United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R02-90/117
September 1990

EPA

# Superfund Record of Decision:

## Hooker-102nd Street, NY

50272-101

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15. Supplementary Notes

16. Abstract (Limit: 200 words)


The 22-acre Hooker-102nd Street site is a former industrial landfill in the city of Niagara Falls, Niagara County, New York. The site is adjacent to, and partially within the Niagara River's 100-year floodplain. Surrounding land use is industrial and residential. From 1943 to 1970, the site was used by Occidental Chemical Corporation (formerly Hooker Chemicals and Plastics Corporation) and Olin Corporation as a disposal area for at least 159,000 tons of solid and liquid industrial wastes including benzene, chlorobenzene and hexachlorocyclohexanes. In 1970, the U.S. Army Corps of Engineers ordered landfilling operations to cease temporarily until a bulkhead between the landfill and the river could be constructed. The bulkhead was completed in 1973, but landfill operations were not resumed. In 1973, a series of investigations were conducted by EPA to characterize site subsurface conditions. These studies and the Remedial Investigation (RI) initiated in 1984, identified contamination in ground water, onsite and offsite soil, rivershore sediment, and within a storm sewer. Additionally, the presence of a leachate plume of non-aqueous phase liquids (NAPLs) was discovered emanating from the landfill area. This Record of Decision (ROD) is the final remedy,


(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Hooker-102nd Street,NY
First Remedial Action - Final
Contaminated Media: soil, sediment, gw
Key Contaminants: VOCs (benzene, TCE, toluene), other organics (PCBs, phenols), metals (arsenic)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

| 18. Availability Statement | 19. Security Class (This Report) None | 21. No. of Pages 70 |
|---|---|---|
| | 20. Security Class (This Page) None | 22. Price |

(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

which addresses all of the contaminated media. The primary contaminants of concern affecting the soil, sediment, and ground water are VOCs including benzene, TCE, and toluene; other organics including PCBs and phenols; and metals including arsenic.

The selected remedial action for this site includes consolidating offsite soil and lesser contaminated sediment within the landfill area then capping the landfill and perimeter soil; constructing a slurry wall around the site perimeter to contain the NAPL plume; extracting NAPLs from the landfill and dredging "hot spot" river sediment, transporting sediment and leachate offsite for incineration; dredging and dewatering remaining sediments and consolidating them within the landfill area; recovering ground water with an interception drain, followed by onsite discharge to the Niagara River or offsite treatment and discharge to a city sewer; cleaning the storm sewer, and placing a plastic slipliner within the sewer; extracting and incinerating offsite NAPLs within consolidated river or sewer sediment; long-term ground water monitoring; and implementing institutional controls including deed and land use restrictions, and site restrictions such as fencing. The estimated present worth cost for this remedial action is $30,080,000, which includes an annual O&M cost of $7,209,600.

PERFORMANCE STANDARDS OR GOALS: Cleanup goals for ground water will be the more stringent of Federal MCLs or State regulated levels. Chemical-specific ground water goals include benzene to detection limits (State), TCE 5.0 ug/l (State), PCBs 0.1 ug/l (State), phenols 1 ug/l (State), and arsenic 25.0 ug/l (State). Sediment remedial levels will be the solid phase concentrations necessary to potentially exceed State Ambient Water Quality Standards in the liquid phase. Chemical-specific cleanup levels for sediment include benzene 40 ug/kg, TCE 111 ug/kg, and PCBs 42.4 ug/kg.

# RECORD OF DECISION

Hooker Chemical

# 102nd STREET LANDFILL

## NIAGARA FALLS, NEW YORK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

NEW YORK, NEW YORK

# ROD FACT SHEET

**SITE-**

| | |
|---|---|
| Name:..... | 102nd Street Landfill |
| Location:..... | Niagara County<br>Niagara Falls, New York |
| HRS Score:..... | 30.48 |
| NPL Rank:..... | 973 |

**ROD-**

| | |
|---|---|
| Date signed:..... | September 26, 1990 |
| Remedy:..... | Synthetic-lined cap (covering approx. 24 acres), consolidation of "off-site" soils beneath cap, containment via a circumferential slurry wall, dredging and incineration of highly contaminated sediments, dredging and consolidation beneath the cap of the remaining contaminated sediments, recovery and treatment of ground water, incineration of any recovered NAPL, post-remedial monitoring, fence, and institutional controls. |
| Capital Cost:..... | $22,870,000. |
| O&M/Year:..... | $7,209,600. |
| P-W Cost:..... | $30,080,000. |

**LEAD-**

| | |
|---|---|
| PRPs:..... | Occidental Chemical Corporation (OCC) and Olin Corporation (Olin) |
| Primary contact:.. | Paul J. Olivo (212)-264-6477 |
| PRPs contacts:.... | OCC: Alan F. Weston (716)-286-3607<br>Olin: David L. Cummings (615)-336-4549 |

**WASTE-**

| | |
|---|---|
| Type:..... | industrial landfill. Waste included approximately 4,600 tons of benzene, chlorobenzene, chlorophenols and hexachlorocyclohexanes (HCCHs). |
| Media:..... | ground water, soils and river sediments |
| Origins:..... | landfill dumping |
| Est. Quantity:.... | 159,000 tons of liquid and solid wastes. |

# DECLARATION FOR THE RECORD OF DECISION

## Site Name and Location

102nd Street Landfill
Niagara Falls, New York

## Statement of Basis and Purpose

This decision document presents the selected remedial action for the 102nd Street Landfill Site (the "Site"), located in Niagara Falls, New York. The remedial action was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for the Site. The New York State Department of Environmental Conservation (NYSDEC) concurs with the selected remedy.

The information supporting this remedial action decision is contained in the administrative record for the Site.

## Assessment of the Site

Actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response actions selected in this Record of Decision (ROD), may present an imminent and substantial threat to the public health or welfare, or to the environment.

## Description of the Selected Remedy

The remedial actions described in this document address the three operable units (OUs) at the Site. The three OUs are:

> OU-1: Landfill residuals including on-site fill, "off-site" soils, shallow ground water, and non-aqueous phase liquids (NAPL), (For purposes of this document, "off-site" soils are located on the triangular plot of land adjacent to the Site, north of Buffalo Avenue and south of the LaSalle Expressway, as well as on the areas immediately adjacent to the Site to the east and to the

west);

OU-2: River sediments within the shallow embayment of the Niagara River adjacent to the Site; and,

OU-3: The storm sewer which crosses the Site and discharges into the Niagara River.

The major components of the selected remedy include the following:

Capping of the Site
A synthetic-lined cap, constructed in accordance with federal and state standards, will be installed over the landfill and perimeter soils.

Consolidation of Soils
All off-site soils above cleanup thresholds, will be consolidated beneath the cap.

Erection of a Slurry Wall
A slurry wall, completely surrounding the Site's perimeter, will be constructed and keyed into the underlying clay/till geologic formation. The precise location of the slurry wall will be established through the use of geotechnical borings which will determine the extent of the NAPL plume. The NAPL plume will be contained by the slurry wall.

Recovery and Treatment of Ground Water
Ground water will be recovered using an interception drain installed at the seasonal low-water table in the fill materials. Recovered ground water will be treated. Although the recovery of ground water does include a treatment component, the primary function of ground-water recovery in general, is to create and maintain an inward gradient across the slurry wall.

Recovery and Treatment of NAPL
NAPL beneath the Site will be recovered using dedicated extraction wells, and will be incinerated at an off-site facility.

Embayment Sediments
The two areas of Niagara River sediments which contain elevated concentrations of contaminants ("hot spots"), will be dredged, and these highly contaminated sediments will be incinerated at an off-site facility. The remaining sediments will be dredged out to the "clean line" with respect to site-related contamination. These remaining sediments, after dewatering, will then be consolidated on the landfill. Any NAPL found within the

remaining sediments will be extracted, and will be incinerated at an off-site facility.

The primary focus of this remediation plan is to contain the NAPL plume with the slurry wall. In the event the slurry wall's initial positioning places it across the "hot spot" area(s), practicality may dictate that the wall be extended outward to enclose these "hot spots." In such case, these highly contaminated sediments, rather than being dredged and incinerated, would be left in place, that is, contained by the slurry wall, covered with fill, and finally covered with the cap. The remaining sediments beyond the slurry wall would still be dredged and consolidated beneath the cap.

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

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

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

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

## Declaration of Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable, or relevant and appropriate to the remedial

actions, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for the Site. However, because treatment of the principal threats of the Site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element. Because the selected remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of the remedial action to ensure that the selected remedy continues to provide adequate protection of human health and the environment.

Constantine Sidamon-Eristoff
Regional Administrator

September 26, 19
Date

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# DECISION SUMMARY

## 102nd STREET LANDFILL
## NIAGARA FALLS, NEW YORK

### I.- Site Location and Description

The 102nd Street Landfill (the "Site"), which covers 22.1 acres, is located at the eastern edge of the City of Niagara Falls in the County of Niagara and the State of New York. As shown in the attached Figure 1., the Site is adjacent to the Niagara River (the "River") on the south, and abuts Buffalo Avenue on the north. The geographical coordinates of the Site are long. 78°56'53" W. and lat. 43°04'21" N.

The Site, which is presently owned by Occidental Chemical Corporation (OCC) and Olin Corporation (Olin), collectively referred to as the "Companies," was operated as a disposal location for industrial wastes by the Companies and their respective predecessors. OCC, and its predecessors, operated their 15.6-acre portion of the Site as a landfill from approximately 1943 until 1970. Olin, and its predecessors, operated their 6.5-acre portion (which occupies the eastern section of the overall Site) as a landfill from 1948 to 1970.

To the west of the Site is Griffon Park (12.8 acres) which was used as a refuse-dumping facility by the City of Niagara Falls until 1953. Thereafter, it was converted into a recreational park until 1986. At the present time, only the boat-launch facilities to the west of the park are open to the public. Griffon Park in turn, is bordered on its west by the Little Niagara River. Cayuga Island, which is zoned "one family residential," is immediately across the Little Niagara River from Griffon Park. Cayuga Island has a population of approximately 2,000.

The privately owned property to the east of the Site (the "Belden Site") was, from 1955 through 1967, an industrial disposal area. The Belden Site is now a New York State registered inactive hazardous waste site that is classified as one which does not present a significant threat to the public health or to the environment. Along Buffalo Avenue to the north of the Site, there are several uninhabited residences.

The RI/FS study area included the triangular plot of land adjacent to the Site, north of Buffalo Avenue and south of the LaSalle Expressway, the areas immediately adjacent to the Site to the east

and to the west, as well as the River sediments adjoining the Site. For ease of reference, the triangular plot of land north of Buffalo Avenue and south of the LaSalle Expressway, is denoted herein as an "off-site" area to distinguish it from the area that was historically used as a landfill. All areas, including the landfill area, this off-site area, and others where contamination associated with the landfill has come to be located, are included within the definition of the Site's "facility" as defined in Section 101(9) of CERCLA, 42 U.S.C. §9601(9).

According to the 1980 Census, the population of the City of Niagara Falls was approximately 71,000 and the population of the Town of Wheatfield was approximately 9,600. The Town of Wheatfield adjoins the City of Niagara Falls on the east.

In December 1970, the Buffalo District of the U.S. Army Corps of Engineers (COE) notified OCC and Olin that any construction or landfilling at the Site must cease until a dike or bulkhead was installed along the River shoreline, under a permit issued by the COE. A bulkhead was completed in 1973, and no subsequent construction or landfilling occurred.

Areas near the Site have historically experienced flooding in low-lying areas adjacent to the Niagara River. Both Cayuga Island located west of the Site and a residential area along River Road in the Town of Wheatfield, east of the Site, have been flooded numerous times in the past 40 years with major flood events occurring in 1942, 1943, 1954, 1955, 1962, 1972, 1975, 1979, and 1985. Both of the affected areas are within a one-mile radius of the Site. However, as expected due to the elevated height of the Site behind the bulkhead, no flood events are known to have occurred for portions of the Site which are located between the bulkhead and Buffalo Avenue. The small lowland area, which consists of 0.6 acres, at the edge of the southern property line on the Niagara River, however, is designated as being a location which is subject to 100-year flooding with average depths of less than one foot. In addition, the ditch area immediately to the east of the Site, is expected to be included in the 100-year flood plain.

Topographical relief at the Site is minimal since the ground surface is relatively flat. The maximum change in elevation across the Site behind the bulkhead is approximately 5 feet. This flat topography, except for the embankment at the River's edge, limits runoff. Elevations within the study area range from 564 feet above mean sea level (MSL), at the River's edge, to 578 feet, on a slight crest behind the bulkhead. There are also some slight depressions on the OCC portion of the Site in which surface water collects. The slightly mounded effect of the surface topography essentially results in surface-water flowing off-site in four directions, although all surface-water eventually discharges into the Niagara River. The majority of the Site drains directly to the Niagara

River to the south. However, there are some surface areas where surface water runoff flows to the east, west and north. The easterly component flows to the ditch that parallels the eastern property boundary. This ditch discharges to the south into the Niagara River. The flow off the western edge of the Site eventually flows into the Niagara River or the Little Niagara River. Flow off site to the north follows along the southern edge of the pavement of Buffalo Avenue either in an easterly or westerly direction until it is past the limits of the Site and then turns south and flows to the River.

Since the ground surface is covered by a thick growth of vegetation, and since the topography is rather flat, the present potential for off-site transport of soil in surface water is minimal. Historically, while the Site was still operating, erosion of material from the Site and subsequent sedimentation in the Niagara River probably did occur. However, the bulk of the sediment deposition would be expected to have occurred in the area immediately adjacent to the shoreline. This condition was substantiated by the Sediment Survey which was part of the Remedial Investigation (RI) report. This Survey identified the major portion of the chemical presence in the sediment to be limited to the shoreline vicinity. As landfilling operations continued to expand farther south, many of the sediments historically deposited are now under the current landfill.

In order to minimize the erosion of material from the Site, certain preventive measures have already been taken along the shoreline. The most significant was the construction of the bulkhead. The placement of the bulkhead material created a buffer between the River and the waste materials. Furthermore, the riprap placed on the River face of the bulkhead, reduced erosion. In addition, the Olin section of the bulkhead (toward the eastern portion of the Site), was constructed with a filter fabric membrane behind the riprap and a surface swale along the top of the riprap. Both of these measures aid further in the prevention of erosion by the River and erosion by surface-water flow off the Site.

## II.- Site History and Enforcement Activities

The present OCC portion of the Site (15.6 acres) was created by the combination of properties resulting from the merger of two firms (Niagara Alkali in 1955 and Oldbury Electrochemical in 1956) with Hooker Electrochemical Company (Hooker). Site ownership has been continuous by Hooker since that time, although the company name changed to Hooker Chemical Corporation (1958), Hooker Chemicals and Plastics Corporation (1974), and OCC (1982).

The Olin portion of the Site (6.5 acres) was acquired by its predecessor company, Mathieson Chemical Corporation, in 1948. Site ownership has been continuous although the company's name was

changed to Olin Mathieson Chemical Corporation in 1954 and to Olin Corporation in 1969.

As mentioned earlier, OCC and Olin used the Site as an industrial waste landfill from the mid-1940s until 1970. During this period, the Companies deposited at least 159,000 tons of waste, in both liquid and solid form, into the landfill. These deposits included approximately 4,600 tons of benzene, chlorobenzene, chlorophenols, and hexachlorocyclohexanes (HCCHs).

In 1973, upon the completion of the bulkhead along the shoreline, a series of investigations began regarding subsurface conditions at the Site. Sampling programs were also undertaken with respect to the sediments adjacent to the Site in the Niagara River. On December 20, 1979, a complaint pursuant to the Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), and the Rivers and Harbors Act of 1899 (RHA), was filed by the United States of America, on behalf of the Administrator of the EPA against the Companies in the U.S. District Court in Buffalo, New York, seeking injunctive relief and civil penalties for an imminent and substantial endangerment to the public health and welfare. On November 18, 1980, a complaint pursuant to the New York State Conservation Law and the state's common law of public nuisance, was filed by New York State (NYS) against the Companies in the U.S. District Court in Buffalo, New York, seeking civil penalties. The Site was formally listed as a National Priority List (NPL) site on September 8, 1983. The EPA and NYS, working with the Companies, prepared a Remedial Investigation (RI) Work Plan for the Site in 1984, for a study of the nature and extent of the contamination. The RI was conducted by the Companies pursuant to a Stipulation filed with the U.S. District Court on June 26, 1984. The Feasibility Study (FS) Work Plan was prepared by the EPA and NYS. The Companies performed the FS Work Plan pursuant to a Stipulation and Decree entered with the U.S. District Court on May 15, 1989. The Work Plan provides the guidance under which the Companies conducted the FS. The FS report describes the development and analyses all of the remedial alternatives for the Site. Throughout the RI/FS process, the EPA and NYS have reviewed all of the interim documentation and monitored the collection and analysis of samples from the Site.

## III.- Highlights of Community Participation

The RI/FS and the Proposed Plan were released to the public for comment on July 25, 1990. The public comment period began on July 25, 1990 and continued until August 25, 1990. The administrative record file, containing the information upon which the selection of the response action was based, including the RI/FS reports and other site-related documents, was made available to the public at the following locations:

Michael J. Basile
U.S. EPA Public Information Office
Carborundum Center - Suite 530
345 Third Street
Niagara Falls, New York 14303

Paul J. Olivo
U.S. EPA - Region 2
Room 737
26 Federal Plaza
New York, New York 10278

Michael Podd
Love Canal Public Information Office
9820 Colvin Blvd.
Niagara Falls, New York 14304

Thomas R. Christoffel, P.E.
NYSDEC
50 Wolf Road
Albany, New York 12233

A notice regarding the availability of these documents, along with a statement regarding the Proposed Plan, the duration of the public comment period, and the date and location of a public meeting, was published in two local newspapers, namely, THE BUFFALO NEWS and THE NIAGARA GAZETTE, on July 25, 1990. The public meeting was held on August 15, 1990, at the Red Jacket Inn located at 7001 Buffalo Avenue in Niagara Falls, New York. At this meeting, representatives of the EPA and the NYSDEC presented the Proposed Plan regarding remediation of the Site, and later answered questions and responded to comments concerning such Plan and other details related to the RI/FS reports. Responses to the comments and questions received at the public meeting, along with other questions and comments received during the public comment period, are included in the Responsiveness Summary, which is a part of this ROD.

## VI. Scope and Role of the Response Actions Within Site Strategy

The problems at the 102nd Street Landfill Site are complex. As a result, the work was divided into three discrete segments or operable units (OUs). Although the remedies for these three aspects (OUs) of the Site were evaluated separately, the OUs will be remediated concurrently where practical. Remediation of each of these OUs is addressed in this ROD.

