

## 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 October 15, 2008. The disposal cell and all associated surface water diversion and drainage structures were in excellent condition and functioning as designed. NRC concurred in the revised LTSP was received in November and DOE will implement monitoring program modifications in 2009. NRC concurred in the sale of a portion of the disposal site situated between Area C and the railroad (i.e., the east end of former Tract 117). A DOE-funded, Borough-sponsored stream bank stabilization project along Chartiers Creek was completed. Riprap was restored in the outlet to the diversion ditch northeast of the disposal cell following stream bank stabilization work. The protective casings and bollards for all monitor wells were painted. Vegetation control for noxious weeds is ongoing. No other 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 Canonsburg Disposal Site are specified in the *Long-Term Surveillance Plan [LTSP] for the Canonsburg, Pennsylvania, Disposal Site* (DOE/AL/62350–203, Rev. 0, U.S. Department of Energy [DOE], Albuquerque Operations Office, October 1995) and in procedures established by DOE to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 3–1.

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

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Sections 3.1 and 7.0	Section 3.3.1
Follow-Up or Contingency Inspections	Sections 3.2 and 6.2, Appendix E.4	Section 3.3.2
Routine Maintenance and Repairs	Section 6.1	Section 3.3.3
Groundwater Monitoring	Section 4.0	Section 3.3.4
Corrective Action	Section 4.4	Section 3.3.5

**Institutional Controls**—Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal ownership of the property, a site security fence, warning/no-trespassing signs mounted on the security fence, and a locked gate at the entrance to the site. Verification of these institutional controls is part of the annual inspection.

The 30-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.

Inspectors found no evidence that these institutional controls were ineffective or violated.

The Commonwealth of Pennsylvania sold Area C to a private party in 2006. DOE and the Commonwealth complied with restrictions on parcel transfers stipulated in UMTRCA and the Cooperative Agreement between DOE and the Commonwealth. The deed for Area C establishes

restrictions to limit excavation in the area, prohibits disturbance of the stream bank, maintains access for monitoring, and prevents the area from being used for residential purposes.

DOE has determined that an approximately 0.5-acre portion of former Tract 117, lying east of Strabane Avenue and between the railroad and Area C, may also be sold, and the same Area C land use restrictions will be imposed. Inspectors found no evidence that these institutional controls were ineffective or violated.

### 3.3 Compliance Review

#### 3.3.1 Annual Inspection and Report

The site, located between the communities of Canonsburg and Houston, Pennsylvania, was inspected on October 15, 2008. Features and photograph locations (PLs) mentioned in this report are shown on Figure 3–1. Numbers in the left margin of this report refer to items summarized in the “Executive Summary” table.

##### 3.3.1.1 Specific Site-Surveillance Features

**Access, Gates, Fence, and Signs**—Access to the site is directly from Strabane Avenue, a public right-of-way within the borough of Canonsburg in Washington County, Pennsylvania. The security fence and all four site gates (replaced in 2007) were in excellent condition. A vegetation-free buffer zone is being maintained around the entire site security fence.

The entrance sign and 11 perimeter signs are in good condition.

**Site Markers and Monuments**—The site contains two site markers, three survey monuments, and four boundary monuments. Both site markers and all three survey monuments were located and are in excellent condition. All four boundary markers are also in excellent condition.

