Five-Year Review Report
Pfohl Brothers Landfill Superfund Site
Erie County
Town of Cheektowaga, New York

Prepared by:

United States Environmental Protection Agency
Region 2
New York, New York

March 2006

EXECUTIVE SUMMARY

This is the first five-year review for the Pfohl Brothers Landfill Superfund site. The site is located in the Town of Cheektowaga, Erie County, New York. Currently, the landfill remedy is functioning as intended by the decision documents and is protecting human health and the environment.

Five-Year Review Summary Form

Site Name *(from WasteLAN)*: Pfohl Brothers Landfill

EPA ID *(from WasteLAN)*: NYD980507495

Region: 2	**State:** NY	**City/County:** Town of Cheektowaga/Erie County

SITE STATUS

NPL Status: ■ Final ☐ Deleted ☐ Other (specify) _____

Remediation Status (choose all that apply): ☐ Under Construction ☐ Operating ■ Complete

Multiple OUs ■ YES ☐ NO	**Construction completion date:** September 27, 2002

Are portions of the site in use or suitable for reuse? ■ YES ☐ NO ☐ N/A

REVIEW STATUS

Lead agency: ☐ EPA ■ State ☐ Tribe ☐ Other Federal Agency _____

Author name: Pamela Tames

Author title: Remedial Project Manager	**Author affiliation:** EPA

Review period: 3/19/2001 to 3/19/2006

Date(s) of site inspection: 10/17/2005

Type of review:

☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only
☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead
☐ Regional Discretion ☐ Policy ■ Statutory

Review number: ■ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____

Triggering action:

■ Actual RA Onsite Construction at OU # 1 ☐ Actual RA Start at OU# ___
☐ Construction Completion ☐ Previous Five-Year Review Report
☐ Other (specify) _____

Triggering action date *(from WasteLAN)*: 3/19/2001

Due date *(five years after triggering action date)*: 3/19/2006

Does the report include recommendation(s) and follow-up action(s)? ☐ yes ■ no
Is human exposure under control? ■ yes ☐ no
Is migration of contaminated groundwater stabilized? ■ yes ☐ no ☐ not yet determined
Is the remedy protective of the environment? ■ yes ☐ no ☐ not yet determined
Acres in use or suitable for use: **restricted:** 94 acres **unrestricted:** 36 acres

Five-Year Review Summary Form (continued)

Issues, Recommendations, and Follow-Up Actions

This site has ongoing operation, maintenance and monitoring activities as part of the selected remedy. As was anticipated by the decision documents, these activities are subject to routine modification and adjustment. This report includes suggestions for improving, modifying, and/or adjusting these activities. This report did not identify any issue or make any recommendation for the protection of public health and/or the environment which was not included or anticipated by the site decision documents.

Protectiveness Statement

The implemented actions under Operable Unit 1 protect human health and the environment. The landfilled areas have been capped, removing direct contact (*i.e.*, ingestion or dermal contact of soil) exposures to the public. Institutional controls are in place to further prevent potential exposures to the public, including trespassers. The potential impacts to groundwater are being addressed through the caps that reduce or prevent percolation through the landfilled areas. The leachate collection system is discharging to an appropriate discharge facility to further reduce potential exposures to the population. The Operable Unit 2 remedy provided no further actions. Therefore, the site is protective of human health and the environment.

I. Introduction

This first five-year review for the Pfohl Brothers Landfill site, located in the Town of Cheektowaga, Erie County, New York, was conducted by United States Environmental Protection Agency (EPA) Remedial Project Manager (RPM) Pamela Tames. The review was conducted pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §9601 *et seq.* and 40 CFR 300.430(f)(4)(ii) and in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The purpose of five-year reviews is to ensure that implemented remedies protect public health and the environment and that they function as intended by the site decision documents. This report will become part of the site file.

In accordance with the Section 1.3.1 of the five-year review guidance, a five-year review is triggered by the initiation of the first remedial action that leaves hazardous substances, pollutants, or contaminants on-site above levels that allow for unlimited use and unrestricted exposure. The trigger for this five-year review is the on-site construction start associated with capping the landfilled areas, which was March 19, 2001.

This site is divided into two operable units. Operable Unit 1 consists of 2 landfilled areas and Operable Unit 2 consists of a soil borrow area and off-site groundwater.

This five-year review found that the implemented remedy is functioning as intended and continues to protect human health and the environment.

II. Site Chronology

Table 1 (attached) summarizes the site-related events from discovery to the present.

III. Background

Site Location

The Pfohl Brothers Landfill site is a 130-acre inactive landfill located in a commercial/residential area in the Town of Cheektowaga, Erie County, New York, approximately one mile northeast of Buffalo International Airport.

