SIXTH FIVE-YEAR REVIEW REPORT FOR
HYDE PARK LANDFILL SUPERFUND SITE
NIAGARA COUNTY
NIAGARA FALLS, NEW YORK

Prepared by

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

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LIST OF ABBREVIATIONS & ACRONYMS

AMSL	Average Mean Sea Level
APL	Aqueous Phase Liquid
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COC	Contaminants of Concern
CRCR	Comprehensive Remedial Characterization Report
EDD	Enforcement Decision Document
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
GSHI	Glenn Springs Holdings, Inc.
HQ	Hazard Quotient
IC	Institutional Control
IRIS	Integrated Risk Information System
MOE	Ministry of the Environment (Ontario)
NAPL	Non-Aqueous Phase Liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NYPA	New York Power Authority
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and Maintenance
OBCS	Overburden Barrier Collection System
OCC	Occidental Chemical Corporation
OMW	Overburden Monitoring Well
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PMP	Performance Monitoring Plan
PPB	Parts Per Billion
PPM	Parts Per Million
PPT	Parts Per Trillion
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RPM	Remedial Project Manager
RRT	Requisite Remedial Technology
SC	Source Control
SOI	Site Organic Indicator
SVOC	Semi-Volatile Organic Compound
TCDD	2,3,7,8-Tetrachlorodibenzo-*p*-dioxin
TCE	Trichloroethene
TCP	2,4,5-Trichlorophenol
UU/UE	Unlimited Use/Unrestricted Exposure
VOC	Volatile Organic Compound

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the sixth FYR for the Hyde Park Landfill Superfund site, located in Niagara Falls, Niagara County, New York. The triggering action for this statutory review is the previous FYR, dated August 23, 2016. The FYR has been prepared due to the fact that hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE). The site consists of one operable unit (OU), which will be addressed in this FYR.

The Hyde Park Landfill Superfund site FYR was led by the U.S. Environmental Protection Agency (EPA) Remedial Project Manager (RPM) Aidan Conway. Participants included Liana Agrios (EPA) hydrogeologist, Marian Olsen (EPA) human-health risk assessor, Charles Nace (EPA) ecological risk assessor, Michael Basile (EPA) Community Involvement Coordinator (CIC), and Peter Lisichenko (EPA) on-scene coordinator. The Hyde Park Landfill Potentially Responsible Party (PRP) was notified of the initiation of the FYR. The FYR began on August 3, 2020.

Site Background

The Hyde Park Landfill is a 15-acre site in the northwest corner of the Town of Niagara, New York. The site is immediately surrounded by several industrial facilities and property owned by the New York Power Authority. Residential neighborhoods are located to the northwest and south of the landfill. The Niagara River, an international boundary, is located 2,000 feet to the northwest, down the Niagara Gorge which descends approximately 350 feet below the surface of the landfill. The Niagara River flows into Lake Ontario approximately 10 miles downstream of the site. Lake Ontario is a drinking-water source for millions. Niagara University, which has 3,000 students, is less than one mile north of the site. The Bloody Run is a small drainage area flowing north from the landfill and considered part of the site. The stream flows under a neighboring industry via a storm sewer, and under University Drive via a storm sewer which emerges at the Niagara Gorge.

Hooker Chemical and Plastic Corporation, now Occidental Chemical Corporation (OCC), disposed of approximately 80,000 tons of waste (drummed and bulk liquids, and solids) at the site, from 1953 to 1975, consisting primarily of chlorobenzenes, chlorotoluenes, halogenated aliphatics and 2,4,5-trichlorophenol (TCP) from still bottoms. There were two onsite lagoons and four rail tank cars in which non-aqueous phase liquid (NAPL) was stored. An estimated 3,300 tons of TCP were disposed of at the site; TCP wastes are known to contain significant amounts of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD). EPA has estimated that approximately 0.7 - 1.6 tons of TCDD were associated with the TCP wastes at the site.

The geology underlying the site is glacial overburden overlying Lockport Dolomite, a fractured bedrock. Groundwater in the vicinity of the landfill flows in both the overburden and the bedrock. Generally, the overburden is saturated at depths below 10 feet. The groundwater movement from the landfill is both downward and horizontal. At one time some of this groundwater exited the Niagara Gorge Face in the form of seeps which flowed into the Niagara River. Contaminants migrate from the landfill in two forms: aqueous phase liquid (APL or contaminated groundwater) and dense NAPL. The fractured bedrock environment typical of the Niagara Falls area makes it difficult to locate and remove NAPL.

The Hyde Park APL plume is composed primarily of benzoic acids, chlorobenzoic acids, chlorendic acid, and

phenol. The major known constituents of the Hyde Park NAPL are dichlorotoluene, chlorotoluene, toluene, tetrachloroethylene, phenol, methyl benzoate, benzoic acid and benzochlorotrifluorides; TCDD and substantial amounts of polychlorinated biphenyls (PCBs) based on Aroclor analysis have also been detected in the NAPL.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Hyde Park Landfill Superfund Site (AKA Hooker Hyde Park Landfill Superfund Site)		
EPA ID: NYD000831644		
Region: 2	**State:** NY	**City/County:** Niagara Falls/Niagara
SITE STATUS		
NPL Status: Deleted		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA ***[If "Other Federal Agency", enter Agency name]*:**		
Author name (Federal or State Project Manager): Aidan Conway		
Author affiliation: EPA		
Review period: 8/23/2016 – 12/15/2020		
Date of site inspection: 12/1/2020		
Type of review: Statutory		
Review number: 6		
Triggering action date: 8/23/2016		
Due date *(five years after triggering action date)*: 8/23/2021		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

EPA filed a lawsuit in 1979 in federal district court under the authority of the Resource Conservation and Recovery Act (RCRA) and the Clean Water Act seeking to require that OCC remediate the site. EPA, New York State and OCC filed a *Stipulation and Judgement Approving Settlement Agreement* (Settlement Agreement) in January 1981, which the Court approved in April 1982. The Settlement Agreement required OCC to perform an Aquifer Survey (which can be compared to a remedial investigation study) to define the extent of contamination in the overburden and bedrock and assess remedial alternatives. OCC completed this effort in 1983.

Significant NAPL was detected in the bedrock groundwater, with 40 to 50 percent of the constituents of the NAPL being high molecular weight compounds which could not be identified by gas chromatograph mass spectrometry

analysis. TCDD was detected in the bedrock groundwater within the NAPL plume up to 0.9 parts per trillion (ppt). In addition, total organic halogens, phenols, and other compounds were detected in the APL Plume extending to the bedrock seeps at the Niagara Gorge Face in the parts per million (ppm) range. TCDD was also detected in the Gorge Face seeps at 0.18 ppt.

The results of the aquifer survey were used by the negotiation team (EPA/New York State and OCC) to agree on remedial actions to be performed at the site. These required remedial actions were documented in a *Stipulation on Requisite Remedial Technology* (RRT Stipulation), which was approved by the Court in August 1986. EPA issued an Enforcement Decision Document (EDD - a precursor to a Record of Decision) on November 26, 1985, which documented the remedial action selected for site cleanup. The site was listed on the National Priorities List in 1982.

During the RRT negotiations, EPA performed a risk assessment using worst case exposure scenarios, which was the approach used before the 1989 *Risk Assessment Guidance for Superfund, Part A* was issued and applied at sites. The risk assessment for the APL plume flux indicated that the greatest risk from the site was the consumption of fish contaminated with TCDD. Therefore, the RRT required that a study be performed by EPA, New York State and OCC to determine if TCDD was bioaccumulating in fish consumed by anglers in Lake Ontario.

EPA acknowledged that the APL and NAPL plumes would not be remediated to drinking water standards because of the persistent nature of NAPL. Therefore, the goal of the remedies selected in the EDD is to hydraulically contain contaminated groundwater (APL plume) in the vicinity of the site, while extracting as much NAPL as is practicable. The achievement of hydraulic containment of APL would be proved by the creation of an inward hydraulic gradient surrounding the landfill (i.e., groundwater in the vicinity of the site would flow radially inward towards the landfill). The reduction of NAPL volume would create less driving force (head) on the NAPL plume, preventing further NAPL migration. The RRT stipulated that the extracted NAPL would be destroyed by incineration.

The RRT established the basis for a groundwater monitoring program to provide data for assessing any potential adverse impacts from the site to the surrounding community. A series of monitoring programs were also established to determine if contaminants from the site had migrated beyond the shale, which was believed to be an aquitard that would prevent contamination from further downward migration.

