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Record of Decision:

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RECORD OF DECISION

DuPont Necco Park Site

City of Niagara Falls and Town of Niagara,
Niagara County, New York

United States Environmental Protection Agency
Region II

September 1998

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

DuPont Necco Park Site

City of Niagara Falls and Town of Niagara

Niagara County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the DuPont Necco Park Site, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), and to the extent practicable, 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 Source Area (as defined herein).

The New York State Department of Environmental Conservation (NYSDEC) concurs with the selected remedy. A letter of concurrence from the NYSDEC is attached to this document (Appendix IV).

The information supporting this remedial action decision is contained in the administrative record for this Site. The index for the administrative record is attached to this document (Appendix III).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the DuPont Necco Park Site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The remedy described in this document for the DuPont Necco Park Site will address contaminants in the landfill soils and dense non-aqueous phase liquid (DNAPL) in the soils and bedrock which represent continuing sources of contamination to the groundwater. This action will require long-term management to maintain the groundwater pump and treat systems and groundwater monitoring to determine the effectiveness of the containment measures in reducing contaminant concentrations in the far-field aquifer.

The major components of the selected remedy include the following:

1. Containment of the Source Area by:

- upgrading the existing cap to meet New York State Part 360, or equivalent standards;
- using hydraulic measures in the overburden (A zone) to maintain an inward gradient within the Source Area or installing a physical barrier (e.g., slurry wall, sheet pile) on the southern, and portions of the eastern and western Necco Park property boundaries; and
- using hydraulic measures in the bedrock (B-F zones) to maintain an inward gradient within the Source Area and prevent the movement of contaminated groundwater beyond the Source Area boundary.

The control of the contaminated groundwater will be achieved through the installation, operation, and maintenance of the groundwater extraction wells (and, optionally, a physical barrier in the overburden). The exact number, size, depth, and pumping rates of these wells will be determined in the remedial design of the selected remedy.

2. Treatment of the extracted groundwater from the Source Area, either on-site or off-site, to achieve the

appropriate discharge requirements. Currently, groundwater extracted from the Site is treated at the adjacent CECOS wastewater treatment plant. Expansion of the CECOS facility would likely be required to accommodate the increased volume of water to be treated under this remedy. The need to either expand the CECOS facility, build an on site facility, or utilize another off-site facility for groundwater treatment will be determined during the design.

3. Collection of DNAPL in the Source Area by:

- utilizing the existing monitoring wells network;
- utilizing any groundwater recovery wells placed in the Source Area; and
- the installation of additional dedicated DNAPL recovery well(s).
- Collected DNAPL would be disposed of off-site at an appropriate facility.

4. Operation and maintenance (O&M) of the existing systems and the systems constructed under this selected remedy.

5. Comprehensive monitoring to verify hydraulic control, identify DNAPL occurrence, demonstrate the effectiveness of the remedial measures, and assess the impact of such measures on far-field groundwater quality. Existing monitoring wells on the Necco Park property will be used to monitor the performance of the groundwater extraction system and establish that sufficient control occurs. Additional monitoring wells may be required. The need for such additional wells will be determined during the design and implementation of the groundwater extraction system.

6. Additional characterization of the Site to assess whether natural attenuation will be effective in addressing far-field contamination.

7. Development and implementation of institutional controls to restrict Site access, the use of groundwater at the Site, and control land use such that it is consistent with Site conditions.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in CERCLA º121, 42 U.S.C. º9621, is protective of human health and the environment, and is cost-effective. The remedy utilizes permanent solutions and treatment technologies to the maximum extent practicable, given the scope of the action, and will permanently reduce the toxicity, mobility, or volume of contaminants at the Site. In addition, the actions to address contamination at the Necco Park Site comply with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action.

Remediation of the DNAPL contaminated soils, bedrock and groundwater in the Source Area of the Necco Park Site is considered to be technically impracticable from an engineering perspective. Therefore, this ROD waives the federal and State drinking water standards and State groundwater quality standards for the groundwater in the Source Area. The waiver is issued pursuant to Section 121 (d)(4)(C) of CERCLA, 42, U.S.C. º 9621 (d)(4)(C), and º300.430(f)(1)(ii)(c)(3) of the NCP. There are technical limitations which make it impracticable to recover all of the DNAPL from the Necco Park Source Area. Removal of all the DNAPL would require the excavation of more than 1,000,000 cubic yards of landfill materials (soils and fill) from the Necco Park and adjacent BFI landfills. In addition, DNAPL has migrated into the fractured bedrock beneath the Necco Park landfill, adjacent CECOS secure hazardous waste cells, and the adjacent BFI landfill. No current technology exists to completely remove the DNAPLs from the fractured bedrock medium. Since it is technically impracticable to excavate this area, and current technologies for the removal of all of the DNAPLs from the fractured bedrock are unavailable, DNAPL impacted soil, bedrock and groundwater will remain at the Site.

Because DNAPLS contribute to dissolved phase contamination restoration of groundwater in the Source Area of the Necco Park Site has been determined to be technically impracticable.

EPA believes that the selected remedy for the Source Area at the Necco Park Site is protective of human health and the environment. Recognizing that groundwater restoration in the Source Area is technically impracticable, the goal of this remedial action is to establish hydraulic control of the contaminated groundwater within the Source Area, and to prevent groundwater and DNAPLs from migrating beyond the Source Area by utilizing hydraulic barriers (and, optionally, a physical barrier in the overburden [A zone]). This action complies with federal and State requirements that are applicable or relevant and appropriate to this remedial action (other than those requirements which are being waived as described in the preceding paragraph) and is cost-effective. The selected remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on the Site above health-based levels, a review of this remedial action, pursuant to CERCLA º121(c), 42 U.S.C. º9621(c), will be conducted within five years after commencement of remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

<IMR SRC 98144A>

RECORD OF DECISION
DECISION SUMMARY

DuPont Necco Park Site

City of Niagara Falls and Town of Niagara, Niagara County, New York

United States Environmental Protection Agency
Region II
New York, New York

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SITE NAME, LOCATION AND DESCRIPTION

The 24-acre Necco Park landfill is an inactive hazardous and industrial waste landfill located approximately 1.5 miles north of the Niagara River in the City of Niagara Falls and the Town of Niagara, Niagara County, New York (Figures 1 and 2). The landfill, located off of Pine Avenue near 56th Street in Niagara Falls, was originally used as a recreational park by the Niagara Electrochemical Company, from which "Necco" is derived. The property was sold to DuPont in 1930.

Necco Park is located in a heavily industrialized section of
Niagara Falls and is bounded on three sides by commercial disposal facilities. Immediately adjacent to the north and east lies the Newco solid waste landfill, an active nonhazardous waste facility owned by Browning-Ferris Industries (BPI) ("BFI facility"). Immediately adjacent to the south are three inactive secure hazardous waste landfill cells and a wastewater treatment facility owned by CECOS International, Inc. ("CECOS facility"). An access road and a Conrail. (Niagara Junction Railway Company) right-of-way bound the landfill to the west. The nearest residential neighborhoods are located approximately 2,000 feet to the south and 2,500 feet to the west, respectively.

Wastes from the Necco Park landfill have migrated in the overburden and bedrock underneath the landfill and now extend underneath the CECOS facility and a portion of the BFI facility. The Necco Park Site ("Necco Park Site" or "Site,,) consists of the 24-acre landfill and the areas surrounding the landfill where hazardous substances in the soil, bedrock and the groundwater from the landfill have come to be located.

Regional Physiography

Regional Soil

Unconsolidated overburden material in the Niagara Falls area consists of glacially derived sand, silt, and clay and miscellaneous fill. Natural unconsolidated overburden deposits, in ascending order from top of bedrock to top of grade, can be divided into the following three units (Figure 3): glacial till, glaciolacustrine sediment; and recent alluvium.

Regional Bedrock Geology

The western New York region is underlain by a thick succession of Paleozoic sedimentary rocks that form the northern flank of the Allegheny Basin., The Niagara Falls area is underlain by strata representing Ordovician and Silurian systems. The upper Ordovician, represented by the Queenston Formation, consists of a thick, laterally extensive, soft red-brown mudstone with minor sandstone beds. The Silurian system is represented, from oldest to youngest, by the Medina, Clinton, and Lockport Groups.

Topographically, the western New York region is relatively flat. The three most prominent topographic features in the area include the Niagara Gorge, Niagara Escarpment, and Onondaga Escarpment. The Niagara and Onondaga Escarpments coincide with exposures of two relatively resistant bedrock units, the Lockport Dolomite and Onondaga Limestone.

Vertical fractures related to regional stress patterns are present in the Lockport Formation, particularly in the upper 20 or 30 feet of the Lockport Dolomite, where a high degree of weathering has occurred. Where joints have been further opened through dissolutioning, they act as vertical and horizontal conduits of groundwater between bedding-plane fracture zones. Near the bedrock surface, joints tend to be open and well developed. However, they become relatively tight and poorly developed at depth. The frequency of vertical fractures may vary with depth between areas.

Horizontal fracture zones coincident with various bedding planes are distributed throughout the Lockport Formation. In the Niagara Falls area, bedding-plane fracture zones tend to be horizontally continuous and can be traced for several miles. Numerous investigations have illustrated that these horizontal bedding-plane fracture zones are primary pathways for groundwater movement through the Lockport Formation.

Regional Hydrogeology

Groundwater in the Lockport Formation flows generally toward the Niagara Gorge and the lower Niagara River. The Niagara River downstream of Niagara Falls receives discharge from the bedrock groundwater flow system. The Niagara River upstream of Niagara Falls acts as a groundwater recharge area. However, studies demonstrate that the New York Power Authority (NYPA) conduits and several sewers/tunnels act as regional groundwater sinks. Groundwater entering the conduit drainage system near the Necco Park Site may flow either to the south where a portion infiltrates the Falls Street tunnel where these structures intersect, or to the north where the water may eventually discharge to the Forebay Canal through bedrock fractures. The dry weather flow of the Falls Street tunnel discharges to the Niagara Falls Publicly Owned Treatment Works (POTW), where the effluent is treated (discussed in greater detail, below).

Groundwater flows horizontally and, to a lesser extent, vertically in the Lockport Formation. Horizontal flow occurs predominantly through bedding-plane fracture zones. These water-bearing bedding-plane fracture zones are primary conduits for groundwater flow through the Lockport Formation. The bedding-plane fracture zones have been found to be areally extensive and affect groundwater flow for distances of several miles.

The groundwater aquifer in the Niagara area is classified by New York state as class GA fresh groundwaters. As defined in New York State Codes, Rules and Regulations (NYCRR), Title 6, Part 701.15, the best usage of class GA fresh groundwaters is as a source of potable water supply. Upper zones of the Lockport Formation were historically used as potable water supplies. However, groundwater sources are not generally used for domestic purposes in the Niagara region because of the close proximity to the large fresh water supply of the Niagara River. No known domestic wells are present in the areas downgradient of the Site at this time. Groundwater withdrawal from the Lockport Formation in the Niagara Falls area is generally limited to industrial cooling water use or for groundwater remediation purposes.

The regional groundwater quality of the Lockport Formation has been heavily affected by industrial sources of contamination. In addition to the Necco Park Site, other sites have been identified as contributors to groundwater contamination in the region.

Man-made Passageway Capture Zones

Groundwater flow in the bedrock regime is greatly influenced by a number of man-made features. These include water transport and storage structures related to the NYPA Robert Moses Power Project, several sewers and tunnels excavated into bedrock and the overburden, bedrock grouting, and groundwater extraction. Each of these features has varying effects on regional and near-Site groundwater flow.

Completed in the early 1960s, the NYPA Robert Moses Power Project water diversion and storage structures have a great influence on regional groundwater flow. Components having the greatest effect are: the NYPA conduits, which transport water north to the Robert Moses Power Generating Stations; the Forebay Canal, an L-shaped excavation linking the conduits to the generating stations; and the storage reservoir, a 2.97-square mile surface impoundment east of the Forebay Canal (Figure 4).

The NYPA conduits consist of twin buried tunnels of poured concrete constructed in parallel trenches 52 feet wide. The depth of the NYPA conduits varies between 100 feet (at the intake structures) and 160 feet (near the Forebay Canal) below ground surface, well into bedrock. Each conduit is jacketed by a drain system that is in direct contact with the bedrock and is designed to balance hydrostatic pressure on the conduit walls. The drain system jacket is hydraulically connected to the conduit structures at two locations. Each location uses weirs to balance hydraulic head in the NYPA conduits aind surrounding jacket.

Studies of regional groundwater flow in the Niagara Falls area by the United States Geological Survey (USGS) indicate that the conduit drain system acts as a line discharge for groundwater in the upper Lockport Formation along its entire length. Groundwater in the upper Lockport Formation both east and west of the conduit flows toward the conduits and into the conduit drain system.

The Forebay Canal is an unlined excavation into bedrock approximately 4,000 feet long, 500 feet wide, and 110 feet deep. Water enters the Forebay Canal through conduits, where it is either diverted to the Robert Moses Generating Station or to the reservoir, depending on the power generation schedule. Daily water

levels in the Forebay Canal fluctuate as much as 25 feet during low flow conditions in the Niagara River, which occur during summer and fall. The Forebay Canal is in hydraulic communication with the conduit drain system through bedding-plane fracture zones exposed in the walls of the Forebay Canal.

The Falls Street tunnel also has a great influence on bedrock groundwater flow in the Niagara Falls area. A gravity-fed sewer constructed in the early 1900s, it extends 16,000 feet from 56th Street and John Street to the lower Niagara River near the Rainbow Bridge. For most of its length, it is an unlined rock tunnel. Used as a combined sewer for decades, in 1985 it was converted to a storm sewer. Where the Falls Street tunnel crosses, the NYPA conduits, it is a 500-foot section of 84-inch diameter concrete pipe, 300 feet of which is encased in a concrete vault. A study conducted in 1987 by the city of Niagara Falls identified the 500-foot section of the Falls Street tunnel where it crosses the conduits as the major groundwater discharge location for an 11-square-mile area, the north/south axis of which coincides with the NYPA conduits. Current estimates are that 4 to 5 million gallons per day (mgd) of infiltration enter the Falls Street tunnel in the vicinity of Falls Street tunnel/NYPA conduits intersection.

At a minimum, an undetermined amount of groundwater flowing south from the Necco Park site in the upper bedrock zones (B and C zones, discussed below) has the potential to, or does, enter the Falls Street tunnel. Currently, 100% of dry weather flow in the tunnel goes to the Niagara Falls POTW. However, during wet-weather flow (i.e., storm event), a portion of the flow in the Falls Street tunnel bypasses the POTW and discharges directly to the Niagara River. Also, groundwater flowing west from Necco Park in the middle and lower bedrock zones (D through G zones) has the potential to, or does, enter the NYPA conduit drain system. Water in the drain system may flow north, towards the Forebay Canal, or south, towards the Falls Street tunnel.

As discussed above, there is a degree of hydraulic connection between the NYPA conduit drain system and the Falls Street tunnel where the two structures cross. It is believed that water from the conduit drain system enters the Falls Street tunnel at this intersection which is located southwest of the Site. There is currently insufficient information to determine the direction of flow in the NYPA conduit drains on a continual basis. It is believed that fluctuations in water volume used by the NYPA creates changes in flow direction in the NYPA conduit drainage system. Therefore, any groundwater contamination from the Necco Park Site that may enter the conduit drainage system has the potential to flow either to the north where it may discharge to the Forebay Canal through bedrock fractures, or to the south where at least a portion of the water enters the Falls Street tunnel.

Loadings to the Niagara River and Lake Ontario

As stated previously, a portion of the contaminated groundwater from the Site enters the Niagara River which flows into Lake Ontario. During the 1970s, it became apparent that pollution caused by persistent toxic substances was harming Great Lakes species and posing risks to human and wildlife consumers of fish. Accordingly, the Great Lakes Water Quality Agreement of 1978 was signed between the United States and Canada which commits the two countries to "virtually eliminate" persistent toxic substances in the Great Lakes ecosystem.

To address this contamination and chemical loadings to the Niagara River, a Four-Party Agreement was signed in 1987. The four parties (Environment Canada, EPA, Ontario Ministry of the Environment, and New York State Department of Environmental Conservation (NYSDEC)] committed to reducing, by 50 percent by 1996, toxic loadings entering the Niagara River. As a result, most of the dry weather flow in the Falls Street tunnel was diverted to the Niagara Falls POTW in 1989. Since 1993, all dry-weather flow and an undetermined amount of wet-weather flow is directed to the POTW, where it is treated prior to discharging to the Niagara River.

It is estimated that the 50 percent reduction goal in loadings of certain toxic chemicals to the Niagara River (set forth in the Four-Party Agreement of 1987) has been accomplished through remedial actions taken to date at several hazardous waste sites, including Necco Park, and by the 1993 diversion of all dry-weather flow in the Falls Street tunnel to the Niagara Falls POTW. However, during wet-weather flow, at least some of the flow in the Falls Street tunnel bypasses the POTW and discharges directly to the Niagara River. In addition, contaminated groundwater has the potential to move untreated into the Forebay Canal, and subsequently the Niagara River. Therefore, further actions to reduce the loadings, which is in keeping

with the "virtual elimination" goal, need to be conducted at the Site.

To accomplish the objective of "virtual elimination", the International Joint Commission in 1990 urged the United States and Canada to develop "a comprehensive, binational program to lessen the uses of, and exposure to persistent toxic chemicals found in the Great Lakes environment. Since that time, both countries have undertaken their own virtual elimination efforts. In addition, in February 1995, Prime Minister Chretien and President Clinton confirmed the commitment by the U.S. and Canada to work together to develop a binational strategy to reduce and eventually eliminate the input of the most persistent toxic substances in the Great Lakes environment. The binational strategy was approved for implementation by Environment Canada and EPA in 1997.

Site Physiography

Site Geology

Three geologic units exist beneath the Necco Park Site. These units include unconsolidated overburden, the Lockport Formation, and the Rochester Shale Formation. The Lockport Formation underlies unconsolidated overburden deposits. In general, the top of bedrock is relatively unweathered. The Lockport Formation within the study area ranged in thickness from 142 to 151 feet. The Rochester Shale is a non-permeable formation which underlies the Lockport Formation.

Site Hydrogeology

A series of horizontal bedding-plane fracture zones in the Lockport Formation similar to those described for the region have been delineated at the Necco Park Site. Groundwater beneath the Site flows in the overburden under unconfined conditions and in the separate, fairly continuous bedding-plane fracture zones in dolomite bedrock of the Lobkport Formation under confined conditions.

These fracture zones behave as separate and hydraulically distinct water-producing units. Letter designations were assigned to these principal water-bearing zones as follows: the A zone refers to saturated overburden and the B, C, CD, D, E, F, and G zones refer to identified Lockport Formation bedding-plane fracture zones (Figure 5) . The interface between the basal member of the Lockport Formation and Rochester Shale is defined as the J zone. Based on hydraulic conductivity testing, the J zone was determined not to be a significant water-producing zone.

Overburden is defined as the A zone. As a consequence of the low hydraulic conductivity (1 x 10 -7 cm/sec) estimated for those areas of the A zone where most liquid disposal occurred, groundwater in the overburden tends to flow vertically downward to the more transmissive bedrock units.

The upper Lockport, which includes water-producing fracture zones in approximately the upper 30 feet of the Lockport Dolomite, corresponds to the B and C zones at the Necco, Park Site. Groundwater in the B and C zones generally flows to the south in areas beyond the radius of influence of the operational recovery well system. Although the Falls Street tunnel is located southwest of the Site and flow in the study area is to the south, the hydraulic influence of the Falls Street tunnel may extend some distance east of the Falls Street tunnel/John Street sewer intersection. Therefore, although insufficient information is available to determine the exact flow path, a portion of B and C zone groundwater ultimately discharges to the Falls Street tunnel.

Groundwater in the D, E, and F zones generally flows in a westerly direction toward the NYPA power conduits. This groundwater is intercepted by the conduit drain system.

The piezometric map for the G zone generally indicates that hydraulic gradients are low. The primary flow direction appears to be west/northwest toward the groundwater discharge boundary at the NYPA conduits. However, some easterly components have been observed, usually during water-level fluctuations in the Forebay Canal.

Construction of a grout curtain in the bedrock zones was completed at the Site in 1989. It was designed to

reduce the rate of bedrock groundwater flow beneath the Site from upgradient areas and enhance efficiency of on-Site groundwater recovery operations. As a result of the grout curtain installation, it appears that cones of depression associated with recovery wells RW-1 and RW-2 have been enlarged under the same pumping rates.

Recovery well RW-3 was installed after the grout curtain completion. Results of a well RW-3 pumping study indicate that consistent operation of recovery well RW-3 at its optimal pumping rate of 4 gpm causes drawdown in the D, E, and F zones in the eastern portion of the Necco Park Site.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Necco Park landfill was used or the disposal of industrial and process wastes generated at the DuPont Niagara Plant from the mid 1930's until 1977. Specific knowledge of activities at the Site prior to 1964 is limited. Available evidence indicates that approximately 186 million pounds of liquid and solid industrial wastes were disposed of at the Site. The following wastes were disposed of in the largest quantities:

- Fly ash
- Building demolition and miscellaneous plant debris
- Sodium sludge waste salts, cell bath, and floor sweepings (i.e., barium, calcium, and sodium chloride)
- Sodium cell rubble (i.e., thermal brick, corroded steel)
- Polyvinyl acetate solids and stilling bottoms (i.e., vinyl acetate with high-boiling tars)
- Chlorinolysis wastes (i.e., high-boiling residues such as hexachlorobenzene, hexachlorobutadiene, and hexachloroethane)
- Liming residues (i.e., sludge saturated with tri- and tetrachloroethene (TCE and PCE))
- Scrap organic mixtures, off-grade product
- Glycol polymer (Terathane) scrap (i.e., filter press cloth, filter press sludge)
- Refined adiponitrile wastes (high-boiling residues)

These wastes were reported to contain hazardous substances such as carbon tetrachloride, chloroform, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, methylene chloride, PCE, and TCE. Liquid wastes were generally disposed of in shallow earthen lagoons on the southeastern portion of the landfill, while the remainder of the landfill functioned primarily as a solid waste landfill.

Wastes from the Necco Park landfill have migrated in the overburden and bedrock underneath the landfill and now extend underneath the CECOS facility and a portion of the BFI facility. The "Site" consists of the 24-acre landfill and the areas surrounding the landfill where hazardous substances from the landfill have come to be located.

As a result of this disposal, soils at the landfill and groundwater beneath and downgradient from the landfill have been contaminated. Contamination at the Site is found as aqueous phase liquids (APL, i.e., dissolved in water) and as non-aqueous phase liquids (NAPL, i.e., occurs as a separate phase and does not readily dissolve in water; in this case, dense NAPL or DNAPL, i.e., heavier than water) . Areas of soil contamination exist above levels that would be considered protective of groundwater quality. Groundwater contamination is above New York State (NYS) groundwater standards.

In 1977, the Site was identified as a potential source of groundwater contamination and the landfill was closed. In February 1977, the State requested that DuPont take action to correct groundwater contamination at the Site. Groundwater investigations were initiated in September 1977. Since that time, several investigations and remedial studies have been conducted. Preliminary investigations by DuPont's contractors (Calspan, 1978; Recra Research, 1979; Roy F. Weston, 1978, 1979, 1981, 1982; and Woodward-Clyde, 1984) focused on assessing conditions in the immediate vicinity of Necco Park and establishing a groundwater recovery operation.

Previous Response Actions

Several response actions were implemented to mitigate the impact and spread of contamination. These

remedial actions are identified in Figure 6 and are described as follows:

During 1978 and 1979, a clay cap was constructed over the 24-acre site. The final compacted cover consisted of a minimum of 18 inches of clay. Data collected from soil borings at the Site indicate that the average cap thickness is approximately 24 inches. The cap is overlain by a 6-inch cover of topsoil and grass.

In 1982, two existing monitoring wells (D-12 and 52) were converted to recovery wells (RW-1 and RW-2) to control off-Site migration of contaminated groundwater in the upper bedrock fracture zones (B and C zones). Extracted groundwater is pumped to a CECOS commercial wastewater treatment facility located adjacent to Necco Park where it is treated and discharged to the Niagara Falls POTW. Wells RW-1 and RW-2 have been used as recovery wells from 1982 to the present.

Under optimal conditions, wells RW-1 and RW-2 are pumped at an average rate of 10 to 15 gallons per minute (gpm) and 5 to 10 gpm, respectively. However, mechanical difficulties have curtailed continuous operation of well RW-2, particularly from early 1992 through 1993. Efforts to improve the system's operational efficiency, including pump and line replacement and construction of an automated acid addition system for well RW-2, were undertaken. Initial evaluations, of the recovery well network's effectiveness indicated that under continuous operation, the wells created a hydraulic barrier across the entire southern perimeter of the Necco Park property in the first two bedrock water-bearing zones (B and C zones). However, after additional monitoring wells were installed during subsequent investigations, a reevaluation of the recovery well system's effectiveness revealed that some off-site flow from these two zones was occurring, particularly along the eastern property boundary in the C zone. The primary influence of well RW-2 was observed in the B zone, and the primary influence of well RW-1 was observed in the C zone.

To enhance the groundwater pumping system's effectiveness, a grout curtain, termed Subsurface Formation Repair (SFR), was constructed from July 1988 through September 1989 (Figures 6 and 7). The SFR extends along the entire western and northern perimeter of the Necco Park property and to just over one-half of the eastern perimeter. The southern perimeter and southern portion of the eastern perimeter were left ungrouted due to the possible presence of DNAPL and to allow for recovery of contamination that had migrated beyond the Necco Park property boundary. To reduce the potential for an upgradient increase in the water-table elevation in the overburden, the upper 10 feet of bedrock were not grouted on the northern perimeter.

Post remedial investigation data indicates that wells RW-1 and RW-2 and the SFR have reduced off-Site migration of contamination in the B and C zones. In 1992, a third recovery well, RW-3, was installed and began operation at the Necco Park Site. Well RW-3 penetrates the D, E, and F zones, is located at the center of the southern Necco Park property line, and is pumped at an average rate of 3.5 to 4 gpm. When well RW-3 is pumped continuously, a shallow cone of depression extending throughout the central portions of the Necco Park property is observed in the D, E, and F zones.

Annual groundwater sampling and analytical testing is conducted at 38 monitoring wells on or near the Necco Park property. Groundwater monitoring systems are currently in place at the CECOS and BFI facilities, in accordance with State and federal regulations, to assure protection of human health and the environment as a result of operation of those facilities.

Investigations

A number of supplemental investigation and remedial studies needed to design and implement a remedial program were conducted from 1984 to 1988. DuPont and EPA agreed to a Consent Decree (as a settlement of a civil action filed by DuPont in federal district court seeking judicial review of an Administrative Order issued by EPA under Section 3013 of the Resource Conservation and Recovery Act (RCRA)) that specified additional investigations pertaining to the Necco Park Site. The Consent Decree was entered by the court in January 1988. DuPont had commenced most of the work required by the Consent Decree before it was entered into judgment, and the work specified in the Consent Decree was completed by February 1989. This work included: an evaluation of existing monitoring wells; monitoring well seal verification; installation of new monitoring wells; development of a geologic report; characterization of vertical fracturing (lineament study); development and refinement of a Site-specific indicator parameter list for groundwater and NAPLs; groundwater and NAPL sampling; a man-made passageway investigation; an historic drainageway investigation;

and development of a health and safety plan. The results of these investigations are presented in the Necco Park Interpretive Report (Woodward-Clyde (WCC) 1991). EPA approved the Interpretive Report in July 1992.

In October 1989, an Administrative order on Consent pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) was signed by EPA and DuPont. This Order required DuPont to conduct additional investigations beyond those performed pursuant to the 1988 Consent Decree, and to analyze remedial alternatives to address the contamination at the Site. These investigations included: additional groundwater monitoring; sampling for 2,3,7,8-tetrachlorodibenzodioxin (2,3,7,8-TCDD); further investigation of vertical fracturing (lineament investigation); assessment of the current remedial actions; sampling of underground man-made passageways; and further assessment for the presence of NAPLs. This work began in May 1991 and was completed in September 1992. The results of these investigations are presented in the Necco Park Investigation Report (IR, WCC 1993) . EPA approved the Investigation Report in May 1994.

Based on the information collected during the investigation and from previous investigations, EPA performed a Risk Assessment which examined the potential human health and environmental risks attributable to the contaminants present at the Site. EPA considered both present risks and potential future risks from the Site. A summary of the Risk Assessment is presented below.

An analysis of alternatives was then conducted to identify, develop, screen, and evaluate response action alternatives to address the contamination and potential health risks identified by the Necco Park Investigation and EPA's Risk Assessment and Addendum to the Risk Assessment. This analysis of remedial alternatives is presented in the Analysis of Alternatives (AOA) Report. The AOA Report was approved by the EPA in June 1996.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The IR, AOA Report, and the Proposed Plan for the Site were released to the public for comment on July 22, 1996. These documents were made available to the public in the administrative record file at the EPA Docket Room in Region II, New York and the information repository at EPA's Public Information Office, 345 Third Street, Suite 530, Niagara Falls, New York. The notice of availability for the above-referenced documents was published in the "Niagara Gazette" on July 22 and July 24, 1996. The public comment period was held from July 22, 1996 to August 20, 1996. In response to a request, the comment period was extended 30 days to September 19, 1996. A notice was published in the Niagara Gazette on August 23, 1996 announcing the extension of the public comment period.

On August 13, 1996, EPA and NYSDEC conducted a public meeting at the Best Western Inn on the River, 7001 Buffalo Avenue, Niagara Falls, New York to inform local officials and interested citizens about the Superfund process, to review current and planned remedial activities at the Site, and to respond to any questions from area residents and other attendees. Responses to the comments received at the public meeting and in writing during the 1996 public comment period are included in the Responsiveness Summary, Part I (see Appendix V).

The nature of the comments received during the 1996 public comment period were unsupportive both from the general public, who felt the preferred alternative was not comprehensive enough, and from DuPont, which felt that additional remedial actions were not necessary. As a result, EPA reconsidered the preferred alternative. Following discussions with DuPont, and keeping the comments of the general public in mind, EPA developed a modified preferred alternative that is fully protective of human health and the environment and is supported by DuPont in its commitment to implement the modified remedy.

The modified preferred alternative was detailed in a Revised Proposed Plan. This document was released to the public for comment on February 28, 1998, along with the Responsiveness Summary, Part I, from the 1996 comment period. These documents were made available for review in the administrative record file at the information repositories at EPA's Region II office and at EPA's Niagara Falls Public Information Office. The notice of availability for the Revised Proposed Plan was published in the "Niagara Gazette" on February 28, 1998. The public comment period was held from February 28, 1998 to March 29, 1998. In response to a request, the comment period was extended 60 days to May 28, 1998. A notice was published in the Niagara Gazette on March 30, 1998 announcing the extension of the public comment period.

On March 12, 1998, EPA conducted a second public meeting at the Best Western Inn on the River to inform local officials and interested citizens about the modified preferred alternative and to respond to any questions from area residents and other attendees. Responses to the comments received at the public meeting and in writing during the 1998 public comment period are included in the Responsiveness Summary, Part II (see Appendix VI) , which is part of this ROD. This decision document represents the selected remedial action for source control for the DuPont Necco Park Site in Niagara County, New York, chosen in accordance with CERCLA, as amended, and to the extent practicable, the NCP. The decision for this Site is based on the administrative record.

SCOPE AND ROLE OF OPERABLE UNIT

In order to evaluate various alternatives and deal with the most contaminated areas at the Site first, the Site was subdivided into two areas of concern:

- The Source Area: An area associated with Necco Park acting as a continuing source of constituent migration to the downgradient aqueous environment was identified. The primary criterion for defining the source area was the areal extent of free-phase or residual DNAPL. To be conservative, in addition to areas where DNAPLs were observed to be present, areas where aqueous constituent levels might theoretically indicate the presence of DNAPLs were included using various solubility criteria. The source area, therefore, includes: the 24-acre Necco Park landfill itself, areas where DNAPLs have been observed to be present, and areas where the concentration of aqueous phase contaminants in the groundwater indicate that DNAPL may be present (Figure 8).

- Far-field Area: The far-field is the large area outside the source area (Figures 9-15) where chemical constituents attributable to the Necco Park Site have been found to have contaminated the groundwater. The far-field aqueous plume is defined as the plume of dissolved contaminants downgradient of the source area. Transport modeling of dissolved constituents was conducted to supplement available monitoring well data to estimate horizontal spreading in the far-field.

This ROD addresses the source area. The EPA is proposing this action to eliminate or reduce the contribution of DNAPLs, contaminated soil and bedrock, and contaminated groundwater in the source area to the degradation of the groundwater quality in the far-field. The IR identified groundwater at the Necco Park Site above NYS groundurater quality standards, NYS drinking water standards and federal maximum contaminant levels (MCLs). The IR has also identified soils on the property that need to be addressed to protect the groundwater quality. Therefore, the selected remedy will implement hydraulic control/containment of the groundwater and DNAPLs in the source area (with the option of including physical control/containment for the A zone), and the physical containment of soil in the source area. Further characterization of the groundwater in the far-field area will be performed to determine the effectiveness of the source control remedy in eliminating further contribution to the far-field area and determine the ability of natural attenuation to achieve the groundwater standards in the far-field.

The EPA and NYSDEC are currently coordinating activities concerning the groundwater contamination that is present at other sites in the Niagara Falls area and adjacent to Necco Park. These sites are being managed by using source control measures (e.g., groundwater pump and treat, capping, etc.) as well.

SUMMARY OF SITE: CHARACTERISTICS

The IR, combined with previous studies, resulted in the characterization of the environmental conditions at the Necco Park Site. Sampling of all media including air, soil, surface water, sediment and groundwater has identified areas of potential environmental concern. The following briefly summarizes the results of the sampling conducted during the Investigation:

Soil Vapor: The potential for volatile organic contaminant (VOC) vapors to infiltrate basement structures in the downgradient communities was examined in an attachment to the Risk Assessment. Based on actual contaminant levels in groundwater, modeling was performed to estimate the concentrations of vapors that could potentially infiltrate basements. The results of the contaminant vapor analysis did not indicate any current potential for VOC vapors in the soil or groundwater to pose a human health risk via basement

infiltration.
Drainage Swale Sedimentg: The sediments from the drainage swales contained very low levels (low parts per billion (ppb) range) of chemicals associated with surface water runoff before the landfill was capped. These sediments contained contaminants at levels below concentrations considered protective of groundwater. On at least one occasion, the sediments have been excavated, tested, and disposed of properly.

Surface Water: The surface water existing in the drainage swales in between the Necco Park landfill and the CECOS/BFI landfills contained very low levels (low ppb range) of chemical constituents due to surface water runoff from the landfill areas.

Soils and DNAPLs: The soils at the Necco Park landfill are known to contain a variety of contaminants associated with past disposal of industrial and hazardous wastes. Soil borings were performed at more than 90 locations across the Necco Park property fot the installation of monitoring wells and recovery wells, DNAPL investigations, and soil characterization. The investigation identified occurrences of chemicals in the surface soil throughout the Necco Park property. Soils in specific areas of the former landfill on the Necco Park property contained DNAPLs. The soil borings performed to date indicate the presence of DNAPLs in the southeastern and western portions of the Necco Park property. The presence of contaminants and DNAPLs in the soils constitutes a threat to groundwater (i.e., contamination levels are sufficiently high such that potentially contaminants can continue to go into solution and enter the groundwater system). The soils and DNAPLS in the source area represent "hot spots" or concentrated areas of contamination which act as continuing sources of groundwater contamination.

Groundwater: A total of approximately 150 monitoring wells have been installed at the Site. Some of these wells were installed prior to, and some were installed as part of, the Investigation. Based on the sampling conducted prior to, and during the Investigation, the evidence indicates that groundwater beneath the Necco Park property contains chemical constituents above NYS drinking water standards, NYS groundwater quality standards and EPA MCLs. Groundwater containing Site indicator parameters (Table 1 is moving downgradient from the Necco Park property. In the upper bedrock zones (B and C zones), groundwater flows to the south southwest, and in the lower bedrock zones (D through G zones), groundwater flows to the west (Figures 9 - 15). Concentrations of Site indicator parameters in the groundwater are very high (high parts per million (ppm) range) directly beneath, and immediately adjacent to, the Necco Park property. Chemical concentrations diminish as the groundwater flows south and west away from the property. Available information from the IR and other previous studies indicates there are regional occurrences of chloroethylenes and that additional sources of these contaminants are present outside the extent of the Necco Park property.

Man-made Passageway: Several man-made passageways (i.e. sewers, sumps, etc.) were sampled including: the 61st Street sewer, dewatering sumps at Great Lakes Carbon, John Street tunnel, Falls Street tunnel, New Road tunnel and the New York Power Authority (NYPA) conduit drain system. The 61st Street sewer samples contained only chloroform at very low (<10 ppb) levels. VOCs were detected up to a maximum of 160 ppb in four of five of the Great Lakes Carbon sumps that penetrated the upper bedrock (B zone) No VOCs were detected in the sumps that penetrated only the overburden. The John Street Tunnel had no Site indicator parameter detections; however, other organic compounds including 2-butanone, acetone, and bis(2-ethylhexyl)phthalate were detected. A variety of organic compounds were detected in both the Falls Street Tunnel and the New Road Tunnel up to a maximum of 140 ppb, includingseveral Site indicator parameters. Several Site indicator parameters were also detected in all three of the NYPA drain system monitoring wells sampled. Concentrations of organic compounds detected ranged from 0.13 to 1,100 ppb.

Hydrogeolocry: The geologic units beneath the Necco Park Site (in descending order from the ground surface) are: unconsolidated overburden, the Lockport Formation, and the Rochester Shale Formation. A series of horizontal bedding-plane fracture zones in the Lockport Formation similar to those described for the region has been delineated at the Site. These fracture zones behave as separate and hydraulically distinct water-producing units. Letter designations were assigned to these principal water-bearing zones as follows: the A zone refers to saturated overburden and the B, C, CD, D, E, F, and G zones refer to identified Lockport Formation bedding-plane fracture zones (Figure 5). The interface between the basal member of the Lockport Formation and Rochester Shale is defined as the J zone. Based on hydraulic conductivity testing, the J zone was determined not to be a significant water-producing zone.

Groundwater in the A zone generally flows vertically downward, feeding the bedrock aquifers.

Groundwater in the B and C zones generally flows to the south in areas beyond the radius of influence of the operational recovery well system.

Groundwater in the D, E, F, and G zones generally flows in a westerly direction toward the NYPA power conduit drainage system.

The piezometric map for the G zone generally indicates that hydraulic gradients are very low. The primary flow direction appears to be west/northwest toward the groundwater discharge boundary at the NYPA conduit drainage system.

The groundwater aquifer in the Niagara area is classified by the State as class GA fresh groundwaters. As defined in NYCRR, Title is 6, Part 701.15, the best usage of Class GA fresh groundwaters is as a source of potable water supply. However, groundwater sources currently are not used for domestic purposes in the Niagara region because of the proximity to the large fresh water supply of the Niagara River.

The regional groundwater quality of the Lockport Formation has been heavily affected by industrial sources of contamination. In addition to the Necco Park Site, numerous other major sites have been identified as contributing to groundwater contamination in the region.

Man-made Passageway Capture Zones: Groundwater flow in the bedrock regime is greatly influenced by a number of man-made features. These include water transport and storage structures related to the NYPA Robert Moses Power Project, several sewers and tunnels excavated into bedrock and the overburden, bedrock grouting, and groundwater extraction. Each of these features has varying effects on regional and near-Site groundwater flow.

Components having the greatest effect are the NYPA conduits and conduit drain system, which transport water north to the Robert Moses Power Generating Station; the Forebay Canal, an L-shaped excavation linking the conduits to the generating station; the storage reservoir, a 2.97-square-mile surface impoundment east of the Forebay Canal (Figure 4); and the Falls Street tunnel, an unlined sewer in the upper bedrock of the Lockport formation.

Based on all available data, B and C zone groundwater leaving Necco Park flows south towards the Falls Street tunnel and D through G zone groundwater flows west towards the NYPA conduit drain system. A portion of the groundwater that collects in the drain system west of Necco Park discharges to the Falls Street tunnel through bedrock fractures and is conveyed through the tunnel for treatment at the Niagara Falls POTW.

At a minimum, an undetermined amount of groundwater flowing south from the Necco Park Site in the B and C zones has the potential to, or does, enter the Falls Street tunnel. Currently, 100% of dry weather flow in the tunnel goes to the POTW . However, a portion of the wet-weather flow in the Falls Street tunnel bypasses the POTW and discharges directly to the Niagara River.

Groundwater flowing west from Necco Park in the D through G zones has the potential to, or does, enter the NYPA conduit drain system. There was a direct hydraulic connection between the NYPA conduit drain system and the Falls Street tunnel where the two structures cross. This connection was grouted by the City of Niagara Falls in 1989. Notwithstanding this grouting project, it is believed that water from the drainage system continues to enter the Falls Street tunnel at, and in the vicinity of, this intersection which is located southwest of Necco Park. However, there is currently insufficient information to determine whether the direction of flow in the NYPA conduit drain system is towards the Falls Street tunnel on a continual basis. It is believed that fluctuations in water used by the NYPA create changes in flow direction in the NYPA conduit drainage system. Therefore, any groundwater contamination from the Site that may enter the conduit drainage system has the potential to flow either to the north where it may discharge to the Forebay Canal through bedrock fractures, or to the south where at least a portion of the water enters the Falls Street tunnel.

Loadings to the Niagara River and Lake Ontario: As stated previously, an unquantified portion of the contaminated groundwater from the Site enters the Niagara River which flows into Lake Ontario. During the 1970s, it became apparent that pollution caused by persistent toxic substances was harming Great Lakes species and posing risks to human and wildlife consumers of fish. Accordingly, the United States and Canada entered into the Great Lakes Water Quality Agreement of 1978 which committed the two countries to the "virtual elimination" of persistent toxic substances in the Great Lakes ecosystem.

In 1987, the four environmental agencies representing the federal, state, and provincial governments in the United States and Canada entered into the Four-Party Agreement which committed the governments to the overall reduction of toxic chemical loadings to the Niagara River. In particular, the parties committed to an interim goal for the reduction by 50 percent of the total point and non-point source loadings of persistent toxic chemicals of concern entering the Niagara River by 1996.

In 1987, portions of the groundwater from at least seven hazardous waste sites, including the Necco Park Site, had infiltrated the Falls Street tunnel and was discharged from the tunnel directly to the Niagara River without treatment. The Falls Street tunnel was reconnected to the Niagara Falls POTW in 1989 with a diversion of part of the flows in the tunnel to the POTW. Since 1993, all dry-weather flow and an unquantified amount of flow from storm events in the Falls Street tunnel is directed to the POTW, where it is treated prior to discharge to the Niagara River. The rediversion of Falls Street tunnel flows to the POTW constituted one of the most significant reductions in loadings to the Niagara River towards attainment of the interim goal of 50 percent reduction of persistent toxic chemicals of concern to the Niagara River.

To accomplish the final objective of "virtual elimination", the International Joint Commission in 1990 urged the United States and Canada to develop "a comprehensive, binational program to lessen the uses of, and exposure to persistent toxic chemicals found in the Great Lakes environment." Since that time, both countries have undertaken their own virtual elimination efforts. In addition, in February 1995, Prime Minister Chretien and President Clinton confirmed the commitment by the U.S. and Canada to work together to develop a binational strategy to reduce and eventually eliminate the input of the most persistent toxic substances in the Great Lakes environment. The binational strategy was approved for implementation by Environment Canada and EPA in 1997.

Groundwater and DNARLs: Two different groundwater areas have been defined for purposes of evaluating remedial options in the Necco Park AOA: a DNAPL zone (source area) and a dissolved contamination zone (far-field area).

Source Area Definition:

The source area has been defined as the area associated with Necco Park acting as a continuing source of constituent migration to the downgradient aqueous environment. The primary criterion for defining the source area was the areal extent of free-phase or residual DNAPL. To be conservative, areas where aqueous constituent levels might theoretically indicate the presence of DNAPL were included using various solubility criteria.

The Necco Park source area is presented in Figure 8. This defined area is considered the source of the far-field aqueous plume for purposes of defining the far-field area.

Far-Field Area Definition:

The far-field area is defined as the aqueous plume of dissolved VOCs downgradient of the source area. Figures 9 through 15 show the estimated extent of dissolved contamination for the A through G zones, respectively. To evaluate remedial alternatives for the far-field, the extent of dissolved constituents was derived using transport modeling to supplement available monitoring well data to estimate horizontal spreading in the far-field.

Nature and Extent of Contamination: As part of the 1988 Consent Decree, a list of indicator parameters for the Necco Park Site was identified (Table 1). Overburden, bedrock, and groundwater at the Site have been impacted by past waste disposal activities. Most groundwater contamination at the Site is the result of the

dissolution of disposed chlorinated organic liquids. DNAPLs have been observed and recovered from wells in and near the Necco Park property. Inorganic constituents disposed of at the Site are also present in groundwater.

Groundwater in and near the Necco Park Site has been impacted by organic compounds, primarily chlorinated VOCs and semivolatile organic compounds (SVOCs).

No other media associated with the Site (air, sediment, or surface water) have been shown to be significantly contaminated.

In summation, the results of the Investigation conducted at the DuPont Necco Park Site indicate the past disposal activities has contaminated the soils, bedrock and groundwater at the Site. Sampling indicates the presence of volatile organic, semi-volatile organic and inorganic contaminants in the form of DNAPLs and APLs in the landfill and adjacent soils as well as in the bedrock above levels considered protective of groundwater quality. These constituents have contaminated a large area of groundwater beneath and downgradient of the Necco Park landfill.

SUMMARY OF SITE RISKS

The following Tables are included in Appendix II for the risk assessment discussion below:

Table 2a:

Contaminants of concern are included in Table 2a.

Table 2b:

Exposure pathways considered, pathways quantitatively evaluated clearly distinguishing between current and future land-uses, populations evaluated (i.e., children, adults) and the rationale for selection or exclusion of a pathway.

