Third Five-Year Review Report

Pfohl Brothers Landfill Superfund Site

Erie County

Town of Cheektowaga, New York

Prepared by

U.S. Environmental Protection Agency

Region 2

New York, New York

June 2016

Approved by: **Date:**

June 30, 2016

Walter E. Mugdan, Director

Emergency and Remedial Response Division

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Executive Summary

This is the third five-year review for the Pfohl Brothers Landfill site, located in the Town of Cheektowaga, Erie County, New York. The implemented actions are protective of 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. Leachate from the leachate collection system is being discharged to a publicly-owned treatment works further reducing potential exposures to the population.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Pfohl Brothers Landfill site		
EPA ID: NYD980507495		
Region: 2	**State:** NY	**City/County:** Town of Cheektowaga/Erie County

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA ***[If "Other Federal Agency", enter Agency name]*:** Click here to enter text.
Author name (Federal or State Project Manager): Pamela Tames
Author affiliation: EPA
Review period: 3/19/2011 - 3/18/2016
Date of site inspection: 11/5/2015
Type of review: Statutory
Review number: 3
Triggering action date: 3/18/2011
Due date *(five years after triggering action date)*: 3/18/2016

ISSUES/RECOMMENDATIONS
OU(S) without Issues/Recommendations Identified in the Five-Year Review:
OU 1

OU PROTECTIVENESS STATEMENT		
Operable Unit: 01	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* N/A
Protectiveness Statement: The implemented actions under Operable Unit 1 are protective of human health and the environment.		
SITEWIDE PROTECTIVENESS STATEMENT		
	Protectiveness Determination: Protective	*Addendum Due Date (if applicable):* N/A
Protectiveness Statement: The implemented actions are protective of human health and the environment.		

Introduction

This is the third five-year review for the Pfohl Brothers Landfill site, located in the Town of Cheektowaga, Erie, New York and was conducted by 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 (CERCLA), 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.

The triggering action for this statutory five-year review is the date of the completion of the March 2011 second five-year review.

A five-year review is required at this site due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. This site is being addressed as two operable units (OUs). OU 1 consists of two landfilled areas (Area B and Area C) and is the subject of this five-year review. OU 2 consists of a soil borrow area (Area A) and off-site groundwater. A 1994 ROD chose no action for OU 2 and, therefore, it is not subject to this five-year review.

Site Chronology

See Table 1 for the site chronology.

Background

Site Location/Physical Characteristics

The Pfohl Brothers Landfill site is a 130-acre area with an inactive landfill located in a commercial/residential area in the Town of Cheektowaga, Erie County, New York, approximately one mile northeast of Buffalo Niagara 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, B, and C (see figure).

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 tollbooths, 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 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 groundwater 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 groundwater 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 one 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. Ellicott Creek, classified as Class B and Class C, depending on the section, may receive surface waters from a small unnamed creek located adjacent to Aero Lake and from adjacent drainage swales.

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; 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 performed 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 (NPL) 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.

In February 1984, the property owner conducted 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.

Basis for Taking Action

NYSDEC initiated a remedial investigation/feasibility study (RI/FS) in 1988, which identified significant soil, surface water/sediment and groundwater contamination. Contaminants of concern included: PAHs, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), and metals. The RI/FS also concluded that the setting of the site adjacent to freshwater wetlands, fishing areas and creeks, as well as the uncovered and exposed waste at the site presented a high potential for terrestrial and aquatic wildlife exposure, with resultant degradation of these critical environmental areas.

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 NPL; the site was included on the NPL in December 1994.

Remedial Actions

Remedy Selection

Based upon the results of the above-noted investigations, on February 11, 1992, a Record of Decision (ROD) was signed for Operable Unit (OU1). The selected remedy included:

- 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 groundwater beneath the site and protect the integrity of the cap; and
- An Interim Remedial Measure (IRM) to remove drums and phenolic tars within the 100-year flood plain and at concentrated areas of the site.