Under the agreement, OCC was required to cap the landfill and its perimeter to prevent further infiltration of rainwater, which produces leachate. Remedial actions, such as the sealing of sumps and manholes and the capping of pipes, would be performed by OCC at neighboring industries. Sediments in the Bloody Run would be excavated or capped. Remedial action would be conducted at the Niagara River Gorge Face.

Response Actions

Remedy Selection

The Hyde Park Landfill remedy selected in the 1985 EDD includes the following specific elements:

- Source control (prototype extraction wells);
- Containment and collection of APL and NAPL in the overburden;
- Containment and collection of APL and NAPL in the bedrock;
- Treatment of collected APL and NAPL;
- Community Monitoring Program (monitoring wells for early detection of site chemicals);
- Intermediate and Deep Formations Study (monitoring wells);
- Industrial Protection Program (remediation of sumps and sealing of manholes);
- Perimeter capping (clay cap around perimeter of landfill);
- Gorge face seeps remediation;
- Bloody Run excavation or capping;
- Final capping and site closure; and,

- TCDD Bioaccumulation Study in Lake Ontario.

The EDD did not identify remedial action objectives (RAOs). However, during the remedial investigation, EPA acknowledged that the APL and NAPL plumes would not be remediated to drinking water standards because of the persistent nature of NAPL. Therefore, the goal of the remedies selected in the EDD is to hydraulically contain contaminated groundwater in the vicinity of the site, while extracting as much NAPL as is practicable.

The RRT established APL Plume Flux Action Levels for the following chemicals: TCDD (0.5 grams/year); perchloropentacyclodecane [Mirex] (0.005 lbs/day); Aroclor 1248 (0.005 lbs/day); and, chloroform (1.7 lbs/day). These action levels represent concentrations of these contaminants that, if detected entering the river (flux of contaminants to the river) at or above these concentrations, would cause OCC to take additional remedial actions (e.g. increased pumping, installing additional wells or other remedial measures) to reduce these contaminant levels.

EPA issued an Explanation of Significant Differences (ESD) in 2012 which clarified that the selected remedy for the site in the EDD is a containment remedy and not an aquifer restoration remedy intended to restore the aquifer to its best beneficial use (i.e., a source of drinking water). Additionally, the ESD documented the placement of a Declaration of Restrictive Covenants and Environmental Easement on the property.

Status of Implementation

Source Control

The purpose of the source control program is to reduce the amount of chemicals migrating downward from the landfill by removing any mobile NAPL remaining in the landfill. The source control remedial program, as described in the RRT Stipulation, consists of a prototype system of up to six 36-inch diameter wells installed in the overburden inside the landfill. These wells were designed to collect NAPL for subsequent destruction by incineration.

In 1990, as required by the RRT, OCC installed two 36-inch extraction wells in the landfill. OCC performed pump tests on these wells and also investigated potential NAPL source areas within the landfill through 1993. However, the large-diameter source-control wells did not collect as much NAPL as was expected. The source control system was redesigned using the 2-inch NAPL extraction well design OCC had successfully utilized at its Durez facility. OCC installed four 2-inch source control wells in the landfill with two-phase flow pumps to facilitate the pumping of NAPL. Nine monitoring wells were also installed in the landfill. One source-control well has since been converted to a monitoring well due to low NAPL collection.

While the source control program originally yielded significant amounts of NAPL, in recent years yields have declined. To date, more than 300,000 gallons of NAPL have been collected and treated. EPA believes that most of the NAPL which was once present in the overburden in the landfill has either flowed into the bedrock, been captured, or remains in pockets or pools that are not hydraulically connected to the source-control wells. In addition, the installation of the final cap on the landfill has eliminated the continued production of leachate from rainfall and thereby dramatically reduced the hydraulic head of APL within the landfill, removing the driving force for the NAPL.

NAPL is extracted by the source-control wells and flows into a decanter at the onsite Storage and Treatment Facility. The total recovered NAPL volume is measured monthly and the potential amount of NAPL contributed by each well is estimated annually by OCC. The source-control wells are currently pumped only once per month because of low NAPL volume.

Overburden - APL and NAPL Plume Containment System

The goal of the remedy selected for the overburden is to contain the lateral migration of the NAPL plume and contain the APL plume, to the extent practicable, as stated in the RRT Stipulation. The remedy was implemented by construction of the Overburden Barrier Collection System (OBCS), a drain around the entire landfill to contain

and collect contaminated groundwater. The OBCS was installed in 1991. Eight monitoring well pairs were installed beyond the alignment of an existing drain around the landfill. One well from each pair is inside the APL plume limits and one well from each pair is outside the APL plume. The inner wells are pumped to create an inward hydraulic gradient. Hydraulic stabilization was deemed to have occurred in 1994, following one year of continuous dewatering of the OBCS (i.e., no accumulation of water in the wet wells was found). Hydraulic monitoring of the OBCS is performed by water-level measurements taken at the eight well pairs. Water-level measurements indicate whether an inward gradient is being achieved, thereby ensuring the capture of contaminated groundwater associated with the site.

Bedrock NAPL Plume Containment System

OCC performed an investigation which defined the extent of the NAPL plume in the bedrock surrounding the landfill in 1982 and revised the extent of the NAPL plume again in 1996 after performing further investigation. OCC performs NAPL presence checks at all 49 bedrock wells and these checks indicate that the NAPL plume has not significantly migrated since 1996.

The NAPL Plume Containment System was designed to create an inward hydraulic gradient in the bedrock aquifer surrounding the landfill in order to capture groundwater contaminated by site chemicals. The system was designed and installed in a phased approach in order to achieve proper placement of the extraction wells. The phased construction of the system was completed and became operational in 1997.

In 2000, OCC began a re-characterization of the site. The work included additional modeling, extensive field data collection and evaluation. The analysis of the field data resulted in a revised hydrogeologic framework consisting of 11 discrete flow zones separated by aquitards. OCC has documented its revised hydrogeologic framework in two documents: *Site Characterization Report: Revised Geologic and Hydrogeologic Characterization* (February 2002) and *Site Characterization Report: Hydrologic Characterization* (February 2003). These reports were complemented by several other reports including:

- *Site Characterization Report: Groundwater Flow Model*, dated June 2003.
- *Site Characterization Report: Remedial Characterization Report* (RCR), dated June 2003.
- *Comprehensive Remedial Characterization Report* (CRCR), dated August 2004.

These studies and reports documented that no migration of contaminants outside of the containment system is occurring, and the performance objectives of the RRT are satisfied.

Additionally, in November 2003, OCC issued the *Major Ions Study*. This report concluded that sulfate ions are an indicator of the relative age of groundwater and that the vertical and horizontal distribution of sulfate ions near the site support the revised conceptual model of groundwater flow. Furthermore, sampling results from the Gorge Seeps indicate that the seeps appear to originate primarily from surface runoff (water of a very young age) and not water which has migrated from the site (water of an older age).

Bedrock APL Plume Containment System

The APL Plume Containment System, consisting of three purge wells installed at the Niagara Gorge Face, was designed to collect a significant portion (60-88%) of the contaminated groundwater outside the NAPL plume (as required by the RRT Stipulation). These wells were installed in 1994. The portion of the APL plume not collected is monitored by three flux monitoring well clusters to the west of the site and three piezometer clusters in the northern and eastern portion of the APL plume.

None of the APL plume flux parameters were detected above their respective reporting levels in groundwater samples collected in annual monitoring performed during this FYR period. As a result, OCC was not required to calculate the flux to the Niagara River Gorge.

Leachate Storage and Treatment Facility

Since April 1990, APL is treated onsite at the Leachate Storage and Treatment Facility with a capacity of 400 gallons per minute. The APL/NAPL mixture is pumped from the wells through force mains into a decant tank. The NAPL, denser than water, settles to the bottom. APL is taken off the top of the decanter and pumped into the storage tanks. The APL first passes through sacrificial activated carbon beds (which cannot be recycled because of the dioxin and are disposed offsite). The APL is then treated in an activated carbon system.

NAPL Treatment

During the early remedial operations at the site, NAPL was transferred by tanker truck to OCC's Buffalo Avenue Plant in Niagara Falls for incineration. Since 1996, OCC transports the NAPL via trucks to Laidlaw Environmental Services in Deer Park, Texas, for incineration. To date, more than 300,000 gallons of NAPL have been removed and destroyed. 1,235.5 gallons of NAPL were collected during this FYR period.