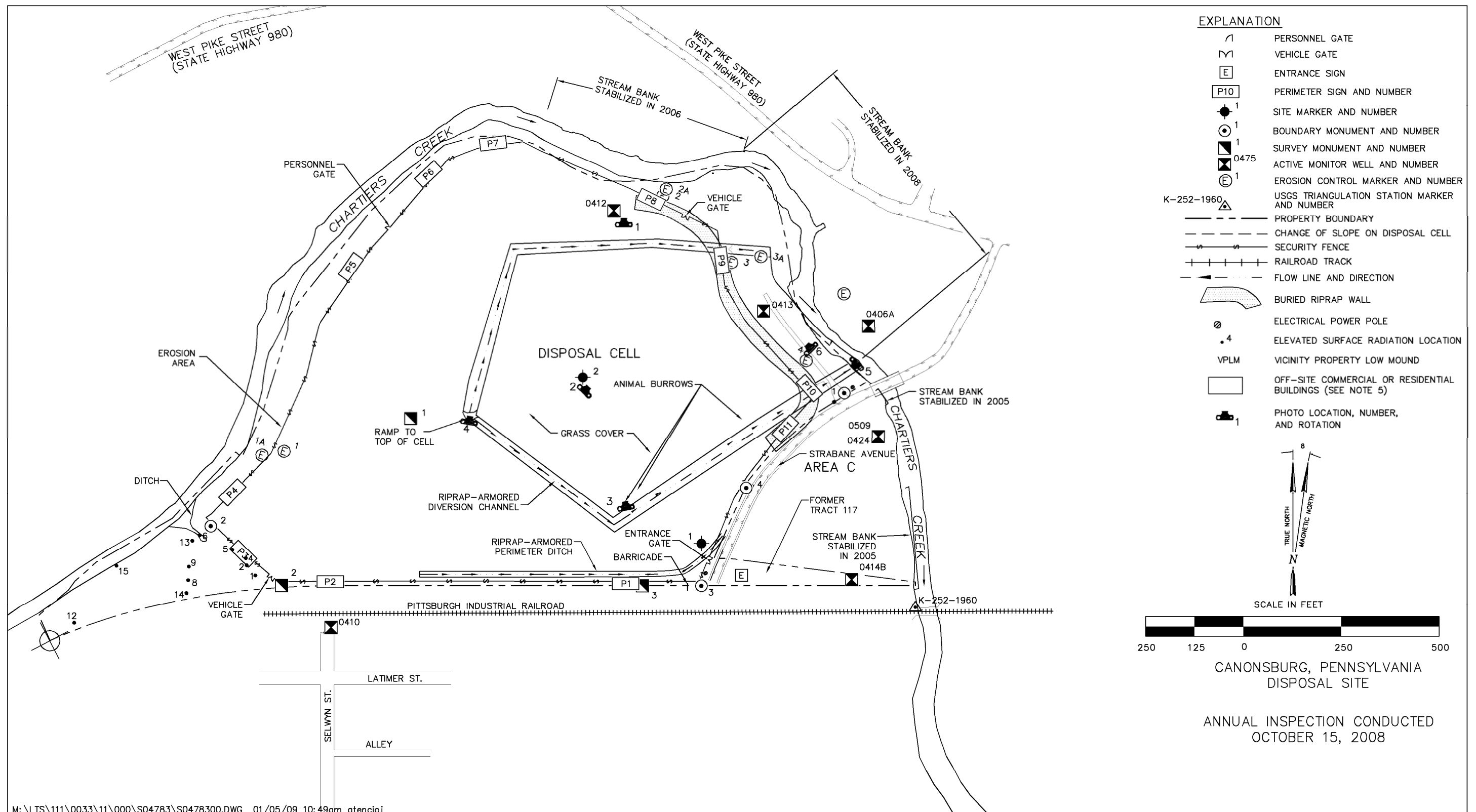
Four pairs of erosion control markers were initially installed along the bank of Chartiers Creek. One of these markers, ECM–4A, was lost to erosion in 1997; erosion control marker ECM–4 has been used for reference. Stream bank stabilization work is complete, and erosion control marker ECM–4A will be reinstalled. ECM–3A was reset in 2005 after hurricane damage. All remaining erosion control markers are in excellent condition.

**Monitor Wells**—The groundwater monitoring network for the site consists of six monitor wells (MW–0406A, MW–0410, MW–0412, MW–0413, MW–0414B, and MW–0424). All were in excellent condition. The protective casings and bollards for all monitor wells were painted in 2008 (PL–1).

3A

##### 3.3.1.2 Transects

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



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The area inside each transect is inspected by walking a series of traverses. Within each transect, the inspectors examine specific site-surveillance features, drainage structures, vegetation, and other features. Inspectors also look for evidence of settlement, erosion, or other modifying processes that might affect the site's integrity or long-term performance.

**3B Disposal Cell**—The grass-covered disposal cell surface was in excellent condition (PL-2); there was no evidence of slumping, settling, erosion, or other modifying processes. The grass is mowed and mulched at least annually in accordance with the LTSP. DOE continued to control Canada thistle and poison hemlock through a combination of spot spraying with herbicide and mulching, which has greatly reduced the extent of these listed noxious and invasive weeds.

**3C** Animal burrows continue to be observed on the cell cover, but only the upper topsoil material appears to have been displaced. Because the buried tailings at this site 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 into the tailings is unlikely, and such burrows should not pose a risk to disposal cell integrity or public health. The location and significance of burrows will continue to be monitored. In 2008, three animal burrows were noted on the east side of the cell cap just above the diversion ditch (PL-3). No new activity was noted at any of the existing burrows, and no new burrows were detected.

**3D Diversion Channels and Perimeter Ditch**—Diversion channels around the disposal cell and the perimeter ditch along the south side of the site are armored with riprap and were in good condition. No indications of diminished rock durability were noted. Woody vegetation establishing in the diversion ditches continues to be controlled by cutting and spraying (PL-4). Riprap in the outlet to the diversion ditch northeast of the cell cap was restored after a temporary access road for the stream bank stabilization work was removed (PL-5).

**Other Areas on Site**—Thick grass covers the area surrounding the disposal cell. The grass extends beyond the security fence to the north and east as far as the bank of Chartiers Creek. The grass inside the site boundary was in excellent condition; it is mowed and mulched at least annually in accordance with the LTSP.

**Site Perimeter**—Chartiers Creek is an active, meandering waterway that abuts the east, north, and west portions of the site. As a result of flooding in past years, particularly in 2004, the creek cut into the bank and required a series of stream bank stabilization efforts. Funding for the work was provided by both the Borough of Canonsburg and DOE. NRC representatives evaluated the plans and concurred in the work.

In 2001, Chartiers Creek bank along Area C was reconstructed to stop slumping. In 2004, inspectors found that floodwater 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 and 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 that consisted of restoring the creek bank profile along Area C by filling scoured areas with riprap. Shrub and forb seed was also broadcast to further stabilize the bank with vegetation. In

2006, the area between perimeter signs P7 and P8 was stabilized. And, in 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 the planting of live fascines.

- 3E The completion of the Chartiers Creek stream bank stabilization work was verified during the 2008 inspection (PL-6). Stream bank stability will continue to be monitored.