The remedial action objectives (RAOs) identified in the ROD were established as follows:

- 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;
- Reduce carcinogenic and non-carcinogenic risks caused by dermal exposure to leachate seeps;
- Reduce carcinogenic risks caused by dermal absorption and ingestion of sediments;
- Prevent migration of contaminants from sediments that could result in surface water exceedance of Class B or D stream standards;
- Reduce carcinogenic and non-carcinogenic risks caused by ingestion and dermal contact of landfill soils;
- Reduce risk or exposure to groundwater via ingestion and dermal contact; and
- Minimize migration of contaminants into uncontaminated groundwater.

Based on the off-site investigations discussed above, on January 10, 1994, a no action ROD was signed for OU2.

Remedy Implementation

NYSDEC initiated the IRM required by the OU 1 ROD by performing drum removal and excavation activities 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 and forty cubic yards of visibly-contaminated soil were excavated from Areas B and C and were staged on-site in roll-off containers for later disposal off-site.

An Order on Consent to complete the IRM was signed by NYSDEC and the potentially responsible parties (PRPs) in October 1993. 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/remedial action (RD/RA) 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 RD started in October 1994 and was approved by NYSDEC in April 2001 upon the execution of a second Order on Consent with the PRPs.

Construction activities commenced in March 2001.

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. Two caps totaling 94 acres were constructed over the consolidated wastes in conformance with New York State 6 NYCRR Part 360 closure requirements. Each 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 inches of topsoil capable of supporting vegetation. Forty-nine gas vents were installed to convey the gas from beneath the low permeability layer of the caps via the gas venting layer to the atmosphere.

The leachate collection system consists of an eight-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 Buffalo Sewer Authority's

Treatment Plant via the Town of Cheektowaga's sewer system through six collection wet wells and a force main that was connected to a sewer interceptor. Twenty-eight manholes were installed to facilitate monitoring and maintenance. A 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 acre of wetland was 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.

System Operations/Operation and Maintenance

An operation and maintenance (O&M) plan, which provides for a long-term monitoring program for the cover system, the drainage system, the groundwater, and the institutional controls, was approved in February 2006. The O&M activities at the site are being performed by the Town of Cheektowaga. Semi-annual O&M reports are reviewed by NYSDEC and EPA. The elements of the O&M plan are discussed in more detail below.

A final Close-Out Report documenting the completion of the implementation of the site remedies was issued by EPA on December 10, 2007. The site was deleted from the National Priorities List effective September 22, 2008.

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; and

• 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, dead/dying grass and signs of burrowing animals;

• 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 leachate is collected in a trench collection system and 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. As a condition for renewal of this permit, an analysis of all constituents within the leachate, not just metals, is required within every three year period.

In November 2007, NYSDEC approved the Town of Cheektowaga's request to eliminate radionuclides, dioxins and dibenzofurans from their list of test parameters because they were not detected in the leachate since monitoring commenced in September 2005.

Surface water and sediment sampling was performed in the spring of 2004, 2005 and 2006 for pH, specific conductivity, temperature, and turbidity, as well as VOCs, semivolatile organic compounds (SVOCs), PCBs, metals, and cyanide. At several locations, surface water samples exceeded the Class B standards for aluminum and iron. An additional round of surface water and sediment sampling was performed in the spring of 2008 for PCBs only. Surface water and sediment samples were collected from eight creek/drainage swale locations surrounding the landfill. No PCBs were detected in the surface water samples and only one sediment sample (located closest to the Thruway) had a PCB concentration just over the wildlife bioaccumulation guidance value.

As a result of these sample results, NYSDEC approved the PRPs' request to end surface water and sediment sampling in 2008.

The groundwater monitoring wells are sampled every six months.

The inspections, maintenance, sampling, monitoring, data evaluation, and reporting costs averaged approximately $80,000 during the past five years. Maintenance repairs included replacement of surge suppressors, fuses, discharge hoses, and check valves as needed, replacement of pumps and a flow meter, and a clean out of the force main piping. A wildlife trapper was engaged, as needed, to control ground burrowing animals and herbicide was applied to control vegetation growth on the stone access road.

Potential site impacts from climate change have been assessed. The performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the site.