Lake Ontario TCDD Bioaccumulation Study

The APL Plume Flux Action Level for TCDD in the RRT Stipulation is 0.5 g/yr. TCDD is presently found in fish in levels which require the issuance of Federal (e.g., Food and Drug Administration (FDA) Advisory for fish including contaminants of TCDD), State (e.g., New York State Department of Health fish consumption advisories), and Canadian fish health advisories. At the time of the development of the RRT, there was no consensus in the scientific community on the bioaccumulation of dioxin in fish. Without this consensus, fish uptake of TCDD could not be calculated. Therefore, the RRT required that EPA, New York State and OCC perform a Lake Ontario TCDD Bioaccumulation Study in order to determine a bioaccumulation factor for TCDD specific to Lake Ontario. The results of this study would then be used to re-examine the TCDD APL Plume Flux Action Level.

EPA, New York State and OCC designed and implemented a work plan to collect fish and sediment samples from Lake Ontario and analyze them for TCDD. The final peer reviewed TCDD Bioaccumulation Study report reflecting the comments of the peer reviewers was released to the public in September 1991. This study, together with the modelling performed at the time, indicated that TCDD was bioaccumulating in the tissues of various species of Lake Ontario fish at a range of rates such that the overall TCDD APL Plume Flux Action Level of 0.5 g/yr stipulated by the RRT remains protective.

Landfill Cap

The Settlement Agreement required OCC to cap the landfill with 36 inches of clay and with a 12-inch vegetative cover. Before a final cap could be placed on the landfill, wastes associated with remedial activities needed to be managed. OCC developed the Waste Disposal Plan, which was implemented in 1988. Waste disposal cells lined with clay were constructed on top of the landfill to consolidate wastes resulting from remedial actions and investigations conducted at the site. Contaminated soils from investigative activities and sediment from the Bloody Run remediation were consolidated in the landfill. The perimeter cap of the landfill was completed in 1991, and the entire landfill was capped in 1994. The final cap consisted of the following: low-permeability clay; a synthetic membrane; a drainage layer and topsoil seeded with native vegetation for barrier protection. EPA routinely inspects the landfill cap for erosion.

Community Monitoring Program

The Community Monitoring Wells, a system of wells installed in 1987 throughout the neighborhood, provide early warning of the presence of Hyde Park contaminants in the groundwater. These wells are currently sampled and analyzed annually. Should contamination be detected, OCC must take further remedial action. Hyde Park contaminants have never been detected in these wells. The data collected have demonstrated that the groundwater flow is vertically downward in the nearby community. EPA and New York State review the analytical results from the sampling of these wells to ensure the community is being protected.

Industrial Protection Program

The Industrial Protection Program, implemented in 1987, established engineering controls to eliminate the exposure of nearby workers to contaminants present in the NAPL and APL plumes. Sumps and manholes in neighboring industries, including Grief Brothers, were sealed, eliminating worker exposure to vapors that may migrate into the sump. OCC relocated a sewer at neighboring TAM Ceramics in 1989. The College Heights sewer was remediated in 1990. OCC purchased the Grief Brothers building in 1999. Access to this facility is now controlled by OCC. Periodic surveys of neighborhood manholes and sumps are performed to ensure the remedies remain intact.

Bloody Run Remediation

The Settlement Agreement set forth two possibilities for remedial action at the Bloody Run, sediment excavation or capping. The 1992 EPA risk assessment determined the excavation of sediments in the Bloody Run would not pose an adverse risk, would be protective of human health, and, was the preferred alternative.

OCC excavated approximately 30,000 cubic yards of contaminated sediment from the Bloody Run drainage area. The area was then backfilled and covered with riprap. This work was completed in January 1993. The Bloody Run now flows via a storm sewer which surfaces at the Niagara Gorge. The restored area was observed to have abundant vegetation during a site visit in October 2019.

Niagara River Gorge Face Remediation

Groundwater seeps from the rock at the Niagara Gorge, approximately 2,000 feet from the site. TCDD was detected in one sample from a seep during remedial investigations at 0.2 ppt. EPA and New York State determined that humans should be isolated from the seeps to prevent potential direct exposure to the contaminants. The Gorge Face Seeps were remediated in 1988, except for the Bloody Run portion, which was remediated in 1994. Access by humans to the seeps has been prevented by the installation of fences and the diversion of seeps into culverts. All contaminated sediments were scraped away. The pumping of the APL wells has strongly influenced the seeps, drying many. Biennial inspections of the Gorge Face are conducted by representatives of EPA, New York State and OCC. The most recent inspection conducted in October 2019 confirmed that conditions in the gorge remain unchanged and no repairs are required.

As part of the Niagara River biomonitoring program, the Ontario Ministry of the Environment (MOE) collected surficial sediment samples at the base of the Bloody Run, as well as samples of caged mussels kept in the river near these sediments. The report concluded that concentrations of dioxins and furans in sediment and mussels were lower than pre-remediation levels. TCDD was detected in sediment at the mouth of the Bloody Run up to 45 parts per billion (ppb). However, a number of factors limit accessibility to the sediments at the mouth of the Bloody Run, including fluctuations of the riverbank, the installation of fences, and the construction of a fishing platform so that anglers can use this location to fish without hiking down to the sediment area. Further, hydraulic containment activities have changed the hydrogeology around the site and significantly reduced the flux of groundwater out of the Niagara Gorge Face. EPA and New York State Department of Environmental Conservation (NYSDEC) concluded that the sediments are not exposed for long enough durations to represent a risk to anglers or others who may decide to use this sediment area; therefore, no further action was required to limit direct human exposure to sediments. As determined in the last FYR, because of their location, ecological exposures to these sediments are not expected either.

Intermediate and Deep Bedrock Formations Study

The Intermediate and Deep Formations Study was designed to determine if contaminants from the Hyde Park Landfill had penetrated the Rochester Shale (aquitard) formation below the Lockport Dolomite. The *Monitoring Report, Intermediate Formations Wells, November 1991/1992* summarizes the results of the investigation, which indicated that Hyde Park contaminants had not migrated through the shale and were not present in the Intermediate Formations. Therefore, OCC was not required to perform further remedial work in these formations.

Additional Remedial Action

OCC has performed additional remedial actions at the site in addition to those previously discussed. The onsite lagoons were remediated in 1991. NAPL in the lagoons was pumped into the leachate storage facility and the lagoons were closed. NAPL was also pumped from four railroad tank cars, which had been used onsite for years as storage for NAPL generated from remedial investigations because there was no facility permitted to destroy dioxin through incineration. In 1991, the tank cars were placed in the waste disposal cells which were constructed as part of the landfill cap.

OCC also remediated sewers in the area. Sewers provided preferential pathways for contaminants to migrate through the overburden. As previously mentioned, OCC relocated a sewer at TAM Ceramics and remediated the College Heights sewer. The remediation of the University Drive (bordering Niagara University) sewer was completed in August 1993. NAPL contaminated soils were removed from under University Avenue; these soils were placed in a waste disposal cell at the landfill, prior to installing the final cap.

Institutional Controls (IC) Summary Table

Table 1: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	Sitewide	Restrict installation of groundwater wells and groundwater use.	Niagara County Department of Health, 1985; A Declaration of Restrictive Covenants and Environmental Easement, Oct. 7, 2010.
Land use Restriction	Yes	Yes	Sitewide	Restrict any site use that would adversely impact the remedial action performed at the site.	A Declaration of Restrictive Covenants and Environmental Easement, Oct. 7, 2010.

A Declaration of Restrictive Covenants and Environmental Easement was placed on the deed to the site property at the County recording office in Niagara County on October 7, 2010. The Grantor (Occidental) grants a permanent restrictive covenant and an environmental easement to the Grantee (Town of Niagara) to provide a right of access over the approximately 21-acre property (the "Property") for purposes of implementing, facilitating and monitoring the remedial action. The covenant/easement also imposes on the Property certain use restrictions that will run with the land for the purpose of protecting human health and the environment in the future.

The following restrictions apply to the use of the Property, run with the land, and are binding on the Grantor: the Property shall not be used in any manner that would interfere with or adversely affect the implementation, integrity, or effectiveness of the remedial action performed at the site, including, but not limited to: a) the extraction of on-site groundwater; b) any digging, excavation, extraction of materials, construction, or other activity outside the requirements of the remedial action that would disturb the cap placed upon the landfill at the site; or c) other activity

that would disturb or interfere with any portion of the remedial action for the site enumerated in the RRT Stipulation. The Property also may not be used for residential use. However, the Property may be used for commercial or industrial use as long as long-term engineering controls are employed and remain effective. That is, specifically, the operation of the portion of the response action pertaining to the pumping of the extraction wells, the operation of the treatment facility, and maintenance of the landfill cap.