**Outlying Area**—The predominant land use near the site is residential and commercial. The area outward, for a distance of approximately 0.25 mile, was visually inspected for development or change in land use that might affect the safety or security of the site.

- 3F In 2006, the Commonwealth of Pennsylvania sold Area C, east of the disposal cell, to a private party. DOE and the Commonwealth complied with requirements for parcel transfers stipulated in UMTRCA and the Cooperative Agreement between DOE and the Commonwealth. Deed restrictions were developed and recorded, and apply to the present owner and all future owners of the parcel. The adjacent 0.5-acre portion, former Tract 117, remains for sale. However, on November 28, 2008, NRC provided technical evaluation of and written concurrence in the LTSP Revision dated September 2008, which included a discussion of the institutional controls to support the sale of Tract 117. In addition, the letter also approved DOE's request for concurrence in the sale of a portion of the disposal site situated between Area C and the railroad.

In 2007, DOE conducted a radiological survey on the small portion of the site property that lies outside the perimeter fence southwest of the disposal cell. The survey was conducted to evaluate the potential for releasing this portion of the site for industrial reuse. The survey identified isolated radium-226 contamination in soil, in excess of UMTRCA standards for unrestricted use. DOE will retain this portion of the site. Under the current property use, these radiological conditions do not pose unacceptable risk to personnel, and no corrective measures are required. DOE has added monitoring for disturbance of this area to inspection procedures and installed a boundary monument at the western edge of the DOE-owned property.

### 3.3.2 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) a condition is identified during the annual inspection or other site visit that requires a return to the site to evaluate the condition, or (2) DOE is notified by a citizen or outside agency that conditions at the site are substantially changed.

No follow-up or contingency inspections were required in 2008.

### 3.3.3 Routine Maintenance and Repairs

In 2008, DOE restored riprap placement at the outlet to the east diversion channel, controlled woody growth within the diversion channels, painted the monitor well protective casings and bollards, mowed grass on and adjacent to the disposal cell, cleared vegetation from the perimeter fence, and sprayed noxious and invasive weeds.

### 3.3.4 Groundwater and Surface Water Monitoring

- 3G** DOE monitors groundwater and surface water at the Canonsburg Site to comply with requirements in the LTSP and the Groundwater Compliance Action Plan (GCAP). The LTSP monitoring is implemented as a best management practice because NRC determined that cell performance monitoring, to ensure compliance with remedial actions conducted under Subpart A of 40 CFR 192, was not required because the disposal cell's design was adequate to provide long-term protection of human health and the environment. The GCAP requires monitoring to ensure compliance with Subpart B of 40 CFR 192 (i.e., legacy uranium-processing-site-related contamination). The Subpart B protection strategy is no remediation in conjunction with the application of an alternate concentration limit (ACL) for uranium.

The monitoring network consists of six wells completed in the uppermost aquifer (shallow unconsolidated materials) and three surface water locations in Chartiers Creek (Table 3–2 and Figure 3–1). The LTSP specified best management practice sampling for 2 years after the site was transferred to DOE for long-term care. This was met by sampling in 1996 and 1997. However, because the concentration of uranium in some wells remained above the maximum concentration limit (MCL) of 0.044 milligrams per liter (mg/L) (Table 3–3), DOE continued to monitor these locations annually.

Monitoring requirements to verify compliance with the GCAP include four wells and one surface location (Table 3–2). The GCAP requires monitoring for a period of no less than 5 years (through 2004) and up to 30 years (through 2029—the estimated time for any contamination to naturally attenuate).

The LTSP was revised in September 2005 to combine the LTSP monitoring program and GCAP monitoring requirements into a comprehensive site-wide monitoring program. The revised LTSP also included proposed modifications to the groundwater and surface water monitoring program (discussed below).

*Table 3–2. Groundwater and Surface Water Sampling Locations at the Canonsburg Disposal Site*

<b>Sample Locations LTSP (prior to revision)</b>	<b>Sample Locations GCAP (DOE 2000)</b>	<b>Sample Locations Revised LTSP</b>
Monitor wells: MW–0410 Upgradient MW–0406A Downgradient <sup>a</sup> MW–0412 Downgradient MW–0413 Downgradient MW–0424 Downgradient MW–0414B Crossgradient <sup>b</sup>	Monitor wells: MW–0406A Downgradient MW–0412 Downgradient (POC) MW–0413 Downgradient (POC) MW–0414B Crossgradient (POC)	Monitor wells: MW–0406A Downgradient (BMP) MW–0412 Downgradient (POC) MW–0413 Downgradient (POC) MW–0414B Crossgradient (POC) MW–0424 Downgradient (BMP)
Surface water locations: SW–0601 Upstream SW–0602 Adjacent to Area C SW–0603 Downstream	Surface water location: SW–0602 Adjacent to Area C (POE)	Surface water location: SW–0602 Adjacent to Area C (POE)

<sup>a</sup>MW–0406 was destroyed during a sanitary sewer construction project in 2001 and replaced. The current designation is MW–0406A.

<sup>b</sup>MW–0414 has been replaced twice because of damage during construction. The current designation is MW–0414B. Key: BMP = best management practice; POC = point of compliance; POE = point of exposure.

