



Third Five-Year Review Report

**Hooker (102nd Street) Landfill Superfund Site
Niagara County
Niagara Falls, New York**

Prepared by:

**U.S. Environmental Protection Agency
Region 2
New York, New York**

September 2011

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List of Acronyms

EPA	United States Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIC	Community Involvement Coordinator
ESD	Explanation of Significant Differences
NPL	National Priorities List
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
MCL	Maximum Contaminant Level
PPB	Parts Per Billion
PRP	Potentially Responsible Party
UAO	Unilateral Administrative Order
RI	Remedial Investigation
RA	Remedial Action
RD	Remedial Design
FS	Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
APL	Aqueous Phase Liquid
NAPL	Non-Aqueous Phase Liquid
O&M	Operation and Maintenance
COPC	Contaminant of Potential Concern
PCB	Polychlorinated Biphenyl
BHC	Benzene Hexachloride
RCRA	Resource Conservation and Recovery Act
COE	U.S. Army Corps of Engineers
RHA	Rivers and Harbors Act of 1899
CWA	Clean Water Act
IER	Intermediate Engineering Report
LCTF	Love Canal Treatment Facility
PRG	Preliminary Remediation Goal
WQR	Water Quality Regulation
OCC	Occidental Chemical Corporation
CRA	Conestoga-Rover's & Associates
GSH	Glenn Springs Holding
BHHRA	Baseline Human Health Risk Assessment
HI	Hazard Index
TAGM	Technical and Administrative Guidance Memorandum
TBC	To Be Considered
ARAR	Applicable or Relevant and Appropriate Requirement
CR	Cancer Risk

EXECUTIVE SUMMARY

The remedy for the Hooker (102nd Street) Landfill Superfund Site located in Niagara Falls, Niagara County, New York includes hydraulic containment of aqueous phase liquids (APLs) and non-aqueous phase liquids (NAPLs) within the landfill. To achieve this remedial action objective, installation of a slurry wall surrounding the perimeter of the landfill, recovery and treatment of APL leachate, separate recovery and off-site incineration of NAPL, installation of a landfill cap, and storm sewer rerouting have been conducted. The trigger for this five-year review was the previous five-year review conducted in September 2006.

Based upon review of the 1990 Record of Decision (ROD), the 1995 ROD Amendment, the 1993 Explanation of Significant Differences (ESD), Semi-Annual Ground Water Sampling Results, Annual Operation & Maintenance Reports, Site Inspection Reports by the New York State Department of Environmental Conservation (NYSDEC) and an inspection of the site, it has been concluded that the remedies, as defined by the site's decision documents, are protective of human health and the environment in the short-term.

This is the third five-year review for the Hooker (102nd Street) Landfill Superfund site.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name (from WasteLAN): Hooker (102 nd Street) Landfill		
EPA ID (from WasteLAN): NYD 980506810		
Region: 2	State: NY	City/County: Niagara Falls, Niagara County
SITE STATUS		
NPL Status: <input type="radio"/> Final <input checked="" type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation Status: <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Construction Complete		
Multiple OUs? YES NO <input checked="" type="checkbox"/>	Construction completion date: 03/09/1999	
Are portions of this site and/or investigated adjacent properties in use or suitable for reuse? no		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency		
Author name: Jennifer LaPoma		
Author title: Remedial Project Manager	Author affiliation: EPA	
Review period:** 9/20/2006 to 9/19/2011		
Date(s) of site inspection: 5/8/2011		
Type of review: <input type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion <input checked="" type="checkbox"/> Statutory		
Review number: <input type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input checked="" type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
Triggering action: <input type="checkbox"/> Actual RA On-site Construction at OU # <u>1</u> <input type="checkbox"/> Actual RA Start at OU# <u>1</u> <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Other (specify) Previous 5-year review report		
Triggering action date (from WasteLAN): 9/19/2006		
Due date (five years after triggering action date): 9/19/2011		
Does the report include recommendation(s) and follow-up action(s)? <input checked="" type="checkbox"/> yes <input type="checkbox"/> no		
Is human exposure under control? <input checked="" type="checkbox"/> yes <input type="checkbox"/> no		
Acres in use or available for use: restricted: <u>22</u> unrestricted: <u>0</u>		

Five-Year Review Summary Form (Continued)

Remedy Assessment Summary

Based on the data reviewed and the site inspection, the remedy is functioning as intended by the 1990 ROD, the 1993 ESD, and 1995 ROD Amendment. The cap is effectively limiting the infiltration of water into and through the landfill materials. The cap also prevents direct contact exposure and fencing restricts access to the cap. The inward gradient across the slurry wall, with only one nonmaterial exception at the piezometer location along Buffalo Avenue, has been maintained since the initial implementation of the remedy. The steady-state leachate pumping operations indicate that the integrity of the slurry wall has been maintained since the remedy has been implemented. However, additional sampling to assess elevated levels of contaminants outside the slurry wall will be conducted. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Issues, Recommendations, and Follow-Up Actions

The selected remedy has been fully implemented. Institutional controls to protect the landfill remedy and to prevent the installation of potable water wells in the vicinity of the landfill have been established. The site has ongoing operation, maintenance and monitoring activities as part of the selected remedy. As anticipated by the decision documents, these activities are subject to routine modification and adjustments. Review of these activities revealed the need for follow-up actions, including data collection, to support the conclusion that hydraulic containment is being maintained.

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Inward gradients were not consistently maintained for quarters between 2006 and 2010 at well pair PCM-07R/PZ-07. Recommend that piezometers are tested to ensure they are not clogged and are in hydraulic communication.	The Companies	EPA	9/2012	N	Y
Evaluate source of ground water contamination outside of slurry wall on southwest side of site. Sample surface water and sediment to evaluate residual contamination.	The Companies	EPA	9/2012	N	Y

Protectiveness Statement

The remedy at the Hooker (102nd Street) Landfill site currently protects human health and the environment as there is no human exposure to contaminated groundwater or landfill residuals, and engineered and institutional controls continue to be operated, monitored and maintained. However, in order for the remedy to be protective in the long-term, additional sampling to assess elevated levels of contaminants outside the slurry wall will be conducted to ensure long-term protectiveness.