Table 2c:

Noncarcinogenic toxicity values-oral and inhalation and subchronic, if applicable and sources of toxicity information.

Table 2d:

Noncarcinogenic risk estimates for each exposure pathway and receptor assessed. Total Site risk.

Table 2e:

Carcinogenic toxicity values - oral and inhalation, if applicable and sources of toxicity information.

Table 2f:

Carcinogenic risk estimates for each exposure pathway and receptor assessed.

Table 2g:

Contaminants of concern used in the environmental evaluation (assessment of risk to non-human receptors).

Table 2h:

List of exposure assumptions.

Table 2i:

List of species in ecologically significant habitats.

Table 2j:

Estimated concentration of groundwater contaminants discharged to the Niagara River through the Falls Street tunnel (before Niagara River dilution).

Table 2k:

Estimated concentration of groundwater contaminants discharged to the Forebay Canal through the NYPA conduit drain system.

Table 2l:

Estimated concentration of groundwater contaminants discharged to the Niagara River through the Falls Street tunnel and the Forebay
Canal.

Table 2m:

Surface water ecological risk summary.

Based upon the results of the IR and previous reports, a baseline risk assessment was conducted to estimate the risks associated with current and future Site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the Site if no remedial action were taken. Some of the groundwater contamination from the Site has the potential to enter the Niagara River and ultimately Lake Ontario. Contamination of the fish and ecosystem in the Lake Ontario basin has been an ongoing concern to both the United States and Canada and has resulted in a strategy to "virtually eliminate" persistent toxic substances that affect or have the potential to affect the Great Lakes ecosystem. It is important to note that the risk assessment evaluated the risks from the Necco Park Site contaminants only. Total ecological risks or synergistic effects posed from other contaminants present in the Niagara River and Lake Ontario basin were not evaluated.

EPA conducted a baseline risk assessment to evaluate the potential risks to human health and the environment associated with the DuPont Necco Park Site in its current and future states. The Risk Assessment focused on contaminants in the groundwater which are likely to pose significant risks to human health and the environment. Air, surface water, sediments, soils and biota (fish) were also evaluated. The summary of the contaminants of concern (COC) in sampled matrices are listed in Table 2a for human health receptors and Table 2g for environmental receptors.

Human Health

EPA's baseline risk assessment addressed the potential risks to human health by identifying several potential exposure pathways by which the public may be exposed to contaminant releases at the Site under current and future land-use conditions. Air, soil, sediment, surface water, and groundwater exposures were assessed either qualitatively or quantitatively for both present and future land use scenarios. As discussed above, groundwater can be found in several different bedrock zones (B-G zones, Figure 5). Since some of these zones are hydraulically similar, the risk assessment grouped several of these bedrock zones together for the purposes of the risk characterization. The groundwater pathway was divided into three groups: the A-C zones (overburden and upper bedrock), the D-F zones (middle bedrock) and the G zone (lower bedrock). The contaminants of concern for human health receptors are listed in
Table 2a.

The current land-use scenario quantitatively evaluated the potential for volatilization of groundwater contaminants into the basements of residents. The current land-use scenario qualitatively evaluated ingestion of, and dermal contact with, Necco Park drainage ditch sediments by Site workers and trespassers. The current land-use scenario also qualitatively evaluated ingestion of, and dermal contact

with, Niagara River surface water. Finally, the current land-use scenario considered the ingestion of fish from the Niagara River by residents. The exposure pathways considered under current and future uses are listed in Table 2b. The reasonable maximum exposure was evaluated.

The future land-use scenarios quantitatively valuated the groundwater ingestion, inhalation and dermal contact pathways for adult residents. A list of exposure assumptions for these scenarios are listed in Table 2h. Inhalation of volatile vapors from groundwater infiltrating basements was qualitatively evaluated. Necco Park drainage ditch sediment ingestion and dermal contact as well as dermal contact with the drainage ditch surface waters by Site workers and trespassers were evaluated qualitatively under the future land-use scenario. Ingestion and dermal contact of Niagara River surface water were also qualitatively evaluated under the future land-use scenario. Finally, the future land-use scenario considered the ingestion of fish from the Niagara River by residents.

Under current EPA guidelines, the likelihood of carcinogenic (cancer-causing) and noncarcinogenic effects due to exposure to Site chemicals are considered separately. It was assumed that the toxic effects of the Site-related chemicals would be additive.

Thus, carcinogenic and noncarcinogenic risks associated with exposures to individual compounds of concern were summed to indicate the potential risks associated with mixtures of potential carcinogens and noncarcinogens, respectively.

Noncarcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and safe levels of intake (Reference Doses). Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects. RfDs, which are expressed in units of mg/kg-day, are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). The reference doses for the compounds of concern at the Site are presented in Table 2c. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) are compared to the RfD to derive the Hazard Quotient for the contaminant in the particular medium (The Hazard Quotient acquires a numerical value by dividing the cronic daily intake (CDI) by the RfD.) The HI is obtained by adding the hazard quotients for all compounds across all media that impact a particular receptor population.

An HI greater than 1.0 indicates that the potential exists for noncarcinogenic health effects to occur as a result of Site-related exposures. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. A summary of the noncarcinogenic risks associated with these chemicals across various exposure pathways is found in Table 2d.

It can be seen from Table 2d that the HIs for noncarcinogenic effects from groundwater ingestion under the reasonable maximum exposure for adults in the three different groundwater pathways are 1 X 10 4 (10,000) for the A-C zones (upper bedrock), 3 x 10 3 (3,000) for the D-F zones (middle bedrock) and 1 x 10 2 (100) for the zone (lower bedrock). Therefore, noncarcinogenic effects may occur from the exposure routes evaluated in the Risk Assessment. The noncarcinogenic risk was attributable to several compounds including carbon tetrachloride, chloroform, trichloroethane, cis-1,2-dichloroethene, barium and 1,1,2-trichloroethane. HIs were also generated for dermal contact with the groundwater from the contact for the upper, middle and lower bedrock zones were calculated to be 3 X 10 3 (3000), 9 X 10 2 (900) and 3 x 10 1 (30), respectively. Noncarcinogenic risk associated with inhalation of volatilized groundwater contaminants could not be determined because there are no EPA-approved inhalation toxicity values (RfDs) for the contaminants detected.

Potential carcinogenic risks were evaluated using the cancer slope factors developed by EPA for the contaminants of concern. Cancer slope factors (SFs) have been developed by EPA's Carcinogenic Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. SFs, which are expressed in units of (mg/kg-day) -1, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an upper-bound estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes

the underestimation of the risk highly unlikely. The SF for the compounds of concern are presented in Table 2e.

For known or suspected carcinogens, EPA considers excess upper-bound individual lifetime cancer risks of between 10 -4 to 10 -6 to be acceptable. This level indicates that an individual has not greater than approximately one in ten thousand to one in a million chance of developing cancer as a result of Site-related exposure to a carcinogen over a 70-year (i.e., lifetime) period under specific exposure conditions at the Site.

Under the future land-use scenario, the excess lifetime cancer risks for adult residents exposed to the highest levels of contaminants by ingesting the contaminated groundwater exceeded 1 in 100 for the A-C zones, the D-F zones and the G zone. Carcinogenic risks attributable to inhalation of volatilized contaminants (such as would occur during a shower) also exceeded 1 in 100 for the upper, middle and lower bedrock zones. Carcinogenic risk from dermal contact with the contaminated groundwater was also evaluated. Contact with groundwater from the upper, middle and lower bedrock zones yielded excess cancer risks of greater than 1 in 100 (upper and middle bedrock) and 6 x 10 -3 (6 in 1000, lower bedrock), respectively. All of these calculated carcinogenic risk numbers are considered above EPA's acceptable excess cancer risk. The carcinogenic risk estimates are summarized in Table 2f.

The results of the baseline risk assessment indicated that the current use of groundwater was not a risk since no one is believed to use the groundwater for domestic purposes. However, future potential carcinogenic and noncarcinogenic risks from using the groundwater were determined to be significant. on the Necco Park property, current and future worker/trespasser exposures from soil ingestion, inhalation and dermal contact scenarios were not considered because the Site is capped, access is restricted, disturbance is expected to be minimal and historical data indicate that the site does not contribute significantly to airborne contaminant levels. Current and future worker/trespasser exposure to Site drainage ditch sediments via ingestion and dermal contact, and exposure to drainage ditch surface waters via dermal contact were also not considered significant for the same reasons. Ingestion and dermal contact risks for Niagara River surface waters were determined to be minimal due to the dilution of Necco Park contaminants in the river and the infrequent exposure of individuals that would likely occur. Exposure to contaminated biota (i.e., ingestion of fish) is possible, however, the dilution of Necco Park constituents combined with low exposure frequency minimize human health risks from this Site alone.

Ecological

Potential risks to the environmental receptors associated with the DuPont Necco Park Site were identified in the ecological risk assessment. The ecological risk assessment identified no species, sensitive environments/resources as potential receptors at the facility threatened by the Site contaminants under current Site conditions. The reasonable maximum environmental exposure is evaluated. A four-step process is utilized for assessing Site-related ecological risks for a reasonable maximum exposure scenario: Problem Formulation--a qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study. Exposure Assessment--a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations. Ecological Effects Assessment -– literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors. Risk Characterization--measurement or estimation of both current and future adverse effects.

The ecological risk assessment began with habitat and species characterization. The Necco Park property is not considered a unique or significant habitat. The 24-acre Site is capped with an overlying grass cover that is regularly maintained through mowing. However, regionally significant habitats that may be impacted by Necco Park contaminants are present within 1.5 miles of the Site. Areas of ecological significance include the Niagara River, Niagara Gorge and Lake Ontario. A variety of species that inhabit these areas were then identified (Table 2i).

The primary medium of concern for the characterization of ecological risk at the Necco Park Site is

downgradient surface water that may be impacted by Site contaminants transported by groundwater and man-made structures. Possible exposure pathways for ecological receptors include: ingestion of contaminated biota in the food chain and, contact with and/or ingestion of surface water contaminants. Surface soils at the Site are not expected to represent a significant exposure medium as the former landfill has been covered by a clay cap. The cap likely precludes exposure of the identified receptor species.

The contaminants of concern identified in Table 2g were assumed to travel through the groundwater and ultimately two different discharge locations to surface water habitats. Groundwater in the A-C zones would flow south and into the Falls Street tunnel while the groundwater in the D-G zones would flow west to the NYPA conduit drain system. Water in the Falls Street tunnel was assumed to discharge directly to the Niagara River (*This risk assessment was performed before any diversion of the Falls Street tunnel flow to the Niagara Falls POTW was occurring, and is therefore, conservative). Water in the conduit drain system was assumed to flow north and discharge to the Forebay Canal through bedrock fractures. The concentrations of contaminants reaching the Falls Street tunnel, Forebay Canal and the Niagara River are presented in Tables 2j, 2k and 2l.

Risks to ecological receptors were assessed quantitatively by modeling Necco Park groundwater contaminant concentrations reaching the area of the Niagara River at two locations: the Forebay Canal adjacent to the Robert Moses Powerplant, and the Falls Street tunnel outlet to the river.

Potential risks to ecological receptors from estimated surface water concentrations of contaminants were assessed by comparing exposure point concentrations with criteria/guidelines. This comparison (expressed as a risk index) was calculated for each contaminant of concern. If the calculated Risk Index is greater than one, it indicates that biota may be at risk of an adverse effect from that contaminant within that exposure medium. A total risk index was also calculated for each exposure medium by summing chemical-specific risk indices. If the total risk index is greater than one, this indicates that exposure to all contaminants of concern within one medium may pose a risk to organisms. The Risk Indices are presented in Table 2m.

Potential hazards to aquatic organisms present within the surface waters of the Falls Street tunnel discharge, Forebay Canal and Niagara River were assessed by comparing mean and maximum exposure point concentrations of contaminants with Ambient Water Quality Criteria (AWQC) or toxicity effect levels (when AWQC were not available).

Estimated mean and maximum contaminant concentrations within the Forebay Canal and Niagara River are several orders of magnitude below acute and chronic ambient water quality criteria. Mean concentrations of contaminants within the Falls Street tunnel discharge to the Niagara River are also below acute ambient water quality criteria. Maximum concentrations of hexachlorobutadiene, pentachlorophenol, and cyanide within the Falls Street tunnel discharge are slightly above acute criteria, and average maximum concentrations somewhat exceed (Federal and State of New York) chronic criteria. However, adverse impacts to aquatic biota are not expected within the Niagara River as a result of additional contaminant dilution with the Niagara River water volume. Pentachlorophenol, hexachlorobenzene, and hexachlorobutadiene represent Necco Park contaminants that are known to bioaccumulate within aquatic receptor species. However, estimated fish tissue concentrations calculated from the concentrations of these two contaminants within the Forebay Canal and Niagara River were determined to be several orders of magnitude below fish flesh criteria designed to protect piscivorous wildlife. The concentration of hexachlorobenzene within the Falls Street tunnel discharge yielded a mean fish tissue calculation above fish flesh criteria. It is unknown whether this discharge location represents a foraging area for wildlife receptor species.

The ecological risk assessment considered all potential exposure media for ecological receptors. Exposure of potential receptor species to surface soils and airborne contaminants was assumed to be insignificant due to the presence of the existing clay cap. Surface water and sediment contaminant risks associated with the Necco Park drainage ditch were not assessed because of the low levels of contaminants in those areas.

The risk assessment determined that the contaminated soils, groundwater, and surface water attributable to the Necco Park Site alone currently do not pose an unacceptable ecological risk. As discussed above, impacts to Lake Ontario or cumulative risks from this Site plus other sites in Niagara Falls were not

assessed. Future ecological impacts to the Niagara River may occur however, if remedial actions are not implemented.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data.

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the Risk Assessment provides upper-bound estimates of the risks to populations near the Site, and is highly unlikely to underestimate actual risks related to the Site.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the Risk AssessmentReport.

Actual or threatened releases of hazardous substances from this Site, if not addressed by the selected alternative or one of the other remedial measures considered, may present an imminent and substantial endangerment to the public health, welfare, and the environment.

RESPONSE ACTION OBJECTIVES

Response action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable, or relevant and appropriate requirements (ARARs) and risk-based levels established in the risk assessment.

The following RAOs were established for the Site:

Groundwater

The Risk Assessment has identified a number of COCs in the groundwater. These contaminants are listed in the Risk Assessment Summary section. The contaminants in the groundwater pose a future carcinogenic and noncarcinogenic health risk to residents who may reside downgradient (south and west) of the Necco Park Site. These contaminants in groundwater are subject to a number of regulations for cleanup and discharge. These regulations include the New York State Water Quality Regulations, specifically, 6 NYCRR and 10 NYCRR as well as federal Maximum Contaminant Levels (MCLs). A complete list of the ARARs is included in Table 3. The specific ARARs identifying the groundwater cleanup are presented in Table 4. The treatment of groundwater will also address compounds which are not COCs, but exceed the ARARs.

Therefore, the specific RAOs for groundwater are the reduction of risks to human health associated with potential exposure to Site related compounds by: reducing the quantity of source materials (i.e., DNAPLs) to the extent practicable; controlling the migration of groundwater downgradient from the Necco Park property and the source area; and attaining the groundwater cleanup criteria.

The RAO of attaining the groundwater cleanup criteria is only being applied to areas outside the source area (i.e., the far-field area). Due to the concentration of DNAPLs and contaminants in the soils and bedrock in the source area, and the complexities associated with remediation of DNAPLs in fractured bedrock, EPA does not anticipate that the RAOs can be achieved within the source area. Since waste materials are being left in place, and it is technically impracticable to achieve the RAOs for groundwater in areas where DNAPL has migrated, the groundwater ARARs are not expected to be met in the source area. Therefore, EPA is issuing a technical impracticability waiver of groundwater ARARs in the source area.

EPA's memorandum, Guidance for Evaluating the Technical Impracticability of Groundwater Remediation (OSWER Directive 9234.2-25, October 1993) recognizes that there are circumstances under which groundwater restoration may be technically impracticable. Presently, there are technical limitations in recovering DNAPL from soil and fractured bedrock. Even if all the soil containing DNAPLs at the Site were excavated, DNAPLs would still be present in the fractured bedrock. No present-day technology has been developed to completely remove DNAPLs from fractured bedrock. Because these residual DNAPLs would continue to contribute to aqueous phase groundwater contamination, restoration of the groundwater in the source area to ARARs is determined to be technically impracticable.

Landfill Soils

No human health risks associated with direct exposure to the contaminants remaining in Site soils are anticipated with the maintenance of the cap. However, contaminant concentrations in the landfill soils are above levels that would be protective of the groundwater quality. This means that, unless remediated or contained, the soil could continue to act as a source of contamination to the groundwater. The NYSDEC has developed procedures for determining soil cleanup criteria that it considers to be protective of groundwater quality. This procedure, established in NYSDEC's Technical and Administrative Guidance Memorandum (TAGM), will be used as a to-be-considered (TBC) goal in cleaning up soils at the Site (Table 5). The TBC values are not promulgated regulations and, therefore, are not considered ARARs. As TBCs, they are not enforceable standards but may be used as one of the criteria in determining whether the RAOs have been met.

Therefore, the RAOs for soils at the Site are the protection of the groundwater quality, and ultimately human health, through reduction of the source materials (i.e., DNAPLs) to the extent practicable, as well as limiting exposure to surficial soil contaminants.

DESCRIPTION OF REMEDIAL ALTERNATIVES

CERCLA º121(b)(1), 42 U.S. C. º9621 (b)(1) requires that each selected Site remedy be protective of human health and the environment, be cost-effective, comply with other statutory laws, and utilize permanent solutions, alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances. CERCLA º121(d), 42 U.S. C. º9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified.

This Record of Decision evaluates in detail, fourteen alternatives for addressing the contamination associated with the Necco Park Site. Construction time refers to the time required to physically construct the remedial alternative. This does not include the time required to negotiate with the responsible parties for the remedial design and remedial. action, or design the remedy.

The alternatives to address the contamination at the Site are as follows:

Alternative 1: No Action

Capital Cost: $ 0
0&M Cost: $ 0/year
O&M Present Worth Cost: $ 0
Total Cost: $ 0
Construction Time: No construction is required for the no action alternative.

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. This alternative has been included in order to provide a datum from which to evaluate the other alternatives. The no action alternative assumes that all present remedial activities at the Site will cease and that no additional actions will be taken at the Site to address groundwater contamination. Contaminated groundwater beneath the Necco Park property would continue to move uncontrolled, downgradient and potentially impact the Niagara River. Contaminated soils at the Site would not be addressed by this alternative either. This would allow contaminants to contribute to the degradation of the groundwater quality by leaching from the soils. No institutional controls would be implemented which would provide no control for groundwater use in the area or well restrictions. This alternative would not treat any quantity of the contaminated groundwater, requires no engineering components, treatment components, and has no costs associated with its implementation. The no action alternative is easily implemented as no effort would be required. The groundwater ARARs would not be met for this alternative.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 2: Existing Systems

Capital Cost: $ 271,785
O&M Cost: $ 1,658,325/year
O&M Present Worth Cost (30 years): $ 20,578,155
Total Cost: $ 20,850,000
Construction Time: This alternative would require less than one year to implement.

Alternative 2 consists of continuation of present response activities at the Necco Park Site. Groundwater recovery from the existing wells RW-1, RW-2, and RW-3 would continue at a rate of approximately 20 gpm. Extracted groundwater would be treated at the CECOS waste-water treatment plant (WWTP) and discharged to the POTW. Groundwater monitoring and the current DNAPL extraction program would continue. The grout curtain and cap would remain in place. The cap would continue to be maintained through mowing and repair of subsidence. Access controls (fencing and security personnel) would continue to be maintained. Utility drains would continue to intercept a portion of the far-field groundwater. Estimated percent reduction in loadings from the source area to the far-field, as compared to Alternative 1, would be 40%. Total groundwater to be pumped would be approximately 20 gallons per minute (gpm).

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternatives 3 through 13 all contain, as part of their remedy, the existing systems described in Alternative 2. The description for these alternatives includes components in addition to the existing systems that would be provided by these alternatives.

Alternative 3

Capital Cost: $ 2,780,899
O&M Cost: $ 1,669,025/year
O&M Present Worth Cost (30 years): $ 20,710,931
Total Cost: $ 23,492,000
Construction Time: It is estimated that the time required to upgrade the cap and install additional DNAPL

extraction wells would be less than one year.

Alternative 3 would include an upgrade of the existing clay cap to comply with the New York State regulations (6NYCRR, Part 360) for a landfill cap [hereinafter, "Part 360 (or equivalent) cap"] and additional DNAPL extraction through a dedicated recovery well. Also included under this alternative is the continued O&M of existing systems described in Alternative 2, above. Estimated percent reduction of loadings to the far-field is 40%. Total groundwater to be pumped is approximately 20 gpm.

Because this alternative may result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 4

Capital Cost: $ 5,094,136
O&M Cost: $ 1,933,650/year
O&M Present Worth Cost (30 years): $ 23,944,663
Total Cost: $ 29,089,000
Construction Time: The estimated time to construct this alternative would be less than one year.

Alternative 4 includes installation of a slurry wall in the overburden along the southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park facility. Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within Necco Park overburden, contain overburden groundwater, and function as collection points for DNAPL removal. This alternative would also include an upgrade of the existing clay cap, as necessary, to comply with requirements of a Part 360 (or equivalent) cap. Also included under this alternative is the continued O&M of existing systems described in Alternative 2, above. Estimated percent reduction in loading to the far-field is 40%. Total groundwater to be pumped is approximately 25 gpm.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 5

Capital Cost:	$ 6,530,587
O&M Cost:	$ 1,810,450/yr + $ 768,750 for Dual Phase Extraction (DPE) for 5 years
O&M Present Worth Cost:	The 30-year present worth cost is $ 22,465,874 + 5-year present worth cost of $ 3,152,029 for DPE
Total Cost:	$ 32,148,000

Construction Time: This alternative would require approximately one to two years to complete construction.

Alternative 5 consists of construction and operation of a dual phase extraction (DPE) system on the 24-acre Necco Park landfill. The DPE system consists of extraction wells, pumps, piping, and vapor- and liquid-phase treatment to remove and destroy organic constituents. The DPE system would also provide a level of hydraulic control through removal of groundwater from the A zone and upper bedrock zones. A pilot test would be required to determine the most effective design for a DPE system. This alternative assumes that the DPE system would be in operation for approximately five years and that the system would be shut down during November through March (DPE does not operate efficiently in extremely cold conditions). Also included under this alternative is groundwater recovery from wells RW-1, RW-2, and RW-3, groundwater treatment at CECOS, and groundwater monitoring. During operation of the DPE system, groundwater recovery rates from wells RW-1 and RW-2 may be reduced or halted because the DPE system would recover groundwater from upper bedrock zones. Once DPE operation is complete, total recovery rate from wells RW-1, RW-2 and RW-3 would be approximately 20 gpm. The cap would be upgraded upon completion of the DPE system. The current DNAPL extraction program would continue. The existing grout curtain would remain in place. The cap would be maintained to ensure integrity. Access controls (fencing and security personnel)

would continue to be maintained by CECOS. The utility drains would continue to intercept a portion of the far-field groundwater. Natural attenuation of far-field groundwater would continue to occur. Estimated percent reduction of loadings to the far-field is 40%. Total groundwater pumped would vary with the operation of the DPE system between 20-30 gpm.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 6

Capital Cost: $ 3,760,774
O&M Cost: $ 2,897,775/yr
O&M Present Worth Cost (30 year): $ 35,958,490
Total Cost: $ 39,719,000
Construction Time: This alternative would require less than one year to construct.

The goal of Alternative 6 is to reduce constituent loading to the far field by 80% compared to Alternative 1. Alternative 6 includes installation of additional recovery wells to increase the groundwater recovery rate to achieve an 80% reduction in constituent loadings to the far field compared to the no action alternative. The estimated total recovery rate to achieve the 80% reduction is approximately 70 gpm. Recovered groundwater would be treated at the CECOS WWTP and discharged to the POTW. In addition, a new, dedicated DNAPL extraction well would be installed. The cap would be upgraded in this alternative to meet Part 360 or equivalent standards through permeability testing and placement of additional low-permeability material as necessary. Also included under this alternative is the continued O&M of existing systems described in Alternative 2, above.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 7

Capital Cost: $ 6,074,011
O&M Cost: $ 3,162,400/yr
O&M Present Worth Cost (30 year):$ 39,242,222
Total Cost: $ 45,316,000
Construction Time: It is estimated that the time to construct this alternative would be approximately one year.

Under Alternative 7, a slurry wall would be installed in the overburden along the southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park facility. overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within Necco Park overburden, contain overburden groundwater, and function as collection points for DNAPL removal. Alternative 7 includes an increase in groundwater recovery rates to achieve an approximately 80% reduction in constituent loadings to the far field compared to Alternative 1. To increase groundwater recovery, additional recovery wells would be installed. Recovered groundwater would be treated at the CECOS WWTP and discharged to the POTW. The cap would be upgraded in this alternative to meet Part 360 or equivalent standards through permeability testing and the placement of additional low permeability material, as necessary. Also included under this alternative is the continued O&M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field is 80%. Total groundwater pumped is approximately 70-75 gpm.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 8

Capital Cost: $ 7,510,462

O&M Cost: $ 2,887,075/yr + $ 850,875 for DPE for 5 years
O&M Present Worth Cost: The estimated 30-year present worth cost is $ 35,825,714 + $ 3,448,758 5-year present worth cost for DPE
Total Cost: $ 46,825,000
Construction Time: It is estimated that the time to construct this alternative would be approximately one to two years.

Alternative 8 consists of construction and operation of a DPE system on the 24-acre Necco Park landfill. The DPE system consists of extraction wells, piping, and vapor- and liquid-phase treatment. The DPE system would remove groundwater from the A zone and upper bedrock zones. This alternative also includes an increase in groundwater recovery rates to achieve an approximate 80% reduction in constituent loading to the far-field compared to the no action alternative. To increase groundwater recovery, additional recovery wells would be installed. The estimated recovery rates to achieve an 80% reduction in constituent loading to the far-field compared to the no action alternative is 70 gpm. Recovered groundwater would be treated at the CECOS WWTP and discharged to the POTW. A pilot test would be required to determine the most effective design for a DPE system. This alternative assumes that the DPE system would be in operation for approximately five years and that the system would be shut down during November through March. The cap would be upgraded upon completion of the DPE system, as necessary. Also included under this alternative is the continued O&M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field is 80%. Total groundwater pumped would vary with the operation of the DPE system between 25-70 gpm.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 9

Capital Cost: $ 15,564,011
O&M Cost: $ 3,080,275/yr
O&M Present Worth Cost (30 year): $ 38,223,132
Total Cost: $ 53,787,000
Construction Time: It is estimated that one to five years would be required to construct this alternative.

Alternative 9 consists of installing a grout curtain in the bedrock (on the southern, southeastern, and southwestern boundaries of the source area) that would be tied into the existing grout curtain (also called the subsurface formation repair or SFR which was installed on the northern, northeastern and northwestern boundaries of the source area), around the source area, extending from the B through F zones (approximately 80 feet deep). Groundwater would be recovered in the B through F zones to maintain an inward hydraulic gradient across the curtain. Estimated flow rate to achieve an inward hydraulic gradient in the B through F zones in the source area is approximately 65 gpm.

Extracted groundwater would be treated at the CECOS WWTP and discharged to the POTW. Under this alternative, a slurry wall would be installed in the overburden along the southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park landfill. Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within the Necco Park property overburden, contain overburden groundwater, and function as collection points for DNAPL removal. Groundwater extraction from inside the grout curtain and slurry wall would result in total hydraulic control of source area groundwater in the A through F zones. The cap would be upgraded in this alternative to meet Part 360 or equivalent standards as necessary. Also included under this alternative is the continued O&M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field is 90%. Total groundwater pumped is approximately 65-75 gpm.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 10

Capital Cost: $ 7,837,136
O&M Cost: $ 4,614,775/yr
O&M Present Worth Cost (30 year): $ 57,264,743
Total Cost: $ 65,102,000
Construction Time: It is estimated that the time to construct this alternative would be approximately one year.

As with Alternatives 2 through 13, Alternative 10 consists of groundwater extraction from the existing wells RW-1, RW-2, and RW-3 as well as additional extraction to achieve total hydraulic control of the A through F zones in the source area. The approximate pumping rate required to create a complete hydraulic barrier in the A through F zones in the source area is 155 gpm. Treatment of the extracted groundwater from the source area, either on-site or off site, would be required to achieve the appropriate discharge requirements. Currently, groundwater extracted from the Site is treated at the adjacent CECOS wastewater treatment plant. Expansion of the CECOS facility would likely be required to accommodate the increased volume of water to be treated under this alternative. The need to either expand the CECOS facility, build an on-site facility, or utilize another off-site facility for groundwater treatment would be determined during the design. For costing purposes, it is assumed that recovered groundwater would be treated at the CECOS facility, expanded for the increased capacity, and discharged to the POTW. The CECOS WWTP has an available capacity of 110 gpm and would require expansion to treat the additional 50 gpm, at an estimated cost of $1,050,000 (this is included in the total cost). Under this alternative, a slurry wall would be installed along the southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park landfill. Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within Necco Park overburden, contain overburden groundwater, and function as collection points for DNAPL removal. Groundwater extraction from the B through F zones and overburden groundwater recovery would result in total hydraulic control of source area groundwater in the A through F zones. The cap would be upgraded under this alternative to meet Part 360 or equivalent standards as necessary. Also included under this alternative is the continued O&M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field is 95%. Total groundwater pumped is approximately 155-160 gpm.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 10A

For ease of reference, the modified preferred alternative described in the "Highlights of Community Participation" section of this ROD, is designated Alternative 10A. This alternative is essentially identical to Alternative 10, except that A zone containment may be achieved either hydraulically or by physical barrier (e.g., slurry wall, sheet pile) implementation. The capital cost figure cited below includes the construction cost of a slurry wall, estimated to be $1,335,000. If the slurry wall is not constructed, the capital cost would be reduced to $6,502,136, but the O&M Present Worth Cost would increase since more leachate would be generated in the overburden that would require collection and treatment. The increased O&M costs anticipated without a slurry wall were not estimated at this time. These anticipated costs will be calculated during the design phase of the remedy. The relative cost effectiveness of hydraulic and physical containment will be assessed at that time. Either alternative that is implemented will have to meet the performance standards for containment of groundwater in the A zone.

Capital Cost: $ 7,837,136
O&M Cost: $ 4,614,775/yr
O&M Present Worth Cost (30 year): $ 57,264,743
Total Cost: $ 65,102,000
Construction Time: It is estimated that the time to construct this alternative would be approximately one year.

As with Alternatives 2 through 13, Alternative 10A consists of groundwater extraction from the existing

wells RW-1, RW-2, and RW-3 as well as additional extraction to achieve total hydraulic control of the A through F zones in the source area. The approximate pumping rate required to create a complete hydraulic barrier in the A through F zones in the source area is 155 gpm (and possibly slightly higher if hydraulic containment is employed in the A zone). As described under Alternative 10, the treatment facility for the extracted groundwater would be determined in the design. For costing purposes, it is assumed that recovered groundwater would be treated at the CECOS facility, expanded for the increased capacity, and discharged to the POTW. The CECOS WWTP has an available capacity of 110 gpm and would require expansion, at an estimated cost of $1,050,000 (this is included in the total cost), to treat the additional 50+ gpm. Under this alternative, either groundwater extraction and treatment to achieve hydraulic containment in the overburden would be implemented or a physical barrier would be installed along the southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park landfill. Overburden collection wells would be installed in the landfill near the physical barrier to maintain an inward hydraulic gradient across the barrier, prevent mounding within Necco Park overburden, contain overburden groundwater, and function as collection points for DNAPL removal. Groundwater extraction from the B through. F zones and overburden groundwater recovery (either exclusively through hydraulic means or through slurry wall implementation) would result in hydraulic control of source area groundwater in the A through F zones. The cap would be upgraded in this alternative to meet Part 360 or equivalent standards. Also included under this alternative is the continued O&M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field is 95%. Total groundwater pumped under this alternative is approximately 155-160 gpm.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 11

Capital Cost: $ 9,354,723
O&M Cost: $ 4,421,575/year + $ 768,750 for DPE for 5 years
O&M Present Worth Cost: The estimated 30-year present worth cost is $ 54,867,324 + the 5-year present worth cost of $ 3,152,029 for DPE.
Total Cost: $ 67,374,000
Construction Time: It is estimated that the time to construct this alternative would be approximately one year.

Alternative 11 consists of construction and operation of a DPE system on the 24-acre Necco Park landfill. The DPE system consists of extraction wells, pumps, controls, piping, and vapor- and liquid-phase treatment. The DPE system would remove groundwater from the A zone and upper bedrock zones. This alternative includes an increase in groundwater recovery rates to achieve total control of source area groundwater in the A through F zones. The estimated recovery rate to achieve total hydraulic control in the source area is 160 gpm. As described under Alternative 10, the treatment facility for the extracted groundwater would be determined in the design. For costing purposes, it is assumed that recovered groundwater would be treated at the CECOS facility, expanded for the increased capacity, and discharged to the POTW. The CECOS WWTP has an available capacity of 110 gpm and would require expansion, at an estimated cost of $ 1,050,000 (this is included in the total cost), to treat the additional 50 gpm. A pilot test would be required to determine the most effective design for a DPE system. This alternative assumes that the DPE system would be in operation for approximately five years and that the system would be shut downduring November through March. The cap would be upgraded upon completion of the DPE system, as necessary. Also included under this alternative is the continued O&M of existing systems described in Alternative 2, above. Estimated reduction in loadings to the far-field is 95%. Total groundwater pumped would vary with the operation of the DPE system between 140-160 gpm.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 12

Capital Cost: $ 39,051,761
O&M Cost: $ 3,218,650/year
O&M Present Worth Cost (30 year): $ 39,940,228
Total Cost: $ 78,992,000
Construction Time: It is estimated that the time to construct this alternative would be approximately one to five years.

Alternative 12 consists of installing a grout curtain in the bedrock that would be tied into the existing grout curtain (also called the subsurface formation repair or SFR), around the source area, extending from the B through G zones (approximately 120 - 140 feet deep). A total pumping rate of approximately 70 gpm would be necessary to maintain an inward hydraulic gradient in the B through G zones within the source area. Extracted groundwater would be treated at the CECOS WWTP and discharged to the POTW. Under this alternative, a slurry wall would be installed in the overburden along the southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park facility. Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within Necco Park overburden, contain overburden groundwater, and function as collection points for DNAPL removal. Groundwater extraction from inside the grout curtain and slurry wall would result in total hydraulic control of source area groundwater in the A through G zones. The cap would be upgraded in this alternative to meet Part 360 or equivalent standards as necessary. Also included under this alternative is the continued O&M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field is 96%. Total groundwater pumped is approximately 70-75 gpm.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

Alternative 13

Capital Cost: $ 19,343,761
O&M Cost: $ 6,214,525/year
O&M Present Worth Cost (30 year): $ 77,116,041
Total Cost: $ 96,460,000
Construction Time: It is estimated that the time to construct this alternative would be one to five years.

Alternative 13 consists of installing a grout curtain in the bedrock that would be tied into the existing grout curtain (also called the subsurface formation repair or SFR), around the source area, extending from the B through F zones (approximately 80 feet deep). The grout curtain would be tied into the existing grout curtain. Groundwater would be recovered in the B through F zones to maintain an inward hydraulic gradient. The estimated flow rate needed to achieve an inward hydraulic gradient is 65 gpm.
Extracted groundwater would be treated at the CECOS WWTP and discharged to the POTW. Under this alternative, a slurry wall would also be in-stalled in the overburden along the southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park facility. Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within Necco Park overburden, contain overburden groundwater, and function as collection points for DNAPL removal. The goal of groundwater extraction from inside the grout curtain and slurry wall would be total hydraulic control of source area groundwater in the A through F zones. Groundwater would also be pumped from the far field in an effort to intercept and remove virtually all of the groundwater constituents from the Necco Park area prior to entering the NYPA conduit system. Approximately 400 gpm would be extracted in the far-field to attempt to intercept virtually all of the far-field groundwater. This water would be treated at the POTW. The cap would be upgraded in this alternative to meet Part 360 or equivalent standards as necessary. Also included under this alternative is the continued O&M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field is 96.5%. Total groundwater pumped is approximately 465-475 gpm.

Because this alternative would result in contaminants remaining on the Site above health-based levels, CERCLA requires that the Site be reviewed every five years.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative was assessed utilizing nine evaluation criteria as set forth in CERCLA º121, 42 U.S.C. º9621, the NCP, 40 CFR º300.430(e)(9) and OSWER Directive 9355.3-01. These criteria were developed to address the requirements of Section º121 of CERCLA to ensure all important considerations are factored into remedy selection decisions.

The following "threshold" criteria are the most important, and must be satisfied by any alternative in order to be eligible for selection:

1. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with ARARs addresses whether or not a remedy would meet all of the applicable, or relevant and appropriate requirements of federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

The following "primary balancing" criteria are used to make comparisons and to identify the major trade-offs between alternatives:

3. Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of a remedial technology, with respect to these parameters, that a 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 periods until cleanup goals are achieved.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed.

7. Cost includes estimated capital and operation and maintenance costs, and the present-worth costs.

The following "modifying" criteria are considered fully after the formal public comment period on the Proposed Plan is complete:

8. State acceptance indicates whether, based on its review of the RI/FS and the Proposed Plan, the State supports, opposes, and/or has identified any reservations with the preferred alternative.

9. Community acceptance refers to the public's general response to the alternatives described in the Proposed Plan and the IR/AOA reports. Factors of community acceptance to be discussed include support, reservation, and opposition by the community.

A comparative analysis of the remedial alternatives, based upon the evaluation criteria noted above, follows.

- Overall Protection of Human Health and the Environment

The no action alternative (Alternative 1) would not provide protection of human health because the contaminants in the landfill would continue to leach into the groundwater and therefore degrade the groundwater quality. The potential for exposure through the groundwater migration pathway would then

present a future potential human health risk. In addition, the existing cap would not be maintained under Alternative 1. The degradation of the existing cap would create the potential for individuals to come into direct contact with contaminants in the landfill.

Currently, the groundwater aquifer is not being used for public water supply, therefore no current unacceptable risk to human health exists for Alternatives 2 through 13. However, since the aquifer has been used as a source in the past, and is classified by the State as class GA fresh groundwater, a future potential risk does exist if someone were to use the aquifer for domestic purposes. Under the future residential-use scenario, all identified alternatives except for no action will reduce risk to varying degrees by reducing constituent loadings to the far-field and therefore the Niagara River. The risk reduction is the result of a reduction of constituent loading to the far-field through various techniques.

Alternatives 2 through 5 reduce the loadings to the far-field the least. Alternatives 6 through 8 provide a greater reduction in loadings while Alternatives 9 through 12 accomplish the largest reduction in loadings. Alternative 13 reduces loadings to the far field and captures all the contaminants in the far-field groundwater that are not contained in the source area. The loadings from the source area to the far-field for each alternative are quantified in Table 6 (It should be noted that the loadings for the remedial alternatives are estimates based on groundwater modeling performed for the AOA Report. These estimates are subject to errors inherent in the assumptions made in applying the models to a complex fractured bedrock system).

Contaminant levels in the source area will be similar for most of the alternatives as each, except for no action, employ DNAPL recovery through monitoring and extraction wells. However, because DNAPL in fractured bedrock and in overburden cannot be fully removed, residual DNAPLs will remain in the soil and bedrock for all alternatives.

Alternatives that include DPE (Alternatives 5, 8 and 11) will result in greater source removal, but the resultant effect on source area groundwater cannot be quantified. It is important to note that there is considerable uncertainty whether any of the alternatives will achieve the groundwater ARARs, and therefore protectiveness, in the far-field.

In addition to reducing contaminant loading to the far-field, Alternatives 9, 12 and 13 also provide a physical barrier to DNAPL migration through the installation of a grout curtain in the bedrock to surround the source area. Alternatives 9 and 13 would grout the B-F bedrock zones while Alternative 12 would grout the B G bedrock zones. This would prevent DNAPL migration in the bedrock and prevent the source area from expanding.

In addition to active remedial measures, all alternatives include interception of a portion of far-field groundwater by the existing utility drains where a portion of collected groundwater is then treated at the Niagara Falls POTW.

The cap will be maintained or upgraded in all alternatives except for no action. This cap would protect human health by preventing contact with contaminated soil. The cap also acts to minimize precipitation percolation through contaminated soil and thus minimize constituent migration.

- Compliance with ARARs

There are currently no promulgated standards for contaminant levels in soils. The EPA is instead using the procedure for determining soil cleanup values developed by NYSDEC that are considered protective of groundwater quality, as a TBC criteria for organic chemicals in soil. The TBC values, as discussed above, are found in NYSDEC's TAGM.

Alternative 1, no action, would not meet the TBC soil criteria. Contaminants in the soil would not be treated or contained in any manner, resulting in continued leaching into the groundwater system. Alternatives 2 through 13, which involve upgrading the existing cap, would not meet the TBC criteria either. However, the mobility of the contaminants would be reduced by eliminating the exposure to infiltrating precipitation. In addition, Alternatives 2 through 13 would comply with NYS Part 360 standards

by upgrading the cap.

In the source area, none of the identified alternatives would achieve the groundwater chemical-specific limits identified in the following ARARs: New York Safe Drinking-Water Act Standards, New York Surface-Water and Groundwater-Quality Standards and Effluent Standards, Federal Safe Drinking-Water Act, National Primary Drinking-Water Standards and Amendments, National Secondary Drinking-Water Standards, Niagara County Drinking-Water Standards, and the Coastal Zone Management Act.

The presence of the arficial waste materials (landfill) and DNAPL in fractured bedrock in the source area makes attainment of the groundwater ARARs technically impracticable. Therefore, this ROD waives the federal and state drinking water standards and state groundwater quality standards for the groundwater in the source area. The waiver is issued pursuant to Section 121(d)(4)(C) of CERCLA, 42, U.S.C. º 9621(d)(4)(C),and º300.430(f)(1)(ii)(C)(3)of the National Contingency Plan (NCP) which authorizes EPA to waive applicable or relevant and appropriate requirements for groundwater cleanup in the source area of the Necco Park Site based on technical impracticability, from an engineering perspective. There are technical limitations which make it impracticable to recover all the DNAPL from the Necco Park source area. In order to remove all the DNAPL, in excess of 1,000,000 cubic yards of landfill materials (soils and fill) from the Necco Park and adjacent BFI landfills would require excavation. In addition, DNAPL has migrated into the fractured bedrock beneath the Necco Park landfill, adjacent CECOS secure hazardous waste cells, and adjacent BFI landfill. No current technology exists to completely remove DNAPLs from the fractured bedrock medium. Since it is technically impracticable to excavate this area and current technologies for the removal of all of the DNAPL from the fractured bedrock are insufficient, DNAPL impacted soil, bedrock and groundwater will remain at the Site. Because DNAPLs contribute to dissolved phase contamination, restoration of groundwater in the source area of the Necco Park Site has been determined to be technically impracticable.

No alternative completely complies with the Coastal Zone Management Act. Specifically, the Coastal Zone Management Policy 38 states that "the quality and quantity of surface-water and groundwater supplies will be conserved and protected..." Alternatives 2 through 13 would provide increasing incremental compliance with the CZMA through increasing groundwater remedial action and therefore increasing incremental benefits to the groundwater resource. Any alternative chosen will require a full Coastal Zone Consistency Evaluation to be completed. This evaluation would occur during the early design stage of the selected remedy. A Final Coastal Zone Consistency Determination would be made by EPA.

As discussed above, Alternatives 2 through 13 reduce far-field constituent loading from the source area to varying degrees. It is expected that contaminants in the far-field groundwater would naturally attenuate over time to eventually reach the groundwater standards. However, based on limited existing information and the complexities of modeling groundwater in a fractured bedrock medium, a degree of uncertainty exists whether the groundwater will or will not eventually achieve the MCLs in the far-field. Additional information will be required to fully evaluate the potential for ARARs to be achieved in the far-field. The second RAO is control of source material (DNAPL and contaminated soil) to minimize direct exposure and impact on groundwater quality. Alternatives 2 through 13 reduce far-field contaminant loading through groundwater extraction, thereby improving groundwater quality. Alternatives 9 through 11 and 13 include total hydraulic control of the A through F zones in the source area. Alternative 12 includes hydraulic control of the A through G zones in the source area. In addition to active remedial measures, all alternatives include interception of a portion of far-field groundwater by the existing utility drains where a portion of collected groundwater is then treated at the Niagara Falls POTW.

EPA has identified the Great Lakes Water Quality Agreement of 1978, not an an ARAR but as a "to be considered" (TBC) criterion. This Agreement establishes as its primary purpose that "[the] discharge of toxic substances in toxic amounts be prohibited and the discharge of any or all persistent toxic substances be virtually eliminated...and [that] best management practices be developed and implemented... to ensure adequate control of all sources of pollutants." Based on the remedial activities that have been taken at Necco Park to date, and the treatment of the portion of groundwater from Necco Park that infiltrates into the Falls Street tunnel and is treated at the POTW, the Analysis of Alternatives Report estimated that discharges from the Site have been reduced by at least the 50 percent which corresponds to the interim percentage reduction commitment for 1996 established in the Four-Party Agreement (discussed in

the Site Description section, above). However, the interim commitment and the final goal of "virtual elimination," established in the Great Lakes Water Quality Agreement, are applicable to the total loadings from all point sources as well as non-point sources, which include surface runoff, atmospheric deposition, and unaccounted for loadings. All non point sources must be addressed to reduce loadings to the Niagara River to the maximum extent practicable to address the goal of "virtual elimination." Alternatives 1 through 13 incrementally decrease loadings to the far-field and ultimately to the Niagara River. Alternative 13 therefore would best address the goal of "virtual elimination."

- Long-Term Effectiveness and Permanence

Alternative 1 would not be effective or permanent in providing protection to public health over the long-term. Contaminated groundwater would continue to migrate from the Site posing a risk to potential receptors. The cap would degrade, mobilizing more contamination, and create a potential direct exposure pathway to contaminated soil and landfill materials.

