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Long-Term Surveillance Plan for the U.S. Department of Energy Canonsburg Uranium Mill Tailings Disposal Site Canonsburg, Pennsylvania

U.S. Department of Energy

Office of Legacy Management

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Disclaimer

The information in this plan represents the most current and best understanding of technical and regulatory issues and responsibilities regarding the Canonsburg Disposal Site. Additional Site data continue to be obtained, and negotiations with regulators and stakeholders continue. This document will be revised as necessary to reflect changes based on newly obtained information.

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Acronyms and Abbreviations

ACL	alternate concentration limit
AEC	U.S. Atomic Energy Commission
BM	boundary monument
BMP	best management practice
CFR	*Code of Federal Regulations*
D_{50}	mean diameter of riprap rock by weight
DOE	U.S. Department of Energy
ECM	erosion control marker
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
ft	foot (feet)
GCAP	Ground Water Compliance Action Plan
LTSP	Long-Term Surveillance Plan
MCL	maximum concentration limit
msl	mean sea level
mg/L	milligram(s) per liter
MW	monitor well
NRC	U.S. Nuclear Regulatory Commission
PDEP	Pennsylvania Department of Environmental Protection
PMP	probable maximum precipitation
POC	point of compliance
POE	point of exposure
RBC	risk based concentration
SM	survey monument
SMK	site marker
UMTRA	Uranium Mill Tailings Remedial Action [Project]
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978 (42 *United States Code* 7901, et seq.)
USACE	U.S. Army Corps of Engineers
Vitro	Vitro Corporation of America
VPLM	vicinity property low mound

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1.0 Introduction

1.1 Purpose

This Long-Term Surveillance Plan (LTSP) explains how the U.S. Department of Energy (DOE), as long-term custodian, will meet requirements of the general license for the Canonsburg, Pennsylvania, Disposal Site.

1.2 Legal and Regulatory Requirements

The Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978 (42 *U.S. Code* §7901), as amended, provides for the remediation and regulation of uranium mill tailings at uranium mill sites regulated under Title I and Title II of the act. Title I addresses former uranium mills that were unlicensed and essentially abandoned as of January 1, 1978. Title II addresses uranium mills that were under specific license on January 1, 1978. In both cases, the licensing agency is the U.S. Nuclear Regulatory Commission (NRC) or possibly, as allowed for in UMTRCA for Title II sites, an agreement state.

Federal regulations at Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27) provide for the licensing, custody, and long-term care of uranium mill tailings disposal sites remediated under Title I of UMTRCA. NRC issues a general license for the long-term custody and care of such sites. Long-term care includes institutional control, inspection, monitoring, maintenance, and other measures to ensure that the sites continue to protect public health, safety, and the environment after remediation is completed. The general license becomes effective when a site-specific LTSP receives NRC concurrence. The original LTSP for the Canonsburg Site (DOE 1995b) received NRC concurrence on January 16, 1996 (Appendix A).

This revision of the LTSP addresses the remedy for site groundwater and incorporates associated requirements. Documentation of NRC concurrence in this revision will be attached to this LTSP when it is produced for distribution. Requirements at 10 CFR 40.27 for the LTSP and for the long-term custody of the Canonsburg Site are listed in Table 1–1 in this revised LTSP.

Table 1–1. Requirements for the Long-Term Surveillance Plan and the Long-Term Surveillance and Maintenance of the Canonsburg, Pennsylvania, Disposal Site

Requirements for the LTSP		
No.	*Requirement*	*Revised LTSP*
1.	Final site conditions	Section 2.0
2.	Legal description of the site	Appendix B
3.	Long-Term Surveillance Program	Section 3.0
4.	Follow-up inspections	Section 3.4
5.	Maintenance and other actions	Section 3.5 & Appendix C
Requirements for Long-Term Custody		
No.	*Requirement*	*Revised LTSP*
1.	Changes to the LTSP	Section 3.1
3.	Permanent NRC Right-of-Entry	Section 3.1
3.	Notification of significant problems or actions	Section 3.6

The plans, procedures, and specifications in this revised LTSP are based on the guidance document, *Guidance for Implementing the Long-Term Surveillance Program for UMTRCA Title I and Title II Disposal Sites* (DOE 2001b). The guidance document and the current LTSP constitute the DOE operational plan for long-term custody of this site.

1.3 Role of the U.S. Department of Energy

In 1988, DOE designated the Grand Junction, Colorado, office to be the program office for the long-term surveillance and maintenance of all DOE remedial action project disposal sites, as well as other sites as assigned, and to be the common office for the surveillance, monitoring, maintenance, and institutional control of these sites. DOE established the Long-Term Surveillance and Maintenance Program at Grand Junction to carry out this responsibility.

In 2003, DOE established the Office of Legacy Management (LM), which assumed responsibility for all closed DOE sites, including the Canonsburg Site. The DOE office in Grand Junction, Colorado, is part of the DOE–LM organization. DOE–LM is responsible for the implementation and revision of the LTSP.

2.0 Final Site Conditions

2.1 Site History

The Canonsburg Site operated as a radium extraction plant by the Standard Chemical Company from 1911 to 1922. Vitro Corporation of America (Vitro) acquired the property in 1933 and processed ore to extract uranium, vanadium, and radium. From 1942 until 1957, Vitro was under contract to the federal government to recover uranium from ores, concentrates, and residues (waste). The residues were from various U.S. Atomic Energy Commission (AEC) installations and contractors (DOE 1983a).

During Vitro's tenure, solid wastes were stored in piles on site, and liquid wastes were discharged into lagoons in a former swamp (now designated Area C) through a drainage system underneath Strabane Avenue. A drainage ditch connected the swamp to Chartiers Creek.

In 1956, the Oak Ridge Operations Office of AEC approved removal of approximately 11,600 tons (dry weight) of waste materials ("unrecoverable materials—measured") to a railroad landfill in Burrell Township, near Blairsville, Pennsylvania. This removal was completed in 1957. Remediation of this landfill resulted in the creation of the Burrell, Pennsylvania, Disposal Site.

From 1957 to 1966, AEC licensed the site for the storage of remaining residues and waste materials. The real property was sold to industrial developers in 1962. Vitro retained title to the uranium-bearing residues and waste materials. In 1965, Vitro obtained a permit from the Commonwealth of Pennsylvania (State) to move the uranium-bearing materials to Area C. Once these materials were moved to Area C, they were covered with slag and clean fill. Vitro's license terminated after this action.

In 1966, a portion of the property was developed into the Canon Industrial Park by the Canon Development Company, which leased the property to tenant companies for light industrial use. The component properties were acquired by the State in 1982, pursuant to Section 104 of UMTRCA, in anticipation of remedial action by DOE. The State conveyed the disposal site portion of the acquired property to the U.S. Government after remedial action was completed and retained ownership of Area C. The State completed the sale of Area C to a private party in 2005, with DOE and NRC concurrence (Appendix B).

Remedial action by DOE began in 1983 and was completed with the closure of the disposal cell in December 1985. During the course of remedial action, contaminated materials were removed from 163 vicinity properties and disposed of on site. NRC included the site under the general license of 10 CFR 40.27 on January 16, 1996. On that date, the long-term surveillance and maintenance of the site became the responsibility of DOE. Now those activities are assigned to DOE–LM.

2.2 Area Description

The Canonsburg Site is within the Borough of Canonsburg, Washington County, in southwestern Pennsylvania, approximately 20 miles southwest of Pittsburgh (Figure 2–1).

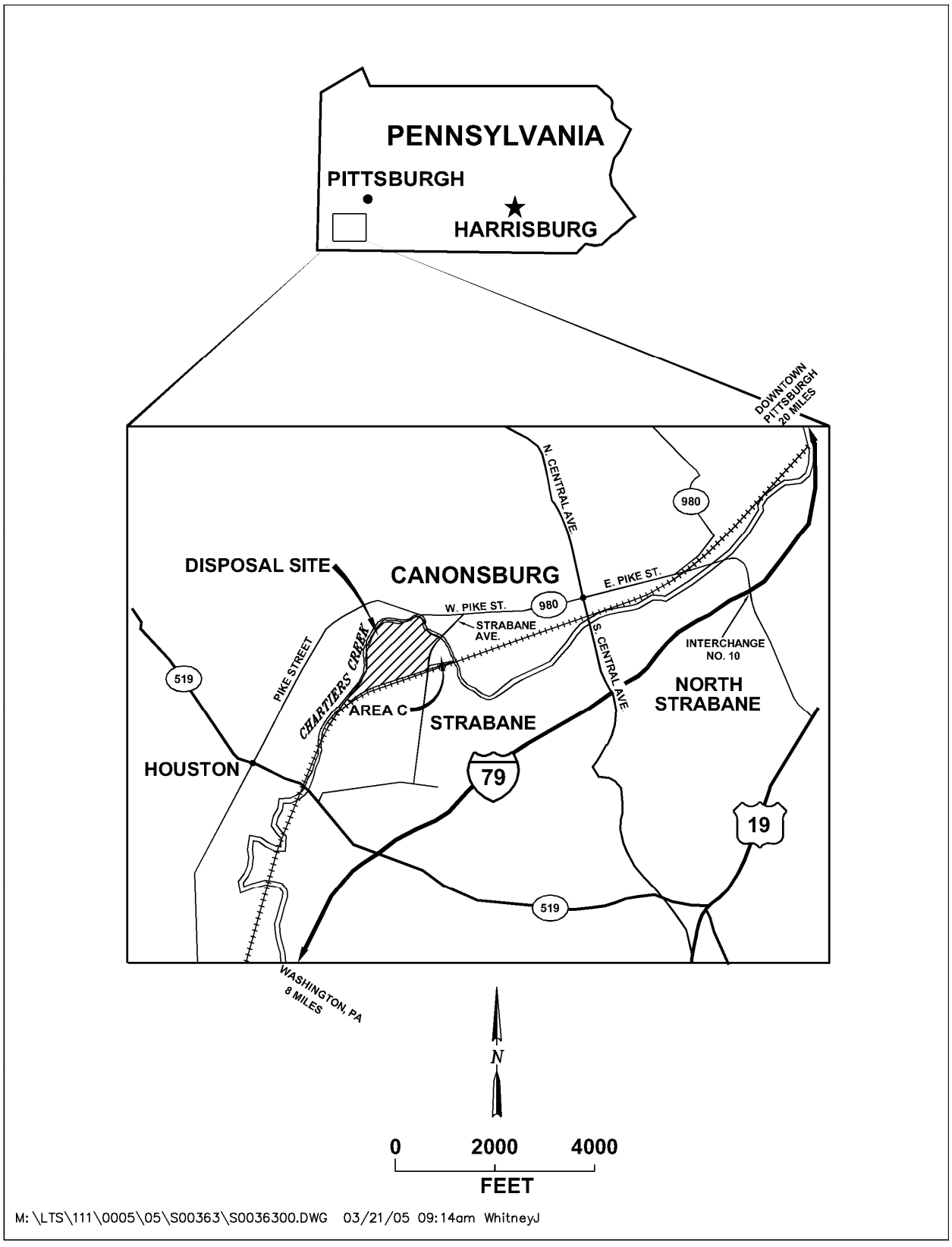

Figure 2–1. Location Map of the Canonsburg, Pennsylvania, Disposal Site

The site, on the south bank of Chartiers Creek, is irregular in shape. It is bounded on the north and west by Chartiers Creek. The north bank of the creek is commercially developed. On the east, the site is bounded by Strabane Avenue and Area C. The Pittsburgh and Ohio Central Railroad and, beyond, the residential community of Strabane border the site on the south. Residences in the Strabane community are as close as 250 feet (ft) to the disposal cell.

The climate is temperate and humid with distinct seasons. The site is far enough from the coast to be influenced more by continental than coastal weather patterns except for hurricane storm systems that occasionally move inland. Temperatures range from a maximum of 99 °F in summer to a minimum of −18 °F in winter. Average temperatures range from the 70s in summer to the upper 20s in winter. Precipitation averages 37 inches per year and is evenly distributed throughout the year. Winds are mainly westerly at moderate speeds.

2.3 Site Description

2.3.1 Legal Description

During remedial action, industrial and residential properties were acquired and combined to become the disposal site. The legal description of the site and a brief history of the acquisition of the various properties are provided in Appendix B. The site boundary is shown in Figure 2–2 and Figure B–1. As shown in both maps, the site boundary does not always extend to Chartiers Creek. Several small slivers of land are present just outside of the site boundary and Chartiers Creek. A small sliver of land is also present east of Former Area C between Former Area C and the creek. As of 2008, these small slivers of land are owned by the Canon Development Corporation.

2.3.2 Location

Directions to the site from Pittsburgh follow. See also Figure 2–1.

- Exit at Interchange No. 10 on Interstate 79, and turn north (right) into Canonsburg. Follow the signs to State Route 980.
- At the “T” intersection with a traffic light, turn left onto Morganza Road. At the second traffic light, turn left (west) onto Adams Avenue (State Route 980 South).
- Adams Avenue becomes East Pike Street.
- At Central Avenue, East Pike Street becomes West Pike Street. Continue south on West Pike Street.
- Turn left at the stop light at the intersection of Strabane Avenue and West Pike Street (look for a hospital sign).
- Cross the bridge over Chartiers Creek. The disposal site is the large, fenced space on the right. Area C is on the left.

2.3.3 Site Description

Disposal Site—The site comprises 34.2 acres. It is covered with grass except for several wooded areas that predate remedial action. Features described in this LTSP are shown in Figure 2–2.

Disposal Cell—The disposal cell occupies 6.8 acres in the eastern half of the site. It is roughly pentagonal in outline and approximately 700 ft across. The cell contains 266,000 wet tons of tailings (mill tailings, other residues, contaminated soil, and building debris). The amount of radioactivity within the disposal cell is 100 curies of radium-226.

The disposal cell is a surface impoundment about 28 ft thick at the center. The bottom, or "footprint," is about 8 ft below the previous surface of the ground. As built, the disposal cell appears as a knoll. The highest point, at the center, stands about 30 ft above surrounding grade. The disposal cell is completely covered with a grass vegetative cover (a mixture of grasses, weeds, and crown vetch).

The bottom of the disposal cell is lined with a 1-ft-thick layer of sand (capillary break layer) (Figure 2–3). The sand layer is overlain by a compacted clay layer 2 ft thick. The tailings are placed on the compacted clay layer.

The tailings are protected by an engineered cover. The cover is designed to (1) protect the disposal cell from erosion, (2) control the escape of radon to the atmosphere (radon flux), and (3) prevent or minimize infiltration of precipitation. Grass vegetative cover growth (mixture of grass, weeds, and crown vetch) on the disposal cell provides erosion protection and helps reduce moisture in the cover through evapotranspiration.

The cover top slope has a 3-percent grade to promote drainage. The side slopes are steeper at a 20-percent grade (one foot of vertical change to 5 ft of horizontal change). The change in slope between the top and sides is not distinct on most of the cell.

The cover consists of a compacted clay layer (radon barrier) that is 3 ft thick; a pit-run rock layer, for drainage, that is 1.5 ft thick; and a topsoil layer, to support the grass vegetative cover, that is 1 ft thick. The side slopes are similarly constructed except that the pit-run drainage layer is 2 ft thick for additional erosion protection. The median size of the rock (D_{50}) in the pit-run layer on top of the disposal cell is 6 inches. (D_{50} is a measure such that 50 percent of the rock by weight is of the indicated diameter size or larger. All rock sizes given in this LTSP are the D_{50} size.) The D_{50} of rock in the pit-run layer on the side slopes is 16 inches.

Drainage Structures—A rock-lined diversion ditch surrounds the disposal cell. This ditch intercepts runoff and conveys it to Chartiers Creek via two outflow channels. Another rock-lined channel, the perimeter drainage ditch, protects the railroad grade on the south and Strabane Avenue on the east from runoff and erosion. The D_{50} of the rock in the rock-lined diversion ditch is 16 inches. In the perimeter ditch, the D_{50} is 6 inches.

Vicinity Property Low Mound—A feature labeled "VP [vicinity property] low mound" on some early drawings (hereafter, VPLM), immediately northwest of the disposal cell contains 943 cubic yards of waste materials from vicinity properties. This material includes low-level-contaminated materials received too late for inclusion in the disposal cell. The VPLM is approximately 70 ft by 90 ft in plan and 2 to 3 ft deep. One ft of soil and well-established grass vegetative cover (grasses, weeds, and crown vetch) covers the VPLM disposal area. Despite the term "mound," the surface expression of the VPLM is only about 1 ft above surrounding grade. In 2006, a small amount of soil material from a stream bank stabilization project was placed between the cell and the VPLM.

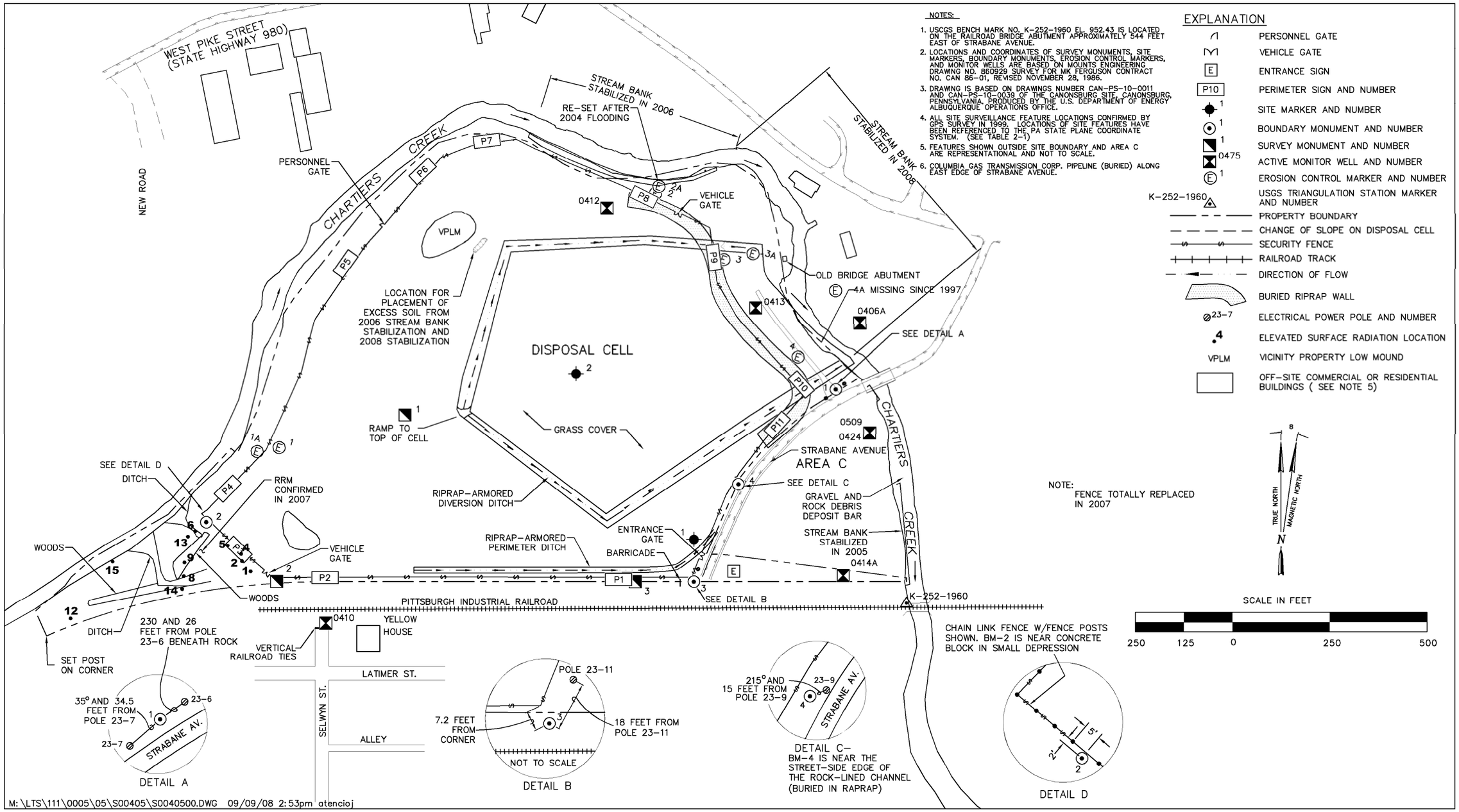

Figure 2–2. Canonsburg, Pennsylvania, Disposal Site

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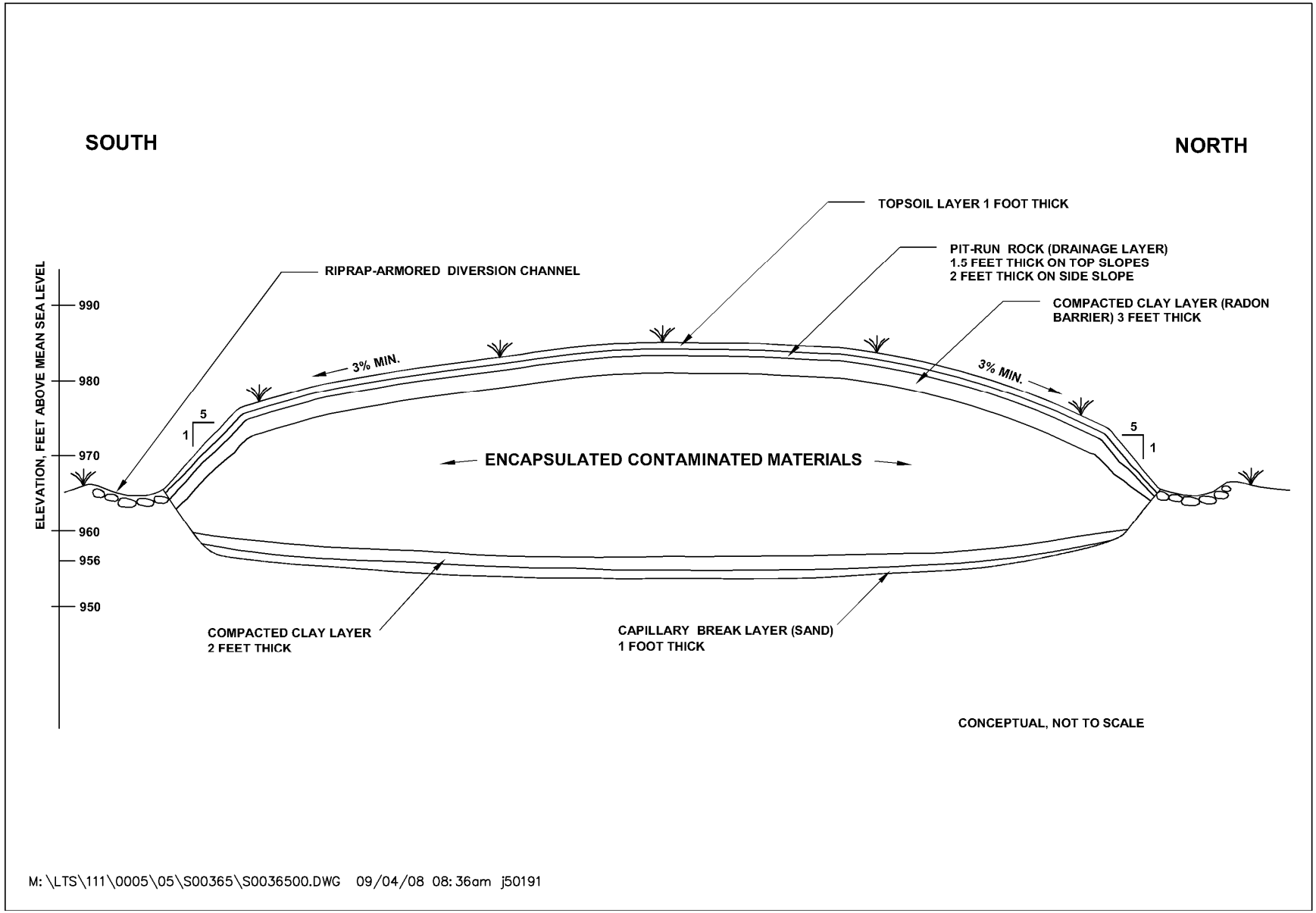