The site is bordered by wetlands, Aero Lake, Aero Creek, and the New York State Thruway to the north. The remaining boundaries consist of Transit Road to the east, a Niagara Mohawk Power easement and wetlands to the west, and residential yards (along the north side of Pfohl Road) and Conrail tracks to the south. In addition, the site is bisected by Aero Drive. The road and wetlands

divide the site into three distinct areas—Areas A[1], B, and C (see figure).

Physical Characteristics

The site consists of two capped fill areas. One fill area (approximately 70 acres) is located on Area B and the other (approximately 24 acres) is located on Area C. The two capped areas are individually fenced and there are two entrance gates along Aero Drive—one on the north side for Area B and another on the south side for Area C. A utility building is located inside the entrance gate on the north side of Aero Drive. The capped areas have evenly-distributed gas vents for the landfill gas control system. Several engineered drainage swales, ditches, and culverts divert surface water off the caps.

A portion of Area A was used as a borrow area by the New York Thruway Authority for road fill material. Aero Lake, a 40-acre man-made lake, was created from the borrow pit. The remainder of Area A contains the Thruway ramp and toll booths, as well as a trucking firm.

Surface drainage in the area is generally to Aero Creek, Aero Lake, adjacent wetlands and unnamed tributaries, which eventually drain into Ellicott Creek, a regional creek that empties into the Niagara River at the City of Tonawanda, New York. Several ponds, marshes, and wetlands are within a mile of the site.

Existing flood insurance maps (Federal Emergency Management Agency, 1983) indicate that the site is not in the Ellicott Creek Floodway. Changes to the flood elevation in Ellicott Creek did not occur as a result of site construction. The areas just outside the boundary of Area B (*i.e.*, Aero Lake, Aero Creek, and adjacent wetlands) are within the 100-year flood zone elevation of 696.8 feet, as are several areas within Area C located adjacent to Aero Drive, Transit Road and Pfohl Road.

Vegetation patterns at the site are a mixture of herbaceous field, weed, and grass species. Both open-field, wetland and forested habitats characterize the surrounding area. These habitats support a variety of avian and mammalian species. No New York State Department of Environmental Conservation (NYSDEC) Significant Habitat Areas are found on-site, and no endangered or threatened species were identified in this area.

Site Geology/Hydrogeology

The Pfohl Brothers Landfill is located in the Lake Erie Plain. The topographic setting consists of gently rolling hills and intervening flatlands 6 to 12 miles in width formed by Pleistocene glaciation. The region is underlain by gently dipping bedrock of sedimentary nature (*e.g.*, sandstones, siltstones, and shales). The advancement, melting and subsequent retreat of the glacier resulted in the deposition of till and lacustrine sediments in the vicinity of the site. The sediments consist of clay

[1] Area A was the subject of a January 10, 1994 no action Record of Decision (ROD) (See Section IV. Remedial Actions, Remedy Selection, below). Therefore, Area A is not being reviewed.

with discontinuous bands of silt and very fine sand.

The underlying bedrock, located approximately 20 feet below ground surface (bgs), consists of Onondaga Limestone and also serves as the principal aquifer within the area of the landfill. Most of the ground water flow occurs through rock fractures and interconnected cavities. Recharge to the aquifer occurs mainly through precipitation, which averages about 36 inches per year.

The landfill lies within the Erie-Niagara drainage basin and is surrounded by Aero Lake to the north and Ellicott Creek to the south. Data obtained from surface water level measurements in creeks and tributaries surrounding the landfilled areas imply that the aforementioned surface-water features act as hydraulic boundaries to groundwater flow and that groundwater from the landfilled areas discharges, in part, into nearby surface waters.

The regional ground water flow in the unconsolidated aquifer is generally in a south-southwest direction and eventually discharges into both Aero Lake and Ellicott Creek. During the wet seasons, the groundwater moves radially outward from the site in all directions, except to the northeast, due to local groundwater mounding. During those times, Aero Lake and the wetlands surrounding the site serve as local discharge areas for the aquifer.

Land and Resource Use

Land use in the vicinity of the site consists of a mix of residential, commercial, and industrial properties. The Buffalo Niagara International Airport is located just 1 mile to the west of the site. Several residences are located to the southwest within 1,000 feet of the site boundary.

The New York State Thruway borders Area A to the north. A toll plaza and an access ramp for the Thruway are located in the southern half of Area A. Aero Lake, a 40-acre man-made lake formed from a borrow pit used during the construction of the Thruway, is located to the west of Area A and north of Area B. The 40-acre, 20-foot deep man-made Aero Lake is classified as Class D water and is used by local residents for fishing in the warmer months.

Thirty-six acres of the landfilled areas located on either side of Aero Drive and along Pfohl Road were excavated during the remedial action and are now available for redevelopment.

History of Contamination

Landfilling operations at the site were conducted from 1932 to 1971. The landfill was operated as a cut and fill operation, whereby waste and drums which were filled with substances that could be spilled out, were emptied into shallow 150-foot diameter pits. Most of the waste materials were disposed of in Areas B and C and consisted of municipal and industrial wastes. Steel and metal manufacturers, chemical and petroleum companies, utilities, and manufacturers of optical and furnace-related materials were among those firms whose wastes were reportedly disposed of in the pits.