The OUs are defined as follows:

- OU-1: Landfill residuals including on-site fill, "off-site" soils, shallow ground water, and non-aqueous

phase liquids (NAPL), (For purposes of this document, "off-site" soils are located on the triangular plot of land adjacent to the Site, north of Buffalo Avenue and south of the LaSalle Expressway, as well as on the areas immediately adjacent to the Site to the east and to the west.)

- OU-2: River sediments within the shallow embayment of the Niagara River adjacent to the Site; and,

- OU-3: The storm sewer which crosses the Site and discharges into the Niagara River.

During the compilation of the RI report, samples were collected of ground water, on-site and off-site soils, offshore sediments, and storm sewer discharge (see Figure 2.). These samples were analyzed for chemical contamination. Additional sampling was conducted to detect the presence of NAPL. The RI/FS reports supply detailed data for a total of 69 "chemicals of concern" for the Site. No site-related contamination was found in the bedrock aquifer. The response actions described in this ROD will address all of the principal threats posed by these contaminants and the present conditions at the Site.

## V.- Summary of Site Characteristics

During the time the Site was operated as an industrial waste landfill, from 1943 to 1970, it is estimated that approximately 159,000 tons of waste were deposited by OCC, Olin, and their predecessors.

As part of the RI/FS monitoring program, approximately ninety-five (95) boreholes and monitoring wells were installed and sampled. During the RI/FS monitoring period, conducted from 1986 through 1989, hundreds of ground-water, soil, and sediment samples were collected and analyzed. Hydrogeologic and special sampling for the presence of non-aqueous phase liquid (NAPL) contamination was also performed. Chemical analyses of all hazardous substances found at the Site led to the development of a listing of the chemicals which generated the most concern. In all, a total of 69 "chemicals of concern" were identified and evaluated. These chemicals include both the "site-specific indicators" (SSIs) monitored during the RI, and the "assessment chemical monitoring program chemicals," monitored during the FS. The SSIs are chemicals representative of Site contamination and were selected based on their respective prevalence at the Site, uniqueness to the Site, stability and mobility, and reliability of analytic method. The assessment chemicals (which include some of the SSIs) are those Site contaminants which were considered to pose the greatest possible threats to human health and the environment. The SSIs and assessment chemicals, as stated above, can be found in Table 1.

Contaminants found within the Survey Area during the RI/FS monitoring period included heavy metals (such as mercury), chlorinated single-ring aromatics (e.g., chlorobenzene compounds), chlorinated phenols, hexachlorocyclohexanes (HCCHs), polychlorinated biphenyls (PCBs), and polychlorinated dioxins and dibenzofurans (PCDDs and PCDFs).

The principal pathway for current migration of contaminants off-site is via ground-water discharge from the fill and alluvium zones of the landfill into the embayment. Based on RI chemical monitoring data and estimated ground-water discharge rates, the total SSI organic chemical load in ground water discharging from the Site is estimated to average approximately 1.7 to 3.5 pounds per day. The average total organic chemical load discharging in ground water, using general chemical analyses (not specific chemicals) and extrapolation methods, is estimated to range from 17.2 to 34.6 pounds per day. The phosphorus load in ground water is estimated to average between 17.1 and 34.1 pounds per day, and the average mercury load in ground water is estimated to range from 0.0001 to 0.0003 pounds per day. Ground water seeping into the storm sewer was analyzed for SSI contaminants, and does not appear to carry a significant chemical load (approximately 2% of the total organic chemical load in ground water). The storm sewer bedding material, upon which the sewer was constructed, does not appear to be a preferential pathway for ground-water flow.

Ground-water samples taken from the bedrock aquifer beneath the Site did not contain SSIs. Based on this finding, and considering the highly impermeable nature of the clay/till layer separating the alluvium from the bedrock, shallow (overburden) ground water does not appear to flow vertically from the Site into the bedrock aquifer. Rather, the overburden ground water discharges laterally into the embayment and across the Site's eastern and western boundaries.

The EPA prepared an evaluation of the possible threats to human health and the environment that could result if the Site were to remain in its current condition with no cleanup. This type of analysis is referred to as a "baseline" risk assessment, and a copy of the evaluation can be found in the Administrative Record. The EPA's risk assessment is dated May 25, 1990, and is titled "Baseline Human Health Risk and Environmental Endangerment Assessments for the 102nd Street Landfill," (Gradient Corporation, 1990), and is hereinafter referred to as the "Risk Assessment."

A summary of the RI/FS sampling results is provided in Table 2 for the compounds demonstrating the largest health or environmental risks in the EPA's risk assessment.

During the RI, NAPL was found within the fill and alluvial zones on the Site. The Companies estimated that approximately 300,000 gallons of NAPL are on-site. None of the NAPL was found in the

clay/till zone. NAPL is prevented from migrating into the bedrock beneath the Site due to the presence of the clay/till confining layer which is highly impermeable. It is not possible to reliably estimate the rate of NAPL migration, if any, toward the River through the fill and alluvial zones, or into the storm sewer. Storm sewer sediment samples indicated the presence of NAPL in the buried sediments, however the surface sediment samples were free of NAPL suggesting that NAPL is not currently discharging into the sewer. The remedy for the Site will address any areas of NAPL contamination which may extend beyond the Site boundaries and will prevent any future migration from the Site.

Niagara River sediments within the embayment were extensively sampled during the RI. Based on the sediment monitoring, the extent of SSIs in the sediments is limited to an area within 300 feet from the shore. The "clean line," which defines the extent of SSIs above the survey level (100 ppb for organics, 200 ppb for mercury) is shown in Figure 3. The "clean line" is considered the extent to which site-related contamination has migrated.

Surface soils around the Site's perimeter (the "perimeter soils") and surface soils north of Buffalo Avenue (the "off-site soils") contained SSIs exceeding the survey levels. Upper-bound chemical concentrations in the surface soil samples, on the order of several parts per million, were summarized in Table 2 for the chemicals of greatest health concern. Dioxin (2,3,7,8-TCDD) was detected in the surface soils in the area immediately north of the Site's fence and south of Buffalo Avenue, that exceeded the 1 ppb action level recommended by the Centers for Disease Control. Interim corrective measures, which included placing several inches of gravel over the contaminated areas, were implemented during the RI to preclude possible exposure at these locations.

## VI.- Summary of Site Risks

The EPA's Risk Assessment evaluated potential human health risks and environmental endangerment for each aspect of the Site assuming current conditions (i.e., no future residential/commercial uses of the Site were considered). These aspects of the Site include:

(1) surface water contamination due to ground-water discharge;

(2) surface water contamination due to storm-sewer discharge;

(3) contaminated embayment sediments; and,

(4) surface soil contamination (including airborne particulates).

Toxicity Assessment

Cancer potency factors (CPFs) have been developed by the EPA's Carcinogenic Assessment Group for estimating excess-lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake (dose) of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risks unlikely. CPFs are derived from the results of human epidemiological studies or chronic bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by the EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur. Table 3 summarizes the toxicity values for the chemicals of concern.

Human health risks posed by exposure to the chemicals of concern from the 102nd Street Site were quantified for potential pathways by which the local population may be exposed to Site contaminants. Because one area adjacent to the Site is zoned "residential," and residences currently exist near the Site, exposures to surface soil contamination around the Site perimeter and in the off-site soils were calculated for residential populations who potentially receive higher exposures than do either occupational populations, or individuals using the area recreationally. The major human exposure routes evaluated include:

- ingestion of fish from the embayment of the Niagara River;
- chemical exposure while swimming in the embayment;
- drinking water from the Niagara River as it is withdrawn at the Niagara Falls Drinking Water Treatment Plant; and,
- dermal contact with, ingestion of, and inhalation of dust from off-site contaminated soils.

Other potential exposure routes which were mentioned in the Site's Work Plan were discussed either semiquantitatively (such as exposure to embayment sediments) or reviewed and concluded to be insignificant due to the lack of current exposure pathways. Because the shallow overburden ground water is not now used for drinking water (and is not anticipated to be used in the future) potential health risks associated with such use were not considered.

Conservative but reasonable assumptions were utilized throughout the EPA's risk assessments to evaluate "reasonable maximum exposures" consistent with current EPA guidance. The reasonableness of predicted chemical concentrations (predicted for areas or media for which RI data are unavailable) used in the Risk Assessment was verified against measured data from other (non-RI) sources, when such information existed. Predicted surface water concentrations in the embayment agree favorably with the small number of pre-RI measurements of several chemicals of concern in embayment surface water samples. Similarly, predicted contaminant levels in fish are in general agreement with the limited available site-specific fish data from published (non-RI) sources, typically differing from the measured values by less than an order of magnitude.

Both carcinogenic and noncarcinogenic human health risks were estimated for the chemicals of concern. Based on exposures to contaminants in the embayment of the Niagara River and to soil contaminants off-site, total increased lifetime carcinogenic health risk is estimated to be $2.2 \times 10^{-3}$, with ingestion of fish from the embayment of the River the most important route of exposure contributing to this risk (see Table 4). Potential exposure to off-site soils yields an increased cancer risk of $8.1 \times 10^{-5}$. The carcinogens which contribute to the greatest extent to the Site's health risks are PCBs, HCCHs, hexachlorobenzene, and 2,3,7,8-TCDD (dioxin).

The total calculated "reasonable maximum" noncarcinogenic hazard index (a ratio of calculated exposure compared to an "allowable" exposure, as measured by the risk-reference dose) is estimated to be 4.3, where fish ingestion is the only exposure pathway which leads to the potential of significantly adverse health effects (Table 4). The 1,2,3,4- and 1,2,4,5-tetrachlorobenzene isomers are the chemicals with the largest hazard indices with respect to fish consumption.

Environmental Assessment

Environmental endangerment was evaluated for aquatic organisms and fish-eating species at the Site. No site-specific ecological data were gathered during the RI/FS so representative sensitive species were identified using EPA environmental risk assessment methods.

The potential environmental risks were quantified by comparing estimated environmental concentrations in the embayment with either water quality criteria for the protection of aquatic species (whenever available) or published aquatic toxicity factors. Using this methodology, EPA determined that environmental endangerment in the embayment is probable due to a number of Site contaminants. These chemicals, which enter the water in the embayment by way of ground-water discharge, discharge from the storm sewer, and chemicals emanating from the contaminated sediments, are identified in Table 5. Chemicals of "probable" concern are those whose embayment surface water concentrations exceed water quality criteria or aquatic toxicity criteria by more than an order of magnitude (factor of 10). Chemicals of "possible" concern are those which are predicted to occur in the embayment surface water at levels ranging from 1/10 up to 10 times relevant water quality and aquatic toxicity criteria. A number of site-related chemicals, including HCCHs, chlorinated benzenes, 2,3,7,8-TCDD, and Mirex, are of probable ecological concern. The contaminated embayment sediments pose the most significant threat to the environment.

Discussion of Uncertainties in Risk Assessment

Estimating human health risk requires many assumptions in order to quantify potential exposure and subsequent adverse health effects. In many instances potential exposure levels estimated for the 102nd Street Site were extrapolated from contaminant levels measured in different media from the medium of direct contact or exposure. For example, surface water concentrations were estimated from ground water (and storm sewer) chemical loads into the embayment. These chemical loads were estimated from measured chemical concentrations in ground water and estimated ground-water discharge rates. Finally, the chemical concentrations in the surface water of the embayment and the Niagara River near the Site were calculated based on the likely dilution in the areas considered most likely to be influenced by Site contaminants. These, and other similar calculations, all result in uncertain predictions of possible health risks.

The uncertainties in each step of the exposure and risk assessment process combine multiplicatively in the final risk calculation. EPA's risk assessment followed the most recent "Risk Assessment Guidance for Superfund" (December, 1989) recommendations for assessing "reasonable maximum exposures" (RMEs) and risks posed by the Site. For those pathways which yielded the highest risk estimates (ingestion of fish and exposure to soil) sufficient monitoring data were available to construct statistically based RMEs and risk calculations. Monte Carlo methods (which involve statistically based calculations) were used to calculate reasonable maximum chemical loads from the Site and also used to calculate reasonable maximum ingestion of possibly contaminated fish. The possible risks due to consuming contaminated fish using these methods were approximately 10 times higher than "average" risk

estimates which did not consider uncertainties in the RI data and exposure calculations, but the Monte Carlo risk estimates for fish consumption were approximately 10 times lower than "worst case" calculations which adopt overly conservative assumptions of maximum values for all exposure estimates. For soil exposure pathways, the 95% upper-bound chemical concentration in soil was used in the exposure calculations, which, again, provided RME estimates which were approximately 10 times higher than average conditions, but also 10 times less extreme than if the maximum detected chemical concentrations would have been used. Although rigorous statistical analyses of the uncertainties in the risk assessment were not performed, the above discussion indicates that, for the most significant pathways of chemical exposure, reasonable maximum exposures have an "uncertainty" range of approximately ± 10 (an order of magnitude).

In conclusion, based on the results of the Risk Assessment, actual or threatened releases of hazardous substances from the 102nd Street Landfill Site, if not addressed by implementing the selected remedy as contained in this ROD, may present an endangerment to the public health, to the public welfare, or to the environment.

## VII.- Description of Alternatives

### OU-1 (Landfill, Off-site Soils, Ground Water, and NAPL)

The FS describes various remedies for the Site, including, as required by CERCLA, the option of taking "no-action" and leaving the Site as it is with a fence and existing soil cover. Following a general screening of the many possible alternatives, a total of 15 alternatives were evaluated including the no-action alternative (see Table 6).

The final-candidate remedies for OU-1 can be grouped into several broad categories (the numbered categories below and in all future discussions, correspond to the numbered alternatives in the FS). Each of these categories consists of several alternatives for the remediation of ground water and soils.

Accordingly, these categories (for OU-1 alternatives only) can be defined as follows:

| Alternative | Remedy |
|---|---|
| (1) | **No-Action** -- (leaves existing fence and soil cover on landfill) |
| (2) | **Limited Action** -- Upgrade existing fence and leave existing soil cover; includes options that remove/remediate off-site soils and stabilize or deposit these soils in a "secure |

cell" on-site; recover and treat ground water with installation of a ground-water cutoff wall.

(3) **Cap Site/On-Site Waste Containment** -- Includes options that incorporate soil from off-site areas, and recover and treat ground water with installation of a ground-water cutoff wall or circumferential slurry wall. (Post-remedial monitoring will be performed to determine the effectiveness.)

(5) **Excavate/Incinerate Landfill Wastes and Off-Site Soils** -- Recover and treat ground water; installation of ground-water cutoff wall or a circumferential slurry wall.

The most comprehensive alternatives of each of the three "action alternative" categories involving Site cleanup are outlined below. The FS report contains complete summaries of all 15 alternatives for this Operable Unit. Estimated costs and implementation times summarized here are from the FS. Since the implementation periods for each operable unit may overlap, the overall time to complete remedies for all OUs may be somewhat less than the implementation times of each OU added together. It should also be noted that the stated implementation periods include a component for the design of the intended remedial action. In specific terms, for OU-1, Alternatives 2A through 2E allow 18 months for design, while Alternatives 3A through 3F allow 24 months, and Alternatives 5A,5B, and 5C, anticipate 36 months. The implementation periods for OU-2 and OU-3 include 12 months for remedial design.

<u>OU-1 Alternative 2E: Existing Landfill Cover; Stabilize Perimeter and Off-site Soils; Cutoff Wall for Ground-Water and NAPL Control and Ground-Water Recovery</u>

| | |
|---|---|
| **Implementation Period:** | **24 months** |
| Capital Costs: | $5,830,000 |
| Operation & Maintenance: | $4,820,000 |
| **Present Worth Costs:** | $10,700,000 |

This alternative would involve excavation of all perimeter and off-site soils (5,800 $yd^3$) above cleanup thresholds. These soils would then be treated so as to form cement-like materials, and thereafter be deposited on-site. A low permeability "cutoff" wall would be installed in the soil along the river boundary so as to control water intrusion from the River and to retard ground-water and NAPL migration. Actual placement of the cutoff wall (in certain options, a circumferential slurry wall) will be determined through the installation of geotechnical borings along the proposed route of the wall. These borings will extend to the clay/till layer and will be used to define the extent of NAPL. The cutoff wall will

be constructed outside the extent of the NAPL. Ground-water recovery wells would remove an estimated 25 gpm for treatment to remove organic and inorganic contamination. This treated water would then be discharged either to a City sewer or to the Niagara River in accordance with applicable laws and regulations.

Optional, less comprehensive, variations of this alternative include the following. The variations' implementation period and present-worth cost follow their respective descriptions.

2A) Excavation of only perimeter soils "hot spots" for mercury and dioxin with permanent placement in a secure (lined and capped) cell on-site; no other remedial components (19 months, $1.8 million).

2B) Same as 2A for perimeter soils plus a slurry cutoff wall along the riverbank with ground-water recovery and treatment (23 months, $9.62 million).

2C) Same as 2B, except perimeter soils would be incinerated rather than buried on-site (23 months, $9.51 million).

2D) Excavate all perimeter and off-site soils above cleanup thresholds with burial on-site in a secure cell (without stabilization) and cutoff wall/ground-water recovery identical to 2E (24 months, $9.86 million).

<u>OU-1 Alternative 3F: Cap Landfill and Perimeter Soils; Excavate Off-Site Soils and Bury Beneath Cap; Circumferential Wall; Ground-Water Recovery and Treatment; NAPL Recovery and Incineration</u>

| | |
|---|---|
| **Implementation Period:** | 36 months |
| Capital Costs: | $13,200,000 |
| Operation & Maintenance: | $7,140,000 |
| **Present Worth Costs:** | $20,340,000 |

This alternative involves moving off-site soils above cleanup thresholds to the Site, capping the entire Site (about 24 acres) using a combined compacted soil layer with a synthetic liner, and ground-water and NAPL controls. A 4,800 ft slurry wall completely encircling the Site would be installed throughout the varying depth of 10 to 35 feet to the clay/till confining layer so as to minimize ground-water flow through the landfill soils. Ground water would be collected (for treatment) via interceptor drainage trenches installed below the seasonal low water table, creating inward gradients across the wall. In order to create such inward gradient, it is estimated that an approximate amount of 1,000,000 gallons will be extracted initially over a short time period (e.g., 3 months). Thereafter, ground-water recovery on a steady-state basis would total an estimated 2,500 gallons per day, a relatively small amount because the cap and circumferential slurry wall reduce infiltration and ground-water inflow at the Site. In addition,

NAPL extraction wells would be placed in areas of NAPL contamination. NAPL would be incinerated at an off-site facility, and ground water would be treated either on-site or in one of three off-site treatment facilities prior to discharge to a City sewer or to the River in accordance with applicable laws and regulations. As is the case in all instances, post-remedial monitoring will be performed to determine the effectiveness of the remedial action.