Figure 2–3. North–South Cross Section of the Canonsburg, Pennsylvania, Disposal Site

Flood Plane and Buried Riprap Wall—The site is on the south bank of Chartiers Creek. On the west and north, the site is protected from flooding by a high, stable, natural stream bank supported by undisturbed bedrock and mature hardwood forest. On the northeast, along the creek and between erosion control markers ECM−2 and ECM−2A (Section 2.3.5) and the Strabane Avenue bridge, the site is bordered by a narrow floodplain.

The east portion of the site along Chartiers Creek is within the 100-year floodplain and is subject to flooding during extreme (rare) storm events. To protect the disposal cell from erosion, a buried riprap wall was constructed between the disposal cell and the creek (Figure 2–4). This wall is approximately 850 ft long. It extends from upstream of ECM−2 and ECM−2A, downstream (southeast) to Strabane Avenue where it wraps around toward the southwest, parallel to Strabane Avenue.

The wall is constructed on a 2:1 slope along the northeast edge of the disposal cell (DOE 1983b and 2001a). The wall is 18 inches thick and constructed of rock with a D_{50} of 12 inches. The toe of the wall is keyed into bedrock to a depth of 1 ft. The wall is covered with clean fill except where it bends toward the southwest, where it is covered by rock in the outflow channel and the perimeter drainage ditch that parallels Strabane Avenue.

On the basis of estimates from the Federal Emergency Management Agency (FEMA), the maximum water elevation for a 500-year flood is 954 ft above mean sea level (msl), and for a 100-year flood, 950 ft msl (DOE 1983b). Calculations by DOE for the probable maximum precipitation (PMP) event and the 1,000-year flood are 973 ft msl and 955 ft msl, respectively (DOE 1983b). (The PMP is a theoretically "worst possible" storm event of extremely low probability.)

Under PMP conditions, water may overtop the high bank west of the disposal cell and VPLM, but the shallow depth and low velocity of the water are considered insufficient to threaten either feature, both of which are protected by well-established turf and, in the case of the disposal cell itself, an engineered cover designed to prevent erosion from overland flows. Flooding from a 1,000-year storm event would only reach an elevation of 955 ft msl, 13 ft below the VPLM at its deepest point. The risk of flood damage to the VPLM disposal area, including the possibility that flood water could erode and expose buried materials, is therefore not credible.

Stream Bank—In 2006, stream bank stabilization work was conducted in the area between perimeter signs P7 and P8. The work was conducted under a grant from the Commonwealth of Pennsylvania. Additional stream bank stabilization work, between perimeter sign P8 and the Strabane Avenue Bridge, was conducted in 2008. The stream bank stabilization work was sponsored by the Borough of Canonsburg and funded by DOE. It consisted of cutting back the slope of the bank and armoring the toe with riprap keyed into bedrock. Above the riprap, the slope is protected by stabilization matting and live fascines.

Area C—Area C, a parcel of 3.1 acres, was acquired by the State prior to remedial action. Area C was not required for the disposal system and, therefore, was not included within the final disposal site boundary.

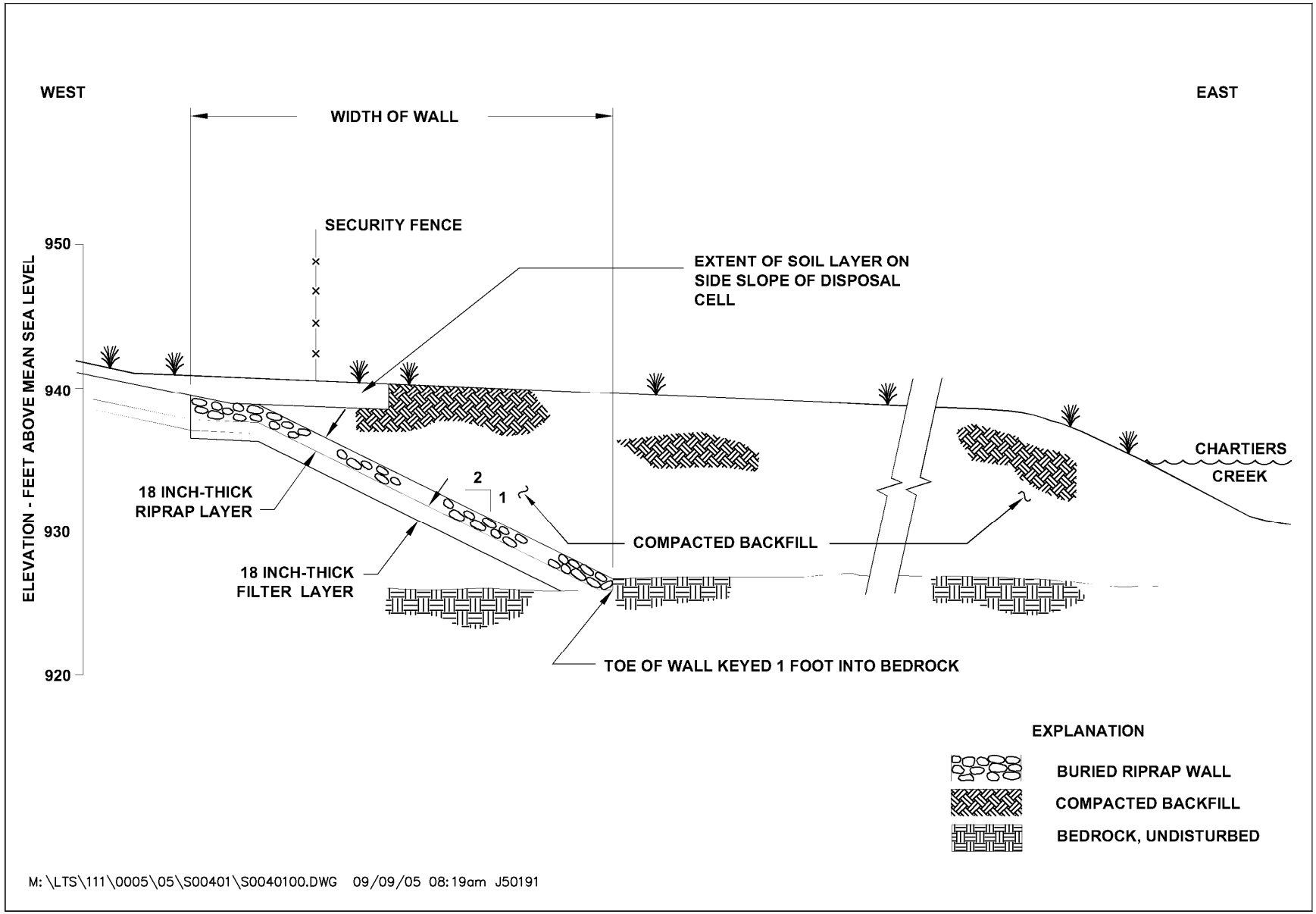

Figure 2–4. East–West Cross Section Through Buried Riprap Wall, Canonsburg, Pennsylvania, Disposal Site

Residual contamination in Area C consists of decreasing concentrations of uranium in groundwater (Section 2.4.4) and two thorium-230 (Th-230) anomalies that were discovered during remedial action verification beneath clean fill at depths of 6 to 8 ft. Ingrowth from thorium was not a consideration when the Canonsburg Site was being remediated, so the thorium anomalies were left in place (Figure 3–2). However, within 1,000 years, radium-226 ingrowth will result in concentrations that slightly exceed the standard in 40 CFR 192 within 1,000 years.

The State sold this parcel to a private party. Perpetual deed restrictions apply as a condition of the sale (Section 2.3.4 and Appendix B).

Small parcel of land adjacent to the southwest boundary of the disposal cell—In 2007, a radiological survey was conducted on this small parcel of land to evaluate the potential for releasing it for industrial reuse (DeNuke 2008). The survey identified isolated radium-226 contamination in soil, in excess of established average criterion for the property. The largest areas of contamination were approximately 60 square feet in area, and radium-226 concentrations ranged as high as 173 picocuries per gram (pCi/g)at some locations. Three of the areas contained radium-226 concentrations that exceeded the criteria for individual deposits of elevated activity. Contamination was primarily in the upper 12 inches of soil; however, contamination above the criterion was present to a depth of at least 2.5 ft at five of the locations. Under current property usage, these radiological conditions do not pose a level of risk to personnel that are sufficient to require corrective measures. Due to the isolated areas of radium-226 contamination, the entire parcel of property does not satisfy established radiological criteria for release for beneficial reuse. The removal of an estimated 30 to 35 cubic yards of soil from the areas of major contamination, and a resurvey of the remediated areas, would be required for the property to be released for industrial reuse. The decision was made to take no action and to remove this small parcel as a candidate for reuse. Two key factors were considered when concluding that this is the best course of action. First, the current land usage and the levels of contamination do not pose a threat to human or the environmental threat. Second, the parcel of land has railroad tracks running along side the southern edge of the property and Chartiers Creek runs along side the northern edge, rendering the parcel “landlocked” in the eyes of any potential buyers (other than the railroad). DOE will retain ownership of this parcel of land and will control land use. Inspectors will look for evidence of trespassing.

2.3.4 Institutional Controls

Disposal Site—Institutional controls at the disposal site consist of federal ownership of the property. This is backed up with physical access controls (warning signs and a chain-link security fence).

Area C—In accordance with UMTRCA Section 104(e), the State concluded the sale of Area C to a private party. Prior to the sale, NRC concurred that institutional control to restrict groundwater use beneath Area C was no longer required (NRC 2003; see the memorandum in Appendix B). (NRC, however, requested that DOE continue to monitor groundwater and surface water associated with Area C to account for the uncertainty in the groundwater modeling [Section 3.7.1]).

Deed restrictions, summarized below, are a condition of sale and apply to the present owner, and all future owners, of the parcel known as Area C. These restrictions were recorded in the Records of the County of Washington, Pennsylvania.

1. If a structure is to be built, the owner shall not excavate deeper than 4 ft. Excavations for utilities shall not exceed 6 ft. This is to prevent exposure of thorium anomalies, which are at depths greater than 6 ft. Exceptions to this restriction require written approval from both DOE and the Pennsylvania Department of Environmental Protection (PDEP).
2. Use of groundwater is not restricted.
3. The owner shall grant DOE access to one monitor well (MW−0424) and one surface water sampling location along Chartiers Creek on the east side of Area C.
4. The owner may not develop or use Area C for residential purposes.
5. The owner is advised to monitor structures for indoor radon levels.
6. The owner shall not compromise the integrity of the stream bank along Chartiers Creek.
7. The owner shall allow access for stream bank maintenance easement.
8. These restrictions shall endure in perpetuity. Except for Restriction 3, these restrictions may be removed by consensus decision of both DOE and PDEP. DOE may remove Restriction 3 without PDEP consensus.

Areas Sold in the Future—Any other area sold at some time in the future will include appropriate deed restrictions and inspection criteria similar to that of Area C. As of September 2008, DOE is working with NRC to sell Track 117-E (also known as the East Property).

The full text of the deed restrictions is in Appendix B.

2.3.5 Specific Site Surveillance Features

Features described in this section are shown in Figure 2–2. Specifications for the construction of most of these features are in the guidance document (DOE 2001b). Coordinates for boundary monuments (BMs), survey monuments (SMs), and site markers (SMKs) are established to second-order standards and were confirmed by global positioning system in 1999 (Table 2–1).

Security Fence—Most of the Canonsburg Disposal Site is enclosed by 7-ft-high chain-link fence (Figure 2–2). The previous 6-ft-high chain-link fence topped with three strands of barbed wire was replaced in 2007. The new fence was realigned along a portion of the west side of the site by moving it back from the steep slope that drops down to Chartiers Creek. The fence is considered to be the de facto erosion control marker (ECM). There are three large vehicle gates in this fence: an entrance gate at the southeast corner of the site along Strabane Avenue, a vehicle access gate at the southwest corner, and a vehicle access gate north of the disposal cell between perimeter signs P8 and P9. There is also a personnel access gate northwest of the disposal cell between perimeter signs P5 and P6. All gates are secured by padlocks.

Two extensions of the site, one at the southwest corner and the other across Strabane Avenue at the southern end of Area C, are unfenced (Figure 2–2).

Along the upstream reach of the creek, the fence is at the top of the high bank above the creek. As explained in Section 2.3.3, the slope that descends to the creek, although steep, is wooded with mature trees and underlain by stable bedrock. Erosion or slumping along this bank that could destabilize the fence will be easily recognized by inspectors and may, depending on severity, constitute an action level for maintenance (Section 3.6.1).

Table 2–1. Location of Monuments, Markers, and Monitor Wells at the Canonsburg, Pennsylvania, Disposal Site

Locations of Monuments, Markers, and Wells— Site Construction Grid		
Survey Monuments		
SM−1	N 10319.98	E 10090.07
SM−2	N 9891.20	E 9760.39
SM−3	N 9890.40	E 10682.67
Boundary Monuments		
BM−1	N 10385.38	E 11197.87
BM−2	N 10043.42	E 9579.83
BM−3	N 9890.05	E 10833.33
BM−4	N 10140.95	E 10948.08
Site Marker		
SMK−1	N 9999.10	E 10833.44
SMK−2	N 10426.44	E 10529.88
Erosion Control Marker		
ECM−1	N 10199.73	E 9810.11
ECM−1A	N 10225.24	E 9710.07
ECM−2	N 10890.30	E 10735.17
ECM−2A	N 10919.92	E 10739.93
ECM−3	N 10720.09	E 10910.04
ECM−3A	N 10734.94	E 10984.88
ECM−4	N 10470.09	E 11099.86
ECM−4A[a]	N 10514.93	E 11144.86
Active Monitor Wells		
0412	N 10852.96	E 10609.73
0413	N 10595.25	E 10992.32
0424	N 10273.31	E 11284.79
0414B	N 9905.72	E 11217.43
0406A	N 10556.79	E 11256.55

Locations of Monuments, Markers, and Wells— Pennsylvania South Zone State Plane Coordinates		
Survey Monuments		
SM−1	N 345348.78	E 1315889.53
SM−2	N 344840.58	E 1315704.38
SM−3	N 345117.74	E 1316584.03
Boundary Monuments		
BM−1	N 345744.96	E 1316926.14
BM−2	N 344931.32	E 1315486.35
BM−3	N 345162.81	E 1316727.80
BM−4	N 345436.63	E 1316761.61
Site Marker		
SMK−1	N 345266.82	E 1316695.05
SMK−2	N 345582.82	E 1316276.83
Erosion Control Marker		
ECM−1	N 345149.76	E 1315658.82
ECM−1A	N 345143.93	E 1315555.75
ECM−2	N 346086.98	E 1316332.79
ECM−2A	N 346116.66	E 1316328.40
ECM−3	N 345977.38	E 1316550.82
ECM−3A	N 346014.09	E 1316617.71
ECM−4	N 345796.20	E 1316807.15
ECM−4A	N 345852.52	E 1316836.56
Active Monitor Wells		
0412	N 346013.57	E 1316224.43
0413	N 345883.13	E 1316666.90
0424	N 345664.29	E 1317042.79
0414B	N 345293.49	E 1317089.33
0406A	N 345927.84	E 1316931.23

[a]As built (Section 2.3.5). Monument lost to slumping in 1997.

Boundary Monuments—There are four permanent boundary monuments (BMs). All are on the property line. BM−1, BM−3, and BM−4 are on the east side of the site near Strabane Avenue; BM−2 is at the west end of the site. Finding aids, in the form of details with measurements, are included in Figure 2–2.

Survey Monuments—There are three permanent survey monument (SMs). SM−1 is on high ground just west of the disposal cell. SM−2 and SM−3 are along the southern boundary of the site.

SMs, BMs, and ECMs (below) are anchored in concrete 1 to 1.5 ft below the frost line. The frost line is approximately 4 to 4.5 ft deep.

Site Markers—Site markers (SMKs) are unpolished granite monuments. SMK−1 is inside the entrance gate at the southeast corner of the site. SMK−2 is at the highest point on the disposal cell. The markers are inscribed with a diagram to show the site boundary and location of the disposal cell inside the site boundary, the date of closure (December 1985), the wet tonnage of tailings (266,000 wet tons), and the level of radioactivity (100 curies of radium-226).

Signs—Eleven perimeter (warning) signs are mounted on the security fence around the site. The signs are metal or plastic, approximately 24 inches wide and 18 inches high. Perimeter signs identify the site as a uranium mill tailings repository, state that the site is U.S. Government property, and state that no trespassing allowed. The international symbol for radioactive materials (trefoil) on the signs warns of the potential hazard, although there is no hazard as long as the engineered cover over the tailings remains intact and disposal site groundwater is not used.

An entrance sign is posted on the entrance gate. This sign provides the same information as the perimeter signs and also has the site name and a 24-hour telephone number in case of emergencies or inquiry (Section 3.4.1).

Erosion Control Markers—Four pairs of erosion control markers (ECMs) were installed along the bank of Chartiers Creek. Damage to any of the markers serves as a trigger for potential follow-up action (see Section 3.6.1).

The first pair (ECM−1 and ECM−1A) is on the edge of the high bank above the creek at the west end of the site. The other three pairs (ECM−2 and ECM−2A, ECM−3 and ECM−3A, and ECM−4 and ECM−4A) are installed along the downstream reach of the creek where the high bank flattens and widens into a narrow floodplain along the edge of the creek north and northeast of the disposal cell. In 1997, inspectors noted the loss of ECM−4A. Erosion at ECM−4A was localized, and more than 80 ft from the buried riprap wall that protects the disposal cell and VPLM.

Each ECM is a Berntsen A−1 monument. The monuments are 5 ft in length and set in the ground so that the bottom of the monument is below the frost line. Only about 1 ft of the monument is exposed above the surface. The innermost ECM in each pair north and northeast of the disposal cell (ECM−2, ECM−3, and ECM−4), is on or near the outer edge of the buried riprap wall that lies between the creek and the disposal cell (Section 2.3.3).