I. INTRODUCTION

This third five-year review for the Hooker (102nd Street) Landfill Superfund Site, located in Niagara Falls, Niagara County, New York, was conducted by the United States Environmental Protection Agency (EPA) Remedial Project Manager (RPM) Jennifer LaPoma. 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 done 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 Section 1.3.1 of the five-year review guidance, a five-year review is triggered by the signing date of the previous five-year review report. The previous five-year review report was signed on September 19, 2006.

II. SITE CHRONOLOGY

Table 1 summarizes the site chronology.

III. BACKGROUND

Site Location

The site is located on Buffalo Avenue in Niagara Falls, New York. The site borders on the Niagara River and lies less than one-quarter mile directly south of the Love Canal Superfund site, separated from the Love Canal site by the LaSalle Expressway, and Buffalo and Frontier Avenues. A portion of the filled area of the site is an extension of the original Love Canal excavation.

Land and Resource Use

The site consists of approximately 22.1 acres; 15.6 acres are owned by Occidental Chemical Corporation (OCC), formerly the Hooker Chemicals & Plastics Corporation, and 6.5 acres are owned by the Olin Corporation (Olin). Hereafter, OCC and Olin will collectively be referred to as the "Companies." The site has restricted access and has not been put to reuse.

The site is bounded to the south by a shallow embayment of the river. A stone-faced bulkhead, constructed in the early 1970s to minimize soil erosion to the river, runs along the length of the shoreline at the site. The embayment lies at the upstream end of the Little Niagara River which flows around the north shore of Cayuga Island before discharging into the river approximately 1.5 miles downstream from the site. To the west of the site is Griffon Park, which was formerly

used as a landfill for municipal waste by the City of Niagara Falls. Griffon Park is owned by the City of Niagara Falls and is utilized for passive recreational activities and a boat ramp along the Little Niagara River. There is limited residential development to the west of Griffon Park. Across the Little Niagara River is Cayuga Island, which is a residential community. The property to the east of the site is zoned residential and currently has two waterfront residences, but is otherwise an unimproved densely brushed field.

A well-maintained perimeter fence restricts site access. Authorized vehicular traffic access is provided from Buffalo Avenue by locked fence gates.

History of Contamination

The larger portion of the landfill operated from 1943 to 1971. During that time, approximately 23,500 tons of mixed organic solvents, organic and inorganic phosphates, and related chemicals were deposited at the landfill. Brine sludge, fly ash, electrochemical cell parts and related equipment and 300 tons of hexachlorocyclohexane process cake, including lindane, were also deposited at the site. A landfill operated on the smaller portion of the site property from 1948 to about 1970, during which time 66,000 tons of mixed organic and inorganic chemicals were disposed. In addition, about 20,000 tons of mercury brine and brine sludge, more than 1,300 tons of mixture of hazardous chemicals, 16 tons of mixed concrete boiler ash, fly ash, and other residual materials were disposed at the site.

Initial Response

In December 1970, the Buffalo District of the U.S. Army Corps of Engineers (COE) inspected the site and notified the Companies that their disposal practices were in violation of the Rivers and Harbors Act of 1899 (RHA). As a result, any further landfilling at the site by the Companies stopped. A bulkhead along the water's edge was completed in 1973.

On December 20, 1979, a complaint pursuant to the Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), and the RHA was filed by the United States of America, on behalf of the Administrator of the EPA, against the Companies seeking injunctive relief to remediate imminent and substantial endangerment to the public health and welfare, and civil penalties. On November 18, 1980, a complaint pursuant to the New York State Conservation Law and the state's common law of public nuisance was filed by New York State (NYS) against OCC and Olin in the U.S. District Court for the Western District of New York, seeking injunctive relief and civil penalties. The two complaints were consolidated. The site was added to the National Priorities List (NPL) in September 1983.

In 1972, the site was capped, a fence was erected on three sides, and a bulkhead along the Niagara River was installed. The Companies prepared a work plan for conducting the Remedial Investigation (RI) and Feasibility Study (FS) at the site in 1984, and after receiving EPA approval the Companies commenced to investigate landfill residues, off-site fill, shallow ground water, liquid waste, off-site soil, river sediments, and storm drains. The RI/FS was completed in 1990.

Basis for Taking Action

Contaminants found within the survey area during the RI/FS monitoring period included heavy metals (such as mercury), chlorobenzene compounds, chlorinated phenols, hexachlorocyclohexanes, polychlorinated biphenyls (PCBs), and polychlorinated dioxins and dibenzofurans. Ground water samples taken from the bedrock aquifer beneath the site did not contain site contaminants. Based on these findings and considering the highly impermeable nature of the clay/till layer separating the alluvium from the bedrock, shallow (overburden) ground water does not appear to flow vertically from the site into the bedrock aquifer. Rather, the overburden ground water discharges laterally into the embayment and across the site's eastern and western boundaries. The principal pathway for current migration of contaminants off-site is via ground water discharge from the fill and alluvium zones of the landfill into the embayment. Sediment monitoring conducted in the River shows contamination limited to an area within 300 feet from the shore.

Off-site investigations also indicated surface soils north of Buffalo Avenue and surface soils around the property perimeter contained site contaminants including dioxin above the 1 part per billion (ppb) action level. As a result, several inches of gravel were placed over the contaminated areas to preclude possible exposure at these locations.

The risk assessment concluded that the risks were present at the site for fish consumption and direct contact with contaminated surface soils. In addition, potential ecological risks were identified for sensitive species exposure to contaminated surface water above water quality standards and contaminated sediments.

IV. REMEDIAL ACTIONS

Remedy Selection

On September 26, 1990, EPA issued a ROD, identifying the selected remedy for the site. The remedial objective of the selected remedy is to contain the source area and to prevent further migration of contaminants to the extent possible.