In addition to the site-specific institutional controls, the Niagara County Department of Health imposes restrictions on the drilling and usage of groundwater wells at the site. These restrictions ensure that drinking-water wells are not installed in areas of contaminated groundwater, effectively preventing exposure to site-related contaminants through direct contact (e.g., ingestion, inhalation, and dermal contact).

Systems Operations/Operation & Maintenance

OCC conducts extensive operations and maintenance (O&M) at the site. The carbon beds at the treatment facility are routinely changed and regenerated. The sacrificial carbon beds must also be changed and disposed. OCC conducts influent and effluent analyses to ensure compliance with the discharge permit. OCC monitors the effluent from the treatment facility and prepares daily, weekly, and quarterly Treatment System Effluent Monitoring Data Reports.

Quarterly groundwater sampling is performed. Hydraulic and chemical data are collected and analyzed. These results are documented in a Quarterly Report. OCC collects water-level elevations in the 11 flow zones and in the overburden on a quarterly basis and presents potentiometric-contour maps and water-elevation summaries in the Quarterly Reports.

OCC performs extensive well and pump maintenance because NAPL often fouls wells and pumps.

OCC performs a biennial Gorge Face Seep Survey to ascertain that the remedial actions taken in the Gorge remain protective of human health and the environment.

OCC monitors the Bloody Run monitoring wells every five years to ensure that site-related contaminants are not impacting groundwater in the upper bedrock formation.

Potential site impacts from climate change have been assessed, and 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.

III. PROGRESS SINCE THE LAST REVIEW

Table 2: Protectiveness Determinations/Statements from the 2016 FYR

OU #	Protectiveness Determination	Protectiveness Statement
Sitewide	Protective	The remedy at the Hyde Park Landfill Superfund site is protective of human health and the environment.

Recommendations identified in 2016 FYR: There were no recommendations or follow-up actions resulting from the 2016 FYR.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On October 1, 2020, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, Puerto Rico and the U.S. Virgin Islands, including the Hyde Park Landfill site. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews.

In addition to this notification, a notice of the commencement of the FYR was sent to local public officials. The notice was made available via the City of Niagara Falls website on 11/24/2020. The purpose of the notice was to inform the community that EPA would be conducting a FYR to ensure that the remedy implemented at the site remains protective of public health. In addition, the notice included contact information, including addresses and telephone numbers, for questions related to the FYR process or the site.

Once the FYR is completed, the results will be made available to the local elected officials, on EPA's Hyde Park Landfill site webpage (www.epa.gov/superfund/hooker-hyde-park), and at the EPA Region 2 Superfund Records Center, 290 Broadway, 18th Floor, New York, New York, 10007.

Data Review

The 2006 Performance Monitoring Plan (PMP) outlines the monitoring requirements for the site. The PMP requires annual assessment of the following three monitoring programs:

1. Overburden Monitoring Program
2. Bedrock Monitoring Program
3. Community Monitoring Program

The results of these three monitoring programs are submitted in an Annual Periodic Review Report. In addition, Quarterly Operations Reports that display performance monitoring data of the Bedrock and Overburden Monitoring Programs are submitted.

Overburden Monitoring Program

The Overburden Monitoring program involves the monitoring of the Source Control (SC) Wells and the Overburden Collection System. The SC Wells are a series of production wells installed within the landfill to recover NAPL, while the Overburden Collection System is comprised of a pair of French-drain systems designed to control the lateral migration of dissolved phase constituents and NAPL in the overburden.

The overburden groundwater elevation data are measured on a quarterly basis and are used to determine whether hydraulic containment is maintained over the landfill area. Groundwater potentiometric surface maps are generated every quarter to help make this determination. During this FYR period, the overburden potentiometric surface maps indicate that containment has generally been maintained with the lowest groundwater elevations centered over the northwest section of the landfill.

The SC wells (SC-2 to SC-6) were historically operated on a monthly basis to pump down the APL/NAPL level to approximately the top of the pump in each well. The 2014 Annual Periodic Review Report recommended that monthly purging of the SC wells and subsequent water level and NAPL thickness measurements be discontinued due to the low amounts of NAPL recovered; however in order to provide additional data to support discontinuation, the frequency of these events was changed to quarterly beginning in 2016. The combined APL/NAPL production by SC wells in 2019 (208.6 gallons) has declined compared to production in 2006 (799 gallons).

NAPL presence checks are completed annually in the Overburden Barrier Collection System (OBCS), Overburden Monitoring Wells (OMWs) and the OBCS manholes (Figure 3). In 2016, the NAPL presence monitoring data from the OMW wells and manholes indicated that NAPL was present in three of the 17 manholes monitored (MH-29, MH-30, MH-31). From 2017 to 2019, NAPL was present in four of the 17 manholes monitored (MH-29, MH-30, MH-31, and MH-32). From 2016 to 2019, NAPL was present in one of the two wet wells (Wet Well D). The four manholes are located near the southwest corner of the landfill and all flow to Wet Well D. However, NAPL is not present in OMW-9, OMW-11R, OMW-12R, OMW-13R, and OMW-14R, wells that are located outside of the OBCS to the west and southwest of the manholes with NAPL present. The lack of NAPL presence in these OMW wells indicates that any Overburden NAPL is contained within the boundaries of the OBCS and is not bypassing the OBCS. Based on the overburden data collected, the overburden monitoring systems are operating properly, and overburden containment is being achieved.

Bedrock Monitoring Program

The Bedrock Monitoring program (Figure 4) includes the Lockport Bedrock APL and NAPL Plume Containment Systems and the Bloody Run Creek Monitoring Program. The Lockport Bedrock APL and NAPL Plume Containment Systems consist of 19 purge wells that control lateral migration of dissolved phase constituents and NAPL in the bedrock, while the Bloody Run Creek Monitoring Program ensures that contaminant migration via the Bloody Run Creek remains under control.

Bedrock purge well flow-rate data during this FYR period indicate that purge well flow rates were consistent with historical flow rates and that water levels were maintained within the acceptable target setpoint ranges at each of the purge wells. The water level in flow zone nine (FZ-09) in the area between the landfill and the APL purge wells, APW-1 and APW-2, is maintained at an elevation of 526 feet average mean sea level (AMSL) or lower to ensure that the FZ-09 outcrop along the New York Power Authority (NYPA) access road remains unsaturated. The bedrock flow zone groundwater elevation data were used to generate groundwater potentiometric surface maps for each of the 11 monitored flow zones (FZ-01 to FZ-11). The quarterly potentiometric surface maps for each monitored flow zone indicated containment relative to the NAPL limits established in each flow zone.

Groundwater samples are collected quarterly for organic acids and collected every '5th Quarter' for a more comprehensive list of chemical constituents (volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), organic acids, and sulfate). Sampling results are compared to the Site Organic Indicators (SOI) chlorendic acid, benzene, 1,1,2,2-tetrachloroethane, tetrachloroethylene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride. For the past five years, exceedances to the established screening levels for SOIs were reported at several locations for chlorendic acid (up to an estimated 500 ppb), benzene (up to 290 ppb), 1,1,2,2-tetrachloroethane (up to 110 ppb), PCE (up to 16 ppb), TCE (up to 350 ppb), cis-1,2-DCE (up to 150 ppb), and vinyl chloride (up to 110 ppb). In addition, there were several locations where non-SOI parameters were reported to exceed screening levels, the chemical constituents 1,1,2-trichloroethane (1,1,2-TCA) (up to 17 ppb), chloroform (up to 560 ppb), and bis(2-ethylhexyl)phthalate (DEHP) (up to an estimated 220 ppb). Non-SOIs are hypothesized

to be from other sources in the area. Concentrations are not expected to change significantly until NAPL is recovered.

The primary remedial objective of keeping the flow zones dewatered is being achieved. However, SOIs continue to exceed screening levels in many bedrock piezometers during this FYR period. Glenn Springs Holdings, Inc. (GSHI) conducted a two-part analysis of concentrations of organic compounds detected in the bedrock wells from 2006 through the second quarter of 2019. All of the organic compounds currently included in the bedrock sampling program were included in the analysis as well as hydraulically upgradient or cross-gradient wells. Based on this analysis, two organic compounds were detected in the bedrock wells that have been detected at concentrations above the screening levels and have exhibited sustained increases in concentrations. Benzene was detected in bedrock wells D1L-11, E6-11, J6-11, and G6-04 while vinyl chloride was detected in bedrock wells H2M-06 and G6-04. In addition, increasing concentrations of 1,1,2,2-tetrachloroethane, benzene, chloroform, vinyl chloride, TCE, 1,1,2-trichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and chlorobenzene have been reported in G6-05, located south of the Hyde Park Landfill, during this FYR period.