Initial Response

In 1982, EPA contracted with Fred C. Hart Associates to perform a preliminary assessment of the site. Water and sediment samples were obtained from the site and analyzed for organics, inorganics, sulfide, cyanide, and ammonia. Although the investigation revealed the presence of benzene, chlorinated benzenes, and nitrogen compounds in water samples taken from a spring flowing from the landfilled areas, the site was not recommended for listing on the National Priorities List at that time.

Between 1983 and 1985, all of the residences near the site were connected to the municipal drinking water supply. Previously, these residents obtained their drinking water from private wells.

Basis for Taking Action

In February 1984, the property owner contracted with Ecology and Environment to conduct additional investigations at the site. The sample analyses revealed elevated levels of polycyclic aromatic hydrocarbons (PAHs), phenols, barium, lead, chromium, cadmium and nickel in the groundwater and soils. As a result of this work, the site was listed on the NYSDEC Registry as a Class 2 Inactive Hazardous Waste site in 1985. NYSDEC initiated a remedial investigation/feasibility study (RI/FS) in 1988, which identified significant surface water/sediment and groundwater contamination and ultimately led to the selection of a remedy to address Areas B and C. In 1992, NYSDEC initiated an off-site RI to study the influence of the landfilled areas on off-site groundwater contamination and to determine if Area A required remediation. Based upon the results of this investigation, it was determined that Area A was not used for the disposal of hazardous substances and significant levels of ground water contamination were not detected. In 1993, the site was proposed for inclusion on the National Priorities List (NPL); the site was included on the NPL in December 1994.

IV. Remedial Actions

Remedy Selection

Based upon the results of the above-noted investigations, on February 11, 1992 and January 10, 1994, RODs were signed for the site as follows[2]:

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[2] Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information, standards, and risk-based levels established in the risk assessment. The following remedial action objectives for the site were identified: 1) reduce organic and inorganic contaminant loads to the surface water streams from leachate seeps and groundwater to assist in meeting Class B and D stream standards; 2) reduce carcinogenic and noncarcinogenic risks caused by dermal exposure to leachate seeps; 3) reduce carcinogenic risks caused by dermal absorption and ingestion of sediments; 4) prevent migration of contaminants from sediments that could result in surface water exceeding Class B or D stream standards; 5) reduce carcinogenic and

- Construction of a barrier wall containment system around the perimeter of the landfilled areas;
- Construction of a leachate collection and conveyance system;
- Construction of 6NYCRR Part 360 (regulations for Solid Waste Management Facilities) compliant landfill caps over the landfilled areas in Areas B and C;
- Treatment and disposal of the collected leachate either on- or off-site;
- Operation and maintenance of the caps and leachate collection system, and long-term groundwater monitoring;
- Institutional controls to restrict access to the landfilled areas in order to prevent the use of ground water beneath the site and protect the integrity of the cap.
- An Interim Remedial Measure (IRM) to remove drums and phenolic tars within the 100-year flood plain and at concentrated areas of the site; and
- No action within Area A.

The objectives of Operable Unit 2 were to determine whether or not Area A required remediation and to determine whether the landfilled areas were a source of downgradient groundwater contamination. While drinking water standards downgradient from the landfills were met at the time of the ROD for this operable unit, the Operable Unit 2 monitoring wells were used for groundwater monitoring related to Operable Unit 1.

Remedy Implementation

The IRM was initiated by NYSDEC in 1992 and was later completed by eight potentially responsible parties (PRPs) under an Order of Consent. The goals of the IRM were to investigate the suspected drum areas and remove and properly dispose of surface and sub-surface drums, drum contents, spilled contents from those drums, if any, and surface radioactive materials in Areas B and C. In addition, visibly-impacted soils from any other areas identified during investigative activities were to be excavated and disposed of off-site. Surface drums, drum contents, spilled drum contents, visibly impacted soils, and surface radioactive materials were also to be removed from areas within the 100-year floodplain and disposed of off-site.

OHM Corporation of Clarence Center, New York was selected as NYSDEC's contractor for the initial phase of the IRM and URS Consultants provided oversight. Drum removal and excavation activities were conducted between September 1992 and February 1993. A total of 2,928 drums containing wastes were removed, placed in metal overpack drums, and staged on-site for later off-site disposal. Another 1,619 empty drums were recovered and later reburied on-site. Fifteen drums containing low-level radioactive waste were overpacked and staged on-site for later disposal off-site. Four hundred forty cubic yards of visually-contaminated soil were excavated from Areas B and C and were staged on-site in roll-off containers for later disposal off-site.

