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Main File

SUPERFUND PRELIMINARY CLOSEOUT REPORT

HYDE PARK LANDFILL SUPERFUND SITE

NIAGARA FALLS, NEW YORK

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

July 2003

SUPERFUND PRELIMINARY CLOSE-OUT REPORT
Hyde Park Landfill Superfund Site
Niagara County, New York

I. INTRODUCTION

The United States Environmental Protection Agency (EPA) has determined that construction activities at the Hyde Park Landfill Superfund Site (Site) have been completed in accordance with the *Close-Out Procedures for National Priorities List Sites (OSWER Directive 9320.2-09 A-P, January 2000).*

Based upon field observations associated with EPA's construction oversight, the results of a June 24, 2003 EPA inspection of the Site, EPA has determined that the potentially responsible party (PRP), Occidental Chemical Corporation (OCC) has constructed the remedy in accordance with the 1984 Enforcement Decision Document (EDD), *Stipulation and Judgment Approving Settlement Agreement* (Settlement Agreement), *Stipulation on Requisite Remedial Technology* (RRT Stipulation) and the remedial design (RD) plans and specifications, as modified by the as-built documentation. EPA has also determined that no further response (other than long-term groundwater monitoring, groundwater extraction, on-site treatment) is anticipated. OCC has initiated the activities necessary to achieve performance standards and Site completion. Human exposures and contaminated groundwater releases are under control.

II. SUMMARY OF SITE CONDITIONS

Background

The Hyde Park Landfill Site, approximately 15 acres in area, is located northwest of the City of Niagara Falls in the northwest corner of the Town of Niagara. The neighborhood surrounding the Site is mixed industrial and residential. The Niagara River, an international water body, is located 2000 feet to the northwest of the Site in the Niagara Gorge which descends approximately 350 feet below the surface of the landfill.

Hooker Chemical and Plastic Corporation, now Occidental Chemical Corporation (OCC), disposed of approximately 80,000 tons of chemical wastes at the Hyde Park Landfill from 1953 to 1975, primarily chlorobenzenes. Trichlorophenol (TCP) still bottoms were disposed of at the Site and approximately 0.7 - 1.6 tons of dioxin (2,3,7,8-Tetrachlorodibenzo-p-dioxin or TCDD) are believed to have been associated with these TCP wastes.

The geology underlying the site is glacial overburden overlying Lockport Dolomite, a fractured rock. The overburden is relatively impermeable and approximately 0 to 30 feet thick. Bloody Run Creek is a drainage channel that flows from the northwest corner of the landfill directly north, into storm sewers discharging to the Niagara Gorge and Niagara River. The bedrock is composed of various layers: beginning with the Lockport Dolomite, a fractured Karst formation (approximately 100 feet thick); followed by the Rochester Shale (60 feet thick); the Irondequoit/Reynales Limestone formation (Intermediate Formation); and, ending with the Queenston Shale (Deeper Formation).

The groundwater in the overburden moves toward the northwest and strongly downward into the bedrock. The groundwater in the bedrock moves downward and laterally, primarily in the northwest direction toward the Gorge Face, which acts as a natural drain. Some of the groundwater emerges from the bedrock at the Gorge Face in the form seeps which flow into the Niagara River.

Chemicals migrate from the landfill in two phases: (1) chemicals dissolved in the groundwater called aqueous phase liquids or "APL" and (2) a denser than water phase like a viscous sludge in appearance which migrates under the influence of gravity called nonaqueous phase liquid or NAPL.

APL and NAPL migrate from the landfill, creating two separate contamination plumes in the overburden and the bedrock. The Bloody Run drainage area was contaminated as a result of infiltration of surface runoff while the landfill was still operating, and not from the movement of groundwater from the landfill.