Progress Since the Last Five-Year Review

The second five-year review for this site, which was approved on March 13, 2011. The five year review concluded that:

"The implemented actions under Operable Unit 1 protect human health and the environmental in the short term. 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. Leachate from the leachate collection system is being discharged to a publicly-owned treatment works further reducing potential exposures to the population. The Operable Unit 2 remedy provides no further actions. In order for the remedy to be protective in the long term, additional data and information is needed to ensure that the remedy is fully functioning as intended."

The issues, recommendations, and their implementation are discussed in detail below.

1. A subset of wells purged dry during low-flow sampling.

Recommendation: Explore use of passive diffusion bags for VOC sample analyses in monitoring wells that usually purged dry during low-flow sampling.

Status: During this review period, the PRPs used this approach on three monitoring wells for VOC sample collection and will continue use this approach to sample these wells for VOCs going forward. Regular sampling protocols are still used for the remaining constituents.

2. It was difficult to determine if the off-site groundwater exhibited traces of leachate without having a full scan of the leachate for comparison.

Recommendation: Analyze leachate for all constituents on an annual basis.

Status: A full leachate analysis that was performed in March 2011 indicated that very low levels of two VOCs were present in the leachate. No SVOCs or pesticides were found in the leachate. Since very small amounts of only two VOCs were found, it was decided that the current leachate analysis schedule should continue. The next full leachate analysis will be performed before the current discharge permit expires in late 2016.

3. Quarterly leachate discharge monitoring samples for metals were composites, it was assumed that the leachate samples collected for the full leachate analysis were also composited and would risk volatilizing the VOCs in the sample prior to the analysis.

Recommendation: Obtain a direct leachate sample that would not be prone to volatilizing VOCs.

Status: After the five year review was completed, the PRPs noted that the discrete VOC samples are composited in the laboratory to prevent volatilizing the VOCs prior to analysis. Therefore, no further actions were necessary.

4. Without current background data, the source of metals in the perimeter monitoring wells could not be confirmed to be due to background sources. In addition, background monitoring well GW-18 could not be located.

Recommendations:

- Sample leachate annually for all of the site's chemicals of concern for comparison with the off-site sampling results;
- Sample background wells on a regular basis, for comparison;
- Use another background well in addition to monitoring well GW-6.

Status: During this review period, it was determined that monitoring well GW-6 now contains too much sediment and is, therefore, unusable. The PRPs state that the upgradient, semi-annually sampled monitoring wells GW-1D, GW-1S, GW-7D and GW-7S provide an adequate picture of the upgradient groundwater chemistry. These wells are currently indistinguishable from the rest of

the monitoring network. It is preferred that more separation exist between the background wells and the on-site wells. There may be local wells in the USGS or NYSDEC inventory which can suffice as background wells.

5. Trends in the data are inconsistent.

Recommendation: Compile data into tables and graphs showing monthly values, it could help show if there is a trend of decreasing leachate production due to lowered infiltration.

Status: The data is now compiled into tables and graphs showing monthly values.

6. The vertical gradients in well clusters 4 and 7 were very large and trend downward instead of upward, which is preferred.

Recommendation: The large downward gradients in these well clusters may mean that the deep wells are not functioning properly and need to be redeveloped and/or repaired. If they cannot be repaired, these well clusters should be replaced with wells that better reflect actual aquifer conditions adjacent to the landfill.

Status: During this review period, these wells were redeveloped. Water levels collected in December 2014 indicate a large downward vertical gradient still exists in well cluster 7. That is, the flow remains downward between wells 7S and 7D.

7. It was pointed out during the site visit that phragmites were taking over the wetlands.

Recommendation: Put a phragmites eradication program into place so that the native flora and fauna can prosper.

Status: It was concluded during this review period, that phragmites are widespread throughout the area and that an eradication program would be temporary and of limited success.

Five-Year Review Process

Administrative Components

The five-year review team consisted of Pamela Tames (RPM), Michael Scorca (hydrogeologist), Rachel Griffiths (hydrogeologist), Chuck 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 is Michael Basile.