When one of the outer markers in an ECM pair is lost to erosion, as occurred with ECM−4A in 1997, DOE will note this event in its annual report to NRC (Section 3.3.5) and in the inspection checklist for the next annual inspection (Section 3.3.3). It if becomes apparent that the second or innermost ECM in the pair is threatened by erosion, this may constitute an action level for evaluation, intervention, or maintenance by DOE (Section 3.6.1).

Monitor Wells—There are six monitor wells remaining at the Canonsburg Site (Figure 2–2). Other wells, installed during remedial action, have been decommissioned.

Two wells (MW−0412 and MW−0413) are on site and downgradient from the disposal cell. Two other wells (MW−0414B and MW−0424) are across Strabane Avenue in or near Area C. A fifth well (MW−0406A) is across Chartiers Creek to the northeast. The sixth well (MW−0410) is a background well south of the railroad tracks.

2.4 Groundwater and Surface Water

2.4.1 Geology

The uppermost aquifer beneath the Canonsburg Site consists of unconsolidated materials overlying bedrock of the Pennsylvanian Casselman Formation. The unconsolidated materials are composed of sandy loam, silty clay, clay, alluvium, and fill material as much as 30 ft thick. The fill consists of cinders, stones, and building rubble. These materials are heterogeneous and do not form discrete, continuous units. The permeability is variable because of the types and placement of the materials.

The underlying bedrock of the Casselman Formation is composed of gray and black carbonaceous shales, sandy shales with thin coal seams, and calcareous shales (DOE 1983a). Some resistant sandstone is present in the shallow subsurface beneath the site, as evidenced by exposures in the stream bank north and northwest of the site. The sandstone is nearly flat-lying, is jointed, and has well-defined bedding planes. The upper part of the Casselman Formation is weathered and jointed.

2.4.2 Groundwater

Groundwater is present in the interconnected unconsolidated materials and shallow bedrock (uppermost aquifer) under unconfined to semi-confined conditions. The unconsolidated materials and shallow bedrock are hydrologically connected. Because of the heterogeneity of the unconsolidated materials, hydraulic interconnection from place to place is variable, and water may perch on clay layers. Saturated thickness is approximately 10 ft, but variable.

Gradient in the unconsolidated materials is toward Chartiers Creek, the normal discharge zone for the shallow groundwater (Figure 2–5). Flow in the shallow bedrock is downward and then through zones of secondary porosity along joints, fractures, and bedding planes. A low-permeability rock formation separates groundwater in the shallow bedrock from higher-quality water in deeper aquifers.

Although some groundwater is present in the unconsolidated materials and shallow bedrock beneath the site, neither unit is considered a viable aquifer from a water resource perspective, but only in the sense that 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 the source of recharge to the shallow units is minimal, sustained yield to a well from these units would be limited. Shallow groundwater is not normally used as a drinking water supply in the area, although some domestic water is derived from a few private wells deeper than 100 ft.

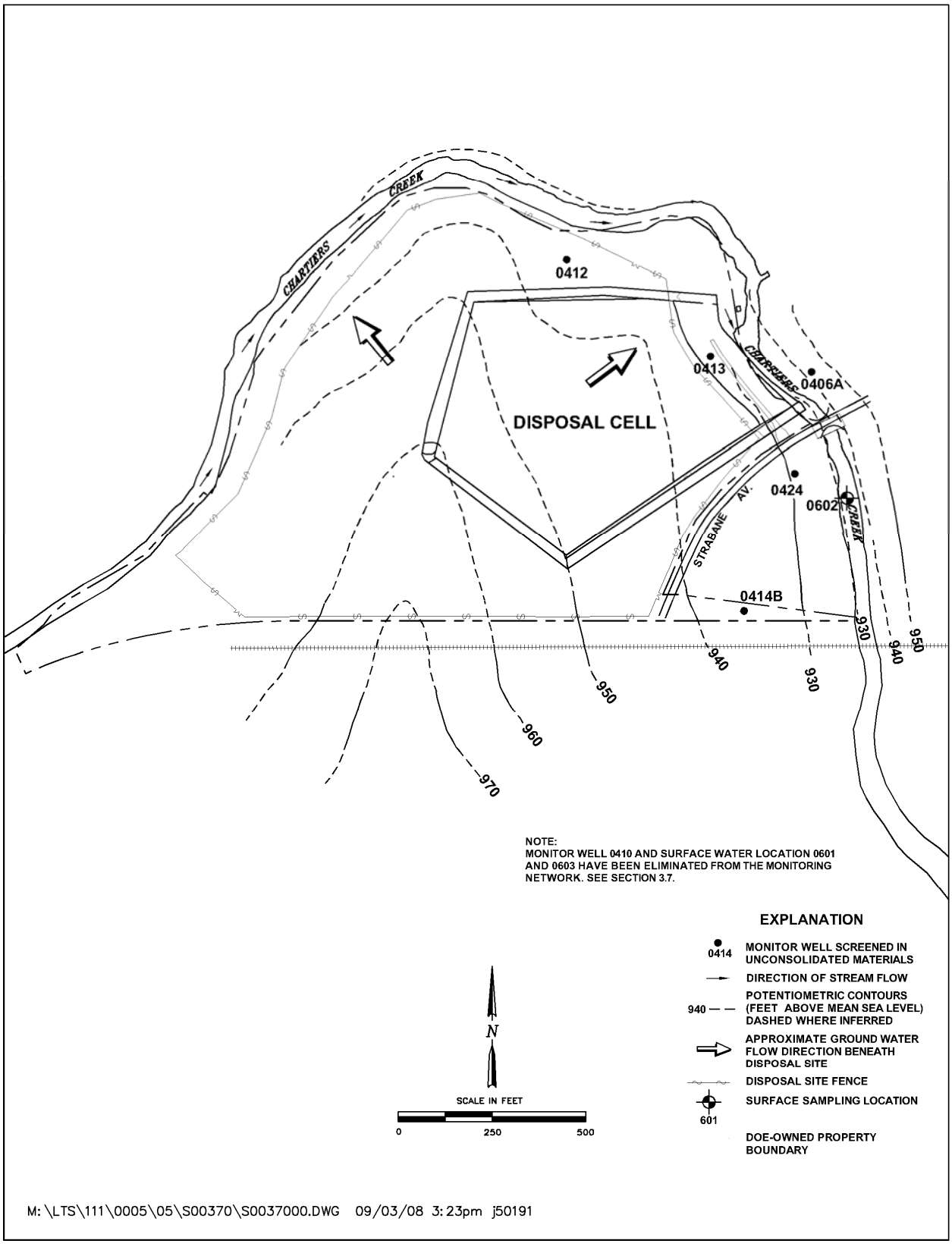

Figure 2–5. Potentiometric Surface, Monitor Wells, and Surface Water Sampling Locations, Canonsburg Disposal Site

2.4.3 Surface Water

Chartiers Creek is a partially incised, meandering stream. Its course in the vicinity of the Canonsburg Disposal Site is altered by clearing and fill associated with commercial development and by flood control projects completed by the U.S. Army Corps of Engineers. At normal (low-water) stage, the creek is approximately 15 to 20 ft wide and 2 to 3 ft deep. The catchment (upstream drainage basin) is approximately 80 square miles. Chartiers Creek is a tributary to the Ohio River 15 miles downstream of the disposal site.

The creek is not a source of potable water. 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.

Several stream bank stabilization projects have been conducted along Chartiers Creek. The most recent project took place in the summer of 2008 and was located just northwest of the Strabane Avenue Bridge. The work consisted of cutting back the slope of the bank and armoring the toe with riprap keyed into bedrock. Above the riprap, the slope is protected by stabilization matting and live fascines.

2.4.4 Water Quality

Water quality at the Canonsburg Site, both before and immediately following remedial action, is described in the Baseline Risk Assessment (DOE 1995a) and the original LTSP (DOE 1995b). DOE began monitoring surface water and groundwater in 1986. Groundwater and surface water samples have been analyzed for three specific analytes considered in the baseline risk assessment as risk drivers and key constituents for monitoring trends in water quality and demonstrating compliance with the groundwater protection standards (uranium, molybdenum, and manganese) along with standard water quality indicators (calcium, chloride, magnesium, potassium, sodium, and sulfate). Reference standards used as benchmarks for uranium and molybdenum are the maximum concentration limits (MCLs) established in 40 CFR 192. A risk-based concentration (RBC) has been established for manganese based on U.S. Environmental Protection Agency (EPA) documentation (Table 2–2).

Table 2–2. Reference Standards for Groundwater and Surface Water Monitoring at the Canonsburg, Pennsylvania, Disposal Site

Analyte	Standard/MCL	ACL	Standard Source
Uranium – groundwater	0.044 mg/L	1.0 mg/L	40 CFR 192 – MCL
Uranium – surface water	0.044 mg/L	0.01 mg/L	40 CFR 192 – MCL
Molybdenum	0.1 mg/L	--	40 CFR 192 – MCL
Manganese	1.7 mg/L	--	Risk-based concentration (EPA)

Monitoring results indicate that some site-related contamination is present in groundwater in the uppermost aquifer both downgradient from the disposal cell and adjacent to Chartiers Creek. Uranium is the only constituent of potential concern that exceeds the MCL in groundwater. Data since monitoring began indicate that concentrations of other constituents in groundwater remain relatively stable.

Since remedial action, residual contamination in the shallow, saturated, unconsolidated materials has presumably continued to migrate and discharge into Chartiers Creek. Elevated levels of uranium, manganese, molybdenum, selenium, and other constituents have been identified in the groundwater.

An assessment of water quality results for the three specific analytes from 1995 (date of predecessor LTSP) through 2007 is provided below. Overall there is no unacceptable risk to human health and the environment based on concentrations of these specific analytes in groundwater and surface water, and levels are below the respective standards and limits.

Uranium—Concentrations of uranium in groundwater in the uppermost aquifer beneath the site remain above the MCL, but below the alternate concentration limit (ACL), at the point-of-compliance (POC) wells adjacent to the disposal cell (Figure 2–6). Spatial distribution of uranium in groundwater in the unconsolidated materials is variable, and no well-defined plumes are apparent. This is a result of the heterogeneous nature of the uppermost aquifer materials, the amount of recharge (primarily precipitation), and the variable groundwater flow direction in the unconsolidated materials. In general, the geochemistry of groundwater beneath the site is favorable for the mobilization of uranium.

Concentrations of uranium in groundwater in POC wells 0412 and 0413, adjacent to disposal cell, are still above the MCL of 0.044 milligrams per liter (mg/L), but are considerably lower than the ACL of 1.0 mg/L. Although uranium concentrations have fluctuated since 1995, they have remained close to the range historically observed at the site (Figure 2–6). Background (upgradient) levels in groundwater in monitor well 0410 have been consistently at or below the laboratory detection limit (approximately 0.001 mg/L). Concentrations of uranium in groundwater in monitor well 0414B, in Area C, have decreased below the MCL. Concentrations in monitor well 0406A, across Chartiers Creek, are also very low.

Uranium has been at or below the laboratory detection limit in surface water in Chartiers Creek at all three sampling locations since 1995.

Molybdenum—Concentrations of molybdenum in groundwater near the site are typically very low and have been at or near the laboratory detection limit since 1995.

Concentrations of molybdenum in surface water in Chartiers Creek exceeded the MCL in 1998; the highest concentration (0.119 mg/L) was at former upstream sampling location 0601. In 2007, concentrations in surface water samples ranged from 0.087 to 0.090 mg/L. The value at the upstream sampling location was 0.090 mg/L. Because concentrations are higher in the creek than in groundwater at the site, elevated molybdenum levels in surface water samples appear to derive from upstream sources and not from site-related activities.

Manganese—Elevated concentrations of manganese are present at MW−0412 just north of the disposal cell. High concentrations are also present at other monitor wells, including former background monitor well MW−0410. Elevated concentrations well above the secondary standard in the background well indicate that manganese is probably a naturally occurring constituent near the disposal site and not exclusively related to processing activities at the former mill site. Elevated concentrations of manganese in groundwater appear to be widespread and are probably related to the continental sedimentary rocks (including the underlying Casselman Formation) and the associated coal beds these rocks contain (DOE 1998).

Concentrations of manganese in surface water are significantly below the RBC of 1.7 mg/L and are within the range of ecological benchmarks for aquatic biota (as high as 1.27 mg/L; Suter and Tsao 1996). Manganese from the vicinity of monitor well 0412, potentially discharging to Chartiers Creek, has not impacted surface water and does not present a risk to human health and the environment. Concentrations of manganese in Chartiers Creek are similar at sampling locations upstream, adjacent to, and downstream of the site. Much of the manganese in the creek is probably naturally occurring and related to coal deposits in the area. Manganese is often present in streams receiving drainage from coal mines in concentrations in excess of 1 mg/L (Hem 1985).

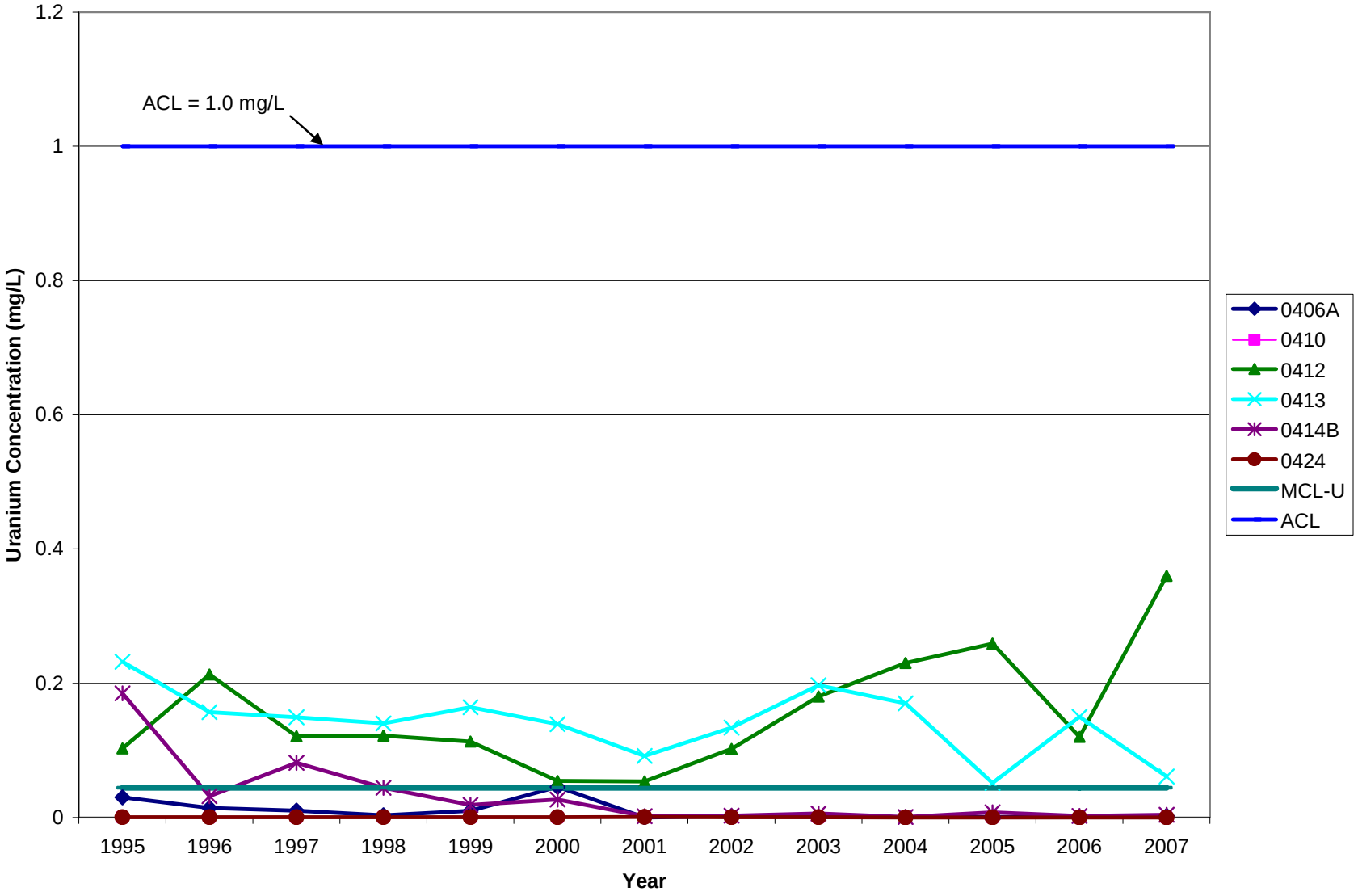

Figure 2–6. Uranium Concentration Trends in Groundwater at the Canonsburg, Pennsylvania, Disposal Site, 1995−2007

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3.0 Long-Term Surveillance Program

3.1 General License for Long-Term Custody

With NRC concurrence in the original LTSP (Appendix A), the Canonsburg Site was included under the general license for long-term custody for UMTRCA Title I sites (10 CFR 40.27).

Although sites remediated under UMTRCA are designed and constructed to last "for up to 1,000 years, to the extent reasonably achievable, and, in any case, for at least 200 years" [(40 CFR 192, Subpart A, 192.02(a)], there is no termination of the general license for DOE's long-term custody of these sites [10 CFR 40.27(b)].

An LTSP is a requirement of the general license. When DOE determines that revision of the LTSP is necessary, DOE will notify NRC. Changes to the LTSP may not conflict with the requirements of the general license (Section 3.2).

In addition, DOE must guarantee NRC permanent right-of-entry to the site so that NRC may conduct site inspections. The Canonsburg Site abuts Strabane Avenue, a public right-of-way.

3.2 Requirements of the General License

Requirements of the general license are at 10 CFR 40.27 and 10 CFR 40, Appendix A, Criterion 12. The requirements of the general license and the sections in this LTSP where each requirement is addressed are listed in Table 3–1.

Table 3–1. Requirements of the General License and DOE Implementation

Requirement	This Revised LTSP
1. Annual site inspection	Section 3.3
2. Annual inspection report	Section 3.3.5
3. Follow-up inspections and follow-up inspection reports, as necessary	Section 3.4
4. Site maintenance, as necessary	Section 3.5
5. Emergency measures in the event of catastrophe	Section 3.6
6. Environmental monitoring, if required	Section 3.7

3.3 Annual Site Inspection

3.3.1 Frequency of Inspection

At a minimum, sites must be inspected annually to confirm the integrity of visible features and to determine the need, if any, for maintenance, additional inspections, or monitoring (10 CFR 40, Appendix A, Criterion 12).

DOE will inspect the Canonsburg Site once each calendar year. The date of the inspection may vary from year to year, but DOE will endeavor to inspect the site once every 12 months unless circumstances warrant variance. The variance will be explained in the inspection report. DOE will notify NRC of the annual inspection at least 30 days in advance of the annual inspection.

3.3.2 Inspection Procedure

To ensure a thorough and uniform inspection, the site is divided into areas called transects. Transects for the inspection of the Canonsburg Site are listed in Table 3–2 and shown on Figure 3–1.

Table 3–2. Transects Used during Inspection of the Canonsburg, Pennsylvania, Disposal Site

Transect	Description
Disposal cell	Surface of the disposal cell. Grass-covered (grasses, weeds, and crown vetch).
Area adjacent to the disposal cell	Grass-covered and partially wooded area between the disposal cell and the security fence.
Diversion channels and perimeter ditch	Rock-armored channels that divert runoff to prevent erosion. Includes outflow areas at the mouth of the channels.
Site perimeter and security fence	Area between the security fence and the site boundary, including the security fence, boundary and survey monuments, entrance and perimeter warning signs.
Outlying areas	Area within 0.25 mile of the site boundary, including the former Area C and the stream bank of Chartiers Creek.

Each transect is visually inspected during a walk-over. Within each transect, inspectors examine specific site surveillance features, such as monitor wells, survey, and boundary monuments, signs, site markers, and erosion control markers. These features are listed on the "Site Inspection Checklist" (Section 3.3.3 and Appendix C).

Inspectors also examine each transect for the success of previous maintenance and for erosion, settling, slumping, plant or animal encroachment, human intrusion or vandalism, and other activity or phenomenon that might affect the safety, integrity, long-term performance, or institutional control of the site.

Inspectors may use photographs to support or supplement written observations.

Inspectors will note changes within 0.25 mile of the site. Changes in the outlying area that might be significant include new development, changes in land use, improvements or adjustments along the railroad right-of-way, and changes along the bank of the creek upstream, downstream, and adjacent to the site.

When inspecting the outlying area transect, inspectors will note development within former Area C and any area sold in the future, and will evaluate the owner's compliance with deed restrictions (Sections 2.3.4 and 3.8).

3.3.3 Inspection Checklist and Map

Inspectors are briefed, and the inspection checklist is reviewed before the annual inspection. A sample checklist is provided in Appendix C. The checklist includes;

- Specific site surveillance features to be inspected,
- Routine observations to be made, and
- Special issues or problems to be evaluated.

The checklist is reviewed annually and revised as necessary to reflect changing site conditions.