EPA filed a lawsuit in 1979 under the authority of the Clean Water Act to require OCC to remediate the Site. EPA, NY State and OCC filed a Settlement Agreement in January 1981 which the Court approved in April 1982. The Settlement Agreement set forth the scope of the investigation OCC was to perform to characterize the nature and areal and vertical extent of the APL and NAPL plumes in both the overburden and the bedrock. OCC has been implementing the Settlement Agreement under government oversight since 1982. The Aquifer Survey (the equivalent of a remedial investigation) was conducted by Conestoga-Rovers & Associates (CRA) and completed in 1983. In 1985, after extensive negotiations , EPA, New York State and OCC agreed on the RRT Stipulation which decreed the remedies for the cleanup of the landfill. EPA issued an Enforcement Decision Document (EDD - the equivalent of a Record of Decision) in November 1985 selecting the following remedial actions:

- Source Control (prototype extraction wells);
- Containment and collection of contaminants in the overburden by the "Overburden Barrier Collection System" (OBCS)
- Containment and collection of contaminants in the Lockport bedrock (purge and recirculation wells);
- Treatment and monitoring of collected leachates (both APL & NAPL);
- Community Monitoring Program (monitoring wells for early detection of indicator chemicals);
- Intermediate and Deep Formations Study (monitoring wells);
- Industrial Protection Program (remediation of sumps and sealing of manholes);
- Perimeter Capping;
- Gorge Face Seeps Remediation;
- TCDD Bioaccumulation Study in Lake Ontario;
- Bloody Run Excavation or Capping; and,
- Final Capping/Site Closure.

OCC has been implementing the requirements of the EDD and RRT since 1986. OCC utilizes CRA as its contractor. CRA conducted the remedial design. All design documents were reviewed and approved by EPA and New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH). Since the remedy was designed and installed in a phased approach, there is not just one remedial design document, but a series of remedial design documents for each aspect of the remedy.

CRA has also conducted the remedial action on behalf of OCC under the oversight of EPA, NYSDEC and NYSDOH. In 1999, Miller Springs Remediation Management (MSRM) took over the implementation of the remedial action. MSRM is a subsidiary of , of Glenn Springs Holdings, Inc.(GSHI), which is in turn a subsidiary of OCC. The majority of the remedial action has been complete for several years at the Site. However, until recently, MSRM could not determine if the bedrock containment system, which was installed in a phased approach, was meeting its performance standards.

Remedial Construction Activities

Source Control

The purpose of the source control program is to reduce the contamination migrating downward from the landfill by removing 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.

As required by the RRT, OCC installed two 36-inch extraction wells in the landfill in 1990. 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 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 because of insufficient NAPL collection.

The source control program has not yielded significant amounts of NAPL. EPA believes that most of the NAPL that 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, thereby dramatically reducing the hydraulic head and therefore reducing the driving force for the NAPL.

NAPL extracted by source-control wells flows into a decanter at the on-site 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 insufficient NAPL volume.

The source-control well were designed and installed by OCC and CRA under the oversight of EPA and NYSDEC. TAMS Consultants (now Earthtech) performed oversight for EPA . Gerry Pietrezek, a NYSDEC Region 9 hydrogeologist, routinely conducted oversight. Matt Forcucci, NYSDOH Region 9, conducted oversight for NYSDOH. OCC and CRA issued the *Source Control Assessment Report* in September 1993. MSRM reports the amount of NAPL removed by the source control well in the *Hyde Park RRT Program Annual Monitoring Report.*

Overburden - APL and NAPL Plume Containment System

The goal of the remedy selected for the overburden and stated in the RRT Stipulation, is to contain the lateral migration of the NAPL plume and contain the APL plume, to the extent practicable. 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 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). Hydraulic monitoring of the OBCS is performed by water-level measurements taken at the eight well pairs. Water-level measurements indicate that an inward gradient is being achieved, thereby capturing the contaminated groundwater associated with the Site. In addition, NAPL has not been observed in any of the overburden monitoring well locations, indicating that the OBCS serves as a barrier to off-site NAPL migration.

The OBCS was designed and installed by CRA under the oversight of EPA, NYSDEC and NYSDOH. The OBCS remedial design document, *Plans and Specifications for the Overburden Barrier Collection System*, was issued by OCC and CRA and approved by EPA and NYSEDC in October 1994. MSRM reports the results of the overburden monitoring in the *Hyde Park RRT Program Quarterly Monitoring Report* and the *Hyde Park RRT Program Annual Monitoring Report.*

Bedrock NAPL Plume Containment System

In 1982, OCC performed an investigation which defined the extent of the NAPL plume in the bedrock surrounding the landfill. MSRM currently performs NAPL presence checks at 49 bedrock wells. The NAPL plume has been re-defined in 1996 and 2003 and has not significantly migrated, indicating that it is at steady-state.