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noncarcinogenic risks caused by ingestion and dermal contact of landfill soils; 6) reduce risk or exposure to groundwater via ingestion and dermal contact; and 7) minimize migration of contaminants into uncontaminated groundwater.

An Order of Consent to complete the IRM was signed by NYSDEC and the PRPs on October 4, 1993. The PRPs selected IT Corporation as their contractor. Field work, which was performed from January 1994 to August 1995, included the excavation and off-site disposal of 392 cubic yards of visibly-contaminated soils previously staged by NYSDEC, the removal and off-site disposal of 1,724 drums and 990 cubic yards of visibly-contaminated soils and tar materials discovered during the final phase of the IRM, the rehabilitation of the site to pre-IRM conditions and the removal of all appropriate IRM support facilities.

Negotiations with the PRPs for the performance of the remedial design (RD)/remedial action related to the selected remedy resulted in 34 PRPs signing a Consent Decree on October 4, 1993. The Pfohl Brothers Landfill Site Steering Committee represented the PRP group. The Steering Committee retained Conestoga Rovers & Associates of Ontario, Canada to conduct the RD, solicit and obtain bids to construct the cap, and provide construction administration and resident engineering. The RD started in October 1994 and was approved by NYSDEC in April 2001 upon the execution of an Order on Consent with the PRPs.

Nonintrusive construction activities, including mobilization and tree clearing, commenced on March 13, 2001. Intrusive construction work commenced on May 21, 2001. Sevenson Environmental Services, Inc. was chosen by the Steering Committee as the prime contractor for the construction work.

To facilitate future development along Pfohl Road and Aero Drive, approximately 36 acres of the landfilled areas, consisting of about 540,000 cubic yards of waste located along these roads (the edges of Areas B and C) were excavated and consolidated on the interior portions of Areas B and C. In addition, 9,200 cubic yards of contaminated soil and waste were excavated to protect the wetlands and consolidated on the interior portions of Areas B and C. Post-excavation soil samples showed that the remaining soils met New York State Technical and Administrative Guidance Memorandum No. 94-HWR-4046 January 24, 1994 (Revised) cleanup objectives. The excavated areas were backfilled with clean fill and top soil and were reseeded. A 94-acre cap was constructed over the consolidated wastes in conformance with New York State 6 NYCRR Part 360 closure requirements. The cap consists of a six-inch gas venting layer overlain by a layer of filter fabric, a 40-mil thick very flexible polyethylene (VFPE) liner, a 24-inch barrier protection layer of clean soil, and topped with six inched of topsoil capable of supporting vegetation. Forty-nine gas vents were installed to convey the gas from beneath the low permeability layer of the cap via the gas venting layer to the atmosphere.

The leachate collection system consists of an 8-inch diameter perforated collection pipe set in a granular material-filled trench, which runs along the 10,000-foot perimeter of the landfilled areas at a depth of approximately five to 22 feet bgs. An additional 1,000 feet of collection drain was installed eight to 14 feet bgs in the southwest interior of Area B to promote an upward gradient from the bedrock to the overburden within the confines of the perimeter barrier containment system. All of the collected leachate is discharged directly to the Cheektowaga Publically-Owned Treatment Works via six collection wet wells and a force main that was constructed to a sewer interceptor. Twenty-eight manholes were installed to facilitate monitoring and maintenance. A polyethylene (VFPE) wall keyed into 24 inches of undisturbed clay at the bottom of the perimeter trench was

installed as a vertical barrier to prevent the collection drain system from collecting clean off-site groundwater and dewatering the adjacent wetlands. The polyethylene wall was connected to the VFPE liner in the landfill caps.

All disturbed areas of the site were subsequently restored. A vegetative layer consisting of hardy, shallow rooted grasses was established on the surface of the landfill caps. The grass serves to stabilize the soil against erosion, minimize percolation of precipitation, promote evapotranspiration of soil moisture, and is aesthetically pleasing.

Due to meandering wetland boundaries, the construction of the landfill caps led to the permanent removal of 0.16 acre of wetlands along a portion of the western boundary of Area B. As mitigation, 0.50 acres of wetland were reestablished along the northern boundary of Area B, resulting in a net gain of 0.34 acre of wetland.

Based upon the results of a final inspection of the site conducted on September 26, 2002 by NYSDEC and EPA, it was determined that all construction activities had been completed and that the implemented remedy was consistent with the 1992 and 1994 RODs and the design documents.

Institutional Controls Implementation

The 1992 ROD required the implementation of institutional controls to protect the integrity of the containment remedy and to prevent the use of contaminated groundwater. The restrictions were placed on Areas B and C in the form of Declarations of Covenants and Restrictions and Grant of Access signed by each of the seven owners whose parcels make up the site. Five of the seven agreements were signed by the end of 2003 and the last two were signed in late 2005. Each Declaration requires that the owners agree to not use any on-site groundwater other than for monitoring the remedial action that no on-site surface water cisterns be constructed, that the capped areas not be accessed without prior written approval of NYSDEC, that on-site soil not be excavated, removed, or disturbed any soil without NYSDEC written approval, and that trees and shrubs whose roots may breach the cap not be planted.