All of the alternatives, except no action, permanently reduce the volume of DNAPL at the Site through DNAPL recovery in monitoring and extraction wells and subsequent destruction. However, Alternatives 5, 8 and 11 would probably recover the most DNAPL through the use of DPE.

Alternatives 5, 8 and 11, that include DPE, would provide long-term effectiveness for some of the contaminants by permanently removing them from the soil. However, other contaminants at the Site are not effectively removed by DPE due to their low volatility. These remaining contaminants may be sufficiently soluble to be transported into the groundwater. DPE would be required to be shut down during the winter months which limits its effectiveness in contaminant removal. Following the application of the DPE, capping of the soils would be expected to reduce or eliminate the mobility of the remaining contaminants. O&M would be required to operate the DPE system and maintain the cap. Periodic monitoring would be required to evaluate the performance of the DPE.

Permanence of protection would be achieved by removal of the contaminants from the soils and groundwater through treatment. Alternatives 2 through 13 provide increasing capture and subsequent treatment of contaminated groundwater. Alternative 2 captures and treats the least amount of contaminated groundwater while Alternative 13 captures and treats all of the contaminant plume. The constituent loadings for each alternative are included in Table 6.

All alternatives, except for no action, rely on pump-and-treat technology and a grout curtain (either existing or additional) for hydraulic control. Pump-and-treat systems require periodic maintenance to maintain effectiveness of the hydraulic control system. Operation and maintenance of the extraction and treatment system would be required including the servicing of pumps and motors, periodic well development, and treatment operation. The extraction and treatment system would require monitoring to measure its performance.

Alternatives 9, 12 and 13 include a downgradient grout curtain. Attempts to control DNAPL hydraulically (i.e., pump-and-treat) remain unproven since DNAPL may move independently from the groundwater flow. The grout curtain would provide a more permanent and reliable barrier to DNAPL migration. However, these alternatives do not contain DNAPL that may have migrated under the BFI landfill.

Alternatives with a downgradient slurry wall or DPE (Alternatives 4, 5, 7 through 13, and optionally for 10A) limit DNAPL migration in the A zone. Alternatives with a complete source area grout curtain (Alternatives 9 and 13) limit horizontal DNAPL migration in the B through F zones through the use of a vertical barrier. Alternative 12 includes a source area grout curtain to limit horizontal DNAPL migration in the B through G zones. Because of the unpredictable nature of DNAPL movement and the potential that DNAPL exists under the BFI landfill, no proposed alternative can completely contain DNAPL.

A low-permeability cap, which is included in Alternatives 2 through 13, is effective in reducing potential contact with constituents and minimizing precipitation percolation into the landfill. With maintenance, the cap is a reliable containment technology.

- Reduction in Toxicity, Mobility or Volume

Alternative 1 does not reduce the toxicity, mobility or volume of contaminants present in the groundwater. The movement of contaminated groundwater would be unrestricted allowing downgradient migration and the existence of a potential exposure pathway. Such an exposure pathway would create an unacceptable risk to human health. If no action were taken at the Site, contaminants in the landfill would continue to leach into the groundwater resulting in greater mobility. While the contaminant concentrations would decrease in the soil and bedrock, the resultant volume of contaminated material would also increase as contaminants spread through the groundwater. Residual contaminant compounds would remain in the soils and act as potential sources to groundwater contamination. The existing clay cap would not be maintained and would degrade creating a possible direct contact exposure risk.

All alternatives, except for no action, include technologies to reduce constituent toxicity once it is removed from the environment. Alternatives that include groundwater extraction (Alternatives 2 through 13) reduce aqueous constituent toxicity through treatment at the CECOS WWTP and further treatment at the Niagara Falls POTW. The CECOS WWTP treats aqueous-phase constituents by metal precipitation, air stripping, vapor-phase carbon adsorption, and liquid-phase carbon adsorption. The POTW treats aqueous-phase constituents through physical-chemical treatment. Liquid-phase toxicity is reduced in Alternatives 2 through 13 through the use of an off-Site incinerator that destroys DNAPL. Vapor-phase toxicity is reduced in DPE alternatives (Alternatives 5, 8, and 11) by treatment.

Alternatives 2 through 13 include maintaining a cap that limits precipitation and percolation, thus limiting mobility of overburden constituents. Groundwater pumping and treatment also reduces constituent mobility. The extent of aqueous constituent mobility reduction can be estimated by the constituent loadings for each alternative (Table 6).

Alternatives with slurry walls (Alternatives 4, 7, 9, 10, 12, 13, and optionally for 10A) reduce mobility of aqueous and DNAPL constituents in the A zone. Grout curtain alternatives (Alternatives 9, 12, and 13) reduce mobility of DNAPLs in the B through F zones (9 and 13) , and the B through G zones (12), through the use of a vertical barrier.

Alternatives 2 through 13 include extraction of DNAPs, which reduces DNAPL volume. Alternatives that include DPE (Alternatives 5, 8, and 11) may result in greater DNAPL volume reduction through the use of vacuum extraction in overburden and upper bedrock zones. Treatability studies are required to determine the extent of reduction and effect on groundwater quality.

- Short-Term Effectiveness

For Alternatives 2 through 13, no short-term risks to the public are expected to be created by constructing the groundwater extraction and treatment systems. The operation of the extraction and treatment systems is expected to be a long-term activity which is not anticipated to present a risk to the public.

Alternative 1, no action, would not present any risk due to the fact that the contaminants are present at depth which leaves no opportunity for short-term exposure. Alternative 2 is not expected to present any short-term risks through the construction and implementation of the remedy. Alternatives 3 through 13 may involve a slight increase in truck traffic in the area to transport in materials to construct the cap. This impact is expected to be minimal as the area is industrial and truck traffic is a routine occurrence. Alternatives 5, 8 and 11 would not present any risks during construction; however, the operation of the DPE system may generate volatile organic vapors by extracting them from the soil. These vapors, depending on their concentration, may require treatment either by carbon adsorption or incineration in a burn unit. The DPE system is not expected to present a risk when properly monitored and operated. However, a malfunction of the vapor recovery system could create a potential hazard to workers at the Site.

Once completed, all alternatives will require a similar amount of time to attain full effectiveness (steady-state constituent concentrations in the far-field). However, it should be noted that the effectiveness of the various alternatives in reducing concentrations in the far-field vary considerably. Alternative 2 is least effective in reducing contaminants concentrations in the far-field while Alternative

13 would be most effective by capturing the entire plume. Alternative 13 may reach a steady-state condition in a slightly shorter time period due to far-field pumping.

Alternatives that physically disturb overburden material may create short-term risks due to organic constituent volatilization. A significant amount of overburden material is disturbed in alternatives that include a slurry wall (Alternatives 4, 7, 9, 10, 13, and optionally for 10A).

Alternatives that include a grout curtain (Alternatives 9, 12, and 13) or that require expansion of the CECOS WWTP (Alternatives 10, 10A, and 11) will require the longest time to implement (up to five years) because of the need for extensive construction activities. DPE alternatives (Alternatives 5, 8, and 11) require one to three years to construct because of the need for a pilot study.

- Implementability

Alternatives 1 and 2 require no further construction and, therefore, are the easiest to implement. The no action alternative, Alternative 1, would not involve construction or the use of technologies of any kind. No modifications to the Site would be required to be made. Therefore, this alternative would be easily implemented. However, DNAPLs would not be contained, downgradient migration of contaminants in the groundwater would continue to occur, and the cap would eventually degrade, creating a potential risk to receptors. All components of Alternative 2 (existing systems) are in place, therefore, no new additional construction would be required. However, modifications to the existing systems would be required to make them more reliable.

Alternatives 2 through 13 involve the extraction and treatment of groundwater. This type of technology has been applied at a variety of sites. From a geologic and hydrologic viewpoint, the groundwater aquifers under the Necco Park Site which are characterized by fractured bedrock would make it slightly more difficult to operate a pump and treat system successfully when compared to unfractured strata. However, adequate control of groundwater beneath the Necco Park property could be established through the use of a system of extraction and monitoring wells. The treatment systems required in these alternatives would all be the same. Many standard water treatment technologies exist that have been employed at other sites. It would be expected that these same technologies would be able to treat the groundwater at this Site.

While Alternative 2 would not require the installation of any new groundwater extraction wells, Alternatives 3 through 13 would. The installation of groundwater extraction wells has been conducted at many sites and is easily implementable in most cases. At sites where DNAPLs are present, extra precautions must be taken to minimize and/or prevent further mobilization of DNAPL during well installation. Alternatives that rely solely on hydraulic control of the bedrock (Alternatives 3, 4, 5, 6, 7, 8, 10, 10A, and 11) involve installation of groundwater extraction wells. Alternative 3 would require the least number of wells while Alternative 13 would require the greatest number of wells. Since Alternative 13 includes installation of a grout curtain and construction of an extensive far-field pump-and-treat system downgradient of the Necco Park property, this alternative may be the most difficult to implement. The far-field pump-and-treat system requires permission from commercial or residential property owners to install extraction wells. Right-of-ways are also necessary for connection to the sanitary sewer system.

Alternatives 4, 7, 9, 10, 12, 13, and optionally for 10A, include a slurry wall. A slurry wall may be difficult to implement because of the need to excavate through contaminated overburden, but the technology has been widely used at landfill sites.

DPE alternatives (Alternatives 5, 8, and 11) require treatability studies to determine the effectiveness of the system on Necco Park contaminants and to complete the detailed design. DPE alternatives also include an extensive well, piping, and vapor-phase treatment system.

Alternatives 10, 10A, and 11 require expansion of the CECOS WWTP. This will require an agreement to expand by CECOS, followed by design and construction. Negotiations between CECOS and DuPont would be required to determine if this alternative is implementable. If not, construction of an on-Site treatment system or implementation of an alternate off-Site treatment system would be required. This would be implementable but

would extend the required construction time.

Grout curtain alternatives require a long time (up to five years) to implement. The grout curtain may be difficult to implement due to physical limitations in repairing fractured bedrock and the need for intrusive rights-of-way or easements to other properties near the landfill. A partial grout curtain has already been installed at the Site, however, so these limitations are not impossible to overcome.

- Cost

The costs for all of the alternatives are presented in the description of the Summary of Alternatives section above. For comparison purposes, the costs of the various alternatives are presented as follows:

Of the various groundwater alternatives, Alternative 1, no action, presents the lowest costs at $ 0 for capital, present-worth and O&M. This alternative provides a baseline to compare the costs of other alternatives. Alternative 13, is the most expensive alternative to implement with a total cost of $ 96,460,000. The costs of all other alternatives fall in between these two.

The alternatives' costs are included in Table 7. Alternative 1 has the lowest total cost followed by Alternatives 2, 3, 4, 5, 6, 7, 8, 9, 10, 10A, 11, 12, and 13.

- State Acceptance

After review of all available information, NYSDEC has indicated that it concurs with the selected remedy. NYSDEC's letter of concurrence is presented in Appendix IV of this document.

- Community Acceptance

Community acceptance of the preferred alternative has been assessed in the Responsiveness Summary portion of this ROD following review of the public comments received on the IR, AOA Report, the Proposed Plan, and the Revised Proposed Plan. All comments submitted during the two public comment periods were evaluated and are addressed in the attached Responsiveness Summary, Parts I and II (Appendices V and VI).

SELECTED REMEDY

The EPA has determined, upon consideration of the requirements of CERCLA, the detailed analysis of the various alternatives, and public comments, that Alternative 1OA is the appropriate remedy for the Site.

This remedy (the subject of this Record of Decision) for the DuPont Necco Park Site will address the contaminants in the landfill soils, and DNAPL in the soils and bedrock which present the greatest threats to the groundwater as continuing sources of contamination. This action will require long-term management to maintain the groundwater extraction systems and upgraded closure cap.

The major components of the selected remedy include the following:

1. Containment of the Source Area by:

- upgrading the existing cap to meet New York State Part 360, or equivalent standards;

- using hydraulic measures in the overburden (A zone) to maintain an inward gradient within the Source Area or installing a physical barrier (e.g., slurry wall, sheet pile) on the southern, and portions of the eastern and western Necco Park property boundaries; and

- using hydraulic measures in the bedrock (B-F zones) to maintain an inward gradient within the Source Area and prevent the movement of contaminated groundwater beyond the Source Area boundary.

The control of the contaminated groundwater will be achieved through the installation, operation, and

maintenance of the groundwater extraction wells (and, optionally, a physical barrier in the overburden). The exact number, size, depth, and pumping rates of these wells will be determined in the remedial design of the selected remedy.

2. Treatment of the extracted groundwater from the Source Area, either on-site or off-site, to achieve the appropriate discharge requirements. Currently, groundwater extracted from the Site is treated at the adjacent CECOS wastewater treatment plant. Expansion of the CECOS facility would likely be required to accommodate the increased volume of water to be treated under this remedy. The need to either expand the CECOS facility, build an on-site facility, or utilize another off-site facility for groundwater treatment will be determined during the design.

3. Collection of DNAPL in the Source Area by:

- utilizing the existing monitoring wells network;
- utilizing any groundwater recovery wells placed in the Source Area; and
- the installation of additional dedicated DNAPL recovery well(s).

Collected DNAPL would be disposed of off-site at an appropriate facility.

4. Operation and maintenance (O&M) of the existing systems and the systems constructed under this selected remedy.

5. Comprehensive monitoring to verify hydraulic control, identify DNAPL occurrence, demonstrate the effectiveness of the remedial measures, and assess the impact of such measures on far-field groundwater quality. Existing monitoring wells on the Necco Park property will be used to monitor the performance of the groundwater extraction system and establish that sufficient control occurs. Additional monitoring wells may be required. The need for such additional wells will be determined during the design and implementation of the groundwater extraction system.

6. Additional characterization of the Site to assess whether natural attenuation will be effective in addressing far-field contamination.

7. Development and implementation of institutional controls to restrict Site access, the use of groundwater at the Site, and control land use such that it is consistent with Site conditions.

The use of groundwater will be restricted until such time as the groundwater beneath the Site has been determined to be fully remediated.

The goal of the remedial action is to contain the source area to minimize further impact to the far-field groundwater, and to attain groundwater cleanup criteria. Based on information obtained during the investigation, and the analysis of all remedial alternatives, EPA and NYSDEC believe that the selected remedy will be able to achieve this goal.

However, sporadic low-level regional groundwater contamination may be especially persistent in the far-field. Therefore, the ability to achieve cleanup goals in the groundwater downgradient of the source area cannot be determined until the containment, extraction and treatment systems have been implemented, modified as necessary, and plume response monitored over time.

The estimated costs for the selected remedy are as follows:

Capital Cost:	$ 7,837,136
Annual O&M Costs:	$ 4,614,775
30-year Present Worth Cost:	$ 57,264,743
Total Cost:	$ 65,102,000

STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete the selected remedial action for this Site must comply with applicable, or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy is protective of human health and the environment. Contaminated groundwater will be prevented from migrating from the source area and further degrading the quality of the aquifer. Potential exposure to contaminated groundwater will be controlled through the extraction and treatment of the groundwater. Contaminants in the groundwater will be removed through treatment. The landfill soils and the source area representing potential sources of contamination to the groundwater will be contained through the installation of the cap, groundwater extraction wells, and, optionally, a physical barrier.

Recognizing that groundwater restoration in the source area is technically impracticable, the goal of this remedial action is to establish hydraulic control of the source area contaminated groundwater, and to prevent groundwater and DNAPL from migrating beyond the source area by utilizing hydraulic barriers (optionally, a physical barrier in the overburden). The selected remedy also combines the groundwater remediation with the soils remediation to address the principal threat posed by the soils, which is: the further contribution to groundwater degradation from contaminants in the soil. By addressing the contaminated soils in the source area, the preferred alternative also reduces the potential contribution to groundwater contamination.

Containment of the source area through the implementation of a cap and groundwater extraction and treatment system (and, optionally, a physical barrier) would provide long-term effectiveness in the protection of human health and the environment. In addition, human health will be protected further through institutional controls to restrict access to the Site and the use of groundwater at the Site.

It is not anticipated that any significant short-term impacts on human health or the environment would occur during the construction and implementation of the preferred alternative.

Compliance with ARARs

The groundwater extraction and treatment portion of the selected remedy is expected to meet the ARARs for pretreatment of discharges to POTWs.

The presence of DNAPLs in the contaminated soils, bedrock, and groundwater in the source area of the Necco Park Site, renders the attainment of groundwater requirements within the source area technically impracticable. Therefore, this ROD waives the federal and State drinking water standards and State groundwater quality standards for the groundwater in the source area. The waiver is issued pursuant to Section 121(d)(4)(C) of CERCLA, 42, U.S.C. º 9621(d)(4)(C), and º300.430(f)(1)(ii)(C)(3) of the National Contingency Plan (NCP) which authorizes EPA to waive applicable or relevant and appropriate requirements based on technical impracticability, from an engineering perspective. EPA's memorandum, Guidance for Evaluating the Technical Impracticability of Groundwater Remediation (OSWER Directive 9234.2-25, October 1993), recognizes that there are circumstances under which groundwater restoration may be technically impracticable. There are technical limitations which make it impracticable to recover all the DNAPL from the Necco Park source area. In order to remove all the DNAPL, in excess of 1,000,000 cubic yards of landfill materials (soils and fill) from the Necco Park and adjacent BFI landfills would require excavation. In addition, DNAPL has migrated into the fractured bedrock beneath the Necco Park landfill,

adjacent CECOS secure hazardous waste cells, and adjacent BFI landfill. No current technology exists to completely remove DNAPLs from the fractured bedrock medium. Since it is technically impracticable to excavate this area, and current technologies for the removal of all of the DNAPL from the fractured bedrock are insufficient, DNAPL impacted soil, bedrock and groundwater will remain at the Site. Because DNAPLs contribute to dissolved phase contamination, restoration of groundwater in the source area of the Necco Park Site has been determined to be technically impracticable.

Additionally, the upgrading of the cap to meet NYS Part 360 standards and the prevention of groundwater from migrating beyond the source area by utilizing a hydraulic barrier, is consistent with the TBC Great Lakes Water Quality Agreement of 1978 that best management practices be implemented to ensure adequate control of all sources of pollution.

EPA believes that the selected remedy will achieve the Response Action objectives (RAOs) for groundwater of reduction of risk to human health through prevention of migration of groundwater downgradient from the source area and through collection and treatment of DNAPLs to the extent practicable. Due to the concentration of DNAPLs and contaminants in the soils and bedrock in the source area, and the complexities associated with remediation of DNAPLs in fractured bedrock, EPA does not anticipate that the RAOs can be achieved within the source area. It is uncertain whether or not the implementation of this source containment remedy will enable the aquifer outside the source area to be restored to a usable quality. The potential diffusion of contaminants from the Site in the bedrock, as well as the presence of groundwater contaminants from other sources in the region, may exacerbate or prevent the attainment of groundwater ARARs in the far-field. Therefore, groundwater in the far-field will be monitored to determine the effectiveness of the source containment efforts and additional Site characterization will be performed to collect further data to evaluate the future potential for natural processes to achieve ARARs in the far-field.

In addition to the ARARs and TBCs, the selected remedy will also be consistent with the NCP and EPA policy concerning remedial actions at sites with contaminated groundwater and DNAPL. Expectations for contaminated groundwater are stated in the NCP as follows: "EPA expects to return usable groundwaters to their beneficial uses wherever practicable, within a reasonable time frame that is reasonable given the particular circumstances of the site. When restoration of the groundwater to beneficial uses is not practicable [e.g., source area groundwater], EPA expects to prevent further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction." Also, EPA guidance indicates that source control is a critical component of both active and passive restoration remedies. Where the objective of preventing further contamination of groundwater can not be attained by removal and/or treatment of contaminated soils and subsurface NAPLs, containment of the subsurface NAPLs and soils would be the preferred approach, to the extent practicable. EPA guidance, "Considerations in Groundwater Remediation at Superfund Sites and RCRA Facilities - Update," OSWER Directive 9283.1-06, May 27, 1992; and "Guidance for Evaluating Technical Impracticability of Groundwater Restoration," OSWER Directive 9234.2-25, EPA/540-R-93-080, September 1993, recommend the following for DNAPL sites:

A)Short-term actions should: 1) Prevent further spread of the aqueous plume (plume containment), 2) Control further migration of contaminants from subsurface DNAPLs (source containment) where practicable, and 3) Reduce the quantity of source material (free-phase DNAPL) present in the subsurface, to the extent practicable (source removal/treatment).

B)Long-term remedies should: 1) Minimize further release of contaminants from soils and DNAPLs to the surrounding groundwater (source containment), 2) Reduce the quantity of source material (free-phase NAPL) present in the subsurface, to the extent practicable (source removal/treatment), and 3) Restore the maximum areal extent of the aquifer to those cleanup levels appropriate for its beneficial use.

Cost-Effectiveness

The selected remedy is cost-effective because it has been demonstrated to provide the best overall effectiveness proportional to its cost.

Due to the presence of waste materials and DNAPLs in the source area, and the lack of present-day technology to remove those materials from the fractured bedrock medium, none of the alternatives are capable of achieving the ARARs in a cost-effective manner in the source area. Therefore, it is imperative that those materials be contained to prevent further spread of the source area and to prevent the source area from further degrading groundwater quality downgradient.

The various methods employed to achieve containment of the source area have strong bearing on the cost-effectiveness of the various alternatives. Alternatives 9, 12, and 13 provide both physical and hydraulic containment of the source area through the use of a grout curtain and pumping wells in the bedrock, and a slurry wall in the overburden. Alternatives 4, 7, and 10 (and 1OA, as an option) utilize a slurry wall or other physical barrier for containment in the overburden and hydraulic containment for the bedrock source area. Each of these alternatives utilize a physical barrier for some level of source area containment. Although a physical barrier provides effective containment of groundwater and DNAPLs, it is capital cost intensive to implement. Alternatives 2, 3, 6, and 10A (without the optional physical barrier) employ solely hydraulic controls for source area containment. Hydraulic controls are less capital cost intensive but more, costly in terms of operation and maintenance expenditures. Since a hydraulic remedy can be implemented in phases, the potential exists to achieve hydraulic containment at lower pumping rates than originally estimated. Physical barriers do not allow for this degree of flexibility and the capital costs disbursed in the initial installation of the physical barrier cannot be recouped once the barrier is in place. Furthermore, the barrier, once placed, cannot contain materials
that may subsequently be discovered outside the barrier without occasioning a costly extension of the barrier. For these reasons, a hydraulic containment remedy is considered more cost-effective compared to the alternatives with physical barrier components.

None of the alternatives achieves ARARs within the source area, however, the selected alternative (Alternative 1OA) achieves the maximum amount of containment in the source area, at less capital cost than other alternatives. Therefore, the selected remedy will provide the best balance of trade-offs among alternatives with respect to the evaluating criteria.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

By employing treatment for the groundwater and destruction of DNAPLs collected, the selected remedy utilizes permanent solutions and treatment technologies to the maximum extent practicable.

It is anticipated that the groundwater extraction and treatment portion of the preferred alternative in conjunction with the installation of the cap (and, optionally, a physical A zone barrier) will effectively reduce the mobility and volume of the contaminated groundwater. Uncertainty does exist concerning the ability of the containment system to achieve the appropriate groundwater standards in the far-field. The ability to achieve the standards through containment and natural attenuation will be
determined by additional Site characterization. The toxicity of the contaminants may also be permanently reduced through destruction. The contaminants in the groundwater within the source area will captured and treated in the groundwater treatment system, permanently reducing their volume, mobility, and potentially their toxicity. Containment of the source area soils will reduce their mobility.

Preference for Treatment as a Principle Element

This remedy also satisfies the statutory preference for treatment as a principal element to reduce the toxicity, mobility and volume of contaminants at the Site.

Groundwater extraction and treatment will provide long-term effectiveness in the protection of human health and the environment. The extraction and treatment of groundwater in the source area and the collection and destruction of DNAPLs in the source area will also be permanent solutions through the removal of contaminants in the affected media. The application of groundwater pump and treat combined with the DNAPL collection will utilize treatment technologies to address the contaminants present at the Site.

DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes from the preferred alternative presented in the Revised Proposed Plan.

APPENDIX I

FIGURES

APPENDIX II

TABLES

Table 1
NECCO PARK AQUEOUS INDICATOR PARAMETER LIST

Inorganic and General Water Quality Parameter	Volatile Organic Compounds	Semivolatile Organic Compounds
pH	Vinyl chloride	Hexachloroethane
Specific conductivity	1,1-dichloroethene	Hexachlorobutadiene
Temperature	Trans-1,2-dichloroethene	Phenol
Chloride	Cis-1,2-dichloroethene	4-methylphenol
Ammonia nitrogen	Chloroform	2,4,6-trichlorophenol
Soluble barium	Carbon tetrachloride	2,4,5-trichlorophenol
Cyanide	1,2-dichloroethane	Pentachlorophenol
Total organic halogens	Trichloroethene	Hexachlorobenzene
Total organic carbons	1,1,2-trichloroethane	TIC-1
Total dissolved solids	Tetrachloroethene	
Total suspended solids	1,1,2,2-tetrachloroethane	
Rhodamine		

TABLE 2

RISK ASSESSMENT TABLES

TABLE 2a INDICATOR CHEMICALS DETECTED IN 1992 GROUND WATER SAMPLES (HUMAN HEALTH RECEPTORS)

VOCs

- Carbon Tetrachloride
- Chloroform
- 1,2-Dichloroethane
- 1,1-Dichloroethene
- Cis- 1,2-Dichloroethene
- Trans-1,2-Dichloroethene
- Hexachlorobenzene
- Hexachloroethane
- 1,1,2,2-Tetrachloroethene
- Tetrachloroethene
- 1,1,2-Trichloroethene
- Trichloroethene
- Vinyl Chloride

BNAs

- Hexachlorobutadiene
- 4-Methylphenol
- Pentachlorophenol
- Phenol
- 2,4,5-Trichlorophenol
- 2,4,6-Trichlorophenol

Inorganics

- Barium
- Cyanide

TABLE - 2b DUPONT NECCO PARK SITE: SUMMARY OF EXPOSURE PATHWAYS

Pathway	Receptor	TIME-FRAME EVALUATED		DEGREE OF ASSESSMENT		Rationale for Selection or Exclusion	Data Grouping
		Present	Future	Quant.	Qual.		
Ground Water							
Ingestion of Ground Water	Resident	No	Yes	X		Although no private drinking water wells or public water supplies are currently located downgradient of the site, it is possible that downgradient private wells may be installed and used as a drinking water source in the future. Furthermore, New York State has classified ground water in the vicinity of the site as a potable drinking water source (Class GA).	On-site sampling data from several aquifers used as input to contaminant transport model.
Inhalation of Ground Water Contaminants during Showers	Resident	No	Yes	X		Same rationale as above.	On-site sampling data from several aquifers used as input to contaminant transport model.
Dermal Contact with Ground Water	Resident	No	Yes	X		Same rationale as above.	On-site sampling data from several aquifers used as input to contaminant transport model.
Inhalation of Contaminants that Volatize from Ground Water and Seep into Basements	Resident	Yes	Yes		X	Infiltration of volatiles is ground water to local basements is possible.	
Soils							
Incidental Ingestion of Onsite Soils	Worker/Trespasser	No	No			The site has been capped with approximately 2 to 4 feet of clean fill. Disturbance is expected to be minimal.	
		No	No				
Dermal contact with Onsite Soils	Worker/Trespasser	No	No			Same as above.	
Inhalation of VOC Emissions and Particulates from Soils	Worker/Trespasser	No	No			Same as above.	

TABLE 2b (CONTINUED)

Pathway	Receptor	TIME-FRAME EVALUATED Present	Future	DEGREE OF ASSESSMENT Quant.	Qual.	Rationale for Selection or Exclusion	Data Grouping
Sediments (Drainage Ditches)	Worker/Trespasser	Yes	Yes		X	Drainage ditches exist along the perimeters of the site which accumulate standing water and sediments. A major source of these sediments and runoff water is considered to be upgradient sites (landfills). The contribution of Dupont Necco Park is difficult to determine.	
Dermal Contact with Sediments	Worker/Trespasser	Yes	Yes		X	Same as above.	
Surface Water (Drainage Ditch)							
Incidental Ingestion of Surface Water	Worker/Trespasser	No	No			Water level in ditches is shallow. Anticipated activity involves eligible exposure via the oral route.	
Dermal Contact with Surface Water	Worker/Trespasser	Yes	Yes		X	Drainage ditches exist along the perimeters of the site which accumulate standing water and sediments. A major source of these sediments and runoff water is considered to be upgradient sites (landfills). The contribution of Dupont Necco Park is difficult to determine.	
Surface Water (Niagara River and Reservoir near Forebay Canal)							
Incidental Ingestion of Surface Water	Resident	Yes	Yes		X	The Niagra River downriver of Niagara Gorge and the reservoir near the Forebay Canal may be used for recreation. Exposure potential is minimal as a result of dilution and infrequent exposure.	
Dermal Contact with Surface Water	Resident	Yes	Yes		X	Same rationale as above.	
Blots (Niagara River and Reservoir Forebay Canal)							
Ingestion of Fish	Resident	Yes	Yes		X	Exposure is possible. Dilution, low exposure frequency, and generally low bioconcentration potential will reduce risks.	

Table 2c TOXICITY VALUES FOR CONTAMINANTS OF CONCERN AT THE DUPONT NECCO PARK SITE

	CARCINOGENIC			NON-CARCINOGENIC	
Chemical	Weight of Evidence Classification	Oral Slope Factor (mg/kg/day)-1	Inhal. Slope Factor (mg/kg/day)-1	Chronic Oral RfD (mg/kg/day)	Chronic Inhal. RfD (mg/kg/day)
VOCs					
Carbon tetrachloride	B2 a	1.30E-01 a	5.30E-02 b	7.00E-04 a	
Chloroform	B2 a	6.10E-03 a	8.10E-02 b	1.00E-02 a	
1,2-Dichloroethane	B2 a	9.10E-02 a	9.10E-02 a	3.00E-01 c	
1,1-Dichloroethene	C a	6.00E-01 a	1.20E+00 a	9.00E-03 a	
cis-11,2-Dichloroethene	D a			1.00E-02 b	
trans-1,2-Dichloroethene	- a			2.00E-02 a	
Hexachlorobenzene	B2 a	1.60E+00 a	1.60E+00 b	8.00E-04 a	
Hexachloroethane	C a	1.40E-02 a	1.40E-01 b	1.00E-03 a	
1,1,2,2-Tetrachloroethane	C a	2.00E-01 a	2.00E-01 a		
Tetrachloroethene	B2-C c	5.20E-02 c	2.00E-03 c	1.00E-02 a	
1,1,2-Trichloroethane	C a	5.70E-02 a	5.70E-02 b	4.00E-03 a	
Trichloroethene	B2-C c	1.10E-02 c	6.00E-03 c	6.00E-03 c	
Vinyl Chloride (chloroethene)	A b	1.90E+00 b	3.00E-01 b		
BNAs					
Hexachlorobutadiene	C a	7.80E-02 a	7.80E-02 b	2.00E-03 a	
4-Methylphenol (p-cresol)	C a			5.00E-03 b	
Pentachlorophenol	B2 a	1.20E-01 a		3.00E-02 a	
Phenol	D a			6.00E-01 a	
2,4,5-Trichlorophenol	-			1.00E-01 a	
2,4,6-Trichlorophenol	B2 a	1.10E-02 a	1.00E-02 b		
Inorganics					
Barium	- a			7.00E-02 a	1.00E-04 b
Cyanide	D a			2.00E-02 a	

a. From IRIS
b. From HEAST
c. Interim value from ECAO (see risk assessment text for specific references)

TABLE 2d SUMMARY OF NONCARCINOGENIC HAZARD INDICES (HI) ESTIMATED FOR THE DUPONT NECCO PARK SITE

Scenario	Receptor	Present/Future	Chronic HI
Ground Water - Aquifer Layers A-C			
Ingestion	Resident	F	1 X 10 4*
Inhalation During Showering	Resident	F	--
Dermal Contact During Showering	Resident	F	3 x 10 3*
Ground Water - Aquifer Layers D-F,			
Ingestion	Resident	F	3 x 10 3*
Inhalation During Showering	Resident	F	--
Dermal Contact During Showering	Resident	F	9 x 10 2*
Ground Water - Aquifer Layer G			
Ingestion	Resident	F	1 x 10 2*
Inhalation During Showering	Resident	F	--
Dermal Contact During Showering	Resident	F	3 x 10 1*

D - HI exceeds one (1)
-- Not evaluated quantitatively due to lack of toxicity values

TABLE 2e TOXICITY VALUES FOR CONTAMINANTS OF CONCERN AT THE DUPONT NECCO PARK SITE

	CARCINOGENIC			NON-CARCINOGENIC
Chemical	Weight of Evidence Classification	Oral Slope Factor (mg/kg/day)-1	Inhal. Slope Factor (mg/kg/day)-1	Chronic Oral RfD (mg/kg/day)	Chronic Inhal.RfD (mg/kg/day)
VOCs					
Carbon tetrachloride	B2 a	1.30E-01 a	5.30E-02 b	7.00E-04 a	
Chloroform	B2 a	6.10E-03 a	8.10E-02 b	1.00E-02 a	
1,2-Dichloroethane	B2 a	9.10E-02 a	9.10E-02 a	3.00E-01 c	
1,1-Dichloroethene	C a	6.00E-01 a	1.20E+00 a	9.00E-03 a	
cis-1,2-Dichloroethene	D a			1.00E-02 b	
trans-1,2-Dichloroethene	-- a			2.00E-02 a	
Hexachlorobenzene	B2 a	1.60E+00 a	1.60E+00 b	8.00E-04 a	
Hexachloroethane	C a	1.40E-02 a	1.40E-02 b	1.00E-03 a	
1,1,2,2-Tetrachloroethane	C a	2.00E-01 a	2.00E-01 a		
Tetrachloroethene	B2-C c	5.20E-02 c	2.00E-03 c	1.00E-02 a	
1,1,2-Trichloroethane	C a	5.70E-02 a	5.70E-02 b	4.00E-03 a	
Trichloroethene	B2-C c	1.10E-02 c	6.00E-03 c	6.00E-03 c	
Vinyl chloride(chloroethene)	A b	1.90E+00 b	3.00E-01 b		
BNAs					
Hexachlorobutadiene	C a	7.80E-02 a	7.80E-02 b	2.00E-03 a	
4-Methlyphenol(p-cresol)	C a			5.00E-03 b	
Pentachlorophenol	B2 a	1.20E-01 a		3.00E-02 a	
Phenol	D a			6.00E-01 a	
2,4,5-Trichlorophenol	--			1.00E-01 a	
2,4,6-Trichlorophenol	B2 a	1.10E-02 a	1.00E-02 b		
Inorganics					
Barium	-- a			7.00E-02 a	1.00E-04 b
Cyanide	D a			2.00E-02 a	

a. From IRIS
b. From HEAST
c. Interim value from ECAO (see risk assessment text for specific references)

TABLE 2f SUMMARY OF CARCINOGENIC RISKS ESTIMATED FOR THE DUPONT NECCO PARK SITE

Scenario	Receptor	Present/Future	Total Risk
Ground Water - Aquifer Layers A-C			
Ingestion	Resident	F	1 x 10 0**
Inhalation During Showering	Resident	F	5 x 10 -1**
Dermal Contact During Showering	Resident	F	2 x 10 -1**
Ground Water - Aquifer Layers D-F			
Ingestion	Resident	F	5 x 10 -1**
Inhalation During Showering	Resident	F	2 x 10 -1**
Dermal Contact During Showering	Resident	F	1 x 10 -1**
Ground Water - Aquifer Layers G			
Ingestion	Resident	F	6 x 10 -2**
Inhalation During Showering	Resident	F	3 x 10 -2**
Dermal Contact During Showering	Resident	F	6 x 10 -3**

**exceeds 10 -4 risk

TABLE 2g INDICATOR CHEMICALS DETECTED IN 1992 GROUND WATER SAMPLES (ENVIRONMENTAL RECEPTORS)

VOCs
- Carbon Tetrachloride
- Chloroform
- 1,2-Dichloroethane
- 1,1-Dichloroethene
- Cis-1,2-Dichloroethene
- Trans-1,2-Dichloroethene
- Hexachlorobenzene
- Hexachloroethane
- 1,1,2,2-Tetrachloroethane
- Tetrachloroethene
- 1,1,2-Trichloroethane
- Trichloroethene
- Vinyl Chloride

BNAs
- Hexachlorobutadiene
- 4-Methlyphenol
- Pentachlorophenol
- Phenol
- 2,4,5-Trichlorophenol
- 2,4,6-Trichlorophenol

Inorganics
- Barium
- Cyanide

TABLE 2h EXPOSURE PATHWAY: INGESTION OF GROUNDWATER BY RESIDENT FOR FUTURE SCENARIO

VARIABLE	RANGE	MIDPOINT	VALUE USED	RATIONALE	REFERENCE
Receptor Population				Resident	
Body Weight (kg)					
Adult Resident	--	--	70	Per EPA Guidance	RAGS Suppl.
Duration of Esposure (years)					
Adult Residents	1 - 70	35	30	90th percentile for time at a single residence	RAGS Suppl.
Exposure Frequency (days/years)	1 - 365	182.5	350	Per EPA Guidance	RAGS Suppl.
Ingestion Rate (1/day)					
Adult Resident	--	--	2	Per EPA Guidance	RAGS Suppl.
Averaging Time (days)					
noncarcinogens	--	--	10950	Values used are based on exposure duration for noncarcinogens and lifetime exposure for carcinogens	RAGs
carcinogens	--	--	25550		

RAGS Suppl.: U.S. EPA, Risk Assessment Guidance for Superfund, Vol. I. Supplemental Guidance: Standard Default Exposure Factors, Interim Final. Office of Emergency and Remedial Response. March 1991.
RAGS: U.S. EPA, Risk Assessment Guidance for Superfund, Volume I, EPA 540/1-89/002. Office of Emergency and Remedial Response. December 1989.

TABLE 2h EXPOSURE PATHWAY: INGESTION OF CONTAMINANTS VOLATILIZED FROM GROUND WATER WHEN RESIDENTS SHOWER FOR FUTURE SCENARIO (continued)

VARIABLE	RANGE	MIDPOINT	VALUE USED	RATIONALE	REFERENCE
Receptor Population				Residents	
Contaminant Concentration (mg/cu.m)					
Modeled value based on contaminant concentrations associated with on-site wells			See Appendix E		
Body Weight (kg)					
Adult	--	--	70	Per EPA Guidance	RAGS Suppl.
Exposure Time (hours/day)					
Adult	0.116-0.2	0.158	0.2	90th percentile value for showering	RAGS
Duration of Exposure (years)					
Adult	1 - 70	35	30	90th percentile for time at a single residence	RAGS Suppl.
Exposure Frequency (days/years)	1 - 365	182.5	350	Equivalent to ingestion frequency	RAGS Suppl.
Inhalation Rate (cu. m/hour)					
Adult	--	--	0.6	Value used is an hourly rate that is specific to showering activities	RAGS
Averaging Time (days)					
Adult					
noncarcinogens	--	--	10950	Values used are based on exposure duration for noncarcinogens and lifetime exposure for carcinogens	RAGS
carcinogens	--	--	25550		

RAGS: U.S. EPA, Risk Assessment Guidance for Superfund, Volume I, EPA 540/1-89/002. Office of Emergency and Remedial Response. December 1989.
RAGS Suppl.: U.S. EPA, Risk Assessment Guidance for Superfund, Vol. I. Supplemental Guidance: Standard Default Exposure Factors, Interim Final. Office of Emergency and Remedial Response. March 1991.

TABLE 2h EXPOSURE PATHWAY: DERMAL CONTACT WITH GROUND WATER WHEN RESIDENTS SHOWER FOR FUTURE SCENARIO (continued)

VARIABLE	RANGE	MIDPOINT	VALUE USED	RATIONALE	REFERENCE
Receptor Population				Residents	
Body Weight (kg)					
Adult			70	Per EPA Guidance	RAGS Suppl.
Exposure Time(hours/day)					
Adult	0.116-0.2	0.158	0.2	90th percentile value for showering.	RAGS
Duration of Esposure(years)					
Adult	1 - 70	35	30	90th percentile for time at a single residence	RAGS Suppl.
Exposure Frequency(days/years)	1 - 365	182.5	350	Equivalent to ingestion frequency.	RAGS Suppl.
Skin Surface Area Contacted (sq. cm)					
Total	17,000-23,000	20,000	20,000	50th percentile value average over entire group.	DEA
Permeability Coefficient (cm/hr)			see Table		
Chemical-specific	--	--	4-5	Chemical-specific values	DEA
Averaging Time (days)				Values used are based	RAGS
noncarcinogens	--		10950	on exposure duration for	
carcinogens	--		25550	noncarcinogens and lifetime for carcinogens	

RAGS: U.S. EPA, Risk Assessment Guidance for Superfund, Volume I, EPA 540/1-89/002. Office of Emergency and Remedial Response. December 1989.
RAGS, Suppl.: U.S. EPA. Risk Assessment Guidance for Superfund, Vol. I. Supplemental Guidance: Standard Default Exposure Factors, Interim Final, Office of Emergency and Remedial Response. March 1991.
DEA: Dermal Exposure Assessment: Principles and Applications, Interim Report. EPA/600/8-91/011B. Office of Research and Development. January 1992.

TABLE 2i WILDLIFE SPECIES POTENTIALLY INHABITING THE NECCO PARK SITE, NIAGARA FALLS, NY

Family	Common Name	Latin Name	Guild 1	Forage Method	Breeding Substrate
Amphibians					
Bufonidae	Eastern American Toad	Bufo a. americanus	I	Ground Ambusher	Water
Birds					
Accipitridae	Northern Harrier	Circus cyaneus	C	Ground Pouncer	Not applicable 2
	Red-tailed Hawk	Buteo jamaicensis	C	Ground Pouncer	Tree-Branch
	*Rough-legged Hawk	Buteo lagopus	C	Ground Pouncer	Not applicable
Alaudidae	Horned Lark	Eremophila alpestris	O	Ground Gleaner	Ground-Herb
Apodidae	Chimney Swift	Chaetura palagica	I	Air Screener	Buildings
Caprimulgidae	Common Nighthawk	Chordeiles minor	I	Air Screener	Buildings
Charadriidae	*Killdeer	Charadrius vociferus	I	Ground Gleaner	Ground-Herb
Columbidae	Mourning Dove	Zenaida macroura	G	Ground Gleaner	Tree-Branch
	*Rock Dove	Columbia livia	O	Ground Gleaner	Buildings
Corvidae	American Crow	Corvus brachyrhynchos	O	Ground Gleaner	Tree-Branch
Falconidae	*American Kestrel	Falso Sparverius	C	Ground Pouncer	Tree Cavity-Crevice
Fringillidae	American Tree Sparrow	Spizella arborea	O	Ground Gleaner	Not applicable
	Common Redpoll	Carduelis flammea	G	Ground Gleaner	Not applicable
	Dark-eyed Junco	Junco hyemalis	G	Ground Gleaner	Not applicable
	Grasshopper Sparrow	Ammodramus savannarum	O	Ground Gleaner	Ground-Herb
	Hoary Redpoll	Carduelis hornemanni	G	Ground Gleaner	Not applicable
	Lapland Longspur	Calcarius lapponicus	G	Ground Gleaner	Not applicable
	Savannah Sparrow	Passerculus sandwichensis	O	Ground Gleaner	Ground-Herb
	Snow Bunting	Plectrophenax nivalis	G	Ground Gleaner	Not applicable
	*Song Sparrow	Melospiza melodia	O	Ground Gleaner	Ground-Herb
	Vesper Sparrow	Pooecetes gramineus	O	Ground Gleaner	Ground-Herb
	White-throated Sparrow	Zonotrichia albicollis	G	Ground Gleaner	Not applicable
Hirundinidae	Barn Swallow	Hirundo rustica	I	Air Screener	Buildings
	Cliff Swallow	Hirundo pyrrhonota	I	Air Screener	Buildings
Icteridae	Bobolink	Dolichonyx oryzivorus	O	Ground Gleaner	Ground-Herb
	Brown-headed Cowbird	Molothrus ater	O	Ground Gleaner	Nest Parasite
	Common Grackle	Quiscalus quiscula	O	Ground Gleaner	Tree-Branch
	Eastern Meadowlark	Sturnella	I	Ground Gleaner	Ground-Herb

TABLE 2i WILDLIFE SPECIES POTENTIALLY INHABITING THE NECCO PARK SITE, NIAGARA FALLS, NY (cont.)