The major components of the selected remedy consist of the following:

Landfill Residuals

- A synthetic-lined cap, constructed in accordance with federal and state standards, will be installed over the landfill and perimeter soils.
- All "off-site" soils above cleanup thresholds will be consolidated beneath the cap.

- A slurry wall, completely surrounding the site's perimeter, will be constructed and keyed into the underlying clay/till geologic formation. The precise location of the slurry wall will be established through the use of geotechnical borings which will determine the extent of the NAPL plume. The NAPL plume is to be contained by the slurry wall.
- Ground water will be recovered using an interception drain installed at the seasonal low-water table in the fill materials. Recovered ground water will be treated. Although the recovery of ground water does include a treatment component, the primary function of ground water recovery in general, is to create and maintain an inward gradient across the slurry wall.
- NAPL beneath the site will be recovered using dedicated extraction wells, and will be incinerated at an off-site facility.

Niagara River Sediments

- The two areas of river sediments which contain elevated concentrations of contaminants ("hot spots") will be dredged, and these highly contaminated sediments will be incinerated at an off-site facility.
- The remaining sediments will be dredged out to the "clean line" with respect to site-related contamination.
- These remaining sediments, after dewatering, will then be consolidated on the landfill.
- Any NAPL found within the remaining sediments will be extracted, and will be incinerated at an off-site facility.
- The primary focus of this remediation plan is to contain the NAPL plume with the slurry wall. In the event the slurry wall's initial positioning places it across the "hot spot" area(s), practicality may dictate that the wall be extended outward to enclose these "hot spots." In such case, these highly contaminated sediments, rather than being dredged and incinerated, would be left in place, that is, contained by the slurry wall, covered with fill, and finally covered with the cap. The remaining sediments beyond the slurry wall would still be dredged and consolidated beneath the cap.

Storm Sewer

- The existing storm sewer will be cleaned, and a high density polyethylene plastic slip liner will be installed within the sewer. The annular space between the original pipe and the slip liner will then be pressure-grouted.
- Any NAPL found in the soils and/or sediments taken from the existing sewer will be extracted, and will be incinerated at an off-site facility.

Monitoring

- Post-remedial monitoring shall be performed to determine the effectiveness of the remedial alternatives which have been selected.

Restriction of Access

- A 6-foot high chain-link fence will be installed around the perimeter of the cap in order to restrict access to the site.

Institutional Controls

- Institutional controls in the form of deed restrictions, or similar restrictions, on future uses of the landfill, will be established.

On September 30, 1993, EPA issued an Explanation of Significant Differences (ESD) to document a change in the remedial action for the then-existing storm sewer. The ESD documented the requirement to construct a new storm sewer that would be re-routed around the eastern perimeter of the landfill, and the then existing storm sewer would be plugged and abandoned.

On June 9, 1995, EPA issued a ROD Amendment to document a change in the treatment of excavated sediments from the River. The remedial action, as identified in the 1990 ROD required dredging the River sediments to the "clean line" with respect to site related contamination. As a result of the ROD Amendment, these sediments, after dewatering, would not be incinerated, but instead would be consolidated in the landfill. Any NAPL found within these sediments would be extracted and incinerated at an off-site facility, consistent with the 1990 ROD.

Remedy Implementation

On May 24, 1991, EPA issued Special Notice letters under Section 122(e) of CERCLA to the Companies offering the opportunity to perform the Remedial Design/Remedial Action (RD/RA) as set forth in the ROD for the site. The Special Notice provided for a moratorium of 120 days during which the EPA agreed not to conduct the remedial design and remedial action (RD/RA) pending the outcome of negotiations for the Companies to conduct the RD/RA. This letter also included a demand for the reimbursement of the EPA's past costs, in the amount of \$3,047,706.88, plus interest. On July 16, 1991, the Companies responded to EPA's Special Notice and Demand Letter with a "good faith offer" of their willingness to perform the RD/RA. However, subsequent negotiations were not successful.

In the absence of an agreement on the RD/RA, EPA, pursuant to Section 106(a) of CERCLA, issued a Unilateral Administrative Order (UAO) to the Companies on September 30, 1991 to

conduct the RD/RA at the site. Counsel for the Companies indicated that their clients intended to comply with the terms of this UAO.

As a result, remedial design activities pursuant to the UAO began in October 1991. The Intermediate Engineering Report (IER), the equivalent of the Remedial Design Report, was approved by the EPA on August 31, 1993. However, federal and state natural resource trustees subsequently raised certain concerns related to the IER. As a result, EPA issued a ROD Amendment in June 1995. The ROD Amendment eliminated the requirement to incinerate excavated sediments from the embayment and called for a realignment of the slurry wall. As a result of the ROD Amendment, these sediments would be consolidated under the landfill cap.

Landfill Residual Remediation

In April 1996, the remedial action began at the site with the mobilization of erosion and sediment control measures. Construction activities including excavation, consolidation and isolation of perimeter and off-site soils under the landfill cap were completed in August 1996. Table 4 identifies the site-specific soil cleanup criteria.

The circumferential slurry wall construction began in August 1996, and was completed in May 1997. A straight line slurry wall alignment, outlined in the IER, would have destroyed approximately three acres of wetlands and aquatic habitat in the embayment area. In the October 1994 Ecological Resource Impacts and Mitigation Site Study, federal and state natural resource trustees expressed that remediation of the site-related chemicals in the embayment area would have resulted in the loss of an irreplaceable habitat along the River. Therefore, a modified alignment was constructed to preserve wetland and aquatic habitat and the shoreline was entirely dredged. The wall was keyed into the underlying clay/till formation to hydraulically contain the APL/NAPL plume within the site.

An interception drain was installed within the landfill at the seasonal low water table to recover leachate and create inward gradients across the slurry wall. Four individual APL wet wells are set at target elevations (561.9 feet) and shut down when elevations in the wells reach target level. A force main system for pumping APL leachate from the landfill to the Love Canal Treatment Facility (LCTF) became operational in March 1999. NAPL is recovered at the landfill and its presence is monitored by eight dedicated extraction wells.