Benzene in Flow Zone 11 appears to be naturally occurring due to the presence of natural gas, while benzene concentrations in G6-04 appear to be stabilizing based on the data from 2016-2019. Concentrations of vinyl chloride appear to be stabilizing in H2M-06 and have been relatively low in both H2M-06 and G6-04. In 2019, NYSDEC indicated that recent increases in concentrations of SOIs had been noted for piezometer G6-05 and requested that a groundwater evaluation be completed in the area of G6-05. GSHI's analysis concluded that the increasing concentrations of SOIs in G6-05 are related to minor changes in the groundwater flow and the resulting redistribution of contaminant mass and are not considered evidence of an expanding plume. Changes in groundwater flow may be due to pumping stresses or interconnected flow zones from previously abandoned long open-interval wells.

The Bloody Run Creek Monitoring Program is required to be monitored every five years. The Creek was last monitored in July 2016. Analyses included VOCs, SVOCs, and organic acids. Bloody Run sampling event data indicate that TCE exhibited an exceedance (70 ppb) in well BR-1 and chlorendic acid exhibited exceedances (up to 320 ppb) in wells BR-2, BR-3, and BR-4. The exceedance of chlorendic acid in BR-2, BR-3 and BR-4 is consistent with the 2011 sampling event where chlorendic acid exceeded the GSHI screening levels in BR-2, BR-3, and BR-4. There was an additional exceedance of TCE in BR-1 that was not previously seen during the historic sampling events. The detection of TCE in BR-1 in 2016 appears to be an anomaly, and further evaluation will be conducted after the next Bloody Run Creek sampling event, scheduled for the fall of 2021.

The water-quality, water-level, and pumping-rate data collected during this FYR period demonstrate that the bedrock APL and NAPL purge well systems are operating properly, and containment is being maintained in each of the flow zones. No changes to the bedrock purge or monitoring systems are needed at this time.

Community Monitoring Program

The Community Monitoring program was developed to ensure that the public is not being exposed to site-related contaminants. The Community Monitoring program includes the Gorge Face Seep Program, the APL Flux Monitoring Program, and the Residential Community Monitoring Program. The Gorge Face Seep Program involves biennial inspections of the Niagara River Gorge to ensure that site-specific contamination is not discharging to a publicly accessible area. The APL Flux Monitoring Program ensures that the mass loading via groundwater discharged to the Niagara River Gorge is less than the defined Flux Action Level. The Residential Community Monitoring Program ensures that residents in the area are not exposed to site-related constituents in the groundwater or from soil vapors above the groundwater.

Gorge Face Seep: The biennial survey which was previously scheduled in 2018 was postponed due to inclement weather conditions. The most recent Gorge Face Seep Survey was performed on October 11, 2019. A total of 24 seep locations and eight culverts, as well as the Garfield Street Outfall Sewer and the Bloody Run outlet, were visited and inspected for variations in flow and exposed wet areas. The results of the Survey indicate that conditions

in the Gorge have not changed since the previous survey in 2015 and that no additional remedial actions are necessary. Sampling of the seeps was temporarily suspended after the 2011 survey because of the large number of non-detect samples at all seeps. Sampling of the seeps will not be required unless conditions change in the Gorge. Based on preliminary discussions with the NYSDEC and GSHI, EPA is considering reducing the frequency of the Gorge Face Seep Survey from once every two years to once every five years to coincide with the EPA FYR of the site. The next inspection is currently scheduled for the fall of 2021.

APL Plume Flux Sampling: APL plume flux composite sampling is performed quarterly. If APL plume flux parameters (for select polychlorinated biphenyls, pesticides, and dioxin furans) are detected above their respective reporting levels, calculation of the flux to the Niagara River Gorge is required. Calculation of the flux to the Niagara River Gorge was not required during this FYR period.

Quarterly Hydraulic Gradient: Water level elevations and vertical hydraulic gradients are measured at 11 paired community monitoring wells on a quarterly basis. During this FYR period, downward vertical hydraulic gradients were consistently maintained at each of the well pairs throughout each year.

Soil Vapor Monitoring: Annual soil vapor monitoring is performed at six locations near the Hyde Park Landfill. In September 2016, four of the six soil vapor monitoring locations did not exhibit recordable concentrations of total VOCs. In SVP-3, 37 ppmv (parts per million by volume) and 7 ppmv were recorded at the one- and two-minute time intervals, respectively. After the one- and two-minute time intervals, there were no recordable concentrations of VOCs, likely indicating an instrument error. At CMW-8OB, a background concentration of 17 ppmv was recorded. During the September 2017 event, five of the six soil vapor monitoring locations did not exhibit recordable concentrations of total VOCs. A VOC reading could not be obtained from the sixth location, SVP-3, during the September 2017 monitoring event due to water in the probe. During the September 2018 and 2019 monitoring events, the monitoring locations did not exhibit recordable concentrations of total VOCs for any of the six soil vapor monitoring locations.

NAPL Presence Monitoring: The annual NAPL presence check was conducted at the catch basin on the north side of the Greif Brothers' warehouse in October or November of each year during this FYR period. NAPL was not present in the catch basin at these times. In addition, the PMP requires annual collection of an APL sample from the open catch basin and analysis of that sample for organic acids. In November 2016 and October 2018, the data indicated no exceedances of the site screening levels. All organic acid parameters were non-detect. However, in October 2017 and 2019, chlorendic acid was detected at estimated concentrations of 38 ppb and 75 ppb, respectively.

Site Inspection

The inspection of the site was conducted on December 1, 2020. In attendance were Peter Lisichenko, EPA on-scene coordinator, Joel Spring, GHD (contractor to GSHI), Dennis Hoyt, GHD, and Andrew Zwack, NYSDEC. The purpose of the inspection was to assess the protectiveness of the remedy.

No issues or adverse conditions impacting protectiveness were observed, however, several minor maintenance related items were identified during the inspection. At the on-site treatment facility, staining on the concrete pad at several locations revealed pipes that have been patched and repaired. Some pipes continue to have minor leaks. Minor vegetative growth around the base of the bulk storage tanks was also observed.

V. TECHNICAL ASSESSMENT

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

The remedy for the Hyde Park Landfill site as set forth in the EDD calls for hydraulic containment and collection of contaminated groundwater (APL) and NAPL in the overburden and fractured carbonate bedrock aquifer (Lockport Dolomite) beneath the landfill. The EDD recognizes that the APL and NAPL plumes would not be

remediated to drinking water standards due to the persistence of NAPL at the site. Consequently, the remedial action objective focuses on the hydraulic containment of the APL plume that surrounds the landfill and the reduction of NAPL to reduce the driving force and prevent further migration. Various monitoring programs have been established for the overburden, the bedrock, and the residential community next to the site to evaluate the performance of the remedy and ensure that the components of the remedy are functioning properly. Based on an evaluation of data from these programs, the remedy is functioning as intended by the decision documents.

Overburden Containment

The overburden containment system consists of SC wells that are used to recover NAPL/APL within the landfill. The OBCS controls the lateral migration of NAPL and APL in the overburden and consists of a system of French drains and sumps encircling the landfill. The overburden NAPL/APL plume containment system has been operating since 1991 and has been performing consistently to prevent lateral migration of contaminated groundwater.

Data collected for the Overburden Monitoring Program for the last five years indicate that the SC purge wells are generally effective in removing liquid wastes (NAPL and APL) from within the landfill. Starting in 2016, the SC water levels and NAPL thickness were measured quarterly. The total gallons purged from the SC wells increased slightly during this FYR period (1,235.5 gallons) compared to the previous FYR period (1,040 gallons). Based on water-level data from piezometers, the potentiometric surface in the overburden shows that the plume is contained. The NAPL Presence Monitoring shows that NAPL does not bypass the OBCS and detected NAPL is consistent with historical data. Thus, the containment system for the overburden operates properly and containment is being achieved.