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 first set of wells were installed, pump tested and connected by force mains to the on-site treatment facility. The capture zones of the wells were evaluated, and based on the results of the evaluation, additional wells were installed in areas where capture was not being attained. The remedial design document, *Plans, Specifications and Protocols • Well Installation Program*, was issued by OCC and CRA and approved by EPA and NYSDEC in October 1989.

Phase I, consisting of six purge wells, was installed for OCC by CRA in 1990 under the oversight of EPA, NYSDEC and NYSDOH. Two well nests of three wells each were installed in the upper, middle and lower units of bedrock. OCC conducted pump tests on individual and multiple wells throughout 1991. OCC submitted to EPA and New York State a Phase I pump test report in February 1993. EPA and New York State approved OCC's recommendation for the location of Phase II purge and recirculation wells and required OCC to install two additional wells. The installation of the Phase II wells was completed in 1993. OCC conducted pump tests on the Phase II wells which were completed in 1994. The results of these pump tests indicated that further hydraulic control was necessary. Additional wells were installed and a network of eleven bedrock purge wells was operational in 1997. The presence of NAPL has caused severe operational difficulties because it clogs pumps and wells.

The RRT Stipulation required a groundwater monitoring program with well locations selected along vectors radiating from the center of the landfill. The monitoring wells are located inside and outside the NAPL Plume. The RRT Stipulation stated that an inward gradient must be established across the NAPL plume boundary. However, implementation of the vector scheme has not proven to be an effective monitoring system. Practical considerations frequently impact the selection of well locations. Certain vectors are located in nonwater-bearing rock. Other vectors show a flat gradient. To enhance the vector monitoring scheme, with which OCC reports its site cleanup progress, local groundwater contour maps were developed.

OCC has implemented the bedrock hydraulic monitoring program since 1996. For the purpose of monitoring, the bedrock was divided into three separate flows zones: Upper Bedrock, Middle Bedrock and Lower Bedrock. Currently, there are 16 bedrock extraction wells in operation. The monitoring program established by the RRT Stipulation was not able to demonstrate an inward hydraulic gradient of the contaminated groundwater. MSRM, working with EPA, NYSDEC and the United States Geological Service, has revised the hydrogeologic framework at the Site and has implemented a new groundwater monitoring plan.

Groundwater Modeling Study

MSRM contracted S. S. Papadopulos & Associates, Inc. (SSPA) to perform a detailed groundwater modeling study of the Site during 2000-2001 to address uncertainties with respect to groundwater flow. The Site is located in a very complex hydrogeologic setting and MSRM sought to formulate a conceptual model which synthesized data collected from the Site and the regional hydrogeologic setting. The model was used to evaluate the performance of the current bedrock remedial pumping system. Particle tracking was utilized to determine the capture zones of the existing bedrock wells. The model indicated that there was a vertical component of flow (i.e., some of the water from the Upper Bedrock zone was being captured in the Lower Bedrock zone).

Groundwater model simulations using the flow rate data from the first quarter of 2001 indicate that 52.1% of the Upper, 90.4% of the Middle, and 98.8% of the Lower Bedrock zone groundwater are being captured.

Installation of Additional Wells in 2001

MSRM used the results of the model to select the locations of six additional wells which were installed in 2001. EPA and NYSDEC approved the locations of these wells. MSRM, EPA and NYSDEC evaluated the complex water-level data to determine if an inward hydraulic gradient was being achieved by the current set of eighteen extraction wells. The analysis of the water-level data led MSRM to determine that the system of Upper, Middle and Lower Bedrock monitoring that utilized wells with long screening intervals, which were open over several flow zones, could not measure the groundwater capture at the Site with accuracy.

Site Re-Characterization

Subsequent to the development of the ground-water model, MSRM revised the Site conceptual model which provided the basis for the numerical simulation of the hydrogeologic system. MSRM conducted field investigations from 2001 to 2003, including down-borehole geophysics, water-level measurements in 113 piezometers. The analysis of the field data resulted in a revised hydrolgeologic framework consisting of eleven discrete flow zones separated by aquitards. MSRM 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). This report, dated February 2003, was produced for MSRM by Services Environmental, Inc.(SEI), SSPA and CRA.