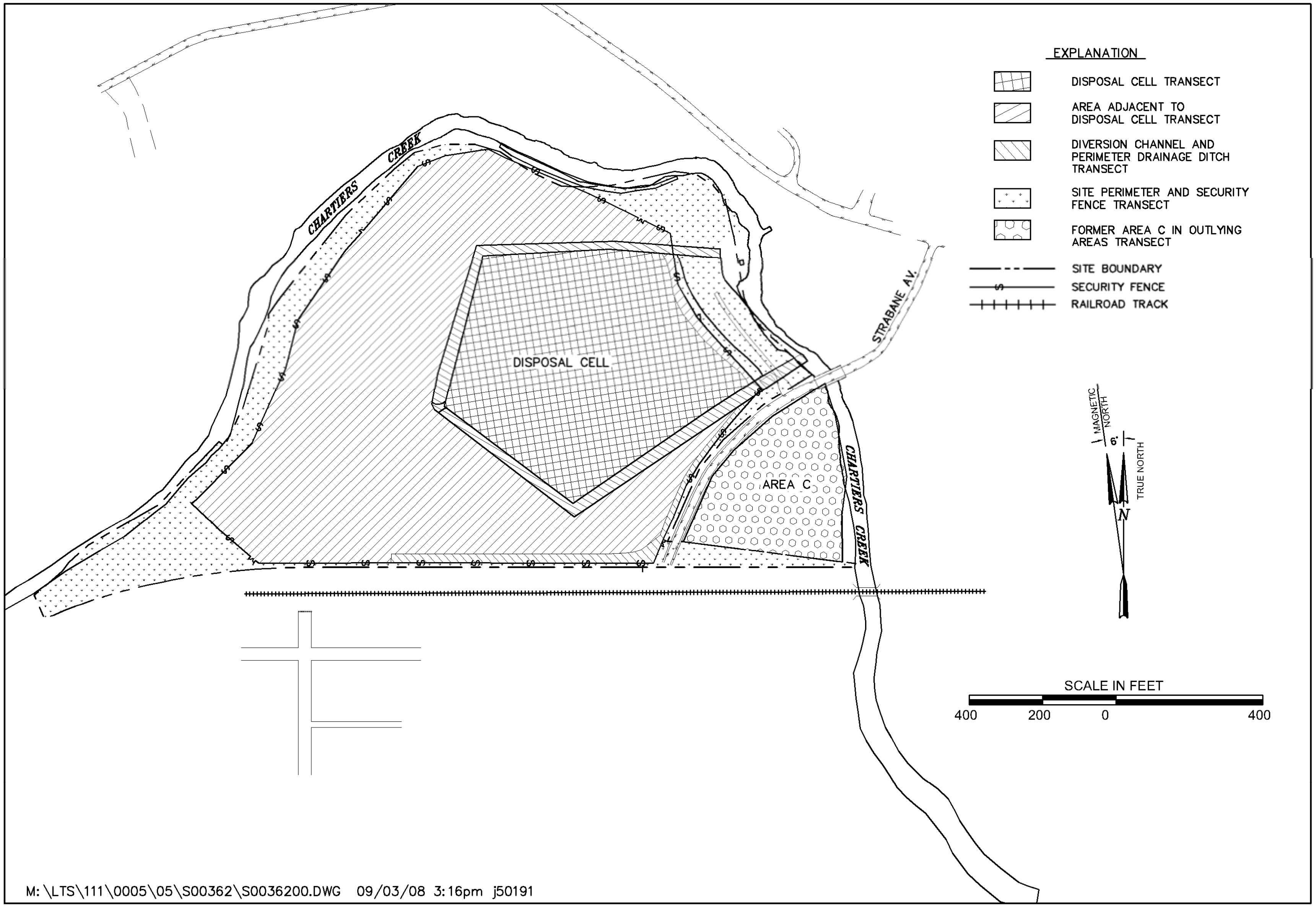

Figure 3–1. Canonsburg, Pennsylvania, Disposal Site, Inspection Transects

Inspectors also will carry site inspection maps. The base map, represented by Figure 2–2, will be annotated to reflect recent observations, issues, and photograph locations. Inspectors will annotate the map, sign and date it, and submit it to the inspection case file. Map information will be processed for inclusion in the inspection report and will constitute the basis for the following year's inspection map.

3.3.4 Personnel

Typically, two inspectors will perform annual inspections. Inspectors will be experienced engineers or scientists who have the required knowledge, skills, and abilities to evaluate site conditions and recognize imminent or actual problems.

Inspectors will be assigned for a given inspection of the Canonsburg site on the basis of the site conditions and inspector expertise. Areas of expertise include civil, geotechnical, and geological engineering; geology, hydrology, biology, and environmental science (e.g., ecology, soils, or range management). If conditions warrant, more than two inspectors may be assigned to the inspection to evaluate serious or unusual problems and make appropriate recommendations.

3.3.5 Annual Inspection Report

Results of the annual inspection will be reported to NRC within 90 days of the last UMTRCA Title I site inspection in the calendar year (10 CFR 40, Appendix A, Criterion 12). In the event that the report cannot be submitted in accordance with 10 CFR 40, DOE will notify NRC. Annual reports are available to the public and other agencies.

3.4 Follow-Up Inspections

Follow-up inspections are in response to significantly new or changed conditions at the site.

3.4.1 Criteria for Follow-Up Inspections

Requirements for the establishment of criteria for follow-up inspections are at 10 CFR 40.27(b)(4). DOE will conduct a follow-up inspection when:

- A condition is identified during the annual inspection (or other site visit) that requires personnel, perhaps with special expertise, to return to the site to evaluate the condition, or
- DOE is notified by a citizen or outside agency that conditions at the site are substantially changed.

DOE may request the assistance of local agencies to confirm the seriousness of a condition before conducting a follow-up inspection or emergency response (Section 3.6.3).

The public may use the 24-hour DOE telephone number posted prominently on the entrance sign to request information or to report a problem at the site (Section 2.3.5). DOE can be reached anytime at (970) 248-6070 or toll free at (877) 695-5322.

Once a new or changed condition is identified, DOE will evaluate the information and determine whether a follow-up inspection is warranted. Conditions that may require a routine follow-up

inspection include changes in vegetation, erosion, storm damage, deliberate human intrusion, minor vandalism, or the need to evaluate, design, or perform certain maintenance projects.

Conditions that threaten the safety of the site or the integrity of the disposal cell may require a more urgent follow-up inspection or emergency response. Slope failure, disastrous storm, major seismic event, and deliberate human intrusion are among these conditions.

DOE will use a graded approach with respect to follow-up inspections. Urgency will be proportional to the potential seriousness of the condition. For example, a follow-up inspection to investigate or control vegetation may be postponed until a particular time during the growing season. A follow-up inspection to evaluate erosion may be scheduled to avoid snow cover.

In the event of "unusual damage or disruption" (10 CFR 40, Appendix A, Criterion 12), damage that may compromise or threaten the safety, security, or integrity of the site, DOE will:

- Notify NRC pursuant to 10 CFR 40, Appendix A, Criterion 12, or 10 CFR 40.60, whichever applies.
- Begin DOE's internal occurrence notification process (DOE Order 232.1A).
- Respond with an immediate follow-up inspection or deployment of an emergency response team.
- Implement emergency measures, as necessary, to prevent or contain exposure or dispersal of radioactive materials (Section 3.6).

3.4.2 Personnel

DOE will assign inspectors to follow-up inspections on the same basis as the annual site inspection (see Section 3.3.4).

3.4.3 Reports

Results of routine follow-up inspections will be included in the annual inspection report to NRC (Section 3.3.5). Separate reports will not be issued unless DOE determines that it is advisable to notify NRC and other agencies of a potentially serious problem at the site.

If follow-up inspections are required for more urgent reasons, DOE will submit a preliminary report of the follow-up inspection to NRC within the 60-day period required by 10 CFR 40, Appendix A, Criterion 12.

3.5 Site Maintenance

Sites remediated under UMTRCA are designed and constructed so that "ongoing active maintenance is not necessary to preserve isolation" of radioactive material (10 CFR 40, Appendix A, Criterion 12). Nevertheless, routine maintenance requirements are established for the Canonsburg Disposal Site and for the bank of Chartiers Creek along the northern site boundary and eastern edge of Area C.

3.5.1 Routine Maintenance

DOE will conduct routine maintenance at the Canonsburg Site to preserve the proper functioning of built features and demonstrate that the site is well cared for.

Vegetation—Vegetation management comprises (1) efforts to prevent trees and shrubs from establishing on the disposal cell and in the rock-lined diversion channels and perimeter drainage ditch, and (2) the management of grass vegetative cover to prevent erosion.

Trees and shrubs growing in the diversion channels and perimeter drainage ditch are a concern because, with time, these plants and the fallen leaves and branches they trap will choke the channels and ditch. This could reduce the capacity of these features to convey storm water safely off site without overflowing and causing erosion. To prevent loss of capacity, trees and shrubs in the channels and ditch are treated with herbicide, and dead plant material is removed every 2 to 3 years or as necessary.

Grass vegetative cover (grasses, weeds, and crown vetch) on the disposal cell and in the area surrounding the disposal cell serves two purposes—erosion protection and control of water infiltration through evapotranspiration. The grass vegetative cover gives the site aesthetic appeal; it has an open, park-like appearance in an otherwise urban setting. Grass vegetative cover is mowed annually in mid-summer. Mowing effectively prevents trees and shrubs from establishing on the disposal cell. Grass cuttings are mulched during mowing so that fertilization of the grass vegetative cover is not required.

DOE clears vegetation from along the security fence to prevent damage from entwining vegetation and provide access for inspection and maintenance. This clearing also enhances site security by removing vegetation that might provide a means of scaling the fence.

Although not required by the general license, control of noxious and invasive weeds may be required from time to time to meet local, county, and state requirements. Control is usually achieved by additional mowing and the application of selected herbicides.

Security Fence—Inspectors, samplers, and other site visitors may conduct limited, minor limb removal from the security fence if deemed appropriate. DOE uses grounds-keeping subcontractors to perform more significant clearing of vegetation.

In the humid Canonsburg climate, the security fence corrodes and requires periodic replacement. DOE decided to replace the fence in 2007. The barbed wire was brittle, the chain-link fabric was rusted, and the posts and top rails had some corrosion. The service life of the new security fence is expected to be 20 to 30 years. Frequent lock replacement is required.

A portion of the replacement fence between perimeter signs P4 and P6 along the west side was moved eastward from the position of the previous fence to allow a safer pathway between the fence and the stream bank.

Signs—Entrance and perimeter signs fade and are subject to corrosion and vandalism. DOE will maintain legible postings in good repair. Inspectors will carry replacement signs.

Markers and Monuments—These features are durable and not expected to require maintenance. Monuments may be lost to erosion or accident, at which time DOE will determine if the particular feature should be replaced.

3.5.2 Bank of Chartiers Creek

Disposal Site—During the site licensing process, there was concern that flooding along Chartiers Creek (from a rare storm or PMP) could, hypothetically, threaten the disposal cell and the VPLM disposal area. DOE considers the risk posed by flooding very small for several reasons.

Inspectors have formally inspected the Canonsburg Site annually since 1990. During these inspections, inspectors have noted that the bank along the upstream reach of the creek is stable and heavily wooded with mature trees and dense understory. Competent sandstone of the Casselman Formation crops out where the bank is steepest. The rock and vegetation provide natural erosion protection and have survived high water in the past without significant effect.

In 2004, flood waters triggered by a hurricane left the Chartiers Creek channel near perimeter sign P-6, crossed the floodplain portion of the site and Strabane Avenue, and reentered the creek channel downstream of the Strabane Avenue bridge. This was roughly a 100-year flood. A large tree was dislodged between perimeter signs P7 and P8, and the fence was damaged. DOE moved the fence away from the top of the bank in 2005. Bank erosion occurred along Area C, and DOE hardened the bank with riprap in 2005. No other damage occurred.

Along the downstream reach of the creek adjacent to the disposal site, the bank decreases in height and broadens into a low-lying floodplain covered with grass and brushy stream bank vegetation. Erosion has occurred in this area since 1997. This erosion does not present a credible threat to the disposal cell or the VPLM because it is far removed (more than 80 ft) from the buried riprap wall that is designed, in any case, to protect the contaminated materials from erosion, even erosion from a rare PMP (Section 2.3.3). However, in an effort to stem downstream sedimentation and to prevent further stream bank erosion toward the disposal cell, the Borough of Canonsburg obtained a grant from the Commonwealth of Pennsylvania and performed stream bank stabilization approximately between perimeter signs P7 and P8 in 2006. In 2007, DOE granted additional funding to the Borough to perform additional stabilization between perimeter signs P8 and the Strabane Avenue bridge. This work was conducted in 2008.

Erosion at or near the VPLM disposal area is not likely because the VPLM is above the 500-year floodplain as determined by FEMA, and above the 1,000-year floodplain determined during the design of the disposal site (Section 2.3.3).

DOE will continue to inspect and record changes along the stream bank. Inspectors will use (1) the security fence above the creek along the west and northwest boundary of the site and (2) the ECMs from ECM−2 and −2A downstream to the Strabane Avenue bridge as benchmarks for detection of significant erosion. (Significant erosion will be erosion that threatens to expose contaminated materials in the disposal cell, the VPLM area, or materials below the cleanup standard that may remain on site.)

Along the upstream reach of the creek, the security fence is along the top of the bank above the creek. As explained in Section 2.3.3, the bank, although steep, is stable, wooded with mature

forest, and supported by competent bedrock. Erosion or slumping along this bank that could destabilize the fence will be obvious to inspectors and will constitute an action level for evaluation, intervention, or maintenance by DOE.

Three pairs of erosion control markers (ECM−2 and ECM−2A; ECM−3 and ECM−3A; and ECM−4 and ECM−4A) were installed along the downstream reach of the creek where the high bank flattens and widens into a narrow floodplain. For each ECM pair, the marker that is closer to the disposal cell also marks the approximate location of the top of the buried riprap wall.

Area C—In 1992 inspectors began to observe progressive loss of stream bank along the eastern edge of Area C. The loss was attributed to loss of cohesion in the bank materials due to seepage and erosion from occasional high water in the creek. Erosion at Area C is no threat to the disposal site, but perhaps a concern because of two thorium anomalies in Area C (Figure 3–2).

During remedial action verification, two thorium anomalies were discovered beneath clean fill at depths of 6 to 8 ft. Ingrowth from thorium was not a consideration at the time the Canonsburg Site was remediated, so the thorium anomalies were left in place. However, radium-226 ingrowth will result in concentrations slightly exceeding the standard in 40 CFR 192 within 1,000 years. DOE does not consider erosion along the stream bank to be a threat to these anomalies because the closer of the anomalies is 220 ft from the bank where slumping has occurred. However, in 2000−2001, DOE intervened to stabilize the stream bank to preserve the value of the property, prevent exposure of the thorium anomalies, and prevent sedimentation in the creek.

During the bank stabilization project, large-diameter rock was placed along the bottom of the bank to an elevation just above the normal high-water line. Above the riprap and normal high-water line, the bank was cut back and reconstructed in three layers. Each layer consisted of rock (for drainage) and geogrid fabric (to prevent slumping). The face of the reconstructed bank was protected with erosion control fabric and revegetated. The 2004 storm event caused erosion of portions of the vegetated stream bank. DOE armored the stream bank by replacing the eroded material with riprap in 2005.

With the sale of the property to a private party in 2006, deed restrictions accompanying that sale require the new and subsequent owners to maintain and, if necessary, repair the bank if erosion recurs as a result of the owners' actions (Section 2.3.4). DOE will repair stream bank damage caused by "Acts of God." DOE will continue to monitor the stability of the stream bank along Area C.

3.6 Intervention or Emergency Response

Intervention or emergency response is action DOE will take in response to "unusual damage or disruption" that threatens or compromises site safety, security, or integrity (10 CFR 40, Appendix A, Criterion 12).

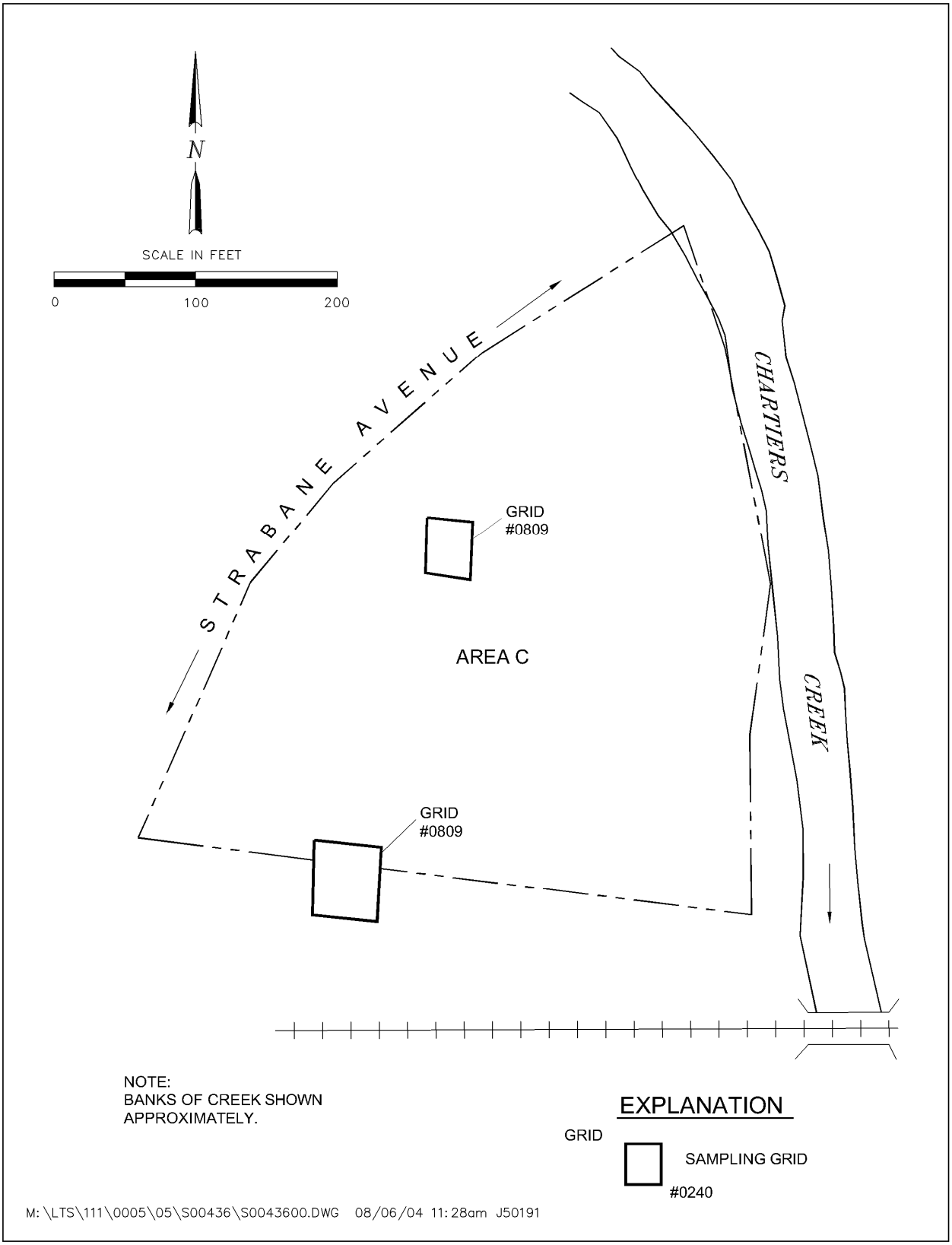

Figure 3–2. Location of Thorium-230 Anomalies, Area C, Canonsburg, Pennsylvania, Disposal Site

3.6.1 Criteria for Emergency Response

Conceptually, there is a continuum in the progression from small-scale, minor, routine maintenance (Section 3.3) to large-scale intervention that might include reconstruction of the disposal cell following an unlikely disaster. Although required by 10 CFR 40.27(b)(5), criteria for initiating specific responses to progressively more serious problems are not easily established because the nature and scale of potential problems is unforeseeable and highly scale dependent. The information in Table 3–3 is a guide to the actions DOE may take in response to increasingly serious problems.

Table 3–3. Criteria for Emergency Response

Priority[a]	Event	Example	DOE Response
1 Urgent	Breach of containment with dispersal of contaminated materials.	Side slope of disposal cell fails, radioactive materials are dispersed.	1. Notify NRC. 2. Conduct immediate follow-up inspection by DOE emergency response team. 3. Recover radioactive materials. 4. Repair side slope.
2	Breach of containment without dispersal of contaminated materials.	Side slope of disposal cell fails, or failure is imminent. Radioactive materials are not dispersed.	1. Notify NRC. 2. Conduct immediate follow-up inspection by DOE emergency response team. 3. Repair side slope.
3	Breach of site security with or without excavation or removal of materials.	Deliberate human intrusion or significant vandalism.	Restore security. Harden security as necessary.
4	Erosion along Chartiers Creek.	Loss of bank or relocation of channel.	Stabilize bank.
5 Routine	Minor problems, small-scale changes.	Minor vandalism, small-scale changes along creek bank, undesirable changes in vegetation.	Routine maintenance.