Bedrock Containment

The bedrock NAPL/APL plume containment system has been designed to prevent lateral migration of groundwater in the bedrock by creating inward and downward flow gradients. Prior to 2002, it could not be demonstrated that full containment had been achieved in the bedrock aquifer. Investigative studies conducted in 2002 and 2003, which were aimed at re-characterizing the Lockport bedrock, showed that the bedrock consists of multiple discreet bedding-parallel flow zones. As a result, plume boundaries were re-defined for each flow zone, previously installed wells were retrofitted to communicate with specific flow zones, and the Bedrock Monitoring Plan was modified to reflect the updated understanding of the bedrock flow system.

The Bedrock Monitoring Program involves the evaluation of water levels, fluxes, and water quality of wells screened in discreet fracture zones in the Lockport bedrock. 19 purge wells are used to control the lateral migration of APL/NAPL in the bedrock. Potentiometric data collected for the past five years indicate that the contaminant plume within each flow zone is contained by groundwater flow gradients, and that the purge well flow rates have been consistent with historic values and the purge well system operates as designed.

In the bedrock plume containment system, hydraulic containment is implemented by controlling water levels at target set points. Based on the past five years of data, the pumping level set points for wells are all maintained within an acceptable operating range. To control flow migration in the area between the landfill and wells APW-1 and APW-2 (outcrop along NYPA access road), unsaturated conditions need to be maintained in Flow Zone 09 in this area by keeping water levels at or below the elevation of 526 feet. Water levels have been consistently maintained below 526 feet, and for the past five years have averaged close to 518 feet.

Groundwater samples are collected quarterly for organic acids and collected every ‘5th Quarter’ for a more comprehensive list of chemical constituents (VOCs, SVOCs, organic acids, and sulfate). Sampling results are compared to the SOIs chlorendic acid, benzene, 1,1,2,2-tetrachloroethane, PCE, TCE, cis-1,2-DCE, and vinyl chloride. For the past five years, data from these sampling events show that several locations exhibit exceedances to the established screening levels for some SOIs as well as for some non-SOIs, such as 1,1,2-TCA, chloroform, and bis(2-ethylhexyl) phthalate (DEHP). Non-SOIs are hypothesized to be from other sources in the area. Concentrations are not expected to change significantly until NAPL is recovered. SOIs continue to exceed screening

levels in many bedrock piezometers during this FYR period, but the primary remedial objective of keeping the flow zones dewatered is being achieved.

Another component of the Bedrock Monitoring Program involves monitoring Bloody Run Creek, which is monitored every five years to confirm that contamination via the creek remains under control. Analysis includes VOCs, SVOCs, and organic acids. The Creek was last monitored in July 2016. The results from the sampling event indicated that there was an exceedance of TCE in well BR-1 and exceedances of chlorendic acid in wells BR-2, BR-3, and BR-4. The detection of TCE in BR-1 in 2016 appears to be an anomaly, and further evaluation will be conducted after the next Bloody Run Creek sampling event, scheduled for the fall of 2021.

Community Monitoring

The Community Monitoring Program has been put in place at the site to provide early warning to the residential community and make certain that residents in the area adjacent to the landfill are not exposed to contaminants in groundwater or from soil vapors above groundwater. Results from the last five years of hydraulic measurements in paired community monitoring wells near the landfill show that downward and vertical gradients are maintained at each well pair. Results of soil vapor monitoring for the same period show that in September 2016, 37 ppmv and 7 ppmv were recorded at the one- and two-minute time intervals, respectively, in soil vapor monitoring location SVP-3. After the one- and two-minute time intervals, there were no recordable concentrations of VOCs, likely indicating an instrument error. At CMW-8OB, a background concentration of 17 ppmv was recorded. In addition, a VOC reading could not be obtained from SVP-3 during the September 2017 monitoring event due to water in the probe. The Community Monitoring Program includes annual APL flux monitoring to ensure that mass loading via groundwater discharge to the Gorge is less than the defined Flux Action Level as documented in the RRT Stipulation. Data for the last five years show that no APL plume flux parameters (i.e., PCBs, pesticides, dioxin, and furans) were detected above their reporting limit, consequently calculations of flux to the Niagara River Gorge were not necessary.

An annual NAPL presence check is conducted at the catch basin on the north side of the former Grief Brothers' warehouse. For the past five years NAPL has not been present in the open basin. An annual APL sample from the basin and analysis of the sample for organic acid is also required. In October 2017 and 2019, chlorendic acid was detected at estimated concentrations of 38 ppb and 75 ppb, respectively.

The Community Monitoring Program also calls for a biennial inspection of the Gorge Face to ensure that contaminants are not discharging to public access areas. A Gorge Face Seep survey was conducted on October 11, 2019. For the survey, previously identified seep locations or wet areas were inspected, and notes were made regarding flow, vegetation, and odors. Based on the survey performed, there were no significant changes noted from previous surveys and no recommendations for groundwater sampling.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Human Health Risk Assessment

As described in the "Basis for Taking Action" section above, the initial sampling found significant NAPL contaminated with TCDD. Other contaminants included: total organic halogens, phenols, and other compounds in the APL. The plume extended to the bedrock seeps at the Niagara Gorge Face in the ppm range. TCDD was also detected in the Gorge Face seeps. When the EDD was issued in 1985, EPA was developing risk assessment guidance. During the site investigation, EPA performed a site-specific risk assessment using worst case exposure scenarios. This approach was used before issuance of the 1989 *Risk Assessment Guidance for Superfund, Part A*, and its application at sites and later guidance on toxicity and exposures were developed. The risk assessment for the APL plume flux indicated that the greatest risk from the site was the consumption of fish contaminated with TCDD. Therefore, the RRT required that a study be performed by EPA, New York State and OCC to determine if TCDD was bioaccumulating in fish consumed by anglers in Lake Ontario.

Based on the contamination of TCDD in Lake Ontario from the site and potentially other sites in the area, the New York State Department of Health issued Fish Consumption Advisories. The current New York State Department of Health Advisories for fish consumption recommend women of child-bearing age and children under the age of 15 years not eat fish from Lake Ontario based on the contaminants: PCBs, Mirex, and Dioxin. Recommendations for men over 15 years of age and women over 50 years of age are species specific including: White Sucker up to one meal/month; White Perch east of Point Breeze, up to one meal/month; west of Point Breeze, eat none; Lake Trout greater than 25", up to one meal/month; less than 25", up to four meals/month; Carp, Channel Catfish eat none; Brown Trout greater than 20", up to one meal/month; less than 20", up to four meals/month; and all other fish up to four meals/month. Continuing inputs of TCDD to Lake Ontario from the site are not expected since contaminated groundwater is contained, and Bloody Run has been remediated.

Since the original risk assessment was performed in the 1980s, EPA developed Superfund-specific guidance, Agency-wide guidelines, exposure assumptions, and toxicity values including those for TCDD, PCBs and mirex. The risk assessment assumptions for exposure to contaminated sediments from the previous FYR has not changed. There have been no changes in the toxicity information for the contaminants of concern (COCs) that impact the protectiveness of the remedy e.g., TCDD, PCBs and mirex. At the current time, the toxicity of PCBs is being updated through the Agency consensus toxicity database, the Integrated Risk Information System (IRIS). Any updates to this toxicity value will be evaluated in the next FYR. There have also been no changes in the EPA Exposure Factors Handbook originally issued in 2011 and the Standard Default Exposure Assumptions used at Superfund sites last updated in 2014 that will impact the protectiveness of the remedy. There have been no updates in the exposure assumptions for fish consumption since the last FYR.

Ecological Risk Assessment

There are several ecological exposure pathways that have been evaluated and/or monitored which are associated with the contaminants related to the site. These pathways include groundwater seeps along the Gorge Face and groundwater discharge to Bloody Run Creek and the Niagara River. The previous FYR concluded that these pathways were not complete due to the effective operation of the remedies. The Gorge Face Seep Survey, as part of the Community Monitoring Program, was conducted most recently in October 2019. The 2019 visual inspection showed that the seeps at the Gorge Face had no significant changes noted from previous surveys and that contaminants were not discharging to the environment. These results are consistent with the 25 years of inspections that have occurred. Based on the historic and 2019 survey results, conditions at the Gorge Face have not changed. This will be verified during the next inspection. In addition, the current monitoring indicates that the groundwater associated with the site and Bloody Run Creek are being captured by the bedrock remedial system, and therefore the pathway remains incomplete. The previous FYR also indicated that the sediments associated with the shoreline of the Niagara River are not available for exposure. This conclusion remains valid. Therefore, based upon the historic and current monitoring data and conditions, ecological receptors are not being exposed to site contaminants. The cleanup goals and RAOs remain valid.