The eleven flow zones replace the Upper, Middle and Lower Bedrock framework formerly used at this Site. Groundwater monitoring has been conducted in the eleven flow zones since late 2002 and MSRM is now building a data base of water-level measurements.

After the geology at the Site was re-characterized, MSRM produced a new ground-water model which assists in determining if the groundwater remedy provides capture of the contaminated water associated with the Site. *Site Characterization Report: Groundwater Flow Model*, dated June 2003, was prepared for MSRM by SSPA. The results of the groundwater model indicate that capture of contaminated groundwater is achieved in the bedrock.

MSRM issued the *Site Characterization Report: Remedial Characterization Report* (RCR), prepared by SEI, SSPA and CRA in June 2003. The RCR concludes that the Bedrock NAPL Plume Containment System satisfies the performance objectives of the RRT (inward gradient). Although the data for two of the flow zones suggest some uncertainty in the inward gradient, chemical analyses of the groundwater from these two zones indicate that Site-related contaminants are not present in this groundwater. This indicates that no migration of contaminants outside of the containment system is occurring. MSRM will conduct additional studies to better define the areas of uncertainty.

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). These wells were designed by CRA under the

oversight of EPA and NYSDEC and installed in 1994. The portion of the APL plume not collected is monitored by 3 flux monitoring well clusters to the west of the Site and 3 piezometer clusters in the northern and eastern portion of the APL plume.

The RRT established APL Plume Flux Action Levels based on EPA's worst-case bioaccumulation assumptions 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 require OCC to take additional remedial actions (*e.g.* increased pumping, installing additional wells or other remedial measures) to reduce these contaminant levels. The only parameter detected in 2001 was TCDD. OCC calculated the flux of TCDD to the Niagara River as 7.06×10^{-5} grams/year, which is several orders of magnitude below the Flux Action Level.

Leachate Storage and Treatment Facility

APL is treated on-site at the Leachate Storage and Treatment Facility constructed by OCC which began operating in April 1990. 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 of offsite). The APL is then treated in an activated carbon system.

OCC and CRA designed the Leachate Treatment Facility in 1989 to process 70 gallons per minute (gpm) of influent. The 70 gpm treatment capacity proved insufficient as excess water (much of it clean) was entering the OBCS from the northwest. A clay barrier wall was installed to the north and west of the OBCS in an attempt to prevent the migration of clean groundwater from off-site to the collection system and the Leachate Treatment Facility was upgraded to 110 gpm. In 2001, OCC again increased the treatment capacity to 400 gpm to be able to adequately handle periods of large water volume. More than 30,000,000 gallons have been treated to date by the Hyde Park Leachate Treatment Facility.

The Leachate Treatment Facility was designed and installed by OCC and CRA under the oversight of EPA and NYSDEC. MSRM operates the facility according to the MSRM 2002 *Hyde Park Collection and Aqueous Phase Leachate (APL) Treatment System Operation and Maintenance Manual.*

NAPL Treatment

Before 1990, NAPL collected at Hyde park was stored in railroad tank cars because there was no commercial incinerator available to destroy these wastes. The RRT required OCC to obtain a permit modification for its Buffalo Avenue Plant incinerator to burn wastes containing dioxins. The five years spent in obtaining the permit modification significantly delayed the Hyde Park remedial schedule. OCC was issued this modification by EPA and NYSDEC in November 1990. This was the first industrial incinerator permitted to burn dioxin. From 1990 until 1996, NAPL was transferred by tanker truck to OCC's Buffalo Avenue Plant in Niagara Falls for incineration. OCC suspended incinerating NAPL at its Buffalo Avenue Plant in 1996 and it now trucks the NAPL to

Laidlaw Environmental Services in Deer Park, Texas, for incineration. To date, more than 300,000 gallons of NAPL have been removed and destroyed.

Lake Ontario TCDD Bioaccumulation Study

The APL Plume Flux Action Level for TCDD in the RRT Stipulation is 0.5 grams/year. TCDD is presently found in fish in levels in excess of New York State 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. Without this consensus, the parties could not agree how to calculate the fish uptake of TCDD. 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 was used to reexamine the TCDD APL Plume Flux Action Level.