Family	Common Name	Latin Name	Guild 1	Forage Method	Breeding Substrate
Icteridae	Red-winged Blackbird	Agelaius phoeniceus	O	Ground Gleaner	Shrub
Laniidae	Northern Shrike	Lanius excubitor	C	Ground Pouncer	Not applicable
Phasianidae	*Ring-necked Pheasant	Phasianus colchicus	O	Ground Gleaner	Ground-Herb
Picidae	Northern Flicker	Colaptes auratus	I	Ground Gleaner	Tree Cavity-Crevice
Ploceidae	House Sparrow	Passer domesticus	G	Ground Gleaner	Buildings
Scolopacidae	Upland Sandpiper	Bartramia longicauda	I	Ground Gleaner	Ground-Herb
Strigidae	Short-eared Owl	Asio flammeus	C	Ground Pouncer	Not applicable
	Snowy Owl	Ncytea scandiaca	C	Ground Pouncer	Not applicable
Sturnidae	European Starling	Sturnus vulgaris	O	Ground Gleaner	Buildings
Turdidae	American Robin	Turdur migratorius	O	Ground Gleaner	Tree-Branch
Tytonidae	Common Barn-Owl	Tyro alba	C	Ground Pouncer	Buildings
Mammals					
Canidae	Coyote	Canis latrans	O	Ground Forager	Terrestrial Subsurface
	Red Fox	Vulpes Vulpes	O	Ground Forager	Terrestrial Subsurface
Cervidae	White-tailed Deer	0docoileus virginianus	H	Ground Grazer	Ground-Herb
Cricetidae	*Meadow Vole	Mirotus pennsylvanicus	H	Ground Grazer	Terrestrial Subsurface
	White-footed Mouse	Peromyscus leucopus	O	Ground Forager	Terrestrial Subsurface
Didelphidae	Virginia Opossum	Didelphis virginiana	O	Ground Forager	Tree Cavity-Crevice
Leporidae	Eastern Cottontail	Sylvilagus floridanus	H	Ground Grazer	Ground-Herb
Muridae	House Mouse	Mus musculus	O	Ground Forager	Buildings
	Norway Rat	Rattus norvegicus	O	Ground Forager	
Terrestrial Subsurface					
Mustelidae	*Striped Skunk	Mephitis mephitis	O	Ground Forager	Terrestrial Subsurface
Procyonidae	Raccoon	Procyon lotar	O	Ground Forager	Tree Cavity-Crevice
Sciuridae	Woodchuck	Marmota monax	H	Ground Grazer	Terrestrial Subsurface
Soricidae	N. Short-tailed Shrew	Blarina brevicauda	I	Ground Gleaner	Terrestrial Subsurface
Talpidae	Hairy-tailed Mole	Parascalops breweri	I	Ground Gleaner	Terrestrial Subsurface
Vespertilionidae	Big Brown Bat	Eptesicus fuscus	I	Air Hawker	Buildings
	Little Brown Bat	Myotis lucifugus	I	Air Hawker	Buildings
	N. Long-eared Bat	Myotis septentrionalis	I	Air Hawker	Tree Cavity-Crevice
	Small-footed Myotis	Myotis leibii	I	Air Hawker	Buildings
Zapodidae	Meadow Jumping Mouse	Zapus hudsonius	O	Ground Forager	Ground-Herb

TABLE 2i WILDLIFE SPECIES POTENTIALLY INHABITING THE NECCO PARK SITE, NIAGARA FALLS, NY (cont.)

Family	Common Name	Latin Name	Guild 1	Forage Method	Breeding Substrate
Reptiles					
Colubridae	E. Smooth Green Snake	Opheodrys v. vernalis	I	Ground Ambusher	Terrestrial Subsurface
	Eastern Garter Snake	Thamnophia s. sirtalis	C	Ground Ambusher	Terrestrial Subsurface
	Eastern Milk Snake	Lampropeltis t. triangulum	C	Ground Ambushes	Terrestrial Subsurface
	Northern Brown Snake	Storeria d. dekayi	I	Ground Ambusher	Terrestrial Subsurface

* Species (or sign) observed on the site.

1 Guild Includes: C: Carnivore
G: Granivore (Seed-eater)
H: Herbivore
I: Insectivore
O: Omnivore

2 Not applicable since not anticipated to breed in vicinity of site.

TABLE 2i WILDLIFE SPECIES POTENTIALLY INHABITING THE NECCO PARK SITE, NIAGARA FALLS, NY (cont.)

Family	Common Name	Latin Name	Guild 1	Forage Method	Breeding Substrate
Amphibians					
Plethodontidae	N. Two-fined Salamander	Eurycea b. bislineata	I	Water Gleaner	Water
Ranidae	Bullfrog	Rana catesbeiana	C	Water Ambusher	Water
	Green Rog	Rana clamitans melanotu	C	Riparian Ambusher	Water
Birds					
Accipitridae	Dam Eagle	Haliaeentus leucocephalus	C	Ground Scavenger	Not applicable 2
	Osprey	Pandion haliatus	P	Water-Foot Plunger	Tree Branch
Alcedinidae	Belled Kingfisher	Ceryle alcyon	P	Water Plunger	Riparian Subsurface
Anatidae	American Black Duck	Anas rubripes	O	Water Forager	Riparian Ground
	Bufflehead	Bucephala albeola	O	Bottom Forager	Not applicable
	Canada Goose	Branta canadensis	H	Ground Grazer	Riparian Ground
	Common Goldeneye	Bucephala clangula	O	Bottom Forager	Not applicable
	Common Merganser	Mergus merganser	P	Water Diver	Riparian Tree Cavity
	Greater Scaup	Aythya marila	O	Bottom Forager	Not applicable
	Mallard	Anas platyrhynchos	G	Water Forager	Riparian Ground
	Oldsquaw	Clangula hyemalis	O	Bottom Forager	Not applicable
	Rcd-breasted Merganser	Mergus serrator	P	Water Diver	Riparian Ground
Ardeidae	Great Blue Heron	Ardea herodias	C	Water Ambusher	Riparian Twig-Branch
	Green-backed Heron	Butorides striatus	C	Water Ambusher	Riparian Shrub
	Black-crowned Night Heron	Nycticorax nycticorax	C	Water Ambusher	Riparian Twig-Branch
Gaviidae	Common Loon	Gavia immer	P	Water Diver	Not applicable
Hirundinidae	Bank Swallow	Riparia riparia	I	Air Screener	Terrestrial Subsurface
	N. Rough-winged Swallow	Stelgidopteryx serripennis	I	Air Screener	Terrestrial Subsurface
	Tree Swallow	Tachycineata bicolor	I	Air Screener	Tree Cavity-Crevice
Laridae	Common Tem	Sterna hirundo	P	Water Plunger	Beach-Rock-Dune
	*Herring Gull	Larus argentatus	C	Coastal Scavenger	Beach-Rock-Dune
	*Ring-billed Gull	Larus delawarensis	O	Coastal Scavenger	Beach-Rock-Dune
Phalacrocoracidae	*Double-crested Cormorant	Phalacrocorax auritus	P	Ocean Diver	Riparian Ground
Scolopacidae	Spotted Sandpiper	Actitis macularia	O	Riparian Gleaner	Ground-Herb

TABLE 2i WILDLIFE SPECIES POTENTIALLY INHABITING THE NIAGARA RIVER, NIAGARA FALLS, NY (cont.)

Family	Common Name	Latin Name	Guild 1	Forage Method	Breeding Substrate
Mammals					
Mustelidae	Mink	Mustela vison	P	Water Diver	Riparian Subsurface
Vespertilionidae	Big Brown Bat	Eptesicus fuscus	I	Air Hawker	Buildings
	Eastern Pipistrelle	Pipistrellus subflavus	I	Air Hawker	Cave-Crevice
	Little Brown Bat	Myotis lucifugus	I	Air Hawker	Buildings
	N. Long-eared Bat	Myotis septentrionalis	I	Air Hawker	Tree Cavity-Crevice
	Small-footed Myotis	Myotis leibii	I	Air Hawker	Buildings
Reptiles					
Chelydridae	Snapping Turtle	Chelydra serpentina	O	Bottom Forager	Riparian Subsurface
Colubridae	Northern Water Snake	Nerodia s. sipedon	C	Water Ambusher	Riparian Subsurface
Emydidae	Midland Painted Turtle	Chrysemys p. marginata	O	Bottom Forager	Terrestrial Subsurface
	Map Turtle	Graptemys geographica	O	Bottom Forager	Terrestrial Subsurface
Kinosternidae	Stinkpot	Sternotherus odoratus	C	Bottom Forager	Riparian Subsurface

* Species observed in the area.

1 Guild includes:
- C: Carnivore
- G: Granivore
- H: Herbivore
- I: Insectivore
- O: Omnivore
- P: Piscivore

2 Not applicable since species not anticipated to breed in vicinity.

NOTE: Page 5-13 in Table 2i is not missing. It continues text from a previous page and is not part of the wildlife table.

TABLE 2i FISHES PRESENT IN NIAGARA RIVER, NEW YORK (cont.)

Family	Common Name	Scientific Name
Lepisosteidae	Longnose Gar	Lepisosteus osseus
Clupeidae	Alewife	Alosa pseudoharengus
	Gizzard Shad	Dorosoma cepedianum
Ictaluridae	Brown Bullhead	Ictalurus nebulosus
	Tadpole Madtom	Noturus gyrinus
Catostomidae	White sucker	Catastomus commersoni
	Norther Hogsucker	Hypentelium nigricans
	Silver Redhorse	Moxostoma anisurum
	Golden Redhorse	Moxostoma erythrurum
	Shorthead Redhorse	Moxostoma macrolepidotuni
	Greater Redhorse	Moxostoma valenciennesi
Cyprinidae	Goldfish	Carassius auratus
	Common Carp	Cyprinus carpio
	Golden Shiner	Notemigonus crysoleucus
	Hornghead chub	Nocomis biguttatus
	River Chub	Nocomis micropogon
	Longnose Dace	Rhinichthys cataractae
	Emerald Shiner	Norropis atherinoides
	Striped Shiner	Norropis chrysocephalus
	Common Shiner	Norropis cornutus
	Spottail Shiner	Norropis hudsonius
	Sand Shiner	Narropis stramineus
	Bluntnose Minnow	Piniephales notatus
	Blacknose Shiner	Norropis heterolepis
Osmeridae	Rainbow Smelt	Osmerus mordax
Esocidae	Northern Pike	Esox lucius
	Muskellunge	Esox masquinongy
Cyprinodontidae	Banded Killifish	Fundulus diapharus
Centrarchidae	Rock Bass	Ambloplites rupestris
	Pumpkinseed	Lepomis gibbosus
	Bluegill	Lepomis macrochirus
	Smallmouth Bass	Micropterus dolemieui
	Largemouth Bass	Micropterus salmoides
	Black Crappie	Pomoxis nigromaculatus
	White Crappie	Pomoxis annularis

TABLE 2i (CONTINUED)

Family	Common Name	Scientific Name
Percidae	Rainbow Darter	Etheostoma caeruleum
	Johnny Darter	Etheostoma nigrum
	Yellow Perch	Perca flavescens
	Walleye	Stizostedion vitreum
Sciaenidae	Freshwater Drum	Aplodinotus grunniens
Cottidae	Mottled Sculpin	Cottus bairdi
Umbridae	Central Mudminnow	Umbra limi
Moronidae	White Bass	Morone chrysops
Salmonidae	Chinook Salmon	Oncorhynchus ishawytscha
	Coho Salmon	Oncorhynchus kisutch
	Rainbow Trout	Salmo gairdneri

From Smith, 1985

TABLE 2j CONCENTRATIONS OF NECCO PARK GROUND WATER CONTAMINANTS (A - C) DISCHARGED TO NIAGARA RIVER THROUGH THE FALLS STREET TUNNEL (PRIOR TO DILUTION TO NIAGARA RIVER).

	Necco Park Concentration (ug/l)		Dilution	Exposure Concentration (ug/l)	
Contaminant	Mean	Maximum	Factor 1	Mean	Maximum
VOLATILES					
Carbon Tetrachloride	8751.8	210000	8.60E-04	7.53E+00	1.81E+02
Chloroform	26242.8	200000	8.60E-04	2.26E+01	1.72E+02
1.2-Dichloroethane	1232.3	13000	8.60E-04	1.06E+00	1.12E+01
1.1-Dichloroethene	958.3	22000	8.60E-04	8.24E-01	1.89E+01
(cis)1.2-Dichloroethene	6728.8	66000	8.60E-04	5.79E+00	5.68E+01
(trans)1.2-Dichloroethene	1400.4	19000	8.60E-04	1.20E+00	1.63E+01
Hexachlorobenzene	158.9	1500	8.60E-04	1.37E-01	1.29E+00
Hexachloroethane	342.0	3000	8.60E-04	2.94E-01	2.58E+00
1.1.2.2-Tetrachloroethane	18689.4	170000	8.60E-04	1.61E+01	1.46E+02
Tetrachloroethene	6440.8	69000	8.60E-04	5.54E+00	5.93E+01
1.1.2-Trichloroethene	8849.8	180000	8.60E-04	7.61E+00	1.55E+02
Trichloroethene	29407.6	270000	8.60E-04	2.53E+01	2.32E+02
Vinyl Chloride	1314.0	19000	8.60E-04	1.13E+00	1.63E+01
BASE-NEUTRAL ACID EXTRACTABLES					
Hexachlorobutadiene	4553.1	120000	8.60E-04	3.92E+00	1.03E+02
4-Methylphenol	141.8	900	8.60E-04	1.22E-01	7.74E-01
Pentachlorophenol	1497.2	28000	8.60E-04	1.29E+00	2.41E+01
Phenol	306.6	1900	8.60E-04	2.64E-01	1.63E+00
2.4.5-Trichlorophenol	308.4	6600	8.60E-04	2.65E-01	5.68E+00
2.4.6-Trichlorophenol	203.8	2800	8.60E-04	1.75E-01	2.41E+00
INORGANICS					
Barium	567590.0	14800000	8.60E-04	4.88E+02	1.27E+04
Cyanide	2360.0	70000	8.60E-04	2.03E+00	6.02E+01

1 Dilution factor calculated by dividing ground water layer (A - C) flux rate (1040 cfd) derived in Appendix D-2 by the average Fall Street Tunnel flow rate (1.203.208 cfd).

TABLE 2k CONCENTRATIONS OF NECCO PARK GROUND WATER CONTAMINANTS (D - G) DISCHARGED TO THE FOREBAY CANAL VIA PASNY CONDUITS.

	Necco Park Concentration (ug/l)		Dilution	Exposure Concentration (ug/l)	
Contaminant	Mean	Maximum	Factor 1	Mean	Maximum
Ground Water Layers D, E, F:					
VOLATILES					
Carbon Tetrachloride	4017.0	70000	1.00E.06	4.02E-03	7.00E-02
Chloroform	7748.7	110000	1.00E-06	7.75E-03	1.10E-01
1.2-Dichloroethane	348.3	3700	1.00E-06	3.48E-04	3.70E-03
1.1-Dichloroethene	718.0	11000	1.00E-06	7.18E-04	1.10E-02
(cis)1.2-Dichloroethene	2206.9	10000	1.00E-06	2.21E-03	1.00E-02
(trans)1.2-Dichloroethene	654.3	4900	1.00E-06	6.54E-04	4.90E-03
Hexachlorobenzene	71.9	280	1.00E-06	7.19E-05	2.80E-04
Hexachloroethane	237.6	3600	1.00E-06	2.38E-04	3.60E-03
1.1.2.2-Tetrachloroethane	4188.7	58000	1.00E-06	4.19E-03	5.80E.02
Tetrachloroethene	4246.1	46000	1.00E-06	4.25E-03	4.60E-02
1.1.2-Trichloroethane	2228.4	21000	1.00E-06	2.23E-03	2.10E-02
Trichloroethene	13699.9	170000	1.00E.06	1.37E-02	1.70E-01
Vinyl Chloride	775.7	5700	1.00E-06	7.76E-04	5.70E-03
BASE-NEUTRAL ACID EXTRACTABLES					
Hexachlorobutadiene	1673.3	17000	1.00E-06	1.67E-03	1.70E-02
4-Methylphenol	32.0	130	1.00E-06	3.20E-05	1.30E-04
Pentachlorophenol	439.3	4250	1.00E-06	4.39E-04	4.25E-03
Phenol	71.5	740	1.00E-06	7.15E-05	7.40E-04
2.4.5-Trichlorophenol	275.8	2950	1.00E-06	2.76E-04	2.95E-03
2.4.6-Trichlorophenol	201.3	1900	1.00E-06	2.01E-04	1.90E-03
INORGANICS					
Barium	130.0	1300	1.00E.06	1.30E-04	1.30E-03
Cyanide	10.0	170	1.00E-06	1.00E-05	1.70E-04
Ground Water Layer G:					
VOLATILES					
Carbon Tetrachloride	25.6	34	5.00E-07	1.28E-05	1.70E-05
Chloroform	2250.6	12000	5.00E-07	1.13E-03	6.00E-03
1.2-Dichloroethane	30.0	150	5.00E-07	1.50E-05	7.50E-05
1.1-Dichloroethene	279.4	1800	5.00E-07	1.40E-04	9.00E-04
(cis)1.2-Dichloroethene	1977.8	11000	5.00E-07	9.89E-04	5.50E-03
(trans)1.2-Dichloroethane	604.4	3500	5.00E-07	3.02E-04	1.75E-03
1.1.2.2-Tetrachloroethane	379.6	1700	5.00E-07	1.90E-04	8.50E-04
Tetrachloroethene	297.0	1400	5.00E-07	1.49E-04	7.00E-04
1.1.2-Trichloroethane	1349.8	6700	5.00E-07	6.75E-04	3.35E-03

TABLE 2k CONCENTRATIONS OF NECCO PARK GROUND WATER CONTAMINANTS (D - G) DISCHARGED TO THE FOREBAY CANAL VIA PASNY CONDUITS (CONTINUED).

	Necco Park Concentration (ug/l)		Dilution	Exposure Concentration (ug/l)	
Contaminant	Mean	Maximum	Factor 1	Mean	Maximum
Trichloroethene	3870.2	17000	5.00E-07	1.94E-03	8.50E-03
Vinyl Chloride	229.9	1500	5.00E-07	1.15E-04	7.50E-04
BASE-NEUTRAL ACID EXTRACTABLES					
Hexachlorobutadiene	213.0	1600	5.00E-07	1.07E-04	8.00E-04
Phenol	58.0	200	5.00E-07	2.90E-05	1.00E-04
INORGANICS					
Barium	80.0	540	5.00E-07	4.00E-05	2.70E-04

1 Dilution factor calculated by dividing groundwater layer flux rate (D - F:4754 cfd and G:2246 cfd) by low PASNY conduit flow rate (50,000 cfs or 4,320,000,000 cfd).

TABLE 21 CONCENTRATIONS OF NECCO PARK GROUND WATER CONTAMINANTS DISCHARGED TO NIAGARA RIVER (THROUGH THE FALLS STREET TUNNEL AND FOREBAY CANAL).

	Falls Street Tunnel Concentration (ug/l)		Dilution	Forebay Canal Concentration (ug/l)		Dilution	Niagara River Concentration (ug/l) 3	
Contaminant	Mean	Maximum	Factor 1	Mean	Maximum	Factor 2	Mean	Maximum
VOLATILES								
Carbon Tetrachloride	7.53E+00	1.81E+02	1.54E-04	4.03E-03	7.00E-02	5.56E-01	3.40E-03	6.69E-02
Chloroform	2.26E+01	1.72E+02	1.54E-04	8.88E-03	1.16E-01	5.56E-01	8.42E-03	9.10E-02
1,2-Dichloroethane	1.06E+00	1.12E+01	1.54E-04	3.63E-04	3.78E-03	5.56E-01	3.65E-04	3.83E-03
1,1-Dichloroethene	8.24E-01	1.89E+01	1.54E-04	8.58E-04	1.19E-02	5.56E-01	6.04E-04	9.53E-03
(cis)1,2-Dichloroethene	5.79E+00	5.68E+01	1.54E-04	3.20E-03	1.55E-02	5.56E-01	2.67E-03	1.74E-02
(trans)1,2-Dichloroethene	1.20E+00	1.63E+01	1.54E-04	9.56E-04	6.65E-03	5.56E-01	7.16E-04	6.21E-03
Hexachlorobenzene	1.37E-01	1.29E+00	1.54E-04	7.19E-05	2.80E-04	5.56E-01	6.11E-05	3.55E-04
Hexachloroethane	2.94E-01	2.58E+00	1.54E-04	2.38E-04	3.60E-03	5.56E-01	1.78E-04	2.40E-03
1,1,2,2-Tetrachloroethane	1.61E+01	1.46E+02	1.54E-04	4.38E-03	5.88E-02	5.56E-01	4.92E-03	5.52E-02
Tetrachloroethene	5.54E+00	5.93E+01	1.54E-04	4.39E-03	4.67E-02	5.56E-01	3.29E-03	3.51E-02
1,1,2-Trichloroethane	7.61E+00	1.55E+02	1.54E-04	2.91E-03	2.44E-02	5.56E-01	2.79E-03	3.75E-02
Trichloroethene	2.53E+01	2.32E+02	1.54E-04	1.56E-02	1.78E-01	5.56E-01	1.26E-02	1.35E-01
Vinyl Chloride	1.13E+00	1.63E+01	1.54E-04	8.91E-04	6.45E-03	5.56E-01	6.70E-04	6.10E-03
BASE-NEUTRAL ACID EXTRACTABLES								
Hexachlorobutadiene	3.92E+00	1.03E+02	1.54E-04	1.78E-02	1.78E-02	5.56E-01	1.59E-03	2.58E-02
4-Methylphenol	1.22E-01	7.74E-01	1.54E-04	3.20E-05	1.30E-04	5.56E-01	3.66E-05	1.92E-04
Pentachlorophenol	1.29E+00	2.41E+01	1.54E-04	4.39E-04	4.25E-03	5.56E-01	4.43E-04	6.08E-03
Phenol	2.64E-01	1.63E+00	1.54E-04	1.01E-04	8.04E-04	5.56E-01	9.66E-05	7.18E-04
2,4,5-Trichlorophenol	2.65E-01	5.68E+00	1.54E-04	2.76E-04	2.95E-03	5.56E-01	1.94E-04	2.52E-03
2,4,6-Trichlorophenol	1.75E-01	2.41E+00	1.54E-04	2.01E-04	1.90E-03	5.56E-01	1.39E-04	1.43E-03
INORGANICS								
Barium	4.88E+02	1.27E+04	1.54E-04	1.70E-04	1.57E-03	5.56E-01	7.55E-02	1.96E+00
Cyanide	2.03E+00	6.02E+01	1.54E-04	3.14E-04	9.30E-03	5.56E-01	4.88E-04	1.45E-02

1 Dilution factor calculated by dividing Falls Street Tuneel discharge rate (13.9 cfs) by the Niagara River low flow rate (90,000 cfs).
2 Dilution factor calculated by dividing Forebay Canal discharge rate (50,000 cfs) by the Niagara River low flow rate (90,000 cfs).
3 Niagara River concentration equals the sum of the FST and Forebay Canal concentrations multiplied by their respective dilution factor.

TABLE 2m SURFACE WATER ECOLOGICAL RISK SUMMARY

C0NTAMINANT OF CONCERN	EXPOSURE CONCENTRATION 1 (ıg/l)		WATER QUALITY VALUE 2 (ıg/l)		RISK INDICES 3 FOR ACUTE CRITERIA		RISK INDICES 3 FOR CHRONIC CRITERIA	
	MEAN	MAXIMUM	ACUTE	CHRONIC	MEAN	MAXIMUM	MEAN	MAXIMUM
Falls Street Tunnel (at discharge to Niagara River)								
Carbon Tetrachloride	7.53E+00	1.8IE+02	3.52E+004	-	2E-04	5E-03	-	-
Chloroform	2.26E+01	1.72E+02	2.89E+04	1.24E+03	8E-04	6E-03	2E-02	1E-01
1,2-Dichloroethane	1.06+00	1.12E+01	1.18E+05	2.00E+04	9E-06	9E-05	5E-05	6E-04
1,1-Dichloroethene	8.20E-01	1.89E+01	1.16E+04	-	7E-05	2E-03	-	-
(cis)1,2-Dichlorothene	5.79E+00	5.68E+01	1.16E+04	-	5E-04	5E-03	-	-
(trans)1,2-Dichloroethene	1.20E+00	1.63E+01	1.16E+04	-	1E-04	1E-03	-	-
Hexachlorobenzene	1.40E-01	1.29E+00	6.00E+00	3.68E+00	2E-02	2E-01	4E-02	4E-01
Hexachloroethane	2.90E-01	2.58E+00	9.80E+02	5.40E+02	3E-04	3E-03	5E-04	5E-03
1,1,2,2-Tetrachloroethane	1.61E+01	1.46E+02	-	2.40E+03	-	-	7E-03	6E-02
Tetrachloroethene	5.54E+00	5.93E+03	5.28E-03	8.40E+02	1E-03	1E-02	7E-03	7E-02
1,1,2-Trichloroethane	7.61E+00	1.55E+02	-	9.40E+03	-	-	8E-04	2E-02
Trichloroethene	2.53E+01	2.32E+02	4.50E+04	2.19E+04	6E-04	5E-03	1E-03	1E-02
Vinyl Chloride	1.13E+00	1.63E+01	3.88E+05	1.16E+03	3E-06	4E-05	1E-03	1E-02
Hexachlorobutadiene	3.92E+00	1.03E+02	9.00E+01	1.00E+00	4E-02	1E+00	4E+00	1.0E+02
4-Methylphenol	1.20E+01	7.70E-01	1.40E+03	4.20E+01	9E-05	6E+04	3E+03	2E-02
Pentachlorophenol	1.29E+00	2.41E+01	2.00E+01	4.00E-01	6E-02	1E+00	3E+00	6.0E+01
Phenol	2.60E-01	1.63E+00	1.02E+04	5.00E+00	3E-05	2E-04	5E+02	3E-01
2,4,5-Trichlorophenol	2.70E-01	5.68E+00	1.00E+02	6.30E+01	3E-03	6E-02	4E-03	9E-02
2,4,6-Trichlorophenol	1.80E-01	2.41E+00	-	9.70E+02	_	_	2E-04	2E-03
Barium	4.88E+02	1.27E+04	1.45E+04	5.80E+03	3E-02	9E-01	8E-02	2E+00
Cyanide	2.03E+00	6.02E+01	2.20E+01	5.20E+00	9E-02	3E+00	4E+01	1.2E+01
			TOTAL RISK INDEX		3E-01	6E+00	8E+00	1.8E+02

TABLE 2m SURFACE WATER ECOLOGICAL RISK SUMMARY (CONTINUED).

CONTAMINANT OF CONCERN	EXPOSURE CONCENTRATION 1 (ug/l)		WATER QUALITY VALUE 2 (ug/l)		RISK INDICES 3 FOR ACUTE CRITERIA		RISK INDICES 3 F0R CHRONIC CRITERIA	
	MEAN	MAXIMUM	ACUTE	CHRONIC	MEAN	MAXIMUM	MEAN	MAXIMUM
Forebay Canal								
Carbon Tetrachloride	4.00E-03	7.00E-02	3.52E+04	-	1E-07	2E-06	-	-
Chloroform	9.00E-03	1.16E-01	2.89E+04	1.24E+03	3E-07	4E-06	7E-06	9E-05
1,2-Dichloroethane	3.60E-04	4.00E-03	1.18E+05	2.00E+04	3E-09	3E-08	2E-08	2E-07
1,1-Dichloroethene	1.00E-03	1.20E-02	1.16E+04	-	9E-08	1E-06	-	-
(cis)1,2-Dichloroethene	3.00E-03	1.60E-02	1.16E+04	-	3E-07	1E-06	-	-
(trans)1,2-Dichloroethene	1.00E-03	7.00E-03	1.16E+04	-	9E-08	6E-07	-	-
Hexachlorobenzene	7.20E-05	2.80E-04	6.00E+00	3.68E+00	1E-05	5E-05	2E-05	8E-05
Hexachloroethane	2.40E-04	4.00E-03	9.80E+02	5.40E+02	2E-07	4E-06	4E-07	7E-06
1,1,2,2-Tetrachloroethane	4.00E-03	5.90E-02	-	2.40E+03	-	-	2E-06	2E-05
Tetrachloroethene	4.00E-03	4.70E-02	5.28E+03	8.40E+02	8E-07	9E-06	5E-06	6E-05
1,1,2-Trichloroethane	3.00E-03	2.40E-02	-	9.40E+03	-	-	3E-07	3E-06
Trichloroethene	1.60E-02	1.79E-01	4.50E+04	2.19E+04	4E-07	4E-06	7E-07	8E-06
Vinyl Chloride	1.00E-03	7.00E-03	3.88E+05	1.16E+03	3E-09	2E-08	9E-07	6E-06
Hexachlorobutadiene	2.00E-03	1.80E-02	9.00E+01	1.00E+00	2E-05	2E-04	2E-03	2E-02
4-Methylphenol	3.20E-05	1.30E-04	1.40E+03	4.20E+01	2E-08	9E-08	8E-07	3E-06
Pentachlorophenol	4.40E-04	4.00E-03	2.00E+01	4.00E-01	2E-05	2E-04	1E-03	1E-02
Phenol	1.00E-04	1.00E-03	1.02E+04	5.00E+00	1E-08	1E-07	2E-05	2E-04
2,4,5-Trichlorophenol	2.80E-04	3.00E-03	1.00E+02	6.30E+01	3E-06	3E-05	4E-06	5E-05
2,4,6-Trichlorophenol	2.00E-04	2.00E-03	-	9.70E+02	-	-	2E-07	2E-06
Barium	1.80E-04	1.57E-03	1.45E+04	5.80E+03	1E-08	1E-07	3E-08	3E-07
Cyanide	1.00E-05	1.70E-04	2.20E+01	5.20E+00	5E-07	8E-06	2E-06	3E-05
			TOTAL RISK INDEX		6E-05	5E-04	3E-03	3E-02

TABLE 2m SURFACE WATER ECOLOGICAL RISK SUMMARY (CONTINUED).

CONTAMINANT OF CONCERN	EXPOSURE CONCENTRATION 1 (ug/l)		WATER QUALITY VALUE 2 (ug/l)		RISK INDICES 3 FOR ACUTE CRITERIA		RISK INDICES 3 FOR CHRONIC CRITERIA	
	MEAN	MAXIMUM	ACUTE	CHRONIC	MEAN	MAXIMUM	MEAN	MAXIMUM
Niagara River								
Carbon Tetrachloride	3.40E-03	6.69E-02	3.52E+04	-	1E-07	2E-06	-	-
Chloroform	8.42E-03	9.10E-02	2.89E+04	1.24E+03	3E-07	3E-06	7E-06	7E-05
1,2-Dichloroethane	3.65E-04	3.83E-03	1.18E+05	2.00E+04	3E-09	3E-08	2E-08	2E-07
1,1-Dichloroethene	6.04E-04	9.53E-03	1.16E+04	-	5E-08	8E-07	-	-
(cis)1,2-Dichloroethene	2.67E-03	1.74E-02	1.16E-04	-	2E-07	1E-06	-	-
(trans)1,2-Dichloroethene	7.16E-04	6.21E-01	1.16E+04	-	6E-08	5E-07	-	-
Hexachlorobenzene	6.11E-05	3.55E-04	6.00E+00	3.68E+00	1E-05	6E-05	2E-05	1E-04
Hexachloroethane	1.78E-04	2.40E-03	9.80E+02	5.40E+02	2E-07	2E-06	3E-07	4E-06
1,1,2,2-Tetrachloroethane	4.92E-03	5.52E-02	-	2.40E+03	-	-	2E-06	2E-05
Tetrachloroethene	3.29E-01	3.51E-02	5.28E+03	8.40E+02	6E-07	7E-06	4E-06	4E-05
1,1,2-Trichloroethane	2.79E-03	3.75E-02	-	9.40E+03	-	-	3E-07	4E-06
Trichloroethene	1.26E-02	1.35E-01	4.50E+04	2.19E+04	3E-07	3E-06	6E-07	6E-06
Vinyl Chloride	6.70E-04	6.10E-03	3.88E+05	1.16E+03	2E-09	2E-08	6E-07	5E-06
Hexachlorobutadiene	1.59E-03	2.58E-02	9.00E+01	1.00E+00	2E-05	3E-04	2E-03	3E-02
4-Methylphenol	3.66E-05	1.92E-04	1.40E+03	4.20E+01	3E-08	1E-07	9E-07	5E-06
Pentachlorophenol	4.43E-04	6.08E-03	2.00E+01	4.00E-01	2E-05	3E-04	1E-03	2E-02
Phenol	9.66E-05	7.18E-04	1.02E+04	5.00E+00	9E-09	7E-08	2E-05	1E-04
2,4,5-Trichlorophenol	1.94E-04	2.52E-03	1.00E+02	6.30E+01	2E-06	3E-05	3E-06	4E-05
2,4,6-Trichlorophenol	1.39E-04	1.43E-03	-	9.70E+02	-	-	1E-07	1E-06
Barium	7.55E-02	1.96E-00	1.45E+04	5.80E+03	5E-06	1E-04	1E-05	3E-04
Cyanide	4.88E-14	1.45E-02	2.20E+01	5.20E+00	2E-05	7E-04	9E-05	3E-03
			TOTAL RISK INDEX		8E-05	1E-03	3E-03	4E-02

1 Surface water exposure concentrations from Tables 5 - 5 (Layers A - C), 5 -6 (Layers D - F and G totaled), and 5 - 7 (all layers diluted into Niagra River).
2 Water Quality Criteria/Effects Concentrations from Table 5-8.
3 Risk Index = COC concentration (average or maximum)divided by water quality value (acute or chronic)

Table 3
CHEMICAL-SPECIFIC ARARs

Standards, Requirements, Criteria, or Limits	Citation or Reference	Description
New York Safe Drinking-Water Act Standards	10 NYCRR Chapter I Part 5-1	State maximum contaminant level (MCL) standards for public water systems based on public health and feasibility technology
New York Surface-Water and Groundwater Quality Standards and Effluent Standards	6 NYCRR Parts 700-705	State surface-water and groundwater quality and recerving water discharge standards
New York State Pollutant Discharge Elimination System	6 NYCRR Chapter X, Parts 750-758	Permitting procedures and discharge limitations for discharges of effluent to surface water
Federal Safe Drinking-Water Act	42 USC s300f	The act that provides the EPA with the authority to develope and implement drinkine-water standards
National Primary Drinking-Water Standards	40 CFR 141	Standards (MCLs and MCLGs) for public water systems based on public health and feaslibility technology
National Secondary Drinking-Water Standards	40 CFR 143	Numerical criteria-based (secondary MCLs-SMCLs) aesthetics
Niagara County Drinking-Water Standards	Niagra County Sanitary Codes Chapter IV	Niagra County drinking-water standards (MCLs) for public water systems based on public health and feasible technology
Standards for Owners and Operators of Hzardous Waste TSDs	40 CFR 264.94	Groundwater protection standards for toxic metals and pesticides
Federal Water-Quality Criteria	33 USC SS 1251-1376 40 CFR 131	Criteria for water quality based on toxicity to aquatic organiisms and public health
New York Water Pollution Control Regulations	6 NTCRR Parts 608, 610-614	Permit requirements for protected stream disturbance, petroleum cleanup, and petroleum storage
New York Rules for Inactive Hazardous Waste Disposal Site	6 NYCRR Part 375	Regulation for inactive hazardous waste sites
Toxic Substances Control Act	40 CFR 761	Regulation of PCBs, dioxins and commercial chemical

Table 3 (continued)
POTENTIAL LOCATION-SPECIFIC ARARS

Standards, Requirements, Criteria, or Limits	Citation or Reference	Description
Coastal Zone Management Act	16 USC 1451 15 CFR 923/930	Preserves, protects, develops, restores, and enhances the resources of the coastal zone
Endangered Species Act	16 USC 153	Protects endangered species threatened to become extinct
New York Wetlands Regulations	6 NYCRR Part-661	Protects wetlands in the state of New York from adverse environmental impact caused by developement activities
Executive Order on Floodplain Management	E.0. No. 11988	Requires federal agencies to evaluate the potential effects of actions in a floodplain to avoid, to the maximum extent possible, the adverse impact associated with direct and indirect development of a floodplain

Table 3 (continued)
ACTION-SPECIFIC ARARs AND TBCs

Standards, Requirements, Criteria, or Limits	Citation or Reference	Description
New York Safe Drinking-Water Act Standards	10 NYCRR Chapter I, Part 5-1	State standards (MCLs) for public water systems based on public health and feasible technology
New York Surface-Water and Groundwater Quality Standards and Effluent Standards	6 NYCRR Puts 700-705	State surface-water and groundwater quality and recieving-waters discharge standards
New York State Pollutant Discharge Elimination System	6 NYCRR Chapter X, Parts 750-758	Requirements for discharges of effluent to surface water
Federal Safe Drinking-Water Act	42USC s300f	The act that provides the EPA with the authority to develop and implement drinking-water standards
National Primary Drinking-Water Standards	40 CFR 141	Standards (MCLs and MCLGs) for public water systems based on public health and feasible technology
National Secondary Drinking-Water Standards	40 CFR 143	Numerical criteria-based (SMCLs) aesthetics
Standards for Owners and Operators of Hazardous Waste TSDs	40 CFR 264.94	Groundwater protection standards for toxic metals and pesticides
Toxic Substances Control Act	40 CFR 761	Regulation of the management of PCBs and dioxins and commercial chemicals
Clean Water Act Section 404	40 CFR 300	Prohibits discharge of dredged or fill material into wetlands without a permit; preserves and enhances wetlands
New York Hazardous Waste Regulations	6 NYCRR Parts 370-375	Establishes regulations for hazardous waste treatment storage, transportation, and disposal in the state of New York

Water Allocation Permit	Article 15, Environmental Conservation Law, Title 16	Laws implementing requirements of the Great Lakes compact; applicable to facilities with a minimal well pumping rate of 100,000 gallons per day and other facilities that divert water from the Great Lakes drainage basin
New York State Solid and Hazardous Waste Regulations	6 NYCRR Part 364	Waste Transporter Permit
New York State Solid and Hazardous Waste Regulations	6 NYCRR Part 376	LDRs
New York State Solid and Hazardous Waste Regulations	6 NYCRR Part 257	Air Quality Standards
New York Solid Waste Regulations	6 NYCRR 360	Establishes regulations for nonhardous waste disposal
New York Air Emissions Limits Regulations	6 NYCRR Parts 200-254	Sets limits for air emissions for specific processes and permit required
Well Permitting Procedures	10 NYCRR Chapter I Part 5	Establishes procedures for permitting installation of a well
City of Niagara Falls Sewer Discharge Permit	City of Niagara Falls Sewer Use Ordinance Chapter 250	Limits contaminant concentration and discharges to POTWs

Table 3 (continued)
ACTION-SPECIFIC ARARs AND TBCs

Standards, Requirements, Criteria, or Limits	Citation or Reference	Descripition
Niagara County Drinking Water Standards	Niagara County Sanitary Code Chapter IV	Niagara County drinking-water standards (MCLs) for public water systems based on public health and feasible technology
Resource Conservation and Recovery Act	40 CFR 260 - 270 42 USC 6901 et seq.	Regulates the generation, transport, treatment, storage, and disposal of hazardous wastes
New York Occupational Safety and Health	6NYCRR 662-666	Worker health and safety
Federal Occupational Safety and Health	29 CFR	Worker health and safety
Federal Air Emissions Regulations	40 CFR, Part 50-80	Regulation of the construction, operation, and emissions from stationary and mobile sources of air pollutants identified by the EPA
Hazardous Materials Transportation Act	49 USC 55 1801-1813 49 CFR 100-180	Regulation of the packaging, marking, labeling, manifesting, and mode of transportation of materials identified as hazardous materials by the Department of Transportation
NYSDEC Technical and Administrative Guidance Memorandum	N/A	Determination of soil cleanup objectives and cleanup levels
New York State Air Guide 1	N/A	Toxic Ambient Air Contaminants Guidelines
Four-Party Agreement	N/A	

Table 4
CHEMICAL-SPECIFIC ARARs AND ACCEPTABLE RISK-BASED CONCENTRATIONS FOR GROUNDWATER

Contaminant	New York Public Water Supply Regulations (ıg/l)	New York Groundwater Quality Standards (ıg/l)	Maximum Contaminant Level (ıg/l)	Maximum Contaminant Level Goal (ıg/l)	Noncarcinogenic Risk Based Concentration 7 (ıg/l)	Carcinogenic Risk Based Concentration 1 (ıg/l)	Practical Quantitation Limit (ıg/l)
1,1,2,2-tetrachloroethane	5 4,6	5 4				0.3	10
Carbon tetrachloride	5 4,6	5	5	0	15	0.46	10
Vinyl chloride	2	2	2	0		0.04	10
1,1,2-trichloroethane	5 4,6	5 4	5	3	98	1.0	10
1,1-dichloroethene	5 4,6	5 4	7	7	200	0.07	10
Hexachlorobutadiene	5 4,6	5 4			18	0.3	10
1,2-dichloroethane	5 4,6	5 4	5	0	7,387	0.63	10
Chloroform	100 2	7	100 2		238	1.9	10
Tetrachloroethene	5 4,6	5 4	5	0	183	1.0	10
Trichloroethene	5 4,6	5 4	5	0	136	5.5	10
2,4,6-trichlorophenol	50 5	1 3				4.5	10
Hexachlorobenzene	5 4,6	0.35	1	0	4	0.008	10
Hexachloroethane	5 4,6	5 4			17	2.8	10
Pentachlorophenol	1	1 3	1	0	67	0.04	50
Barium, soluble	2,000	1,000	2,000	2,000	2,555		
Cyanide, total		100	200		730		
Phenol	50 5,6	1 3			21,054		10
4-methylphenol	50 5,6	1 3			169		10
2,4,5-trichlorophenol	50 5,6	1 3			1,839		50
cis-1,2-chloroethene	5 4,6	5 4	70	70	229		10
trans-l,2-dichloroethene	5 4,6	5 4	100	100	459		10

1 Concentrations were calculated for a cancer risk level of 10 -6 assuming residential exposures via ingestion, inhalation, and demal adsorption while showering.
2 Based on total trihalomethanes.
3 Total phenolics.
4 Based on classification as a principal organic contaminant (POC).
5 Based on classification as an unspecified organic contaminant (UOC).
6 Total combined POC and UOC has a maximum limit of 100 ıg/l.
7 Concentrations were calculated for a hazard index of 1 assuming residential exposures via ingestion, inhalation, and dermal adsorption while showering.
ıg/l = micrograms per liter

TABLE 5

TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM:
DETERMINATION OF SOIL CLEANUP OBJECTIVES AND CLEANUP LEVELS

<IMG SCR 98144P1>

TO: Regional Haz. Waste Remediation Engineers, Bureau Dirs. & Section Chiefs
FROM: Michael J. O'Toole, Jr., Director, Div. of Hazardous Waste Remediation
SUBJECT: DIVISION TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM:
DATE: DETERMINATION OF SOIL CLEANUP OBJECTIVES AND CLEANUP LEVELS.

JAN 24 1994

The cleanup goal of the Department is to restore inactive hazardous waste sites to predisposal conditions, to the extent feasible and authorized by law. However, it is recognized that restoration to predisposal conditions will not always be feasible.

1. INTRODUCTION:

This TAGM provides a basis and procedure to determine soil cleanup levels at individual Federal Superfund, State Superfund, 1996 EQBA Title 3 and Responsible Party (RP) sites, when the Director of the DHWR determines that cleanup of a site to predisposal conditions is not possible or feasible.

The process starts with development of soil cleanup objectives by the Technology Section for the contaminants identified by the Project Managers. The Technology Section uses the procedure described in this TAGM to develop soil cleanup objectives. Attainment of these generic soil cleanup objectives will, at a minimum, eliminate all significant threats to human health and/or the environment posed by the inactive hazardous waste site. Project Managers should use these cleanup objectives in selecting alternatives in the Feasibility Study (FS). Based on the proposed selected remedial technology (outcome of FS), final site specific soil cleanup levels are established in the Record of Decision (ROD) for these sites.

It should be noted that even after soil cleanup levels are established in the ROD, these levels may prove to be unattainable when remedial construction begins. In that event, alternative remedial actions or institutional controls may be necessary to protect the environment.

2. BASIS FOR SOIL CLEANUP OBJECTIVES:

The following alternative bases are used to determine soil cleanup objectives:

(a) Human health based levels that correspond to excess lifetime cancer risks of one in a million for Class A 1 and B 2 carcinogens, or one in 100,000 for Class C 3 carcinogens. These levels are contained in USEPA's Health Effects Assessment Summary Tables (HEASTs) which are compiled and updated quarterly by the NYSDEC's Division of Hazardous Substances Regulation;

(b) Human health based levels for systemic toxicants, calculated from Reference Doses (RfDs). RfDs are an estimate of the daily exposure in individual (including sensitive individuals) can experience without appreciable risk of health effects during a lifetime. An average scenario of exposure in which children ages one to six (who exhibit the greatest tendency to ingest soil) is assumed. An intake rate of 0.2 gram/day for a five-year exposure period for a 16-kg child is assumed. These levels are contained in USEPA's Health Effects Assessment Summary Tables (HEASTs) which are compiled and updated quarterly by the NYSDEC's Division of Hazardous Substances Regulation;

(c) Environmental concentrations which are protective of groundwater/drinking water quality; based on promulgated or proposed New York State Standards;

(d) Background values for contaminants; and

(e) Detection limits.

A recommendation on the appropriate cleanup objective is based on the criterion that produces the most stringent cleanup level using criteria a, b, and c for organic chemicals, and criteria a, b, and d for heavy metals. If criteria a and/or b are below criterion d for a contaminant, its background value should be used as the cleanup objective. However, cleanup objectives developed using this approach must be, at a minimum, above ft method detection limit (MDL) and it is preferable to have the soil cleanup objectives above the Contract Required Quantitation Limit (CRQL) as defined by NYSDEC. If the cleanup objective of a compound is "non-detectable", it should mean that it is not detected at the MDL. Efforts should be made to obtain the best MDL detection possible when selecting a laboratory and analytical protocol.

The water/soil partitioning theory is used to detemnine soil cleanup objectives which would be protective of groundwater/drinking water quality for its best use. This theory is conservative in nature and assumes that contaminated soil and groundwater are in direct contact. This theory is based upon the ability of organic matter in soil to adsorb organic chemicals. The approach predicts the maximum amount of contamination that may remain in soil so that leachate from the contaminated soil will not violate groundwater and/or drinking water standards.

(1) Class A are proved human carcinogens
(2) Class B are prbable human carcinogens
(3) Class C are possible human carcinogens

This approach is not used for heavy metals, which do not partition appreciably into soil organic matter. For heavy metals, eastern USA or New York State soil background values may be used as soil cleanup objectives. A list of values that have been tabulated is attached. Soil background data near the site, if available, is preferable and should be used as the cleanup objective for such metals. Background samples should be free from the influences of this site and any other source of contaminants. Ideal background samples may be obtained from uncontaminated upgradient and upwind locations.