On November 19, 2015, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 32 Superfund sites and four federal facilities in New York and New Jersey, including the Pfohl Brothers Landfill site. The announcement can be found at the following web address: http://www2.epa.gov/sites/production/files/2015-11/documents/fy_16_fyr_public_website_summary.pdf. In addition to this notification, a public notice announcing the five-year review for the Pfohl Brothers Landfill site was distributed electronically to everyone on the mailing list.

Once the five-year review is completed, the CIC will make the results available at the local site repositories.

Document Review

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

Data Review

Groundwater

During the review period, groundwater monitoring data was collected from six deep and twelve shallow perimeter monitoring wells located outside of the leachate collection system. Sampling results indicate that no VOCs, SVOCs, PCBs, dioxins, furans, or cyanide exceeded its Class GA water quality standards. Iron, magnesium, manganese, and sodium routinely exceeded Class GA standards in most wells. See Table 3. Chromium was only sporadically detected above Class GA standards. These inorganic constituents are common in landfill leachate, but also can be from other natural and man-made sources. The elevated concentration of sodium in the shallow groundwater wells may be attributed to seasonal de-icing activities on the nearby New York State Thruway toll plaza and Transit Road, a major local roadway. Since the last five-year review, the PRP has provided EPA and NYSDEC with data trends compiled for parameters routinely exceeding groundwater standards. Trends since this time are generally stable or decreasing, but many constituents remain above groundwater standards in several wells.

There is not enough separation between the landfill and the current background well clusters (1 and 7). It is recommended that the following landfill leachate indicator constituents be added to the current analyte list for all wells: calcium, potassium, alkalinity (as HCO_3), ammonia, bromide, sulfate, chloride, and nitrate. It is also suggested that a new background well be installed further

from the landfill or that a suitable well be identified and sampled from the USGS, NYS or County well inventory.

In addition, the three groundwater wells continue to be purged dry during sampling, and, therefore, require the continued use of passive diffusion bags for VOC sample collection.

Leachate

During the review period, all of the parameters in samples of the leachate that were collected quarterly in the groundwater collection system were below the limits set by the permit for discharge to the Town of Cheektowaga Wastewater Treatment plant.

The results of the full analyses of leachate in 2011 contained only very low levels of two VOCs. Quarterly sampling of the pumped leachate indicates some elevated metals 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, indicating an inward horizontal gradient. There is, however, limited water level measurement data for the bedrock aquifer. Of the six monitoring well clusters on the perimeter of the facility, only one cluster on the northern part of the site generally had an upward flow gradient (monitoring well GW-3) and the other five indicated a downward flow gradient (monitoring wells GW-1, GW-4, GW-7, GW-8, and GW-35S/26D) as of December 2014.

The vertical gradient in well cluster 7 remains very large and trends downward instead of upward, which is preferred. The large downward gradient in this well cluster may mean that the deep well is not functioning properly and needs to be redeveloped again and/or repaired. If it cannot be repaired, this well cluster should be replaced with wells that better reflect actual aquifer conditions adjacent to the landfill.

Site Inspection

On November 5, 2015 a five-year review site inspection was conducted by the RPM, Pamela Tames. Also in attendance were Jaspal Walia and David Szymanski from NYSDEC, Patrick Bowen from the Town of Cheektowaga and Jon Sundquist, Cheektowaga's consultant, from AECOM.

During the site inspection, ponding was observed in an area of the landfill that has settled. Fill should be applied to the area where settling has occurred so that it can be re-landscaped and have proper water runoff.

Interviews

No interviews were conducted in conjunction with this five-year review.

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 were obtained from all seven owners of the lots affected by the Pfohl Brothers Landfill to protect the remedy. Five of the agreements were signed in 2003 and two were signed in 2005. 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. In uncapped areas that can be redeveloped, these agreements prohibit basements and require active or passive soil gas controls, surface water systems to convey water to existing systems and paved parking areas. These institutional controls are still in effect.

