs

| 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.*

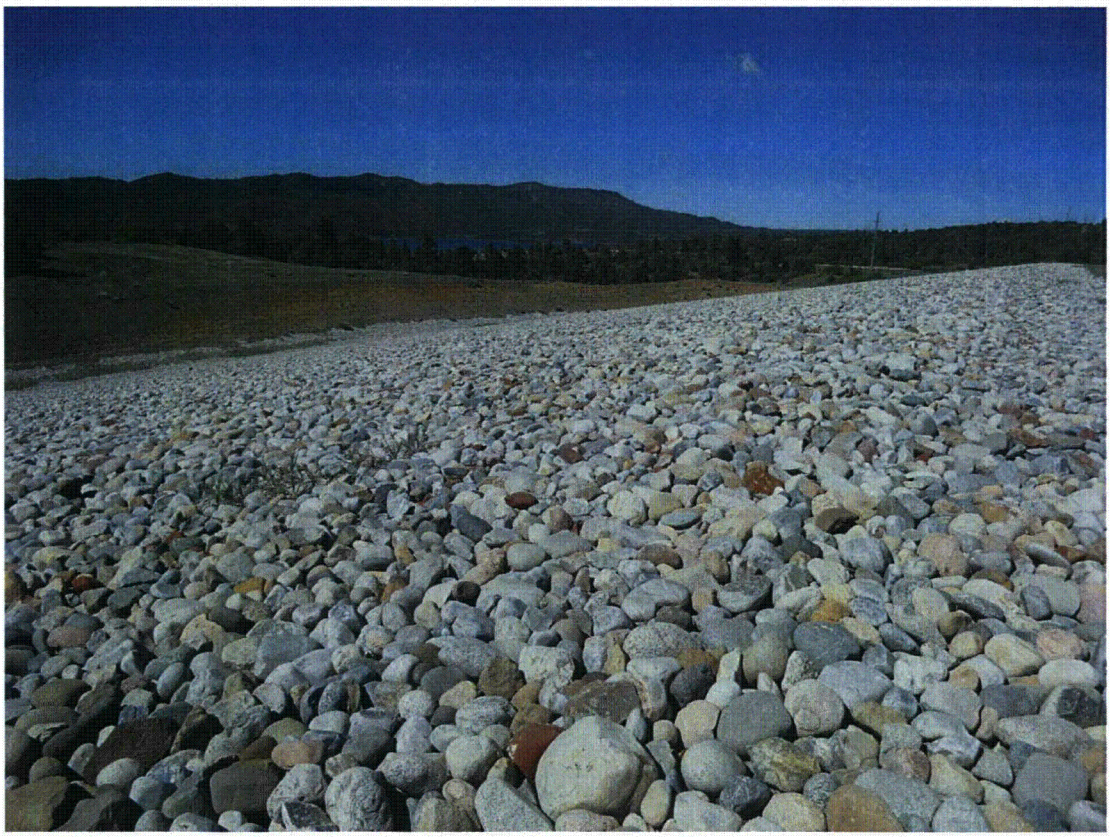



*DUD 5/2013. PL-4. Site marker SMK-1, showing damage.*

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

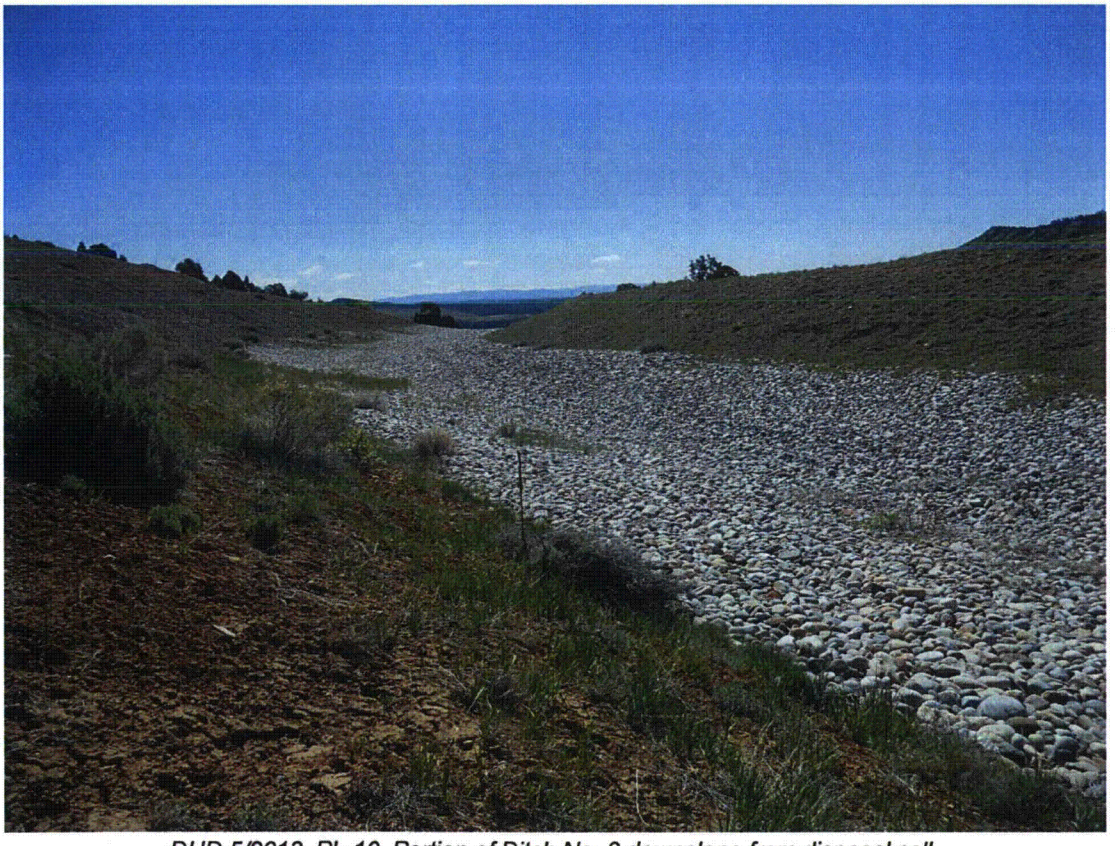

*DUD 5/2013. PL-6. Well 0605.*

*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.*