EPA Region II, 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. Lab studies were performed by EPA's Duluth lab and the University of Minnesota. The draft Lake Ontario TCDD Bioaccumulation Study was completed in July 1989 and distributed for scientific peer review. The final TCDD Bioaccumulation Study report reflecting the comments of the peer reviewers was released to the public in September 1991.

As part of this study, EPA's Large Lakes Research Station in Grosse Ile, Michigan, collaborated with Manhattan College's Department of Environmental Engineering to produce the Lake Ontario TCDD Modeling Report. A mass-balance model was developed based upon models of fallout radionuclides and PCB contamination of the Great Lakes. With the assistance of a panel of scientists convened by EPA, the model was refined and reparameterized for TCDD.

The predicted steady-state TCDD concentrations for an input comparable to the TCDD APL Plume Flux Action Level of 0.5 grams/year are 0.026 nanograms/year (sorbed sediment concentrations) and 9.5×10^{-5} picograms/liter (water column dissolved concentration).

The TCDD Study, together with the model, 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 grams/year stipulated by the RRT remains protective.

The TCDD Study was performed as a partnership among EPA, NYSDEC, and the New York State Department of Health (DOH) and OCC. The Gradient Corporation, Ecology and Environment, University of Michigan, EPA - Large Lakes Research Station, EPA - Duluth Lab performed work on the TCDD Study for EPA.

Landfill Cap

The Settlement Agreement required OCC to cap the landfill with 36 inches of clay, with a 12-inch vegetative cover. Before a final cap could be placed on the landfill, wastes associated with remedial activities had 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 cap was completed 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. The current condition of the cap is excellent.

The remedial design document , *Project Specification for Final Landfill Cap* was issued by OCC and CRA in June 1994 and reviewed and approved by EPA and NYSDEC. The landfill cap was designed and installed by CRA under the oversight of EPA, NYSDEC and NYSDOH.

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 sampled and analyzed quarterly. 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 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 (located directly down-gradient from the landfill), were sealed, eliminating worker exposure to vapors that may migrate into the sump. OCC relocated a sewer at neighboring Tams Ceramics in 1989. The College Heights sewer was remediated in 1990.

OCC has recently purchased the Grief Brothers building. Future 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 Bloody Run received drainage from the landfill prior to any remedial measures. Residents living alongside contracted chloroacne, a skin disease, from exposure to the contaminated water. OCC relocated several families who lived next to this stream.

The Settlement Agreement set forth two possibilities for remedial action at the Bloody Run, sediment excavation or capping. In 1992, EPA performed a risk assessment that 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.

CRA excavated approximately thirty thousand 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 Site visits during 2000-2003. Monitoring wells located in this area demonstrate that there is no landfill- related contamination.

Niagara River Gorge Face Remediation

Groundwater seeps from the rock at the Niagara Gorge, approximately 2000 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 an exposure pathway 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. Annual inspections of the Gorge Face are conducted by representatives of EPA, New York State and OCC. The pumping of the APL wells has strongly influenced the seeps, drying many.

A rock slide occurred in 1994 on the lower slopes of the Bloody Run, below the New York Power Authority road. Globules of NAPL were exposed on some rocks. These rocks were removed and the remaining rocks were covered with native rocks. Residual NAPL remains hidden in this slope.

Gorge Face Seep inspections are conducted every summer by OCC, CRA, TAMS and NYSDEC. These inspections are documented in the *Annual Gorge Seep Survey* issued by MSRM and CRA.

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. If action levels documented in the RRT are exceeded in the Intermediate Formations, then monitoring wells will be installed in the Deep Formations. In addition, a total flux to the Niagara River is calculated, and if the Flux Action Levels are exceeded, further remedies would be required to reduce the loading to the river.

Monitoring wells were installed by OCC and CRA in the intermediate formations in 1990 without detecting the presence of NAPL. Most wells contained insufficient volumes of groundwater for sample collection after purging activities, indicating that the shale is a good aquitard. The *Monitoring Report, Intermediate Formations Wells, November 1991/1992*, prepared by OCC and CRA, summarizes the results of the investigation. Most of the parameters were not detected above the concentrations of Lower Formation Survey Parameters listed in the RRT Stipulation. However, phenol, total organic halogen, PCB-1248 and conductivity did exceed the survey levels. OCC calculated a flux in the monitoring report which was four to five orders of magnitude below the Flux Action Level.