Technical Assessment

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

The landfill cap is routinely maintained and minimizes leachate generation. A perimeter fence is maintained preventing unacceptable exposures to landfill materials. The leachate collection system effectively maintains an inward gradient in the shallow groundwater preventing leachate seeps from reaching the adjacent wetlands. This containment is supported by the fact that groundwater monitoring results in the shallow aquifer do not exceed state groundwater cleanup levels for VOCs, SVOCs, PAHs, and PCBs. The containment of leachate in the bedrock is not well defined due to monitoring well performance issues, however groundwater generally flows upward from the deeper aquifer which minimizes concerns for leachate migration. Groundwater in the deeper wells of site well pairs typically have lower and fewer constituent concentrations than the shallow wells. Adequate background samples and a more comprehensive leachate analysis is needed to better understand any leachate flow in the aquifers. Groundwater outside of the landfill leachate collection system continues to show elevated levels of inorganics. While exceedances of metals are present in groundwater samples collected during the review period, the exceedances correspond to those also found in the local background wells. It is recommended that an additional background well pair be installed and sampled for metals to confirm that metals on site are consistent with background conditions. Very small amounts of other constituents (primarily SVOCs) were found sporadically. Other components such as sodium are likely due to the location of the nearby New York State Thruway toll plaza and Transit Road, a major local roadway, and copious use of road salt during the long winter season.

The institutional controls which restrict development on top of the cap and use of groundwater are in place and effective.

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

The exposure assumptions and toxicity data used to estimate potential risks and hazards to human health followed general risk assessment practices at the time the risk assessment was conducted. Although the risk assessment process has since been updated, and specific parameters and toxicity values may have changed, the risk assessment process that was used is consistent with current practice and the need to implement the remedial action remains valid.

The exposures to soil at the site have been interrupted by the placement of the cap, leachate collection system, and vertical barriers. Institutional controls and environmental easements were placed on the property to ensure that no activities are conducted on the consolidated waste area that would disturb the cap. The cap prevents direct contact with the waste materials. Overall, the remedial action to address soil contamination continues to interrupt exposures and the soil remedy is protective of human health. NYSDEC's Division of Hazardous Waste Remediation, Technology Section, Draft Soil Cleanup Guideline Values were used as soil cleanup objectives for the areas which were excavated and are now ready for development. Although some of the soil cleanup objectives have changed since the 1992 ROD, they are still within the acceptable risk range. Areas of the site that were not included in the capped area, such as

the areas from which the consolidated waste originated (i.e., buffers between cap and roadway), were sampled post-excavation to ensure that the remaining soil was below the soil cleanup values. As indicated above, the values used for soil cleanup values are still valid and protective. These areas would be acceptable for redevelopment as long as the development adheres to the ICs that are in place.

The cleanup levels that were chosen for the on-site groundwater were the state Class A groundwater standards. These levels are still valid.

An exposure pathway that was not considered in the original assessment is vapor intrusion into indoor air. However, since the low levels of VOCs sporadically found 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.

Although the ecological risk assessment methodology used to support the 1992 ROD may not necessarily reflect current ecological risk assessment guidance, the landfill cap eliminates any potential risk from surface soil contaminants to terrestrial receptors. Fish studies were conducted to support the risk assessment during the remedial investigation. Fish collected from four locations (Aero Lake and Ellicott Creek) including the control station had tissue concentrations which exceeded the recommendation of 0.11 milligrams per kilogram PCBs. However, tissue concentrations did not exceed levels associated with an impact to piscivorous receptors. Further, surface water and sediment monitoring were discontinued in 2008 based upon monitoring data which indicated that there was not any significant potential risk to ecological receptors. In addition, groundwater wells between the landfill and wetlands do not show exceedances of contaminants. Therefore, ecological receptors are not impacted by site contaminants.

The RAOs, previously listed in the Remedial Action/ Remedy Selection section remain valid.

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

No, there does not appear to be any other information that could call 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.

Issues, Recommendations and Follow-Up Actions

Table 4 (attached) summarizes several suggestions stemming from this five-year review.

Protectiveness Statement

OU1

The implemented actions under OU 1 are protective of human health and the environment.

Sitewide

The implemented actions are protective of human health and the environment.