System Operations/Operation and Maintenance

The Operation, Maintenance, and Monitoring Manual for the Pfohl Brothers Landfill site contains the procedures for inspecting and evaluating the landfill caps, off-site disposal of the collected leachate and extracted groundwater, provision and certification of institutional controls, monitoring of groundwater, surface water and wetlands in the immediate perimeter of the landfilled areas, and long-term monitoring of downgradient groundwater wells. Repairs are to be made to the cap, drainage, and leachate collection systems as necessary, to control the effects of settling, subsidence, erosion or other events that might interfere with the performance of the remedy.

The site is inspected on a monthly basis as follows:

- The manholes and wetwells are inspected to determine that each one is free of obstructions, in good condition, and locked securely.

- The wetlands are inspected and checked for bare areas, washouts, dead/dying/undesirable plants, build-up of sediments, flow restrictions, the stability of erosion protection, and the general condition of the water budget and water levels.

The site is inspected on a quarterly basis as follows:

- The landfill caps are inspected for signs of erosion, bare areas, washouts, leachate seeps, length of grass, and dead/dying grass;
- The surface water drainage system is inspected for signs of sediment build-up, erosion, obstructions, and dead/dying grass in the drainage ditches;
- The landfill gas venting system is inspected for any damage to the vents;
- The access roads are inspected for erosion, obstructions, potholes, puddles and debris;
- The integrity of the two landfill perimeter fences, gates, locks, and placement and condition of signs are checked;
- The utility building is inspected for vandalism, damage, and if secure; and
- The site is inspected for debris, litter and/or waste.

The inspections, maintenance, sampling, monitoring, data evaluation, and reporting costs are approximately $125,000 on an annual basis.

During the five-year review site inspection, it was observed that many of the shrubs planted at the edge of the landfill next to the wetlands had been mowed down. The shrubs were replanted following the inspection.

V. Five-Year Review Process

Administrative Components

The five-year review team consisted of Pamela Tames (RPM), Michael Scorca (hydrogeologist), Charles Nace (human health risk assessor), and Mindy Pensak (ecological risk assessor).

Community Involvement

The EPA Community Involvement Coordinator (CIC) for the Pfohl Brothers Landfill site, Michael Basile, published a notice in the *Buffalo News*, a local newspaper, on January 11, 2006**,** notifying the community of the initiation of the five-year review process. The notice indicated that EPA

would be conducting a five-year review of the site to ensure that the site is protective of public health and the environment and that the implemented components of the remedy are functioning as designed. It was also indicated that once the five-year review is completed, the results will be made available in the local site repository. In addition, the notice included the addresses and telephone numbers for the RPM and CIC for questions related to the five-year review process or the Pfohl Brothers Landfill site.

Document Review

The documents, data, and information which were reviewed in completing the five-year review are summarized in Table 2 (attached).

Data Review

Since the completion of the remedy in 2002, groundwater monitoring data[3] collected from perimeter monitoring wells indicate that no volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), dioxins, furans, or cyanide were detected above the Class GA water quality standards. Bis(2-ethylhexyl)phthalate, a semivolatile organic compound (SVOC), was detected sporadically marginally above water quality standards in one well. It should be noted that almost half the groundwater wells were purged dry during sampling, possibly affecting the VOC sampling results. No radionuclides were detected above the EPA Maximum Contaminant Level (MCL) of 4 millirem/year exposure. Iron, magnesium, manganese, and sodium routinely exceeded Class GA standards in most wells. These inorganic constituents are common in landfill leachate, but also can be from other natural and man-made sources. During the RI, each of these constituents was also found to exceed groundwater criteria in samples from a local background well or regional aquifer wells. In addition, the elevated concentration of sodium in the shallow groundwater wells may be attributed to seasonal de-icing activities. Cadmium, chromium, and silver were only sporadically detected above Class GA standards. Continued monitoring will help to determine long-term trends of chemicals in the aquifer.

The leachate collected in the groundwater collection system is discharged to the Buffalo Sewer Authority's Treatment Plant via the Town of Cheektowaga's sewer system. Sampling of the leachate was performed monthly for the first two years and is now performed quarterly in accordance with the requirements of Discharge Permit No. 02-11-CH016 between the Buffalo Sewer Authority and the Town of Cheektowaga. During all sampling events, each regulated parameter was below the limits set by the permit.

Surface water and sediment sampling was performed annually for two years in the spring for pH, specific conductivity, temperature, and turbidity, as well as VOCs, SVOCs, PCBs, metals, and cyanide. At several locations, surface water samples exceeded the Class B standards for aluminum and iron.

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[3] Table 3, attached, summarizes the maximum groundwater concentrations.