(3) DETERMINATION OF SOIL CLEAN GOALS FOR ORGANICS IN SOIL FOR PROTECTION OF WATER QUALITY

Protection of water quality from contaminated soil is a two-part problem. The first is predicting the amount of contamination that will leave the contaminated media as leachate. The second part of the problem is to determine how much of the contamination will actually contribute to a violation of groundwater standards upon reaching and dispersing into groundwater. Some of the contamination which initially, leaches out of soil will be absorbed by other soil before it reaches groundwater. Some portion will be reduced through natural attenuation or other mechanism.

PART A: PARTITION THEORY MODEL

There are many test and theoretical models which are used to predict leachate quality given a known value of soil contamination. The Water-Soil Equilibrium Partition Theory is used as a basis to determine soil standard or contamination limit for protection of water quality by most of the models currently in use. It is based on the ability of organic carbon in soil to adsorb contamination. Using a water quality value which may not be exceeded in leachate and the partition coefficient method, the equilibrium concentration (Cs) will be expressed in the same units as the water standards. The following expression is used:

Allowable Soil Concentration $Cs = f \times Koc \times Cw$ . . . (1)

Where: f = fraction of organic carbon of the natural soil medium.

Koc = partition coiefficient between water and soil media. Koc can be estimated by the following equation:

$\log Koc = 3.64 - 0.55 \log S$

S = water solubility in ppm

Cw = appropriate water quality value from TOGS 1.1.1

Most Koc and S values are listed in the Exhibit A-1 of the USEPA Superfund Public Health Evaluation Manual (EPA/540/1-86/060). The Koc values listed in this manual should be used for the purpose. If the Koc value for a contaminant is not listed, it should be estimated using the above mentioned equation.

PART B: PROCEDURE FOR DETERMINATION OF SOIL CLEANUP OBJECTIVES

When the contaminated soil is in the unsaturated zone above the water table, many mechanisms are at work that prevent all of the contamination that would leave the contaminated soil from impacting groundwater. These mechanisms occur during transport and may work simultaneously. They include the following: (1) volatility, (2) sorption and desorption, (3) leaching and diffusion, (4) transformation and degradation, and (5) change in concentration of contaminants after reaching and/or mixing with the groundwater surface. To account for these mechanisms, a correction factor of 100 is used to establish soil cleanup objectives. This value of 100 for the correction is consistent with the logic used by EPA in its Dilution Attenuation Factor (DAF) approach for EP Toxicity and TCLP. (Federal Register/Vol. 55, No. 61, March 29, 1990/Pages 11826-27). Soil cleanup objectives are calculated by multiplying the allowable soil concentration by the correction factor. If the contaminated soil is very close (< 3' - 5') to the groundwater table or in the groundwater, extreme caution should be exercised when using the correction factor of 100 (one hundred) as this may not give conservative cleanup objectives. For such situations the Technology Section should be consulted for site-specific cleanup objectives.

Soil cleanup objectives are limited to the following maximum values. These values are consistent with the approach promulgated by the States of Washington and Michigan.

1) Total VOCs 10 ppm
2) Total Semi VOCs 500 ppm.
3) Individual Semi VOCs 50 ppm.
4) Total Pesticides 10 ppm.

One concern regarding the semi-volatile compounds is that some of these compounds are so insoluble that their Cs values are fairly large. Experience (Draft TOGS on Petroleum Contaminated Soil Guidance) has shown that soil containing some of these insoluble substances at high concentrations can exhibit a distinct odor even though the substance will not leach from the soil. Hence any time a soil exhibits a discernible odor nuisance, it shall not be considered clean even if it has met the numerical criteria.

4. DETERMINATION OF FINAL CLEANUP LEVELS:

Recommended soil cleanup objectives should be utilized in the development of final cleanup levels through the Feasibility Study (FS) process. During the FS, various alternative remedial actions developed during the Remedial Investigation (RI) are initially screened and narrowed down to the list of potential alternative remedial actions that will be evaluated in detail. These alternative remedial actions are evaluated using the criteria discussed in TAGM 4030, Selection of Remedial Actions at Inactive Hazardous Waste Sites, revised May 15, 1990, and the preferred remedial action will be selected. After the detailed evaluation of the preferred remedial action, the final cleanup levels which can be actually achieved using the preferred remedial action must be established. Remedy selection, which will include final cleanup levels, is the subject of TAGM 4030.

Recommended soil cleanup objectives that have been calculated by the Technology Section are presented in Appendix A. These objectives are based on a soil organic carton content of 1% (0.01) and should be adjusted for the actual organic carbon content if it is known. For determining soil organic carbon content, use attached USEPA method (Appendix B). Please contact the Technology Section, Bureau of Program Management for soil cleanup objectives not included in Appendix A.

Attachments

cc: T. Jorling
J. Lacey
M. Gerstman
A. DeBarbieri
E. Sullivan
T. Donovan
C. Sullivan
J. Eckl
R. Davies
R. Dina
C. Goddard
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P. Counterman
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M. Birmingham
D. Johnson
B. Hogan
Regional Directors
Regional Engineers
Regional Solid and Haz. Waste Engrs.
Regional Citizen Participation Spec.

<IMG SCR 98144P2>
<IMG SCR 98144P3>
<IMG SCR 98144P4>
<IMG SCR 98144P5>
<IMG SCR 98144P6>

TABLE 5 (continued)

Conventional Sediment Variables
Total Organic Carbon (TDC)
March 1986

TOTAL ORGANIC CARBON (TOC)

USE AND LIMITATIONS

Total organic carbon is a measure of the total amount of nonvolatile, volatile, partially volatile, and particulate organic compounds in a sample. Total organic carbon is independent of the oxidation State of the organic compounds and is not a measure of the organically bound and inorganic elements that can contribute to the biochemical and chemical oxygen demand tests.

Because inorganic carbon (e.g., carbonates, bicarbonates, free CO 2) will interfere with total organic carbon determinations. Samples should be treated to remove inorganic carbon before being analyzed.

FIELD PROCEDURES

Collection

Samples can be collected in glass or plastic containers. A minimum sample size of 25 g is recommended. If unrepresentative material is to be removed from the sample, it should be removed in the field under the supervision of the chief scientist and noted an the field log sheet.

Processing

Samples should be stored frozen and can be held for up to 6 mo under that condition. Excessive temperatures should not be used to thaw samples.

LABORATORY PROCEDURES

Analytical Procedures

a Equipment
- Induction furnace
  e.g., Leco WR-12, Dohraann DC-50, Coleman CH analyzer, Perkin Elmer 240 elemental analyzer, Carlo-Erba 1106
- Analytical balance
  0.1 mg accuracy
- Desiccator
- Combustion boats
- 10 percent hydrochloric acid (HCl)
- Cupric oxide fines (or equivalent material)
- Benzoic acid or other carbon source as a standard.

• Equipment preparation
  - Clean combustion boats by placing them in the induction furnace at 9505 C. After being cleaned, combustion boats should not be touched with bare hands.
  - Cool boats to room temperture in a desiccator.
  - Weigh each boat to the nearest 0.1 mg.

• Sample preparation
  - Allow frozen samples to warm to room temperature.
  - Homogenize each sample mechanically incorporation any overlying water.

- Transfer a representative aliquot (5-10 g) to a clean container.

• Analytical procedures
  - Dry samples to constant weight at 70 " 25 C. The drying temperature is relatively low to minimize loss of volatile organic
  - Cool dried samples to room temperature in 4 desiccator.
  - Grind sample using a mortar and pestle to break up aggregates.
  - Transfer a representative aliquot (0.2-0.5 g) to a clean, preweighed combustion boat.
  - Determine sample weight to the nearest 0.1 mg.
  - Add several drops of HCl to the dried sample to remove carbonates. Wait until the effervescing is completed and add more acid. Continue this process until the incremental addition of acid causes no further effervescence. Do not add too much acid at one time as this may cause loss of sample out to frothing. Exposure of small samples (i.e., 1-10 mg) having less than 50 percent carbonate to an HCl atmosphere for 24-48 h has been shown to be an effective means of removing carbonates (Hedges and Stern 1984). If this method is used for sample sizes greater than 10 mg, its effectiveness should be demonstrated by the user.
  - Dry the HCl-treated sample to constant weight at 70 " 25 C.
  - Cool to room temperture in a desiccator.
  - Add previously ashed cupric oxide fines or equivalent material (e.g., alumina oxide) to the Sample in the combustion boat.
  - Combust the sample in an induction furnace at a minimum temperatures of 950 " 105 C.

• Calculations
  - If an ascarite-filled tube is used to capture C0 2, the carbon content of the sample can be calculated as follows:

$$\text{Percent carbon} = \frac{A(0.2729)(100)}{B}$$

Where:

A = the weight (g) of CO 2 determined by weighing the ascarite tubes before and after combustion
B = dry weight (g) of the unacidified sample in the combustion boat
0.2729 = the ratio of the molecular weight of carbon to the molecular weight of carbon dioxide

A silica gel trap should be placed before the ascarite tube to catch any moisture driven off during sample combustion. Addition silica gel should be placed at the exit end of the ascarite tube to trap any water that might be formed by reaction of the trapped CO 2 with the NaOH in the ascarite. If in elemental analyzer is used, the amount of C0 2 will be measured by a thermal conductivity detector. The instrument should be calibrated drinking using an empty boat blank as the zero point and at least two standards. Standards should bracket the expected range of carbon concentrations in the samples.

QA/OC Procedures

It is critical that each sample be thoroughly homogenized in the laboratory before a subsample is taken for analysis. Laboratory homogenization should be conducted even if samples were homogenized in the field.

Dried samples should be cooled in a desiccator and held there until they are weighed. If a desiccator is not used, the sediment will accumulate ambient moisture and the samle weight will be overestimated. A

color-indicating desiccant is recommended so that spent desiccant can be detected easily. Also, the seal an the desiccator should be checked periodically and, if necessary, the ground glass rims should be greased or the "0" rings should be replaced.

It is recommended that triplicate analyses be conducted on one of every 20 samples, or an one sample per batch if less than 20 samples are analyzed. A method blank should be analyzed at the same frequency as the triplicate analysts. The analytical balance should be inspected daily and calibrated at least once per week. The Carbon analyzer should be calibrated daily with freshly prepared standards. A standard reference material should be analyzed it least once for each major survey.

DATA REPORTING REQUIREMENTS

Total organic carbon should be reported as a percentage of the dry weight of the unacidified sample to the nearest 0.1 unit. The laboratory should report the results of all samples (including QA replicates, method blanks, and standard reference measurements) and should note any problems that may have influenced sample quality. The laboratory should also provide a summary of the calibration procedure and results (e.g., range covered, regression equation, coefficient of determination).

Table 6

ZONE SPECIFIC FAR-FIELD LOADINGS

Alternative	B zone	C zone	D zone	E zone	F zone	G zone	TOTAL
1	4.97	3.86	0.55	4.82	7.43	0.99	22.6
2	0.01	<0.01	0.53	4.61	7.14	0.98	13.3
3	0.01	<0.01	0.53	4.61	7.14	0.98	13.3
4	0.01	<0.01	0.53	4.61	7.14	0.98	13.3
5	0.01	<0.01	0.53	4.61	7.14	0.98	13.3
6	0.01	<0.01	0.13	1.11	1.61	0.97	3.8
7	0.01	<0.01	0.13	1.11	1.61	0.90	3.8
8	0.01	<0.01	0.13	1.11	1.61	0.97	3.8
9	0.09	0.10	0.03	0.25	0.38	0.89	1.7
10 & 10A	<0.01	<0.01	0.00	0.01	0.01	0.96	1.0
11	<0.01	<0.01	0.00	0.01	0.01	0.96	1.0
12	0.05	0.08	0.03	0.24	0.36	<0.01	0.8
13	0.01	0.06	0.03	0.24	0.37	0.82	1.5

TABLE 7

ALTERNATIVE	CAPITAL COST	ANNUAL O&M COST	30-YEAR PRESENT WORTH COST	TOTAL COST
Alternative 1	$0	$0	$0	$0
Alternative 2	$271,785	$1,658,325	$20,578,155	$20,850,000
Alternative 3	$2,780,899	$1,669,025	$20,710,931	$23,492,000
Alternative 4	$5,094,136	$1,933,650	$23,944,663	$29,089,000
Alternative 5	$6,530,587	$1,810,450+ $768,750 for 5 years for DPE	$22,465,874+ $3,152,029 for 5 years for DPE	$32,148,000
Alternative 6	$3,760,774	$2,897,775	$35,958,490	$39,719,000
Alternative 7	$6,074,011	$3,162,400	$39,242,222	$45,316,000
Alternative 8	$7,510,462	$2,887,075 + $850,875 for 5 years for DPE	$35,825,714 + $3,488,758 for 5 years for DPE	$46,825,000
Alternative 9	$15,564,011	$3,080,275	$38,223,132	$53,787,000
Alternative 10 /10A	$7,837,136	$4,614,775	$57,264,743	$65,102,000
Alternative 11	$9,354,723	$4,421,575 + $768,750 for 5 years for DPE	54,867,324 + $3,152,029 for 5 years for DPE	$67,374,000
Alternative 12	$39,051,761	$3,218,650	$39,940,228	$78,992,000
Alternative 13	$19,343,761	$6,214,525	$77,116,041	$96,460,000

APPENDIX III

ADMINISTRATIVE RECORD INDEX
DUPONT/NECCO PARK
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS

3.0 REMEDIAL INVESTIGATION

3.1 Sampling and Analysis Plans

P. 300001-300058 Report: Field Sampling Plan, Necco Park, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours & Company, Inc., November 1991.

3.2 Sampling and Analysis Data/Chain of Custody Forms

P. 300059-300086 Letter to Mr. Dale Carpenter, Chief, Site Compliance Branch, Emergency and Remedial Response Division, US EPA, Region II, from Ms. Marjorie D. Ripsom, Area Engineer, Engineering and Environmental Affairs, Du Pont Chemicals, re: attached lab report from Enseco-CAL laboratory's analysis for 2,3,7,,8-TCDD Study, April 10, 1992. Attached Report: Data Quality Assessment and Validation, Du Pont Necco Park, 2,3,7,8-TCDD Analytical Program, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours & Company, Inc., March 1992.

P. 300087-300113 Letter to Ms. Margie D. Ripsom, Area Engineer, Engineering and Environmental Affairs, Du Pont Chemicals, from Ms. Shelly Eyraud, Manager of Low Resolution Dioxin Services, Enseco, re: enclosed amended report for the fourteen aqueous and four solid samples for the DuPont Necco Park Project, received at Enseco-Cal Lab on October 18, 1991, January 8, 1992.

P. 300114-300134 Letter to Ms. Ann Masse, Du Pont Chemicals, from Ms. Shelly Eyraud, Manager of Low Resolution Dioxin Service, Enseco, re: enclosed report for the one aqueous, four solid and seven waste samples for the DuPont Necco Park Project, received at Enseco-Cal LAb on October 23, 1991, November 25, 1991.

P. 300135-300266 Report: Geologic, Report, Necco Park, Niagara Falls, New York, July 1988 - Volume I, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, July 1988.

P. 300267-300758 Report: Geologic Report Necco Park, Niagara Falls. New York, July 1988 - Volune II, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, July 1988.

P. 300759-300892 Report: Results of NAPL Sampling and Analytical Program (May, 1987), Necco Park, Niagara Falls. New York, December 7, 1987, prepared by Woodward-Clyde Consultants, December 7, 1987.

P. 300893-300956 Report: Ambient Air Sampling Report for the Necco Park Landfill Summer 1986 Sampling, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours & Company, August 21, 1987.

P. 300957-301152 Report: Refinement of Aqueous Indicator Parameter List for Necco Park, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, December 31, 1986.

P. 301153-301242 Report: NAPL Investigation, Necco Park, Niagara Falls, New York, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, December 22, 1986.

P. 301243-301296 Report: Ambient Air Sampling Report for the Necco Park Landfill, Fall 1985 Sampling, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, July 23, 1986.

P. 301297-301442 Map: Sample Location Map, Niagara Falls Groundwater Monitoring Program, Niagara Falls. N.Y., prepared by NUS Corporation, (undated). Attached are: Well Construction Details, Borehole Logs, Well Descriptions, Appendix D - Monitoring Well installation, Construction and Development, and Appendix F - Borehole Logs.

3.3 Work Plans

P. 301443-301639 Report: Quality Assurancce Quality Control Audit Manual, Version 3.1. Necco Park, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours & Company, Inc., November 1991.

P. 301640-301775 Report: Investigation Work Plan, Necco Park, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours & Company, Inc., March 1991.

3.4 Remedial Investigation Reports

P. 301776-302024 Report: Investigation Report, Necco Park, Volume I - Text, Tables, Figures, prepared by Woodward Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, Inc., October 1993.

P. 302025-302492 Report: Investigation Report, Necco Park, Volume II, Appendix A-C, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, Inc., October 1993.

P. 302493-302947 Report: Invesstigation Report, Necco Park, Volume III Appendix D-I, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours, and Company, Inc., October 1993.

P. 302948-303374 Report: Final Rinal Assessment, Dupont Necco Park Site, Niagara Falls, New-York - Risk Assessment, Work Assignment: C02124 (Ref, No. 1-635-353), prepared for United States Environmental Protection Agency, prepared by TRC Environmental Corporation, July 29, 1993.

P. 303375-303540 Report: Niagara Falls Regional Groundwater Assessment, Volume I - Text, prepared by Woodward-Clyde Consultants and Conestoga-Rovers & Associates for Du Pont Chemicals, Occidental Chemical Corporation, and Olin Chemicals, June 1992.

P. 303541-304128 Report: Niagara Falls Regional Groundwater Assessment, Volume II - Appendix A-Site Summary Attachments, prepared by Woodward-Clyde Consultants and Conestoga-Rovers & Associates for Du Pont Chemicals, Occidental Chemical Corporation, and Olin Chemicals, June 1992.

P. 304129-304160 Drawings: Niagara Falls Regional Groundwater Assessment - Volume III Plans, prepared by Woodward-Clyde Consultants and Conestoga-Rovers Associates, prepared for Du Pont Chemicals, Occidental Chemical Corporation, and Olin Chemicals, June 1992.

P. 304161-304611 Report: Interpretive Report for Necco Park, E.I. du Pont de Nemours & Company, Niagara Falls, New York. Volume II, Appendices C, D, E and F, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, Inc., January 16, 1991.

P. 304612-304673 Report: Addendum to Appendix D, Interpretive Report, Tabulated Qualified Data, Necco Park, Niagara Falls, New York, prepared by Woodward Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, Inc., October 30, 1989.

P. 304674-304754 Report: Appendix-D, Interpretive Report Tabulated Qualified Data, Necco Park, Niagara Falls, New York, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, Inc., June 14, 1989.

P. 304755-304947 Report: Interpretive Report for Necco Bark, E.I. du Pont de Nemours & Company, Niagara Falls New York, Volume I, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, Inc., May 4, 1989.

P. 304948- 305303 Report: Interpretive Report for Necco Park, E.I. du Pont de Nemours & Company, Niagara Falls, New York, Volume II - Appendices, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont de Nemours and Company, Inc., May 4, 1989.

P. 305304- 305443 Report: Contaminant Transport Estimates for Du Pont Necco Park, Supporting Calculations and Maps, prepared by Woodward-Clyde Consultants, prepared for E.I. du Pont do Nemours & Company, Inc., undated).

P. 305444- 305449 Report: Attachment 1 - Vapor Infiltration Modeling Summary, prepared by TRC Environmental Corporation, (undated).

7.0 ENFORCEMENT

7.3 Administrative Orders

P. 700001- 700025 US EPA Administrative order on Consent, In the Matter of, E.I. du Pont de Nemours and Company, Respondent, Index No. II CERCLA-90221, September 28, 1989. Attached Report: Outline for Scope of work: Necco Park, prepared by Woodward-Clyde consultants, (undated).

9.0 NATURAL RESOURCE TRUSTEES

9.3 Reports

P. 900001- 900039 Report: Effect of Niagara Power Projegt on Ground-Water Flow in the Upper Part of the Lockport Dolomite, Niagara-Falls Area, New York, prepared by U. S. Geological Survey, Water Resources Investigations, in cooperation with US EPA and the New York State Department of Environmental Conservation, 1987.

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4.0 FEASIBILITY STUDY

4.3 Feasibility Study Reports

P. 400001-400533 Report: Volume I, Analysis of Alternatives. DuPont Necco Park Site, Niagara Falls, New York. prepared for DuPont Niagara Plant, prepared by DuPont Environmental Remediation Services, revised October 11, 1995.

P. 400534-401110 Report: Volume II, Analysis of Alternatives, DuPont Necco Park Site, Niagara Falls, New York. prepared for DuPont Niagara Plant, prepared by DuPont Environmental Remediation Services, revised October 11, 1995.

P. 401211-401113 Report: Addendum to the Analysis of Alternatives (AOA) Report, Du Pont, Necco Park Site, Niagara Falls, New York (October 1995), undated.

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10.0 PUBLIC PARTICIPATION

10.7 Responsiveness Summary

P. 10.00001- Responsiveness Summary, Dupont Necco Park
10.00171 Site, Town of Niagara and City of Niagara Fall, Niagara County, New York, prepared by U.S. EPA, Region II, February 28, 1998.

10.9 Proposed Plan

P. 10.00272- Plan: Revised Proposed Plan, Modification to
10.00181 Proposed Remedy, Dupont Necco Park Superfund Site, City of Niagara Falls, Niagara County, New York, prepared by U.S. EPA, Region II, February 1998.

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3.0 REMEDIAL INVESTIGATION

3.5 Correspondence

P. 305450-305450 Letter to Mr. David Fratt, TRC Environmental Corporation, from Mr. Dale J. Carpenter, Western New York Section II, U. S. EPA, re: Risk Assessment, DuPont, Necco Park, August 17, 1994.

P. 305451-305452 Letter to Ms. Marit P. Ogin, Project Manager, Necco Park, E. I. du Pont de Nemours and Company, Inc., from Ms. Carole Petersen, Chief, New York/Caribbean Superfund Branch II, U. S. EPA, re: Investigation Report for Du Pont, Necco Park, May 5, 1994.

4.0 FEASIBILITY STUDY

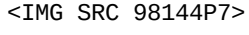
4.6 Correspondence

P. 401114-401118 Letter to Ms. Carole Petersen, Chief, New York/Caribbean Superfund Branch, U. S. EPA, Region II, from Mr. Paul F. Mazierski, PG, Senior Geologist, DuPont Environmental Remediation Services, re: DuPont's response to EPA's Analysis of Alternatives (AOA) addendum comments, August 5, 1996.

P. 401119-401123 Letter to Mr. Paul Mazierski, PG, Project Manager, Du Pont, Necco Park, Du Pont Speciality Chemicals, from Ms. Carole Petersen, Chief, New York/Caribbean Superfund Branch II, re: Revised analysis of alternatives report for the Du Pont, Necco Park Site Dated October 11, 1995, July 9, 1996. (Attachment: Addendum to the Analysis of Alternatives (AOA) Report, Du Pont, Necco Park Site, Niagara Falls, New York, October, 1995.)

APPENDIX IV

STATE LETTER OF CONCURRENCE



APPENDIX V

RESPONSIVENESS SUMMARY
PART I

DUPONT NECCO PARK SITE

TOWN OF NIAGARA AND CITY OF NIAGARA FALLS

NIAGARA COUNTY, NEW YORK

The U.S. Environmental Protection Agency (EPA) established a public comment period from July 22, 1996 through August 20, 1996, which was extended through September 19, 1996, for interested parties to comment on EPA's Proposed Plan for remediation of the DuPont, Necco Park Superfund Site (Necco Park Site). The Site is located within the Town of Niagara and the City of Niagara Falls, New York. The Proposed Plan was developed by EPA with support from the New York State Department of Environmental Conservation (NYSDEC).

EPA held a public meeting on August 13, 1996 at the Best Western Inn on the River, Niagara Falls, New York to describe the remedial alternatives and to present EPA's and NYSDEC's preferred remedial alternative to remediate the Necco Park Site as presented in the 1996 Proposed Plan. In addition to identifying a preferred remedy for the Site, the 1996 Proposed Plan indicated that EPA might modify the preferred remedy or select another remedy if public comments or additional data indicated that such a change would result in a more appropriate remedial action. Upon consideration of the comments received, EPA is proposing a modification to the preferred remedy presented in the July 1996 Proposed Plan. The details of this modification are outlined in a Revised Proposed Plan, dated February 1998. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments, including those concerning the modifications to the proposed remedy described in the Revised Proposed Plan.

The responsiveness summary is prepared for the purpose of providing EPA and the public with a summary of citizens, comments and concerns about the Site raised during the public comment period and EPA's responses to those comments and concerns. All comments summarized in this document will be considered in EPA's final decision for selection of the remedial alternative for remediation of the Necco Park Site. Similarly, all comments summarized and responded to as a result of EPA's February 1998 Revised Proposed Plan will also be considered in EPA's final decision. The responsiveness summary is organized into the following sections:

Section I: Comments Received During the Public Meeting

- A. Groundwater Contamination
- B. Risk Assessment
- C. Other Concerns

Section II: Written Comments Received During the Comment Period

- A. Written Comments From Environmental Groups and Citizens
- B. Written Comments From DuPont
  - i. Executive Summary
  - ii. Introduction
  - iii. General Comments
  - iv. Superfund Fact Sheet Comments
  - v. Necco Park Proposed Plan Specific Comments

Appendices

- A. Meeting Agenda
- B. Proposed Plan (July 1996)

C. Meeting Sign-in Sheet
D. Written Comments on Proposed Plan

SECTION I: COMMENTS RECEIVED DURING THE PUBLIC MEETING

A. GROUNDWATER CONTAMINATION

1. COMMENT: A resident asked whether local use of groundwater included drinking and showering, as mentioned in the risk assessment.

   EPA RESPONSE: Local groundwater is not currently used for domestic purposes in Niagara Falls but has been in the past. Since the groundwater aquifer in the Niagara Falls area is designated by the NYSDEC as a potable aquifer, the risk assessment considered potable use of groundwater (including for drinking and showering) as a potential future risk.

2. COMMENT: A resident asked how long natural attenuation of contaminants in the far-field was expected to take.

   EPA RESPONSE: The time required for natural attenuation in the far-field is uncertain, and that is why EPA is requesting additional monitoring wells and additional Site characterization to assess future groundwater contamination levels and potential impacts to the Niagara River and Lake Ontario. Based on this information, EPA will determine whether any remediation of the far field is required.

3. COMMENT: A resident asked how groundwater contamination which is entering the Falls Street Tunnel will be addressed.

   EPA RESPONSE: Groundwater contamination in the far-field that enters the Falls Street tunnel is treated at the Niagara Falls publicly owned treatment works (POTW) during dry weather conditions. However, during wet weather conditions, it is not known exactly what portion of the wet weather flow in the tunnel is treated at the POTW; that portion of the flow which is not diverted to the POTW discharges to the Niagara River.

   The requirement for containment in the bedrock and in the overburden will provide for source control measures against future groundwater contaminant loadings to the far-field and, ultimately, to the Niagara River during wet weather conditions. In the modified preferred alternative, outlined in EPA's February 1998 Revised Proposed Plan, source control is established through hydraulic containment (i.e., pumping the groundwater extraction wells within the source area). The modified preferred alternative does not include far-field groundwater collection. However, contamination that currently exists in the far-field groundwater will be reduced over time since the source area will no longer be a significant contributor to far-field loadings.

4. COMMENT: A spokesperson questioned why EPA considered Alternative 9 over Alternative 13, which includes groundwater withdrawal in the far-field.

   EPA RESPONSE: As discussed in depth in EPA's February 1998 Revised Proposed Plan, EPA is proposing a modified Alternative 10 as the preferred alternative for Site remediation. The response, therefore, will address why EPA originally proposed Alternative 9 over Alternative 13, and the rationale for then proposing a modified version of Alternative 10 ("the modified preferred alternative") as the preferred remedy for Site cleanup.

   EPA originally proposed Alternative 9 over Alternative 13 based on the existing laws and guidance governing the Superfund process. EPA follows the regulations set forth in CERCLA of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and the National oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR Part 300). These documents contain the legislation, framework, and guidance used in the Superfund remedy selection process. Under this process, alternatives to address contaminants at a site are developed and evaluated using nine

specific criteria. These criteria are: Overall protection of human health and the environment; Compliance with ARARs; Long-term effectiveness and permanence; Reduction of toxicity, mobility, or volume through treatment; Short-term effectiveness; Implementability; Cost; State acceptance; and Community acceptance. In evaluating the alternatives with these criteria, the objective is to select the alternative that achieves the goals of each of the criteria to the fullest extent. The EPA evaluated all of the final 13 alternatives, and the modified preferred alternative, using these criteria.

In considering the cost of each alternative, EPA also evaluates the cost as it relates to the effectiveness of the remedy. In EPA's original comparison of Alternatives 9 and 13 for cost-effectiveness, EPA determined that Alternative 9 provided the best balance of cost versus the reduction in contaminant loadings, magnitude and reduction in risk, potential to achieve ARARs in a reasonable time frame, consistency with EPA policy and guidance, and consistency with other Superfund sites in Niagara Falls. The EPA does not believe that spending $96,460,000 (the cost of Alternative 13) to achieve capture of the far-field contaminant plume is appropriate at this time, when compared to the cost of Alternative 9 or the modified preferred alternative. The impact of source area containment through the implementation of Alternative 9 or the modified preferred alternative and the potential for natural processes to address the far-field must be evaluated before justifying the expenditure of the additional monies. Only then will it be possible to determine the potential for containment and natural processes to address contamination in the far-field.

In its evaluation, EPA also considered the objective to achieve the maximum amount of source area containment. Alternatives 2, 3, and 5 are estimated to achieve only approximately 40 percent reduction in loading of contaminants from the source area to the far-field and did not address containment of DNAPLs. Alternatives 6, 7, and 8 are estimated to provide an approximate 80 percent reduction in loadings with no measures to address DNAPL migration. Alternatives 9, 10, 11, and 12 are estimated to achieve 90 percent or better reduction in loadings. Originally, Alternative 9 was chosen as being more cost-effective than the other alternatives while providing the maximum amount of containment practicable.

Finally, in its comparison of Alternative 9 and the modified preferred alternative, EPA reassessed the cost-effectiveness of each. Since the modified preferred alternative is a modified version of Alternative 10, the cost of the modified preferred alternative was assumed to be the same cost as Alternative 10 ($65,102,000). A review of the breakdown in costs indicates that a considerable capital cost saving would be realized in the implementation of the modified preferred alternative over Alternative 9. The capital cost associated with Alternative 9 is $15,564,000, while the capital cost associated with the modified preferred alternative is $7,837,000. DuPont has indicated in its comments to EPA a preference to distribute remediation costs over time rather than incur a large capital cost outlay at the time of construction. The implementation of containment through hydraulic means (i.e., the modified preferred alternative) rather than physical means (i.e., Alternative 9) also allows a greater degree of flexibility in that a phased approach can be utilized to achieve containment. That is, the installation of additional wells and the adjustment of pumping rates will be assessed periodically during the remedial action and modified, as necessary, to achieve maximum containment. This flexibility also has bearing on the O&M costs of the modified preferred alternative. It should be noted that the costs expressed for all the alternatives in the AA Report represent a range of +50 to -30 percent of that which is stated since conceptual design and construction costs have been found to vary within such a range from actual costs. Therefore, it is possible that the flexibility of a phased approach (such as the modified preferred alternative) would result in a more economical remedy, probably closer to the lower end of the implied cost range. For these reasons, EPA ultimately determined that the modified preferred alternative was more cost-effective, while providing the same amount of containment, than Alternative 9.

5. COMMENT: A resident asked what the probability of groundwater contamination moving north or east into the Town of Niagara might be.

EPA RESPONSE: Based on the hydrogeologic studies performed at the Site, a very low probability exists for northward or eastward contaminant migration in the groundwater.

6. COMMENT: Based on a statement made by DuPont during their presentation at the public meeting, a resident inquired as to the current status of DNAPL collection.

   EPA RESPONSE: At the public meeting, EPA did acknowledge that DNAPL recovery appeared to be declining in the existing well network. EPA does not believe, however, that all recoverable DNAPL has been collected, and that is why the modified preferred alternative includes hydraulic source control and additional collection points.

7. COMMENT: A representative from DuPont asked EPA if anyone from EPA had actually seen DNAPL at the Site.

   EPA RESPONSE: Yes; it has been observed by EPA personnel at the Site during Site visits.

8. COMMENT: On behalf of her environmental group, a spokesperson requested that EPA consider Alternative 13 as the preferred alternative for the Site remedy. (A written comment was submitted detailing the groups position.)

   EPA RESPONSE: As mentioned above (comment number 4), EPA evaluated all of the 13 alternatives and is proposing a modified version of Alternative 10 (the modified preferred alternative). EPA's response to comment number 4 explains the rationale for proposing the modified preferred alternative rather than Alternative 13.

B. RISK ASSESSMENT

1. COMMENT: A resident asked, given that a long period of time has passed since the Site was discovered and EPA is now requiring source control measures, has EPA considered how the elapsed time may have allowed for chronic health effects on the residents south of the Site.

   EPA RESPONSE: The preliminary assessment/site investigation (PA/SI) of the Site did not show any immediate risks to the community. In the absence of immediate exposure risks, it would be speculative to attempt to determine whether there were exposure pathways in the past, and, if so, the level of such exposure. In addition, there are too many uncertainties concerning past exposure to a variety of potential sources that can cause health problems (e.g., smoking, air pollution, etc.) to be able to definitively determine if this Site may have created any chronic health effects. This is why chronic health effects from past exposure from this Site were not examined.

   However, when EPA conducts a risk assessment, it considers future potential pathways. As the groundwater beneath the Site is designated as a potential drinking water source by New York State, EPA considered the potential future use of groundwater to the south or west of the Site for domestic purposes, thereby concluding that a future risk may exist. Based on the findings of the Risk Assessment, EPA determined that actual or threatened releases of hazardous substances from the Site may present a potential threat to public health and that future ecological impacts to the Niagara River may occur, if remedial actions were not implemented.

2. COMMENT: A resident asked if EPA has been tracking or will track chronic health effects which may be related to past, current or future risks associated with the Site.

   EPA RESPONSE: The Risk Assessment Specialist explained that EPA does not track past health statistics, but is only able to consider current and future risks when preparing a risk assessment. The resident was referred to the Agency for Toxic Substances and Disease Registry (ATSDR) for questions regarding chronic health effect concerns. ATSDR's representative for this region is Arthur Block, who may be reached at (212) 637-4307.

3. COMMENT: A resident asked how the flow in the man-made passageway (Falls Street tunnel) which bypasses the Niagara Falls POTW affects drinking water quality in the Niagara River and points downstream.

EPA RESPONSE: The City of Niagara Falls drinking water intake is upstream from the Falls Street tunnel outlet, so there is no impact from the flow in the passageway to the City's drinking water supply. Additionally, all dry weather flow that enters the Falls Street tunnel is treated at the Niagara Falls POTW. However, as mentioned in comment number 3 (Section A), above, it is not known exactly what portion of the wet weather flow in the tunnel is treated at the POTW; at least some of the flow discharges to the Niagara River. Since communities downstream of Niagara Falls rely on the Niagara River and Lake Ontario as drinking water sources, their water quality is impacted to some degree. However, public water is regularly tested and, if any contaminants are present, treated to meet the appropriate drinking water standards. Therefore, no one should be exposed to contaminants above drinking water standards from flow in the Falls Street tunnel.

The risk assessment conducted for the Necco Park Site determined that, for the Necco Park Site alone, the ecological impacts to the Niagara River were minimal. However, both Canada and the United States have identified deleterious impacts to the Great Lakes and the Niagara River as a result of contamination from multiple sources, of which Necco Park is one. These impacts resulted in the establishment of the Great Lakes Water Quality Agreement of 1978 and other agreements directly addressing contamination in the Niagara River and Lake Ontario. Containment of the source area, as required in the proposed remedy for Necco Park, will reduce contamination that currently exists in the far-field groundwater, thereby reducing Site impacts to the Niagara River and Lake Ontario via the Falls Street tunnel.

C. OTHER CONCERNS

1. COMMENT: A resident asked how EPA arrived at a thirty year post-closure responsibility.

EPA RESPONSE: The thirty year figure is the convention used to comparatively analyze the cost of different remediation alternatives over time. Also, the thirty year figure is based on a confidence level associated with the current technologies, and is somewhat related to similar regulations which require thirty year post-closure monitoring for hazardous waste landfills. However, the responsibility for remediation does not end. When contaminants are left on a site, the remedy must be re-evaluated every five years to determine if it remains protective; these reevaluations could extend the post-closure responsibility beyond thirty years.

2. COMMENT: A spokesperson asked why ARARs had been waived at the Site.

EPA RESPONSE: Because current available technologies are incapable of removing all of the DNAPL from the fractured bedrock, application of ARARs would be inappropriate within the source area. Therefore, EPA is proposing to issue a waiver of the groundwater ARARs in the source area only, based on technical impracticability. The ARARs are not being waived for the far-field groundwater.

3. COMMENT: A spokesperson asked if new technologies developed between five year reviews of the Site would be applied to enhance the remedy.

EPA RESPONSE: The five year review is intended to determine if the chosen remedy has maintained its protectiveness. It is not intended to determine if new technologies or additional efforts would improve the selected remedy. If the remedy is found not to be protective, then new technologies or additional efforts would certainly be evaluated.

4. COMMENT: A resident asked for clarification as to the Superfund status of the Site.

EPA RESPONSE: The actions taken at this Site are being performed pursuant to CERCLA, as amended, (i.e., Superfund), which gives EPA several response authorities to take action at a Site if hazardous substances are released into the environment or there is a substantial threat of such a release. EPA cannot, however, spend Superfund monies to remediate a site unless it is listed on the National Priority List (NPL) of hazardous waste sites.

The NPL was established by CERCLA to allocate limited Superfund resources to priority sites across

the Nation so that sites in different States would be assessed using a consistent set of ranking factors. The Hazard Ranking System HRS) is the scoring system used to evaluate sites for NPL listing. The Necco Park Site was scored utilizing the HRS but did not rank high enough to be considered for listing on the NPL. EPA regulations recognize that the HRS would not result in all priority sites being included on the NPL. EPA regulations therefore specify that inclusion on the NPL is not a precondition to use EPA's other enforcement authorities to remediate sites. Sites such as Necco Park that represent endangerments to human health or the environment, notwithstanding that they are not on the NPL, are appropriate sites for EPA, to address using its enforcement authorities under CERCLA.

As stated above, since Necco Park did not qualify for the NPL, EPA cannot spend Superfund monies to remediate the Site. If DuPont does not agree to implement the remedy, EPA would have to commence administrative or judicial enforcement actions, utilizing its enforcement authorities pursuant to Section 106 of CERCLA, to require DuPont to perform the remedy for this Site.

5. COMMENT: A resident east of the Site asked why they received a notice to attend this meeting since they were not likely to be impacted by the contamination from the Necco Park Site.

EPA RESPONSE: It is EPA's usual practice to notify residents living within a half-mile radius of a site of the status of activities at that site. For this Site, residents to the east are not as affected as are residents to the south and west.

SECTION II. WRITTEN COMMENTS RECEIVED DURING THE COMMENT PERIOD

Written comments on the DuPont, Necco Park Proposed Plan were received from: a number of private environmental organizations including the Citizens' Environmental Coalition, Great Lakes United, Lynches River Coalition/Clean Water, Communities Concerned About Corporations and the Mid-South Peace and Justice Center; three private citizens; and the DuPont Corporation. The following sections summarize the written comments received and EPA's response to those comments.

A. WRITTEN COMMENTS FROM ENVIRONMENTAL GROUPS and CITIZENS

All of the written comments received from the various environmental groups and citizens were similar in nature. All of the letters called for the selection of Alternative 13 and most of the letters called for EPA not to waive the ARARs. The following summarizes the arguments made in the correspondence received:

1. COMMENT: All of those who commented rejected EPA's proposal of Alternative 9 or found it to be "... unacceptable..." because they felt Alternative 9 "... fails to address the issue of off-site [far-field) contamination...," that EPA's proposal was "...to ignore off-site [far-field) contaminated groundwater..." or that EPA's proposal was "... to turn [its] back to the off-site [far-field) contaminated groundwater at the DuPont, Necco Park Site".

EPA RESPONSE: As previously noted, EPA has decided to modify its preferred alternative described in the July 1996 Proposed Plan. EPA's modified preferred alternative is outlined in the February 1996 Revised Proposed Plan. EPA's rationale for proposing the modified preferred alternative over Alternative 9 is discussed in its response to comment number 4, Section I.A, above. The response to this comment and subsequent similar comments, therefore, will address why EPA proposes the modified preferred alternative rather than Alternative 13.

While EPA's modified preferred alternative does not include measures for actively remediating or controlling the groundwater contamination in the far-field, EPA does not propose to "ignore" or "turn [its] back" to the far-field contamination. The modified preferred alternative calls for monitoring the far-field groundwater to measure the effectiveness of the source containment efforts and the collection of additional Site characterization data to evaluate the potential for the appropriate cleanup standards to be achieved in the far-field groundwater. EPA believes that the successful implementation of the modified preferred alternative will significantly reduce the impacts of the source area contamination on the far-field groundwater. However, there is considerable uncertainty regarding the ability of the far-field groundwater to achieve the cleanup standards through natural

processes such as attenuation and biodegradation. Therefore, EPA has called for monitoring in the far-field to measure the effectiveness of the source containment efforts as well as the collection of additional Site characterization data to evaluate the potential for the appropriate cleanup standards to be achieved in the far-field groundwater.

2. COMMENT: All written comments called for the selection of Alternative 13 (or Alternative 13 with a deeper grout curtain) instead of Alternative 9 because Alternative 13 was "... more comprehensive ..." (i.e., would address both source area containment and capture of far-field groundwater contamination) and, "... represents the most thorough cleanup of wastes that are both on-site [source area] and off-site [far-field)..."

   EPA RESPONSE: As in its response to comment number 4, Section I.A, EPA will reiterate the rationale for its original proposal of Alternative 9 over Alternative 13 and the current proposal of the modified preferred alternative over Alternative 9.

   EPA agrees that Alternative 13 does indeed represent a "more comprehensive" cleanup alternative and captures or controls more contamination than either the modified preferred alternative or Alternative 9. EPA originally selected Alternative 9 over Alternative 13 based on the existing laws and guidance governing the Superfund process. EPA follows the regulations set forth in CERCLA of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR Part 300). These documents contain the legislation, framework, and guidance used in the Superfund remedy selection process. Under this process, alternatives to address contaminants at a site are developed and evaluated using nine specific criteria. These criteria are: overall protection of human health and the environment; Compliance with ARARs; Long-term effectiveness and permanence; Reduction of toxicity, mobility, or volume through treatment; Short-term effectiveness; Implementability; Cost; State acceptance; and Community Acceptance. In evaluating the alternatives with these criteria, the objective is to select the alternative that provides the best balance of trade-offs among alternatives with respect to the evaluating criteria. The EPA evaluated all of the final 13 alternatives, and the modified preferred alternative, using these criteria.

   In evaluating Alternative 9, Alternative 13, and the modified preferred alternative using the nine criteria, each alternative provides a similar level of short-term protection to human health as the groundwater is not currently being used for public water supply. The same can be said for long-term protection of human health based on current water use (however, if the groundwater were to be used in the future, Alternative 13 provides a greater level of protection by reducing contaminant concentrations in the far-field more than the modified preferred alternative). In the ability to achieve ARARs, EPA believes that none of these three alternatives would be able to achieve the groundwater standards in the source area due to the presence of DNAPLs in the soil and bedrock. For this reason, each of the three alternatives warrant an ARAR waiver for achieving groundwater standards in the source area. Therefore, EPA believes that significant uncertainty exists as to whether the groundwater standards could be achieved in the far-field through natural processes such as attenuation or biodegradation. As such, it is difficult to compare the three alternatives ability to achieve ARARs in the far-field.

   All three alternatives have similar long-term effectiveness in terms of reliability. Alternative 13 would attempt to achieve a greater reduction in the toxicity, mobility and volume of contaminants present at the Site than either Alternative 9 or the modified preferred alternative by capturing and treating the far-field groundwater contamination. Alternatives 9 and 13 both present some difficulty in technical implementation because of the grout curtain requirements (see EPA response to comment number 41, below), whereby the modified preferred alternative does not. Alternative 13 would also pose additional administrative difficulties because groundwater extraction wells would need to be installed in the far-field raising potential right-of-way and access issues.

   In considering the cost of each alternative, EPA also evaluates the cost as it relates to the effectiveness of the remedy. In EPA's original comparison of Alternatives 9 and 13 for cost-effectiveness, EPA determined that Alternative 9 provided the best balance of cost versus the

reduction in contaminant loadings, magnitude and reduction in risk, potential to achieve ARARs in a reasonable time frame, consistency with EPA policy and guidance, and consistency with other Superfund sites in Niagara Falls. The EPA does not believe that spending $96,460,000 (the cost of Alternative 13) to achieve capture of the far-field contaminant plume is appropriate at this time, when compared to the cost of Alternative 9 or the modified preferred alternative. The impact of source area containment through the implementation of Alternative 9 or the modified preferred alternative and the potential for natural processes to address the far-field must be evaluated before justifying the expenditure of the additional monies. Only then will it be possible to determine the potential for containment and natural processes to address contamination in the far-field.

In its evaluation, EPA also considered the objective to achieve the maximum amount of source area containment. Alternatives 2, 3, and 5 are estimated to achieve only approximately 40 percent reduction in loading of contaminants from the source area to the far-field and did not address containment of DNAPLs. Alternatives 6, 7, and 8 are estimated to provide an approximate 80 percent reduction in loadings with no measures to address DNAPL migration. Alternatives 9, 10, 11, and 12 are estimated to achieve 90 percent or better reduction in loadings and include measures to address DNAPL migration. Originally, Alternative 9 was chosen as being more cost-effective than the other alternatives while providing the maximum amount of containment practicable.