Optional less comprehensive variations on Alternative 3 include:

3A) Excavation of perimeter soils above cleanup thresholds and burial beneath a newly constructed Site cap; no other remedial activities (30 months, $9.55 million).

3B) Same as 3A plus a cutoff wall along the River boundary with ground-water/NAPL recovery wells (34 months, $17.6 million).

3C) Same as 3B except the cutoff wall would become a circumferential wall and ground-water extraction would be via shallow drainage trenches; no remediation of off-site soil (36 months, $16.6 million).

3D) Same as 3C plus removal of all off-site soils above cleanup thresholds and burial on-site (36 months, $16.7 million).

3E) Same as 3B (i.e., cutoff rather than circumferential wall) with removal and on-site burial of off-site soils above cleanup thresholds (34 months, $21.3 million).

<u>OU-1 Alternative 5C: Excavate NAPL areas, Off-site and Perimeter Soils with On-Site Incineration and Capping of Landfill; Ground-Water Recovery and Treatment</u>

| | |
|---|---|
| **Implementation Period:** | 156 - 180 months (13 - 15 years) |
| Capital Costs: | $288,000,000 to $448,000,000 |
| Operation & Maintenance: | $8,000,000 |
| **Present Worth Cost:** | $296,000,000 to $456,000,000 |

This alternative would involve excavation of approximately 7.9 acres of NAPL-contaminated soils to the interface of the alluvium with the clay/till layer, a depth of as much as 35 feet in some areas. Prior to excavation, a circumferential slurry wall would be constructed. The enclosed area will approximate 24 acres. The excavation would yield an estimated 406,000 $yd^3$ of material, which would be incinerated on-site. Negligible volume reduction is likely to occur upon incineration, since the volume of the organic compounds, which are destroyed by incineration, is small compared to the volume of the solid material. Thus, approximately 406,000 $yd^3$ of ash would remain after incineration, which would either be

buried on-site or disposed of in an off-site landfill. After excavation, a cap would be installed over the entire Site. Ground water would be recovered using an interceptor drain, and treated. Ground-water treatment and discharge would be performed as described for the other remedial alternatives, listed above.

Two variations of this alternative were also considered:

5B) This Alternative requires less extensive excavation and incineration than Alternatives 5C. Excavation would be limited to NAPL-contaminated soil above the water table, a depth of approximately 10 feet, yielding an estimated 127,500 $yd^3$ of excavated material to be incinerated on-site. As before, negligible volume reduction is likely to occur upon incineration, so approximately 127,500 $yd^3$ of ash would remain after incineration, which would be buried on-site or disposed of in an off-site landfill. Because NAPL in the soil below the water table would not be excavated, attempts would also be made to collect this NAPL after excavation by selectively installing NAPL extraction wells. Any NAPL so recovered would be incinerated on-site. All other aspects of this alternative are as in 5C (156 months, $80.4 to $148 million).

5A) This Alternative is identical to 5B except that selective NAPL extraction/incineration would not be attempted (108 months, $77.1 to $144 million).

<u>OU - 2: River Sediments</u>

The final-candidate remedial alternatives for OU-2 are summarized in Table 7, and described briefly below.

<u>OU-2 Alternative 2A: Dredge/Dewater Sediment Areas with Elevated Concentrations, Spread On-site and Cap</u>

| | |
|---|---|
| **Implementation Period:** | 15 months |
| Capital Costs: | $1,390,000 to $2,310,000 |
| Operation & Maintenance: | $420,000 |
| **Present Worth Costs:** | $[illegible],800,000 to $2,730,000 |

Two areas just offshore from the Site, one near the sewer outfall and the other near the Griffon Park boundary, would be dredged. These are the most contaminated sediment areas in the embayment. Prior to dredging, a berm would be constructed outside of the contaminated area to prevent the downstream transport of sediment. The estimated 4,600 $yd^3$ of sediment would be dewatered using a filter press and spread upon the surface of the Site prior to its capping as part of OU-1-3 options.

One variation of this alternative was considered in depth:

2C) Alternative 2C would involve incineration rather than landfilling of the dredged sediments from the two areas which contain elevated concentrations of contaminants ("hot spots") (16+ months, $3.66 to $4.48 million).

OU-2 Alternative 4: Dredge All Site-Contaminated Sediments; Dewater; Extend Cap Over Dewatered Sediments

| | |
|---|---|
| **Implementation Period:** | 20 months |
| Capital Costs: | $4,620,000 to $6,180,000 |
| Operation & Maintenance: | (No O & M Costs) |
| **Present Worth Costs:** | $4,620,000 to $6,180,000 |

All sediments between the shore and the point farthest offshore which exceed cleanup thresholds (this point or line is known as the "clean line") would be dredged to a depth estimated at 2 ft. Cleanup thresholds are defined as SSI concentrations above survey levels as shown by the "clean line" depicted in Figure 3. These sediments, estimated to be 15,000 $yd^3$, would then be filled (behind a newly constructed berm) into the marshy lowland area between the Site and the River which would provide a settling/dewatering basin. The entire area to be dredged would be separated from the River by the construction of a second berm (beyond the clean line) which would prevent downstream transport of dredged sediment. After a sediment settling period, excess water from the settling basin would be removed for treatment (4.5 million gallons) and then an additional 8,500 $yd^3$ of fill would be added to the settling basin and the area which would be capped (1.8 acres) in conjunction with OU-1. This alternative anticipates more cap coverage than Alternative 6A, hence the increased cost figures and implementation times.

OU-2 Alternative 6A: Dredge All Site-Contaminated Sediments, Dewater and Bury Sediments On-site Beneath Cap

| | |
|---|---|
| **Implementation Period:** | 18 months |
| Capital Costs: | $3,600,000 to $5,570,000 |
| Operation & Maintenance: | (No O & M Costs) |
| **Present Worth Costs:** | $3,600,000 to $5,570,000 |

This alternative would involve dredging the same sediment area as in Alternative 4, with the exception that once dewatered (as accomplished in Alternative 4), the sediments and temporary berm would be re-excavated and buried on-site beneath the cap (Alternative 4 extends landfill cap over the settling basin). The temporary berm would be constructed parallel to the shore and dredged sediments would be stored between this berm and the existing shoreline bulkhead for dewatering. Following dewatering, all contaminated sediments and the berm, totalling approximately 28,000 $yd^3$, would be buried on-site beneath the cap installed as part of OU-1.

One variation of this alternative which was considered:

6C) Alternative OU-2-6C, would involve incineration of the dredged sediments. The berm material would not be incinerated (27+ months, $11.8 to $13.2 million).

OU - 3: Storm Sewer

The final-candidate remedial alternatives for the storm sewer are summarized in Table 8 and described briefly below.

OU-3 Alternative 2A: Install HDPE Slipliner in Sewer

| | |
|---|---|
| **Implementation Period:** | 15 months |
| Capital Costs: | $535,000 |
| Operation & Maintenance: | $69,600 |
| **Present Worth Costs:** | $605,000 |

The existing sewer pipe would be cleaned and left in place but lined with a chemically resistant sleeve made of high density polyethylene (HDPE) plastic. The annular space between the original pipe and the sleeve would be pressure-grouted. This would prevent ground water and NAPL from infiltrating the conduit or the annulus, thereby eliminating enhanced transport of contaminants to the River via this pathway.

One variation of this alternative was considered:

2B) Alternative OU-3-2B would use "insituform," an inversion lining method which employs a thermosetting polyester resin to line the sewer pipe (14 months, $718,000).

OU-3 Alternative 3(A & B): Bypass Site with a Lift Well and Force Main

| | |
|---|---|
| **Implementation Period:** | 19 - 20 months |
| Capital Costs: | $1,830,000/$3,980,000 |
| Operation & Maintenance: | $1,160,000/$970,000 |
| **Present Worth Costs:** | $2,990,000/$4,950,000 |

The existing sewer on-site would be abandoned and a 36-inch diameter pressurized pipe and pumping station would be installed. The new sewer would bypass the Site and be capable of handling 20 MGD (million gallons per day) flow. The abandoned sewer would either be plugged (Option A) or removed (Option B).

## VIII.- Summary of Comparative Analysis of Alternatives

In accordance with CERCLA, a detailed analysis of each alternative is required. The purpose of the detailed analysis is to

objectively assess the alternatives with respect to nine evaluation criteria that encompass statutory requirements and include other gauges of the overall feasibility and acceptability of remedial alternatives. This analysis is comprised of an individual assessment of the alternatives against each criterion and a comparative analysis designed to determine the relative performance of the alternatives and identify major trade-offs, that is, relative advantages and disadvantages, among them.

The nine evaluation criteria against which the alternatives are evaluated are as follows:

Threshold Criteria - The first two criteria must be satisfied in order for an alternative to be eligible for selection.

1. **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with Applicable, or Relevant and Appropriate Requirements (ARARs)** is used to determine whether each alternative will meet all of its federal and state ARARs. When an ARAR is not met, the detailed analysis should discuss whether one of the six statutory waivers is appropriate.

Primary Balancing Criteria - The next five "primary balancing criteria" are to be used to weigh major trade-offs among the different hazardous waste management strategies.

3. **Long-term Effectiveness and Permanence** focuses on any residual risk remaining at the Site after the completion of the remedial action. This analysis includes consideration of the degree of threat posed by the hazardous substances remaining at the Site and the adequacy of any controls (for example, engineering and institutional) used to manage the hazardous substances remaining at the Site.

4. **Reduction of Toxicity, Mobility, or Volume Through Treatment** is the anticipated performance of the treatment technologies a particular remedy may employ.

5. **Short-term Effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and

administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation.

7. **Cost** includes estimated capital, and operation and maintenance costs, both translated to a present-worth basis. The detailed analysis evaluates and compares the cost of the respective alternatives, but draws no conclusions as to the cost-effectiveness of the alternatives. Cost-effectiveness is determined in the remedy selection phase, when cost is considered along with the other balancing criteria.

Modifying Criteria - The final two criteria are regarded as "modifying criteria," and are to be taken into account after the above criteria have been evaluated. They are generally to be focused upon after public comment is received.

8. **State Acceptance** indicates whether based on its review of the RI/FS and the Proposed Plan, the state concurs with the selected remedy.

9. **Community Acceptance** refers to the community's comments on the remedial alternatives under consideration, along with the Proposed Plan. Comments received during the public comment period, and the EPA's responses to those comments, are summarized in the Responsiveness Summary which is a part of this ROD.

At this point, it may be convenient to summarize the selected remedy so as to facilitate the analysis of the alternatives which also follows. Accordingly, the selected remedy consists of these components:

**OU-1- Alternative 3F:** Cap Landfill and Perimeter Soils; Excavate Off-Site Soils and Bury Beneath Cap; Install Circumferential Slurry Wall; Recover and Treat Ground Water; Recover and Incinerate NAPL.

**OU-2- Alternative 6A as modified by Alternative 2C:** Dredge Sediments From Two Areas Which Contain Elevated Concentrations Of Contaminants, and Incinerate These Sediments (2C). Dredge All Remaining Site-Contaminated Sediments, Dewater and Bury Sediments On-site Beneath Cap (6A).

**OU-3- Alternative 2A:** Install Plastic (HDPE) Slipliner in Storm Sewer which crosses the Site.

## Analysis of Alternatives

### Overall Protection of Human Health and the Environment

With the exception of the no-action alternatives, all alternatives would provide some protection of human health and the environment. Because risks from off-site soil exposure and consumption of fish from the Niagara River pose the largest risks, the alternatives which deal with these exposure pathways most effectively, will be the most desirable.

### Protection for Soil Exposure Pathways (OU-1)

Alternatives 2A,2B,2C for OU-1 do not remediate the off-site contaminated soils north of Buffalo Avenue, hence these options do not adequately protect human health or the environment from the effects of Site contaminants. The other two alternatives considered for Alternative 2 (2D and 2E), would provide adequate health and environmental protection by either isolating the contaminants in a secure cell (2D) or stabilizing them (2E). However, none of the Alternative 2 options provides adequate protection from contaminants on the Site, since remediation of the on-site area is limited to an improved fence surrounding the Site.

As in the above case, Alternatives 3A,3B,3C for OU-1 do not remediate contaminated off-site soils and, hence, do not provide adequate human and environmental protection. The remaining variations of Alternative 3 (3D,3E,3F) would address off-site and perimeter soils by excavating off-site soils and reburying the off-site soils beneath a cap over the Site (the cap would cover the perimeter soils), a sufficient technology to provide overall protection given the contaminant levels and exposure pathways. Since the entire Site receives a cap (with a synthetic liner), this alternative provides greater overall protection than Alternative 2, by removing all soils above cleanup thresholds outside the landfill boundaries, with on-site burial accompanied by a new cap over the landfill.

Soil incineration (Alternative 5 for OU-1) provides protection of greater permanence because contaminants are excavated from the Site and destroyed by incineration. However, with adequate implementation and monitoring of the selected option (OU-1-3F), the contaminants will be effectively isolated from future human and environmental exposure such that the increased permanence provided by Alternative 5 may only result in a slight increase in protectiveness. Furthermore, as discussed later, the increased long-term protection provided by Alternative 5 is accompanied by short-term risks associated with excavation/incineration, the technical difficulties involved in the construction of the circumferential slurry wall and in the prevention of the inflow of River water into the excavated area, and much higher costs than those of Alternative 3F.

Protection for Niagara River Exposure Pathways

Protection of the Niagara River and associated exposure pathways requires action to control contaminant exposure/migration from all three Operable Units.

**OU-1.** Migration of contaminants in ground water from the landfill (OU-1) is the primary concern for Niagara River exposure scenarios for this OU. Health risks will be directly influenced by reducing the potential for bioaccumulation in fish caused by discharge of contaminated ground water from the Site into the Niagara River embayment. Alternative 3 combines a cap over the landfill (which reduces infiltration and subsequent ground-water discharge) with more extensive ground-water recovery and treatment options, than Alternative 2. In addition, various options under Alternative 3 (3B,3C,3D,3E,3F) provide varying degrees of NAPL control and remediation.

Therefore, Alternative 3 provides greater health protection than Alternative 2. Alternative 5 controls ground-water migration using the same remedial actions as Alternative 2, but offers increased protection by also removing and incinerating the "NAPL areas," thus greatly reducing the source of contaminants migrating in ground water.

**OU-2.** Dredging of contaminated sediments (OU-2-6A) will be required to reduce risks to aquatic biota as well as to reduce contaminant bioaccumulation in edible fish. Dredging and incinerating "hot spots" (OU-2-2C) will provide permanent protection from these highly contaminated sediments. Since health-based or risk-based sediment remediation criteria have not been established, these combined alternatives (6A and 2C) which have the net effect of excavating all sediments that have migrated to the "clean line," incinerating those sediments from the areas of elevated concentrations, and burying the remaining sediments beneath the cap, were selected as the most reasonable action-alternatives designed to ensure the maximum overall human and environmental protection.

**OU-3.** Remediation of the storm sewer (OU-3) will eliminate the contaminant loadings to the River attributable to the sewer. With adequate installation, monitoring and maintenance, Alternative 2 (the selected alternative) should provide adequate protection of human health and the environment. Alternative 3, which replaces the existing sewer and re-routes another sewer line around the Site, would provide even greater protection. Because the chemical loads in the sewer are less significant than other sources of the Site's contamination, the somewhat greater protection afforded by Alternative 3, is outweighed by the greater technical difficulties and increased costs associated with this alternative.

**Compliance With ARARs**

Tables 9 through 11 summarize the ARARs and "To-be-Considered" guidelines (TBCs) identified for the Site. Each of the remedial alternatives was evaluated for compliance with ARARs and TBCs.

**OU-1.** Ground water located in the landfill soils at the Site is classified by EPA as Class IIB and by NYSDEC as Class GA (potential source of drinking water), although it is not a source of drinking water. The Safe Drinking Water Act Maximum Contaminant Levels (MCLs) and NYSDEC Quality Standards for Groundwaters are chemical-specific ARARs for the ground water on-site. Although RCRA Groundwater Concentration Limits (RCRA limits), which are also ARARs for ground water, exist for 4 of the chemicals of concern, Lindane (4 ppb), mercury (2 ppb), arsenic (50 ppb), and cadmium (10 ppb), these limitations are identical to the previously mentioned MCLs.

Ground water in the landfill soils discharges into the Niagara River and across the western and eastern boundaries of the Site. As stated in the NCP, when wastes are left in place, the "point of compliance" lies at that point beyond the areal limit of the contained wastes where ground water discharges. In the case of the 102nd Street Site, the point of compliance for ground water is the embayment of the Niagara River (just outside the planned location of the slurry wall), the ground water outside the slurry wall in Griffon Park (to the west), and the ground water outside the slurry wall to the east of the Site within the area bounded by the drainage ditch. Relevant ARARs for ground water discharging into the embayment are the Clean Water Act ambient water quality criteria (AWQC) and the New York State ambient water quality standards (AWQS). Chemical-specific ARARs for ground water discharging to the west and to the east of the Site include MCLs and NYS Ground-water Standards. Any remedial alternative selected must be one which reduces the quantity of ground-water discharge, and/or improves its quality to reduce surface-water contaminant concentrations in the embayment, and to reduce ground-water contaminant concentrations to the west and east of the Site; all of which would be done to meet ARARs.

Alternatives 2A and 3A, which do not include the installation of a circumferential slurry wall, and which do not remediate ground water, will not comply with ARARs at the point of compliance. Furthermore, alternatives which do not accomplish any NAPL removal (2A,2B,2C,2D,2E and 3A,3B), and do not enclose the landfill with a slurry wall, thus leaving NAPL as a significant source for ground-water contamination, are unlikely to achieve ARARs at the point of compliance. Only Alternative 5C (the comprehensive incineration option) will remove all NAPL at the Site. Alternatives 3F,5A,5B, and 5C, which provide for some NAPL removal, and which include either a cutoff wall or a circumferential slurry wall, will achieve ground-water ARARs at the point-of-compliance.

It should be noted that although the recovery of ground water does include a treatment component, the primary function of ground-water recovery is to create and maintain an inward gradient across the slurry wall. Since much of the NAPL occurs in the soil beneath the fill (the alluvium), Alternatives 5A and 5B, which require only excavation and incineration of the fill material, but not the alluvium, would not necessarily provide significantly accelerated compliance with ARARs, but would provide more permanent solutions due to incineration, than does Alternative 3F.