Table 3–3. Standards for Groundwater Monitoring at the Canonsburg Disposal Site

Analyte	Standard	ACL	Standard Source
Molybdenum	0.1 mg/L	--	40 CFR 192 — MCL
Manganese <sup>a</sup>	0.05 mg/L	--	40 CFR 143.3 — Secondary drinking water standard
Uranium <sup>b</sup>	0.044 mg/L	1.0 mg/L	40 CFR 192 — MCL

<sup>a</sup>A risk-based concentration of 1.7 mg/L has also been established for surface water based on U.S. Environmental Protection Agency documentation (included in the revised LTSP).

<sup>b</sup>A target concentration of 0.01 mg/L has been proposed for surface water (included in the revised LTSP). Key: ACL = alternate concentration limit, mg/L = milligrams per liter; MCL = maximum concentration limit; CFR = Code of Federal Regulations

Molybdenum and uranium are currently the target analytes identified in the LTSP (Table 3–4), with uranium being the analyte of primary concern. Other water-quality indicators include calcium, chloride, magnesium, potassium, sodium, and sulfate. Field measurements are also performed during sampling. Target analytes under the GCAP are molybdenum, uranium, and manganese.

MCLs for molybdenum (0.1 mg/L) and uranium (0.044 mg/L) are established in Table 1 to Subpart A of 40 CFR 192 (Table 3–3). There is no standard for manganese; however, the performance standard adopted by the GCAP for manganese (0.05 mg/L) is the secondary drinking water standard established in 40 CFR 143.3. A risk-based concentration of 1.7 mg/L has also been established for surface water based on U.S. Environmental Protection Agency [EPA] documentation and included in the revised LTSP. An alternate concentration limit (ACL) of 1.0 mg/L was established for uranium in groundwater in the GCAP for the point-of-compliance (POC) wells. A target concentration of 0.01 mg/L was established for uranium at the point-of-exposure (POE) surface water location.

Table 3–4. Analytes for Groundwater and Surface Water at the Canonsburg Disposal Site

Field Measurements	LTSP (prior to revision)		GCAP	Revised LTSP
	Water-Quality Indicators	Target Analytes	Target Analytes	Target Analytes
Alkalinity Dissolved oxygen pH Specific conductance Temperature Turbidity	Calcium Chloride Magnesium Potassium Sodium Sulfate	Uranium Molybdenum	Uranium Manganese Molybdenum	Uranium Manganese <sup>a</sup>

<sup>a</sup> Applies to groundwater monitor well MW–0412 and surface water monitoring location SW–0602 only.

- 3H** The revised LTSP modifies the groundwater and surface water monitoring program to (1) eliminate the upgradient background well MW–0410 and two surface water sampling locations (the upstream location SW–0601 and the downstream location SW–0603) from the monitoring network (Table 3–2); (2) reduce the target analytes to uranium for the entire network and manganese for MW–0412 and SW–0602 only, while retaining routine field measurements performed at the time of sampling (Table 3–4); and (3) conduct monitoring annually for the next 5 years (through 2010) and then reevaluate the monitoring program.



The objectives of the revised monitoring program are to (1) evaluate downgradient contaminant trends in groundwater in the uppermost aquifer and in surface water to ensure compliance with the established site standards; (2) demonstrate that concentrations of uranium at the POC locations are decreasing as predicted and that the system remains in compliance with the GCAP; and (3) ensure that remedial actions at the disposal site and Area C continue to protect human health, safety, and the environment.

In 2006, NRC reviewed the revised LTSP and responded to recommended modifications as supported in the *Technical Evaluation Report, Canonsburg Uranium Mill Tailings Disposal Site* (October 2006). Monitoring program modifications were accepted with one additional requirement: continued annual monitoring of manganese in groundwater at well MW-0412 and in surface water at location SW-0602 through the next 5-year evaluation period (through 2010). The additional requirement was included in the final version of the revised LTSP. In 2008, NRC concurred in the revised LTSP; the associated monitoring program modifications will be implemented in 2009.

Because NRC concurrence had not been received at the time of sampling, monitoring performed in 2007 and 2008 was conducted in accordance with requirements of the 1995 version of the LTSP (October 1995).

**Monitoring Results**—Analytical results for groundwater and surface water monitoring are presented below. Analytical results from the September 2007 and October 2008 monitoring are included in this report. Time-concentration plots, from 1995 through 2008, for the three target analytes—uranium, molybdenum, and manganese—for groundwater are shown on Figures 3-2 through 3-4 and for surface water on Figures 3-5 through 3-7.

**Groundwater**—In 2007 and 2008, uranium concentrations in wells MW-0412 and MW-0413 remained above the MCL but considerably below the established ACL (Figure 3-2). Following a downward trend from 1996 through 1999, concentrations of uranium at well MW-0412 had increased from 2001 through 2005, with a decrease reported in 2006. In 2007, the uranium concentration rose to 0.36 mg/L, the highest value recorded for this well. In 2008, the uranium concentration dropped to 0.17 mg/L. Even though there continues to be fluctuation in this well, all uranium concentrations remain well below the ACL. No definitive trend can be established in well MW-0412. From 1995 through 2001, uranium concentrations in well MW-0413 displayed a downward trend. Since 2002, uranium concentrations in well MW-0413 have fluctuated but remain below the initial 1995 concentration and have not exceeded the ACL. Uranium concentrations remain below the MCL at the other groundwater monitoring locations in 2007 and 2008.