Preparation of hydraulic monitoring at the site consisted of the installation and subsequent measurement of ground water levels in pairs of monitoring wells and piezometers to determine ground water elevations. This included the installation of ten piezometers (PZ-01 through PZ-10) inside the slurry wall and ten monitoring wells (PCM-01 through PCM-10) outside the slurry wall. The ground water quality evaluation was established to be monitored within the overburden monitoring wells (PCM-01 through PCM-10) and three bedrock monitoring wells (PCBM-01 through PCBM-03). Overburden material is made up a fill (0 to 18 feet) and alluvium layer (up to 32 feet), which are hydraulically connected and underlain by a clay layer, which acts as an aquitard. Ground water flows towards the River.

Installation of the capping system began in November 1997. The capping system consists of a combination of geosynthetic and natural soil materials to minimize infiltration of precipitation into the landfill as well as to isolate the landfill contents.

Access to the site was restricted by the installation of a new six-foot high chain link fence that encircles the site along the property line and along the bulkhead. The fence was previously installed in 1972, as a result of RHA violations, but formerly did not restrict access along the bulkhead. Additionally, institutional controls in the form of deed restrictions were implemented to ensure that future land use at the site is limited so as to preclude certain types of access to the landfill and to restrict ground water use at the site from human consumption.

Sediment Remediation

Beginning in July 1996, a cofferdam was built around the portion of the embayment which contained contaminated sediments. After the embayment area was dewatered, contaminated sediments above the site-specific action levels were removed to a maximum excavation depth of two feet and placed on top of the landfill prior to finalization of the cap installation. Clean fill was backfilled into the excavated embayment. This work was completed in November 1996.

Storm Sewer Remedy

Abandonment and relocation of the 42-inch 100th Street storm sewer that traversed the site was completed in September 1996.

Site Completion

A Preliminary Close-Out Report, which summarizes remedial actions for landfill residuals, perimeter soils, shallow ground water, NAPL, and River sediments, was signed by the EPA on September 2, 1999 and a settling Consent Decree was lodged with the court on July 19, 1999 and was entered by the court on October 1, 1999. Under the terms of the Consent Decree, the Companies reimbursed EPA in the amount of \$6,800,000 for past costs, including interest. By means of a letter dated March 13, 2002, EPA accepted the Companies' Certification of Completion of the remedial action, and transferred the enforcement lead for oversight of the continuing operation and maintenance of the site to NYSDEC from EPA. The site was deleted from the NPL on August 5, 2004.

Operation, Maintenance, and Long-Term Monitoring

All APL leachate collected from the individual wells at the site have been, and continue to be transferred via a force main system to the nearby LCTF, where the leachate is treated and discharged. The LCTF is permitted to discharge to the Niagara Falls municipal sewerage system for final treatment at the Niagara Falls Publicly Owned Treatment Works. Wet wells are set at target elevations (561.9 feet) and shut down when elevations in the wells reach target level, in order to maintain the inward differential (gradient) of one to two feet.

NAPL is recovered at the landfill and its presence is monitored by eight dedicated extraction wells on a quarterly basis. If more than three gallons of NAPL is present in a recovery well, NAPL will be removed and stored on-site before being transferred to Clean Harbors Facility in Deer Park, Texas for incineration.

An Operation and Maintenance (O&M) Plan has been developed and is being implemented. The O&M plan includes routine inspections of the capped area; mowing landfill vegetation to prevent woody growth; quarterly ground water level measurements; semiannual ground water quality monitoring; quarterly NAPL presence monitoring; APL collection and discharge; and maintenance of access restrictions.

In accordance with the O&M Plan, ground water level measurements are monitored within the piezometers and monitoring wells quarterly. There are ten monitoring wells (PCM-01 through PCM-10) outside the slurry wall and three bedrock monitoring wells (identified as PCBM wells) positioned on the southern, northern, and eastern sides of the site. These bedrock wells are monitored in the same manner as the overburden wells for water level and water quality monitoring.

Institutional Controls Implementation

Deed restrictions, precluding the extraction of ground water (other than that required for implementation and O&M of the remedy) and any activity that could interfere with the integrity of the landfill cap or other engineering controls in place at the site, were filed on January 25, 2000, in the County Recorder's Office by the Companies. The Companies are the owners of the real property which comprises the site. The filing of the deed restrictions was effectuated under the terms of a Consent Decree between the Companies and EPA and New York State.

V. Progress Since Last Five-Year Report

The first five-year review was completed on August 15, 2001. It concluded that the implemented remedy continued to be protective of public health and the environment. There were no recommendations, follow-up actions, or issues presented in the first five-year review.

The second five-year review was completed on September 19, 2006 and concluded that the implemented remedy continued to be protective of public health and the environment. It was recommended in the 2006 five-year review that the contaminant mercury be added to the list of parameters monitored for evaluating ground water quality. This addition has been implemented since the 2006 five-year review. It was additionally suggested that all piezometers be tested to ensure that they are in hydraulic communication and that surface water and sediment sampling be conducted based on contamination present near wells PCM-03, PCM-04 and PCM-05. The piezometer testing and additional sampling activities have not been conducted. As such, these suggestions will be carried forward in this five-year review. A letter was transmitted to the Companies on August 17, 2011 requesting that the Companies perform the data collection activities identified in the last five-year review.

VI. FIVE -YEAR REVIEW PROCESS

Administrative Components

The five-year review team consisted of Jennifer LaPoma (Remedial Project Manager), Pete Mannino (Western New York Remediation Section Chief), Julie McPherson (Risk Assessor), Edward Modica (Hydrogeologist) and Mindy Pensak (Ecological Risk Assessor) of EPA.

Community Involvement

The EPA Community Involvement Coordinator for the site, Michael J. Basile, published a notice in the *Niagara Gazette*, a local newspaper, on November 26, 2010, notifying the community of the initiation of the five-year review process. The notice indicated that the EPA would be conducting a five-year review of the remedy for the site to ensure that the implemented remedy remains protective of public health and the environment and is 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. The notice also solicited public comments or questions related to the five-year review process or to the site.