[a]Priority highly dependent upon scale and on-site evaluation.

The table shows that the difference between routine maintenance and various emergency responses is primarily one of risk or urgency. Priorities listed in the table are inversely related to the probability of the problem occurring. The highest priority responses are the least likely to be required.

3.6.2 Notification

In accordance with 10 CFR 40.60, DOE will notify the Decommissioning and Uranium Licensing Directorate, Division of Waste Management and Environmental Protection, Office of Federal and State Materials and Environmental Management Programs, and U.S. Nuclear Regulatory Commission within 4 hours of discovery of a Priority 1 or 2 (or similar) event (Table 3–3). The phone number for the required 4-hour contact to the NRC Operations Center is (301) 816-5100.

3.6.3 Procedure for Intervention or Emergency Response

If a Priority 1 or 2 event occurs, DOE will assess the damage and decide whether evaluation of the problem is required or if immediate intervention (additional remedial action) is essential.

This decision will be based on DOE's evaluation of the adequacy of the damaged feature to perform its intended function. For example, if one of the outer markers in an ECM pair is lost to erosion, as occurred at ECM−4A in 1997, DOE will note this event in its annual report to NRC and in the inspection checklist for the next annual inspection. If it becomes apparent that the second or innermost ECM in the pair or the fence is threatened by erosion, this issue may constitute an action level for evaluation, intervention, or maintenance by DOE.

To make the decision regarding appropriate action to take, DOE will evaluate the following. The evaluation may include assessment of risk.

1. Adequacy of the design specifications for the damaged feature to control or accommodate the observed problem.
2. Extent of the damage, degradation, or departure from the design (or as-built condition) of the damaged feature.
3. Ability of the feature, in its damaged condition, to withstand a design-basis event.

DOE will provide NRC with a clear, technical explanation for its decision to study and evaluate or intervene with additional remedial action (DOE 2001b).

3.7 Environmental Monitoring

Groundwater and surface water monitoring is the only environmental monitoring required at the Canonsburg Site. Monitoring requirements described in the original LTSP were based on surface remedial action under Subpart A of 40 CFR 192 and were approved as part of the NRC general licensing process for the site (DOE 1995b).

Additional monitoring requirements were described in the *Ground Water Compliance Action Plan* (GCAP) (DOE 2000) for the groundwater cleanup phase of remedial action under Subpart B of 40 CFR 192.

This revised LTSP combines both requirements into a comprehensive site-wide monitoring program.

3.7.1 Water Quality Monitoring Under the Original Long-Term Surveillance Plan

EPA groundwater protection standards require implementation of a groundwater monitoring plan to evaluate disposal cell performance (40 CFR 192.03). However, remedial action at the Canonsburg Site was completed in 1985, at the time that a federal court remanded the EPA groundwater standards. Following the remand, NRC concluded that modification of the existing Canonsburg disposal cell was not warranted to meet revised groundwater standards because the design of the disposal cell was adequate to provide long-term protection of human health and the environment.

The original LTSP (DOE 1995b) specified annual monitoring of groundwater and surface water, as a best management practice (BMP), for a period of 2 years following licensing of the site. Because the site was included under the general license in 1996, DOE took that year as the first year of the 2-year monitoring period. The 2-year period was fulfilled by monitoring in 1996 and 1997. The purpose of monitoring was to (1) evaluate trends of two potential contaminants

(uranium and molybdenum) within the unconsolidated materials (uppermost aquifer) that underlie the disposal site and (2) ensure the protection of public health, safety, and the environment.

The monitoring network included six monitor wells and three surface water locations in Chartiers Creek (Table 3–4 and Figure 2–5). Sample analyses consisted of standard water quality indicators, field measurements, and two specific analytes (uranium and molybdenum) (Table 3–5). Water levels in each monitor well were also measured. Sampling was in the fall each year in order to sample surface water in the creek during the period of lowest flow when contaminant concentration would be highest.

DOE continued to monitor groundwater and surface water at the site annually beyond the required 2-year period, as a BMP, because of elevated uranium levels at some of the monitor wells and because it was anticipated that monitoring under the GCAP would include some of the same sampling locations. Continued sampling would acquire data to show trends in contaminant concentrations over time.

Table 3–4. Groundwater and Surface Water Sampling Locations at the Canonsburg, Pennsylvania, Disposal Site

Sample Locations Original LTSP (DOE 1995b)	Sample Locations GCAP (DOE 2000)	Sample Locations Revised LTSP
Monitor wells: MW−0410 Upgradient MW−0406 Downgradient[a] MW−0412 Downgradient MW−0413 Downgradient MW−0424 Downgradient MW−0414 Crossgradient[b]	Monitor wells: MW−0406 Downgradient MW−0412 Downgradient (POC) MW−0413 Downgradient (POC) MW−0414 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	Surface water location: SW-0602 Adjacent to Area C (POE)

[a]MW−0406 was destroyed during a sanitary sewer construction project in 2001 and replaced. The current designation is MW−0406A.
[b]MW−0414 has been replaced twice because of damage during construction. The current designation is MW−0414B.

BMP = best management practice
POC = point of compliance
POE = point of exposure

Table 3–5. Analytes For Surface Water and Groundwater at the Canonsburg, Pennsylvania, Disposal Site

Field Measurements	Original LTSP		GCAP	Revised LTSP
	Water-Quality Indicators	Specific Analytes	Specific Analytes	All Analytes*
Alkalinity Dissolved oxygen pH Specific conductance Temperature Turbidity	Calcium Chloride Magnesium Potassium Sodium Sulfate	Uranium Manganese Molybdenum	Uranium Manganese Molybdenum	Uranium

*Manganese will continue to be monitored in wells MW−0412 and SW−0602 through 2008 per NRC's request.

3.7.2 Water Quality Monitoring Under the Groundwater Compliance Action Plan

The compliance strategy for groundwater cleanup at the Canonsburg Site is no further remediation in conjunction with the application of an ACL for uranium, the only remaining constituent of concern for the site (DOE 2000). In addition to groundwater monitoring, the compliance strategy includes institutional controls to ensure that the application of the ACL will continue to protect public health and the environment. Historical data and computer modeling predict that natural groundwater movement (flushing) and geochemical attenuation processes will reduce uranium concentrations in groundwater to concentrations less than the MCL within 30 years (DOE 2000).

The ACL for uranium is 1.0 mg/L at the POC wells (MW−0412, MW−0413, and MW−0414). The GCAP establishes a limit of 0.01 mg/L at the point of exposure (POE) in Chartiers Creek (surface water location SW−0602). (The EPA MCL for uranium is 0.044 mg/L [40 CFR 192, Subpart A, Table 1].)

The monitoring network includes four monitor wells and one surface water location in Chartiers Creek (Table 3–4 and Figure 2–5). Sample analyses consist of standard water quality indicators, field measurements, and three specific analytes (uranium, molybdenum, and manganese) (Table 3–5). Water levels in each monitor well will also be measured. Sampling is conducted in the fall on an annual basis. Monitoring will be conducted under the GCAP to demonstrate that the ACL for uranium is not exceeded at either the POC wells or at the point of exposure (POE) in Chartiers Creek. Monitoring results will be used to evaluate the progress of uranium flushing and attenuation in groundwater.

3.7.3 Revised Comprehensive Site-wide Water Quality Monitoring Program

This revised LTSP combines the objectives of both the original LTSP (DOE 1995b) and the GCAP (DOE 2000) into a comprehensive site-wide monitoring program. This program will involve sampling three POC wells, two BMP wells, and one surface water location (POE) in Chartiers Creek (Table 3–4, Column 3; and Figure 2–5).

Background levels for uranium at the upgradient (background) well, MW−0410, have been consistently at or below the detection limit, and no changes are expected in the quality of groundwater migrating onto the site. Thus, there is no need to continue monitoring this location. Uranium in surface water samples at all three sampling locations in Chartiers Creek has been

continually at or below detection limit. Therefore, monitoring at the POE is the only surface water sampling that can be justified.

The objectives of the monitoring program will be to (1) evaluate downgradient contaminant trends in groundwater in the shallow unconsolidated materials and in surface water, (2) demonstrate that concentrations of uranium at 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.

Routine field measurements will continue to be collected. However, water quality indicators are no longer required for long-term monitoring. Uranium is the only remaining constituent of concern for the site. In 2003, NRC concurred that groundwater use restrictions could be deleted in Area C (NRC 2003). Even though the restrictions were removed, DOE will continue to monitor the two wells near Area C (MW−0414B and MW−0424) as both a BMP and in response to the NRC request.

The original GCAP indicated that monitoring would be conducted annually for 5 years beginning in 2000 and would be conducted, if necessary, for a maximum of 30 years (through 2029). The year 2000 was selected for the beginning of the comprehensive site-wide monitoring program because that is the year NRC concurred in the recommendations in the GCAP (NRC 2000). The plan indicated that the need to continue or change the frequency of monitoring would be evaluated after the first 5-year period. Based on review of those 5-year results, this revised LTSP recommends revising monitoring parameters to include only field measurements and uranium (Table 3–5). Monitoring is recommended to continue annually for the next 5 years (through 2010) and be reevaluated at that time. DOE could then implement changes in monitoring strategy or frequency, including termination of monitoring, in consultation with the State and with NRC concurrence.

3.7.4 Reports of Water Quality Monitoring

DOE will present results of groundwater monitoring for uranium in annual reports to NRC (Section 3.3.5). Results of each 5-year evaluation may be in the annual report or reported separately.

3.8 Institutional Controls Monitoring

DOE will retain ownership of the disposal site in perpetuity. Through ownership, DOE will control land use. Inspectors will look for evidence of trespass and damage to fences and signs.

Institutional controls have been established for Area C through deed restrictions. These are defined in the sale agreement in Appendix B. The land use restrictions are binding on successive owners. DOE will monitor land use on Area C for conformance with institutional controls. Institutional controls will also be established for any other area sold in the future through deed restrictions.

Specifically, inspectors will monitor Area C for

- Excavations that exceed depth limitations,
- Residential land use,
- Modification of or blocking access to the monitor well (MW–0424), and
- Modification of or allowing erosion to occur on the Chartiers Creek stream bank.

3.9 Records

DOE maintains records for the Canonsburg Site at Grand Junction, Colorado, and at Federal Records Centers. These records contain information essential to the long-term care and custody of the site pursuant to applicable laws and regulations. These records include site characterization reports, remedial action plans, National Environmental Policy Act documents, engineering design and construction documents, as-built drawings, results of environmental monitoring, and annual inspection reports. Records are available for public inspection. Selected records are available online at http://www.lm.doe.gov.

Records for the Canonsburg Site are maintained in compliance with DOE Order 200.1, *Information Management Program*, and 36 CFR 1220−1236, "National Archives and Records Administration."

3.10 Quality Assurance

The long-term care of the Canonsburg Site and all activities related to its annual surveillance, monitoring, and maintenance of the site comply with DOE Order 414.1C, *Quality and Performance Assurance*.

Quality Assurance requirements are transmitted to subcontractors through procurement documents, if and when appropriate.

3.11 Health and Safety

Work at the Canonsburg Site is performed in accordance with safety regulations promulgated by DOE and the Occupational Health and Safety Administration, including the provisions found in 10 CFR 851. Prior to the initiation of work, a job safety analysis (JSA) is developed by the supervisor responsible for the work activity and the assigned workers, and it is then approved by a health and safety representative following the five core functions of the Integrated Safety Management System. Site-specific information relating to known hazards and emergency information can be found in the *Comprehensive Emergency Management System*, LMS/POL/S04326 (formerly STO 8).

All personnel assigned to a work activity or visiting the site are briefed to the approved JSA and are required to have the proper personal protective equipment and communication equipment available for their immediate use.

Maintenance subcontractors are required to follow this same process as per the requirements of 10 CFR 851 that are found in their specific contract documents.

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4.0 References

10 CFR 40.27. U.S. Nuclear Regulatory Commission, "General License for Custody and Long-Term Care of Residual Radioactive Material Disposal Sites," *Code of Federal Regulations*, January 1, 2004.

10 CFR 40. U.S. Nuclear Regulatory Commission, "Domestic Licensing of Source Material," Appendix A, Criterion 12, "Long-Term Surveillance," *Code of Federal Regulations*, January 1, 2004.

40 CFR 143. U.S. Environmental Protection Agency, "National Secondary Drinking Water Regulations," *Code of Federal Regulations*, July 1, 2004.

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DOE (U.S. Department of Energy), 2000. *Ground Water Compliance Action Plan for the Canonsburg, Pennsylvania, UMTRA Project Site*, Grand Junction Office, Grand Junction, Colorado, February.

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DOE (U.S. Department of Energy), 2001a. *Design and Specifications for Buried Riprap Wall, Canonsburg, Pennsylvania, Disposal Site*, Drawing CAN−PS−10−0021, Albuquerque Operations Office, Albuquerque, New Mexico, April.

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DOE (U.S. Department of Energy), 2003. "Review of Request for NRC Approval to Authorize Deletion of Institutional Controls (Area C) at Canonsburg, Pennsylvania," with enclosed *Technical Evaluation Report*, letter from J. Holnich, NRC, to A. Kleinrath, DOE, Washington DC, April 28.

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Appendix A

Regulator Concurrence Documentation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 16, 1996

Mr. Richard Sena, Acting Director
Environmental Restoration Division
Uranium Mill Tailings Remedial Action
Project
U.S. Department of Energy
2155 Louisiana NE, Suite 4000
Albuquerque, NM 87110

SUBJECT: ACCEPTANCE OF THE LONG-TERM SURVEILLANCE PLAN FOR THE CANONSBURG, PENNSYLVANIA URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT SITE

Dear Mr. Sena:

The U.S. Nuclear Regulatory Commission staff hereby accepts the U.S. Department of Energy's (DOE's) Long-Term Surveillance Plan (LTSP), dated October 1995, for the Canonsburg, Pennsylvania Uranium Mill Tailings Remedial Action Project site. This action establishes the Canonsburg site under the general license in 10 CFR Part 40.27.

The staff, based on its review, made a determination that all of the previously identified open issues have been adequately addressed in the October 1995 version of the LTSP for the Canonsburg site. However, the construction document referenced in Appendix E of the LTSP will need to be reviewed by the staff to ensure it meets objectives of the LTSP.

The LTSP satisfies the requirements set forth in the Uranium Mill Tailings Radiation Control Act of 1978 for long-term surveillance of a disposal site, and all requirements in 10 CFR Part 40.27 for an LTSP. In accordance with DOE's guidance document for long-term surveillance, all further NRC/DOE interaction on the long-term care of the Canonsburg site will be conducted with the DOE's Grand Junction Project Office. If you have any questions, please contact the NRC Project Manager, Mohammad Haque at (301) 415-6640.

Sincerely,

Joseph J. Holonich, Chief
High-Level Waste and
Uranium Recovery Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

cc: M. Abrams, DOE Alb
S. Hamp, DOE Alb
J. Virgona, DOE GJPO
E. Artiglia, TAC Alb
J. Yusko, PA DEP

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 24, 2000

Mr. Donald R. Metzler
U.S. Department of Energy
Grand Junction Office
2597 B 3/4 Road
Grand Junction, CO 81503

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION CONCURRENCE OF THE GROUND WATER COMPLIANCE ACTION PLAN AND APPLICATION FOR ALTERNATE CONCENTRATION LIMITS FOR THE CANONSBURG, PENNSYLVANIA, UMTRA SITE

Dear Mr. Metzler:

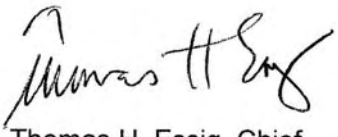
The U.S. Department of Energy (DOE) submitted a Groundwater Compliance Action Plan (GCAP) and Application for Alternate Concentration Limits (ACL) for the Canonsburg, Pennsylvania, UMTRA site in letters dated September 9, 1998, April 8, 1999, and September 27, 1999. A request for additional information was made from this office, and DOE satisfied our concerns in a submittal dated December 17, 1999. Our staff has reviewed this information and concurs with the Groundwater Compliance Action Plan and approves the application for alternate concentration levels.

The staff has determined that the GCAP for the Canonsburg, Pennsylvania site satisfies the requirements set forth in the Uranium Mill Tailings Radiation Control Act of 1978, as amended and the standards in 40 CFR 192, Subpart B for the cleanup of groundwater contamination resulting from the processing of ores for the extraction of uranium. The compliance strategy proposed in the GCAP will achieve compliance with Subpart B of 40 CFR 192.12 through no remediation in conjunction with the application of an ACL, including groundwater monitoring and institutional controls to ensure that the ACL will continue to be protective of human health and the environment.

The staff's Technical Evaluation Report has been enclosed for your information. DOE should revise the Long-Term Surveillance Plan to be consistent with the Groundwater Compliance Action Plan.

Please feel free to contact the NRC Project Manager, Jill Caverly, at (301) 415-6699 should you have any questions regarding this matter.

Sincerely,



Thomas H. Essig, Chief
Uranium Recovery and
Low-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: Technical Evaluation Report

cc: James G. Yusko, Pennsylvania
Department of Environmental
Protection

ENCLOSURE

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TECHNICAL EVALUATION REPORT
CANONSBURG GROUNDWATER COMPLIANCE ACTION PLAN AND
ALTERNATE CONCENTRATION LIMIT APPLICATION

DATE: December 30, 1999

FACILITY: Canonsburg, PA

PROJECT MANAGER: Jill Caverly

TECHNICAL REVIEWER: William von Till

SUMMARY AND CONCLUSIONS:

The U.S. Department of Energy (DOE) submitted a Groundwater Compliance Action Plan (GCAP) and Application for Alternate Concentration Limits (ACLs) for the Canonsburg, Pennsylvania, UMTRA Project Site by cover letter dated September 9, 1998. U.S. Nuclear Regulatory Commission (NRC) staff reviewed the GCAP and provided preliminary comments to DOE in a conference call on August 17, 1999. DOE, by letter dated September 27, 1999, responded to the comments. NRC reviewed all relevant material and by letter dated October 13, 1999, requested additional information. DOE, by letter dated December 17, 1999, provided a response and revised Section 3.0 of the GCAP.

After review of the documents, the staff concurs with the proposed action. The compliance strategy proposed in the GCAP will achieve compliance with Subpart B of 40 CFR 192.12 through no remediation in conjunction with the application of an ACL, including groundwater monitoring and institutional controls to ensure that the ACL will continue to be protective of human health and the environment. Staff has determined that the GCAP for the Canonsburg, Pennsylvania, site satisfies the requirements set forth in the Uranium Mill Tailings Radiation Control Act of 1978, as amended (UMTRCA), and the standards in 40 CFR 192, Subpart B for the cleanup of groundwater contamination resulting from the processing of ores for the extraction of uranium.

The option of no remediation in conjunction with the application of ACLs for the uppermost aquifer is acceptable based on the following:

1) Constituents will not pose a risk to human health and the environment due to the use of institutional controls to prohibit groundwater use on the site during the ACL application period. Groundwater contamination discharging into the stream adjacent to DOE-controlled land will be diluted to well below harmful concentrations, and DOE and the State of Pennsylvania has control over the land from the tailings to the stream.

2) Alternatives would not produce an incremental benefit over the associated costs.

3) Compliance monitoring will be used to verify the decrease in contaminant concentrations, as predicted by modeling, for a minimum of five years and up to 30 years with re-evaluation after five years. To assure that groundwater constituents do not

flow under Chartiers Creek and migrate towards water supply wells, DOE will include monitoring well 406 in the monitoring program.

BACKGROUND:

The NRC concurred on the Remedial Action Plan (RAP) on May 18, 1984, and concurred on two modifications on January 24 and 28, 1986. The staff also concurred on the Remedial Action Inspection Plan on December, 1985. This concurrence was the staff's agreement that the Quality Control Program was acceptable.

DOE submitted a final Completion Report for surface remediation by letter dated April 7, 1994. The staff concurred on the action by letter dated August 14, 1995. The staff accepted DOE's Long-Term Surveillance Plan (LTSP), dated October 1995, by letter dated January 16, 1995.

This supplemental TER documents the staff's review of DOE's GCAP dated September 9, 1998. Canonsburg is one of three sites that were completed early in the program, and in accordance with the Memorandum of Understanding between the DOE and the NRC, dated November 6, 1990. The groundwater restoration phase of the Uranium Mill Tailings Remedial Action (UMTRA) project was initiated by DOE's final Programmatic Environmental Impact Statement (PEIS) for the UMTRA Ground Water Project. The final PEIS was approved for distribution on September 19, 1996, and the Record of Decision was approved and published on April 28, 1997.

Regulatory Framework:

The UMTRA Project regulations provide several ways to comply with the groundwater protection standards for Subpart B of 40 CFR Part 192.12(c). These include meeting the provisions of 40 CFR 192.02(c)(3) or a supplemental standard established under 40 CFR 192.21. Within 40 CFR 192.02(c)(3)(ii), the option for ACLs is established. ACLs are established on a site-specific basis, provided it is demonstrated that the constituents will not pose a substantial present or potential hazard to human health or the environment, as long as the ACLs are not exceeded.