The EPA's Risk Assessment, using embayment water concentrations derived from ground-water chemical discharge and embayment dilution, determined that several compounds currently exceed the AWQC or AWQS. Surface water ARARs will be achieved by those OU-1 alternatives which limit future discharge of contaminated ground water into the River. Alternatives 2A and 3A, which do not restrict ground-water discharge to the River, will not comply with ARARs. The action alternatives employing a cutoff wall (2B,2C,2D,2E;3B;5A,5B) and those employing a circumferential slurry wall (3C,3D,3E,3F;5C) should effectively limit ground-water discharge to the embayment, and thereby meet ARARs. A circumferential slurry wall provides the most complete ground-water control and greatest assurance of meeting the ARARs associated with the embayment.

No ARARs are established for contaminated soils, although the Centers for Disease Control has established a guidance value of 1 µg/kg (ppb) for dioxin in residential soils. Since the Risk Assessment indicates significant health risks are associated with soil exposure, all perimeter and off-site soils above cleanup thresholds will be remediated (including dioxin contaminated soils south of Buffalo Avenue).

Land Disposal Restrictions (LDRs) preclude the placement of restricted RCRA hazardous wastes into a land disposal unit. The off-site and perimeter soils, and the embayment sediments are a restricted RCRA hazardous waste, in part because they contain dioxin. If consolidating these soils and sediments on the landfill constitutes placement into a land disposal unit, then such remedial actions would fail to satisfy the LDRs. According to EPA's Superfund LDR Guide #5 (OSWER Directive 9347.3-05FS, July 1989), "Placement does not occur when wastes are ... moved within a single AOC [area of contamination]." An AOC is "the areal extent of contiguous contamination," such as a "landfill ... and the surrounding contaminated soil. Such contamination must be continuous, but may contain varying types and concentrations of hazardous substances." The perimeter soils and embayment sediments are contiguous and continuous with the contamination at the landfill. The contamination north of Buffalo Avenue is considered contiguous with the contamination surrounding the Site boundaries (even though these areas are separated by the road) because continuous contamination was found between the Site fence and the

south side of Buffalo Avenue, as well as on the northern edge of Buffalo Avenue. Thus, the contamination north of Buffalo Avenue is continuous and contiguous. Therefore, LDRs are not applicable to the placement of the perimeter and off-site soils, and the embayment sediments on the landfill beneath the cap, and accordingly are not ARARs.

**OU-2.** No promulgated federal or state ARARs exist for contaminated sediment, however New York State does have "To-Be-Considered" guidelines (TBCs) for sediment which require aqueous contaminant levels in the water surrounding the sediment ("interstitial" water) to meet ambient water quality criteria (AWQC) and state ambient water quality standards (AWQS). Alternative OU-2-2C, which incinerates the sediment "hot spots," will achieve these TBCs, as well as providing permanent protection from these areas of elevated contaminant concentrations. Alternatives 4 and 6 would achieve the compliance with the sediment TBCs since all site-related sediment contamination would be dredged from the embayment.

Dredging activities for all alternatives would be conducted in compliance with ARARs for excavation in a 100-year floodplain, wetlands, and construction of bulkheads in navigable waters.

**OU-3.** Ground-water infiltration into the sewer and subsequent discharge to the embayment must meet surface water AWQC. All action alternatives should effectively eliminate future discharge of the Site's contaminants and thereby meet these criteria.

**Long-Term Effectiveness and Permanence**

**OU-1.** Alternative 5C and to a lesser extent Alternatives 5A and 5B, which entail the most removal/destruction of the Site's contaminants, provide the greatest long-term effectiveness. The alternatives aimed at NAPL and ground-water recovery/treatment (3E and 3F) or ground-water recovery/treatment (2B,2C,2D,2E) and (3B,3C,3D,3E,3F) also offer degrees of permanent destruction of the most mobile contaminants over the long term. However, these remedies are not "permanent" because long-term monitoring of treatment processes and effective maintenance of the remedy must be achieved to ensure long-term effectiveness for these Alternative 2 and 3 remedial options. All of these alternatives will have similar, positive long-term impacts on the Niagara River.

**OU-2.** Remediation Alternative 6C, which removes all site-related contaminated River sediments to the "clean line" and destroys contaminants by incineration, provides the most permanent overall remedial option. Alternative 2C which removes and incinerates the sediments from the two "hot spots," will likewise provide the highest degree of permanence for these specific areas. Alternatives 4 and 6A also dredge sediments to the "clean line," but do not incinerate the sediment; rather these two alternatives call for depositing sediments on the Site (the difference between

them is in the specifics of where the sediments are backfilled). Because of the low mobility of the primary contaminants of concern in the sediments, with continued monitoring, their excavation and reburial on-site should provide adequate long-term effectiveness. Alternative 2A would provide less long-term effectiveness and permanence because it addresses only two sediment "hot spots" in terms of dredging those sediments and placing them beneath the cap. Although not offering the same degree of permanence, the long-term effectiveness of Alternatives 4 and 6A may be indistinguishable from 6C. This presumes that the site-containment remedial components will be maintained effectively.

**OU-3.** Alternative 3B would be the most permanent solution because it would replace the existing sewer with a new one which bypasses the Site. Plugging the existing sewer and adding a bypass (Alternative 3A) or lining the existing sewer to prevent infiltration (Alternative 2) would be less permanent than Alternative 3A, but would provide essentially the same long-term effectiveness with continued maintenance and periodic replacement of the plug or sewer lining. Without proper inspection and maintenance, plugging or lining the sewer offers less long-term effectiveness than does excavating and rerouting it around the Site.

**Reduction of Toxicity, Mobility or Volume of Contaminants**

With the exception of the no-action alternatives, all of the alternatives reduce the toxicity, mobility and/or volume of the Site's contaminants. Many of the final alternatives considered for the Site focus on reducing contaminant mobility (which effectively isolates contaminants from future human/environmental exposure risks) as the primary remediation method; to varying degrees, the remedies reduce contaminant toxicity or volume for targeted areas or media.

**OU-1.** Alternative 2, which upgrades the fence around the Site and provides some remediation of off-site soil and ground water beneath the Site, has the least impact on toxicity, mobility or volume of Site contamination. Placement of off-site soils in a secure cell (2D) or stabilization (2E) reduces contaminant mobility, but does not reduce their toxicity or volume (stabilization methods actually increase the volume of disposed solids). Ground-water recovery and treatment (2B-2E) will reduce the toxicity and volume of contaminants over very long time periods. Alternative 3 reduces contaminant mobility and volume to a greater extent than Alternative 2 since the cap reduces infiltration (thereby reducing ground-water recharge, while also reducing chemical mobility and volume). Alternative 3 also reduces the toxicity and volume of ground-water contaminants through recovery and treatment. The most comprehensive options of this alternative (3E,3F), which call for selective NAPL removal and incineration, reduce contaminant volume and toxicity to the greatest extent of alternative 3 options.

Finally, Alternative 5, which calls for excavation and incineration of the NAPL areas (5A,5B,5C), provides the greatest contaminant removal/destruction. However, a large volume of ash must be disposed of for this alternative.

OU-2. With the exception of Alternative 6C, which involves removal and incineration of all contaminated sediments to the "clean line," and Alternative 2C, which incinerates the sediments from the "hot spots" only, all action alternatives for OU-2 reduce the mobility and toxicity of contaminants by removing them from the River. Alternatives 6C and 2C provide essentially complete destruction of organic contaminants, but, as above, these options can require disposing of a substantial volume of ash. Alternative 2A, which only remediates the two "hot spots" in terms of removal and placement of sediment beneath the cap, reduces contaminant mobility less than Alternatives 4 and 6A, which dredge all site-related contaminated sediments out to the "clean line."

OU-3. All action alternatives of OU-3 will reduce contaminant mobility by preventing transport via the storm sewer; none of them reduce contaminant toxicity or volume. With careful installation, maintenance, and monitoring, Alternative 2, which involves lining the sewer, should provide results comparable to Alternative 3, which completely reroutes the sewer.

**Short-Term Effectiveness**

Alternatives involving incineration (Alternatives OU-1-5, OU-2-2C, and OU-2-6C) would be the least effective over the short term due to delays anticipated with getting a incinerator available, and due to the potential health risks associated with the excavation and incineration process. It is estimated that an incinerator trial burn would require 2 years during which remedial activities at the Site would be inhibited. Excavation and incineration activities can pose health risks to the nearby residents due to exposure to fugitive dust generated during excavation, and potential emissions from the incinerator. However, both fugitive dust and incinerator emissions can be and would be controlled such that the short-term health risks are either minimized or eliminated. As discussed below with respect to the "implementability" criterion, excavation may have its effectiveness limited and worker safety threatened due to the presence of phosphorus waste at the Site.

Dredging activities associated with the OU-2 alternatives could have short-term negative impacts on the Niagara River. The construction of berms (to contain dredged sediment) in all action alternatives would temporarily increase sediment loads to the River, and some of this sediment transported in the River may be contaminated. However, since the berms in question will clearly be located outside the area of contamination, it is highly unlikely that any contaminated sediments will be released into the River.

As discussed below with respect to the "implementability" criterion, Alternative OU-1-5C could result in serious environmental damage or threats to worker safety from potential slurry wall failure.

Alternatives involving excavation of off-site/perimeter soils, the storm sewer, or trenches for the installation of slurry walls or drains, will all involve some short-term health risks to workers and/or nearby residents due to fugitive dust and vapor emissions. Workers would be required to wear protective clothing in order to minimize potential health risks. All activities requiring excavation of soils along Buffalo Avenue would create short-term concerns of disrupting local utilities. Excavation would be performed in such a way and under such conditions as to minimize risks to nearby residents.

Many of the remediation activities are likely to involve excavating areas containing NAPL (e.g., during slurry wall construction, removing sediments in the storm sewer, and excavating embayment sediments). Although possible worker exposure to NAPL on the Site during excavation will be a concern, standard health and safety measures will be instituted to protect the workers' welfare.

**Implementability**

In general, remediation alternatives for the Site involve technologies and methods which have been used at other hazardous waste sites and should not lead to unusual difficulties at 102nd Street. However, some difficulties may arise requiring contingencies. Potential problem areas for each OU are summarized below.

OU-1. Almost all of the action alternatives require construction of a slurry wall (either a cutoff wall or a circumferential wall), keyed into the clay/till layer beneath the Site. The slurry wall will restrict ground-water migration from the Site. This remedy may encounter difficulties if the clay/till layer is non-contiguous or varies greatly in depth below ground surface across the Site. Areas traversed by the slurry wall which are highly contaminated, would require precautions to protect worker health and safety. In addition, the compatibility of the slurry wall with densely chlorinated organics found in NAPL must be determined in order to ensure that NAPL will not reduce the slurry wall's effectiveness. Furthermore, since NAPL may extend to an unknown extent beneath the embayment area, and since the primary function of the slurry wall will be to contain the NAPL plume, the planned location of the slurry wall may need to be adjusted after data from geotechnical borings give the precise dimensions of the NAPL plume.

The excavation/incineration alternatives (5A,5B,5C) pose the most significant implementation difficulties. In addition to the short-term effectiveness and health risks mentioned previously, other

Site conditions must be considered. The RI report indicates that several locations on the Site received drummed wastes containing elemental phosphorus. Elemental white phosphorus combusts when exposed to the atmosphere. Although the phosphorus disposal areas generally do not coincide with the NAPL-contaminated areas to be excavated, the possibility of inadvertently exhuming phosphorus during excavation poses technical difficulties and potentially threatens worker safety. One area of suspected phosphorus disposal, near the OCC and Olin property boundary, is very close to the NAPL contamination area. If this precludes excavation in this area, the overall effectiveness of Alternative 5 will be reduced.

Additional implementation difficulties exist for Alternative 5C, which involves excavation of the saturated fill and soil in the NAPL-contaminated areas. Excavation in the saturated zone would require dewatering of the Site, which will be made more difficult by the proximity of the Niagara River. Large hydraulic gradients would exist between the dewatered area of the Site and the Niagara River, and also between the dewatered excavation trench and the bedrock beneath it. Failure of the slurry wall and/or the clay/till confining layer during excavation could result in a serious release of contamination to the environment and potentially threaten worker safety.

OU-2. All of the action alternatives for embayment sediments pose some technical problems due to the need to implement sediment control measures, dewater sediments, and treat the water removed from the sediment. Alternative 2A, which only dredges "hot spots," poses the fewest implementation difficulties since much less sediment is removed than in Alternatives 4 and 6. There is little difference in implementation requirements for Alternatives 4 and 6A, both of which excavate similar sediment areas and volumes. Options 2C and 6C (sediment incineration) may have implementation difficulties similar to those for the OU-1 incineration options.

OU-3. The storm sewer remediation alternatives requiring installation of a lining will require a blocking of the sewer during remediation activities and cleaning the sewer of sediments and other obstructions such as protruding stalactites. These activities, which are straightforward, can be accomplished without significant difficulties and will require blocking the sewer for a relatively short period of time. As described previously, the Companies found NAPL in the sewer sediments, and this fact will require special attention to protect the health of workers during the cleaning process and will also require measures to temporarily store the NAPL contaminated sediments before they are incinerated (off-site). Sewer remediation activities should be scheduled during a dry, "low flow" period to minimize any sewer flow which must be temporarily diverted and discharged to the River.

The HDPE slipliner (Alternative 2A), poses fewer difficulties than

installing an "insituform" thermosetting resin liner (2B). Alternative 2A also poses significantly fewer technical difficulties than plugging (3A) or excavating (3B) the existing sewer and rerouting a new sewer line around the Site. Rerouting the sewer would require as long as 8 months to complete, thereby requiring a more elaborate sewer bypass system than 2A which is projected to take 3 months to implement. In addition, Alternative 3 requires installation and long-term maintenance of a pumping station, since the rerouted sewer would no longer be a "gravity" sewer.

**Cost**

Cost estimates for remediation, as shown in Table 6, range from $1.3 million to $456 million for OU-1, with costs for most OU-1 alternatives falling in the $9 to $21 million range. Costs for OU-2 alternatives range from $0.4 million to $13.2 million, with most in the $2 to $5 million range. For OU-3, estimated costs range from $0 to $4.95 million, with most alternatives in the $2 to $5 million range.

Cost effectiveness is an important issue in balancing the evaluation criteria used in the selection of the final remedy. For example, the incineration alternative for OU-1 (Alternative 5C) is nearly 20 times greater in cost than the next most expensive alternative (Alternative OU-1-3F). The comprehensive incineration alternative for sediments (OU-2-6C) would cost more than twice as much as Alternative OU-2-6A which requires the excavation and disposal of sediments beneath the landfill cap. Incineration alternatives do however, provide remedies of greater permanence and greater reduction of the volume, toxicity, and mobility of the Site's contaminants than do alternatives which contain and isolate contamination, but such incineration options do not necessarily provide greater protection of human health and the environment.

**State Acceptance**

The State of New York supports and concurs with the selected remedy as presented in this document.

**Community Acceptance**

Community acceptance of the selected remedy was evaluated after the public comment period had ended. Comments raised at the public meeting and during the public comment period, as well as detailed responses to community concerns, are summarized in the Responsiveness Summary which is a part of this ROD.

## IX.- The Selected Remedy

After careful consideration of all reasonable alternatives, as well

as a detailed evaluation of all comments submitted by interested parties during the public comment period, the EPA has selected the remedy defined by the following alternatives for each Operable Unit:

Landfill (OU-1) - Alternative 3F:

- A synthetic-lined cap, constructed in accordance with federal and state standards, will be installed over the landfill and perimeter soils.

- All "off-site" soils above cleanup thresholds will be consolidated beneath the cap. "Off-site" soils are located on the triangular plot of land adjacent to the Site, north of Buffalo Avenue and south of the LaSalle Expressway, as well as on the areas immediately adjacent to the Site to the east and to the west.

- A slurry wall, completely surrounding the Site's perimeter, will be constructed and keyed into the underlying clay/till geologic formation. The precise location of the slurry wall will be established through the use of geotechnical borings which will determine the extent of the NAPL plume. The NAPL plume is to be contained by the slurry wall.

- Ground water will be recovered using an interception drain installed at the seasonal low-water table in the fill. Recovered ground water will be treated. Although the recovery of ground water does include a treatment component, the primary function of ground-water recovery in general, is to create and maintain an inward gradient across the slurry wall.

- NAPL beneath the Site will be recovered using dedicated extraction wells and will be incinerated at an off-site facility.

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

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

Niagara River Sediments (OU-2) - Alternative 6A As Modified By Alternative 2C:

- River sediments will be dredged from the two areas which contain elevated concentrations of contaminants ("hot spots") (2C).

- These dredged sediments will be incinerated (2C).

- The remaining sediments will be dredged from all areas exceeding the cleanup thresholds to an approximate depth of 2 feet (i.e., dredging will proceed outward from the planned location of the slurry wall to the "clean line") (6A).

- These remaining sediments will be dewatered and placed beneath the landfill cap (6A). (The landfill cap is part of the prior selected alternative, OU-1-3F.)

- Any NAPL found in the remaining sediments will be extracted and will be incinerated at an off-site facility (6A).

- The primary focus of this remediation plan is to contain the NAPL plume with the slurry wall. In the event the slurry wall's initial positioning places it across the "hot spot" area(s), practicality may dictate that the wall be extended outward to enclose these "hot spots." In such case, these highly contaminated sediments, rather than being dredged and incinerated, would be left in place, that is, contained by the slurry wall, covered with fill, and finally covered with the cap. The remaining sediments beyond the slurry wall would still be dredged and consolidated beneath the cap.

Storm Sewer (OU-3) - Alternative 2A:

- The existing storm sewer will be cleaned, and a high density polyethylene (HDPE) plastic slipliner will be installed within the sewer.

- Any NAPL found in the soils and/or sediments taken from the existing sewer will be extracted, and will be incinerated at an off-site facility.

Monitoring:

- In all instances, post-remedial monitoring shall be performed to determine the effectiveness of the remedial alternatives which have been selected.

Figure 4 shows a schematic representation of the major features of the selected remedy. The precise location of each aspect of the selected remedy will be determined during the Remedial Design phase of this overall remediation project.

During the Remedial Design Phase, the lowland area of 0.6 acres, as shown in Figure 1., will be the subject of a "wetlands

assessment."

## X.- The Statutory Determinations

**Protection of Human Health and the Environment**

The major human exposure pathways include: the ingestion of fish from the embayment in the Niagara River, exposure of individuals while swimming in the embayment and the Little Niagara River, the ingestion of drinking water from the Niagara River as it is withdrawn at the Niagara Falls Drinking Water Treatment Plant, and dermal contact with, ingestion of, and inhalation of dust from off-site contaminated soils. The selected remedy of consolidation, capping, and containment will effectively eliminate each of these pathways leading to human exposure. The "ingestion of fish" pathway will be eliminated since no contaminants can leach from the landfill area due to the existence of the slurry wall keyed into the confining clay/till layer, the capping of the Site, and the maintenance of an inward gradient across the slurry wall. In a similar manner, the pathways involving swimming in the River and drinking water from the River, will be eliminated since the entry of contaminants into the River will be eliminated. Exposure to any dust from contaminated off-site soils will be avoided since all off-site soils which have contamination levels above those levels deemed actionable, will be removed from their present location and consolidated beneath the cap. After implementation of the options which comprise the selected remedy, the overall risk associated with the Site will be reduced to $10^{-6}$ for carcinogens, and the hazard indices for non-carcinogens will be less than one.