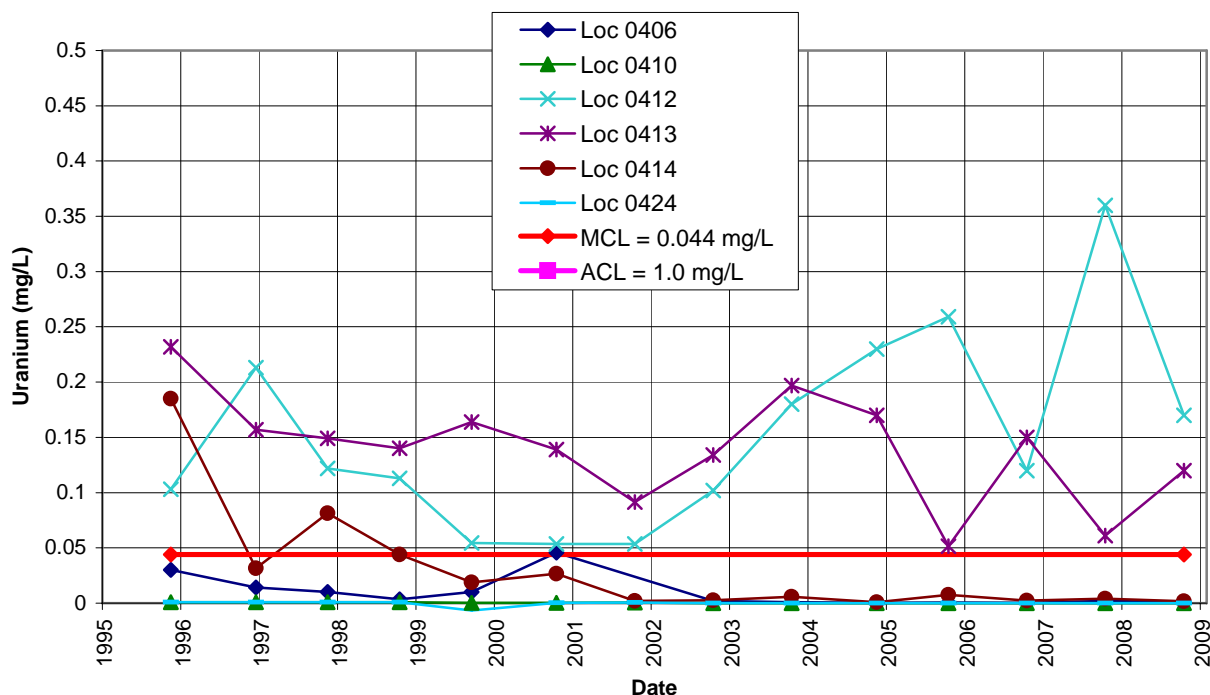


Figure 3-2. Time-Concentration Plots of Uranium in Groundwater at the Canonsburg Disposal Site

DOE continues to consider the risk associated with uranium in groundwater within the unconsolidated materials and shallow bedrock (defined as the uppermost aquifer for regulatory purposes) beneath the site to be negligible because neither unit is considered a viable aquifer from a water resource perspective, although the zone is capable of discharging to surface water (Appendix A to 10 CFR Part 40). Because the materials are not ideal for aquifer formation and because the source of recharge to the shallow units is minimal, sustained yield to a well from these units would be limited. The shallow groundwater is not used as a drinking water source in the area, although some domestic water is derived from a few private wells deeper than 100 feet.

Institutional controls, in the form of government ownership of the site, prevent access to the groundwater directly beneath the site. NRC concurred in deleting groundwater use restrictions for Area C in 2003. Most of the residents in the area are connected to a municipal water system, which is supplied by surface water reservoirs upgradient from the site. Chartiers Creek, the discharge point for the shallow groundwater beneath the site, is not a source of potable water. Additionally, uranium concentrations reported from samples collected from the creek are near the detection limit. Therefore, site-related concentrations do not pose unacceptable risk to human health and the environment.

In 2007 and 2008, molybdenum concentrations in groundwater continued well below the MCL at all locations, with values remaining near the laboratory detection limit. Historically, the highest concentrations of molybdenum were reported from well MW-0414 during the initial years of monitoring. Concentrations in this well have decreased significantly in recent years and indicate an overall decreasing trend (Figure 3-3). In general, molybdenum concentrations at all other wells have remained relatively constant.