OCC was not required to install monitoring wells in the Deep Formations because the Intermediate Formations' investigation indicated that Hyde Park contaminants had not migrated through the shale and were not present in the Intermediate Formations.

Additional Remedial Actions

OCC has performed additional remedial actions at the Site in addition to those previously discussed. The on-site 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 on-site for years as storage for NAPL generated from remedial investigations because there was no facility permitted to destroy dioxin. In 1991, the tank cars were placed in the waste disposal cells.

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.

Operation and Maintenance

MSRM and CRA prepared the Hyde Park Collection and Aqueous Phase Leachate (APL) Treatment System Operation and Maintenance Manual in December 2002. EPA and NYSDEC provided comments on the operations and maintenance (O&M) plan in February 2003. MSRM is currently automating processes at the Leachate Treatment Facility and will submit a revised O&M manual in October 2003.

OCC conducts extensive 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.

Quarterly sampling is performed. Hydraulic and chemical data are collected and analyzed. These results are documented in a Quarterly Report.

OCC must perform extensive well and pump maintenance, as NAPL often fouls wells and pumps.

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

Community Relations Activities

EPA maintains a Public Information Office (PIO) in Niagara Falls, New York operated by Ecology and Environment, Inc. Site files are available in the PIO for public review. Many public meetings were held during the RRT negotiations and during the early stages of remedial action. Public meetings were held at Niagara University near the Site. During the last ten years, EPA has held numerous public availability sessions at the Niagara Falls PIO where the project manager meets with interested members of the public and discuss Site conditions in an informal setting. The PIO maintains a Site mailing list. Periodically, fact sheets and Site updates are mailed to this list.

III. DEMONSTRATION OF CLEANUP ACTIVITY QUALITY ASSURANCE AND QUALITY CONTROL

During the remedial investigation, remedial design and remedial action stages of the project, quality assurance and quality control (QA/QC) for sampling and analysis were carried out in accordance with the QA/QC plans and QA/QC reports submitted to and approved by EPA. The QA/QC plans were in conformance with EPA's QA/QC procedures and protocols. Therefore, EPA has determined that the analytical results are accurate to the degree necessary to assure satisfactory executuion of the RD/RA consistent with the remedy selected by EPA. Remedial designs were reviewed and approved by EPA and NYSDEC. Oversight of the RA construction was provided by TAMS Consulatants and NYSDEC by professional geologists and engineers licensed in New York State.

IV. ACTIVITIES AND SCHEDULE FOR COMPLETION

The activities that remain to be completed for the Site include approval of the recently submitted Operation, Maintenance, and Monitoring (OM&M) Manual, implementation of institutional controls to protect the integrity of the landfill cover system and to prevent the future use of groundwater downgradient from the landfill, conducting a final groundwater inspection, preparing a Close-Out Report, and deleting the Site from the NPL. These activities will be completed according to the following schedule.

Activity	Responsibility	Date
Approve final O&M Manual	EPA	10/03
Finalize Long-Term Groundwater Monitoring Plan	PRP	09/04
Optimization of Groundwater Extraction and Treatment	PRP	09/04
Approve Final Close-Out Report	PRP	09/04
Deletion from NPL	EPA	06/05
Third Five-Year Review	EPA	09/06

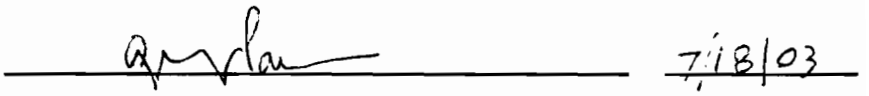
V. SUMMARY OF REMEDIATION COSTS

Construction costs were not required to be submitted by the PRPs under the Consent Decree. The construction cost estimate from the design reports was $65 million. Annual operation and maintenance costs were also not required to be submitted and are estimated to be $2 million.

VI. FIVE-YEAR REVIEW

Hazardous substances remain at this Site above health-based levels. It is the policy of EPA to review such site remedies no less often than every five years. The first five-year review was completed on September 1994 (five years after the commencement of the remedial action) and the second five-year review was completed on September 2001. The third five-year review is scheduled to be completed before September 2006.

Approved:



7/18/03

George Pavlou, Director — Date

Emergency and Remedial Response Division