Although excavation, as in the case of the off-site soils, can pose short-term risks to workers and to nearby residents due to exposure to fugitive dust, any such risks can be minimized or eliminated by the application of the appropriate emission-control technologies. In a similar manner, any emissions due to the incineration of highly contaminated sediments or the incineration of NAPL, can be controlled or eliminated through the application of currently available emission-control technology.

Dredging activities associated with the removal of sediments from the River can have short-term impacts on the River due to the release of contaminated sediments. Prior to the initiation of any dredging activities however, a berm will be constructed beyond the area of contamination so as to effectively retain any loosened sediments, thereby preventing their transport into the River proper from the embayment.

**Compliance with ARARs**

The selected remedy will comply with federal and state ARARs. A listing of such ARARs can be found in Tables 9 through 10. The

ARARs are organized as appropriate according to their respective designations as chemical-specific, or location-specific and action-specific. Distinctions have also been made between applicable requirements, and relevant and appropriate requirements. When the utilization has been made of a requirement which is not an ARAR, but is in the "To-Be-Considered" (TBC) category, a notation in Table 10 has also been made to that effect.

In terms of a specific discussion of the selected remedy and its compliance with ARARs and/or TBCs as the case may be, an appropriate frame of reference for such discussion is the Operable Unit (OU) structure.

**OU-1.** As mentioned earlier, ground water located in the landfill soils at the Site is classified by EPA as Class IIB and by NYSDEC as Class GA (potential source of drinking water), although it is not a source of drinking water. The Safe Drinking Water Act Maximum Contaminant Levels (MCLs) and NYSDEC Quality Standards for Groundwaters are chemical-specific ARARs for the ground water on-site. Although RCRA Groundwater Concentration Limits (RCRA limits), which are also ARARs for ground water, exist for 4 of the chemicals of concern, Lindane (4 ppb), mercury (2 ppb), arsenic (50 ppb), and cadmium (10 ppb), these limitations are identical to the previously mentioned MCLs.

Ground water in the landfill soils discharges into the Niagara River and across the western and eastern boundaries of the Site. As stated in the NCP, when wastes are left in place, the "point of compliance" lies at that point beyond the areal limit of the contained wastes where ground water discharges. In the case of the 102nd Street Site, the point of compliance for ground water is the embayment of the Niagara River (just outside the planned location of the slurry wall), the ground water outside the slurry wall in Griffon Park (to the west), and the ground water outside the slurry wall to the east of the Site within the area bounded by the drainage ditch. Relevant ARARs for ground water discharging into the embayment are the Clean Water Act ambient water quality criteria (AWQC) and the New York State ambient water quality standards (AWQS). Chemical-specific ARARs for ground water discharging to the west and to the east of the Site include MCLs and NYS Ground-water Standards.

The remedial alternative which was selected (OU-1-3F): eliminates ground-water discharge from the landfill by means of the circumferential slurry wall, the maintenance of an inward hydraulic gradient across the slurry wall through ground-water recovery, and the capping of the consolidated landfill; eliminates surface-water contaminant concentrations in the embayment; and, eliminates ground-water site-related contaminant concentrations to the west and to the east of the Site. In so doing, all ARARs will be met.

The EPA's Risk Assessment, using embayment water concentrations

derived from ground-water chemical discharge and embayment dilution, determined that several compounds currently exceed the AWQC or AWQS. Surface-water ARARs will be achieved by the OU-1 segment of the selected remedy which limits future discharge of contaminated ground water into the River. The circumferential slurry wall component of the selected remedy should effectively limit ground-water discharge to the embayment and thereby meet ARARs. The circumferential slurry wall component of the selected remedy provides the most complete ground-water control and the greatest assurance of meeting ARARs.

No ARARs are established for contaminated soils, although the Centers for Disease Control has established a guidance value of 1 µg/kg (ppb) for dioxin in residential soils. Since the EPA's Risk Assessment indicates significant health risks are associated with soil exposure, the selected remedy will remediate all perimeter and off-site soils above cleanup thresholds (including dioxin contaminated soils south of Buffalo Avenue). The perimeter soils will be covered by the cap, and the off-site soils will be excavated and consolidated beneath the cap.

Land Disposal Restrictions (LDRs) preclude the placement of restricted RCRA hazardous wastes into a land disposal unit. The off-site and perimeter soils, and the embayment sediments are a restricted RCRA hazardous waste, in part because they contain dioxin. If consolidating these soils and sediments on the landfill constitutes placement into a land disposal unit, then such remedial actions would fail to satisfy the LDRs. According to EPA's Superfund LDR Guide #5 (OSWER Directive 9347.3-05FS, July 1989), "Placement does not occur when wastes are ... moved within a single AOC [area of contamination]." An AOC is "the areal extent of contiguous contamination," such as a "landfill ... and the surrounding contaminated soil. Such contamination must be continuous, but may contain varying types and concentrations of hazardous substances." The perimeter soils and embayment sediments are contiguous and continuous with the contamination at the landfill. The contamination north of Buffalo Avenue is considered contiguous with the contamination surrounding the Site boundaries (even though these areas are separated by the road) because continuous contamination was found between the Site fence and the south side of Buffalo Avenue, as well as on the northern edge of Buffalo Avenue. Thus, the contamination north of Buffalo Avenue is continuous and contiguous. Therefore, LDRs are not applicable to the placement of the perimeter and off-site soils and the embayment sediments on the landfill beneath the cap, and accordingly are not ARARs.

OU-2. No promulgated federal or state ARARs exist for contaminated sediment, however New York State does have "To-Be-Considered" guidelines (TBCs) for sediments which require aqueous contaminant levels in the water surrounding the sediment ("interstitial" water) to meet ambient water quality criteria (AWQC) and State ambient

water quality standards (AWQS). These sediment TBCs are summarized in Table 10. The OU-2-2C segment of the selected remedy, which incinerates the sediment "hot spots," will achieve these TBCs, as well as provide permanent protection from these areas of elevated contaminant concentrations. The OU-2-6A portion of the selected remedy will achieve compliance with the sediment TBCs since all site-related sediment contamination will be dredged from the embayment. In all instances, confirmatory sampling will be conducted to insure that cleanup criteria have been met.

Dredging activities involved in the selected remedy will be conducted in compliance with ARARs for excavation in a 100-year floodplain, wetlands, and construction of bulkheads in navigable waters.

**OU-3.** Any ground water which infiltrates into the storm sewer and subsequently discharges into the embayment must meet surface water AWQC. Since the selected remedy will line the storm sewer with an HDPE pipe, and pressure-grout the annular space between the new pipe and the existing storm sewer, the discharge of any contaminants will be eliminated, hence the AWQC criteria will be met.

**Cost Effectiveness**

Cost effectiveness is a critical component used in the balancing of the evaluation criteria which eventually led to the remedy which was selected. The selected remedy, at a total estimated cost of $30.0M, is cost-effective, proportionately to its effectiveness. While incineration alternatives do provide greater degrees of permanence and greater degrees of the reduction of the volume, toxicity, and mobility of site-related contamination, the cost figures for the comprehensive incineration options approach $460M. Such incineration options however, do not necessarily provide greater protection of human health and the environment.

**Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable (MEP)**

The EPA and the State of New York believe that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the final remedy at the 102nd Street Landfill Site.

A discussion of the prospective utilization of permanent solutions to the maximum extent practicable (MEP) was performed through an analysis of the nine evaluation criteria. Once the threshold criteria of overall protection and compliance with ARARs were met, the critical decisional role was given to the five balancing criteria of long-term effectiveness and permanence, reduction of toxicity, mobility, or volume (RTMV), short-term effectiveness,

implementability, and cost. The selection of remedy process was additionally affected by the considerations given to the statutory preference for treatment, and the considerations given to acceptance by New York State and the community. The balancing criteria are best considered on a one-by-one basis in order to assess their collective impact on the remedy selection process. To begin, long-term effectiveness as a factor in the selected remedy is more than adequate in terms of the degree of permanence which it offers. The off-site soils will be removed, the NAPL permanently destroyed, and the contaminated sediments removed, thereby eliminating the problem of residuals management for those portions of the remedy. The containment of the landfill also provides long-term effectiveness even though long-term monitoring will be required to insure that the engineering controls are performing as intended. Other options such as the use of a "secure cell" and a cutoff wall, and the incineration options, are either deficient on a short-term basis due to a failure to meet ARARs, or as in the case of the comprehensive incineration option, offer a very high degree of permanence at a very high degree of cost. The RTMV criterion again is achieved more than adequately by the selected remedy since the pathway of migration of contaminants into the Niagara River will be eliminated. Other options are either inadequate since capping is not included, or highly effective as in the case of the comprehensive incineration option but again with an overreaching cost factor ($30M versus $456M). Regarding short-term effectiveness, it is fairly clear that remediation goals will be achieved within a much shorter time frame (36 months) without any uncontrollable excavation or dredging risks, while incineration options will take far longer, up to 15 years, before the requisite goals are attained, and unknowns will still remain as to the technology required to safely excavate the Site. In terms of implementability, the selected remedy will utilize proven technologies, while other options, mainly incineration with its accompanying excavation, will be faced with developing techniques for uncommon engineering design problems such as excavating as deep as 35 feet adjacent to the Niagara River. Considering cost alone, after the threshold criteria have been met, the selection of remedy process points dramatically away from comprehensive incineration possibilities and toward the selected remedy.

The most critical criteria in the selection process were short-term effectiveness, implementability, and cost. These criteria can be regarded as the most critical due to the great disparity, as stated above, in these areas among the options which were ultimately given the most serious consideration after the threshold criteria were met. The trade-offs favor the selected remedy in the sense that cost, implementability, and short-term effectiveness have driven the selection, while countering is a much higher degree of permanence from the prospect of excavation and incineration of the landfill soils. The selected remedy does however, propose a permanent option in that the highly contaminated sediments will be incinerated (after dredging) along with any NAPL which can be

extracted from the landfill, from the remaining sediments, and from the sediments removed during the cleaning and lining of the storm sewer.

As stated above, permanent solutions have been utilized to the maximum extent practicable in that the highly contaminated sediments and recovered NAPL will be incinerated. Since it is anticipated that the highly contaminated sediments will be handled during the dredging process, a window of opportunity exists to permanently treat these contaminants rather than consolidate them beneath the cap. An element of practicability as to a permanent solution for these highly contaminated sediments is available and should be utilized, since the sediments should be handled during the dredging process.

In summary, the selected remedy is considered to be the most appropriate solution to contamination at the Site because it provides the best trade-offs with respect to the nine evaluation criteria and represents the maximum extent to which permanent solutions and treatment technologies are practicable.

**Preference for Treatment as a Principal Element**

The preference for treatment as a principal element is not satisfied since treatment of the principal threat (the landfill residuals) was found to be distinctly impractical. However, the material containing the highest concentrations of contaminants, meaning NAPL, will be treated through incineration.

As mentioned in the prior section, the critical balancing criteria of short-term effectiveness, implementability, and cost, all highlight the impracticable nature of selecting a treatment remedy such as incineration, in order to neutralize the principal threat at the Site.

## Table 1
## Chemicals of Concern
## at the 102nd Street Landfill

| SSIs – Ground Water | SSIs – Soil/Sediment | Assessment Chemicals |
|---|---|---|
| arsenic | chlorobenzene | benzo(a)anthracene |
| benzene | dichlorobenzene, 1,2- | benzo(b)fluoranthene |
| chlorobenzene | dichlorobenzene, 1,4- | benzo(k)fluoranthene |
| chlorobenzoic acid, 2- | dichlorophenol, 2,4- | cadmium |
| chlorobenzoic acid, 3- | dichlorophenol, 2,5- | chloro-m-cresol, 4- |
| chlorobenzoic acid, 4- | dimethylphenol, 2,4- | chloronaphthalene, 2- |
| chloronaphthalene, 2- | hexachlorobenzene | chlorophenol, 2- |
| chlorophenol, 2- | hexachlorocyclohexane, a- | dichloroethylene, 1,1- |
| chlorophenol, 4- | hexachlorocyclohexane, b- | dichlorophenol, 2,4- |
| chlorotoluene, 2- | hexachlorocyclohexane, d- | dimethylphenol, 2,4- |
| chlorotoluene, 4- | hexachlorocyclohexane, g- | hexachlorobenzene |
| dichloroaniline, 2,5- | mercury | hexachlorocyclohexane, a- |
| dichloroaniline, 3,4- | pentachlorobenzene | hexachlorocyclohexane, b- |
| dichlorobenzene, 1,2- | phenol | hexachlorocyclohexane, d- |
| dichlorobenzene, 1,4- | tetrachlorobenzene, 1,2,3,4- | hexachlorocyclohexane, g- |
| dichloroethylene, 1,1- | tetrachlorobenzene, 1,2,4,5- | mirex |
| dichlorophenol, 2,4- | trichlorobenzene, 1,2,3- | PCBs |
| dichlorophenol, 2,5- | trichlorobenzene, 1,2,4- | PCDDs (tetra - octa congeners) |
| dimethylphenol, 2,4- | trichlorophenol, 2,4,5- | PCDFs (tetra - octa congeners) |
| hexachlorobenzene | trichlorophenol, 2,4,6- | pentachlorobenzene |
| hexachlorocyclohexane, a- | | pentachlorophenol |
| hexachlorocyclohexane, b- | | phenol |
| hexachlorocyclohexane, d- | | trichloroethylene |
| hexachlorocyclohexane, g- | | trichlorophenol, 2,4,5- |
| mercury | | trichlorophenol, 2,4,6- |
| phenol | | |
| phosphorus | | |
| tetrachlorobenzene, 1,2,3,4- | | |
| tetrachlorobenzene, 1,2,4,5- | | |
| toluene | | |
| trichlorobenzene, 1,2,3- | | |
| trichlorobenzene, 1,2,4- | | |
| trichlorophenol, 2,4,5- | | |
| trichlorophenol, 2,4,6- | | |

**Table 2**
**102nd Street Landfill Site**
**Summary of RI Sampling Data for**
**Significant Risk Chemicals**

| Medium Sampled/ Parameter | | Number of Samples | Number of Detects | Mean (ppb) | Upper Bound [a] (ppb) |
|---|---|---|---|---|---|
| Groundwater -- Overburden | [b] | | | | |
| hexachlorobenzene | | 84 | 6 | 29 | 215 |
| hexachlorocyclohexanes (HCCHs) | [c] | 85 | 50 | 1,482 | 13,025 |
| TCDD, 2,3,7,8- | | 17 | 3 | 0.0002 | 0.0006 |
| tetrachlorobenzenes | | 60 | 21 | 1,420 | 9,980 |
| Perchloropentacyclodecane (Mirex) | [d] | 90 | 11 | 28,361 | 24,500 |
| PCBs (Aroclor 1248) | | 90 | 8 | 3,680 | 8,000 |
| Surface Soil (Off-Site and Perimeter) | | | | | |
| hexachlorobenzene | | 113 | 24 | 252 | 1,910 |
| hexachlorocyclohexanes (HCCHs) | | 113 | 48 | 735 | 3,753 |
| mercury | | 132 | 118 | 1,731 | 6,491 |
| TCDD, 2,3,7,8- | | 18 | 3 | 0.5 | 2.5 |
| tetrachlorobenzenes | | 113 | 22 | 341 | 3,770 |
| Niagara River (Embayment) Sediment | | | | | |
| hexachlorobenzene | | 114 | 15 | 139 | 1,694 |
| hexachlorocyclohexanes (HCCHs) | | 114 | 17 | 64,768 | 867,353 |
| TCDD, 2,3,7,8- | [e] | 16 | 2 | -- | 3.3 |
| tetrachlorobenzenes | | 114 | 25 | 5,423 | 99,212 |
| mercury | | 121 | 76 | 2,196 | 36,585 |

Notes:

[a] Upper 95th percentile of data set for compound/medium.

[b] Ground water concentrations are summaries of fill and alluvium samples from boundary wells along the Niagara River embayment and the Site perimeter.

[c] HCCHs include the summation of 4 isomers (a-, b-, g-, and d-).

[d] Mirex was detected but below the survey level of 7 ppb.

[e] TCDD sediment data is from Love Canal investigations (non-RI samples); two samples had detectable 2,3,7,8-TCDD levels of 0.1 and 3.3 ppb.