In its comparison of Alternative 9 and the modified preferred alternative, EPA reassessed the cost-effectiveness of each. Although it is EPA's belief that overall cost would not change dramatically between the modified preferred alternative and the cost estimate for Alternative 10 ($65,102,000), a considerable capital cost saving would be realized in the implementation of the modified preferred alternative over Alternative 9. The capital cost associated with Alternative 9 is $15,564,000, while the capital cost associated with the modified preferred alternative is $7,837,000. DuPont has indicated in its comments to EPA a preference to distribute remediation costs over time rather than incur a large capital cost outlay at the time of construction. The implementation of containment through hydraulic means (i.e., the modified preferred alternative) rather than physical means (i.e., Alternative 9) also allows a greater degree of flexibility in that a phased approach can be utilized to achieve containment. That is, the installation of additional wells and the adjustment of pumping rates will be assessed periodically during the remedial action and modified, as necessary, to achieve maximum containment. This flexibility also has bearing on the O&M costs of the modified preferred alternative. It should be noted that the costs expressed for all the alternatives in the AA Report represent a range of +50 to -30 percent of that which is stated since conceptual design and construction costs have been found to vary within such a range from actual costs. Therefore, it is possible that the flexibility of a phased approach (such as the modified preferred alternative) would result in a more economical remedy, probably closer to the lower end of the implied cost range. For these reasons, EPA ultimately determined that the modified preferred alternative was more cost-effective, while providing the same amount of containment, than Alternative 9.

The last two criteria EPA must consider are State acceptance and community acceptance. The NYSDEC has been working with EPA on the Necco Park Site from the beginning and supports the selection of the modified preferred alternative. EPA is addressing community acceptance through the public comments and EPA responses in this Responsiveness Summary and will issue a second Responsiveness Summary to address public comments pertaining to the modified preferred alternative. As discussed above, all written comments from the community advocate the selection of Alternative 13. EPA must, however, evaluate which alternative provides the best balance of trade offs among all alternatives with respect to the evaluating criteria; EPA feels that the modified preferred alternative best meets this requirement. Lastly, DuPont does not endorse Alternative 13, but is willing to implement the modified preferred alternative.

3. COMMENT: Many commenters called for EPA not to waive the groundwater ARARs based on "... technical infeasibility..." They suggested that "... it is inappropriate, and morally wrong to abandon restoration goals ... whether it be due to insufficient technology, unwillingness to spend money, or lack of political will." and, that "...DuPont should be required to meet ARARs for all groundwater, no matter how much it costs or how long it takes."

EPA RESPONSE: The NCP º300.430(f)(1)(ii)(C) contains the criteria that allow for the waiver of the ARARs. This section states that "an alternative that does not meet an ARAR under federal environmental or state environmental or facility siting laws may be selected under the following circumstances..." The section then lists six criteria that may be used for waiving the ARARs. Based on EPA guidance governing DNAPL sites and groundwater restoration (OSWER Directive 9200.4-14 and EPA's Guidance for Evaluating the Technical Impracticability of Groundwater Restoration), EPA is utilizing criterion number 3, "Compliance with the requirement is technically impracticable from an engineering perspective." OSWER Directive 9200.4-14 states that "while EPA remains firmly committed to restoring contaminated groundwater to beneficial uses at Superfund sites, it is also important to recognize that technical limitations to achieving this goal may exist." The Directive also states that "...complete restoration of many groundwater contaminated sites in the Superfund program might not be technically practicable with available remediation technologies due to the presence of non-recoverable DNAPLs, or for other reasons related to complex site hydrogeology or contaminant characteristics." The Necco Park Site contains DNAPLs in the soil and bedrock. Presently no available technology has been identified to fully remove these DNAPLs from the environment.

Therefore, remediation of the DNAPL contaminated soils, bedrock and groundwater in the source area of the Necco Park Site is considered to be technically impracticable and a waiver of the federal and state drinking water standards and state groundwater quality standards for the groundwater in the source area beyond the limits of the landfill where DNAPLs are present would be warranted

EPA believes that the modified preferred alternative for the source area at the Necco Park Site would be protective of human health and the environment. Recognizing that groundwater restoration in the source area is technically impracticable, the goal of the remedial action would be to establish hydraulic control of the source area contaminated groundwater, and to prevent groundwater and DNAPL from migrating beyond the source area by utilizing hydraulic barriers.

The Remedial Action Objectives (RAO) for groundwater of attaining the cleanup criteria (ARARs) would still be applied to areas outside the source area (i.e., the far-field area). However, it is uncertain whether or not the implementation of the source containment remedy would enable the aquifer outside the source area to be restored to a usable quality. Therefore, EPA is proposing that groundwater in the far-field would be monitored to determine the effectiveness of the source containment efforts and additional Site characterization would be performed to collect further data to evaluate the future potential for natural processes to achieve ARARs in the far-field.

4. COMMENT: At least two commenters criticized EPA for proposing Alternative 9 because Alternative 9 "... fails to control the migration of contaminants from the far-field..." and, therefore, "... allows the continued contamination of the Niagara River... " and " ... ultimately to Lake Ontario..." This is not consistent with EPA's own policies and international agreements to protect these Great Lakes water bodies. The commenters also said "An EPA selection of Alternative 13 would demonstrate a commitment to implementing the International Joint Commission's ... bi-national Virtual Elimination Strategy..."

EPA RESPONSE: The international agreement the commenter references is the "Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes Basin" also known as the "Binational Strategy." This strategy is the result of the Great Lakes Water Quality Agreement of 1978. The purpose of the binational strategy is "to set forth a collaborative process by which Environment Canada (EC), the United States Environmental Protection Agency (USEPA), and Great Lakes stakeholders will work as full partners toward the goal of virtual elimination of persistent toxic substances, particularly those which bioaccumulate, from the Great Lakes Basin so as to protect and ensure the health and integrity of the Great Lakes ecosystem." "To accomplish the objective of restoring and maintaining the integrity of the Great Lakes, virtual elimination seeks to reduce and eventually eliminate the use, generation or release of persistent toxic substances. Virtual elimination will be sought within the most expedient time frame though the most appropriate, common sense and cost-effective blend of voluntary, regulatory or incentive-based actions." The agreement also recognizes that by relying on the concept of Virtual Elimination, it "may not be possible to achieve total elimination of all persistent toxic substances..." and that, "Virtual Elimination may not be achievable tomorrow..."

EPA believes that the implementation of the modified preferred alternative would be consistent with the goals and strategy set forth in the Binational Strategy. By containing the source area, contaminant migration to the far-field would be greatly reduced which would also minimize the impact to the Niagara River and Lake Ontario.

5. COMMENT: Several commenters suggested that "DuPont made millions of dollars of profits from the low cost dumping of wastes into Necco Park," and that "the people of the Great Lakes should not have to subsidize those profits with their health, water and taxes." Commenters also contended that the Site should be "... cleaned to pre-disposal conditions... no matter how much it costs or how long it takes..." or that "... DuPont should be made to bear the full cost of a comprehensive cleanup...". In addition commenters suggested that "... anything less [than full comprehensive cleanup) will only encourage irresponsible corporate practices in the name of increased profits."

EPA RESPONSE: EPA must follow the regulations set forth in CERCLA, as amended by SARA, and the NCP, 40 CFR Part 300 in selecting a remedy for this Site. Under these guidelines, EPA must consider the cost of implementing a proposed alternative, as well as eight other criteria mentioned above. For reasons previously stated, EPA believes the modified preferred alternative provides the best balance of trade-offs among all alternatives with respect to the evaluating criteria, including cost.

6. COMMENT: One commenter indicated that DuPont s argument for selecting Alternative 2, that area residents do not use the groundwater and are served by public water supply "...is a flawed argument in that it totally ignores the hydraulic connection between the groundwater and the Niagara River, from which over 1,000,000 people draw their drinking water. In addition, there are presently fish consumption advisories [for] the Niagara River and Lake Ontario." The commenter states that "[m] any of the contaminants of concern in the Necco Park Site are persistent organochlorines... " and that EPA's "... risk assessment conducted for the Necco Park Site did not take into account the cumulative effects of chemicals already in the Niagara River environment but rather assumed that the DuPont chemicals are the only chemicals that pose an exposure risk to public health or the environment."

EPA RESPONSE: EPA recognizes the commenters statements to be essentially correct. Persistent toxic chemicals are indeed present at the Site and EPA's risk assessment did not take into account the synergistic effects of the various chemical constituents present at the Site. EPA's risk assessment also did not examine the cumulative impacts from the Necco Park Site plus other sites in Niagara Falls. In conducting a risk assessment, EPA follows established guidelines. In this process the most obvious and direct exposure risks are examined first. In this case, since the groundwater is designated by NYS to be class GA (potable groundwater source) , EPA examined the current and future potential use of the groundwater. EPA determined that no present risk to human health exists from the groundwater as it is not utilized as a public drinking water source. However, EPA did determine that the future potential use of the groundwater would present a significant human health risk.

In addition, in evaluating the environmental impacts to the Niagara River, EPA's risk assessment found that, after dilution in the Niagara River, no significant ecological risk existed from the Necco Park Site alone. EPA's risk assessment did determine, however, that contaminants in the Falls Street tunnel at the Niagara River discharge location exceeded the total mean chronic risk index, indicating that biota may be at risk of an adverse effect. EPA's modified preferred alternative would greatly reduce contaminant migration to the far-field by containing the source area, thereby reducing the contaminant load in the Falls Street tunnel, ultimately minimizing the impact to the Niagara River and Lake Ontario.

B. WRITTEN COMMENTS FROM DUPONT

DuPont submitted a 34-page document containing their comments on EPA's Proposed Plan and EPA's Fact Sheets. The Document is organized into five sections including: an Executive Summary, Introduction, General Comments, Superfund Fact Sheet Comments and, Necco Park Proposed Plan Specific Comments. EPA's responses have been organized in a similar fashion.

i. Executive Summary

1. COMMENT: pg. ii, M 1 - The first sentence indicates that EPA issued the Proposed Plan (Proposed Plan) on July 18, 1996.

EPA RESPONSE: EPA officially issued the Proposed Plan on July 22, 1996 and provided DuPont with an advanced courtesy copy of the Proposed Plan on July 18, 1996.

2. COMMENT: pg. ii, M 2 - DuPont states here and elsewhere in its comments that it has demonstrated its commitment to protection of human health and the environment through responsible stewardship at Necco Park..." DuPont further characterizes the response actions implemented to date as "...successful..." In subsequent locations throughout the document, DuPont states that the response actions it has implemented have been, and are, "...technically successful..." or are "...successful..." or that "...the success of the existing hydraulic control efforts..." have been demonstrated.

EPA RESPONSE: EPA acknowledges that DuPont has taken response action efforts at the Site, however, EPA disagrees with DuPont's characterization of the existing response actions as "successful" for a number of reasons including:

1) DuPont claims to have achieved "substantial containment and control of groundwater in the source area in the upper bedrock zones" from the operation of recovery wells completed in the upper bedrock and "partial control" in the middle bedrock zones. EPA does not believe that DuPont has sufficiently demonstrated hydraulic containment of the source area groundwater in the upper bedrock zones (B & C zones) or partial containment in the middle bedrock zones (D, E and F zones) for a number of reasons including:

a) Conceptual capture zones presented in the AOA (Figures 1-14, 1-16 and 1-18) do not completely cover the source area and investigation data collected to date indicate that migration of contaminants still occurs outside the area of the recovery well influence, even under optimal pumping conditions.

b) The conceptual capture zones presented in these figures represent the optimal pumping conditions which are not, and historically have not, been consistently achieved. Review of the pumping records for wells RW-1, RW-2 (upper bedrock zones) and RW-3 (middle bedrock zones) reveal that the pumping has been inconsistent. The pumps are frequently down due to various mechanical problems and pumping rates fluctuate widely. Currently, RW-3 does not operate while the other two wells are on line. EPA believes it is unlikely that the transport of contaminants would be controlled under these operating conditions.

c) Groundwater at the edge of the conceptual capture zone may not be captured but may only be influenced by pumping.

d) Actual capture zones have not been calculated.

e) Drawdown responses in the D, E and F-zones within each cluster are not similar. For example, the drawdown responses of 129D and E were similar, but 129F showed no response to pumping. Also, the response curves for 130D and F are dissimilar. These factors make the claim of "containment" in the middle bedrock of the source area improbable.

2) A review of the isoconcentration maps indicates an increasing trend of contaminant concentration distribution from the first semi-annual sampling to the second semi-annual sampling of the remedial investigation. The comparison of the analytical results for vinyl chloride, for example, between the two semi-annual sampling events, indicates that the number of wells in which vinyl chloride concentrations increased outnumbered those that decreased by more than two to one (in wells with initial vinyl chloride concentrations of 1000 Ig/l or greater). Also, the isoconcentration maps for total volatiles indicate increasing concentrations of contaminants spreading south of Necco Park in the following zones: A-zone (Figures C-1, C-8); B-zone (Figures C-2, C-9); and the C-zone (Figures C-3, C-10). The concentrations for barium and a tentatively identified compound (TIC-1) also increased south of the Site in the C-zone. In addition, no apparent change in the contaminant distribution occurred between the Interpretive Report investigation and the remedial investigation as evidenced in the isoconcentration maps contained in both reports. The AOA Report, with the most updated contaminant distribution information, indicates that contamination from Necco Park has most likely migrated beyond areas initially identified in the

Interpretive and investigation Reports.

DuPont asserts that according to data collected after the remedial investigation, the contaminant levels in monitoring wells have decreased by two orders of magnitude (99% decrease) from previous downgradient concentrations. EPA's review of the data in the upper bedrock (B & C zones) reveals that the contaminant concentrations in some monitoring wells have risen, not decreased. Only some selected wells show a significant decrease in concentration. EPA and NYSDEC do not believe that the data collected to date conclusively demonstrate a decrease in downgradient B and C zone contaminant concentrations.

3) DuPont has made the statement that the New York Power Authority (NYPA) conduit drainage system and the Falls Street tunnel capture "a substantial portion" of dissolved Necco Park constituents in the groundwater. EPA does not agree with DuPont's assertion that "... hydraulic control in the lower fractured bedrock zones..." or "... the upper fractured bedrock zones..." is "... achieved by the interception of the off-site contaminant plumes..." by either the NYPA conduits or the Falls Street tunnel. (EPA is interpreting DuPont's use of the term "off-site" to mean the far-field groundwater contaminant plume. Since, by definition, the "Site" extends to areas where contamination from the Necco Park facility has come to be located, there can be no "off-site" groundwater contamination.)

DuPont has not demonstrated that "most" or "all but a small percentage of" the groundwater flowing south in the upper bedrock zones (B and C) and west in the middle and lower bedrock zones (D through G) from Necco Park enters the Falls Street tunnel and the NYPA conduit drain system. While EPA acknowledges that the regional groundwater flow directions are towards these two structures, DuPont has not submitted evidence to confirm the volume of far-field groundwater that may be intercepted by these structures. More importantly, the potential inadvertent interception of far-field groundwater by these structures in no way represents "control" of the far-field contaminant plume. DuPont has no control over the flow direction or ultimate discharge location of the contaminants in the far-field groundwater. In addition, even if all of the far-field groundwater were intercepted by these structures, not all of the water captured by these structures is treated at the POTW.

EPA does not dispute that these structures are indeed discharge points for contaminated groundwater from sites in the area. However, it should be noted as stated in NYSDEC's Proposed Plan for the Solvent Chemical Site that:

> "Contaminated groundwaters pose a threat to human health and the environment by their migration into off-site utilities and the ultimate discharge of some of this contaminated groundwater to the Niagara River...It is important to note however, that the collection of contaminated bedrock groundwater by the Falls Street Tunnel is not by design, and infiltration of site contamination into the Tunnel does not represent permitted discharge of water to the City POTW. [Furthermore] ...the City is under no obligation to maintain the Falls Street Tunnel as a groundwater interceptor and could conceivably undertake additional measures in the future to reduce groundwater flows into the Falls Street Tunnel, which could affect the Solvent Chemical off site contaminant plume." (pgs. 1, 6 and 7)

These same statements apply to the Necco Park Site.

While the NYPA drainage conduits would intercept groundwater flow in the lower bedrock zones (D through G), EPA does not believe DuPont has demonstrated that "most" or "all but a small percentage of" the groundwater flowing south in the upper bedrock zones (B and C) from Necco Park enters the Falls Street tunnel. In addition the AOA report also states that a portion of the groundwater captured by the Falls Street tunnel and the NYPA drainage conduits is diverted to the City of Niagara Falls POTW where it is treated before discharge to the Niagara River.

EPA provides the following information for clarification: At a minimum, an undetermined amount of groundwater flowing south from Necco Park in the upper bedrock zones (B and C) has the potential to, or does, enter the Falls Street tunnel. Currently, 100% of dry weather flow in the tunnel goes to the Niagara Falls POTW. Also, groundwater flowing west from Necco Park in the middle and lower bedrock zones (D through G) has the potential to, or does, enter the NYPA conduit drain system. There is a hydraulic

connection between the NYPA conduit drain system and the Falls Street tunnel where the two structures cross. It is believed that water from the conduit drain system enters the Falls Street tunnel at this intersection which is located southwest of Necco Park. Water entering the Falls Street tunnel goes to the Niagara Falls POTW. However, there is currently insufficient information to determine the direction of flow in the NYPA conduit drain system on a continual basis. It is believed that fluctuations in water used by the NYPA creates changes in flow direction in the NYPA conduit drainage system. Therefore, any groundwater contamination from Necco Park that may enter the conduit drainage system has the potential to flow either to the north where it may discharge to the Forebay Canal through bedrock fractures, or to the south where at least a portion of the water enters the Falls Street tunnel. DuPont has not submitted any information to support the claim that all of the NYPA drainage waters flow into the Falls Street tunnel.

Since contaminants on the Necco Park Indicator Parameter List (NPIPL) (e.g., chloroform, cis-1,2-dichloroethene, tetrachloroethene, trichloroethene, hexachlorobutadiene, hexachloroethane, barium, 4-methylphenol and phenol) have been detected in some of the man-made passageways investigated, there is clearly a potential for migration through these structures to the Niagara River and the Great Lakes.

4) The clay cap in place at the Site is not considered state-of-the-art for present-day caps. The clay cap with a soil cover has been subject to settling of landfill materials and has required repairs. In addition, the soils cover may not adequately protect the clay from damage due to freezing and thawing or desiccation. Additionally, the clay cap does not extend over the entire Site. The cap covers the Necco Park property only. The Site is defined as a much larger area encompassing all areas where contamination from the Necco Park facility have come to be located.

As a result, EPA does not believe that the current groundwater recovery efforts have achieved "... a high degree of hydraulic control..." in the shallow bedrock zones, or "... partial control..." in the deeper bedrock zones for the reasons stated above.

3. COMMENT: pg. ii, M 2 - DuPont states here, and elsewhere in its comments, that it has spent $40 million dollars over the course of 20 years and spends $2 million annually in O&M costs.

EPA RESPONSE: While EPA does not doubt that DuPont has spent considerable funds at the Necco Park Site, EPA is uncertain of the exact amount spent and has not verified the expenditures.

4. COMMENT: pg. ii, M 3 - In this paragraph and in other sections of its comments, DuPont makes the statement that "DNAPL recovery rates declined dramatically (by two orders of magnitude) between 1991 and 1994, indicating the successful removal of the mobile DNAPL phase...No DNAPL movement is evident in either the overburden or bedrock based on no new appearance of DNAPL at any wells and the disappearance of DNAPL at 25 wells. We [DuPont] believe that EPA's concerns about potential DNAPL migration appear speculative and unfounded."

EPA RESPONSE: EPA does not agree that the reduction in DNAPL recovery necessarily indicates the "successful removal" of the free-phase, or mobile, DNAPL; that the disappearance of DNAPL in monitoring wells means there is "no DNAPL movement"; or that EPA's concerns about DNAPL migration are "speculative."

The current body of research and literature certainly confirms that DNAPLs are mobile, or have the potential to be mobile, when released into the environment. DNAPLs can migrate in the subsurface as a mobile, separate phase liquid (Cohen and Mercer, 1993). DNAPLs can also act as a source of subsurface contamination for volatiles in soils and dissolved contaminants in groundwater (Cohen and Mercer, 1993). Many others, such as Feenstra and Cherry (1988), Schwille (1988), Wilson et al. (1990), Huling and Weaver (1991), and USEPA (1992), have studied and confirmed DNAPL transport processes.
Secondly, it is clearly evident that DNAPL at the Necco Park Site has migrated from areas of original placement on the landfill property, to a much larger area beyond the property boundary that has been defined as the source area. This indicates that the DNAPLs have migrated to more than twice their original areal extent. Given the fact that DNAPLs at the Site have unquestionably migrated since their original deposition, and the existence of the current body of research and literature that indicates DNAPLs are mobile in the environment, there is no reason to believe that further migration of DNAPLs is not continuing, or would not, continue to take place.

Considering the predominantly passive DNAPL recovery methods employed at the Site, decreases in DNAPL recovery are more likely the function of a number of other factors including:

1) The mobile DNAPL is more than likely migrating lower into the bedrock fracture zones. According to Cohen and Mercer, 1993, gravity forces promote downward migration of DNAPL and when released to the subsurface, gravity causes DNAPL to migrate downward through the vadose zone as a distinct liquid. The vertical migration is typically accompanied by lateral spreading due to the effects of capillary forces (Schwille, 1988) and medium spatial variability (e.g., layering). In the saturated zone, DNAPL will typically migrate downward until it reaches a barrier layer upon which it may continue to flow laterally under pressure and gravity forces. The rate of DNAPL sinking generally increases with increasing DNAPL density and decreasing DNAPL viscosity. As a result, chlorinated solvents sink much more rapidly through the subsurface than a coal tar/creosote would.

2) The heterogeneity of a fractured bedrock system makes locating and monitoring DNAPL movement difficult. DNAPL introduced into a fractured rock or fractured clay system follows a complex pathway based on the distribution of fractures in the original matrix. The number, size, and direction of the fractures often cannot be determined due to the heterogeneity of the fractured system and the lack of economical formation characterization technologies. Relatively small volumes of DNAPL can penetrate deeply into fractured systems due to the low retention capacity of the fractures and the ability of some DNAPLS to migrate through very small (<20 microns) fractures (Cohen and Mercer, 1993). DNAPLs at the Site are likely to be distributed heterogeneously.

3) The distribution and density of monitoring wells at the Site are inadequate to monitor every fracture migration pathway. The number of monitoring wells at the Site decrease with depth. Most of the monitoring wells are in the A - C zones with fewer in the D - F zones and fewest in the G and J zones. DNAPL could be, and is likely to be, migrating along preferential pathways that are not monitored by the current monitoring well network.

These factors provide a more than significant risk of further DNAPL migration at the Site.

5. COMMENT: pg. ii, M 3 - DuPont makes the statement here and elsewhere within its comments that: "[c]ontaminant concentrations in the aquifer have decreased by 99 percent in the shallow fracture zones off-site, demonstrating the success of the existing hydraulic control efforts." DuPont also asserts that " [s]ite monitoring data from wells in the shallow bedrock zones show a general decline in groundwater plume concentrations."

EPA RESPONSE: EPA does not agree with the latter statement that there has been a general decline in groundwater plume concentrations. As mentioned above, groundwater concentration data collected for the Interpretive Report (1988) was not significantly different from data collected for the Investigation Report (1991 and 1992).

DuPont presented new figures, tables and conclusions in the AOA based on analytical data collected after the remedial investigation (completed in 1992). Only this post-investigation data, collected from a limited number of wells, show declines in groundwater concentrations. EPA has not validated any of the post-investigation data collected by DuPont and cannot verify the information presented in the new tables, figures and conclusions. While DuPont used the Quality Assurance/Quality Control protocols established for the remedial investigation, data were collected from a limited number of wells, EPA did not take any split samples, and the sampling and analysis was not subject to the same level of scrutiny as the data collected for the remedial investigation. Therefore, EPA has concerns with the use of these data and will not rely solely on the information collected after the remedial investigation to determine trends in groundwater concentrations or evaluate remedial alternatives. EPA considers the data as a supplement to validated data collected from previous investigations, but does not believe that this post-investigation data significantly alters EPA's interpretations or conclusions concerning groundwater conditions at Necco Park.

EPA also does not agree with DuPont's assertion that the success of its existing hydraulic control efforts is demonstrated by a 99 percent decrease in contaminant concentrations in the shallow fracture zones in the far-field area. Based on the information in the AOA presenting post-investigation contaminant trends in

some of the downgradient monitoring wells, the reduction claimed by DuPont has occurred in only some of the wells, not all of the wells. EPA believe's it is inappropriate to interpret this limited data as achieving a 99 percent reduction in contaminant plume downgradient of the source area in the shallow bedrock aquifer zones.

In addition, EPA believes that very little control is exhibited by the existing hydraulic pumping efforts based on the existing data. See also EPA's response to comment number 2, above.

6. COMMENT: pg. ii, M 4 - DuPont states here that "...none of the remedies will achieve ARARs in the far-field..." DuPont makes similar statements elsewhere that "...restoration of the far-field aquifer cannot be accomplished within a reasonable time frame, regardless of the remedial alternative that is implemented... [and that] even EPA's proposed alternative does not restore groundwater to a potable condition."

EPA RESPONSE: As was stated in EPA's response to comment number 3 (Written Comments from Environmental Groups and Citizens), above, EPA recognizes that groundwater restoration of the source area is not practicable and is therefore proposing to issue a waiver of the groundwater standards within the source area based on technical impracticability. DuPont's comments concerning the ability to achieve ARARs in the far-field, however, could be interpreted as a request to apply a technical impracticability waiver for the entire aquifer (far-field and source area). EPA believes that such an extension of a technical impracticability waiver at this time would be inconsistent with the NCP and EPA guidance on such waivers.

While EPA believes that attainment of groundwater standards within the source area is not practicable, it maintains that an effective means of control of the source area (such as the modified preferred alternative) is necessary to protect human health and the environment.

EPA guidance specifies that the first preference on long-term remediation objectives for a DNAPL zone is to remove the DNAPLs to the extent practicable. Where removal of DNAPLs is impracticable, containment of DNAPLs is required.

Where it is technically practicable to contain the long term source of contamination, such as the DNAPL zone, EPA expects to restore the aqueous contaminant plume outside the DNAPL zone to required cleanup levels. Effective containment of the DNAPL zone grenerally will be required to achieve this long-term objective because groundwater extraction remedies (e.g., groundwater pump and treat) or in situ treatment technologies are effective for plume restoration only where source areas have been contained or removed. (emphasis added) OSWER Directive 9234.2-25, Guidance for Evaluating the Technical Impracticability of Groundwater Restoration (TI Guidance) at pg. 8.

EPA guidance treats removal or containment of the source as a necessary component for making a technical impracticability determination TI Guidance at pg. 11). The guidance further specifies that "... the spatial extent of the TI zone should be limited to as small an area as possible, given the circumstances of the site." (TI Guidance at pg. 12).

Recognizing that groundwater restoration in the source area is technically impracticable, the goal of this remedial action is to establish hydraulic control of the source area contaminated groundwater, and to prevent groundwater and DNAPL from migrating beyond the source area by utilizing hydraulic and/or physical barriers.

While a TI waiver is proposed for the source area, the RAOs for groundwater of attaining the cleanup criteria (ARARs) are still being applied to areas outside the source area (i.e., the far-field area). According to the NCP, " [t]he goal of EPA's superfund approach is to return usable groundwaters to their beneficial uses within a time frame that is reasonable given the particular circumstances of the site."

EPA groundwater policy allows for extended restoration time periods based on hydrogeological conditions, specific contaminants at the site, the size of the contaminant plume and the availability of alternate sources of drinking water supply. EPA believes an extended time frame for groundwater cleanup could be considered at this Site if significant source containment could be achieved. The TI Guidance also suggests

a phased approach to the remediation of DNAPL sites, and states that "[i]t is critical that the performance of phased remedial actions (e.g., control of plume migration) be monitored carefully as part of the ongoing effort to characterize the site and assess its restoration potential."
(TI Guidance at pg. 4).

Therefore, source control is a prerequisite at DNAPL sites such as the Necco Park Site, even though it is uncertain whether or not the implementation of a source containment remedy will enable the aquifer outside the source area to be restored to a usable quality. The potential diffusion of contaminants from the Site in the bedrock, as well as the presence of groundwater contaminants upgradient of the landfill, may exacerbate or prevent the attainment of groundwater ARARs in the far-field.
DuPont's comments presume that source control will be ineffective in attaining groundwater standards in the far-field and conclude that effective source control need not be attempted. The NCP and the TI Guidance, however, require EPA to restrict the spatial extent of a TI waiver to the smallest area possible and to apply source control measures as a prerequisite to issuance of a TI determination.

Therefore, EPA' s proposed remedy would require that groundwater in the far-field be monitored to determine the effectiveness of the source containment efforts and additional Site characterization would be performed to collect further data to evaluate the future potential for natural processes, in conjunction with the implementation of the modified preferred alternative, to achieve ARARs in the far-field.

7. COMMENT: pg. ii, M 4 - DuPont states several times in its comments that it "...believes that Alternative 9 provides a disproportionate response to the potential risk and, at best, marginal incremental benefit over Alternative 2, at a cost of $ 54 million."

EPA RESPONSE: EPA is proposing a modified preferred alternative, outlined in detail in the February 1998 Revised Proposed Plan. Additionally, DuPont has indicated to EPA its commitment to implement the modified preferred alternative. Therefore, the response will address the comment from the perspective of whether the modified preferred alternative provides a disproportionate response to the potential risk and a marginally incremental benefit over Alternative 2.

EPA believes the modified preferred alternative, while it would not immediately reduce risks to within acceptable levels, would provide the greatest amount of risk reduction and protection for the least cost based on the nine evaluation criteria established by CERCLA and the NCP. EPA also believes that the modified preferred alternative would not be "disproportionate" to the benefits provided and does not agree with DuPont's characterization of the increased benefit provided as " minimal." The modified preferred alternative would provide significantly greater control of the source area than Alternative 2.

DuPont's data, which were compiled in the AOA, were the source for the reduction in loadings (from the source area to the far-field) estimates in the original Proposed Plan. These estimates indicate that, compared to the No Action Alternative, Alternative 2 would result in a 40% reduction in loadings while the modified preferred alternative, in its approximation to Alternative 10, would result in a 90% reduction. In comparing Alternative 13 to the modified preferred alternative, the reductions in loadings from the source area to the far-field are essentially the same. Alternative 13 would also significantly abate the migration of contamination from the far-field to the Niagara River in the short-term due to the additional pumping in the far-field. In the long-term, however, the difference in the effectiveness between Alternative 13 and the modified preferred alternative would lessen since loadings from the source area would be significantly reduced or eliminated allowing far-field contamination to naturally attenuate and degrade.

As discussed above, EPA regulations require it must consider the cost of implementing a proposed alternative, as well as eight other criteria, in selecting a remedy at a site. In evaluating the cost criteria, the modified preferred alternative was estimated to cost more ($65,102,000) [the cost of Alternative 10] than Alternative 2 ($20,850,000) but considerably less than Alternative 13 ($96,460,000). EPA not only considers the cost of every alternative very carefully, but the cost effectiveness as well. In comparing Alternatives 2 and the modified preferred alternative for cost effectiveness, EPA determined that the modified preferred alternative provided the best balance in cost versus the reduction in contaminant loadings, magnitude and reduction in risk, potential to achieve ARARs in a reasonable time frame,

consistency with EPA policy and guidance, and consistency with other Superfund sites in Niagara Falls. EPA does not believe that spending the additional $44,252,000 (the difference in cost between Alternative 2 and the modified preferred alternative) to achieve far greater containment of the source area is inappropriate at this time. The impact of source area containment through the implementation of Alternative 2 has been evaluated and determined to be insufficient by EPA. Greater source area containment measures are required. Only then will it be possible to determine the potential for containment and possibly natural process to address contamination in the far-field.

8. COMMENT: pg. ii, M 4 - DuPont states that "...EPA's proposed remedy appears to be inconsistent with the recent EPA Superfund Administrative Reforms..."

EPA RESPONSE: EPA has reviewed the Administrative Reforms mentioned by DuPont in this paragraph and can find no guidance or directives that would alter the manner in which the risk assessment was conducted or change the evaluation of the nine criteria. As mentioned above, the risk assessment was conducted according the statutory requirements of CERCLA and the NCP, and the appropriate EPA guidance documents.

Evaluation of the proposed remedy was conducted according to the nine criteria as required by the NCP and appropriate EPA guidance documents. See EPA's response to comments 6, 7, 10 and 12.

9. COMMENT: pg. ii, M 4 - DuPont comments here, and elsewhere, that "...EPA's proposed remedy appears to be inconsistent with...other Records of Decision (RODs) issued for similar sites in the Niagara Falls area. To our knowledge, no similar sites in the area are using an extensive grout curtain physical barrier as specified for Necco Park in EPA's proposed alternative."

EPA RESPONSE: As discussed in the Revised Proposed Plan (February 1996), DuPont has suggested and EPA agrees that containment can be achieved through hydraulic means, negating the need for a physical barrier. Nevertheless, EPA does not fully agree with DuPont's statements. At similar sites in Niagara Falls, such as Occidental Chemical Corporation's (OCC) Hyde Park, 102nd Street, S-area and Buffalo Avenue, EPA and NYSDEC have taken the same remedial approach, similar to the one identified in EPA's modified proposed alternative. All of these sites employ maximum source containment and mitigation efforts through the use of caps, overburden barrier walls or drains, groundwater pumping and treatment in the overburden and bedrock, DNAPL extraction and collection in the bedrock, monitoring, and in some cases soil/sediment excavation and additional site characterization. EPA's approach at Necco Park, maximum source area containment, is no different. EPA does acknowledge that none of these sites employ a bedrock grout curtain and for the reasons put forth in the Revised Proposed Plan, the modified preferred alternative for Necco Park will also not employ a bedrock grout curtain.

10. COMMENT: pg. iii, M 1, first bullet - DuPont comments here, and elsewhere in its comments, that "There is no current or plausible future risk to human health or the environment."

EPA RESPONSE: EPA does not agree with this statement. While DuPont may have determined that "...there is no human exposure and no unacceptable risk...," EPA's Risk Assessment did not "...reach the same conclusion..." EPA's Risk Assessment determined that there was a future potential human health risk from groundwater usage. EPA's Risk Assessment also did not determine that "...the existing response actions have been effective..." but did determine that no current human health or ecological risks exist from this Site alone. It is important to note the Risk Assessment did not examine the impacts from multiple sources that are in the Niagara Falls area or the synergistic effects of the various chemicals from the Necco Park Site. Given the fact that persistent toxic substances on the NPIPL have been found in fish tissue in the Niagara River, it is likely that multiple sources of contamination, including Necco Park, are impacting these water bodies and contributing to an overall risk to human health and the environment. Finally, EPA believes that while the modified preferred alternative would not immediately reduce risks to within acceptable levels, it would provide the greatest amount of risk reduction and protection for the least cost based on the nine evaluation criteria established by CERCLA and the NCP.

11. COMMENT: pg. iii, M 1, second and third bullets - DuPont states several times in its comments that "The majority of site indicator compounds are not persistent toxic substances [and there] is no loading of persistent substances from Necco Park to the Niagara River and Lake Ontario."

EPA RESPONSE: EPA does not agree. The specific substances cited by DuPont later in their comments, hexachlorobenzene, hexachlorobutadiene and pentachlorophenol, have been identified at the Necco Park Site and are on the NPIPL. There has been a release of hazardous substances from the Necco Park landfill, including these compounds, that must be addressed. Furthermore, these hazardous substances have, or have the potential to, migrate to the Niagara River and eventually Lake Ontario.

It is evident, as substantiated by the various investigations conducted at this Site, that contaminants containing hazardous substances in the form of aqueous phase liquids (APL) and dense non aqueous phase liquids (DNAPLs) are present at the Necco Park Site in the soil, bedrock and groundwater. It is also evident that there has been a release of these hazardous substances from the Necco Park landfill into the environment. Furthermore, these hazardous substances have migrated, or have the potential to migrate, to the Niagara River and Lake Ontario.

In addition: 1) Both hexachlorobenzene and hexachlorobutadiene have been identified as primary constituents of the DNAPL present at the Site - EPA has already established that the DNAPLs have migrated from their place of origin in the landfill and will more than likely continue to migrate. See EPA's response to comment number 6, above. 2) These DNAPLs act as a continuing source of groundwater contamination. 3) Due to the heterogeneity of groundwater movement in fractured bedrock systems, and the lack of groundwater monitoring wells in the far-field, the existing groundwater monitoring network is insufficient to make the determination that "...these three constituents are largely limited to the source area...and are insignificant contributors to any aqueous plume." With reference to the groundwater plumes as presented in the AOA, the most concentrated portion of the plume in the middle and lower bedrock zones pass between the existing far-field monitoring wells. Only the edges of the plume are detected by the existing monitoring wells. 4) While "...no known source..." of pentachlorophenol may exist at Necco Park, it should be noted that disposal records are incomplete and the compound has been identified as a Necco Park indicator parameter. Given these considerations, EPA does not believe that "These findings confirm that these...three constituents are limited to the source area in all water bearing zones and are insignificant contributors..."

12. COMMENT: pg. iii, M 1, fourth and sixth bullets - DuPont states here, and elsewhere in its comments, that groundwater "is not currently nor plausibly will be used as a future drinking-water source [and that) regional impact on the aquifer [comes) from numerous pollutant sources."

EPA RESPONSE: Groundwater in the Niagara Falls area is classified as New York State Class GA Fresh Groundwaters by NYCRR Title 6, Chapter X Part 701.15. This document clearly states that "The best usage of Class GA groundwaters is as a source of potable water supply." The NCP and EPA's groundwater policy states that "EPA will make use of state classifications when determining appropriate remediation approaches for groundwater." Furthermore, "[it] is EPA's policy to consider the beneficial use of the water and to protect against current and future exposures. Groundwater is a valuable resource and should be protected and restored if necessary and practicable. Groundwater that is not currently used may be a drinking water supply in the future." The NCP, EPA groundwater policy and EPA's Risk Assessment Guidance require an evaluation of both current and future potential risks at all sites. The Site risk assessment was performed on the basis of these regulatory requirements and EPA guidance documents.

In addition to the above, EPA and NYSDEC do not agree with DuPont's assessment of the future groundwater use potential. DuPont has asserted that the groundwater resource in Niagara Falls is useless based on the following:

1 - natural groundwater quality is poor due to high mineral concentrations and the presence of hydrogen sulfide;

2 - various activities of industry have contaminated the bedrock groundwater regionally; and

3 - drinking water is provided by municipal supplies.

The implied conclusion is that the groundwater resource throughout the Niagara area is unworthy of restoration and, therefore, that no further effort should be made to remediate the Site.

EPA and the NYSDEC do not agree with this characterization and conclusion for several reasons. First, the aquifer associated with the upper Lockport formation is quite productive and has been widely used for potable drinking water prior to the introduction of public water supplies at great public expense. Johnston (1956, as cited in the AOA) contains, in Table 7, a synopsis of 297 wells in existence at the time of the report. Of these nearly 300 wells, 160 were screened exclusively in the Lockport formation, and 137 were screened in other formations, including surficial deposits. The average production from Lockport wells tabulated in the report was 102 gpm, while the average production from other wells was 4 gpm.

While it is true that water from the aquifer tends to have relatively high calcium hardness, its hardness is no greater than from many other limestone and dolostone aquifers that are widely used as drinking water sources throughout the United States. While the lower portion of the Lockport contains hydrogen sulfide, the deep Lockport is also a much less productive aquifer and was much less widely used as a drinking water source prior to its contamination.

The fact that a once useful resource has been widely contaminated by activities of various industries does not negate the appropriateness of remediating the damage done. Repairing the damage is precisely the goal of remedial efforts at any site where it can be reasonably accomplished, and at all sites remediation has, as a goal, the containment of contamination to prevent uncontaminated groundwater from becoming contaminated. EPA and NYSDEC are attempting to achieve this long-term restoration goal by addressing the individual sources of groundwater contamination that exist in the Niagara Falls region.

Also, the fact that public drinking water is currently being supplied by municipalities does not guarantee that the groundwater resource will not be needed for human consumption at some time in the future. Surface water is subject to any number of catastrophes, either natural or man-made, that can render the surface supply unusable.

13. COMMENT: pg. iii, M 1, fifth bullet - DuPont states several times in its comments that "There is no compelling evidence of DNAPL migrating from the source area."

EPA RESPONSE: It is necessary to put the comment in the proper context in order to respond to it, by reiterating the definition of the source area. The source area is defined as: an area associated with Necco Park acting as a continuing source of constituent migration to the downgradient aqueous environment. The primary criterion for defining the source area is the areal extent of free-phase or residual DNAPL. To be conservative, areas where aqueous constituent levels might theoretically indicate the presence of DNAPL are included using various solubility criteria. The source area includes: the 24-acre Necco Park landfill itself, areas where DNAPLs have been observed to be present, and areas where the concentration of aqueous phase contaminants in the groundwater indicate that DNAPL may be present. Therefore, it would be impossible for DNAPL to migrate from the source area based on its definition. As DNAPLs migrate, the source area becomes larger. Furthermore, apart from the definition of "source area," the data clearly demonstrate that DNAPL has migrated from the original source, the 24-acre landfill itself.

14. COMMENT pg. iii, M 2, first sentence - DuPont also states on several occasions that "...the actions it [DuPont] has implemented to date have served to prevent any significant risks to human health and the environment, as documented by EPA's own risk assessment."

EPA RESPONSE: DuPont misstates the findings of EPA's risk assessment. See EPA's response to comment number 10, above.

ii. Introduction

15. COMMENT: pg. 1, M 1, last sentence - At several points in its comments, DuPont states that "EPA should address the Necco Park remedy in a phased approach, comprised of Alternative 2 from the AOA, and await the results of more detailed evaluations of potential dense nonaqueous-phase liquid (DNAPL) mobility prior to any further determinations."

EPA RESPONSE: EPA believes that the current approach proposed by EPA is consistent with the "...phased approach..." indicated by DuPont in the last sentence of this paragraph. EPA believes that Alternative 2

(the existing systems), which has been operating for some time, constitutes the first phase of an appropriate response. However, EPA also believes that Alternative 2 has proven to be inadequate and that additional measures are needed to contain the source of contamination present at the Site, reduce future potential risks, minimize impacts to the Niagara River and the Great Lakes, evaluate the effectiveness of additional source control measures and collect additional Site characterization information in the far-field.

In addition, EPA believes that sufficient information has been obtained through the various investigations conducted at the Site to validate concerns of potential DNAPL mobility. See EPA's response to comment number 4, above.

16. COMMENT: pg. 1, M 3, first sentence - DuPont characterizes the implementation of the response actions they have taken to date as "...successful..."

EPA RESPONSE: EPA does not fully believe that DuPont has "...successfully..." implemented the response actions to date. As mentioned above, the extraction wells have been frequently inoperative and the volume of groundwater pumped at the Site has widely fluctuated. For these reasons, these wells would not qualify as "operational and functional" under EPA's definitions for O&M. See EPA's response to comment number 2, above.

17. COMMENT: pg. 1, M 3, third and fourth sentences - DuPont states here, and elsewhere, that " DNAPL recovery rates have declined dramatically indicating the successful removal of the mobile DNAPL phase...[and]...no DNAPL movement is evident..."

EPA RESPONSE: Except for collection of DNAPL in the existing groundwater extraction wells and one other experimental DNAPL recovery well, the DNAPL recovery program has been passive in nature (i.e., collecting DNAPL in monitoring wells). While approximately 6,300 gallons of DNAPL have been collected to date, there is no way to determine how much of the material is present in the soils and bedrock fractures. Available disposal records for the Site are limited and the exact quantity of liquid wastes disposed of at the Site are unknown. If the quantity of liquid wastes deposited in the landfill were far greater than the amount recovered to date, then the recovery efforts could not be characterized as "successful." Also, see EPA's response to comment number 4, above.

18. COMMENT: pg. 2, M 1, second and third sentences - DuPont states several times in its comments that "...EPA's own risk assessment reached the same conclusion [that the response actions in place result in no unacceptable risk and will provide protection to human health and the environment]...[and that EPA's proposed alternative is a]...disproportionate response for the minimal incremental benefits provided..."

EPA RESPONSE: EPA disagrees. See EPA's response to comments number 7 and 10, above.

19. COMMENT: pg. 2, M 4 and pg. 3, M 1 - DuPont cites the "Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes Basin" and identifies three substances on the Necco Park Indicator Parameter List (hexachlorobutadiene, hexachlorobenzene and pentachlorophenol) as being listed as "persistent" by the agreement. DuPont states that "[these] three constituents are relatively immobile and are insignificant contributors to the contaminant plume; only very few low-level detections of two of these compounds have ever been documented in the far-field groundwater monitoring program..." DuPont then states that data from "...18 off-site downgradient monitoring wells since 1992..." show detections of only two of the compounds and declines in their concentrations since 1993.

EPA RESPONSE: DuPont correctly identifies the three substances (hexachlorobutadiene, hexachlorobenzene and pentachlorophenol) as being listed in the "Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes Basin." Hexachlorobenzene is listed as a Level I Substance. According to the agreement, "Level I substances represent the "bullseye" around which the governments will focus and lead action and efforts. Because these substances have been associated with or have the immediate potential to cause deleterious environmental impacts because of their presence in the

Basin, they represent an immediate priority and are targeted for virtual elimination...." Hexachlorobutadiene and pentachlorophenol are identified as Level II Substances "...that have the potential for significantly impacting the Great Lakes ecosystem through their use and/or release." It is important to note that while these three substances are on the NPIPL, the NPIPL does not identify all contaminants that may be present at the Site. The NPIPL is an abbreviated list of compounds that are considered indicative of the contamination present at the Necco Park Site based on the investigations conducted at the Site.

In addition, other compounds present at the Site are covered by other agreements and Great Lakes Guidance that are discussed in EPA's response to comment number 60, below. For example, hexachlorobenzene and tetrachloroethylene are identified as category IA and IB (Priority toxics) in the "Niagara River Toxics Management Plan" (NRTMP). Pentachlorophenol, hexadhlorobenzene, hexachloroethane, hexachlorobutadiene, carbon tetrachloride, chloroform, phenol, 1,1,2,2-tetrachloroethane, tetrachloroethylene, 1,1,2-trichloroethane, 1,2-dichloroethane, trichloroethylene, 1,1-dichloroethylene, trans-1,2-dichloroethylene, 2,4,6-trichlorophenol and vinyl chloride, all on the NPIPL, are identified in the Final Water Quality Guidance for the Great Lakes System; Final Rule, 40 CFR Part 132 as substances for which standards have been or will be generated.