Groundwater level measurements inside the leachate trench collection system have been consistently lower than the water level elevations in the shallow groundwater wells located outside the barrier wall. There is, however, insufficient water level measurement data for the bedrock aquifer.

Site Inspection

On October 17, 2005, a five-year review-related site inspection was conducted by EPA RPM Pamela Tames and NYSDEC RPM Jaspal Walia. Also present at the site inspection were Jon Sundquist of URS, William Pugh from the Town of Cheektowaga, Charles Nace and Michael Scorca from EPA and Dave Szymanski from NYSDEC.

Interviews

During the review period, several discussions were held between the attorney for NYSDEC, Joseph Ryan and EPA's Sharon Kivowitz of the Office of Regional Counsel, Jaspal Walia, NYSDEC RPM and Pamela Tames. The discussions addressed delays encountered in getting the access agreements signed, which delayed the completion of the institutional controls requirements and the approval of the Operation and Maintenance (O&M) Plan. Delays in receiving the monitoring reports were also mentioned.

EPA was recently notified that all of the access agreements have been signed. The O&M Plan was approved on March 10, 2006.

Institutional Controls Verification

The 1992 ROD required the implementation of institutional controls to protect the integrity of the containment remedy and to prevent the use of contaminated groundwater. Restrictions in the form of Declarations of Covenants and Restrictions and Grant of Access have been obtained from all seven owners of the lots affected by the Pfohl Brothers Landfill to protect the remedy. These agreements prohibit the use of groundwater, excavation activities that would affect the integrity of the cap, and activities that would alter surface water drainage.

Implementation of institutional controls was the final action necessary to meet the remedial action objectives. It appears that the site is now suitable for deletion from the NPL.

New York State requires annual certifications that institutional controls are in place and that remedy-related O&M is being performed. NYSDEC verified that the institutional controls are in place and that remedy-related O&M is being performed in December 2005. The next annual verification will be performed at the end of 2006.

Other Comments on Operation, Maintenance, and Institutional Controls

Table 4 (attached) summarizes several observations and offers suggestions to resolve the issues.

VI. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The 1992 ROD called for, among other things, the installation of two landfill caps, a barrier wall containment system, surface water controls, contaminated groundwater extraction, as needed, collection and off-site treatment of leachate, and institutional controls. The purpose of the response action was to reduce the risk to human health and the environment due to contaminants leaching from the landfill mounds. The purpose of capping the landfilled areas was to minimize the infiltration of rainfall and snowmelt into the landfilled areas, thereby reducing the potential for contaminants leaching from the landfilled areas into the groundwater and negatively impacting groundwater quality, as well as impacting surface waters and sediments of adjacent Aero Creek, Aero Lake, Ellicott Creek and nearby wetland habitats. Capping was also intended to prevent direct contact exposure to hazardous contaminants. The purpose of installing a groundwater barrier wall containment system around the perimeter of the landfill and extracting and treating the leachate is to prevent its migration and assure that groundwater beyond the site boundary meets Applicable or Relevant and Appropriate Requirements.

Currently, all twenty perimeter monitoring wells continue to exhibit metal levels above NYSDEC's Technical & Operational Guidance Series (TOGS), New York State Ambient Water Quality Standards and Guidance Values. However, as was noted above, the iron, magnesium, manganese, and sodium were also found to exceed groundwater criteria in samples from a local background well or regional aquifer wells. In addition, the elevated concentration of sodium in the shallow groundwater wells may be attributed to seasonal de-icing activities. Cadmium, chromium, and silver were only sporadically detected above Class GA standards. One well exhibited slightly elevated values of an SVOC, bis(2-Ethylhexyl)phthalate above NYSDEC's TOGs.

By the end of 2005, the PRP steering group had obtained signed Declarations of Covenants and Restrictions and Grant of Access from each of the owners of the lots affected by the Pfohl Brothers Landfill to protect the remedy. Each signed and notarized agreement was filed with the County Clerk's office. These agreements prohibit the use of groundwater, excavation activities that would affect the integrity of the cap, and activities that would alter surface water drainage.

Groundwater level measurements inside the leachate trench collection system have been consistently lower than the water level elevations in the shallow groundwater wells located outside the barrier wall. Therefore, it can be concluded that the containment system is preventing the migration of groundwater contamination within the shallow aquifer. There is, however, insufficient water level measurement data to ascertain whether or not hydraulic control exists in the bedrock aquifer.

Based upon the above assessment, it has been concluded that the remedy is functioning as intended by the decision documents.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

There are no changes in the physical conditions of the site or site usage that would affect the protectiveness of the selected remedy, and there are no significant changes in site use expected over

the next five years. The Pfohl Brother's Landfill has been capped and the cap is being maintained, removing direct contact (*i.e.*, ingestion or dermal contact with soil) exposures to the public as well as ecological receptors. A fence is in place to prevent further potential exposures to trespassers. Potential exposure to contaminated groundwater has also been eliminated. A leachate collection system is working to prevent contaminated groundwater from moving off-site.