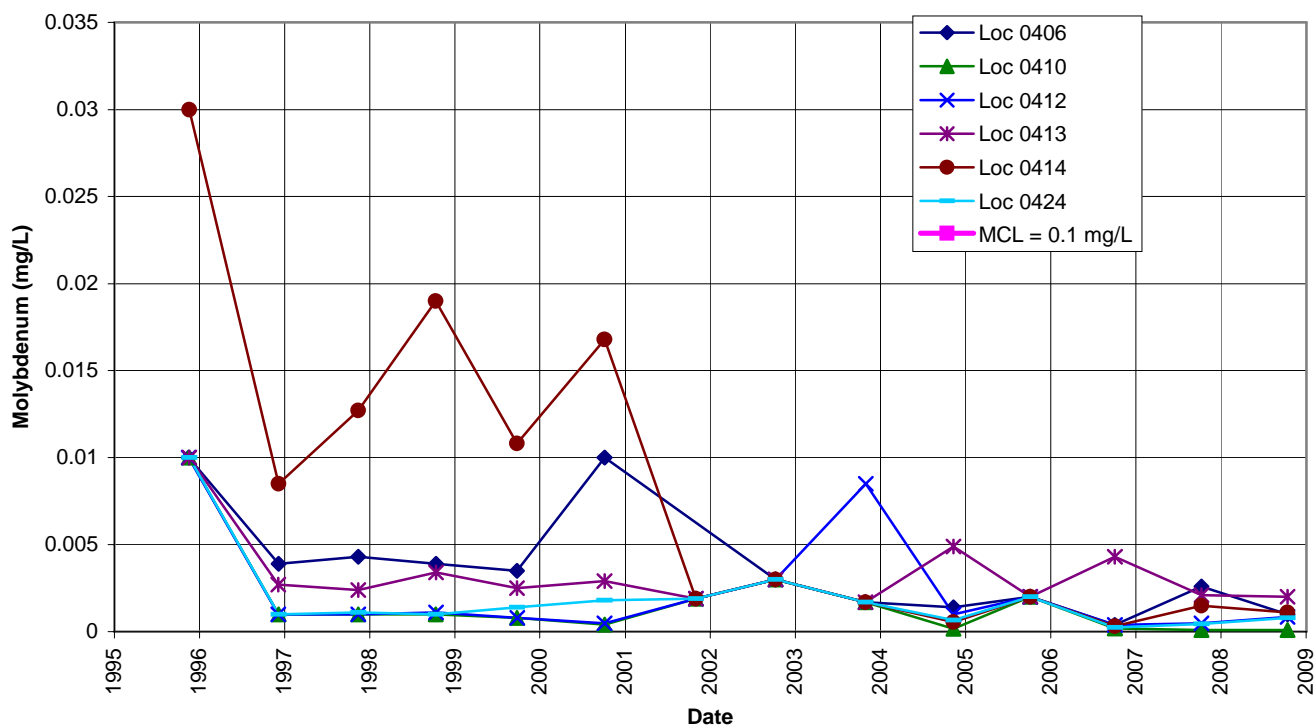


Figure 3–3. Time-Concentration Plots of Molybdenum in Groundwater at the Canonsburg Disposal Site

Manganese concentrations in groundwater continue to exceed the secondary drinking water standard of 0.05 mg/L at all POC wells. Results from 2007 and 2008 are consistent with results from previous years (Figure 3–4). Concentrations of manganese reported from well MW–0412 remain significantly higher than all other wells.

**Surface Water**—Uranium concentrations at all surface water sampling locations in Chartiers Creek remain well below the target concentration of 0.01 mg/L and continue to display a decreasing trend that began in 2001 (Figure 3–5).

The concentrations of molybdenum in the Chartiers Creek samples, as in the past, were higher than in groundwater samples, though still below the MCL of 0.1 mg/L. Historically, concentrations have only exceeded the MCL in 1998 (at all locations) and again, although only slightly, at location SW–0602 in 2000 (Figure 3–6). Surface water concentrations both upstream and downstream of the site exceed concentrations in groundwater. This indicates an ambient or upstream source of molybdenum rather than site-related activities. The surface water quality in upstream and downstream locations is indistinguishable. Molybdenum concentrations at all locations continue to display an overall decreasing trend that began in 1998.