Also, see EPA's response to comments 2, 4 and 11 above, concerning the migration of contaminants at the Site and the "success" of present hydraulic control methods at Necco Park.

20. COMMENT: pg. 3, M 2 - DuPont states that "Based on the contaminant concentrations in the far-field and the potential for diffusion of constituents from the aquifer matrix to act as a continuing source of contamination, DuPont believes that restoration of the far-field cannot be accomplished (as EPA has noted) within a reasonable time-frame, regardless of the alternative that is implemented..."

EPA RESPONSE: In this paragraph, and in other sections of its comments, DuPont concludes that trends in groundwater contamination indicate the diffusion of chemical constituents into the bedrock matrix which would continue to act as a low level source of contamination throughout areas down gradient of Necco Park. EPA and NYSDEC do not believe that the data collected to date provide any indication that matrix diffusion has, or has not, occurred or whether or not it is controlling contaminant concentrations down gradient of the source area. Full source area containment would need to be implemented in order to determine if: matrix diffusion is occurring; constituent concentrations in the monitoring wells in the far field are in an equilibrium state; or actual physical/hydraulic containment of the source area will result in concentrations in the far field similar to those that currently exist. Following the implementation of full source containment, there must be active monitoring of the groundwater conditions for a sufficient period of time to make the determination that future groundwater standards will or will not be achieved. Finally, EPA has concerns regarding matrix diffusion model conceptualization and the general uncertainties of modeling in fractured bedrock. Therefore, EPA and NYSDEC believe that the absolute nature of the language regarding matrix diffusion is overstated.

EPA does not agree with the conclusion stated in this paragraph that containment of the source area will not result in the attainment of the far-field target response goals. See EPA's response to comment number 6, above.

EPA is unable to locate the source of the statement "...(as EPA has noted)..." in this paragraph. EPA is unaware that anyone from the Agency has indicated that "...restoration of the far-field aquifer [at the Necco Park Site] cannot be accomplished...regardless of the remedial alternative that is implemented..."

21. COMMENT: pg. 3, M 3, second sentence - DuPont states here, and elsewhere, that "This remedial alternative [Alternative 9] is, in general, similar to the remedy proposed by DuPont, differing largely in scale."

EPA RESPONSE: As previously stated, EPA is proposing a modified preferred alternative rather than Alternative 9; the response, therefore, will address the modified alternative in comparison to the remedy proposed by DuPont.

EPA disagrees with this statement. DuPont's implementation of limited groundwater pumping and passive DNAPL recovery from the existing monitoring well network (Alternative 2) is estimated (in the AOA) to reduce loadings to the far-field by approximately 40 percent. The modified preferred alternative was estimated to reduce those same loadings by 90 percent in addition to providing some control of DNAPL migration in the overburden and bedrock. EPA believes that the difference between Alternative 2 and the modified preferred alternative is significant in terms of source control.

22. COMMENT: pg. 3, M 3, last sentence - DuPont states that "...EPA's proposed remedy also appears to be inconsistent with the recent Superfund Administrative Reforms and the proposed New York State groundwater strategy program."

EPA RESPONSE: See EPA's response to comment number 8, above, regarding the Superfund Administrative Reforms. Also, EPA has reviewed the proposed NYS groundwater strategy and finds that it is consistent with the groundwater strategy currently employed by EPA as dictated by the NCP and EPA guidance governing DNAPL sites and groundwater restoration (e.g., OSWER Directive 9200.4-14 and EPA's Guidance for Evaluating the Technical Impracticability of Groundwater Restoration). See also EPA's response to comment number 12, above.

23. COMMENT: pg. 3, M 4, first and second sentences - DuPont states on several occasions that EPA's "...proposed remedy is inconsistent with other Records of Decision (RODs) issued for similar sites in the Niagara Falls area [and] no similar sites in the area are using an extensive grout curtain physical barrier..."

EPA RESPONSE: EPA believes that the Proposed Plan and Revised Proposed Plan for the Necco, Park Site is consistent with other RODs issued for similar sites in Niagara Falls. See EPA's response to comment number 9, above.

24. COMMENT: pg. 3, M 4, third, fourth and fifth sentences - DuPont states that the Solvent Chemical Site is analogous to the Necco Park Site and that NYSDECs Proposed Plan for that Site is consistent with DuPont's proposed Alternative 2.

EPA RESPONSE: EPA does not believe the two Sites are suitable for comparison due to substantial differences in the size of the facilities and in their scope of operations. The Necco Park Site is a 24-acre industrial waste disposal facility, while the Solvent Chemical Site is a 5.7-acre inactive chemical manufacturing and storage facility. While leaks, spills and some discharges may have occurred at the Solvent Chemical Site, deliberate disposal of 93,000 tons of waste, such as that which occurred at Necco Park, is not comparable. It would be more appropriate to compare Necco Park to other landfill sites in Niagara Falls such as Hyde Park, S-Area, 102nd Street and Love Canal. In addition, the extent of DNAPL and groundwater contamination at the Solvent Chemical Site is less than that at Necco Park.

Notwithstanding the above, EPA has reviewed the Solvent Chemical Proposed Plan and ROD, signed in December 1996, and finds the remedy to be more consistent with EPA's Proposed Plan and Revised Proposed Plan for the Necco Park Site than DuPont's proposed Alternative 2. The Remedial Action Objectives (RAos) for the two Sites are similar: to eliminate direct human contact with on-site contaminants, to control or eliminate on-site soils contamination, to reduce, control or eliminate groundwater contamination in the overburden and bedrock, and to prevent further migration of bedrock groundwater contamination to facilitate attenuation of the downgradient plume. The proposed (and final) remedy for Solvent Chemical called for: an overburden collection system for overburden hydraulic control, as does EPA's modified preferred alternative, but Alternative 2 does not; a barrier (slurry wall or sheet piling, etc.) in the overburden to enhance hydraulic control, an element Alternative 2 does not; and downgradient pumping wells in the B zone to achieve hydraulic control of the groundwater contamination, also an element not included under Alternative 2.

The remedial actions set forth in the Solvent Chemical Proposed Plan and ROD are intended only as a first phase of remediation. The Proposed Plan stated that "[if] the first phase does not demonstrate a significant reduction in contaminant loadings within the lower (bedrock] zones, subsequent phases would be required. Such phases may include increased B zone extraction, implementation of hydraulic and/or physical

containment systems within the lower bedrock zones of concern, and/or any other appropriate bedrock measures."

EPA believes that DuPont's response actions (Alternative 2) constitute the first phase of a phased remediation. EPA also believes that this first phase has not demonstrated containment, control or significant reductions in contaminant loadings or DNAPL migration in the overburden or bedrock zones. Therefore, implementation of a second phase (EPA's modified preferred alternative) is required. Also, see EPA's response to comment number 19, above.

25. COMMENT: pg. 4, M 1, second sentence DuPont states several times in its comments that they have"...been unable to find examples of the use of grout curtains as a physical barrier to DNAPL migration."

EPA RESPONSE: EPA's modified preferred alternative replaces the physical barrier (grout curtain) with a hydraulic barrier for containment of contaminants. Although the installation of the grout curtain is no longer an element of the preferred alternative for site remediation, the purpose of the grout curtain, as an element of the original preferred alternative (Alternative 9), was to serve a dual function by enhancing the hydraulic barrier in the bedrock to maintain an inward gradient, and by providing a physical barrier to impede DNAPL migration of the bedrock. The bedrock grout curtain would make it easier to achieve hydraulic containment of the source area by reducing the quantity of groundwater pumped, thereby reducing the long-term O&M costs significantly. The initial capital cost of grout curtain installation would be offset by the long-term savings in O&M costs. However, the modified preferred alternative replaces the physical barrier with a hydraulic barrier, thereby replacing the initial capital cost with greater O&M costs. This was a preference expressed by DuPont and explained in detail in the Revised Proposed Plan.

26. COMMENT: pg. 4, M 1, fourth sentence - At several points in its comments, DuPont states that it stands "...ready to analyze the potential for DNAPL migration in detail and support any remedial decision making in this regard."

EPA RESPONSE: EPA believes that sufficient information has been collected through the numerous investigations and studies performed to date concerning past DNAPL migration and the potential for future DNAPL migration. EPA also believes that this information supports EPA's proposed modified preferred alternative.

27. COMMENT: pg. 4, M 1, last sentence - DuPont comments here, and elsewhere in its comments, that "...the construction of a grout curtain...would be difficult..."

EPA RESPONSE: Again, since the grout curtain is no longer an element of the preferred alternative, the comment is no longer relevant. Nevertheless, EPA acknowledges that there would be difficulties encountered with the installation of the grout curtain. However, EPA believes that these difficulties could be overcome as evidenced by the installation of the existing upgradient grout curtain.

iii. General Comments

28. COMMENT: pg. 5, M 1, fourth sentence - DuPont again states that "The highly effective response action taken by DuPont..."

EPA RESPONSE: EPA disagrees with DuPont characterization of their response actions as "highly effective" and does not agree that a "...high degree of hydraulic control..." has been established in the shallow bedrock zones as stated in the second bullet. See EPA's response to comment number 2 above concerning the response actions implemented by DuPont.

29. COMMENT: pg. 6, M 3, second sentence - On a number of occasions DuPont states that EPA's risk assessment "...concluded that there is no risk to human health or to fish and aquatic life in the Niagara River under current conditions."

EPA RESPONSE: Actually, EPA's risk assessment determined that contaminants in the Falls Street tunnel at

the Niagara River discharge location exceeded the total mean chronic risk index. Exceeding the risk index indicates that biota may be at risk of an adverse effect. However, this determination was made when no diversion of the flow in the Falls Street tunnel was occurring (i.e., under worst-case conditions). Presently, all of the dry weather flow in the tunnel is diverted to the POTW for treatment. During precipitation events, some of the flow in the tunnel is diverted to the POTW and some is discharged to the Niagara River. The risk assessment also determined that contaminants present on the NPIPL have been detected in fish tissue samples collected from the Niagara River (Newell et al., 1987). An EPA publication, National Study of Chemical Residues in Fish, 1992, made the same determination. It should be noted that EPA Is ecological risk determinations were based on assessing the impacts from the Necco Park Site alone, and did not include the evaluation of impacts from multiple contaminant sources to the Niagara River. In addition, EPA's risk assessment did not assess the potential synergistic effects from the interaction of different chemicals with one another. In consideration of all the above facts, EPA believes that Necco Park, together with other sources of contamination, are impacting these water bodies (Niagara River and Lake Ontario) and contributing to an overall risk to human health and the environment.

30. COMMENT: pg. 7 M 2, first sentence - DuPont states that "EPA cites the Great Lakes Water Quality Agreement of 1978...as a driver for it's selection of the preferred remedy."

EPA RESPONSE: EPA has never cited any one particular agreement "as a driver" for the selection of a remedy. There are actually a number of international agreements to address the migration of contaminants to the Niagara River and the Great Lakes that were developed as a result of the Great Lakes Water Quality Agreement of 1978. The Great Lakes Water Quality Agreement along with other international treaties and agreements such as the Niagara River Toxics Management Plan are considerations that must be taken into account when evaluating alternatives for the Site.

EPA must select a remedy that is protective of human health and the environment. As an administrative agency in the Executive Branch of the U.S. Government, EPA must take the United States' obligation under international law into consideration at a Site which affects international waters such as the Niagara River and Lake Ontario.

Article IV of the Boundary Waters Treaty of 1909 between the United States and Canada obligates each nation to ensure that the "boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health and property on the other." These treaty obligations are implemented, in part, through the Great Lakes Water Quality Agreement of 1978 which establishes as its primary purpose that "[the] discharge of toxic substances in toxic amounts be prohibited and the discharge of any or all persistent toxic substances be virtually eliminated...and [that] best management practices be developed and implemented by the respective jurisdictions to ensure adequate control of all sources of pollutants."

These international agreements are implemented through the International Joint Commission and the National, State and Provincial governments of Canada and the United States through their respective environmental ministries and agencies. The Binational Strategy for the Great Lakes and the Niagara River Toxics Management Plan are two examples of agreements in implementation of international obligations that must be taken into account when evaluating alternatives for the Site. These agreements specifically affect the management of contaminants impacting the Great Lakes and the Niagara River.

The Binational Strategy (formally, the "Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes Basin") establishes "a collaborative process by which Environment Canada (EC), EPA, and Great Lakes stakeholders will work as full partners toward the goal of virtual elimination of persistent toxic substances, particularly those which bioaccumulate, from the Great Lakes Basin so as to protect and ensure the health and integrity of the Great Lakes ecosystem." This process is currently being implemented through a number of actions including Lakewide Management Plans (LaMPs), Remedial Action Plans (RAPs) and the Great Lakes Initiative which was developed pursuant to º118 of the Clean Water Act (CWA).

The other agreement that is a result of the Great Lakes Water Quality Agreement is the "Niagara River Toxics Management Plan" also know as the "Four-Party Agreement." This agreement, developed and signed in 1987 by EC, EPA, NYSDEC, and the Ontario Ministry of the Environment (MOE), commits the four parties "...to

a management strategy that provides for the coordination and evaluation of collective pollution abatement efforts and the achievement of significant reduction in toxic chemical loadings to the Niagara River." This agreement also set forth specific goals to be achieved, such as "...a target reduction level of 50% for persistent toxic chemicals of concern....by the year 1996."

Pursuant to the Four-Party Agreement, EPA and NYSDEC identified 26 hazardous waste sites as being responsible for virtually all of the toxic inputs to the Niagara River from hazardous waste sites in the United States. The DuPont Necco Park Site has always been a high priority site among these 26 sites. It has been the consistent position of EPA and NYSDEC since 1987 that the goal of virtual elimination would be attained through site remediations that would cut off additional loadings of toxic chemicals from the Site to the Niagara River. The isolation of the source of contamination has been consistently applied to the remediation of all 26 sites by EPA and NYSDEC to reduce the collective impact of these sites to the overall risks to human health, the environment, and the public welfare in the Niagara River and Great Lakes ecosystems.

EPA believes that the modified preferred alternative is consistent with all EPA CERCLA regulations, policies, and guidance as well as the goals and strategies set forth in the Binational Strategy and the Four-Party Agreement in furtherance of the United States' international obligations. By containing the source area, contaminant migration to the far-field will be greatly reduced which will also minimize the impact to the Niagara River and Lake Ontario.

31. COMMENT: pg. 7, M 2, second sentence - DuPont comments that "...the agreement [Great Lakes Water Quality Agreement] is not an [ARAR] as defined in [CERCLA]."

EPA RESPONSE: EPA has not cited the Great Lakes Water Quality Agreement as an ARAR but has identified the Agreement as a to-be-considered (TBC) criterion.

32. COMMENT: pg. 7, M 2, third sentence - DuPont comments that "...the primary objective of this agreement [Great Lakes Water Quality Agreement] is to focus on pollution prevention in the manufacture, transportation and use of persistent toxic substances, not to address remediation of sites."

EPA RESPONSE: The Great Lakes Water Quality Agreement of 1978 between the United States and Canada commits the two countries to "virtually eliminate" persistent toxic substances in the Great Lakes ecosystem. To accomplish this objective the International Joint Commission (IJC) urged the development and implementation of "...a comprehensive, binational program to lessen the uses of, and exposure to persistent toxic chemicals found in the Great Lakes environment". As a result the "Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes Basin," otherwise known as the Binational Strategy, was drafted. According to the Binational Strategy, "[t]o accomplish the objective of restoring and maintaining the integrity of the Great Lakes, virtual elimination seeks to reduce and eventually eliminate the use, generation or release of persistent toxic substances." In addition, the document states that "...in implementing this Strategy, EC, the USEPA and their partners...favor...ways to reduce persistent toxic substances...and applying to all sources and pathways, to reduce their releases...." See also EPA's response to comment number 30, above.

33. COMMENT: pg. 8, M 3 - DuPont again comments that "[the] trend in the analytical data from these wells [18 off-site, downgradient monitoring wells] since 1993 has shown a sharp decline in concentrations of hexachlorobutadiene and pentachlorophenol...[and that]...this trend indicates that the combination of effective hydraulic control and potential intrinsic biodegradation appears to be significantly reducing the level of these compounds in the far-field aquifer."

EPA RESPONSE: See EPA's response to comments number 2 and 5 concerning the trend in contaminant concentrations and the "effectiveness" of the existing remedial systems. EPA has been unable to identify which 18 monitoring wells DuPont is referring to in it's comment. In addition, DuPont has not submitted any documentation to indicate that biodegradation of Necco Park constituents is occurring in the far-field. However, EPA does agree with DuPont that the combination of effective hydraulic control (Alternative 9 or better) and the potential for intrinsic biodegradation presents a realistic possibility for significant

reductions in contamination in the far-field.

34. COMMENT: pg. 9, M 1 - DuPont states that "...intrinsic biological degradation has been documented to reduce contaminant concentrations in the Necco Park groundwater plume...[and the]...intrinsic anaerobic biodegradation study conducted by DuPont at Necco Park has been cited as a successful case study by EPA (Wilson et al, 1996)."

EPA RESPONSE: EPA has not documented intrinsic biological degradation at Necco Park or received sufficient documentation of such from DuPont. In addition, EPA can find no reference to DuPont's claim that EPA has cited its biodegradation study as a "successful case study." The article lists the Necco Park Site in a table as a source for "Apparent Attenuation Rate Constants (Field Scale Estimates). "Mr. John Wilson, the EPA representative referenced by DuPont in its comment, informed EPA Region II personnel that data submitted by DuPont were utilized solely for purposes of developing constants for assessing attenuation rates. Mr. Wilson stated that Site specific conditions at Necco Park were never assessed in the preparation of this article and that, in the absence of such an assessment, EPA could not have made any finding that DuPont made a "successful case study." However, EPA does not deny the possibility that intrinsic biological degradation is occurring in the groundwater at the Site. EPA believes that this possibility has positive implications for the potential restoration of far-field groundwater.

35. COMMENT: pg. 9, M 2, last sentence - DuPont states that "...nearly four times the quantity of groundwater..." would be required to be pumped under Alternative 9 than Alternative 2.

EPA RESPONSE: According to estimates made in the AOA, Alternative 9 would pump 3.5 times more groundwater than Alternative 2. However, Alternative 9 would also provide far greater source area control (90% or better) than Alternative 2 (approximately 40%). The modified preferred alternative would require greater than two times more groundwater be pumped than Alternative 9, while also providing 90% or better source area control. However, the modified preferred alternative also eliminates the need for a physical barrier in the bedrock by replacing it with a hydraulic barrier. This is an approach preferred by DuPont and explained in detail in the February 1998 Revised Proposed Plan.

36. COMMENT: pg. 10, M 2, bullets - DuPont repeatedly cites the NYSDEC Proposed Plan for the Solvent Chemical Site to illustrate its contention that the proposed plan for the Necco Park Site "...goes well beyond remedial action required at other sites..." The Solvent Chemical Proposed Plan specifies: "A site cover, [o]verburden and B zone hydraulic control, [m]onitoring of lower bedrock zones for hydraulic control, [no] physical subsurface barrier or lower zone recovery wells."

EPA RESPONSE: As mentioned in EPA's response to comment number 24, above, the two Sites are not suitable for comparison, yet the proposed alternative for Necco Park is consistent with the remedy for the Solvent Chemical Site. Additionally, as stated above in EPA's response to comment numbers 15 and 24, EPA considers DuPont's existing response actions as the first phase and, based on the evaluation of that phase, additional remedial measures are required. EPA believes that the additional remedial measures proposed in the Revised Proposed Plan are consistent with NYSDEC's remedy in the Solvent Chemical Proposed Plan and ROD.

37. COMMENT: pg. 10, M 3 - DuPont cites the following additional statements from the NYSDEC Solvent Chemical Proposed Plan:

> "Overburden and bedrock groundwater contaminant concentrations on-site would be expected to gradually decrease through operation of a hydraulic control and treatment system, but due to the persistence of DNAPL within the bedrock fracture zones, bedrock groundwater would likely never achieve groundwater standards."
>
> "None of the four alternatives [in the NYSDEC Proposed Plan for Solvent Chemical] would fully comply with Standards, Criteria, and Guidance (SCGs) for groundwater. However, a waiver from groundwater SCGs would be appropriate for the on site bedrock groundwater."
>
> EPA RESPONSE: EPA is in full agreement with these statements. NYSDEC's definition of "on-site" for

the Solvent Chemical Site corresponds to EPA's definition of "source area" for the Necco Park Site. Putting these NYSDEC statements into EPA terminology, they are equivalent to EPA's determination to waive the groundwater standards within the source area for Necco Park (i.e., where DNAPL has been found or is likely to be present based on solubility criteria).

38. COMMENT: pg. 11, M 1 - DuPont lists eight bullets containing comments that DuPont asserts were made by NYSDEC in support of NYSDEC's remedy selection at the Solvent Chemical Site.

EPA RESPONSE: Since many of the statements DuPont attributes to the NYSDEC are not mentioned in the Proposed Plan or ROD for the Solvent Chemical Site, EPA raised these matters with the NYSDEC. Based on EPA's communications with the NYSDEC, it appears that some of these statements are correct while others appear to have been misinterpreted or taken out of context of the comments made at the meeting. The following is NYSDEC's response to the bullets (EPA comments are contained in brackets):

- There in no human use of the groundwater in Niagara Falls.

NYSDEC response: "This was discussed at the public meeting and is generally accurate. The NYSDEC concurs that there is no known [present] use of groundwater for human consumption in the area of Niagara Falls near the Solvent Chemical Site. This statement has been supported by both the County and State Health Departments. However, NYSDEC did not evaluate all water use in the City of Niagara Falls as a part of the Solvent Chemical remedial program."

- There in a county ordinance controlling the issuance of well installation permits and permits are not being granted.

NYSDEC response: "NYSDEC did discuss this at the Solvent Chemical public meeting. The County Health Department has confirmed that there is such a County ordinance in effect and no permits are [presently] being granted."

- Poor natural water quality.

NYSDEC response: "There were discussions at the public meeting concerning the existing state of the groundwater in the vicinity of the Solvent Chemical Site. This discussion acknowledged the fact that the groundwater in the vicinity of the Solvent Chemical Site has also been impacted by other sites in the area (such as Olin and DuPont). No statements were made which discounted the value of the groundwater resource on the basis of poor natural groundwater water quality. Neither the Proposed Plan nor the ROD for the Solvent Chemical Site discusses "poor natural groundwater quality" in the Lockport formation.

[The NYSDEC has previously stated it's disagreement with such a DuPont assessment (see August 4, 1995 letter from G. David Foster, [NYSDEC] to Dale J. Carpenter [EPA]). As stated in this previous correspondence, the aquifer associated with the upper Lockport formation is very productive and was widely used in the past for potable drinking water." EPA concurs with the NYSDEC. See EPA's response to comment number 12, above.)

- Minimal risk to human health and the environment.

NYSDEC response: "The reference to a 'minimal threat to human health' is generally accurate given current conditions. However, potential human exposure pathways of concern were identified for Site trespassers, Site workers, and utility/construction workers downgradient from the Site that may encounter contaminated Site bedrock groundwater."

[EPA concurs with NYSDEC's assessment of the current risk, however, EPA also considered the future potential risks from the Necco Park Site. See EPA's response to comments number 10, 12, and 29, above.]

"The reference to "minimal environmental threats" is not completely accurate. The Proposed Plan [and ROD] include[s] discussions of the Niagara River Toxics Management Plan and the loadings reduction goals. Without hydraulic containment measures at the Site, the Site will continue to function as a source for

groundwater contamination in the area for an extremely long period of time. This was also discussed in the public meeting.

[The NYSDEC's Proposed Plan for the Solvent Chemical Site also stated that "[c]ontaminated groundwater pose a threat to human health and the environment by its migration into off-site utilities and the ultimate discharge of this contaminated groundwater to the Niagara River." NYSDEC's Proposed Plan also stated that "...since there is off-site migration of contaminants, and some of the bedrock groundwater contamination is ultimately discharged to the Niagara River (which in turn flows into Lake Ontario), the potential exists for aquatic resources to be effected by Site contaminants."]

- Plume is at equilibrium.

NYSDEC response: "Some discussion at the public meeting was related to the effects of the NYPA conduit system and the Falls Street Tunnel and the fact that they are likely functioning to prevent the further migration of Site-related contaminants beyond these systems. However, no discussion of chemical equilibrium as raised in the public meeting or is contained in the Proposed Plan [or ROD]."

- Matrix Diffusion of DNAPL in bedrock will sustain contaminant concentrations above drinking water standards.

NYSDEC response: "The NYSDEC did state that fate and transport mechanisms, including small quantities of mobile DNAPL and the matrix diffusion of DNAPL within bedrock, will likely sustain contaminant concentrations above drinking water standards for a very long period. A waiver of ARARs [was included] in the ROD for the on-site groundwater. The ROD also notes that on-site hydraulic containment of the bedrock source areas will allow for natural attenuation of the dissolved phase off-site contaminant plume. The ROD notes that the waiver of ARARs applies only to on-site groundwater (within the area of hydraulic containment) and not to groundwater that has migrated beyond the Site boundaries."

[This approach is consistent with EPA's proposed remedy for the DuPont, Necco Park Site. See EPA's response to comment number 6, above.]

- Cannot restore aquifer to drinking water standards.

NYSDEC response: "The NYSDEC did note that drinking water standards would not likely be met any time soon. This discussion was related to the above point concerning matrix diffusion and residual DNAPL presence at the Site. Again, the ROD recognizes the impracticability of groundwater restoration on-site and provides a waiver for ARARs for on-site groundwater. However, the ROD also discusses likely attenuation of Solvent Chemical-related contaminants of concern within the off-site plume resulting from hydraulic controls on-site. The ROD also discusses the possibility that contaminants of concern may eventually achieve groundwater standards within the off-site plume."

[EPA has made similar statements concerning ARARs at the DuPont, Necco Park Site. EPA believes that ARARs cannot be attained within the source area. However, significant uncertainty exists concerning the ability to achieve the groundwater standards in the far-field. See EPA's response to comment number 6, above.]

- There is no current or planned use of groundwater for human consumption.

NYSDEC response: "This topic was discussed within the context of the County ordinance controlling water well installation."

[See also EPA's response to comment number 12, above.)

39. COMMENT: pg. 11, M 1 last sentence - DuPont states that "The current remedial measures at the Necco Park Site are consistent with these requirements [see bullets listed above] for the Solvent Chemical Site."

EPA RESPONSE: EPA does not consider the statements made at the public meeting as "requirements" for the

Solvent Chemical Site. The information listed in the bullets and discussed in EPA's response to comment number 38, above, are statements of the conditions and circumstances pertaining to the Solvent Chemical Site. EPA agrees that the current remedial measures in place at the Necco, Park Site are, in some ways, consistent with the proposed phase I remedial measures for the Solvent Chemical Site. See EPA's response to comments number 12, 19, and 35, above. The Proposed Plan for the Solvent Chemical Site, however, is equally consistent with the remedial approach taken for the Necco Park Site. See EPA's response to comment number 37, above.

40. COMMENT: pg. 11, M 2, fifth sentence - On several occasions, DuPont comments that it "...stand[s] ready to analyze the potential for DNAPL migration in the detail necessary to support any remedial decision making..."

EPA RESPONSE: EPA believes that sufficient information exists from the numerous Site studies, investigations and monitoring data to make a decision regarding remedy selection for the Necco Park Site. See also EPA's response to comments number 4, 9, 17, and 25, above.

41. COMMENT: pg. 11, M 2, sixth sentence - DuPont comments that "...the construction of a grout curtain...would be extremely difficult because of the inability to verify the completion of an integral barrier and the significant engineering obstructions in the vicinity of the proposed grout curtain."

EPA RESPONSE: EPA acknowledges that there are difficulties associated with the construction of the grout curtain but believes that these difficulties can bp overcome and that DuPont has overstated the severity of the "engineering DuPont and DuPont's subsequent installation of the existing upgradient grout curtain as evidence that the task can be performed. Also, as noted, the modified preferred alternative does not include construction of a grout curtain.

42. COMMENT: pg. 11, M 2, last sentence - DuPont comments that "EPA's own guidance, Considerations in Groundwater Remediation at Superfund Site and RCRA Facilities-Update (May 27, 1992), recommends avoiding drilling through DNAPL areas."

EPA RESPONSE: This Directive (no. 9283.1-06) does recommend that " [caution should be exercised to prevent further migration of contaminants..." and "[d]rilling through DNAPL zones into deeper [uncontaminated] stratigraphic units should be avoided..." during remedial investigations. The same Directive, and other EPA guidance, also states that "[if] a determination of technical impracticability is made, EPA will determine...remedial action objectives which protect human health and the environment and are appropriate, based on site conditions." EPA will require that exposure to contaminated groundwater be prevented, and to the extent practicable, that further contaminant migration be prevented.... Migration prevention actions may include hydraulic gradient control by pumping or physical containment measures, which should address both aqueous and nonaqueous contaminants." In addition this same Directive also states "[n]ew, conventional and/or innovative containment technologies should be considered where they have the potential to provide long-term cost savings and effectiveness." OSWER Directive 9200.4-14 (January 19, 1995) also states "[t]he goal of groundwater cleanup at Superfund sites continues to be restoration of contaminated groundwater to ARAR-based cleanup levels wherever technically practicable...[and where]...such factors constrain groundwater restoration [e.g., the source area at Necco Park], the Superfund program's approach is to emphasize removal or treatment of source materials; containment of non restorable source areas; and restoration of aqueous contaminant plumes."

Notwithstanding the fact that measures for the physical containment of DNAPL are consistent with the above provisions in EPA guidance, it should be noted that the proposed remedy will not require drilling through DNAPL contaminated zones into non-DNAPL contaminated zones. In addition, the use of proper drilling techniques should minimize the potential for cross contamination of bedrock zones.

43. COMMENT: pg. 12, M 1 - DuPont comments on the difficulties and effectiveness of installing a slurry wall in the overburden.

EPA RESPONSE: It should be noted that the modified preferred alternative does provide DuPont the option of

installing an overburden slurry wall instead of using hydraulic containment in the A zone. Should such an option be exercised, it should be noted that the installation of slurry walls is commonly performed at hazardous waste sites for containment of contaminants in the overburden. As noted in the Assessment of Barrier Containment Technologies (Rumer and Mitchell, 1995), "[t]he construction and performance of soils-bentonite slurry trench cutoff walls are well understood and they are usually considered reliable when used as subsurface vertical barriers for containment..." and "[s]oil- and cement-based vertical barrier walls have been successfully constructed to control groundwater seepage and to prevent migration of contaminants from a waste disposal site." In addition, this document states "[t]he expert consensus is that soil- and cement-based vertical barriers, if properly designed and constructed, can serve a very useful waste containment function. " EPA believes that the slurry wall can be successfully installed in the overburden using existing technologies and that the slurry wall will provide an effective containment structure for contamination in the overburden should a physical barrier be used rather than a hydraulic one.

iv. Superfund Fact Sheet Comments

44. COMMENT: pg. 16, M 1, first sentence - DuPont comments that it "...strongly object to the characterization of existing response actions at Necco Park as limited." It also believes that the response actions should be characterized as "...significant and successful..." DuPont also states that it has spent "...$40 million...to date and $2 million annually...over two decades...and do not consider such action as limited."

EPA RESPONSE: EPA characterized DuPont's response actions to date as limited in scope because the response actions implemented by DuPont do not completely address the full extent of contamination from the Necco Park Site. The three pumping wells, two in the B and C zones and one in the D, E and F zones, do not pump from all of the contaminated zones at Necco Park (A through J zones). These three wells do not capture the complete aerial extent of the groundwater contaminant plume at this Site. In fact, even under optimal pumping conditions, the existing wells do not capture all of the source area in all zones. The partial grout curtain and clay cap do not completely enclose or cover the source area. Therefore, regardless of the amount of money DuPont has spent implementing these actions, they do not completely address the contamination at the Site. In addition, EPA does not believe DuPont's response actions to date can be characterized as "significant and successful" based on the performance of the systems in place. See EPA's response to comments number 2, 3, 5, and 17, above.

45. COMMENT: pg. 16, M 1, last sentence - DuPont states that "...its voluntary and proactive response actions were a first of its kind in the Niagara frontier."

EPA RESPONSE: While this may be true, DuPont's response actions to date have long since been surpassed in scope, level of effort, and money spent at several other similar sites in Niagara Falls. Through 1996, the following approximated amounts have been spent in remediation efforts at similar sites: Occidental Chemical Corporation (OCC), Hyde Park, $105 million; OCC, 102nd street, $42.5 million; OCC, S-area, $207 million.

46. COMMENT: pg. 16, M 2 - DuPont comments that [i]t is inappropriate to refer to all contamination in the far-field as attributable to Necco Park...and that...groundwater quality in the Niagara Falls area has been impacted regionally by a large number of industrial sources."

EPA RESPONSE: EPA's fact sheet does not indicate that all contamination in the far-field is solely attributable to Necco Park. The fact sheet merely defines the far-field area as the aqueous phase groundwater contamination, outside of the source area, that is attributable to the Necco Park facility. This is not the same as stating that all aqueous phase groundwater contamination in the far-field is attributable to Necco Park. EPA acknowledges that contaminants from other sources may be present in the area defined as the far-field.

In 1992, DuPont together with the Occidental Chemical Corporation and Olin Chemicals, submitted a report to EPA entitled Niagara Falls Regional Groundwater Assessment. This Report, at pages 8-5 and 8-6, emphasized that within the regional study area, "...chemical presence has both a localized and a regional component...[that localized] chemical presence is generally attributable to a specific site and as such is

being or will be remediated on an individual basis...[and that the] relatively smaller amount of regional chemical presence can be attributed to off-site chemical migration from the localized areas." A major finding of the report was that "[t]he majority of the chemicals within the plumes associated with the sites will be controlled by the on-site remedial programs at each site respectively. This will prevent further chemical migration into and through the regional groundwater formation in the Lockport."

EPA's modified proposed remedy is fully consistent with the approach DuPont and the other companies recommended in 1992, concentrating on source control at each site to contain the majority of chemicals at their source.

47. COMMENT: pg. 16, M 2, last sentence - DuPont comments that "...several Necco Park indicator list constituents cannot be established as being derived from Necco Park."

EPA RESPONSE: The reason an indicator list is developed for a site is to distinguish contamination from that site as opposed to background or other sources of contamination. The NPIPL is an abbreviated list of compounds that are considered indicative of the contamination present at the Necco Park Site based on the investigations conducted at the Site. It is important to note that while specific constituents are on the NPIPL, the NPIPL does not identify all contaminants that may be present at the Site. Figure 7-2 of the Investigation Report indicates "unspecified chlorohydrocarbons" were disposed of at Necco Park which may or may not have included other constituents not on the NPIPL. In addition, it should be noted that disposal records for Necco Park are incomplete.

v. Necco Park Proposed Plan Specific Comments

48. COMMENT: pg. 17, M 1 - DuPont comments that "Because all disposal activities at Necco Park predate promulgation of RCRA regulations in 1980, no RCRA hazardous wastes were disposed of at Necco Park."

EPA RESPONSE: EPA does not agree with DuPont's comment. RCRA requirements apply to any waste that was disposed of prior to 1980 when the materials are actively managed or disposed of at present. However, EPA's disagreement with DuPont on this issue is not relevant since EPA's proposed plan is based upon determinations concerning CERCLA hazardous substances and does not make any determinations of whether or not RCRA hazardous wastes were disposed of at Necco Park.

49. COMMENT: pg. 17, M 4 - DuPont comments that "It should be specified that the Necco Park landfill is capped, therefore, the low chemical concentrations in the drainage swale surface water between Necco Park landfill and the CECOS-BFI landfill are the result of surface water runoff from the surrounding landfill areas."

EPA RESPONSE: EPA acknowledges DuPont's comment and will clarify the language in the Decision Document.

50. COMMENT: pg. 18, M 1 - DuPont comments that "It should be specified that the Necco Park landfill is capped, therefore, the low chemical concentrations in the drainage swales sediment are the result of surface water runoff from the surrounding landfill areas.

EPA RESPONSE: The sediment sampling data was collected as part of DuPont's effort to comply with the Consent Decree requirements which called for sampling the historic drainageways at the Site. According to the Interpretive Report which presents the findings of the sampling effort: "The Historic Drainageways investigation indicated that, in the past, transport of contaminants from Necco Park occurred through surface, water runoff due to the nature of the [S]ite during its operating years. Residual contamination from past transport from Necco Park is apparently manifested in the present as relatively low concentrations of hydrophobic organic chemicals and metals in drainageway sediments." This information is consistent with statements made in the Proposed Plan. EPA does acknowledge that since the Site has been capped, the contribution of contaminants from surface water runoff from Necco Park would be eliminated and impacts from the other surrounding landfills could be impacting the sediments.

51. COMMENT: pg. 18, M 2 - DuPont comments that "The reference to contaminated sediment and routine removal of sediment should be deleted. DuPont does not routinely remove the sediment."

EPA RESPONSE: This section does not state that DuPont removes the sediment. However, according to EPA records (EPA correspondence with DuPont dated July 8, 1994) and discussion with the BFI/CECOS facilities, the sediments in the drainage swale between the Necco Park property and the adjacent facilities have been removed at least once. To clarify the statements made in the Proposed Plan, in the ROD EPA will change the last sentence of the Drainage Swale Sediments section to indicate that the sediments have been removed at least once.

52. COMMENT: pg. 18, M 4 - DuPont comments that "The compounds found in the Falls Street Tunnel, the New Road Tunnel and the NYPA drain system, while possible Necco Park indicators, are also found in other known groundwater source areas in the far-field (i.e., tetrachloroethene [PCE] and trichloroethene [TCE] from other regional sites).

EPA RESPONSE: The chemical constituents identified by DuPont, PCE and TCE, are on the NPIPL and are considered Necco Park indicator parameters. EPA acknowledges that other sources of these compounds may be present in the Niagara Falls area and may be discharging to the Falls Street Tunnel, New Road Tunnel and the NYPA conduit drain system.

53. COMMENT: pg. 19, first sentence - DuPont comments that "For clarification, groundwater in the middle and lower zones would enter the NYPA conduit drainage system, not the conduits."

EPA RESPONSE: EPA agrees with DuPont and will make the distinction in the ROD.

54. COMMENT: pg. 20, first sentence - DuPont states that "It should be clarified that other significant sources to groundwater contamination exist in the vicinity of Necco Park."

EPA RESPONSE: The original Proposed Plan does, in fact, acknowledge that other sources of contamination are present in the Niagara Falls area (e.g., pg. 5, Loadings to the Niagara River and Lake Ontario). The Revised Proposed Plan does not discuss this issue although the ROD will reflect the original Proposed Plan on this topic.

55. COMMENT: pg. 20, M 1, first sentence - DuPont states that second sentence of the Summary of Site Risk of the Proposed Plan be modified as follows: "The baseline risk assessment estimates the human health and ecological risk which could potentially result from exposure to contamination at the [S]ite if no remedial action were taken."

EPA RESPONSE: EPA believes that this section of the Proposed Plan and the Revised Proposed Plan clearly indicates that future risks are "potential," not assured, based on exposure.

56. COMMENT: pg. 20 M 1, second and third sentences - DuPont states that rest of the opening paragraph of the Summary of Site Risk of the Proposed Plan starting with "Contamination of the fish and ecosystem..." be eliminated because the majority of the NPIPL are not persistent and do not bioaccumulate. DuPont also states that the opening paragraph should state "That no significant ecological risks resulting from Necco Park constituents were found..."

EPA RESPONSE: EPA believes that the Summary of Site Risk, as presented in the Proposed Plan, adequately represents the findings of EPA's Risk Assessment, and international concerns on the impacts to the Niagara River and Lake Ontario. The Revised Proposed Plan does not discuss this issue at this level of detail, although the ROD will. See also EPA response to comments number 10, 11, 19, 29, 30, 32, and 47, above.

57. COMMENT: pg,. 20, M 2 - DuPont comments that they believe information regarding hazard identification presented in the Human Health Risk Assessment section of the Proposed Plan is misleading.

EPA RESPONSE: EPA believes that the Human Health Risk Assessment, as presented in the Proposed Plan and Revised Proposed Plan, adequately summarizes and represents the findings of EPA's Risk Assessment. As the Proposed Plan indicates, more detailed information is contained in the supporting documents which are located in the Administrative Record files. The ROD will contain greater detail and more information

concerning the risk assessment for this Site.

58. COMMENT: pg. 20, M 3 and pg. 21, first sentence - DuPont states again that "... clarification is needed for future risk... [and that] ... the potential inhalation exposure is related to showering only under hypothetical conditions."

EPA RESPONSE: EPA believes that the Human Health Risk Assessment, as presented in the Proposed Plan and Revised Proposed Plan, adequately summarizes and represents the findings of EPA's Risk Assessment.

59. COMMENT: pg. 21, M 1 - DuPont comments that the last paragraph of the Human Health Risk Assessment section of the Proposed Plan should be removed as it understates the fact that there are presently no risks to human health and the environment.

EPA RESPONSE: The 1996 Proposed Plan clearly states that the threat to public health and the environment is a potential threat. The ROD will discuss the findings of the risk assessment in detail and will make clear that the biggest risk to human health at the Site is based on a future risk scenario.

60. COMMENT: pg. 21, M 3 - DuPont states that "The Proposed Plan incorrectly refers to the objectives as the remedial action objectives. The correct name of the objectives is response actions objectives. This distinction is important because the [S]ite scored too low for listing on the NPL and therefore has not been deemed a high priority site because of low potential risk from [S]ite contaminants."

EPA RESPONSE: The distinction between "remedial action objectives" or "response action objectives" is unimportant and is not related to the Hazard Ranking System scoring or priorities. The objectives remain the same whether they are called the "remedial" or "response" action objectives. Nevertheless, EPA will call the objectives section of the ROD the "Response Action Objectives (RAO)."

61. COMMENT: pg. 22, M 1 - DuPont comments that the RAO for groundwater presented in the Proposed Plan is different than the RAO approved by EPA in the AOA. DuPont also states: "DuPont believes that the risks to human health are controlled by the existing systems. It should be noted that it is highly unlikely the RAO of groundwater restoration to drinking-water quality can be achieved by any of the alternatives."

EPA RESPONSE: The RAOs in the AOA were sufficient for the purposes of developing and evaluating various remedial alternatives. EPA has drafted similar language for the Proposed Plan that may be more specific but essentially states the same objective.

See EPA's response to comments number 10 and 29 above concerning Site risks. See also EPA's response to comments number 2, 4, 5, 11, 34, and 44 above concerning "control" established by the existing systems. Finally, see EPA's response to comment number 6, above concerning groundwater restoration.

62. COMMENT: pg. 22, M 2 - DuPont comments on the Proposed Plan, Overall Protection of Human Health and the Environment section, page 16, first paragraph: "This paragraph should clarify that exposure would only occur if groundwater were used for potable purposes."

EPA RESPONSE: EPA believes that this section and the Human Health Risk Assessment section of the Proposed Plan and Revised Proposed Plan adequately summarize and represent the findings of EPA's Risk Assessment.

63. COMMENT: pg. 22, M 3 - DuPont comments on the Proposed Plan, Compliance with ARARs section, pg. 16, first paragraph: "The AOA indicated that the intent of the NYSDEC TAGM's would be met for soil by using the cap to prevent contact and minimize infiltration."

EPA RESPONSE: According to NYSDEC's Revised TAGM-Determination of Soil Cleanup Objectives and Cleanup Levels, (January 24, 1994), "[t]he clean up goal of the Department is to restore inactive hazardous waste sites to pre-disposal conditions, to the extent feasible and authorized by law." While utilizing containment technologies to "prevent contact and minimize infiltration" may eventually meet the intent of the TAGM, they do not achieve the soil cleanup criteria established in the TAGM or achieve the goal of

restoring the Site to pre-disposal conditions. The Proposed Plan accurately states that the "TBC criteria" (cleanup numbers in the TAGM) would not be achieved by any of the 13 alternatives, nor the modified preferred alternative in the Revised Proposed Plan.

64. COMMENT: pg. 22, M 4 and pg. 23, M 1 - DuPont comments on the Proposed Plan, Long-term Effectiveness and Permanence section, page 17, first paragraph: "The statement for Alternative 1 that, contaminants would remain in the groundwater posing a potential risk o a receptor, would apply to all alternatives if the hypothetical future exposure scenario is assumed. This statement is used by USEPA throughout the Evaluation of Alternatives text. However, all alternatives do not pose a current risk since there is no exposure to groundwater. The presence of a contaminant in the groundwater can not pose a risk unless an exposure pathway exists. Therefore, contaminants in the groundwater present a potential for exposure not potential risk."

EPA RESPONSE: EPA believes that the Proposed Plan adequately summarizes and represents the findings of EPA's Risk Assessment which discusses exposure pathways and potential risks. Under section IIA, see EPA's response to comment number 6 for EPA's established guidelines on conducting risk assessments.

65. COMMENT: pg. 23, M 3 - DuPont states that "The existing Necco Park pump and treat system has achieved greater than 90 percent uptime during 1996."

EPA RESPONSE: Based on EPA's review of the pumping data for 1996, DuPont's statement concerning uptime for the extraction wells appears to be incorrect. EPA calculates that well RW-3 has not operated at all during 1996, RW-1 has approximately 90 percent uptime and RW-2 has approximately 90 percent uptime. Averaging the uptime for the three groundwater extraction wells yields an approximate uptime percentage of 60 percent. A review of pumping data for previous years reveals significant downtime for all three wells.