There are currently no complete exposure pathways due to the remedial actions that have been completed (*i.e.*, landfill caps, leachate collection system, and vertical barriers) and due to no off-site contamination being present. Therefore, the current exposure parameters and toxicity values that would be used are not relevant, as a current evaluation would not quantify risks or hazards. Since there is no current or expected future exposure to the contaminants located within the landfill, it can be concluded that the exposure parameters and toxicity values that were used are still valid in reference to the protectiveness of the remedy.

The cleanup levels that were chosen for the on-site soils and groundwater were the applicable state and/or federal Applicable or Relevant and Appropriate Requirements (ARARs). Although some of the soil ARARs may have changed, given that the entire surface of the landfilled areas were capped and the vertical walls have eliminated the potential for off-site transport, there are no unremediated areas in which to apply the current soil ARARs. Thus, the cleanup values that were used are still valid. Groundwater ARARs that may have changed would be applicable as current state and federal groundwater standards to meet prior to ceasing the groundwater extraction and treatment system. Therefore, although the numeric values may have changed for select contaminants, the ROD identifies "state and federal ARARs" as the cleanup goals, thus, the cleanup values that were referenced are still valid.

An exposure pathway that was not considered in the original assessment is vapor intrusion into indoor air. However, since the VOCs in the groundwater are located within the containment system and are at a great distance from the residences, the potential for soil vapor intrusion issues related to this site is highly unlikely.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

There is no information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

Based upon the results of the five-year review, it has been concluded that:

- The caps and vegetative covers are intact and in good condition;
- The landfill gas system is operating properly;

- The monitoring wells are securely locked and functional;
- The leachate collection system is functional;
- There is no evidence of trespassing or vandalism; and
- No additional measures are needed to protect public health.

VIII. Issues, Recommendations, and Follow-Up Actions

This site has ongoing operation, maintenance, and monitoring activities as part of the remedy. As was anticipated by the decision documents, these activities are subject to routine modification and adjustment. This report includes suggestions for improving, modifying and/or adjusting these activities (see Table 4).

Table 5 (attached) summarizes a recommendation and follow-up action stemming from this 5-year review.

IX. Protectiveness Statement

The implemented actions under Operable Unit 1 protect human health and the environment. The landfilled areas have been capped, removing direct contact (*i.e.*, ingestion or dermal contact of soil) exposures to the public. Institutional controls are in place to further prevent potential exposures to the public, including trespassers. The potential impacts to groundwater are being addressed through the caps that reduce or prevent percolation through the landfilled areas. The leachate collection system is discharging to an appropriate discharge facility to further reduce potential exposures to the population. The Operable Unit 2 remedy provided no further actions. Therefore, the site is protective of human health and the environment.

X. Next Review

Since hazardous substances, pollutants or contaminants remain at the Pfohl Brothers Landfill site which do not allow for unlimited use or unrestricted exposure, in accordance with 40 CFR 300.430 (f) (4) (ii), the remedial action for the site shall be reviewed no less often than every five years. EPA will conduct another five-year review on or before March 2011.

Approved:

George Pavlou, Director — Date
Emergency and Remedial Response Division

Table 1: Chronology of Site Events	
Event	**Date(s)**
Operation of Landfill	1932-1971
Listed as a Class 2 site in the New York State Registry of Inactive Hazardous Waste Disposal Sites	1985
Site placed on National Priorities List	1994
Remedial Investigation/Feasibility Study	1988-1991
Interim Remedial Measure	1992-1995
Record of Decision for Areas B and C	1992
Record of Decision for Area A	1994
Consent Decree for Remedial Design Study	1993
Remedial Design	1998
Consent Decree for performance of the Remedial Action	2001
Remedial Action	2001-2002
Preliminary Site Close-Out Report	2002
Declaration of Covenants and Restrictions and Grant of Access signed by each of the seven owners whose parcels make up the site	2003-2005

Table 2: Documents, Data, and Information Reviewed in Completing the Five-Year Review	
Document Title, Author	**Submittal Date**
Remedial Investigation/Feasibility Study, Camp, Dresser & McKee	1992
Off-Site Remedial Investigation, NYSDEC	1993
Record of Decision, NYSDEC	1992
Record of Decision, NYSDEC	1994
Drum and Soil Interim Remedial Measure Final Remediation Report, URS	1996
Interim Remedial Measures completion Report, Conestoga-Rovers & Associates	1995
Final (100%) Design Documents, Conestoga-Rovers & Associates	1999
Remedial Action Report, Conestoga-Rovers & Associates	2003
Preliminary Close-Out Report, EPA	2002
Operation, Maintenance, and Monitoring Manual, Conestoga-Rovers & Associates	1999
OM&M Inspection Semi-Annual Summary Report, URS	3/2004
OM&M Inspection Semi-Annual Summary Report, URS	12/2004
OM&M Inspection Semi-Annual Summary Report, URS	10/2005
OM&M Inspection Semi-Annual Summary Report, URS	2/2006
EPA guidance for conducting five-year reviews and other guidance and regulations to determine if any new Applicable or Relevant and Appropriate Requirements relating to the protectiveness of the remedy have been developed since EPA issued the ROD.	