In addition, the notice included the RPM's mailing address and telephone number in the event the public had any comments or questions. No comments were received. The site remedy was discussed with representatives for the potentially responsible parties (PRPs) and NYSDEC. There were no interviews with local officials or community representatives.

Document Review

This five-year review consisted of a review of relevant documents including O&M records and monitoring data. See Table 2.

Data Review

The Companies, through their contractor, Conestoga-Rover's & Associates (CRA) under direct supervision of Glenn Springs Holdings (GSH), an affiliate of OCC, operate and maintain the facilities. Formerly, Miller Springs Remediation Management, Inc. maintained site responsibilities.

APL Collection and Discharge

Since the completion of the force main system and initiation of the leachate pumping operations, the system has shown integrity in that the four wet wells have been recharging properly, the leachate level within the landfill has dropped, and the reduced level has been maintained. During the present steady-state operations, enough leachate has been and will be removed from

the landfill so as to maintain the inward differential (gradient) of one to two feet. The force main system is pumping sufficient APL leachate from the landfill to the treatment facility as to maintain an inward gradient across the slurry wall.

For the past five years, an average total of 393,509 gallons of APL were removed and conveyed to the LCTF. A total of approximately 8.1 million gallons of APL has been removed from the site since pumping was initiated in March 1999.

NAPL Presence Monitoring

NAPL is recovered at the landfill and its presence is monitored at eight dedicated extraction wells on a quarterly basis. Performance data show that the NAPL recovery is functioning properly. Total average quantity of NAPL removed was 8,000 gallons between 2006 and 2010. The majority of NAPL was pumped from NR-2. NAPL is transported to Clean Harbors Facility in Deer Park, Texas for incineration.

Landfill Cap/Consolidated Soils & Sediment

Based on site inspections, the landfill cap is in good repair. There appears to be no significant subsidence or breach on the cover. The perimeter fence is intact and restricts access as intended.

Hydraulic Monitoring

According to performance data for the last five years, water level monitoring at ten well pairs along the landfill perimeter show that hydraulic capture has been generally maintained around the landfill. Water levels are measured quarterly. Water level measurements for the well pair PCM-07R/PZ-07 have shown that inward gradients were not consistently maintained for quarters between 2006 and 2010. Also, wells PCM-06, PZ-6 and PZ-09 were dry for all or most quarters of 2010, 2009, and 2008 so that it could not be confirmed that inward gradients were maintained across the slurry wall where these wells are located along the northern side of the site. However, piezometric contour maps of the landfill show that there is a north to south ground water gradient toward the APL collection trench (in the southern part of the landfill) indicating that ground water flows away from the northern wall. Also, water quality data collected in wells PCM-06, PCM-07 and PCM-09 located on the outside of the slurry wall, show no contamination.

Ground Water Quality Monitoring

The water quality monitoring program calls for semiannual collection of ground water samples from ten monitoring wells screened in the overburden (PCM wells) and three monitoring wells screened in the bedrock (PCBM wells). Between 2006 and 2010, the data indicate that there were exceedances of the pesticides, alpha-benzene hexachloride (BHC) (up to 0.054 ppb), beta-BHC (up to 0.56 ppb), and gamma-BHC (up to 0.81 ppb) in PCBM monitoring wells. The NYSDEC Water Quality Regulations (WQR) for alpha-BHC is 0.01 ppb and 0.04 ppb for both beta-BHC and gamma-BHC.

Between 2006 and 2010, the data indicate that there were no exceedances above the maximum

contaminant level (MCL) in most perimeter wells in the overburden as shown in Table 3. However, overburden wells PCM-03, PCM-04 and PCM-05 have historically shown exceedances of benzene (up to 76 ppb), chlorobenzene (up to 12,000 ppb), 1,2-dichlorobenzene (up to 100 ppb), 1,4-dichlorobenzene (up to 510 ppb), phenol (up to 1.7 ppb), and related compounds. These overburden (screened less than 30 feet deep) wells are screened along the south/southeast side of the landfill, on the outside of the slurry wall near the shoreline. Since inward gradients have been consistently maintained across the section of the slurry wall over the same period, it does not appear that this contamination is due to contaminated water seeping from the landfill, but rather, is due to residual contamination from soils located on the outside of the wall. Consistent with the inward gradient seen in well pairs PZ-03/PCM-03, PZ-04/PCM-04 and PZ-05/PCM-05, any dissolved phase is not moving towards the River.

Residual contamination in subsurface soil may still persist in the soil matrix where the wells are screened, affecting water quality in the saturated zone outside of the slurry wall near the embayment area. This contamination is not unexpected because the slurry wall was constructed close to the edge of the steep embankment and could not enclose all of the contaminated soil. Although inward gradients across the wall should limit the migration of contaminated water to the zone just outside the wall and direct it into the landfill, interstitial pore water affected by the contaminated soil may migrate into the surface water in the embayment area and affect ambient surface water quality. Consequently, it has been suggested that the ambient quality of surface water in the embayment area should be monitored.

Site Inspection

A site visit related to this five-year review was conducted on June 8, 2011. An EPA representative, Gloria Sosa was accompanied by Joseph Branch, project manager for GSH, an affiliate of the Companies. During the site inspection, the EPA representative did not observe any problems or deviations from the ongoing operation and maintenance activities being implemented at the site. The cap appeared fully vegetated with no bare spots and no evidence of erosion. Site fencing was observed to be in good condition.

VI. TECHNICAL ASSESSMENT

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

All components of the remedy are functioning as intended by the decision documents. The remedy objective for the site as described in the 1990 ROD is hydraulic containment of APL/NAPL within the landfill. As specified in the 1990 ROD, the remedy required the installation of a slurry wall around the landfill perimeter, recovery and treatment of APL leachate, separate recovery of NAPL and off-site incineration, and the installation of a landfill cap with consolidation of contaminated soils beneath. The 1995 ROD Amendment eliminated the requirement to incinerate contaminated sediments excavated from the embayment area and allowed for these sediments to be placed beneath the landfill cap. The remedy also called for rerouting of a storm sewer around the eastern edge of the landfill (as per the 1993 ESD), post-

remedial monitoring, and institutional controls. Based on performance data for the past five years, the remedy is functioning according to design.