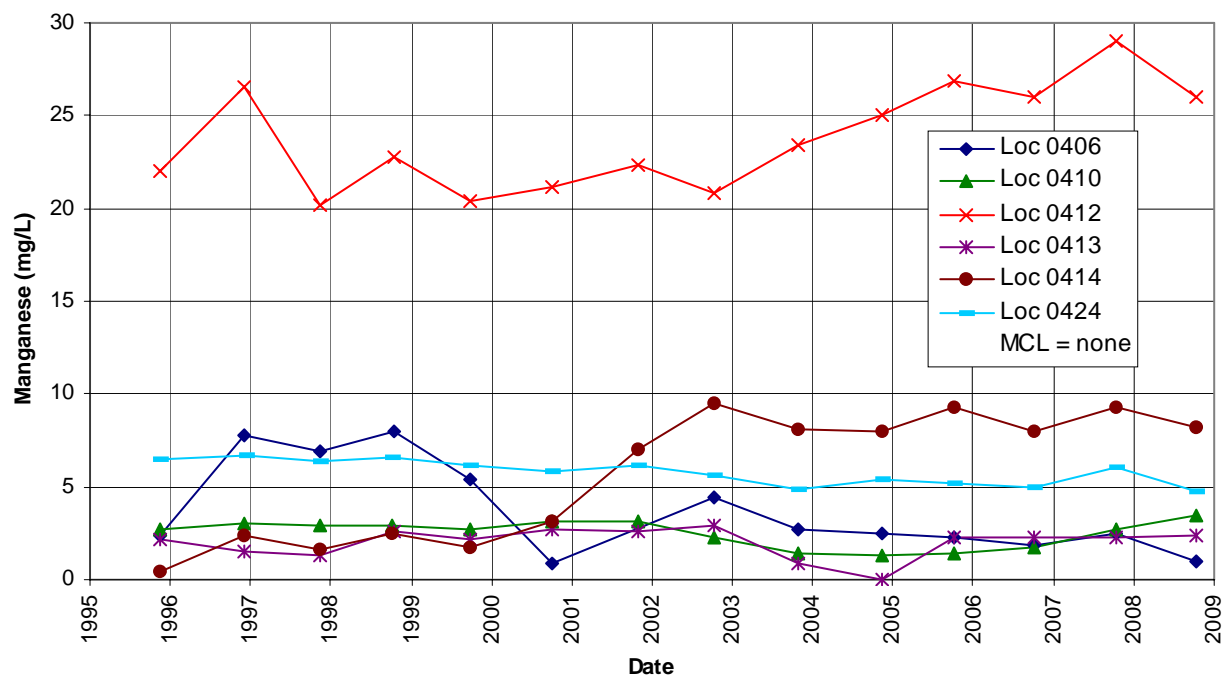


Figure 3-4. Time-Concentration Plots of Manganese in Groundwater at the Canonsburg Disposal Site

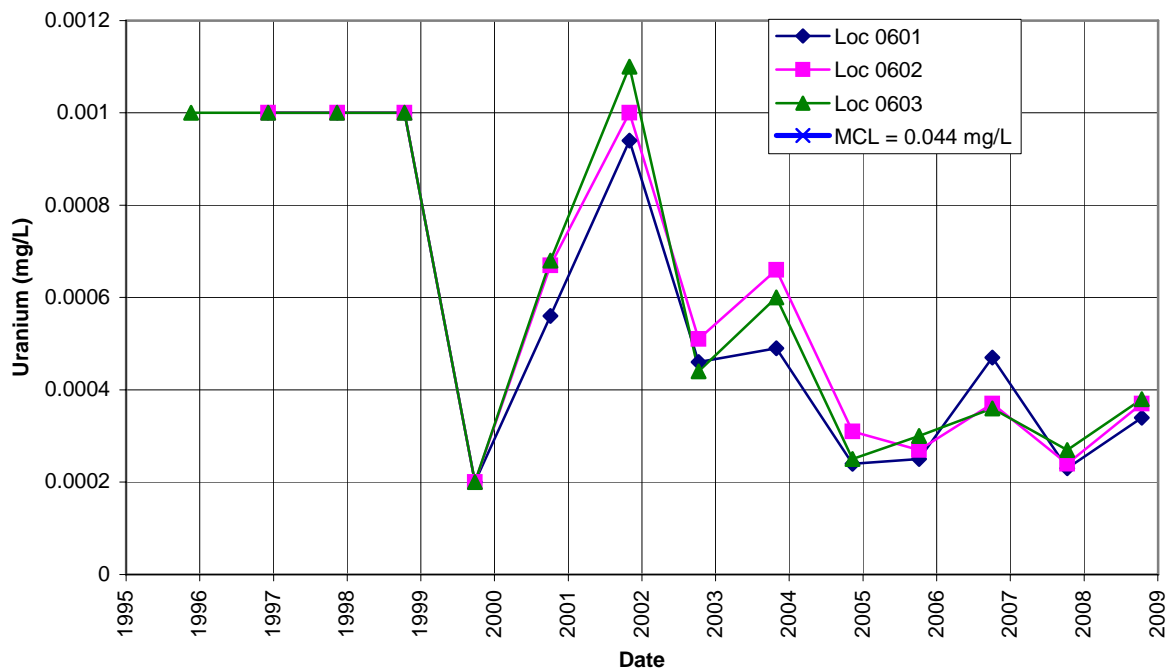


Figure 3-5. Time-Concentration Plots of Uranium in Surface Water at the Canonsburg Disposal Site