Table 3
Reference Doses and Cancer Potency Factors for Chemicals Used in Risk Calculations

| Compound | EPA Wt. of Evidence | Toxicity Factor Oral RfD (mg/kg-d) | Inhalation RfD (mg/kg-d) | Reference | Notes |
|---|---|---|---|---|---|
| Noncarcinogens | | | | | |
| cadmium | | 5.0E-04 | | U.S. EPA, 1989a | a |
| | | 1.0E-03 | | U.S. EPA, 1989a | b |
| chloro-m-cresol, 4- | | 2.0E-01 | | U.S. EPA, 1989a | c |
| chlorobenzene | D | 2.0E-02 | 5.0E-03 | U.S. EPA, 1989a | |
| chlorobenzoic acid, 2- | | 2.0E-01 | | Assume same as below | |
| chlorobenzoic acid, 3- | | 2.0E-01 | | Assume same as below | |
| chlorobenzoic acid, 4- | | 2.0E-01 | | U.S. EPA, 1989a | |
| chloronapthalene, 2- | | | | | |
| chlorophenol, 2- | | 5.0E-03 | | U.S. EPA, 1989a | |
| chlorophenol, 4- | | 5.0E-03 | | Assume same as above | |
| chlorotoluene, 2- | | 1.5E-01 | | Rodricks, 1985 | |
| chlorotoluene, 4- | | 1.5E-01 | | Rodricks, 1985 | |
| dichloroaniline, 2,5- | | | | | |
| dichloroaniline, 3,4- | | | | | |
| dichlorobenzene, 1,2- | D | 9.0E-02 | 4.0E-02 | SPHEM Update, 1988 | |
| dichlorophenol, 2,4- | | 3.0E-03 | | IRIS, 1989 | |
| dichlorophenol, 2,5- | | 3.0E-03 | | Assume same as above | |
| dimethylphenol, 2,4- | | 1.0E-03 | | U.S. EPA, 1989a | e |
| mercury | D | 3.0E-04 | | IRIS, 1989 | |
| pentachlorobenzene | | 8.0E-04 | | IRIS, 1989 | |
| pentachlorophenol | D | 3.0E-02 | | IRIS, 1989 | |
| phenol | | 6.0E-01 | | IRIS, 1989 | |
| phosphorus | | 1.0E-03 | | ACGIH, 1988 | |
| tetrachlorobenzene, 1,2,3,4- | | 3.0E-04 | | Assume same as below | |
| tetrachlorobenzene, 1,2,4,5- | | 3.0E-04 | | IRIS, 1989 | |
| toluene | | 3.0E-01 | 2.0E+00 | IRIS, 1989; U.S. EPA, 1989a | |
| trichlorobenzene, 1,2,3- | | 2.0E-02 | 3.0E-03 | Assume same as below | |
| trichlorobenzene, 1,2,4- | | 2.0E-02 | 3.0E-03 | IRIS, 1989; U.S. EPA, 1989a | |
| trichlorophenol, 2,4,5- | | 1.0E-01 | | IRIS, 1989 | |

Notes
a - water
b - food
c - subchronic RfD divided by an additional uncertainity factor
d - B1 carcinogen by inhalation route only
e - Oral RfD for 3,4-dimethylphenol
RfD - reference dose
CPF - cancer potency factor

Table 3

Reference Doses and Cancer Potency Factors for Chemicals Used in Risk Calculations

| Compound | | Toxicity Factor | | | |
|---|---|---|---|---|---|
| Carcinogens | EPA Wt. of Evidence | Oral RfD (mg/kg-d) | Inhalation RfD (mg/kg-d) | Reference | Notes |
| aroclor 1248 | B2 | 7.7E+00 | | IRIS, 1989 | |
| arsenic | A | 1.8E+00 | 5.0E+01 | IRIS, 1989 | |
| benzene | A | 2.9E-02 | 2.9E-02 | IRIS, 1989 | |
| benzo(a)anthracene | B2 | 1.7E+00 | 8.9E-01 | ICF, 1988; U.S. EPA, 1987a | |
| benzo(b)fluoroanthene | B2 | 1.6E+00 | 8.5E-01 | ICF, 1988; U.S. EPA, 1987a | |
| benzo(k)fluoroanthene | D | 7.6E-01 | 4.0E-01 | ICF, 1988; U.S. EPA, 1987a | |
| cadmium | B1 | | 6.1E+00 | IRIS, 1989 | d |
| dichlorobenzene, 1,4- | B2 | 2.4E-02 | | U.S. EPA, 1989a | |
| dichloroethylene, 1,1- | C | 6.0E-01 | 1.2E+00 | IRIS, 1989 | |
| hexachlorobenzene | B2 | 1.7E+00 | 1.7E+00 | IRIS, 1989 | |
| hexachlorocyclohexane, a- | | 6.3E+00 | 6.3E+00 | IRIS, 1989 | |
| hexachlorocyclohexane, b- | | 1.8E+00 | 1.8E+00 | IRIS, 1989 | |
| hexachlorocyclohexane, d- | | 6.3E+00 | 6.3E+00 | Assume most toxic | |
| hexachlorocyclohexane, g- | B2 | 1.3E+00 | | IRIS, 1989 | |
| mirex | B2 | 1.8E+00 | | IRIS, 1989 | |
| trichloroethylene | B2 | 1.1E-02 | 1.3E-02 | IRIS, 1989 | |
| trichlorophenol, 2,4,6- | B2 | 2.0E-02 | 2.0E-02 | IRIS, 1989 | |
| HeptaCDD, 1,2,3,4,6,7,8- | | 1.6E+03 | | U.S. EPA, 1989a | |
| HeptaCDD, total | | 0.0E+00 | | U.S. EPA, 1989a | |
| HeptaCDF, 1,2,3,4,6,7,8- | | 1.6E+03 | | U.S. EPA, 1989a | |
| HeptaCDF, 1,2,3,4,7,8,9- | | 1.6E+03 | | U.S. EPA, 1989a | |
| HeptaCDF, total | | 0.0E+00 | | U.S. EPA, 1989b | |
| HexaCDD, 1,2,3,4,7,8- | | 1.6E+04 | | U.S. EPA, 1989b | |
| HexaCDD, 1,2,3,6,7,8- | | 1.6E+04 | | U.S. EPA, 1989b | |
| HexaCDD, 1,2,3,7,8,9- | | 1.6E+04 | | U.S. EPA, 1989b | |
| HexaCDD, total | | 0.0E+00 | | U.S. EPA, 1989b | |
| HexaCDF, 1,2,3,4,7,8- | | 1.6E+04 | | U.S. EPA, 1989b | |
| HexaCDF, 1,2,3,6,7,8- | | 1.6E+04 | | U.S. EPA, 1989b | |
| HexaCDF, 1,2,3,7,8,9- | | 1.6E+04 | | U.S. EPA, 1989b | |
| HexaCDF, 2,3,4,6,7,8- | | 1.6E+04 | | U.S. EPA, 1989b | |
| HexaCDF, total | | 0.0E+00 | | U.S. EPA, 1989b | |
| OCDD | | 1.6E+02 | | U.S. EPA, 1989b | |
| OCDF | | 1.6E+02 | | U.S. EPA, 1989b | |
| PentaCDD, 1,2,3,7,8- | | 7.8E+04 | | U.S. EPA, 1989b | |
| PentaCDD, total | | 0.0E+00 | | U.S. EPA, 1989b | |
| PentaCDF, 1,2,3,7,8- | | 7.8E+03 | | U.S. EPA, 1989b | |
| PentaCDF, 2,3,4,7,8- | | 7.8E+04 | | U.S. EPA, 1989b | |
| PentaCDF, total | | 0.0E+00 | | U.S. EPA, 1989b | |
| TCDD, 2,3,7,8- | B2 | 1.6E+05 | 1.6E+05 | U.S. EPA, 1989a | |
| TCDD, total | | 0.0E+00 | | U.S. EPA, 1989b | |
| TCDF, 2,3,7,8- | | 1.6E+04 | | U.S. EPA, 1989b | |
| TCDF, total | | 0.0E+00 | | U.S. EPA, 1989b | |

Notes

a - water

b - food

c - subchronic RfD divided by an additional uncertainity factor

d - B1 carcinogen by inhalation route only

e - Oral RfD for 3,4-dimethylphenol

RfD - reference dose

CPF - cancer potency factor

**Table 3. Notes and References**

## NOTES

No toxicity information was found for 2-chloronapthalene, 2,5-dichloroaniline and 3,4-dichloroaniline

Toxicity factor for phosphorus derived from the occupational guideline for yellow phosphorus

Toxicity factors for dioxin and furan isomers were derived by multiplying Toxicity Equivalence Factors (TEFs) for each isomer, developed in U.S EPA, 1989b, by the toxicity of 2,3,7,8-TCDD.

Toxicity factors for polycyclic aromatic hydrocarbons (PAHs) were determined based on the benzo(a)pyrene relative potency approach ICF, 1988; U.S. EPA, 1987a.

## REFERENCES


U.S. Environmental Protection Agency. July 1989a. Health Effects Assessment Summary Tables. Third Quarter FY 1989. Office of Solid Waste and Emergency Response. Washington, D.C. OERR 9200.6-303-(89-3).

U.S. Environmental Protection Agency. 1989b. Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and -Dibenzofurans (CDDs and CDFs). Risk Assessment Forum. Washington, D.C. EPA/625/3-87/012

U.S. Environmental Protection Agency. 1989. Integrated Risk Information System (IRIS) Database. Maintained and updated periodically by the U.S. EPA. Washington, D.C.

American Conference of Governmental Industrial Hygienists (ACGIH). 1988. Threshold Limit Values and Biological Exposure Indices for 1988 - 1989. ACGIH: Cincinnati, Ohio

U.S. Environmental Protection Agency. 1988. Superfund Public Health Evaluation Manual Update. Office of Emergency and Remedial Response. Washington, D.C.

ICF-Clement Associates. 1988. Comparitive Potency Approach for Estimating the Cancer Risk Associated with Exposures to Mixtures of Polycyclic Aromatic Hydrocarbons. Interim Final Report.

U.S. Environmental Protection Agency. 1987. Updated Reference Dose and Cancer Potency Numbers for Use In Risk Assessments. Memorandum from Sandra Lee of Toxic Integration Branch.

Rodricks, Joseph. 1985. Affadavit of Joseph V. Rodricks, Ph.D. in support of Stipulation and Judgement Approving Settlement Agreement Hyde Park Landfill. Civil Action No. 79-989.

## Table 4
## Summary of Reasonable Maximum Potential Human Health Risks for the 102nd Street Landfill

| TYPE OF RISK | Surface Water Pathways: Drinking Water (WTP) | Surface Water Pathways: Swimming (Embayment) | Surface Water Pathways: Fish Ingestion (Embayment) | Surface Soil Pathways: Dermal, Ingestion and Inhalation | TOTAL |
|---|---|---|---|---|---|
| **Noncarcinogens** | | | | | |
| Groundwater Loadings | 2.2E-03 | 2.0E-02 | 3.7E+00 | | 3.7E+00 |
| Storm Sewer Loadings | 1.1E-04 | 1.0E-03 | 5.6E-01 | | 5.6E-01 |
| Soil Exposure | | | | 2.9E-02 | 2.9E-02 |
| **Total Hazard Index** | 2.3E-03 | 2.1E-02 | 4.2E+00 | 2.9E-02 | 4.3E+00 |
| Significant Risk Chemicals | none | none | TeCB | none | |
| **Carcinogens** | | | | | |
| Groundwater Loadings | 7.0E-06 | 6.5E-05 | 1.5E-03 | | 1.6E-03 |
| Storm Sewer Loadings | 1.1E-07 | 1.0E-06 | 5.4E-04 | | 5.5E-04 |
| Soil Exposure | | | | 8.1E-05 | 8.1E-05 |
| **Total Carcinogenic Risk** | 7.2E-06 | 6.6E-05 | 2.0E-03 | 8.1E-05 | 2.2E-03 |
| Significant Risk Chemicals | HCCHs | HCCHs | HCCHs<br>PCBs<br>TCDD<br>HCB | TCDD<br>HCCHs<br>HCB | |

Abbreviations:

HCCHs: hexachlorocyclohexanes
PCBs: polychlorinated biphenyls
TCDD: tetrachlorodibenzo-p-dioxin
HCB: hexachlorobenzene
TeCB: tetrachlorobenzene

## Table 5
## Chemicals of Probable and Possible Concern for Environmental Endangerment at the 102nd Street Landfill

| Probable Concern | Possible Concern |
|---|---|
| **Groundwater** | |
| mirex | PCBs |
| | chlorobenzene |
| | chlorophenol, 4- |
| | hexachlorocyclohexane, a- |
| | hexachlorocyclohexane, d- |
| | hexachlorocyclohexane, g- |
| | mercury |
| | TCDD, 2,3,7,8- * |
| | tetrachlorobenzene, 1,2,3,4- |
| | trichlorobenzene, 1,2,3- |
| **Storm Sewer** | |
| mirex | PCBs |
| | hexachlorocyclohexane, g- |
| | TCDD, 2,3,7,8- * |
| **Sediment Pore Water** | |
| dichlorobenzene, 1,2- | dichlorobenzene, 1,4- |
| hexachlorocyclohexane, a- | hexachlorocyclohexane, d- |
| hexachlorocyclohexane, b- | tetrachlorobenzene, 1,2,4,5- |
| hexachlorocyclohexane, g- | |
| pentachlorobenzene | |
| TCDD, 2,3,7,8- | |
| tetrachlorobenzene, 1,2,3,4- | |
| trichlorobenzene, 1,2,3- | |
| trichlorobenzene, 1,2,4- | |

* of potential concern when the combined chemical loads from groundwater and the storm sewer are considered

Table 6
Operable Unit One (OU-1) Final Alternatives

| Alternative | Landfill | Perimeter Soils | Off-Site Soils | Ground Water | NAPL | Present Worth Costs |
|---|---|---|---|---|---|---|
| 1 | Existing fence, cover | Existing cover | No Action | No Action | No Action | $1,380,000 |
| 2A | Upgrade fence, use existing cover | Secure cell | No Action | No Action | No Action | $1,800,000 |
| 2B | Upgrade fence, use existing cover | Secure cell | No Action | Cutoff wall recovery and treatment | No Action | $9,620,000 |
| 2C | Upgrade fence, use existing cover | Off-Site Incineration | No Action | Cutoff wall recovery and treatment | No Action | $9,510,000 |
| 2D | Upgrade fence, use existing cover | Secure cell | Secure Cell | Cutoff wall recovery and treatment | No Action | $9,860,000 |
| 2E | Upgrade fence, use existing cover | Stabilization | Stabilization | Cutoff wall recovery and treatment | No Action | $10,700,000 |
| 3A | Capping | Capping | No Action | No Action | No Action | $9,550,000 |
| 3B | Capping | Capping | No Action | Cutoff wall, recovery and treatment | Cutoff wall | $17,600,000 |
| 3C | Capping | Capping | No Action | Circumferential wall, recovery treatment | Circumferent'l wall | $16,600,000 |
| 3D | Capping | Capping | Consolid. | Circumferential wall, recovery treatment | Circumferent'l wall | $16,700,000 |
| 3E | Capping | Capping | Consolid. | Cutoff wall, recovery and treatment | Recovery and incineration | $21,300,000 |
| 3F | Capping | Capping | Consolid. | Circumferential wall,recovery treatment | Recovery and incineration | $20,340,000 |
| 5A | Incineration of contaminated fill, capping | Incineration on-site | Incineration on-site | Cutoff wall, recovery and treatment | Cutoff wall | $77,100,000 to $144,000,000 |
| 5B | Incineration of contaminated fill, capping | Incineration on-site | Incineration on-site | Cutoff wall, recovery and treatment | Recovery and incineration | $80,400,000 to $148,000,000 |
| 5C | Incineration of contaminated fill and alluvium, cap | Incineration on-site | Incineration on-site | Circumferential wall,recovery and treatment | None remains after excavation | $296,000,000 to $456,000,000 |

Table 7
Operable Unit Two (OU-2) Final Alternatives

| Alternative | Description | Present Worth Costs |
|---|---|---|
| 1 | No Action | $415,000 |
| 2 | Sediment control around "hot spots," dredge "hot spots," mechanically dewater sediments, combine with Operable Unit 1 treatment alternatives: | |
| 2A | Capping | $2,730,000 |
| 2C | Incineration | $4,480,000 |
| 4 | Sediment control around "clean line," dredge sediments, dewatering cell near shoreline, extend cap over "hot spots." | $6,180,000 |
| 6 | Sediment control around "clean line," dredge sediments, mechanically dewater sediments, combine with Operable Unit 1 treatment alternatives: | |
| 6A | Capping | $5,570,000 |
| 6C | Incineration | $13,200,000 |
| 6A modified by 2C | Incineration/ Capping | $9,135,000 |

Table 8
Operable Unit Three (OU-3) Final Alternatives

| Alternative | Description | Present Worth Costs |
|---|---|---|
| 1 | No Action | $375,000 |
| 2 | Clean existing sewer and install a storm sewer liner. | |
| 2A | Plastic slipliner | $605,000 |
| 2B | Insituform thermosetting resin liner | $718,000 |
| 3 | Excavate existing sewer and replace it with another sewer line routed around the Site. | |
| 3A | Plug Existing Sewer | $2,990,000 |
| 3B | Remove Existing Sewer | $4,950,000 |

Table 9

Location-Specific and Action-Specific ARARS
102nd Street Landfill
FEDERAL

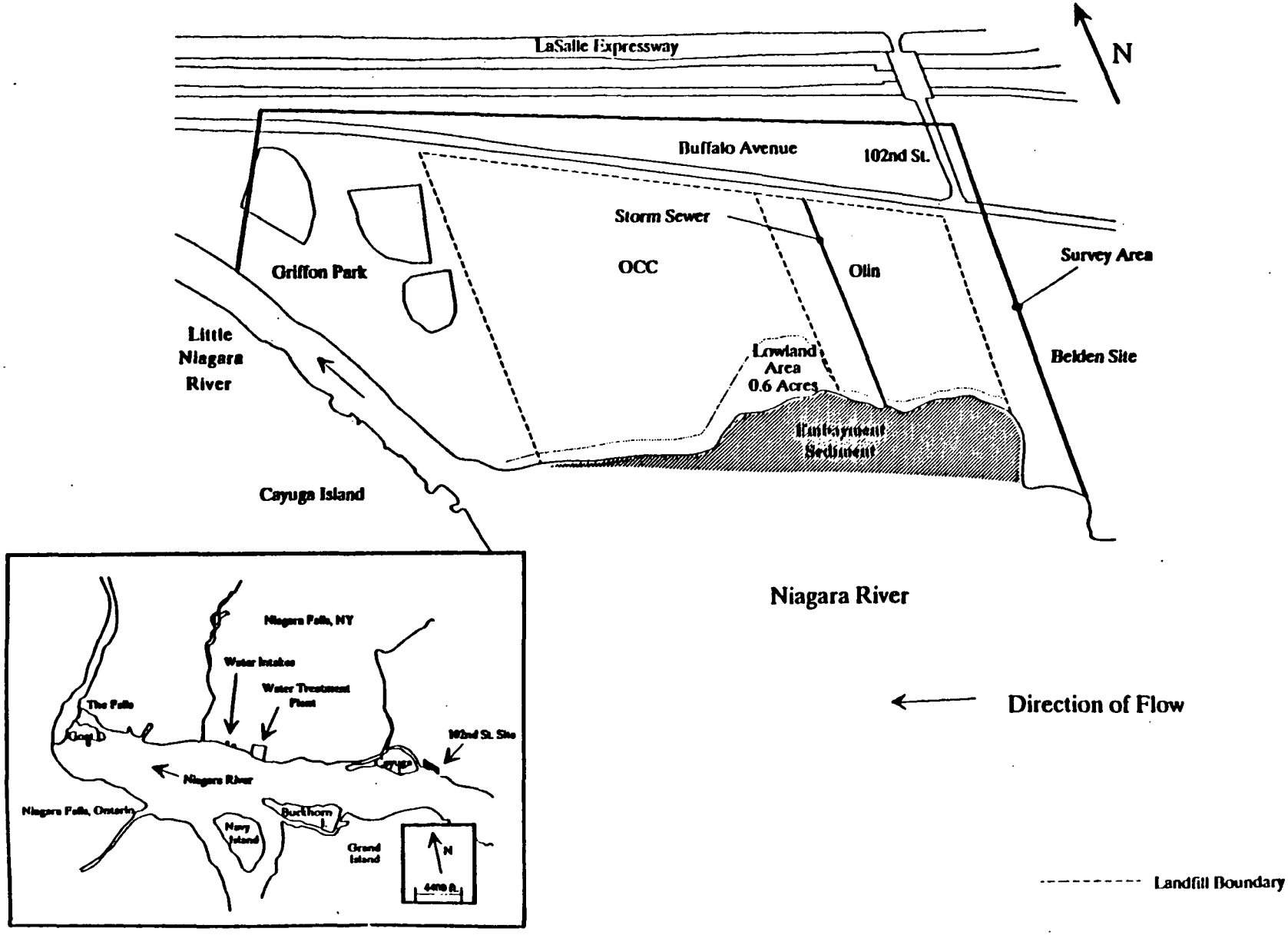
| Requirement | Synopsis | Consideration in the FS |
|---|---|---|
| Coastal Zone Management Act (16 U.S.C. §1451 et seq.) | This regulation requires federal agencies conducting any activities which affect coastal zones, to do so in a manner consistent with state coastal plans. | Remediation activities would have to be consistent with state coastal zone management programs. |
| RCRA Location Standards (40 CFR 264.18) | This regulation outlines the requirements for constructing a RCRA facility on a 100-year floodplain. A facility located on a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood, unless no adverse effects on human health and the environment would result. | Construction activities in the lowland area would have to control the effects of a 100-year flood event. |
| Floodplains Executive Order (EO 11998) | Federal Agencies are required to reduce the risk of flood loss, to minimize impact of floods, and to restore and preserve the natural and beneficial value of floodplains. | Construction activities in the lowland area would control flood impacts. |
| U.S. Army Corps of Engineers Nationwide Permit Program (33 CFR 330) | Activities involving the construction of or alteration to bulkhead, dikes or navigable waters are regulated by the Corps of Engineers. | Construction activities in the Niagara River would be coordinated with the U.S. Army Corps of Engineers. |
| Fish and Wildlife Coordination Act (16 U.S.C. 662) | This regulation requires that any action that proposes to modify a body of water or wetlands must consult with the U.S. Fish and Wildlife Services. This requirement is addressed under CWA Section 404 requirements. | Construction activities in the Niagara River would be coordinated with the U.S. Fish and Wildlife Service. |
| Endangered Species Act (50 CFR 200, 402) | Site activities must minimize impact on identified endangered plant and animal species. | Not applicable since there are no endangered species at the site. |
| Executive Order 11990 Protection of Wetlands | Site activities must minimize the destruction, loss or degradation of wetlands. | Construction activities must consider the potential classification of the lowland area as a wetlands. |
| EPA Policy on Wetland Assessments for CERCLA Actions (OSWER Dir. 9280.0-02, August 5, 1985) | CERCLA actions taking place in land areas potentially consider a wetlands must conduct an assessment to evaluate any environmental impacts. | A wetlands assessment must be conducted for any construction activities in the lowland area. |