APL Collection and Discharge

In 1997, a slurry wall was installed around the perimeter of the landfill and keyed into the underlying clay/till formation to hydraulically contain the APL/NAPL plume within the landfill. An interception drain was also installed within the landfill at the seasonal low water table to recover leachate and create inward gradients across the slurry wall. Since the startup of the pumping operation in 1999, inward gradients have generally been maintained. Individual APL pumps in wet wells are set to target elevations (561.9 feet) and shut down when elevations in the wells reach the target level. For the past five years, an average total of 393,509 gallons of APL were removed and conveyed to the LCTF. Based on recent performance data, the ground water APL collection system appears to be functioning according to design.

NAPL Recovery

As part of the remedy, NAPL is recovered at the landfill and its presence is monitored at eight wells on a quarterly basis. Performance data show that the NAPL recovery system is functioning properly. Total average quantity of NAPL removed was 8,000 gallons between 2006 and 2010. Recovered NAPL is transported to Clean Harbors Facility in Deer Park, Texas for incineration.

Landfill Cap/Consolidated Soils and Sediment

Cap installation and soil/sediment excavation activities were completed on the site by 1997. The cap consists of a geosynthetic layer and natural soil material to reduce infiltration and migration of the APL/NAPL plume. Sediment activities met the cleanup objectives chosen in the 1990 ROD. There has not been a breach of the cap and it remains in good condition. The perimeter fence is intact and restricts access as intended.

Hydraulic Monitoring

Quarterly basis water level monitoring at the well pairs along the landfill perimeter, indicate that hydraulic capture has been generally maintained around the landfill. Water level measurements for the well pair PCM-07R/PZ-07 have shown that inward gradients were not consistently maintained for quarters between 2006 and 2010. Also, wells PCM-06, PZ-6 and PZ-09 were dry for all or most quarters of 2010, 2009 and 2008. Therefore, it could not be confirmed that inward gradients were maintained across the slurry wall where these wells are located along the northern side of the site. However, piezometric contour maps of the landfill show that there is a north to south ground water gradient toward the APL collection trench (in the southern part of the landfill) indicating that ground water flows away from the northern wall. As indicated in section VII, it has been recommended that all piezometers are tested to ensure they are not clogged and are in hydraulic communication.

Ground Water Quality Monitoring

Semiannual ground water quality samples from wells screened in the overburden and wells screened in the bedrock between 2006 and 2010 indicate that there were no exceedances above their respective criteria at most perimeter wells. However, wells PCM-03, PCM-04, and PCM-05 have historically shown exceedances of benzene, chlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, phenol, and related compounds. These wells are screened along the south/southeast side of the landfill, on the outside of the slurry wall near the shoreline, which had originally been targeted for removal prior to 1995 ROD amendment. Since inward gradients have been consistently maintained across the section of the slurry wall over the same period, it does not appear that this contamination is due to contaminated water seeping from the landfill, but rather, is due to residual contamination from soils that were on the outside of the wall.

Federal and state natural resource trustees expressed that remediation of the site-related chemicals in the embayment area would have resulted in the loss of an irreplaceable habitat along the Niagara River. Following an assessment conducted by the natural resource trustees, a modified alignment was constructed to preserve wetland and aquatic habitat. Monitoring wells PCM-03, PCM-04 and PCM-05 are all located outside of the slurry wall, along the steep embankment of the River. Consistent with the inward gradient seen in well pairs PZ-03/PCM-03, PZ-04/PCM-04 and PZ-05/PCM-05, any dissolved phase is not moving towards the River. Ambient quality of surface water and sediments has been suggested for additional sampling in the embayment area as a follow up action to this five-year review.

Institutional controls

Institutional controls, in the form of deed restrictions, were implemented at the site to preclude the extraction of ground water other than as required for the implementation of O&M activities for the remedy. Additionally, institutional controls were implemented to prevent any construction or other activity that could interfere with the integrity of the cap or other engineering controls in place at the site.

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

The majority of the exposure pathways and the receptor populations identified in the 1990 Baseline Human Health Risk Assessment (BHHRA) are still valid.

Ground Water Pathway

The toxicity values for several contaminants of potential concern (COPCs) have changed since the RI. In order to account for changes in toxicity values since the RI, the maximum detected concentrations of COPCs detected in the on-site monitoring wells during the 2007-2010 sampling period were compared to their respective residential ground water Preliminary Remediation Goals (PRGs) and MCLs (i.e., National Primary Drinking Water Standards) and NYSDEC WQRs as identified in Table 3. The MCL is the highest level of contaminant that is

allowed in drinking water. MCLs are promulgated standards that apply to public water systems and are intended to protect human health by limiting the levels of contaminants in drinking water. The PRGs are a human health risk based value that is equivalent to a cancer risk (CR) of 1×10^{-6} or a hazard index (HI) of 1.

Several site-related constituents have consistently been detected in the wells down gradient of the site (PCM-03, PCM-04 and PCM-05) above their respective criteria. Since an inward pressure gradient has been maintained in this area, the concentrations of the constituents detected in the downgradient wells do not suggest that site-related contamination is breaching the slurry wall, but rather the contamination exists outside the slurry wall.