The hazard assessments for ACLs will be acceptable if they meet the following criteria:

1) The point of exposure (POE) is identified.

2) The hazardous constituent source term and the extent of groundwater contamination are characterized.

3) The hazardous constituent transport in groundwater, and hydraulically connected surface water, and the adverse effects on water quality, including the present and potential health and environmental hazards, are assessed.

4) An assessment of human or environment exposures to hazardous constituents, including the cancer risk and other health and environmental hazards, is provided.

5) An evaluation of potential alternatives is provided.

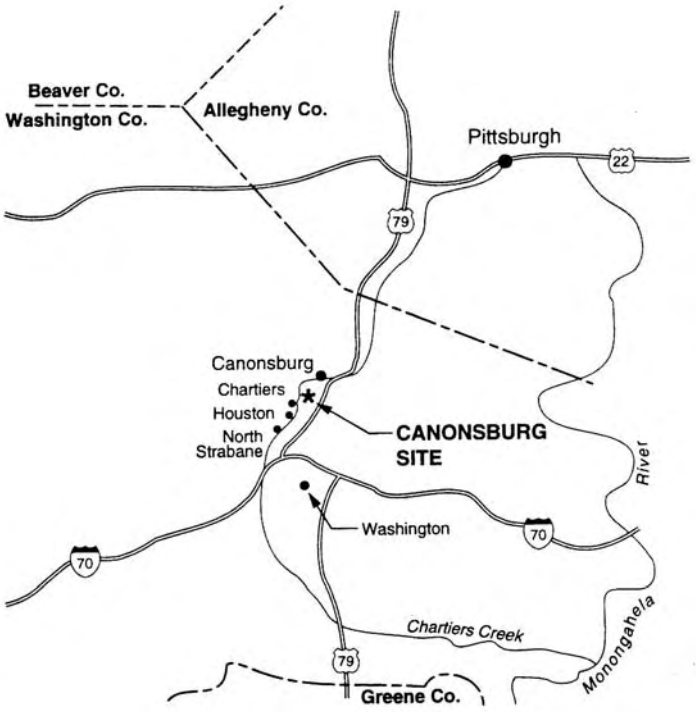
Factors used in evaluating the ACL application can be found in Appendix 1 of this report as outlined in 40 CFR Part 192.02(c)(3)(ii)(B)(1 and 2).

Site Description:

The DOE Canonsburg facility is located in the Borough of Canonsburg, in northern Washington County, Pennsylvania, approximately 20 miles (mi)(32 kilometers [km]) southwest of Pittsburgh, Pennsylvania (Figure 1). The site encompasses approximately 18.5 acres (7.4 hectares) and is adjacent to Chartiers Creek (Figure 2). The facility has been used to process or contain radioactive materials since 1911. Between 1984 and 1986, DOE conducted surface remediation by removing the buildings, contaminated soils, and materials from the site and stabilizing them in a permanent disposal cell. The disposal cell covers 6 acres (2.4 hectares) and contains about 172,000 cubic yards (132,000 cubic meters) of contaminated materials. The site is currently being monitored in accordance with the Long-Term Surveillance Plan (LTSP) for the Canonsburg, Pennsylvania Disposal Site (DOE, 1995).

Groundwater is present in the unconsolidated materials and in the shallow bedrock of the Casselman Formation. The unconsolidated materials are composed of sandy loam to silty clay, clay, alluvium, and fill material up to 30 feet (ft) (9 meters [m]) thick. The lithology of the bedrock to a depth of 90 ft (29 m) consists predominantly of gray siltstone and shale, some inter-bedded limestone, and sparse coal seams. The two units are hydraulically connected with a vertical flow component from the unconsolidated materials to the bedrock. Groundwater depth in the unconsolidated material ranges from 3 to 14 ft (0.9 to 4.3 m) below ground surface. Groundwater occurs in the shallow bedrock under semi-confined conditions mainly in zones of secondary porosity (fractures). The groundwater velocity from the disposal cell toward Chartiers Creek is estimated at approximately 4 ft per day (1.4×10^{-3} cm per second). Groundwater from the unconsolidated material discharges into Chartiers Creek that is directly down-gradient from the disposal cell. Chartiers Creek has an average flow of 90 to 130 ft^3 per second (2.5 to 3.7 m^3 per second) and flows into the Ohio River 15 mi (24 km) downstream from the site. Local residents use the creek for fishing, swimming, and wading. The types of fish found in the creek include carp, catfish, and bluegill. The creek has elevated levels of iron and manganese as a result of acid mine drainage in the area.

Most of the residents in the area are connected to a municipal water supply system supplied by the Monongahela River. A water use survey identified 16 wells within a 1mi (1.6 km) radius of the site. Of these wells, one was in use, eleven were not in use, and four were abandoned. Seven of these wells are up-gradient of the site and would not be affected. The remaining five wells are located on the opposite side of Chartiers Creek, one of which is in use located approximately 400 ft (120 m) north of the site. This well is used only for washing cars, mixing cement, and watering the garden.



LEGEND

70 INTERSTATE HIGHWAY

22 U.S. HIGHWAY

5 0 5 10 MILES

5 0 5 10 KILOMETERS

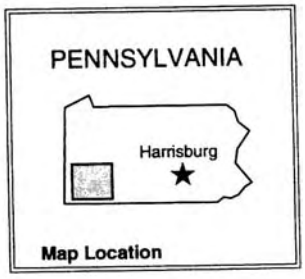


FIGURE 1
CANONSBURG, PENNSYLVANIA, SITE LOCATION MAP

MAC: SITE/CAN/S&M/SITELOC

4

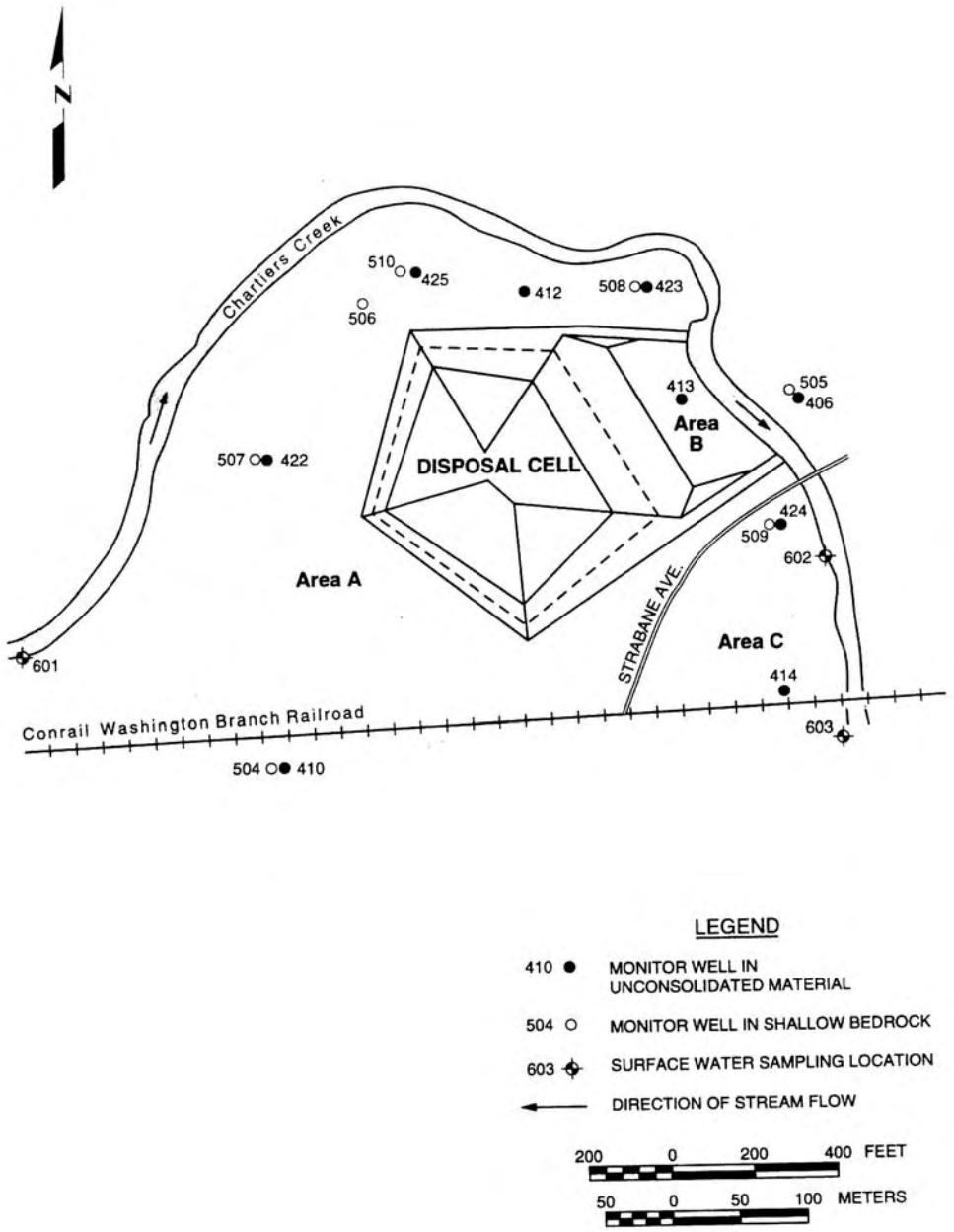


FIGURE 2
LOCATIONS OF MONITOR WELLS AND SURFACE WATER SAMPLING
CANONSBURG, PENNSYLVANIA, DISPOSAL SITE

MAC: SITE/CAN/LTSP/SWSAMPLOCS2

5

TECHNICAL EVALUATION:

DOE has proposed, based on the framework under the Programmatic Environmental Impact Statement for Uranium Mill Tailings Remedial Action Groundwater Project (PEIS)(DOE, 1996), no remediation in conjunction with the application of ACLs to groundwater contamination at the site. This will include incorporation of groundwater monitoring and institutional controls to ensure that the application of ACLs will continue to be protective of human health and the environment. The ACL will be established at a point of compliance (POC), which will consist of monitoring wells 412 and 413, down-gradient from the disposal cell, and monitoring well 414 in Area C. Monitoring well 406 will also be monitored to assure that migration of hazardous constituents under Chartiers Creek is limited. The point of exposure (POE) will be the surface water in Chartiers Creek adjacent to the site and monitoring well 602. DOE owns property from the POC wells to the Creek where groundwater discharges. Ground water constituents are currently flushing into the stream at levels that are below detection with the dilution of the stream.

Manganese, molybdenum, and uranium are the constituents of concern (COC) that have been present in concentrations that exceed MCLs or background in groundwater down-gradient from the disposal cell and in Area C. The proposed ACL for uranium is 1.0 mg/L. An ACL is not required for manganese because it does not have an MCL in Table 1 to Subpart A of 40 CFR 192, does not pose a threat to human health and the environment, and ambient manganese contamination in Chartiers Creek is present at the site. Institutional controls will ensure that the risks from groundwater ingestion of manganese are eliminated. Molybdenum concentrations have been exceeded historically at the site, but recent data indicates that concentrations are below the standard of 0.1 mg/l. The NRC requested that DOE monitor manganese and molybdenum, along with uranium, as part of the groundwater monitoring to make sure concentrations remain protective. DOE agreed to this in their September 27, 1999, correspondence.

Based on the Baseline Risk Assessment (BLRA) (DOE, 1995) no human health risks are currently associated with contaminated groundwater at the site other than potential ingestion of drinking water. Institutional controls will be in place to prevent any use of contaminated groundwater near the processing site and in Area C.

Numerical modeling estimates that there will be no future risk to human health and the environment and that the contaminants will be flushed in less than 30 years. Compliance monitoring will consist of annual monitoring for a period no less than 5 years and up to 30 years. Re-evaluating site conditions will be conducted after the 5-year period. If the compliance strategy is not proceeding as predicted, the site will be re-evaluated and the strategy modified as necessary. When uranium concentrations are consistency below the MCL, monitoring will be discontinued and the institutional controls lifted, subject to regulatory approval.

The hazardous constituent source term and extent of groundwater contamination have been characterized in the Remedial Action Plan (DOE, 1983), the Processing Site Characterization (DOE, 1984), the Baseline Risk Assessment (DOE, 1995), and the Groundwater Compliance Action Plan and Application for ACLs (DOE, 1998). The Canonsburg site has had some form of

radionuclide processing or containment within its boundaries since 1911. In the early 1960s, some surface soil remediation was performed in Area A; the resulting contaminated soils and material were placed in Area C and covered with a relatively impermeable cover material. DOE remediated the surface contamination from 1984 to 1986 that will isolate the source and greatly reduce further infiltration of water through the tailings.

To evaluate the concentrations of fate and transport of uranium between the POC and the POE (Chartiers Creek), DOE used the GANDT code followed by a stream-aquifer model called the riverine model (NRC, 1982). The GANDT model uses both analytical and numerical models of subsurface flow and transport (Knowlton, et al., in press). Sandia National Laboratories (SNL) has been developing the Groundwater Analysis and Network Design Tool, or GANDT, to provide DOE environmental restoration programs with a comprehensive system for analyzing groundwater flow and associated contaminant transport, while directly accounting for transport uncertainty and providing decision analysis capabilities for monitoring well network design.

The objective of the model was to evaluate the likelihood of success of applying ACLs at the site. A probabilistic approach was applied, using Monte Carlo methods to quantify uncertainties. The model estimated the transport of constituents within and from a contaminated source zone, using a pulsed leaching algorithm; through the vadose zone, into the groundwater in the uppermost aquifer, migration and attenuation through groundwater, discharge into the stream, and dilution with the stream. The model's assumptions include the following:

- The surficial aquifer is assumed to be connected to Chartiers Creek. The stream is assumed to be gaining, that is all groundwater discharging into the stream. The stream is assumed to be a sink for all groundwater flowing toward it in the model. Monitoring well 406 was added to verify that this assumption is correct as requested by the NRC.

- A steady-state flow system is assumed.

- The unconfined aquifer is assumed to be homogeneous.

- Sources are assumed to be a single source.

Results of the model predict that concentrations would be one or two orders of magnitude below detection limits. Based on NRC comments, DOE calculated a worse case scenario that uranium concentrations entering the stream at levels in excess of 100 mg/L would still be protective due to dilution. Uranium concentrations are not predicted to be near the levels of 100 mg/L, but NRC wanted to determine the magnitude of variability and uncertainty that could be factored into the program without causing risk. To take into account uncertainties, DOE proposed the ACL for uranium at the POC at 1.0 mg/l. This value is considered to be conservative since DOE calculated that concentrations more than 100 mg/L could discharge into the stream before levels in the stream would be a risk. From a transient perspective of the contamination migration process, it is predicted that a buildup of contaminant concentrations in the aquifer will occur as the initial leaching process proceeds, followed by a decrease in contaminant concentrations after the source term is removed. Once the source term is removed, the processes of desorption, dispersion, and flushing will dominate the characteristics of the migration process, thereby, attenuating the contaminants.

The Baseline Risk Assessment estimated the risk to humans and the environment and concluded that there are no current human health risks associated with the site contaminated groundwater and that there could be potential risk if people were to drink the contaminated groundwater or if contaminated groundwater were used in irrigation. Based on these findings, the conclusion was made that groundwater beneath the site that is contaminated should not be used, at least until levels are below the MCL. The risk of contaminated groundwater discharging into Chartiers Creek was assessed and the report concluded that due to dilution no risk was found or anticipated. The scenarios evaluated for the creek included incidental ingestion of surface water through recreational use, dermal contact with surface water through recreational use, incidental ingestion of sediments through recreational use, and ingestion of contaminated fish.

DOE evaluated a groundwater pump and treat alternative and concluded that it would cost approximately $1,112,000. Two hypothetical wells were modeled at a pumping rate of ten gallons per minute for a period of ten years. The model estimated that the concentrations would still be above the standard and would need an additional 5 to 10 years for natural attenuation to bring the contaminant levels to below the MCL. Therefore, the pump and treat option is marginally quicker than the preferred alternative and would be orders of magnitude more costly and would not be incrementally beneficial.

As a result of comments from the NRC, DOE evaluated the use of a permeable reactive treatment (PeRT) wall. DOE is using this innovative technology in Monticello, Utah, where uranium has been reduced to non-detectable levels. The wall would be placed between wells 412 and 414, down-gradient of the plume. Zero valent iron (ZVI) would be used to precipitate heavy metals from the ground water as it migrates through the wall. COCs uranium and molybdenum could be effectively reduced using this technology, however, manganese may increase because it is a trace element of ZVI. Uranium would precipitate as the mineral uraninite if the oxidation state of the aqueous solution is lowered sufficiently, as occurs with ZVI. The cost for this technology was estimated to be $1,700,000 and would, therefore, not be cost effective. The high cost of this technology is mainly due to costly materials (ZVI).

REFERENCES:

U.S. Department of Energy (DOE), 1998, Groundwater Compliance Action Plan (GCAP) and Application for Alternate Concentration Limits for the Canonsburg, Pennsylvania, UMTRA Project Site.

DOE, 1995, Baseline Risk Assessment of Ground Water Contamination at the Uranium Mill Tailings Site Near Canonsburg, Pennsylvania, DOE/AL/62350-149, Rev. 1.

DOE, 1996, Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Ground Water Project, DOE/EIS-0198.

DOE, 1995, Long-Term Surveillance Plan for the Canonsburg, Pennsylvania, Disposal Site, DOE/AL62350-203, Rev. 0.

DOE, 1993, Remedial Action Plan for Stabilization of the Inactive Uranium Mill Tailings Site at Canonsburg, Pennsylvania, UMTRA-DOE/AL-140.

DOE, 1984, Processing Site Characterization Report, Canonsburg, Pennsylvania, UMTRA-DOE/AL-0041.

Knowlton, R.G., D.M. Peterson, D. Walker, H.Zhang, J. White, in press. Reference Manual for Groundwater Analysis and Network Design Tool, or GANDT, Sandia National Laboratory, Albuquerque, New Mexico.

U.S. Nuclear Regulatory Commission (NRC), 1982, A collection of Mathematical Models for Dispersion in Surface Water and Groundwater, NUREG-0868, written by R.B. Codell, K.T. Key, and G. Whelan.

APPENDIX 1
FACTORS TO CONSIDER FOR ACLS 40 CFR PART 192.02(C)(ii)(B)

1) Potential adverse effects on groundwater quality

   i) The physical and chemical characteristics of constituents in the residual radioactive material at the site, including their potential for migration.

   ii) The hydrogeological characteristics of the site and surrounding land.

   iii) The quantity of groundwater and the direction of groundwater flow.

   iv) The proximity and withdrawal rates of groundwater users.

   v) The current and future uses of groundwater in the region surrounding the site.

   vi) The existing quality of groundwater, including other sources of contamination and their cumulative impacts on the groundwater quality.

   vii) The potential for health risks caused by human exposure to constituents.

   viii) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to constituents.

   ix) The persistence and permanence of the potential adverse effects.

   x) The presence of underground sources of drinking water and exempted aquifers identified under 144.7.

2) Potential adverse effects on hydraulically-connected surface water quality considering:

   i) The volume and physical and chemical characteristics of the residual radioactive material at the site.

   ii) The hydrogeological characteristics of the site and the surrounding land.

   iii) The quantity of groundwater and the direction of groundwater flow.

   iv) The patterns of rainfall in the region.

   v) The proximity to the site to surface waters

   vi) The current and future uses of surface waters in the region surrounding the site and any water quality standards established for those surface waters.

   vii) The existing quality of surface water, including other sources of contamination and their cumulative effect on surface water quality

   viii) The potential for health risks caused by human exposure to constituents.

   ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to constituents.

   x) The persistence and permanence of the potential adverse effects.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 28, 2003

Mr. Art Kleinrath
U.S. Department of Energy
Grand Junction Office
2597 B 3/4 Road
Grand Junction, CO 81503

SUBJECT: REVIEW OF REQUEST FOR NRC APPROVAL TO AUTHORIZE DELETION OF INSTITUTIONAL CONTROLS (AREA C) AT CANONSBURG, PENNSYLVANIA

Dear Mr. Kleinrath:

In a letter dated June 5, 2002, Mr. Cooper Wayman of your staff requested the U.S. Nuclear Regulatory Commission's (NRC's) approval regarding the deletion of institutional controls at the Title I Uranium Mill Tailings Remedial Action (UMTRA) site at Canonsburg, Pennsylvannia. During our review, you provided additional information that included site groundwater quality data and groundwater fate and transport modeling. This additional information demonstrated that groundwater levels are below regulatory standards and will most likely remain below regulatory levels in Area C. Based on the information provided to us, the NRC concurs with your proposal to delete institutional controls at the site.

During the technical review of this issue, NRC staff concluded that further groundwater use restrictions are not imperative based on the risk. However, we ask that you implement some groundwater monitoring in Area C in the future to account for the uncertainty of the fate and transport modeling and the potential for unforseen increases in groundwater concentration levels. We ask that you provide us with a plan for groundwater monitoring at Area C. The Technical Evaluation Report supporting the need for this request is enclosed.