Next Review

The next five-year review report for the site is required five years from the completion date of this review.

Tables

Table 1: Chronology of Site Events	
1932-1971	Operation of landfill
1985	Listed as a Class 2 site in the New York State Registry of Inactive Hazardous Waste Disposal Sites
1994	Site placed on National Priorities List
1988-1991	Remedial Investigation/Feasibility Study
1992-1993	Interim Remedial Measure initiated by NYSDEC
1993-1995	Interim Remedial Measure completed by PRPs under an Order of Consent
1992	Record of Decision for Areas B and C
1994	Record of Decision for Area A
1993	Consent Decree for Remedial Design
1998	Remedial Design
2001	Consent Decree for Remedial Action
2001-2002	Remedial Action
2002	Preliminary Site Close-Out Report
2003-2005	Declaration of Covenants and Restrictions and Grant of Access signed by each of the seven owners whose parcels make up the site.
2006	First Five-Year Review
2007	Site Closeout Report

Table 1: Chronology of Site Events Table 1	
2008	Site deleted from the National Priorities List
2011	Second Five-Year Review

Table 2: Documents, Data, and Information Reviewed in Completing the Five-Year Review	
Document Title, Author	**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
Final Close-Out Report, EPA	2007
Superfund First Five-Year Review Report – Pfohl Brothers Landfill, Town of Cheektowaga, NY	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 2: Documents, Data, and Information Reviewed in Completing the Five-Year Review	
Superfund Second Five-Year Review Report - Pfohl Brothers Landfill, Town of Cheektowaga, NY	2011
OM&M Inspection Semi-Annual Summary Report, URS	2011
OM&M Inspection Semi-Annual Summary Report, URS	2011
OM&M Inspection Semi-Annual Summary Report, URS	2012
OM&M Inspection Semi-Annual Summary Report, URS	2012
OM&M Inspection Semi-Annual Summary Report, URS	2013
OM&M Inspection Semi-Annual Summary Report, URS	2013
OM&M Inspection Semi-Annual Summary Report, URS	2014
OM&M Inspection Semi-Annual Summary Report, URS	2015

Table 3 - Groundwater Exceedances - May 2015

Metal	Class GA Standard (MG/L)	Range (MG/L)	# wells w/exceedances
Iron	0.3	0.12 - 26.4	14
Magnesium	35	18.7 - 114	8
Manganese	0.3	0.14 - 1.8	11
Sodium	20	3.7 - 352	12

Table 4: Other Comments on Operation, Maintenance, Monitoring, and Institutional Controls	
Comment	**Suggestion**
The vertical gradient in well cluster 7 is very large and trends downward instead of upward, which is preferred.	The large downward gradient in this well cluster may mean that the deep well is not functioning properly and needs to be redeveloped again and/or repaired. If it cannot be repaired, this well cluster should be replaced with wells that better reflect actual aquifer conditions adjacent to the landfill.
During the site inspection, ponding was observed an area of the landfill that has settled.	Clean topsoil and/or stone should be brought into this area where settling has occurred so that it can be re-landscaped and have proper water runoff.
There is not enough separation between the landfill and the current background well clusters (1 and 7).	It is recommended that the following landfill leachate indicator constituents be added to the current analyte list for all wells: calcium, potassium, alkalinity (as HCO_3), ammonia, bromide, sulfate, chloride, and nitrate. It is also suggested that a new background well be installed further from the landfill or find a suitable well in the USGS, NYS or County well inventory.
Sampling data has not been sent in EDD format to NYSDEC since 2013 and it was corrupted.	It is recommended that the EDD datasets for the sampling data from 2012, 2013, 2014, and 2015 be sent to EPA and NYSDEC so that our inventory of groundwater data can be complete for the Site. EDD datasets should be submitted with all future O&M reports.


N
AERO LAKE
AERO DRIVE
TRANSIT ROAD
Control Building
Legend
Monitoring Well Location
Staff Gauge Location
Manhole Location
Wet Well Location
400 0 400 Feet
PFOHL BROTHERS LANDFILL
MONITORING LOCATIONS
URS
FIGURE