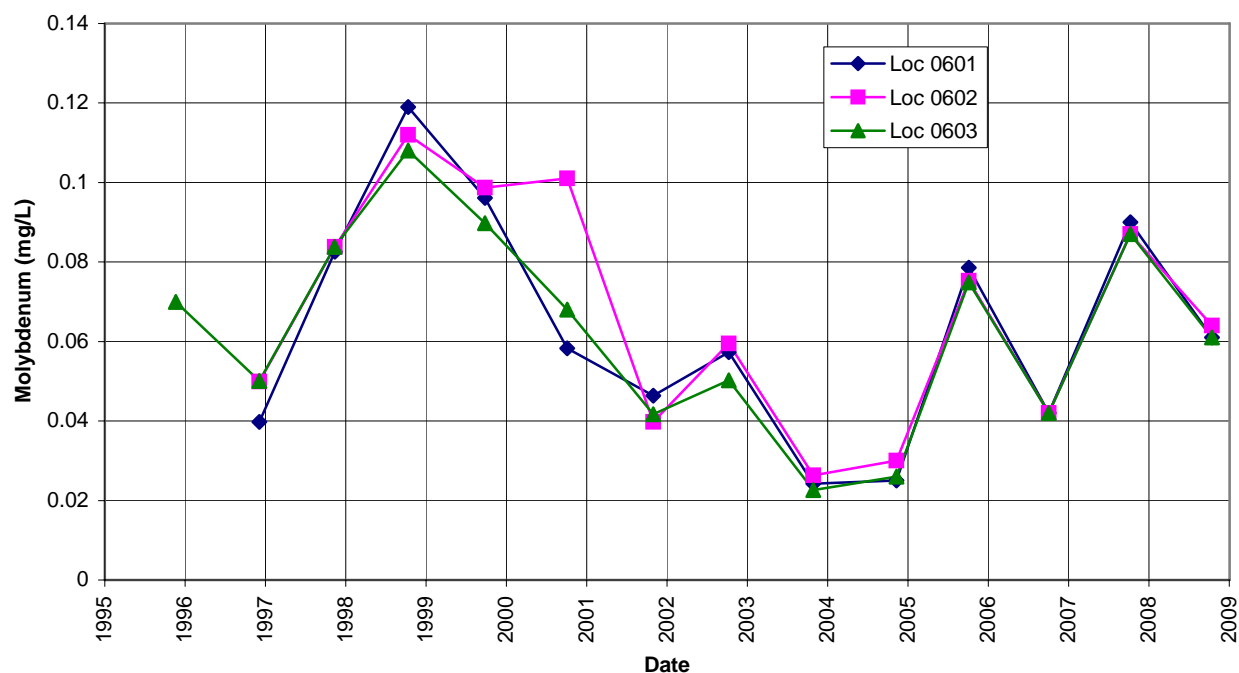


Figure 3–6. Time-Concentration Plots of Molybdenum in Surface Water at the Canonsburg Disposal Site

Manganese concentrations in surface water in Chartiers Creek continue to display an overall decreasing trend at all three locations, although location SW–0602 appeared to have an anomalously low concentration in 2001 (Figure 3–7). With the exception of location SW–0602 in 2001 and 2002, all manganese concentrations in surface water remain above the secondary drinking water standard of 0.05 mg/L but well below the EPA risk-based guideline of 1.7 mg/L. However, manganese concentrations do not appear to be site-related as upstream and downstream concentrations are the same.

The results of the 2007 and 2008 monitoring demonstrate continued compliance with established site standards.

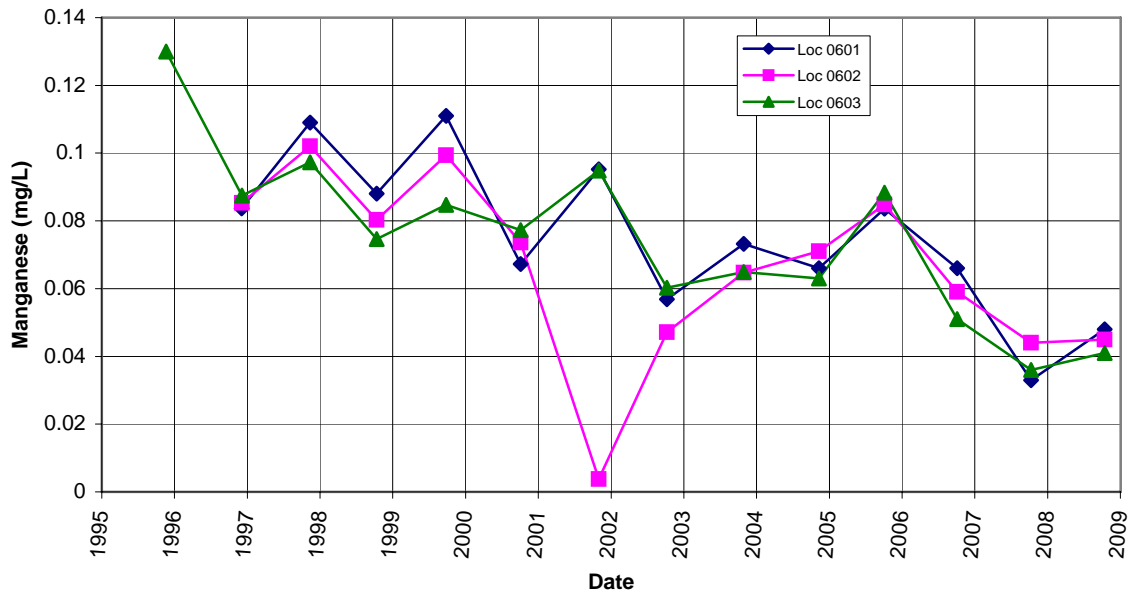


Figure 3-7. Time-Concentration Plots of Manganese in Surface Water at the Canonsburg Disposal Site

### 3.3.5 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 2008.

### 3.3.6 Photographs

Table 3–5. Photographs Taken at the Canonsburg Disposal Site

Photograph Location Number	Azimuth	Photograph Description
PL–1	0	Monitor well 0412 (recently painted).
PL–2	45	Grass-covered disposal cell.
PL–3	350	Animal burrow along edge of the disposal cell and diversion channel.
PL–4	10	Riprap-armored diversion ditch northwest of the disposal cell.
PL–5	225	Riprap restoration at outlet to the east diversion channel.
PL–6	320	Completed stream bank stabilization work west of Strabane Avenue Bridge.





*CAN 10/2008. PL-1. Monitor Well 0412 (recently painted).*



*CAN 10/2008. PL-2. Grass-covered disposal cell.*





*CAN 10/2008. PL-3. Animal burrow along edge of the disposal cell and diversion channel.*



*CAN 10/2008. PL-4. Riprap-armored diversion ditch northwest of the disposal cell.*





*CAN 10/2008. PL-5. Riprap restoration at outlet to the east diversion channel.*



*CAN 10/2008. PL-6. Completed stream bank stabilization work west of Strabane Avenue Bridge.*

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