Table 9

Location-Specific and Action-Specific ARARS
102nd Street Landfill
STATE

| Requirement | Synopsis | Consideration in the FS |
|---|---|---|
| Floodplain Management Regulations (6 NYCRR Part 500) | These regulations protect areas at flood hazard, related erosion hazard, or special mudslide hazard. | Remedial alternatives which effect the floodplain must meet these requirements. |
| Use and Protection of Waters (6 NYCRR Part 608) | Under this regulation, a permit is required to change, modify, or disturb any protection stream, its bed or banks sand, gravel, or other material; or to excavate or place fill in any of the navigable waters or in any marsh, estuaries or wetland, contiguous to any of the navigable waters. | Remedial alternatives affecting any protected streams, its beds or banks or any navigable waters or contiguous marshes or wetlands, will be coordinated with NYSDEC. |
| New York State Ambient Water Quality Standards (6 NMCRR Parts 700-705) | Defines surface water classification (A-special, International Boundary Waters) and aquifer classification (GA) and lists specific chemical standards. | Use classifications and standards to help establish remedial requirements. |
| Species of Wildlife (6 NYCRR Part 182) | Site activities must minimize impact on identified endangered or threatened species of fish or wildlife. | Not applicable since there are no endangered or threatened species at the Site. |
| Freshwater Wetlands Regulations (6 NYCRR Part 664) | Area must be at least 24 acres of unusual importance to be considered a wetlands. | Lowland area is not a wetlands by state standards. |

# Figure 1 102nd Street Landfill and Survey Area



# Figure 2
## 102nd Street Landfill - Remedial Investigation Summary

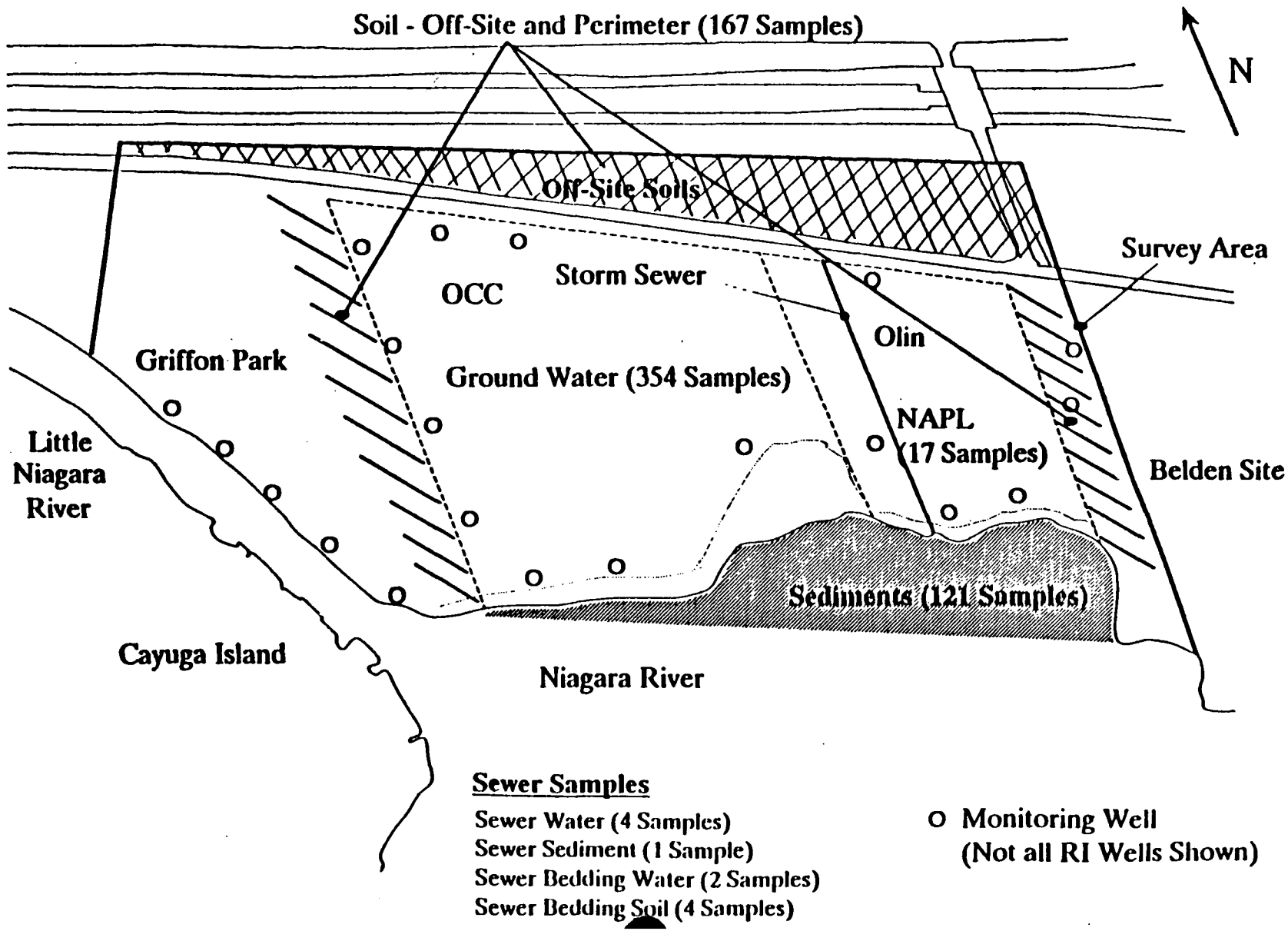
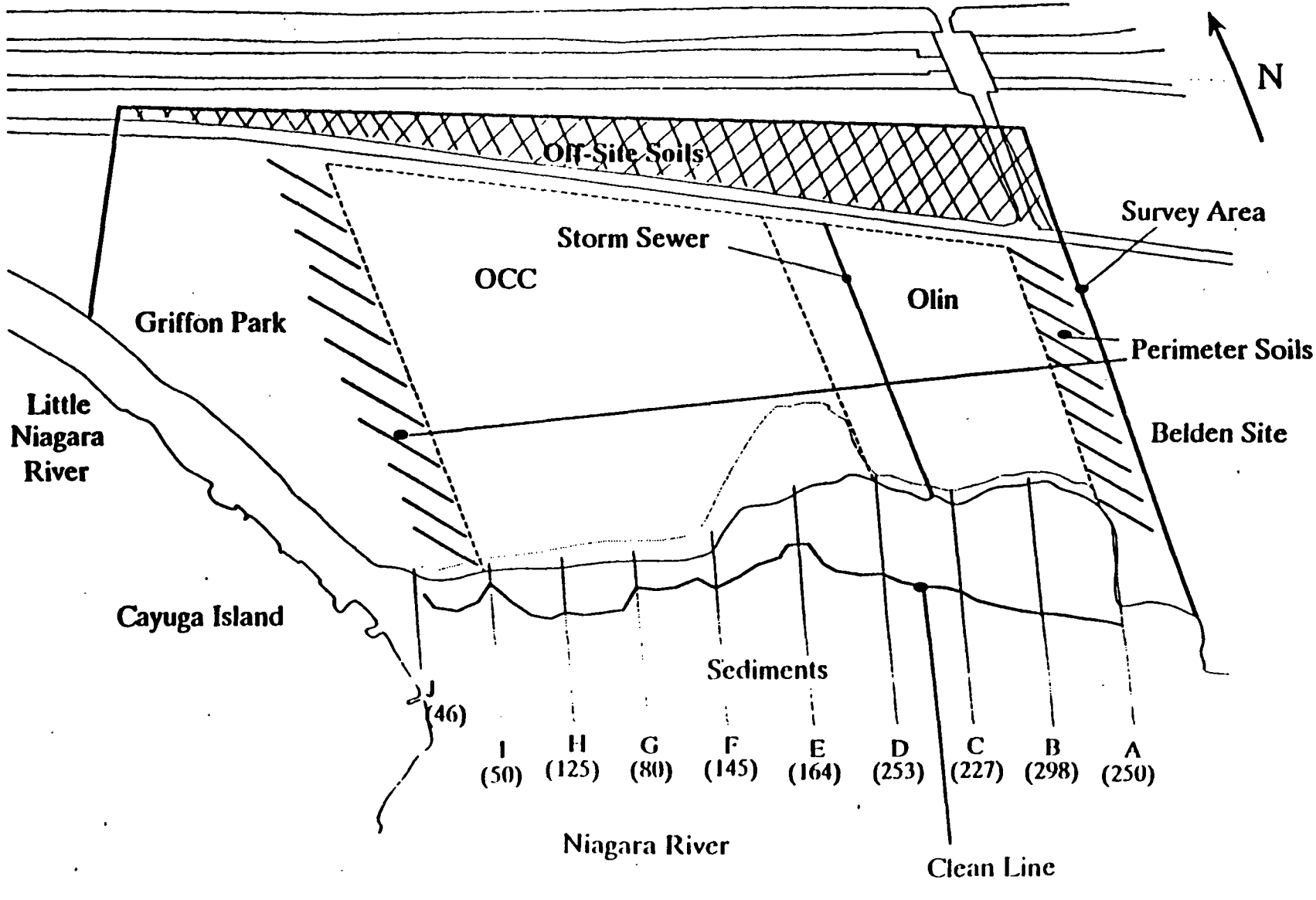


**Figure 3**
**102nd Street Landfill - Sediment Clean Line**
**Numbers in parentheses are clean line distances from shore (in feet) measured along the vectors**



# Figure 4
# 102nd Street Landfill Remedy -- Schematic

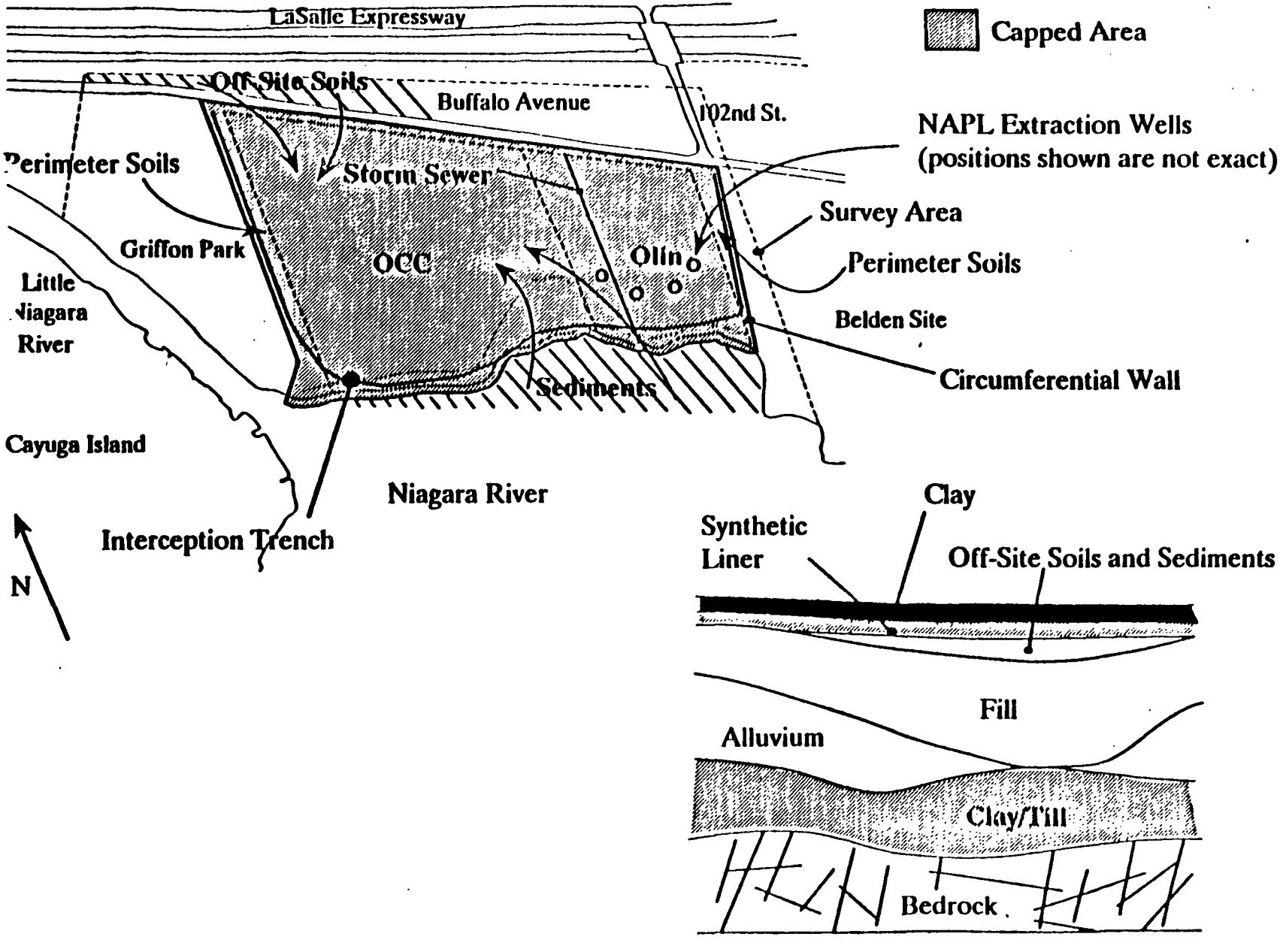


**Table 10**

**Chemical-Specific ARARs - Groundwater**
**102nd Street Site**

| | Regulation | Application | Type |
|---|---|---|---|
| FEDERAL | RCRA Groundwater Concentration Limits (40 CFR 264.94) | Establishes groundwater protection standards for RCRA facilities | RA |
| | Safe Drinking Water Act Maximum Contaminant Levels (MCLs) (40 CFR 141.11-.16) | Enforceable standards for public drinking water systems | RA |
| STATE | NYSDEC Quality Standards for Groundwaters (6 NYCRR 703.5) | Establishes standards for Class GA groundwaters | A |
| | NYSDOH Public Water Supplies (10 NYCRR 5-1) | Establishes standards for public drinking water systems (MCLs) | RA |
| | NYDOH Sources of Water Supply (10 NYCRR 170) | Establishes standards for raw water quality | RA |
| | NYSDEC Standards of Water Quality (6 NYCRR 701.4 and 701.7) | Process for deriving standards based on health levels or chemical correlations | TBC |

A - Applicable
RA - Relevant and appropriate
TBC - To be considered

## Table 11
## Evaluation of Groundwater Concentrations at the 102nd Street Landfill

| Compound | Regulatory Level (ug/L) [1] | | Maximum Site Concentration (ug/L) |
|---|---|---|---|
| **SSI Parameters** | | | |
| benzene | ND | 703.5 | 8200 |
| toluene | 5.00 | 10 NYCRR5 | 5700 |
| chlorobenzene | 5.00 | 10 NYCRR5 | 16000 |
| chlorotoluene, 2- | 5.00 | 10 NYCRR5 | 560 |
| chlorotoluene, 4- | 5.00 | 10 NYCRR5 | [2] |
| dichlorobenzene, 1,2- | 4.70 | 703.5 | 3000 |
| dichlorobenzene, 1,4- | 4.70 | 703.5 | 1200 |
| trichlorobenzenes | 5.00 | 10 NYCRR5 | 3100 |
| tetrachlorobenzenes | 5.00 | 10 NYCRR5 | 2700 |
| hexachlorobenzene | 0.35 | 703.5 | 4 |
| hexachlorocyclohexanes | ND | 703.5 | 1815 |
| dichloroaniline, 2,5- | 5.00 | 10 NYCRR5 | 16000 |
| dichloroaniline, 3,4- | 5.00 | 10 NYCRR5 | [2] |
| phenols (total) | 1.00 | 703.5 | 76 |
| chlorobenzoic acids | 50.00 | 10 NYCRR5 | 10000 |
| mercury | 2.00 | 703.5 | 68 |
| arsenic | 25.00 | 703.5 | 230 |
| **Endagerment Assessment Chemicals** | | | |
| dichloroethylene, 1,1- | 0.07 | 701.4 | 3 |
| trichloroethylene | 5.00 | 10 NYCRR5 | 130 |
| benzo(a)anthracene | 0.00 | 701.7 | ND |
| benzo(b)fluoranthene | 0.00 | 701.7 | ND |
| benzo(k)fluoranthene | 0.00 | 701.7 | ND |
| chloronaphthalene, 2- | 0.00 | 10 NYCRR5 | 10 |
| chlorophenol, 2- | 5.00 | 703.5 [3] | 390 |
| dichlorophenol, 2,4- | 1.00 | 703.5 [3] | 6400 |
| dimethylphenol, 2,4- | 1.00 | 703.5 [3] | 68 |
| trichlorophenol, 2,4,5- | 1.00 | 703.5 [3] | 2500 |
| trichlorophenol, 2,4,6- | 1.00 | 703.5 [3] | 180 |
| chloro-m-cresol, 4- | 1.00 | 703.5 [3] | 28 |
| pentachlorophenol | 1.00 | 701.4 | 38 |
| mirex | 0.04 | 703.5 | ND |
| PCBs | 0.10 | 703.5 | 140 |
| TCDD, 2,3,7,8- | 0.000035 | 703.5 | 0.5 |
| cadmium | 10.00 | 703.5 | 33 |