Vapor Intrusion Pathway

Soil vapor intrusion was not previously evaluated during the RI, as a potential future exposure pathway based on the conservative (health protective) assumption that buildings are not located above the area of ground water with maximum detected concentration for the contaminants of concern. This exposure pathway was qualitatively addressed in the previous five-year review and is shown in Table 5. The health based screening criteria provided in EPA's 2002 Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Ground Water and Soils was used to initially evaluate this exposure pathway. This guidance provides calculations of concentrations in ground water associated with indoor air concentrations at acceptable levels of cancer risk and non-cancer hazard. This review compared the maximum detected concentrations of the COPCs with the vapor intrusion screening criteria. Several site-related constituents have exceeded their respective risk based criteria (1×10^{-6}) and the upper bound of the risk range (1×10^{-4}). This does not indicate that a vapor intrusion problem would occur if a building were to be erected over the site. This merely indicates that further investigation would be necessary, which includes site specific considerations such as the type of building, the location of the building to the maximum detected concentration, and the subsurface characteristics of the site. Currently, there are no buildings on the site; therefore, the exposure pathway is incomplete at this time.

Soils/Sediments Pathway

The soil remedy was reviewed to address the protectiveness of the remedy presented in the 1990 ROD. As stated earlier, the soil and the sediment in the outlying embayment areas were excavated and placed in the landfill. The maximum depth of excavation in the embayment area was two feet. The cleanup criteria, identified in Table 3, for several contaminants exceed their respective New York State Department of Conservation Technical and Administrative Guidance Memorandum (TAGMs) #4046; <http://www.dec.state.ny.us/website/der/tagms/prtg4046e.html>), which are To Be Considered (TBCs). The cleanup criteria presented in the ROD were compared to the Region 9 Preliminary Remediation Goals and the current chemical specific TBCs (e.g., TAGMs). Although cleanup goals for several contaminants have exceeded their current respective TAGMs, the cleanup goals established are within or below EPA's cancer risk range or below the non-cancer threshold. The cleanup goals are considered protective of human health. It should be noted that soil and sediment cleanup goals were not established for several

constituents that are of concern in the ground water.

Dioxin Consideration

EPA's dioxin reassessment has been developed and undergone review over many years with the participation of scientific experts in EPA and other federal agencies, as well as scientific experts in the private sector and academia. The Agency followed current cancer guidelines and incorporated the latest data and physiological/biochemical research into the assessment. The results of the assessment have currently not been finalized and have not been adopted into state or federal standards. EPA anticipates that a final revision to the dioxin toxicity numbers may be released by the end of 2011. In addition, EPA and its Office of Solid Waste and Emergency Response have proposed to revise the interim PRGs for dioxin and dioxin-like compounds, based on technical assessment of scientific and environmental data. However, EPA has not made any final decisions on interim PRGs at this time. Therefore, the dioxin toxicity reassessment for this site will be updated during the next five-year review.

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

No human health or ecological risks have been identified, and no weather-related events have affected the protectiveness of the remedy. No other information has come to light 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 selected remedy has been fully implemented. Institutional controls to protect the landfill remedy and to prevent the installation of potable water wells in the vicinity of the landfill were implemented. The inward gradient across the slurry wall, with only one nonmaterial exception at the piezometer location along Buffalo Avenue, has been maintained since the initial installation of the remedy. The steady-state leachate pumping operations indicate that the integrity of the slurry wall has been maintained since the initial installation of the remedy.

VII. ISSUES, RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The selected remedy has been fully implemented. Institutional controls to protect the landfill remedy and to prevent the installation of potable water wells in the vicinity of the landfill were implemented. This site has ongoing operation, maintenance and monitoring activities as part of the selected remedy. As anticipated by the decision documents, these activities are subject to routine modification and adjustments. Review of these activities revealed the need for follow-up actions, including data collection, to support the conclusion that hydraulic containment is being maintained.

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Inward gradients were not consistently maintained for all quarters between 2006 and 2010 at well pair PCM-07R/PZ-07. Recommend that piezometers are tested to ensure they are not clogged and are in hydraulic communication.	The Companies	EPA	9/2012	N	Y
Evaluate source of ground water contamination outside of slurry wall on southwest side of site. Sample surface water and sediment to evaluate residual contamination.	The Companies	EPA	9/2012	N	Y

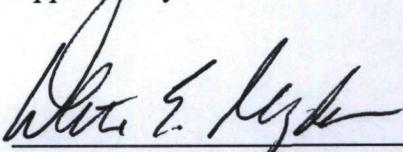
VIII. PROTECTIVENESS STATEMENT

The remedy at the Hooker (102nd Street) Landfill site currently protects human health and the environment as there is no human exposure to contaminated ground water or landfill residuals, and engineered and institutional controls continue to be operated, monitored and maintained. However, in order for the remedy to be protective in the long-term, additional sampling to assess elevated levels of containments outside the slurry wall will be conducted to ensure long-term protectiveness.

IX. NEXT REVIEW

Since hazardous substances, pollutants or contaminants remain at the Hooker 102nd Street Superfund site, the next Five-Year Review for the site should be completed within five years of the signature date below.

Approved by:



 Walter E. Mugdan, Director
 Emergency and Remedial Response Division
 EPA – Region 2

Sept. 19, 2011
 Date

Table 1
Chronology of Site Events

1945 to 1970:	The Companies deposited 159,000 tons of hazardous wastes at the site
1979	EPA sued the Companies.
1982 to 1984	RI Work Plan negotiations and pre-remedial investigations
1983 (September)	Site listed on the National Priorities List
1984 (June)	Work Plan for RI approved
1984 (December)	Site Operations Plan for RI approved
1985	RI field work began
1990 (July)	RI Final Report and FS Final Report approved
1990 (Sept)	ROD signed by EPA
1991 (Sept)	EPA issued Special Notice letters for the Remedial Design and Remedial Action
1991 (Sept)	UAO for Start of Remedial Design and Remedial Action
1993 (Sept)	ESD issued
1995 (June)	ROD Amendment issued
1996 (April)	Construction of the Remedy was started
1999 (March)	Construction of the Remedy was completed
2001 (August)	First Five-Year Review Report issued by EPA
2002 (March)	NYSDEC assumed oversight responsibilities of PRP O&M activities
2004 (August)	Site deleted from the National Priorities List
2006 (Sept)	Second Five-Year Review issued by EPA

Table 2
Documents, Data, and Information Reviewed in Completing the Five-Year Review

- Remedial Investigation, Final Report, July 1990;
- Record of Decision for the 102nd Street Landfill Superfund Site, September 1990;
- Explanation of Significant Differences, September 1993;
- Ecological Resource Impacts and Mitigation Site Study, October 1994;
- Record of Decision Amendment, June 1995;
- Consent Decree, April 1999;
- Final Close-out Report, September 1999;
- Annual Operation and Maintenance Report for 2006;
- Annual Operation and Maintenance Report for 2007;
- Annual Operation and Maintenance Report for 2008;
- Annual Operation and Maintenance Report for 2009;
- Annual Operation and Maintenance Report for 2010; and,
- EPA Guidance for conducting Five-Year Reviews.