In accordance with 10 CFR 2.790 of NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

If you have any comments or questions regarding the NRC's review, please feel free to contact the NRC project manager, Jill Caverly, at 301-415-6699 or by email at jsc1@nrc.gov.

Sincerely,

Susan M. Frant

Susan M. Frant, Chief
Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket No. WM-42

Enclosure: Technical Evaluation Report

TECHNICAL EVALUATION REPORT
DELETION OF INSTITUTIONAL CONTROLS AT CANONSBURG, PA

DATE: April 21, 2003

DOCKET NO.: WM-42

LICENSEE: U.S. Department of Energy

PROJECT MANAGER: Jill S. Caverly

TECHNICAL REVIEWER: William von Till

SUMMARY AND CONCLUSIONS:

The U.S. Department of Energy Grand Junction Office (DOE) submitted to the U.S. Nuclear Regulatory Commission (NRC) for review, a proposal to lift institutional controls at the Title I Uranium Mill Tailing Remedial Action (UMTRA) site at Canonsburg, PA. Based on information provided by, and discussed with, DOE, NRC staff concluded that the deletion of institutional controls was acceptable. DOE provided supporting information and justification that the changes would not increase the risk to human health and the environment.

By letter dated June 5, 2002, the U. S. Department of Energy (DOE) submitted a request to remove institutional controls on Area C at the Canonsburg, PA UMTRA site. The NRC staff concurred on DOE's Groundwater Compliance Action Plan (GCAP) by letter dated January 24, 2000. DOE's GCAP and application for alternate concentration limits (ACLs) were detailed in letters dated September 9, 1998, April 8, 1999, and September 27, 1999. Additionally, a February 23, 2000, DOE report concluded that uranium was the only groundwater contaminant of concern.

Upon reviewing the most recent request by DOE to remove institutional controls, staff relayed several concerns via conference calls. These concerns were related to DOE's model predictions stating that:

> results of the probabilistic analysis for the plume within Area C suggest that the concentrations of uranium will be elevated above the MCL in groundwater for a period of 15 to 20 years (page 24, DOE February 2000 GCAP).

To address NRC's concerns, DOE submitted a supplement to the GCAP by letter dated November 15, 2002, which provided recent site specific water quality data and revised modeling of the fate and transport of potential groundwater contamination.

Groundwater data collected from the point of compliance (POC) well 414 in the time period between 1997 and 2002 suggest that the groundwater contaminant plume may be attenuating

Enclosure

faster than previously predicted. DOE used the GANDT model to run multiple Monte Carlo simulations using more recent data since 1997. Since 1998, water quality in the POC well has been below the 0.044 mg/L uranium standard. The model results predict that the probability of exceeding the standard after 2005 is negligible.

NRC staff met with DOE on February 5, 2003, where DOE indicated that they would like to lift groundwater use restrictions when site data indicate that the concentrations are below regulatory levels.

CONCLUSION:

DOE has demonstrated through site groundwater quality data and groundwater fate and transport modeling that groundwater levels are below regulatory standards and are most likely to remain below regulatory levels in Area C. Therefore, further groundwater use restrictions are not imperative based on the risk. It is suggested, however, that some amount of groundwater monitoring in Area C be implemented to account for the uncertainty of the fate and transport modeling and the potential for unforseen increases in groundwater concentration levels.

Appendix B

Real Estate Documentation

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Acquisition

Site real property was acquired by the Commonwealth of Pennsylvania (State) through its Department of Environmental Resources, pursuant to Section 104 of the Uranium Mill Tailings Radiation Control Act (UMTRCA) (DOE 1995b). This property consisted of three parcels: Areas A, B, and C (Figure B–1).

Upon completion of remedial action, the State conveyed ownership of Areas A and B, via title transfer, to the U.S. government. Transfer was completed on September 13, 1995. Under Section 104(e)(1)(B) of UMTRCA, the State has opted to donate Area C to another government entity for public use (Section 2.3.4). This donation is pending.

Areas A and B consisted of 10.6 and 4.2 acres, respectively. In conjunction with the State's acquisition of Areas A and B, the Borough of Canonsburg, in the City of Canonsburg, vacated George Street and Ward Avenue. The notices to vacate were recorded by the Borough at the Office of the Recorder of Deeds in and for Washington County, in the courthouse of said county, Washington, Pennsylvania.

On the basis of the *Remedial Action Plan* (DOE 1983b), it was determined that 16 additional "non-designated" properties were required in order to complete the remedial action. These 16 properties were acquired by the U.S. Army Corps of Engineers (USACE), Pittsburgh District, on behalf of the U.S. Department of Energy (DOE).

The three parcels acquired by the state (Areas A, B, and C) and the several "non-designated" properties acquired by the USACE are listed in Table B−1 and shown in Figure B−1.

Table B−1. Real Property Acquisitions, Canonsburg Disposal Site

Tract	Acreage	Document	Date	Filing Location
Area A or Tract 118-1	10.60	Declaration of Taking		Washington County Court of Common Pleas, Adsectum Docket No. 104, 1982 term.
Area B or Tract 118-2	4.20	Declaration of Taking		Washington County Court of Common Pleas, Adsectum Docket No. 104, 1982 term.
101	0.68	Declaration of Taking	March 20, 1984	Washington County Courthouse
102	0.44	Declaration of Taking	March 27, 1984	Washington County Courthouse
103	3.07	Warranty Deed	December 14, 1983	Washington County Courthouse
104	0.26	Warranty Deed	December 14, 1983	Washington County Courthouse
106-1	0.28	Warranty Deed	November 29, 1983	Washington County Courthouse
106-2	0.52	Warranty Deed	November 29, 1983	Washington County Courthouse
107	0.27	Warranty Deed	December 13, 1983	Washington County Courthouse
108	0.12	Warranty Deed	December 13, 1983	Washington County Courthouse
109	0.05	Warranty Deed	December 14, 1983	Washington County Courthouse
112	0.90	Warranty Deed	November 29, 1983	Washington County Courthouse
113	6.15	Warranty Deed	May 31, 1984	Washington County Courthouse
114	1.23	Warranty Deed	December 14, 1983	Washington County Courthouse
116-1	0.62	Warranty Deed for Vacated Ward Street		Washington County Courthouse
116-2	1.57	Warranty Deed for Vacated George Street		Washington County Courthouse
117	3.28	Quit Claim Deed	November 7, 1984	Washington County Courthouse
125ML	17.85	Declaration of Taking	February 1, 1985	

Notes: 1. Tract 125ML was a condemnation action to extinguish an oil and gas lease and other leasehold interests.
2. Title assemblies and original deeds are on file at the DOE Management and Operating Contracts Division, Albuquerque, New Mexico.
3. Deed for tracts Areas A and B is recorded as follows: 13 September 1995, Deed Book No. 2755, Page 15, Washington County, Pennsylvania.

Legal Description

The site is a certain tract of land situated in the second ward of the Borough of Canonsburg, Washington County, Pennsylvania, and more particularly bounded and described as follows:

> Beginning at a point being the point of beginning of Tract No. 117 described in Book 2194, Page 190, being a point in the northerly right-of-way line of Consolidated Rail Corporation, on the left descending bank of Chartiers Creek, also located 60 feet northwesterly of station 768+61.60 of the original centerline of said Consolidated Rail Corporation; thence leaving Chartiers Creek and said right-of-way line, with the line of said Tract No. 117, also a line 60 feet northwesterly of and parallel with said centerline,
>
> South 71°15’ west, 502.43 feet to a point on the easterly side of Strabane Avenue; thence continuing with said parallel line, crossing said avenue,
>
> South 71°15’00” west, 995.6 feet; thence southwesterly by a curve to the left concentric with and distant 60 feet by a radial measurement northwesterly from said original centerline, an arc distance of 474.68

feet, said curve having a radius of 1,970.80 feet and a chord which bears south 64°21’00” west, a distance of 473.53 feet;

Thence southwesterly by a curve to the left concentric with and distant 60 feet by a radial measurement northwesterly from said original centerline, an arc distance of 208.42 feet, said curve having a radius of 1,492.69 feet and a chord which bears south 53°27’00” west, a distance of 208.25 feet;

Thence southwesterly by a curve to the left concentric with and distant 60 feet by a radial measurement northwesterly from said original centerline, an arc distance of 49.24 feet, said curve having a radius of 1,206.28 feet and a chord which bears south 48°16’50” west, a distance of 49.24 feet;

Thence with a radial line north 42°53’20” west, 70 feet to a point in said northerly right-of-way line, also the south line of George Street (40 feet wide);

Thence leaving said Tract No. 117, north 30°28’ east, 100.44 feet to a corner of Tract 114 described in Book 2135, Page 197; thence with the line of said Tract No. 114,

North 18°11’ east, 28.00 feet to a point in Chartiers Creek; thence continuing with the line of said Tract No. 114, and with the line of Chartiers Creek, downstream,

North 29°20’ east, 72.93 feet,
North 42°20’ east, 76.03 feet,
North 40°37’ east, 148.20 feet,
North 24°51’ east, 153.40 feet to a corner common to said Tract No. 114 and Tract No. 113 described in Book 2152, Page 511, being a point in Chartiers Creek; thence leaving said Tract No. 114, with the line of said Tract No. 113, downstream in and along Chartiers Creek,

North 24°51’ east, 81.60 feet,
South 67°15’ east, 20.50 feet,
North 06°17’ east, 123.70 feet,
North 01°59’ west, 226.09 feet,
North 16°34’ west, 31.05 feet to a point on the southerly right-of-way line of the Pittsburgh Railways Co., also known as the Washington and Canonsburg Railway (now abandoned), also a corner common to said Tract No. 113 and Tract No. 112 described in Book 2132, Page 405; thence leaving said Tract No. 113, with the line of said Tract No. 112, along or within the southerly portion of Chartiers Creek, downstream,

North 15° 09’ east, 48.00 feet,
North 19°37’ east, 296.50 feet,

North 28°03’ east, 47.28 feet to a corner common to said Tract No. 112 and Tract No. 106-2 described in Book 2132, Page 400, being a point within or near the southerly portion of Chartiers Creek; thence leaving said Tract No. 112, with the line of said Tract No. 106-2, within or along the southerly portion of Chartiers Creek, downstream,

North 28°03’ east, 135.22 feet,
North 32°13’ east, 70.80 feet,
North 55°30’ east, 13.73 feet to a corner common to said Tract No. 106-2 and Tract No. 103 described in Book 2134, Page 273 being a point within or near the southerly portion of Chartiers Creek; thence leaving said Tract No. 106-2, with the line of said Tract No. 103, within or along the southerly portion of Chartiers Creek, downstream,

North 55°30’ east, 67.27 feet,
North 70°59’ east, 88.00 feet,
North 88°04’ east, 69.50 feet,
South 76°05’ east, 107.40 feet,
South 84°20’ east, 85.60 feet,
North 72°50’ east, 67.08 feet,
North 67°40’ east, 68.50 feet along an adjusted course (record: north 68°01’ east, 66.50 feet) to a corner common to said Tract No. 103 and Tract No. 101 described in Declaration of Taking, Civil No. 84-1735, U.S. District Court, Western District of Pennsylvania, being a point on the right descending bank of Chartiers Creek; then leaving said Tract No. 103, with the line of said Tract No. 101, down Chartiers Creek.

North 59°04’ east, 175.58 feet,
North 76°49’ east, 56.90 feet,
South 75°41’ east, 56.60 feet,
South 59°38’ east, 31.85 feet to a corner common to said Tract No. 101 and Tract No. 102 described in Declaration of Taking, Civil No. 84-1250, U.S. District Court, Western District of Pennsylvania, being a point on the right descending bank of Chartiers Creek; thence leaving said Tract No. 101, with the line of said Tract No. 102, down Chartiers Creek,

South 59°38’ east, 21.94 feet,
South 31°22’ east, 26.78 feet to a point on the northerly right-of-way line of the Washington and Canonsburg Railway Company (now abandoned), thence crossing said right-of-way,

South 31°22’ east, 50.03 feet to a point on the southerly right-of-way line of said railway, also a corner common to said Tract No. 102 and Tract No. 118-2 described in Book 2755, Page 15, being a point located on the right descending bank of Chartiers Creek; thence leaving said Tract No. 102, with the line of said Tract No. 118-2, downstream,

South 31°58’ east, 28.82 feet,
South 27°42’ east, 166.65 feet,
South 43°25’ east, 68.10 feet,
South 65°35’ east, 214.75 feet along an adjusted course (Record: South 65°35’ east 214.70 feet) to a point common to the west line of Strabane Avenue; thence leaving Chartiers Creek, continuing with the line of said Tract No. 118-2, with the west line of Strabane Avenue,

South 39°06’ west, 154.30 feet,
South 30°00’ west, 145.65 feet,
South 21°00’ west, 100.47 feet to the intersection of the east line of Ward Street with the west line of Strabane Avenue; thence leaving said Tract No. 118-2, with the west line of Strabane Avenue, crossing Ward Street,

South 05°00’ west, 44.55 feet to the intersection of the west line of Ward Street with the west line of Strabane Avenue, also a corner common to Tract No. 118-1 described in Book 2755, Page 15; thence with the line of said Tract No. 118-1, along the west line of Strabane Avenue,

South 05°00’ west, 130.94 feet to the intersection of the north line of George Street with the west line of Strabane Avenue; thence leaving said Tract No. 118-1, with the west line of Strabane Avenue, crossing George Street,

South 05°00’ west, 43.70 feet to the intersection of the south line of George Street, the west line of Strabane Avenue, and the northerly line of Tract No. 117, described in Book 2194, Page 190; thence leaving the west line of Strabane Avenue, with said line of said Tract No. 117, crossing Strabane Avenue,

North 71°15’ east, 43.70 feet to a corner common to the east line of Strabane Avenue and said line of said Tract No. 117; thence leaving the east line of Strabane Avenue, continuing with said line of said Tract No. 117,

North 78°30’00” east, 475.43 feet to a point on the bank of Chartiers Creek, thence with the bank of Chartiers Creek,

South 18°45’00” east, 10.00 feet to the point of beginning.

Containing 34.169 acres (more or less).

Repository

Documentation and correspondence related to property acquisition are on file at the U.S. Department of Energy, 2597 B ¾ Road, Grand Junction, Colorado, 81503.

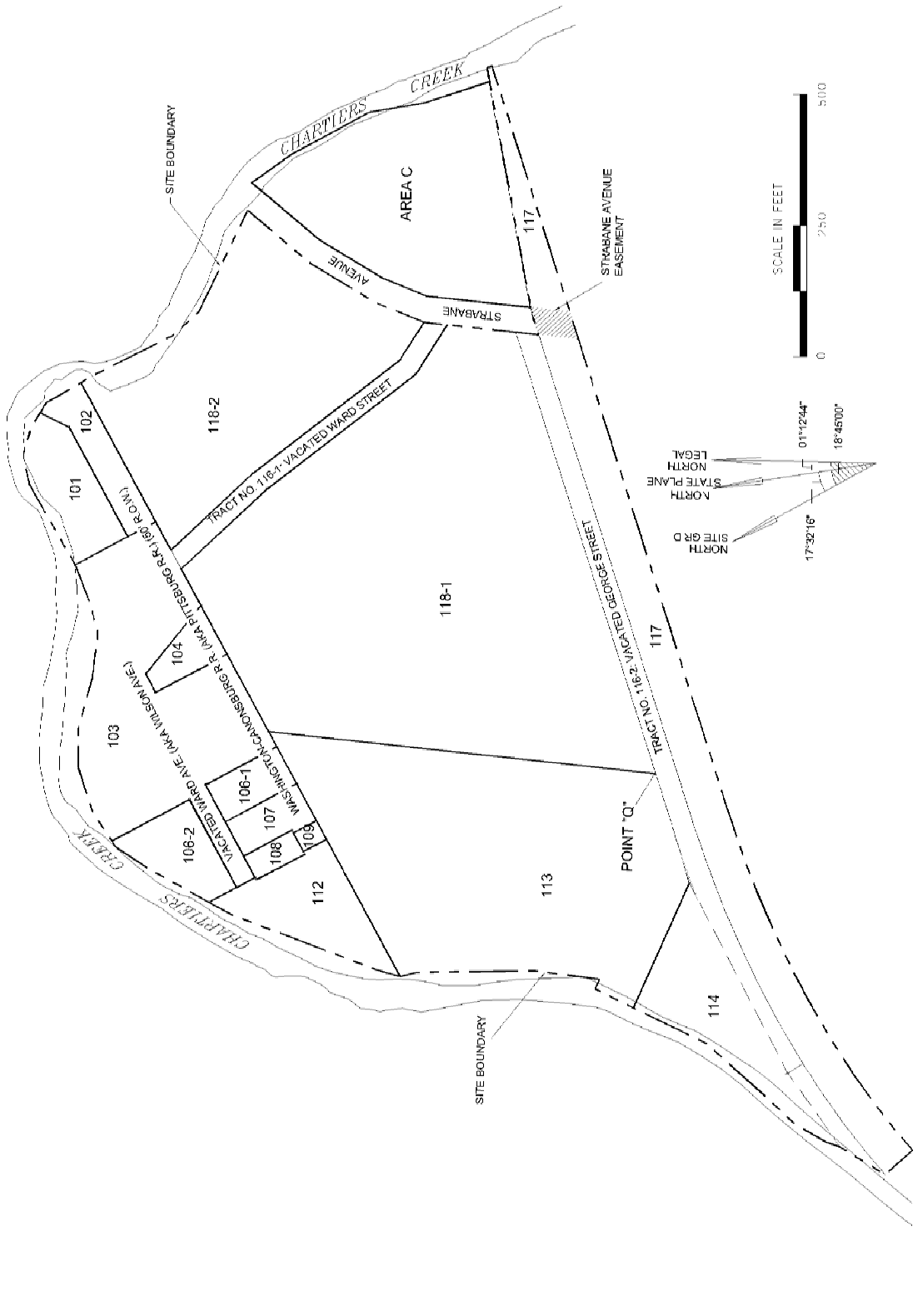

Figure B−1. Real Estate Tract Map for Canonsburg Disposal Site

Area C Deed Restrictions

Recorded in Washington County, Pennsylvania, records.

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R0003LT6 WCR0003312

DE-RO01-07LM70063
Canonsburg, PA

WHEN RECORDED RETURN TO
Steven R. Schiesswohl, Realty Officer
US Department of Energy, Office of Legacy Management
11025 Dover Street, Suite 1000
Westminster, CO 80021-5573

Date:
Fee:
Recorder:
Filed by:
For:

EASEMENT AND COVENANT TO RESTRICT USE
A and S Landscaping

A&S Landscaping, hereinafter referred to as "Grantor," in consideration of the sum of $00.00, does hereby grant, a perpetual and assignable easement interest and agrees to provide the right of access and further restrict the use of the easement areas (hereinafter referred to as "Property") as detailed in Exhibit A to the **UNITED STATES OF AMERICA**, hereinafter referred to as "Grantee", represented by the United States Department of Energy, (hereinafter referred to at "DOE") in, upon, over and across the Property located in the Borough of Canonsburg, County of Washington, State of Pennsylvania.

A. Description of Facts:

A. 1. The Property (Former Canonsburg Site Area C) was previously owned by the Commonwealth of Pennsylvania and DOE and its contractors cleaned it up under the authority of the Uranium Mill Tailings Radiation Control Act of 1978 (42 U.S.C. Section 7901 et seq., (hereinafter "UMTRCA"). The Property was conveyed to A&S Landscaping by sale on June 21, 2005. The deed from the Commonwealth of Pennsylvania is recorded in the Washington County Courthouse under Reception No. 2006000067. Said deed reserved a certain perpetual easement to DOE and also was subject to specific restrictions and covenants such as monitoring wells and radon restrictions that precluded certain soil excavations and other restrictions. This easement supplements those restrictions and covenants, but does not preclude any of the rights and obligations of the parties in the earlier instrument.

A. 2. The Grantor owns the Property in the vicinity of the Canonsburg UMTRCA Site some of which DOE has determined to require deed restrictions and other institutional controls.

A. 3. The Grantor and DOE wish to enter into this agreement to carry out the purposes of UMTRCA as described in detail in the Site's Long Term Surveillance and Maintenance Plan, and to protect the human health and the environment.

B. Deed Restriction Requirement and Perpetual Access:

B. 1. DOE has determined that deed restrictions need to be imposed on the Grantor's Property to ensure protection of human health and the environment. These

include certain specific restrictions on the use of groundwater, restrictions to prevent soil disturbance, and perpetual access by DOE to conduct monitoring and other operations.

B. 2. The Grantor agrees that in order to protect human health and the environment, the Property shall be used in such a manner as to adhere to the rights, conditions and additional restrictions described herein.

ARTICLE I
GENERAL PROVISIONS

1.1 This agreement sets forth rights, conditions and restrictions upon the Property. Each and all of the rights, conditions and restrictions shall run with the land, and pass with each and every portion of the Property, and shall apply to and bind the respective successors in interest thereof.