Table 3. Comparison of maximum groundwater concentrations to New York State Groundwater Quality Standards (GWQS), Federal Maximum Contaminant Levels (MCLs), and EPA Region 9 Preliminary Remediation Goals (PRGs)

Chemical	Maximum Concentration (mg/L)	Location & Date of Maximum Concentration	New York State GWQS (mg/L)	Federal MCL (mg/L)
Cadmium	0.006	GW-30S (5/05)	0.005	0.005
Chromium	0.28	GW-26D (9/05)	0.05	0.1
Iron	21.8	GW-30S (5/05)	0.3	0.3*
Magnesium	78.7	GW-35S (9/05)	35	
Manganese	7.4	GW-35S (9/05)	0.03	0.05*
Sodium	3,170	GW-7S (9/05)	20	20
bis(2-Ethylhexyl)phthalate	11	GW-7D (5/05)	5 µg/L	
Silver	0.079J	GW-29S (5/05)	0.05	0.10

Sources: National Drinking Water Standards (MCLs) are legally enforceable standards that apply to public water systems. Refer to: http://www.epa.gov/safewater/mcl.html
New York State Department of Environmental Conservation Water Quality Regulations (NYSDEC WQR) are the ARARs established in the ROD. Refer to: http://www.dec.state.ny.us/website/regs/ch10.htm

Notes
*: Values are National Secondary Drinking water regulations, which are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects in drinking water

Table 4: Other Comments on Operation, Maintenance, Monitoring, and Institutional Controls	
Comment	**Suggestion**
Current sample collection methods which purge a number of wells dry during sampling may affect VOC sample results.	Well sampling should employ EPA's low-flow protocol or passive diffusion bags.
It is difficult to determine if the off-site groundwater exhibits traces of leachate without having a full scan of the leachate for comparison. Also, the source of the metals in the perimeter monitoring wells needs to be determined (the background wells have not been sampled recently).	The leachate should be sampled annually for all of the site's chemicals of concern for comparison with the off-site sampling results. In addition, the background cluster wells, GW 18 and GW 6, should be sampled once for all of the site's chemicals of concern.
It is not clear if hydraulic control exists in the bedrock aquifer.	If it is determined that the metals in the groundwater exceeding Class GA standards are not naturally occurring, then shallow and deep monitoring wells should be installed within the footprint of the leachate collection system. Water level measurements should be taken in these wells to ascertain whether hydraulic control exists within the bedrock aquifer. During the quarterly groundwater monitoring event, water level measurements should be collected from the bedrock wells. This would allow vertical flow direction to be calculated.
The monitoring well data cannot be easily reviewed for trends.	The Town of Cheektowaga should present the data in charts and tables which show chemical concentrations over time. Historical tables of analyses for each of the wells should be updated regularly and included in the monitoring reports. If possible, graphs should also be included.
The wetlands water level data is not being reported.	A separate section should be placed in the semi-annual report on the operation and maintenance of the landfill which describes the current condition of the wetlands and shows a table of the quarterly water level monitoring effort.
Shrubs planted at the edge of the landfill next to the wetlands were lost by an errant mowing service.	Although the plantings were replaced, markers should be placed so that the wetlands area is clearly marked to avoid a recurrence. The markers should be left in place until the plants are large enough that it is obvious where the landfill ends and the wetlands begin.

Table 5: Recommendations and Follow-up Actions						
Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N) Current	Future
This site has ongoing operation, maintenance, and monitoring activities as part of the remedy. As was anticipated by the decision documents, these activities are subject to routine modification and adjustment. This report includes suggestions for improving, modifying and/or adjusting these activities.	NYSDEC should forward the suggestions presented in Table 4 to the PRPs and obtain a timetable for their implementation.	PRPs	NYSDEC	4/30/06	N	N

Table 6: Acronyms Used in this Document	
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	Below Ground Surface
CIC	Community Involvement Coordinator
EPA	United States Environmental Protection Agency
IRM	Interim Remedial Measure
MCLs	Maximum Contaminant Levels
NPL	National Priorities List
µg/l	Micrograms per Liter
mg/l	Milligrams per Liter
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and Maintenance
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PRGs	Preliminary Remediation Goals
PRPs	Potentially Responsible Parties
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SVOCs	Semi-Volatile Organic Compounds
TOGS	Technical & Operational Guidance Series
VFPE	Very Flexible Polyethylene
VOCs	Volatile Organic Compounds
WQSGV	Water Quality Standards and Guidance Values