Table 3

Comparison of the maximum detected concentrations of COPCs detected in on-site monitoring wells to their respective human health risk-based screening criteria PRGs, Primary Drinking Water Standards (MCLs) and NYSDEC Water Quality Regulations (NYSDEC WQRs)

COPC	Maximum Detected Concentration (ug/l)	Region 9 Preliminary Remediation Goal (ug/l)	Primary Drinking Water Standard - MCL (ug/l)	NYSDEC WQR (ug/l)	Location
1,2,3-trichlorobenzene	36			5	PCM-03
1,2,4-trichlorobenzene	51	7.2 (nc)	70	5	PCM-03
1,2-dichlorobenzene	100	370 (nc)	600	3	PCM-03
1,4-dichlorobenzene	510	0.5 (c)	75	3	PCM-03
2-chlorotoluene	120	120 (nc)		5	PCM-03
Chlorobenzene	12000	110 (nc)	100	5	PCM-04
Benzene	76	0.35 (c)	5	1	PCM-04
2,4-dichlorophenol	28	110 (nc)		1	PCM-03
2-chlorophenol	41	30 (nc)			PCM-03
4-chlorophenol	93				PCM-03
Phenol	1.7	11000 (nc)		1	PCM-03
alpha- BHC	0.11	0.01 (c)		0.01	PCM-07
beta-BHC	5.6	0.037 (c)		0.04	PCM-03
delta-BHC	2			0.04	PCM-03
gamma-BHC	0.048	0.052 (c)	0.2	0.05	PCM-03
Arsenic	10	0.045 (c)	10	25	PCM-03

Footnotes:

(c): Value is based on a cancer endpoint

(nc): Value is based on a non-cancer endpoint

Bold The maximum detected concentration of the contaminant of concern has exceeded the PRG, its respective MCL and/or its respective NYSDEC WQR.

Table 4
Comparison of the Soil Cleanup Goals Established for Site Specific Indicators to the
NYSDEC Soil Cleanup Objectives and the EPA Region 9 PRGs - Residential.

COPC	Cleanup Goal established in the ROD (mg/kg)	NYSDEC Soil Cleanup Objective (mg/kg)	NYSDEC Protection of Ground Water Objective (mg/kg)	EPA Region 9 PRG - Residential (mg/kg)
mercury*	0.1	0.1		6.1 (nc)
2-monochlorotoluene	0.1			
4-monochlorotoluene	0.1			
1,2-dichlorobenzene	0.1			600 (nc)
1,4-dichlorobenzene	0.1			3.4 (c)
1,2,3-trichlorobenzene	0.1			
1,2,4-trichlorobenzene	0.1	0.33	0.034	62 (nc)
1,2,3,4-tetrachlorobenzene	0.1			
1,2,4,5-tetrachlorobenzene	0.1			18 (nc)
pentachlorobenzene	0.1			49 (nc)
hexachlorobenzene	0.1	0.41	1.4	0.3 (c)
alpha-HCCH	0.1	0.11	0.2	0.09 (c)
beta-HCCH	0.1	0.2	0.2	0.3 (c)
delta-HCCH	0.1	0.3	0.3	
gamma-HCCH	0.1		0.06	0.4 (c)
2,4-dichlorophenol	0.1	0.4	0.4	180 (nc)
2,5-dichlorophenol	0.1			
2,4,5-trichlorophenol	0.1			6100 (nc)
2,4,6-trichlorophenol	0.1			6.1 (nc)

Footnotes:

(c): Value is based on a cancer endpoint

(nc): Value is based on a noncancer endpoint

*: The cleanup goal for mercury in soil is 0.1 mg/kg and the cleanup goal for mercury in sediment is 0.2 mg/kg

Bold The cleanup goal established in the ROD exceeds the current NYSDEC Protection of Ground Water Criteria

Table 5
Comparison of the Maximum Detected Concentrations of COPCs Detected in the Monitoring Wells to Their Respective Vapor Intrusion Screening Criteria

COPCs	Maximum detected concentration	Cancer Risk = 1×10^{-6} Non-cancer hazard = 0.1	Cancer Risk = 1×10^{-4} Non-cancer hazard = 1
1,2,3-trichlorobenzene	36		
1,2,4-trichlorobenzene	51		
1,2-Dichlorobenzene	100	260 (nc)	2600 (nc)
1,4-Dichlorobenzene	510	820 (nc)	8200 (nc)
2-Chlorotoluene	120		
Chlorobenzene	12000	39 (nc)	390 (nc)
Benzene	76	1.4 (c)	140 (c)
2,4-Dichlorophenol	28		
2-Chlorophenol	41	110 (nc)	1100 (nc)
4-Chlorophenol	93		
Phenol	1.7	2.1 (c)	210 (c)
alpha- BHC	0.11	3.1 (c)	310 (c)
beta-BHC	5.6		
delta-BHC	2		
gamma-BHC	0.048	11 (c)	1100 (c)

Footnotes:

(c): Value is based on a cancer endpoint

(nc): Value is based on a noncancer endpoint

Bold The maximum detected concentration of the contaminant of concern has exceeded its respective vapor intrusion risk-based criterion.

Source:

Vapor Intrusion Screening Values are used for screening purposes. Refer to:
<http://www.epa.gov/correctiveaction/eis/vapor.htm>