Changes in Risk Assessment Methods

There are no changes in the site physical conditions over the past five years that would change the protectiveness of the remedy. The site has limited access based on its location within an industrial area, fencing, and security guards that would interrupt potential exposures. In addition, the cap over the landfill serves as a barrier to direct exposure to soil and contaminated groundwater.

The establishment of an inward groundwater gradient on site along with on-going monitoring within the community to assure contaminants do not migrate off site prevent potential exposures to groundwater. In addition, Niagara County Department of Health has restrictions to prevent drilling wells for the purpose of a drinking water source which further interrupts potential exposure to the APL/NAPL contaminated groundwater. These actions prevent potential exposures to COCs identified in the 1985 EDD.

Vapor intrusion was evaluated in a previous FYR. Stipulations in the RRT, and the O&M Plan require updates to EPA regarding changes in property ownership where buildings may be built without consideration of vapor intrusion. The RRT also stipulates that the Town of Niagara and the City of Niagara Falls notify EPA and NYSDEC of all applications for permits for construction activities. In the event that there are any plans for construction in the future, notification of EPA and the State of New York will assure appropriate measures are taken to prevent potential exposures through vapor intrusion. In the event that any construction occurs on the landfill, further investigation of the potential for soil vapor intrusion needs to be conducted using the Vapor Intrusion Screening Level Calculator, including subsequent updates, to limit potential exposures through vapor intrusion.

Changes in Exposure Pathways

Potential changes in land use are not expected at this time. A Declaration of Restrictive Covenants and Environmental Easement was placed on the deed to the site property at the County recording office in Niagara County to prevent the use of the property for residential purposes. There are no changes in the human health routes of exposures that would affect the protectiveness of the remedy under current conditions and future land use is addressed through the Easement.

No new contaminants or contaminant sources were identified. There are no unanticipated toxic byproducts not previously addressed by the decision documents. There have been no changes in the conditions at the site that would affect the protectiveness of the remedy.

Changes in Standards, To Be Considered (TBCs), and Toxicity Values

There have been changes in standards, TBCs, and toxicity values for TCDD. Previously, the EDD identified 1 ppb as the basis for remedial action in soil. EPA's dioxin reassessment has been developed and undergone review for 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 guidelines and incorporated the latest data and physiological/biochemical research into the reassessment.

TCDD was identified as a main COC in fish and other media. As a part of prioritizing IRIS assessments, the need for an assessment of dioxin carcinogenicity was re-evaluated by the Agency. In 2011, EPA announced that it would conduct separate assessments for cancer and noncancer health effects of dioxin. The noncancer assessment was completed in 2012 and there have been no updates in the toxicity value for TCDD since then.

The 1985 EDD also identified perchloropentacyclodecane, Aroclor 1248, chloroform, phenol, total organic halogen, benzoic acid, monochlorobenzoic acids (sum of O, P, M isomers), and chlorendic acid as COCs. Currently, the IRIS program is evaluating the noncancer toxicity of PCBs including Aroclor 1248 and any updates to the current toxicity values will need to be evaluated in the next FYR. There have been no changes in the toxicity values for other COCs that impact the protectiveness of the remedy.

Although RAOs were not explicitly identified in the EDD, hydraulically containing contamination to prevent exposure remains a valid objective.

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

No other information has come to light that would call into question the protectiveness of the remedy. There have been no changes at the site as the result of natural disasters or climate change impacts.

VI. ISSUES/RECOMMENDATIONS

No issues affecting protectiveness were identified in the FYR. However, the following items are suggested:

- Request an updated PMP, in the form of a Site Management Plan, to ensure site management procedures are performed consistent with requirements, including but not limited to annual NAPL delineation and groundwater sampling procedures.
- Repair or replace leaking pipes in and around the treatment building, ensure connection hoses are properly sealed, employ secondary containments under connection locations, and trim vegetative growth around bulk storage tanks.

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement	
Protectiveness Determination: Protective	*Planned Addendum Completion Date:* Click here to enter a date
Protectiveness Statement: The remedy at the Hyde Park Landfill Superfund site is protective of human health and the environment.	

VIII. NEXT REVIEW

The next FYR report for the Hyde Park Landfill Superfund site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

2016 Annual Periodic Review Report, Hyde Park Landfill, Niagara Falls, New York, Glenn Springs Holdings, Inc., 2016.

2017 Annual Periodic Review Report, Hyde Park Landfill, Niagara Falls, New York, Glenn Springs Holdings, Inc., 2017.

2018 Annual Periodic Review Report, Hyde Park Landfill, Niagara Falls, New York, Glenn Springs Holdings, Inc., 2018.

2019 Annual Periodic Review Report, Hyde Park Landfill, Niagara Falls, New York, Glenn Springs Holdings, Inc., 2019.

Explanation of Significant Differences for the Hooker Hyde Park Superfund Site, USEPA, May, 2012.

Fifth Five-Year Review Report Hyde Park Landfill Superfund Site, Niagara County, Niagara Falls, New York, USEPA, August, 2016.

Performance Monitoring Plan, Hyde Park Landfill Site, Town of Niagara, New York, Services Environmental, Inc., July, 2006.

Quarterly Operations Report – First Quarter 2019, Hyde Park Remedial Program, Bedrock and Overburden Monitoring Programs, Glenn Springs Holdings, Inc., 2019.

Quarterly Operations Report – Second Quarter 2019, Hyde Park Remedial Program, Bedrock and Overburden Monitoring Programs, Glenn Springs Holdings, Inc., 2019.

Quarterly Operations Report – Third Quarter 2019, Hyde Park Remedial Program, Bedrock and Overburden Monitoring Programs, Glenn Springs Holdings, Inc., 2019.

Quarterly Operations Report – Fourth Quarter 2019, Hyde Park Remedial Program, Bedrock and Overburden Monitoring Programs, Glenn Springs Holdings, Inc., 2019.

Quarterly Operations Report – First Quarter 2020, Hyde Park Remedial Program, Bedrock and Overburden Monitoring Programs, Glenn Springs Holdings, Inc., 2020.

Quarterly Operations Report – Second Quarter 2020, Hyde Park Remedial Program, Bedrock and Overburden Monitoring Programs, Glenn Springs Holdings, Inc., 2020.

Site Organic Indicators Trends Analysis, Hooker-Hyde Park Landfill, Niagara Falls, Niagara County, New York, Glenn Springs Holdings, Inc., 2019.

APPENDIX B – TABLES & FIGURES

TABLES

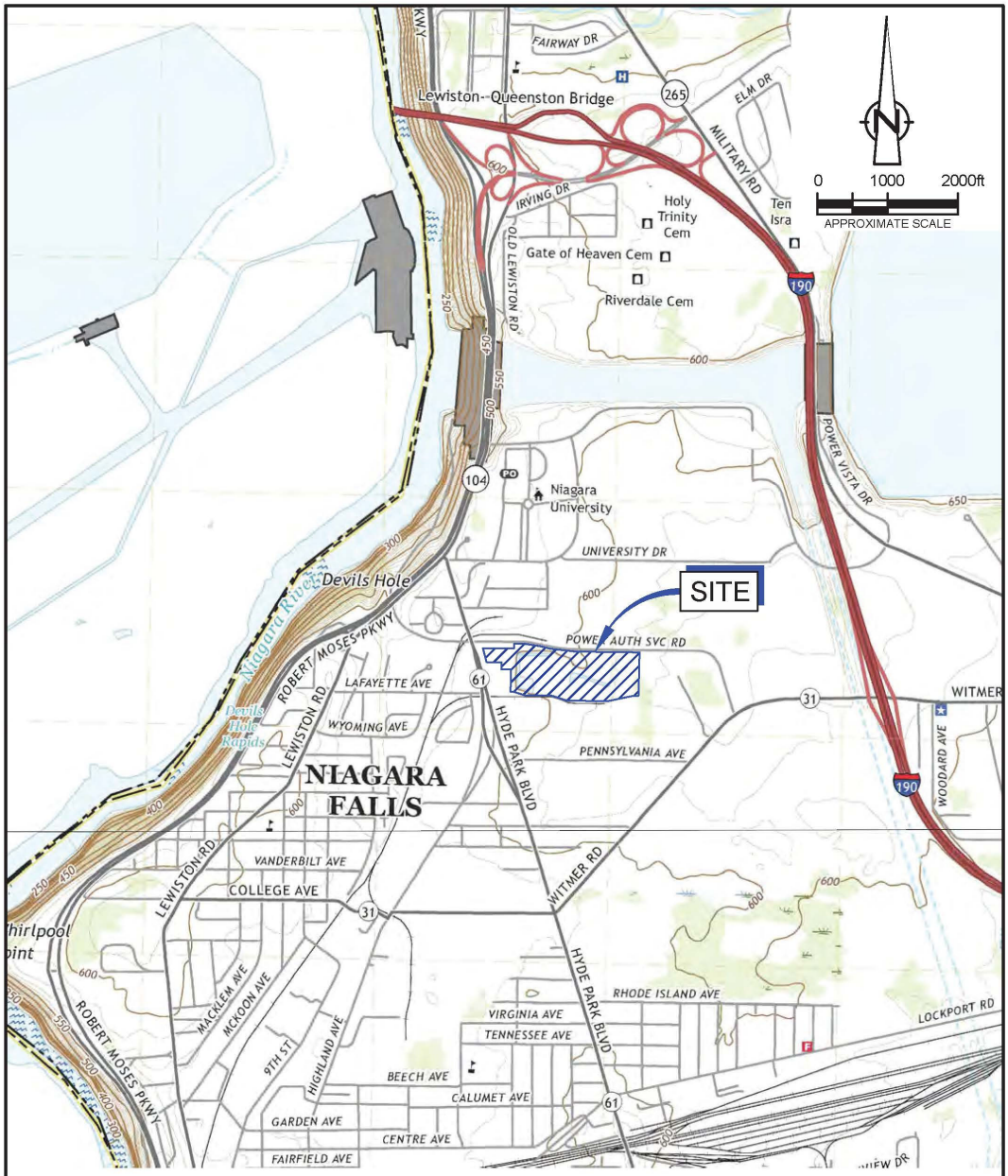
Table 3: Chronology of Remedial Activity Events