Notes:

[1] All regulations are 6 NYCRR unless stated otherwise

[2] Total of all isomers

[3] Total may not exceed 1 ug/L

ND- Not Detected

## Table 12
## Estimated Sediment Quality Criteria at the 102nd Street Landfill

| Compound | NYSDEC AWQS [1] (ug/L) | Sediment Remed. Level (ug/kg) [4] |
|---|---|---|
| TCDD, 2,3,7,8- | 0.000001 | 0.26 |
| trichloroethylene | 11 [2] | 111 |
| benzene | 6 [2] | 40 |
| chlorobenzene | 5 | 132 |
| dichlorobenzene, 1,2- | 5 | 680 |
| dichlorobenzene, 1,4- | 5 | 680 |
| trichlorobenzene, 1,2,3- | 5 | 3680 |
| trichlorobenzene, 1,2,4- | 5 | 3680 |
| tetrachlorobenzene, 1,2,3,4- | 5 [3] | 640 |
| hexachlorobenzene | UA | |
| chlorobenzoic acid, 2- | UA | |
| chlorophenol, 4- | 1 | NC |
| trichlorophenol, 2,4,6- | 1 | 160 |
| dichloroaniline, 2,5- | UA | |
| hexachlorocyclohexane, a- | 0.01 | 3.04 |
| hexachlorocyclohexane, b- | 0.01 | 3.04 |
| hexachlorocyclohexane, g- | 0.01 | 0.86 |
| PCBs | 0.001 | 42.4 |
| arsenic | 190 | ND |
| cadmium | 2.77 | ND |
| mercury | 0.2 | ND |

Notes:
UA - Unavailable
NC - Cannot be calculated without Koc
ND - No algorithm available for metals

[1] NYSDEC Division of Water TOGS 1.1.1 Ambient Water Quality Standards (1987)
[2] NYSDEC TOGS 1.1.1 Guidance Value
[3] NIH IRIS Chronic AWQC for 1,2,4,5-tetrachlorobenzene (1989)
[4] Based on the sediment concentration necessary to potentially exceed AWQS

Organic Carbon (fraction): 0.08

# RESPONSIVENESS SUMMARY

## 102nd STREET LANDFILL
## NIAGARA FALLS, NEW YORK

### I.- Overview

The U.S. Environmental Protection Agency (EPA) held a public comment period from July 25, 1990 through August 25, 1990 so as to allow interested parties to comment upon the EPA's Proposed Plan for the remediation of the 102nd Street Landfill Site (the "Site").

The EPA also held a public meeting on Wednesday, August 15, 1990, at the Red Jacket Inn located at 7001 Buffalo Avenue in Niagara Falls, New York. The purpose of the public meeting was to review the Proposed Plan, to present the EPA's preferred remedy, and to solicit, record and consider all comments received from interested parties during the course of the actual meeting. The preferred remedy carried the concurrence of New York State (NYS), and a technical representative of NYS assisted in the presentation and discussion.

A responsiveness summary is required for the purpose of providing the EPA, NYS, and the public with a summary of citizens' comments and concerns regarding the proposed remediation as such comments and concerns were raised during the public comment period, and the responses to those comments and concerns. All comments summarized in this document were given full consideration in terms of selection of the final remedy as stated in the Record of Decision (ROD).

### II.- Background on Community Involvement and Concerns

The 102nd Street Landfill Site initially became an issue of public concern in December, 1970, when the Buffalo District of the U.S. Army Corps of Engineers (COE) notified Occidental Chemical Corporation and Olin Corporation (the "Companies") that no further construction or landfilling could occur until a bulkhead was installed along the shoreline. Although the bulkhead was completed in 1973, no further landfilling at the Site occurred after construction of the bulkhead. A series of investigations regarding sub-surface conditions at the Site, led to the filing of a complaint in December, 1979, in the U.S. District Court in Buffalo, New York, by the United States of America, on behalf of the Administrator of the EPA, against the Companies seeking injunctive relief and civil penalties for an imminent and substantial endangerment to the public health and welfare. In November, 1980, a compliant pursuant to the New York State

Conservation Law and the state's common law of public nuisance, was filed by the State of New York (NYS) seeking civil penalties. These lawsuits are still pending contingent upon the final remediation of the Site.

The major issues and concerns expressed by the community regarding the 102nd Street Landfill are as follows:

- Incineration Concerns - Certain concerns were expressed at the public meeting, and by means of written comments, regarding incineration emissions in general, and in specific terms, concerns over the incineration of sediments, or other wastes, which contain metals such as mercury.

- Long-Term Monitoring - Concerns were stated at the public meeting as to the precise nature and extent of long-term monitoring which the EPA would require and put into effect.

- Restricted Access to Site After Remediation - The Health Department of Niagara County expressed their objections in writing as to the plan to restrict access to the shoreline after the remediation is completed.

- Containment and/or Removal of NAPL - Concerns were expressed at the public meeting as to the intentions and abilities of the EPA regarding NAPL, specifically its containment and its removal from the landfill and from the contaminated sediments.

- Dredging and Incineration of Contaminated Sediments - The Companies expressed their objections in writing regarding the EPA's plan to incinerate the sediments which contain high levels of contamination, and regarding the EPA's plan to dredge all remaining contaminated sediments out to the "clean line."

## III.- Summary of Major Questions and Comments Received During the Public Meeting and the Responses of the EPA

The summary of the questions and comments made during the public meeting held on August 15, 1990 for the 102nd Street Landfill Site, is organized into the following categories:

A.- Incineration;
B.- Long-Term Monitoring;
C.- Contaminated Sediments; and,
D.- Miscellaneous Concerns.

**A.- Incineration**

1.- Comment: A resident stated her general opposition to any form of incineration, be it incineration of NAPL or incineration of the highly contaminated sediments. She did not believe that the emissions coming from incinerators are or could be safe with respect to human health.

Response: The EPA feels that it is more prudent and safe to extract the most toxic and most mobile substances from the landfill, meaning the NAPL and the highly contaminated sediments, and permanently destroy these toxic substances by means of incineration. The individual who made the comment was advised that the present state of emission-control technology is sufficiently advanced so that there will be no danger to the public from any incineration efforts.

2.- Comment: A resident stated his concerns regarding the presence of mercury in the highly contaminated sediments and the landfill, and the EPA's ability to safely control stack emissions during the incineration of any sediments or NAPL which might contain mercury. He was concerned that mercury would be released to the atmosphere, and would thereby be a threat to public health. The remedy will meet all federal and state regulatory requirements.

Response: The EPA stated that any incineration would be performed with highly efficient mechanisms which would prevent the release of any mercury through stack emissions.

**B.- Long-Term Monitoring**

1.- Comment: A resident stated his concerns over the fact that the EPA mentioned only briefly its intent to perform long-term monitoring of the hazardous substances which will be left at the Site, and that the EPA did not state any specifics as to its monitoring plans.

Response: The EPA advised the individual that the Proposed Plan was only conceptual in nature, and that during the remedial design phase, more than adequate details would be developed as to the nature, number, and locations of the various types of monitoring wells which the EPA routinely utilizes under these circumstances. The EPA also stated that it will, as required by law, review the situation every five years to insure that the engineering controls installed at the Site are in fact, performing as intended.

**C.- Contaminated Sediments**

1.- Comment: A resident expressed concern that the EPA might have some degree of difficulty in locating the positions of the NAPL in and under the sediments.

Response: The individual was informed that during the remedial design process, a series of borings would be made into the soils and sediments to determine if any NAPL had been overlooked during our initial assessment. In any event, the EPA intends to use geotechnical borings to determine the precise location of the NAPL plume. The individual was assured that any containment structures would be farther out into the Niagara River than any NAPL. An explanation was offered regarding the existence of the clay/till confining layer, the fact that NAPL is rather dense in nature, and the fact that the confining layer would collect any descending NAPL, thereby preventing further migration of the NAPL.

**D.- Miscellaneous Concerns**

1.- Comment: A resident expressed an interest in the adjoining Belden Site, and the apparent fact that there were no plans to remediate the Belden Site at the same time as the 102nd Street Landfill.

Response: The resident was advised that the Belden Site is listed by New York State as an inactive hazardous waste site. Any further investigations into the Belden Site will be conducted by New York State. The Belden Site appears at this time to pose less of a risk to human health and the environment. The remedial action conducted at the 102nd Street Landfill will not interfere with any investigations or remedial actions undertaken regarding the Belden Site.

2.- Comment: A resident asked who is paying for all this remedial work.

Response: A brief explanation was offered as to the operation of Superfund, and how responsible parties are encouraged to use their own money to perform remediation work, rather than to use Superfund money initially and then attempt to collect at a later date from the responsible parties.

3.- Comment: A resident asked what the character of the fill was which was deposited on the Site by the Companies.

Response: A description was offered as to the different types and estimated quantities of wastes which were placed on the Site, and how the confining clay/till layer and the bulkhead along the shoreline, prevented most of these wastes from entering the Niagara River. During the time the Site was operated as a landfill, it is estimated that approximately 159,000 tons of waste were deposited by the Companies. Contaminants included heavy metals (such as mercury), chlorinated single-ring aromatics (e.g., chlorobenzene compounds), chlorinated phenols, hexachlorocyclohexanes (HCCHs), polychlorinated biphenyls (PCBs), and polychlorinated dioxins and dibenzofurans (PCDDs and PCDFs).

4.- Comment: A resident inquired as to the boating area at the mouth of the Little Niagara River, and whether the Companies intended to allot some money to dredge the mouth of the river of contamination, if in fact the area was contaminated.

Response: The answer consisted of a description as to how the remedial investigation was conducted in order to determine the extent of site-related contamination. The point was made that the limit of contamination has been well defined, that it's very close to the shoreline, and that it doesn't extend very far beyond the western edge of the property. Since there is no connection between the mouth of the river and site-related contamination, the mouth of the river is not included within the remediation plans for the 102nd Street Site. A suggestion was made that the resident contact the U.S. Army Corps of Engineers regarding the issue of dredging the mouth of the river.

5.- Comment: A resident inquired as to why Griffon Park was closed down. (The resident was apparently aware of the fact that the boat-launch facilities on the western side of the park are open and in regular use).

Response: The belief was expressed that the eastern portion of Griffon Park was closed due to the investigations being conducted at the adjoining 102nd Street Site. No comment could be offered as to the intentions of the local governmental officials regarding the refurbishing of the eastern side of the park.

6.- Comment: A question was asked as to why the original survey area of the 102nd Street Site did not include the portion of the Belden Site used by Goodyear (to apparently dump tires), and were there any plans to remediate various sites upriver toward Tonawanda.

Response: During the time when the initial lawsuit was filed against the Companies (1979), the EPA knew from aerial photographs, the area that the Companies used for dumping (meaning the 102nd Street Site), and concentrated its efforts there. At that time, the Belden Site was not identified. As to remediation of other sites along the Niagara River, it will depend on the priorities which are established. As a general rule, the most serious sites will be remediated first.

## IV.- Summary of Major Written Comments Received During the Public Comment Period and the Responses of the EPA

A public comment period was held from July 25, 1990 through August 25, 1990 in order to receive comments from the public on the RI/FS reports and the Proposed Plan. Written comments submitted during the public comment period are summarized in this section, along with the EPA's responses.

A.- Letter dated August 8, 1990 from the Companies

Comment: The Companies believe that dredging out to the limit of site-related chemicals above survey levels, and that incinerating sediments containing elevated levels of site-related chemicals, are not warranted based on risk or regulatory considerations. The additional costs to implement these measures (approximately $4,500,000. to $6,600,000.) are excessive in light of the absence of any additional protectiveness of human health or the environment that would be achieved.

B.- Letter dated August 24, 1990 from the Companies

Comment: The Companies continue to believe that incineration of sediments with elevated concentrations of chemicals is not warranted based on risk or regulatory considerations and the additional costs are excessive in light of the absence of any additional protectiveness of human health and the environment. Placing the dewatered sediments under the cap effectively removes the sediment areas of concern from the environment and the additional cost of incineration is not justified in this instance.

C.- Letter dated August 30, 1990 from the Companies

Comment: The Companies believe that, where practicable, extension of the slurry wall to enclose sediments with elevated chemical concentrations followed by dredging and placement beneath the cap of the remaining site-related sediments is an appropriate remedy for the Site.

D.- Letter dated September 5, 1990 from the Companies

Comment: The Companies believe that the presence of mercury and the logistics of ash disposal are further justification that the incineration of Site sediments is unwarranted and inappropriate. Placement of sediments beneath the Site cap or within the slurry wall is a technically feasible remedy that can be readily integrated with the remaining remedial design elements and is protective of human health and the environment.

EPA Response (to the four letters received from the Companies): The selected remedy in part, does propose that the highly contaminated sediments be incinerated and that the remaining sediments be dredged out to the "clean line." (The "clean line" represents the extent to which site-related contamination has migrated.) These remaining sediments would then be consolidated beneath the cap. The EPA's intent will always be to use permanent solutions to the maximum extent practicable. In the present case, a window of opportunity exists as to the highly contaminated sediments in that they must be handled during the dredging process. Once removed from the Niagara River, rather than placing these

sediments beneath the cap, it appears more prudent to incinerate them thereby permanently destroying this source of high contamination, and thereby obliging the statutory urgings to search for and to implement permanent solutions to the maximum extent practicable.

The EPA's position regarding dredging all remaining sediments out to the "clean line" is firm. As the Companies are aware, the "clean line" is the acknowledged extent of site-related contamination outward into the embayment. These sediments must be removed or they will simply remain as a source of contamination and an exposure pathway which threatens human health and the environment.

With respect to the comment by the Companies regarding the EPA's plan to incinerate the highly contaminated sediments, one further note is in order. As mentioned elsewhere in this ROD, the primary focus of this remediation plan is to contain the NAPL plume with the slurry wall. If, based on the data obtained from the geotechnical borings installed during the design period to detect the extent of the NAPL plume, the slurry wall's initial positioning places it across the areas containing elevated levels of contaminants, practicality may require that the wall be extended outward to enclose these areas of high contamination. In such case, these highly contaminated sediments, rather than being dredged and incinerated, would be left in place, that is, contained by the slurry wall, covered with fill, and finally covered with the cap. The remaining sediments beyond the slurry wall would still be dredged and consolidated beneath the cap.

E.- <u>Letter dated August 14, 1990 from the Health Department of Niagara County</u>

Comment: While not objecting to the response action as presented in the Proposed Plan, the Health Department is concerned about restricting access to the Site after the remediation is completed. The Health Department contends that there is a limited amount of waterfront space in Niagara County and that long-term demand for waterfront space will intensify. New York State has recognized that the community needs protection against proposed projects which will prevent best usage of coastal lands and has thus created the Coastal Management Plan. Any proposed remediation project along coastal lands should, in the spirit of the Coastal Management Plan, evaluate what additional actions would be necessary to comply with as many coastal management policies as possible. The Niagara River coast line is now recognized as a significant scenic resource. Accordingly, a review of the proposed remediation should be conducted to determine how this scenic resource might best be protected and preserved. One suggestion which might be feasible would be to incorporate a "public right-of-way" along the shoreline. Since the remediation project will modify the existing shoreline by construction of a slurry wall, there may be (with

minimal design modification), enough room between the river and the landfill site to dedicate a strip of land to be used as a pedestrian and bicycle trail. Also, by properly placing vegetation upon conclusion of construction, unattractive elements can be obscured and wildlife will be encouraged.

EPA Response: The merits and feasibility of the proposal made by the Health Department of Niagara County will be given the fullest consideration during the remedial design phase of this project. Restriction of access to the shoreline may not be necessary if it can be demonstrated to the satisfaction of the EPA that "public right-of-way" or other recommendations of local governments, will not interfere with the EPA's selected remedy.

## V.- Remaining Concerns

Concerns raised by the community regarding the alleged negative impacts of incineration emissions upon the public health will continue to linger.

The recommendations made by the Department of Health of Niagara County as to not restricting public access to the waterfront after completion of the remediation, will continue as a public issue, especially during the period when the remedial design is conducted.

The community appears to be concerned about and interested in the initiation of additional remediation projects along the Niagara River.

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Thomas C. Jorling
Commissioner

Mr. Richard Caspe
Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II - 26 Federal Plaza
New York, NY 10278

SEP 26 1990

Re: 102nd Street Landfill (Site #932022, 932031)
Record of Decision

Dear Mr. Caspe:

The Revised draft Record of Decision (ROD) for the 102nd Street Landfill, received by the New York State Department of Environmental Conservation (NYSDEC) on September 21, 1990 has been reviewed. The NYSDEC concurs with the selected remedy for each operable unit as presented in the draft ROD. Specifically, the ROD calls for: containment of the site, with excavation of contaminated off-site soils and placement on the site (Operable Unit One); dredging of those contaminated embayment sediments, with incineration of the areas with high levels of chemicals (Operable Unit Two); and sliplining of the 100th Street storm sewer that runs through the site (Operable Unit Three).

NYSDEC recommends that a draft Consent Order be presented in the very near future to the Potential Responsible Parties by the EPA/State so that implementation can begin. Our respective legal representatives should develop this order as soon as possible. Further, NYSDEC recommends that the selected remedy for each operable unit be implemented as soon as possible. We look forward to working with the USEPA to achieve this goal.

If you have any questions or concerns on this matter, please contact Mr. Michael J. O'Toole, Jr., P.E. at 518/457-5861.

Sincerely,

E.O Sullivan

Edward O. Sullivan
Deputy Commissioner

cc: C. Petersen, USEPA
K. Lynch, USEPA
P. Olivo, USEPA
A. Wakeman, NYSDOH
N. Spiegel, NYSDOL