1.2 By granting and accepting the terms and conditions of this agreement, the Grantor and Grantee (hereinafter the Parties), their successors and assigns, agree to be bound by said terms and conditions and agree that the Parties shall be entitled to specific performance of any of the provisions or conditions thereof in any court of competent jurisdiction if the curing of any violation has not occurred within thirty (30) days after the Party has provided written notice to the violating Party of said violations or deficiencies.

1.3 All purchasers, lessees, or possessors of any relevant portion of the Property shall be deemed by their purchase, leasing, or possession of such Property, to be in accord with the foregoing and to agree for and among themselves, their heirs, successors, and assigns, that the rights, conditions, and restrictions, as herein established, must be adhered to for the benefit of future owners and occupants and that their interest in the Property shall be subject to the Restrictions contained herein.

1.4 The Grantor agrees that the entire agreement set out herein shall be recorded and incorporated by reference in each and all deeds and leases of any portion of the Property. The agreement shall be recorded by the Grantee in the Washington County Recorder's office as set forth above.

1.5 This document shall constitute the entire agreement between the Parties and any prior understanding or representation of any kind shall not be binding on either Party except to the extent incorporated in this agreement. The Parties may enter into separate agreements on the Property for other purposes such as land management or access to specific areas on the Property.

ARTICLE II
RIGHTS, CONDITIONS AND RESTRICTIONS

2.1 Said rights are conveyed subject to existing easements for public roads and highways, public utilities, railroads and pipelines.

2.2 DOE and their authorized representatives, contractors and subcontractors are granted the right of access over the Grantor's Property, described above, to access the property to monitor for any potential radiological contamination of the property, to inspect the Property for stream bank stability, for restoration of any erosion not caused by the Grantor, and to take other responsible action consistent with the evaluation and performance of UMTRCA remedial actions. Access will be coordinated as closely as possible with the Grantor, its successors or assigns, to minimize interference of their use and enjoyment of the Property.

2.3 The monitoring well on the Property shall not be disturbed, and access by foot or vehicle for purposes of monitoring, surveillance, maintenance, or decommissioning activities shall be granted to the Pennsylvania Department of Environmental Protection, hereinafter referred to as "DEP", DOE, or their successors and assigns, or their duly authorized representatives in and around any and all buildings erected on the Property. Grantor shall also allow access to DEP, DOE, or their successors and assigns, or their duly authorized representatives, access by foot to a surface water sampling location on the Chartiers Creek stream bank.

2.4 As a result of possible radon accumulation within occupied or habitable structures, DOE and DEP will permit only non-residential use of the Property. DOE and DEP may monitor the Property for the purpose of measuring and assessing the presence and concentrations of radioactive materials, including but not limited to radon and its daughter products in any occupied structures. As a result of two (2) low-concentration deposits of thorium-230 left in place more than six (6) feet beneath the current land surface, the Grantor shall observe the following limitations on excavation depths:

1) To ensure that structures will remain safe from radon, Grantor and all subsequent purchasers shall ensure that at least two (2) feet of undisturbed, clean material remains on top of the thorium-contaminated soil within a structure footprint. To accomplish this, excavation depths for construction of structures are limited to four (4) feet below present surface grade on the Property, unless owner first obtains written approval of DOE and DEP.

2) To ensure that excavations for other purposes (e.g., utilities) do not encounter the thorium-contaminated soil, Grantor and all subsequent purchasers shall not excavate deeper than six (6) feet below present surface grade anywhere on the parcel without prior written approval of DOE and DEP.

3) If Grantor or subsequent owner of the Property allows or causes thorium contaminated materials from depths greater than six (6) feet beneath the current land surface to be exposed or dispersed, the Grantor or subsequent landowner shall be responsible for all costs relating to consolidation and permitted disposal of the contaminated materials.

2.5 The Grantor shall maintain adequate storm water controls on the Property to prevent erosion of the soils along said Chartiers Creek. If Grantor develops the Property, appropriate storm water controls shall be used to prevent runoff from the Property into Chartiers Creed and to prevent stream bank erosion. The Grantor shall repair any damage to the stream bank caused by the Grantor's actions.

2.5 The Property shall not be used in such a way that will disturb or interfere with the integrity of any monitoring system.

2.6 Any violation of the agreement shall be grounds for DOE to take enforcement action, including the filing of an administrative, civil or criminal action, as provided by law, against the Grantor, its successor or assigns, subject to all applicable defenses.

2.7 The Grantor, its successor or assigns, as the owners of any property where monitoring wells or other response actions are located shall notify DOE and DEP by certified mail, at least thirty (30) days prior to any conveyance, of the property owner's intent to convey any interest in the property and of the provisions made for the continued operation of the monitoring wells or other response actions installed pursuant to this Agreement.

ARTICLE III
REMOVAL OF RESTRICTIONS

3.1 The Restrictions detailed in this agreement may be removed from the Property or portions thereof when DOE and DEP have determined that the site meets regulatory standards, as approved the Nuclear Regulatory Commission; otherwise the Restrictions and requirements of this agreement shall continue in effect in perpetuity.

ARTICLE IV
MISCELLANEOUS

4.1 Nothing set forth herein shall be constructed to be a dedication or offer of a gift or dedication of the Property or any portion thereof of the general public for any purposes.

4.2 Whenever any person gives or serves any notice, demand, or other communication with respect to this agreement, such notice, demand, or communication shall be in writing and shall be sent simultaneously to an authorized representative of the Grantor and to the DOE, in certified mail with return receipt requested.

4.3 If any portion of this agreement is determined to be invalid or unenforceable for any reason, the remaining portion of the agreement shall remain in full force and effort.

TO HAVE AND TO HOLD the rights hereby granted to the Grantee and its successors and assigns forever, by the Grantor, except that the Grantor affirmatively states they have received no claims to ownership from anyone since they acquired title to the Property, and that they have not conveyed or incurred any liens against the Property.

IN WITNESS WHEREOF, the Grantor and the Grantee execute this agreement as of the date set forth below.

11-15-07
Date

Grantor

A & S Landscaping
Partner (Title)

Concurrence

Grantee United States of America

Steven R. Schiesswohl, Realty Officer

Acknowledgement page follows

State of PA

County of Washington

On this the 2ND day of January 2008, before me, Scott J. Sieb, Partner of A&S Landscape, the undersigned personally appeared and is know to me (or satisfactorily proved) to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purposes therein contained.

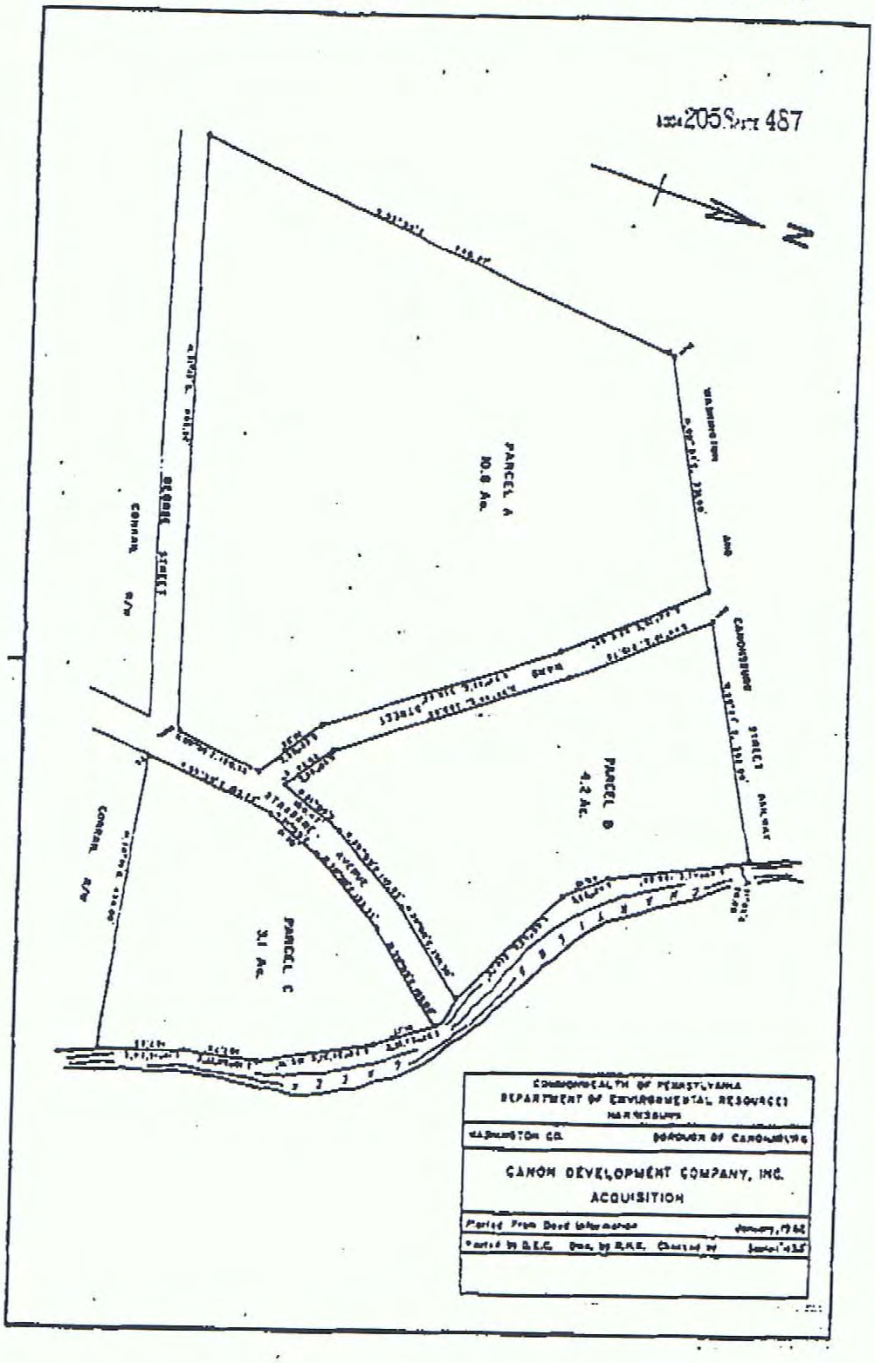
IN WITNESS WHEREOF, I hereunto set my hand and official seal.

Title of Officer

My commission expires: _____

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Roberta Z. [illegible], Notary Public
North Strabane Twp., Washington County
My Commission Expires Mar. 2, 2008
Member, Pennsylvania Association of Notaries

Exhibit A – Area C (Parcel Number 100-034-00-00-0001-00)



Deed Restrictions for Area C
Exhibit 1, Plat of Area C as recorded in Washington County, Pennsylvania, records

Legal Description (Former Area C)

All that land situated in the Borough of Canonsburg, Washington County, being bounded and described as follows:

BEGINNING at the Northern-most corner of Parcel C in Strabane Avenue, which lies South 74° 02'08" East 43.49 feet from a corner of Parcel B; Thence along Chartiers Creek, the following four courses:

1) South 37° 24' 13" East 90.51 feet;
2) South 29° 38' 31" East 169.71 feet to an iron pin;
3) South 10° 58' 17" East 107.79 feet;
4) South 19° 15' 24" East 127.23 feet to an iron pin on other lands of the U.S. Department of Energy;

Thence along lands of the U.S. Department of Energy South 78° 31' 00" West 435.75 feet to an iron pin in Strabane Avenue, the following four courses:

1) North 5° 00' 00" East 195.99 feet;
2) North 21° 00' 00" East 91.70 feet;
3) North 30° 00' 00" East 139.33 feet;
4) North 39° 05' 00" East 168.20 feet to iron pin and the place of **BEGINNING**.

Parcel C is referenced as Parcel #100-034-00-00-0001-00 with Washington County, PA and contains approximately 3.109 acres.

DEBORAH BARDELLA
RECORDER OF DEEDS
WASHINGTON, PA
Pennsylvania

INSTRUMENT NUMBER
200800121
RECORDED ON
Jan 02, 2008
2:55:14 PM
Total Pages: 8

RECORDING FEES $42.00
TOTAL PAID $42.00

NV: 353359 USER: TW

-8-

Appendix C

Inspection Checklist

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U.S. Department of Energy, Office of Legacy Management
Grand Junction, Colorado

ANNUAL SITE INSPECTION CHECKLIST
CANONSBURG, PENNSYLVANIA, UMTRCA TITLE I DISPOSAL SITE

Status of Site Inspections

Date of This Revision: September 2008

Last Annual Inspection: September 20, 2007
Inspectors Ransbottom and Broberg

Next Annual Inspection (Planned): October 2008
Inspectors Miller and Broberg

No.	ITEM	ISSUE	ACTION
1	Access	Access is directly from Strabane Avenue.	None required
2	Protocols	Notify NRC and PA Department of Environmental Protection.	Notifications will be made ahead of scheduled inspection.
3	Specific site surveillance features	See attached list. **Erosion Control Markers:** For each ECM pair, the marker that is closest to the disposal cell marks the approx. location of the buried riprap wall. If it becomes apparent that the innermost ECM in the pair is threatened by erosion, DOE must take action (see LTSP, Section 3.5.2). Erosion control marker ECM–4A was lost to bank erosion in 1997. ECM–2A was washed out and found loose after flood-borne debris was cleaned up in 2005. **Boundary Monuments:** Verify condition of all boundary monuments.	Inspect. Inspect area around ECM-4A for further erosion. ECM–2A was reset in September 2005 and the location was verified using GPS equipment. Carry photos and shovel to assist in finding boundary monuments..

No.	ITEM	ISSUE	ACTION
		Inspectors located BM–4 in rip-rap covered channel in 2004 and inserted finding aids on site map. Marker is near Strabane Ave side of channel. **Security Fence:** Fence was replaced in 2007. **Perimeter Signs:** Perimeter signs have been reported as missing in the past. **Disposal Cell:** In the past, occasional animal burrows have been found on the cell cover.	Note if any signs need to be replaced. Monitor the location and significance of any animal burrows.
4	Monitor wells	There are 5 active monitor wells, and 3 inactive monitor wells. The 3 inactive monitor wells will be inspected when the 5 active monitor wells are sampled. FYI: Monitoring is required as a BMP because uranium is above the MCL at monitor wells MW–0412, MW–0413, and MW–0414B.	Wells (both active and inactive) will be inspected when sampled.
5	Vegetation	Canada thistle, a noxious weed, is present at several locations (see drawing). Poison hemlock, an invasive weed, is established on the south portions of the site. These weeds are being address by the vegetation management plan. The grass (mixture of grasses, weeds, and crown vetch) on the disposal cell site requires mowing to maintain turf health. Deadfall sometimes accumulates in on-site groves, resulting in an unkempt appearance. Inspectors have been monitoring the northeast	A Vegetation Management Control Plan was prepared for this site in 2008. Evaluate vegetation management efforts and report concerns and progress. Assess health of grass on disposal cell. Site should have been mowed before the inspection. Mark any areas of deadfall accumulation. Evaluate the condition of the turf in this area and verify that the vegetation is providing adequate erosion protection.

No.	ITEM	ISSUE	ACTION
		side slope of the cell for several years because the turf in this area has appeared less healthy than that of the remainder of the site.	
6	Diversion channels and perimeter ditches	Diversion channels and perimeter ditches should be kept free of any vegetation that might impede the flow of water. Individual rocks within the diversion channels have been observed to be deteriorating. This condition has not noticeably worsened and is considered an artifact of quarrying and placement.	Note any vegetation found in diversion channels and perimeter ditches that might impede the flow of water. No wood vegetation should be present. Observe riprap quality and note indication of poor rock durability.
7	Stream Bank Stability: Disposal Site	During the site licensing process, there were concerns that flooding along Chartiers Creek could, hypothetically, threaten the disposal cell and VPLM area. DOE considers the risk very small (see LTSP, Section 3.5.2). Several stream bank stabilization projects have been completed along Chartier Creek. Significant erosion occurred during the hurricanes in 2004 and the stream bank was hardened with riprap in spring 2005. The 2004 hurricanes did not damage the cell but water levels rose onto the floodplain, a large tree was uprooted, and much debris was deposited. Stream bank stabilization projects also took place along Chartiers Creek in 2006 and 2008 (locations shown in Figure 2-2). The stream bank west of the site has historically not been inspected for stability because bed rock outcrops and mature trees indicated the bank was stable. In 2007 the site perimeter fence was re-located to the east to allow better access to the	Inspect along the floodplain adjacent to the site for stability and erosion. Inspect stream bank stabilization sites for any changes or impacts that might adversely affect stabilization Inspect area east of west perimeter fence to ensure assumptions remain valid and note any changes to the area that might have taken place

No.	ITEM	ISSUE	ACTION
		outside eastern side of the fence. Beavers have been active along the Chartiers stream bank in the past, felling mature hardwood trees north of the site where the bank slope is flatter.	Monitor for beaver activity
8	Stream Bank Stability: Area C	Stream bank stabilization east of Area C was completed in 2005. Willow plantings were only marginally successful but grass growth was robust.	Inspect bank for stability; assess re-vegetation on bank and on flat surface..
9	Trash	Litter accumulates along Strabane Avenue, and past inspections have discovered beer cans in the grove on the west side of the site.	Carry trash bags and be prepared to pick up trash, and monitor area for signs of trespass, pick up trash.
10	Area C Transfer	Area C was transferred from the Commonwealth of PA to a private owner. Upon transfer, DOE is no longer responsible for maintenance. Area still needs to be inspected to assess if ICs are being observed.	Determine if ICs are being observed.
11	Railroad Encroachment	The Pittsburgh Industrial Railroad has cleared, grubbed, and spread gravel on DOE property in the southwest corner of the site. They have left materials and debris on this property and pushed debris over the bank. The RR has also left debris on DOE property east of Strabane Ave.	DOE informed the RR of the encroachment. Check for new signs of encroachment
12	RRM on parcel of land in SW corner of property, north of railroad tracks.	A radiological survey was conducted in 2007 to evaluate releasing this parcel of land for industrial reuse (DeNuke 2008). Isolated areas of Ra-226 contamination were identified in the soil (Figure 2-2). Under current property usage these radiological conditions do not pose a level of risk that is sufficient to require corrective measures. As discussed in Section 2.3.3 the decision was made to take no action and to remove this parcel of land as a reuse candidate.	Inspect for signs of any changing activity or trespass.

SPECIFIC SITE SURVEILLANCE FEATURES, SEPTEMBER 20, 2007
CANONSBURG, PA, UMTRCA TITLE I DISPOSAL SITE

FEATURE	COMMENT
Access Road	Strabane Avenue (public right of way)
Gates	Gates were replaced in 2007.
Entrance Sign	1
Perimeter Signs	Total: 11, P1, P3, and P5 replaced by samplers in 2004, p11 replaced by inspectors in 2005.
Security Fence	Fence was replaced in 2007.
Survey Monuments	Total: 3
Boundary Monuments	Total: 4
Erosion Control Markers	4 pair initially, ECM–4A lost in 1997, ECM–2A reset in 2005.
Site Markers	Total: 2
Monitor Wells	5 actively monitored MW-0406A: Off-site northeast, across creek – downgradient MW-0412: On-site, north – downgradient MW-0413: On-site, northeast – downgradient MW-0414B: Area C, below railroad grade – crossgradient MW-0424: Area C, near Strabane Avenue bridge – downgradient 3 not actively monitored MW-0504: Off-site, south, at MW-410 – water levels only MW-0505: Off-site, northeast, at MW-406 – water levels only MW-0410: Off-site, south – upgradient

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Appendix D

Area C Thorium Results

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Area C Available Thorium Soil Sampling Results

Ascending order by grid	
Grid	Th-230 Concentration (pCi/g)
220	5.9
230	28
240	58
241	2.5
325	23
328	25
330	31
343	14
390	3.5
413	4.9
420	5.3
430	7
660	17
671	7.5
673	3.2
674	4.3
680	3.9
690	6.4
701	17
703	3.5
704	5.3
732	3
800	4.7
809	58
810	8
826	3.2
827	24
828	7.5
834	3.1
848	28
850	25
851	4.8
860	23
870	4.3
880	4.9
890	3.7
900	4.8
930	4
960	3
962	8.7
969	3.1
970	3.1
971	3.9
990	2.5
992	6.4
993	8
1000	14
1020	5.9
1240	8.7
1241	31

Descending order by concentration	
Grid	Th-230 Concentration (pCi/g)
240	58
809	58
330	31
1241	31
230	28
848	28
328	25
850	25
827	24
325	23
860	23
660	17
701	17
343	14
1000	14
962	8.7
1240	8.7
810	8
993	8
671	7.5
828	7.5
430	7
690	6.4
992	6.4
220	5.9
1020	5.9
420	5.3
704	5.3
413	4.9
880	4.9
851	4.8
900	4.8
800	4.7
674	4.3
870	4.3
930	4
680	3.9
971	3.9
890	3.7
390	3.5
703	3.5
673	3.2
826	3.2
834	3.1
969	3.1
970	3.1
732	3
960	3
241	2.5
990	2.5