REMEDIAL ACTIVITY	DATE
Landfill Closed by Occidental Chemical Corporation	1975
Clay Cap Placed on Landfill	1978
Stipulation and Judgment Approving Settlement Agreement	04/1982
Aquifer Survey	12/1983
Enforcement Decision Document	11/1985
Stipulation on Requisite Remedial Technology Program	05/1986
Community Monitoring Program	04/1987
Industrial Protection Program	09/1987
Gorge Face Seeps Remediation	11/1988
Leachate Treatment Facility	04/1990
Intermediate and Deep Formations Study	09/1990
NAPL Incineration Permit	11/1990
NAPL Plume Containment System: Phase I Extraction Wells	11/1990
Source Control: Extraction Wells	12/1990
Overburden Barrier Collection System	12/1991
TCDD Bioaccumulation Study released to the public	09/1991
Perimeter Capping	07/1991
Bloody Run Remediation	01/1993
NAPL Plume Containment System: Additional Extraction Wells (Phase II)	11/1993
Source Control: Additional Extraction Wells	07/1994
APL Plume Containment System	08/1994
Final Capping/Site Closure	12/1994
First Five-Year Review	09/1996
Geophysical Investigation (Site Re-Characterization)	06/2001
Second Five-Year Review	09/2001

NAPL Plume Containment System: Additional Extraction Wells (Phase III)	12/2001
Site Characterization Report: Revised Geologic and Hydrogeologic Characterization	02/2002
Retrofit of Existing Monitoring Wells to Piezometers Screened in 11 Flow Zones	12/2002
Site Characterization Report: Hydrologic Characterization	02/2003
Site Characterization Report: Groundwater Flow Model	06/2003
Site Characterization Report: Remedial Characterization Report	06/2003
Superfund Preliminary Close-Out Report	07/2003
Major Ions Study	11/2003
Comprehensive Remedial Characterization Report	08/2004
Remedy Determined Operational and Functional by EPA	09/2004
Third Five-Year Review	09/2006
Fourth Five-Year Review	09/2011
Explanation of Significant Differences	05/2012
Deletion from the National Priorities List	10/2013
Fifth Five-Year Review	08/2016

FIGURES

Figure 1: Site Location



SOURCES:

- USGS QUADRANGLE MAP; NIAGARA FALLS, NY, ON, 2019.
- USGS QUADRANGLE MAP; LEWISTON, NY, ON, 2019.

Figure 1

SITE LOCATION
HYDE PARK LANDFILL SITE
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

N:\CA\Waterloo\Legacy\CAD\drawings\01000s\01069\01069-REPORTS\01069-30-403(368)\01069-30-403(368)GN\01069-30-403(368)GN-WA001.DWG Plot Date: MAR 09, 2020

Figure 2: Site Location Aerial View

Figure 3: Overburden Monitoring Program

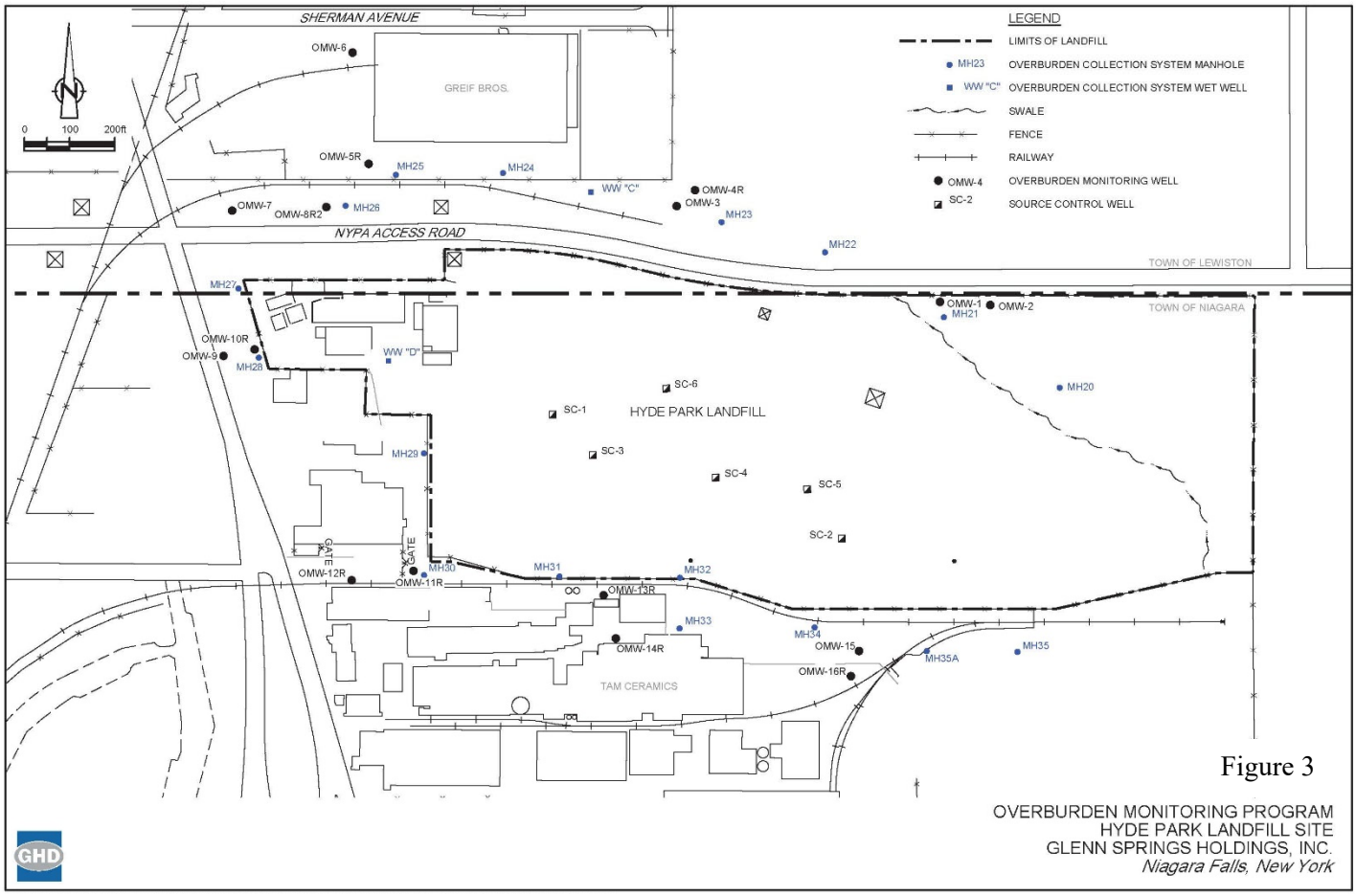


Figure 4: Bedrock Monitoring Program