66. COMMENT: pg. 25, M 1 - DuPont comments on the Proposed Plan, Preferred Alternative Section, page 20, first paragraph: "This paragraph states that the installation of an additional dedicated DNAPL recovery well will collect DNAPL in the source area. Alternative 9 in the AOA did not include a dedicated DNAPL recovery well. Alternative 9 in the AOA states DNAPL recovery would be enhanced through overburden wells installed upgradient of the slurry wall."

EPA RESPONSE: EPA agrees and will incorporate the appropriate information in the ROD.

67. COMMENT: pg. 25, M 2 - DuPont comments that "It should be noted that the implementation of deed restrictions in conjunction with the existing Niagara County ordinance controlling groundwater well permits would clearly eliminate potential future exposure to contaminated groundwater."

EPA RESPONSE: Deed restrictions would only apply to the Necco Park property and not areas downgradient of the property that may be contaminated. Also, the County Ordinance may, or may not, be in place in the future. Finally, this statement does not consider the future potential need for the groundwater resource to be utilized. See EPA's response to comment number 15, above.

68. COMMENT: pg. 25, M 3 - DuPont comments that they believe "...the implementation of Alternative 9 would require three to five years ... " instead of the one to two years indicated in the Proposed Plan.

EPA RESPONSE: As the Proposed Plan states, EPA's estimates "...for implementing the remedial alternative reflect only the time required to construct the various remedies and do not include the time required to negotiate with the responsible parties, to procure contracts that are necessary for implementation or design the remedy." Therefore, EPA's construction estimates may be shorter than those presented in the AOA. This applies to the modified preferred alternative in the Revised Proposed Plan as well.

69. COMMENT: pg. 26, M 3, first bullet - DuPont states that "The Proposed Plan understates the fact that there are presently no risks to human health and the environment." "The Proposed Plan should therefore emphasize that the [S]ite does not pose an unacceptable risk to human health and the environment."

EPA RESPONSE: EPA believes that the Proposed Plan adequately summarizes and represents the findings of EPA's Risk Assessment. The Proposed Plan states that "Assuming that the aquifer will. not be used as a potable source, no current unacceptable risk to human health exists ..." and "The results of the baseline risk assessment indicate that the groundwater for the future-use scenario at the Site poses an unacceptable risk to human health." The Revised Proposed Plan does not discuss the Risk Assessment in any level of detail. DuPont's statement, "...the [S]ite does not pose and unacceptable risk to human health... " is incorrect. See EPA's response to comments number 10 and 29, above.

70. COMMENT-. pg. 26, M 3, second bullet - DuPont states that "The Proposed Plan does not clearly indicate that groundwater will not be drinkable even after implementing Alternative 9 or any other alternative. Therefore, the Proposed Plan should indicate that the implementation of the proposed alternative would still not achieve the goal of drinkable groundwater since it is not technically practicable."

EPA RESPONSE: The Proposed Plan and Revised Proposed Plan both indicate that, for the source area, achieving the ARARs would be considered technically impracticable and proposes the issuance of at TI waiver. The Proposed Plan and Revised Proposed Plan clearly state that "...restoration of the groundwater in the source area to ARARs is considered technically impracticable." The Proposed Plan and Revised Proposed Plan also state that: "It is uncertain whether or not the implementation of this source containment remedy will enable the aquifer outside the source area to be restored to a usable quality ... Therefore, groundwater in the far-field will be monitored to determine the effectiveness of the source containment efforts and to collect further data to evaluate the future potential for natural processes to achieve ARARs in the far-field." See also EPA's response to comment number 6, above.

71. COMMENT: pg. 27, M 2 - DuPont comments that "The glossary states that lagoons are typically used for storage of spent nuclear fuel. DuPont would like to clarify that at no time were spent nuclear fuels placed at the Necco Park [S]ite."

EPA RESPONSE: The glossary gives a generic definition of a lagoon and provides typical uses for those structures. EPA is not suggesting that spent nuclear fuels were disposed of at the Necco Park Site.

72. COMMENT: pg. 27, M 3 - DuPont comments that "Costs presented in the Proposed Plan have been taken from Appendix E of the AOA. These costs are approximate (plus 50 or minus 30 percent). Citing estimated costs to the dollar presents more accuracy than intended by the engineer. DuPont recommends that the costs be rounded to the nearest $ 100,000 as was presented in the AOA. Additionally, DuPont recommends that EPA state that all costs presented in the Proposed Plan are approximate."

EPA RESPONSE: The costs used in the Proposed Plan were taken from the AOA. The Proposed Plan clearly indicates that the costs presented are "estimated." Additionally, the Revised Proposed Plan, in fact, discusses the plus 50 or minus 30 percent range.

RESPONSIVENESS SUMMARY - PART I
APPENDIX A -- MEETING AGENDA

Agenda

Public Meeting

The Best Western Inn on the River
7001 Buffalo Avenue
Niagara Falls, New York

Tuesday. August 13, 1996 at 7:00 pm

Topic: Proposed Plan for the Du Pont, Necco Park Site

I. Introduction	Michael Basile Community Relations Coordinator U.S. EPA, Region 11
II. The Superfund Process	Kevin Lynch Section Chief, Western New York Remediation Section
III. Site History and Update	Dale Carpenter, Project Manager Du Pont, Necco Park Site U.S. EPA, Region II
IV. Proposed Plan	Dale Carpenter
V. Questions and Answers	
V1. Closing	

RESPONSIVENESS SUMMARY - PART I
APPENDIX B -- PROPOSED PLAN (JULY 1996)

Superfund Proposed Plan

<IMG SRC 98144P8> Du Pont, Necco Park

Niagara Falls
Niagara County, New York

EPA
Region 2 July, 1996

PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the Du Pont Necco Park Superfund Site and identifies the preferred remedial alternative with the rationale for this preference. The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), as lead agency, with support from the New York State Department of Environmental Conservation (NYSDEC) The U.S. EPA is issuing the Proposed Plan as part of its public participation responsibilities under Section117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f) of the National Contin- gency Plan (NCP). The alternatives summarized here are described in the Investigation and Analysis of Alternatives Reports which should be consulted for a more detailed description of all the alternatives.

This Proposed Plan is being provided as a supplement to the Investigation and Analysis of Alternatives Reports to inform the public of EPA's and NYSDEC's preferred remedy and to solicit public comments pertaining to all the remedial alternatives evaluated, as well as the preferred alternative.

The remedy described in this Proposed Plan is the preferred remedy for the Site. Changes to the preferred remedy or a change from this preferred remedy to another remedy may be made, if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments. We are soliciting public comment on all of the alternatives considered in the detailed analysis in the Analysis of Alternatives Report because EPA and NYSDEC may select a remedy other than the preferred remedy.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of tho community are considered in selecting an effective remedy for each Superfund site. To this end, the

Investigation and Analysis of Alternatives Reports, Proposed Plan, and supporting documentation have been made available to the public for a public comment period which begins on July 22, 1996 and concludes on August 20, 1996.

A public meeting will be held during the public comment period at the Best Western Inn on the River, 7001 Buffalo Avenue, Niagara Falls, New York on August 13, 1996 at 7:00 pm to present the conclusions of the Investigation and Analysis of Alternatives, to elaborate further on the reasons for recommending the preferred remedial alternative, and to receive public comments.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD). The document which formalizes the selection of the remedy. All written comments should be addressed to:

Dale J. Carpenter
US EPA

290 Broadway, 20th Floor
New York, New York 10007
Phone Number (212) 637-4277

Dates to remember:
MARK YOUR CALENDAR

July 22,1996 to August 20,1996: Public comment period on the Investigation and Analysis of Alternatives Reports, Proposed Plan, and remedies considered.

August 13, 1996: Public meeting at the:
Best Western Inn on the River
7001 Buffalo Avenue
Niagara Falls, New York
7:00pm

<IMG SRC 98144P9>

SITE BACKGROUND

The 24-acre Du Pont Necco Park property (referred to as "Necco Park property" or "Necco Park landfill") is an inactive hazardous and industrial waste landfill located in a heavily industrialized section of the City of Niagara Falls and the Town of Niagara, Niagara County, New York (Figures 1 and 2). The Necco Park landfill, located off of Pine Avenue near 56th Street in Niagara Falls, was originally used as a recreational park by the Niagara Electrochemical Company (from which the "Necco" in Necco Park is derived). The property was then sold to Du Pont in 1930.

The Necco Park landfill is bounded on three sides by commercial disposal facilities. Immediately adjacent to the north and east lies the Newco solid waste landfill, an active nonhazardous waste facility owned by Browning-Ferris Industries (BFI) ("BFI facility"). Immediately adjacent to the south are three inactive secure hazardous waste landfill cells and a wastewater treatment facility owned by CECOS International, Inc. ("CECOS facility"). An access road and a Conrail (Niagara Junction Railway Company) right-of-way bounds the Site to the west.

The Necco Park landfill was used for disposal of Industrial and process wastes generated at the Du Pont Niagara Plant from the mid 1930's to 1977. These liquid and solid wastes included: flyash, sodium salts and cell bath residue, building rubble, chlorinolysis wastes, off-grade products and a variety of other organic and inorganic wastes. Liquid wastes were generally disposed of in shallow earthen lagoons on the southeastern portion of the landfill, while the remainder of the landfill functioned primarily as a solid waste landfill.

Wastes from the Necco Park landfill have migrated in the overburden and bedrock underneath the landfill and now extend underneath the CECOS facility and a portion of the BFI facility The Necco Park Site ("Necco Park Site" or "Site") consists of the 24-acre landfill and the areas surrounding the landfill where hazardous substances from the landfill have come to be located.

Documentation of landfill activities indicates that the following wastes were disposed of in the largest quantities: flyash, building demolition and miscellaneous plant debris, sodium sludge waste salts, cell bath, and floor sweepings (i.e., barium, calcium and sodium chloride), sodium cell rubble (i,e., thermal brick, corroded steel), polyvinyl acetate solids and stilling bottoms (i.e., vinyl acetate with high boiling tars), chlorinolysis wastes (i.e., high boiling residues such as hexachlorobenzene, hexachlorobutadiene, and hexachloroethane), liming residues [i.e., sludge saturate with trichloroethene and tetrachloroethene (TCE and PCE)], scrap organic mixtures, off-grade product, glycol polymer scrap (i.e., filter press cloth, filter press sludge), refined adiponitrile wastes (high boiler residues). It is estimated that approximately 93,000 tons (186 million pounds) of liquid and solid wastes were disposed of at Necco Park. These wastes contained various organic and inorganic constituents including: carbon

tetrachloride, chloroform, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, methylene chloride, tetrachloroethene, and trichloroethene.

As a result of this disposal, soils at the Necco Park landfill and groundwater beneath and downgradient from the Neoco Park landfill have been contaminated. Contamination at the Site is found as aqueous phase liquids (APL, i.e., dissolved in water) and as non-aqueous phase liquids (NAPL, i.e., occurs as a separate phase and does not readily dissolve in water in this case dense NAPL or DNAPL, i.e., heavier than water). Areas of soil contamination exist above levels that would be considered protective of groundwater quality. Groundwater contamination is above New York State's groundwater standards. The Necco Park landfill is currently inactive, i.e. hazardous wastes no longer are disposed of at Necco, Park.

In 1977, Necco Park was identified as a potential source of groundwater contamination and the landfill was closed. Initial groundwater investigatons, began in 1977 and since that time several investigations and remedial studies have been conducted. Preliminary investigations by Du Pont's contractors (Calspan, 1978; Recra Research, 1979; Roy F. Weston, 1978, 1979, 1981, 1982; and Woodward-Clyde, 1984) focused on assessing conditions in the immediate vicinity of Necco Park and establishing a groundwater recovery operation.

A number of supplemental investigation and remedial studies needed to design and implement a remedial program were conducted from 1984 to 1988. Du Pont and EPA agreed to a Consent Decree (as a settlement of a civil action filed by Du Pont in federal district court seeking judicial review of an Administrative Order issued by EPA under Section 3013 of the Resource Conservation and Recovery Act (RCRA)) that specified additional investigations pertaining to the Necco Park Site. The Consent Decree was approved by the court in January 1988. Du Pont had commence most of the work required by the Consent Decree before it was entered into judgment and the work specified in the Consent Decree was completed by February, 1989. This work included: an evaluation of existing monitoring wells, monitoring well seal verification, installation of new monitoring wells, development of a geologic report, characterization of vertical fracturing (lineament), development and refinement of a Site-specific indicator parameter list for groundwater and non-aqueous phase liquids (NAPL), groundwater and NAPL sampling, man-made passageway investigation, historic drainageway investigation and development of a health and safety plan. The results of these investigations are presented in the Necco Park Interpretive Report (Woodward-Clyde (WCC) 1991). EPA approved the Interpretive Report in July, 1992.

In October 1989, an Administrative Order on Consent pursuant to CERCLA was signed by EPA and Du Pont. This Order required Du Pont to conduct additional investigations beyond those performed pursuant to the 1988 Consent Decree, and to analyze remedial alternatives to address the contamination from the Site. These investigations included additional groundwater monitoring, sampling for 2,3,7,8-tetrachlorodibenzodioxin (2,3,7,8-TCDD), further investigation of vertical fracturing (lineament investigation), assessment of the current remedial actions, sampling of underground man-made passageways and further assessment for the presence of NAPLs. This work began in May 1991 and was completed in September 1992. The results of these investigations are presented in the Necco Park Investgation Report (WCC 1993). EPA approved the Investigation Report in May, 1994.

Based on the information collected during the investigation and from previous investigations, EPA performed a Risk Assessment which examined the potential human health and environmental risks attiributable to the contaminants present at the Site. EPA considered both present risks and potential future risks from the Site. A summary of the Risk Assessment is presented below.

An analysis of alternatives was then conducted to identify, develop, screen and evaluate response action alternatives to address the contamination and potential health risks identified by the Nocco Park Investigation and EPA's Risk Assessment and Addendum to the Risk Assessment. This analysis of remedial alternatives is presented in the Analysis of Alternatives Report. The Analysis of Alternatives Report was approved by the EPA In June, 1996. In order to evaluate various alternatives and deal with the most contaminated areas at the Site first, the Site was subdivided into two areas of concern:

- The Source Area: the 24 acre Necco Park landfill itself, areas where DNAPLs, have been observed to be present, and areas where the concentration of aqueous phase contaminants in the groundwater indicate that DNAPL may be present (Figure 3).

- Far-field Area: the large area outside the source area (Figures 4 - 10) where chemical constituents attributable to Necco Park have been found to have contaminated the groundwater.

Du Pont has performed several interim remedial actions at the Site including the installation of a cap over the landfill, monitoring wells, and groundwater, recovery wells. These early remedial actions have partially addressed the contaminated soils and groundwater at the Site. To date, approximately 6,600 gallons of DNAPL have been removed and 118 million gallons of groundwater have been treated.

The investigation Report, the Risk Assessment Report and the Analysis of Alternatives Report, along with other Site related documents, are included in the Administrative Record and provide the basis for this Proposed Plan.

REMEDIAL INVESTIGATION SUMMARY

The Investigation Report, combined with previous studies, resulted in a nearly complete characterization of the environmental conditions of the Necco Park Site. Sampling of all media, including air, soil vapor, soils surface water, sediment and groundwater has identified areas of potential environmental concern. The following briefly summarizes the results of the sampling conducted for the Investigation Report and previous investigations.

Soil Vapor: The potential for volatile organic contaminant (VOC) vapors to infiltrate basement structures in the downgradient communities was examined as part of the Risk Assessment Addendum. Based on actual contaminant levels in groundwater, modeling was performed to estimate the concentrations of vapors that could potentially infiltrate basements. The results of the contaminant vapor analysis did not indicate any current potential for VOC vapors in the soil or groundwater to pose a human health risk via basement infiltration.

Surface Water: The surface water existing in the drainage swales in between the Necco Park landfill and the CECOS-BFI landfills contained very low levels (low part per billion (ppb)) of chemical constituents due to surface water runoff from the landfill areas.

Drainage Swale Sediments: The sediments from the drainage swales contained very low levels (low ppb range) of chemicals associated with surface water runoff before the landfill was capped. These sediments contained contaminants at levels below concentrations considered protective of groundwater. These drainage swales receive surface water runoff from the landfill surfaces which can contain low levels of chemicals, as seen in the surface water. Low-level accumulation of these chemicals in the sediments is a continuing process related to current landfill maintenance activity. These sediments are routinely excavated and disposed of property.

Soils and DNAPLs: The soils at the Necco Park landfill are known to contain a variety of contaminants associated with past disposal of industrial and hazardous wastes. Soil borings were performed at more than 90 locations across the Necco Park property for the installation of monitoring wells and recovery wells, DNAPL investigations, and soil characterization. The investigation identified occurrences of chemicals in the surficial soil throughout the Necco Park property. Soils in specific areas of the former landfill on the Necco Park property contained DNAPLs. The soil borings performed to date indicate the presence of DNAPLs in the southeastern and western portions of the Necco Park property. The presence of contaminants and DNAPLs in the soils constitutes a threat to groundwater (i.e., contamination levels are sufficiently high that contaminants potentially can continue to go into solution and enter the groundwater system). The soils and DNAPLS in the source area represent "hot spots" or concentrated area of contaminants which act as continuing sources of groundwater contamination.

Groundwater: A total of approximately 150 monitoring wells have been installed at the Site. Some of these wells were installed prior to, and some were installed as part of, the latest investigation. Based on the sampling conducted prior to, and during the investigation, the evidence indicates that groundwater beneath the Necco Park property contains chemical constituents above the New York State (NYS) drinking water standards, NYS groundwater quality standards and EPA maximum contaminant levels (MCLs) (See Table 1, Necco

Park indicator parameters). Groundwater containing Necco Park indicator parameters is moving downgradient from the Necco Park property. In the upper bedrock zones (B and C zones), groundwater flows to the south-southwest and in the lower bedrock zones (D through G zones), groundwater flows to the west (Figures 4 - 11). Concentrations of Necco Park indicator parameters in the groundwater are very high (high part per million (ppm)) directly beneath, and immediately adjacent to, the Necco Park property, Chemical concentrations diminish as the groundwater flows south and west away from the property. Available information from the Investigation Report and other previous studies indicates there are regional occurrences of chloroethylenes and that additional sources of these contaminants are present outside the extent of the Necco Park property.

Man-made Passageways: Several man-made passageways (i.e sewers, sumps, etc.) were sampled including: the 61st Street sewer, dewatering sumps at Great Lakes Carbon, John Street tunnel, Falls Street tunnel, New Road tunnel and the New York Power Authority (NYPA) conduit drains. The 61st Street sewer samples contained only chloroform at very low (<10 ppb) levels. VOCs were detected up to a maximum of 160 ppb in four of five of the Great Lakes Carbon sumps that penetrated the upper bedrock (B zone). No VOCs were detected in the sumps that penetrated only the overburden. The John Street Tunnel had no Necco Park indicator parameter detections, however, other organic compounds including 2-butarione, acetone and bis(2-ethylhexyl)phthalate were detected. A variety of organic compounds were detected in both the Falls Street Tunnel and the New Road Tunnel up to a maximum of 140 ppb, including several Necco Park indicator parameters. Several Necco Park indicator parameters were also detected in at all three of the NYPA drain system monitoring wells sampled. Concentrations of organic compounds detected ranged from .13 to 1,100 ppb.

Hydrogelogy

The geologic units beneath the Necco Park Site (in descending order from the ground surface) include unconsolidated overburden, the Lockport Formation, and the Rochester Shale Formation. A series of horizontal bedding-plane fracture zones in the Lockport Formation similar to those described for the region has been delineated at Necco Park. These fracture zones behave as separate and hydraulically distinct water-producing units. Letter designations were assigned to these principal water-bearing zones as follows: the A zone refers to saturated overburden and the B, C, CD, D, E, F, and G zones refer to identified Lockport Formation bedding-plane fracture zones (see Figure 11). The interface between the DeCew Member of the Lockport Formation and Rochester Shale is defined as J zone. Based on hydraulic conductivity testing, the J zone was not determined to be a significant water-producing zone.

Groundwater in B and C zones generally flows to the south in areas beyond the radius of influence of the operational recovery well system.

Groundwater in D, E, F, and G zones generally flows in a westerly direction toward the NYPA power conduits. The piezometric map for G zone generally indicates that hydraulic gradients are very low. The primary flow direction appears to be west/northwest toward the groundwater discharge boundary at the WPA conduits.

The groundwater aquifer in the Niagara area is classified by New York State as class GA fresh groundwaters. As defined in New York State Codes, Rules and Regulations (NYCRR), Title 6, Part 701.15, the best usage of Class GA fresh groundwaters is as a source of potable water supply. However, groundwater sources currently are not used for domestic purposes in the Niagara region because of the proximity to the large fresh water supply of the Niagara River.

The regional groundwater quality of the Lockport Formation has been heavily affected by industrial sources of contamination. In addition to Necco Park, numerous other major sites have been identified as contributing to ground-water contamination in the region.

Man-made Passageway Capture Zones

Groundwater flow in the bearock regime is greatly influenced by a number of man-made features. These include water transport and storage structures related to the New York Power Authority (NYPA) Robert Moses Power Project, several sewers and tunnels excavated into bedrock and the overburden, bedrock grouting, and groundwater extraction. Each of these features has varying effects on regional and near-site groundwater

flow.

Components having the greatest effect are the NYPA conduits, which transport water north to the Robert Moses Power Generating Station; the Forebay Canal, an L-shaped excavation linking the conduits to the generating station; the storage reservoir, a 2.97-square-mile surface impoundment east of the Forebay Canal (see Figure 2); and the Falls Street tunnel, an unlined sewer in the upper bedrock of the Lockport formation.

Based on all available data, groundwater leaving Necco Park flows south towards the Falls Street tunnel (B and C zones or upper Lockport) or west towards the NYPA conduit drain system (D through G zones). A portion of the groundwater that collects in the drain system west of Necco Park discharges to the Falls Street tunnel through bedrock fractures and is conveyed through the tunnel for treatment at the Niagara Falls publicly owned treatment works ("POTW")

At a minimum, an undetermined amount of groundwater flowing south from Necco Park in the upper bedrock zones (B and C) has the potential to, or does, enter the Falls Street tunnel. Currently, 100% of dry weather flow in the tunnel goes to the POTW. However, during any appreciable precipitation events, a portion of the wet-weather flow in the Falls Street tunnel bypasses the POTW and discharges directly to the Niagara River.

Groundwater flowing west from Nocco Park in the middle and lower bedrock zones (D through G) has the potential to, or does, enter the NYPA drainage conduits. There was a direct hydraulic connection between the NYPA drainage conduits and the Falls Street tunnel where the two structures cross. This connection was grouted by the City of Niagara Falls in 1989. Notwithstanding this grouting project, it is believed that water from the drainage conduits continues to enter the Falls Street tunnel at and in the vicinity of, this intersection which is located southwest of Necco Park. However, there is currently insufficient information to determine whether the direction of flow in the NYPA conduit is towards the Falls Street tunnel on a continual basis. It is believed that fluctuations in water used by the NYPA create changes in flow direction in the NYPA conduit drainage

system. Therefore, any groundwater contamination from Necco Park that may enter the conduit drainage system has the potential to flow either to the north where it may discharge to the Forebay Canal through bedrock fractures, or to the south where at least a portion of the water enters the Falls Street tunnel.

Loadings to the Niagara River and Lake Ontario

As stated previously, a portion of the contaminated groundwater from the Du Pont facility enters the Niagara River which flows into Lake Ontario. During the 1970s, it became apparent that pollution caused by persistent toxic substances was harming Great Lakes species and posing risks to human and wildlife consumers of fish. Accordingly, the United States and Canada entered into the Great Lakes Water Quality Agreement of 1978 which committed the two countries to the "virtual elimination" of persistent toxic substances in the Great Lakes ecosystem.

In 1987, the environmental agencies of the federal, state, and provincial governments in the United States and Canada [Environment Canada, EPA, Ontario Ministry of the Environment, and New York State Department of Environmental Conservation (NYSDEC)] entered into the Four-Party Agreement which committed the governments to the overall reduction of toxic chemical loadings to the Niagara River. In particular, the parties committed to an interim goal for the reduction by 50 percent of the total point and non-point source loadings of persistent toxic chemicals of concern entering the Niagara River by 1996. In 1987, portions of the groundwater from at least seven hazardous waste sites, including the Necco Park Site, had infiltrated the Falls Street tunnel and was discharged from the tunnel directly to the Niagara River without treatment. The Falls Street tunnel was reconnected to the Niagara Falls POTW in 1989 with a diversion of part of the flows in the tunnel to the POTW. Since 1993, all dry-weather flow and an undetermined amount of flow from storm events in the Falls Street tunnel is directed to the POTW, where it is treated prior to discharge to the Niagara River. The rediversion of Falls Street tunnel flows to the POTW constituted one of the most significant reductions in loadings to the Niagara River towards attainment of the interim goal of 50 percent reduction of persistent toxic chemicals of concern to the Niagara River.

To accomplish the final objective of "virtual elimination", the International Joint Commission in 1990 urged the United States and Canada to develop "a comprehensive, binational program to lessen the uses of, and exposure to persistent toxic chemicals found in the Great Lakes environment." Since that time, both countries have undertaken their own virtual elimination efforts. In addition, in February 1995. Prime Minister Chretien and President Clinton confirmed the commitment by U.S. and Canada to work together to develop a binational strategy to reduce and eventually eliminate the input of the most persistent toxic substances in the Great Lakes environment. A draft strategy has been prepared and is undergoing Agency review.

Nature And Extent of Contamination

As part of the 1988 Consent Decree, a list of indicator parameters for Necco Park was identified (See Table 1). Overburden, bedrock, and groundwater at Necco Park have been impacted by past waste disposal activities. Most groundwater contamination at the Site is the result of dissolution of disposed chlorinated organic liquids. Dense nonaqueous-phase liquids (DNAPLs) have been observed and recovered from wells in and near the Necco Park property inorganic constituents disposed of at Necco Park are also present in groundwater.

Groundwater in and near Necco Park has been impacted by organic compounds, primarily chlorinated volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCS).

No other media associated with the site (air, sediment, or surface water) have been shown to be significantly contaminated.

Groundwater and DNAPLs

Accordingly, two different groundwater areas have been defined for purposes of evaluating remedial options in the Necco Park Analysis of Alternatives. According to EPA definitions (1992), impacted groundwater has been separated into two areas: a DNAPL zone (source area) and a dissolved contamination zone (far-field area).

Source Area Definition:

An area associated with Necco Park acting as a continuing source of constituent migration to the downgradient aqueous environment was identified. The primary criterion for defining the source area was the areal extent of free-phase or residual DNAPL. To be conservative, areas where aqueous constituent levels might theoretically indicate the presence of DNAPL were included using various solubility criteria.

The Necco Park source area is presented In Figure 3. This defined area is considered the source of the far-field aqueous plume for purposes of defining the far-field area.

Far-Field Area Definition:

To evaluate remedial alternatives for the far-field, the extent of dissolved constituents must be defined. Transport modeling was therefore conducted to supplement available monitor well data to estimate horizontal spreading in the far field.

The far-field aqueous plume is defined as the plume of dissolved VOCs downgradient of the source area where DNAPL solubility criteria have not been met. Figures 4 through 10 show the estimated extent of dissolved contamination for A through G zones, respectively.

In summation, the results of the investigations conducted at the Du Pont Necco Park Site indicate that past disposal practices haves contaminated the soils, bedrock and ground-water on and beneath the Necco Park property. Sampling at the Site indicates the presence of VOCs, SVOCs, barium, and DNAPLs in the soils beneath the cap above levels considered protective of groundwater quality. In addition, the bedrock and groundwater beneath and surrounding the Necco Park landfill have been contaminated.

SUMMARY OF SITE RISK

Based upon the results of the Investigation Report and previous reports, a baseline risk assessment was conducted to estimate the risks associated with current and future Site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the Site if no remedial action were taken. Some of the groundwater contamination from the Site has the potential to enter the Niagara River and ultimately Lake Ontario. Contamination of the fish and ecosystem in the Lake Ontario basin has been an ongoing concern to both the United States and Canada and has resulted in a strategy to "virtually eliminate" persistent toxic substances that affect or have the potential to affect the Great Lakes ecosystem. It is important to note that the risk assessment evaluated the risks from Necco Park contaminants only. Total ecological risks or synergistic effects posed from other contaminants present in the Niagara River and Lake Ontario basin were not evaluated.

Human Health Risk Assessment

The reasonable maximum human exposure is evaluated. A four-step process is utilized for assessing Site-related human health risks for a reasonable maximum exposure scenario: Hazard Identification-identifies the contaminants of concern (COCs) at the Site based on several factors such as toxicity, frequency of occurrence, and concentration. Exposure Assessment-estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated well-water) by which humans are potentially exposed. Toxicity Assessment-determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). Risk Characterization-summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess cancer risk) assessment of Site-related risks.

The baseline risk assessment began with selecting contaminants of concern which would be representative of Site risks. These contaminants included: 1,1,2-trichloroethane, 1,1,2,2-tetrachloroethane, 1,2-dichloroethane, hexachloroethene, 1,1-dichloroethene, tetrachloroethene, trichloroethene, trans-1,2-dichloroethene, cis-1,2-dichloro-ethene, 4-methylphenol, carbon tetrachloride, chloroform, vinyl chloride, hexachlorobenzene, hexachlorobutadiene, pentachlorophenol, phenol,2,4,5-trichlorophenol, 2,4,6-trichlorophenol, barium, and cyanide.

Several of the contaminants, including 1,1-dichloroethene, 1,1,2,2-tetrachloroethane, carbon tetrachloride, chloroform, hexachlorobenzene, tetrachloroethene, trichloroethene and vinyl chloride, are known to cause cancer in laboratory animals and are suspected or known to be human carcinogens.

Potential exposures to Site-related contaminants of concern were examined for the following media: groundwater, soils, sediments, surface water, air and biota. Of these media, the exposure to contaminated groundwater was considered for further quantitative analysis of potential health effects.

The baseline risk assessment quantitatively evaluated the health effects which could result from exposure to contamination as a result of dermal contact ingestion, and inhalation (e.g. from showering) of groundwater. Since groundwater in the bedrock moves in different directions in the various zones (see Remedial Investigation Summary above), and the levels of contaminants are different in each of these zones, separate risk estimates have been developed for the following zones: A (overburden), B and C-zones (upper bedrock); D, E and F-zones (middle bedrock); and G-zone (lower bedrock) (Figures 4 - 11).

The current land-use was considered to be industrial, as it is presently zoned. The future-use scenario also assumed the Necoo Park property would remain zoned for industrial use. Residents were assumed to live downgradient of the Necco Park property in their current locations. The exposure scenarios included the downgradient residents who were assumed to be using the groundwater. Downgradient residents to the south, southwest would potentially be exposed to upper bedrock groundwater contamination while downgradient residents to the west would potentially be exposed to middle and lower bedrock groundwater contamination.

An addendum to the baseline risk assessment evaluated the potential health effects from exposure to contaminants that may volatize from the groundwater and seep into basements.

The results of the baseline risk assessment indicate that the groundwater for the future-use scenario at the Site poses an unacceptable risk to human health. The carcinogenic risks that have been identified for the groundwater exposure scenarios are as follows: Ingestion exposures yielded a potential carcinogenic risk to adults of greater than 1 in 100 for the A, B and C-zones. (This risk number means that, if the Site is not remediated more than one person out of 100, who was taking water from these zones as his or her source of drinking water, would be at risk of developing cancer from this usage.) The D, E and F-zones had a similar potential carcinogenic ingestion risk of greater than 1 in 100 while the G-zone had a corresponding risk of 6 in 1000. The inhalation exposures to downgradient adult residents in the future-use scenario result in a potential carcinogenic risk of greater than 1 in 100 for the A, B, C, D, E and F-zones, and greater than 1 in 1000 for the G-zone. Analysis of groundwater dermal contact exposure to residents resulted in a potential carcinogenic risk to adults of greater than 1 in 100 for the A, B, C, D, E and F-zone and greater than 1 in 1000 for the G-zone.

The Hazard Index (HI), which reflects noncarcinogenic effects for a human receptor, was also estimated for the various bedrock groundwater zones. The hazard quotient is an expression of the chronic daily intake of a chemical divided by a safe dose. The hazard quotients for all chemicals within an exposure pathway are summed to give the HI. A hazard index greater than 1.0 indicates that the exposure level exceeds the protective level for that particular chemical(s). The HI was estimated for ingestion of, and dermal contact with, contaminated groundwater. A HI for inhalation could not be estimated due to the lack of toxicity values. The HI was estimated to be 10,000 for the A, B and C-zones; 3,000 for the D, E and F-zones; and 100 for the G-zone for adults in the groundwater ingestion future-use scenario. HI estimates for dermal contact in the future-use scenario were 3,000 for the A, B and C-zones, 900 for the D, E and F-zones; and 30 for the G-zone.

Current federal guidelines for acceptable exposures are a maximum health Hazard Index equal to 1.0 and an individual lifetime excess carcinogenic risk in the range of 10 -4 to 10 -6 (1 in 10,000 to 1 in 1,000,000).

Actual or threatened releases of hazardous substances from this Site, if not addressed by the preferred alternative or one of the other active measures considered, may present a potential threat to public health, welfare, or the environment.

Ecological Risk Assessment

The reasonable maximum environmental exposure is evaluated. A four-step process is utilized for assessing Site-related ecological risks for a reasonable maximum exposure scenario: Problem Formulation-a qualitative evaluation of contaminant release, migration, and fate, identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study. Exposure Assessment-a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations. Ecological Effects Assessment-literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors. Risk Characterization-measurement or estimation of both current and future adverse effects

Risks to ecological receptors was assessed quantitatively by modeling Necco Park groundwater contaminant concentrations reaching the area of the Niagara River at two locations: the Forebay Canal adjacent to the Robert Moses Powerplant and the Falls Street tunnel outlet to the river.

Potential risks to ecological receptors from estimated surface water concentrations of contaminants were assessed by comparing exposure point concentrations with criteria/guidelines. This comparison (expressed as a risk index) was calculated for each contaminant of concern. If the calculated Risk Index is greater than one, it indicates that biota may be at risk of an adverse effect from that contaminant within that exposure medium. A total risk index was also calculated for each exposure medium by summing chemical-specific risk indices. If the total risk index is greater than one this indicates that exposure to all contaminants of concern (COCs) within one medium may pose a risk to organisms.

Potential hazards to aquatic organisms present within the surface waters of the Falls Street tunnel

discharge (This risk assessment was performed before any diversion of the Falls Street tunnel flow to the Niagara Falls POTW was occurring, and is therefore, conservative.), Forebay Canal and Niagara River were assessed by comparing mean and maximum exposure point concentrations of contaminants with AWQC or toxicity effect levels (when AWQC were not available).

Estimated mean and maximum contaminant concentrations within the Forebay Canal and Niagara River are several orders of magnitude below acute and chronic ambient water quality criteria. Mean concentrations of contaminants within the Falls Street tunnel discharge to the Niagara River are also below acute ambient water quality criteria. Maximum concentrations of hexachlorobutadiene, pentachlorophenol, and cyanide within the Falls Street tunnel discharge are slightly above acute criteria, and average maximum concentrations somewhat exceed (Federal and State of New York) chronic criteria. However, adverse impacts to aquatic biota are not expected within the Niagara River as a result of additional contaminant dilution with the Niagara River water volume. Pentachlorophe and hexachlorobenzene represent Necco Park contaminants that are known to bioaccumulate within aquatic receptor species. However, estimated fish tissue concentrations calculated from the concentrations of these two contaminants within the Forebay Canal and Niagara River were determined to be several orders of magnitude below fish flesh criteria designed to protect piscivorous wildlife. The concentration of hexachlorobenzene within the Falls Street tunnel discharge yielded a mean fish tissue calculation above fish flesh criteria. It is unknown whether this discharge location represents a foraging area for wildlife receptor species.

The Necco Park property is fully developed as a landfill facility, and is surrounded by similar types of land use. There are no natural surface water bodies or wetlands within the immediate Site vicinity. The contaminants of concern are found in the soils and groundwater which do not appear to be a habitat for any wildlife that may impact the food chain. The only observed animal life at the Site were transient species, which are not expected to be significantly exposed, and therefore, any impacts to these transients from the Site are not expected to affect the area's wildlife population.

The ecological risk assessment considered all potential exposure media for ecological receptors. Exposure of potential receptor species to surface soils and airborne contaminants was assumed to be insignificant due to the presence of the existing clay cap. Surface water and sediment contaminant risks associated with the Necco Park drainage ditch were not assessed because of the low levels of contaminants in those areas and the regular maintenance of those areas (i.e., periodic excavation). Therefore only soil and groundwater media were assessed in detail. The risk assessment determined that the contaminated soils and groundwater attributable only to the Site alone currently do not pose an unacceptable ecological risk.
Future ecological impacts to the Niagara River may occur however, if remedial actions are not implemented.

SCOPE AND ROLE OF ACTION

As stated above, the Site has been separated into distinct areas. The areas for this Site are divided as follows:

- The Source Area: the 24 acre Necco Park landfill itself, areas where DNAPLs have been observed to be present, and areas where the concentration of aqueous phase contaminants in the groundwater indicate that DNAPL may be present (Figure 3).

- Far-field Area: the large area outside the source area (Figures 4 - 10) where chemical constituents attributable to Necco Park have been found to have contaminated the groundwater.

This Proposed Plan addresses the Source Area. The EPA is proposing this action to eliminate or reduce the contribution of DNAPLs and contaminated soils to the degradation of the groundwater quality at the Necco Park Site. The Investigation Report Identified groundwater at the Necco Park Site above New York State groundwater quality standards, NYS drinking water standards and Federal MCLs. The Investigation Report has also identified soils on the property that need to be addressed to protect the ground-water quality. Therefore, the proposed action will address the hydraulic and physical control/containment of the ground water in the source area, and the physical containment (to the maximum extent practicable) of soil and DNAPLs in the source area. Groundwater in the far-field area will be monitored to determine the effectiveness of the source control remedy in eliminating further contribution to the far-field area and

determine the ability of natural attenuation to achieve the groundwater standards in the far-field. The Analysis of Alternatives Report, which identifies and describes the various alternatives for addressing the contamination in the areas identified above, was approved by the EPA with an addendum in July, 1996.

The EPA and NYSDEC are currently coordinating activities concerning the groundwater contamination that is present at other sites adjacent to Necco Park. These sites are being managed by using source control measures (e.g., groundwater pump and treat, capping, etc.).

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs) and risk-based levels established in the risk assessment.

The following remedial action objectives were established:

Groundwater:

The Risk Assessment has identified a future carcinogenic and noncarcincgenic health risk to residents who may reside downgradient of the Necco Park Site and use the ground-water. The contaminants in groundwater are subject to a number of regulations for cleanup and discharge. These regulations are the NYS Water Quality Regulations specifically, 6 NYCRR and 10 NYCRR as well as the Federal MCLs. The EPA selects the most stringent criteria from the NYS Water Quality Regulations or Federal MCLs for groundwater cleanup at superfund sites. The specific cleanup criteria are listed in the regulations cited above and are also listed in the Analysis of Alternatives Report for this Site. The treatment of groundwater will also address compounds which are not COCs, but exceed the standards.

Therefore, the specific Remedial Acton Objectives for groundwater are the reduction of risks to human health associated with potential exposure to Site related compounds by reducing the quantity of source materials (i.e., DNAPLs) to the extent practicable, and attaining the groundwater cleanup criteria.

The RAO for groundwater of attaining the cleanup criteria are only being applied to areas outside the source area (i.e., the far-field area). Due to the concentration of DNAPLs and contaminants in the soils and bedrock in the source area, and the complexities associated with remediation of DNAPLs in fractured bedrock, EPA does not anticipate that the RAOs

can be achieved within the source area. Since waste materials are being left in place, and it is technically impracticable to achieve the RAOs for groundwater in areas where DNAPL has migrated, the groundwater ARARs are not expected to be met in the source area. Therefore, EPA proposes to issue a technical impracticability waiver of groundwater ARARs in the source area.

EPA's memorandum, Guidance for Evaluating the Technical Impracticability of Groundwater Remediation (OSWER Directive 9234.2-25, October 1993) recognizes that there are circumstances under which groundwater restoration may be technically impracticable. Presently, there are technical limitations in recovering DNAPL from soil and fractured bedrock. Even if all the soil containing DNAPLs at the Site were excavated, DNAPLs would still be present in the fractured bedrock. No present-day technology has been developed to completely remove DNAPLs from fractured bedrock. Because these residual DNAPLs would continue to contribute to aqueous phase groundwater contamination, restoration of the groundwater in the source area to ARARs is considered technically impracticable.

Soils:

No risks were associated with direct exposure to contaminants in the soils remaining at the Site. However, contaminant concentrations in some areas of soils at the Site (hot spots) are above levels that would be protective of the groundwater quality. This means that contaminants in the soil could leach into the groundwater at levels above the groundwater standards. The NYSDEC has developed soil cleanup criteria that is considered protective of ground-water quality. This criteria, established in NYSDEC's Technical and

Administrative Guidance Memorandum (TAGM), will be used as a to-be-considered (TBC) objective in cleaning up soils at the Site. The TBC values are not promulgated regulations. As TBCs, they are not enforceable standards but may be used as comparative values in determining whether the remedial action objectives have been met.

Therefore, the Remedial Action Objectives for soils at the Site are the protection of the groundwater quality, and ultimately human health through reduction of source materials (i.e., DNAPL) to the extent practicable, as well as limiting exposure to surficial soil contaminants.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost effective, comply with other statutory laws, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

The AOA report evaluates in detail source area groundwater alternatives, soil and DNAPL alternatives and far-field groundwater alternatives for addressing the contamination associated with the Du Pont Necco Park Site.

The above alternatives were screened and a final set of 13 alternatives were developed to address the various media at the Site. These alternatives are summarized in this section.

Alternatives 3 through 13 all incorporate the existing systems currently in place at Necco Park. The existing systems include three groundwater extraction wells, two in the B and C zones (RW-1 and RW-2) and one in the D, E and F zones (RW-3), an upgradient grout curtain in the B through F zones. DNAPL extraction from monitoring wells and the groundwater extraction wells, groundwater monitoring; a clay cap over the Necco Park property; fencing and utilization of security personnel, capture of a portion of the far-field groundwater by existing utility structures; and natural attenuation of the groundwater contamination.

The time periods referenced below for implementing the remedial alternatives reflect only the time required to construct the various remedies and do not include the time required to negotiate with the responsible parties, to procure contracts that are necessary for implementation or design the remedy.

Alternative 1: No Action

Capital Cost: $0
O & M Cost: $ 0/year
O & M Present Worth Cost: $0
Total Cost: $0
Construction Time: No construction is required for the no action alternative.

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. This alternative has been included in order to provide a baseline from which to evaluate the other alternatives. The no action alternative assumes that all present remedial activities at the Site will cease and that no additional actions will be taken at the Du Pont, Necco Park Site to address groundwater contamination.

Contaminated groundwater beneath the Necco Park property would continue to move uncontrolled, downgradient Leaching of water through contaminated soils at the Site would contribute to the continued degradation of the groundwater quality. No institutional controls would be implemented. This would provide no controls for ground-water water use or well restrictions in the area. This alternative would not treat any quantity of the contaminated

groundwater, requires no engineering components, treatment components, and has no costs associated with its

implementation. The no action alternative is easily implemented as no effort would be required. The ground-water standards would not be met for this alternative.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 2: Existing Systems

Capital Cost: $271,785
O & M Cost: $ 1,658,325/year
O & M Present Worth Cost: The 30-year present worth cost is $20,578,155.
Total Cost: $20,850,000
Construction Time: This alternative would require less than one year to implement.

Alternative 2 consists of continuation of present response activities at Necco Park. Groundwater recovery from the existing wells RW-1, RW-2, and RW-3 would continue at a rate of approximately 20 gpm. Extracted groundwater would be treated at the CECOS waste-water treatment plant (WWTP) and discharged to the POTW. Groundwater monitoring and the current DNAPL extraction program would continue. The grout curtain and cap would remain in place. The cap would continue to be maintained through mowing and repair of subsidence. Access controls (fencing and security personnel) would continue to be maintained. Utility drains would continue to intercept a portion of the far-field groundwater. Natural attenuation of far-field groundwater would continue. Estimated percent reduction in loadings from the source area to the far-field, as compared to Alternative 1, would be approximately 40%. Total ground-water to be pumped would be approximately 20 gallons per minute (gpm).

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 3

Capital Cost: $2,780,899
O & M Cost: $1,669,025/year
O & M Present Worth Cost: The 30-year present worth cost is $20,710,931.
Total Cost: $23,492,000
Construction Time: It is estimated that the time required to upgrade the cap and install additional DNAPL extraction wells would be less than one year.

Alternative 3 would include an upgrade of the existing clay cap to comply with requirements of a NYS 360 (or equivalent) cap and additional DNAPL extraction through a dedicated recovery well. Also included in this alternative is the continued O & M of existing systems described in Alternative 2, above. Estimated percent reduction of loadings to the far-field is approximately 40%. Total groundwater to be pumped is approximately 20 gpm.
Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 4

Capital Cost $5,094,136
O & M Cost: $11,933,650/year
O & M Present Worth Cost: The 30-year present worth cost is $23,944,663.
Total Cost: $29,089,000

Construction Time: The estimated time to construct this alternative would be less than one year.

Alternative 4 includes installation of a slurry wall in the overburden along the southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park facility. Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within Necco Park overburden, contain overburden groundwater, and function as collection points for DNAPL removal. This alternative would also include an upgrade of the existing clay cap, as necessary, to comply wilth requirements of a NYS 360 (or equivalent) cap. Also included in this alternative is the continued O & M of existing systems described in Alternative 2, above. Estimated percent reduction in loading to the far-field is approximately 40%. Total groundwater to be pumped is approximately 25 gpm.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 5

Capital Cost: $6,530,587
O & M Cost: $1,810,450/yr + $768,750 for Dual Phase Extraction (DPE) for 5 years
O & M Present Worth Cost: The 30-year present worth cost is $22,465,874 + 5-year present worth cost of $3,152,029 for DPE
Total Cost: $32,148,000
Construction Time: This alternative would require approximately one to two years to complete construction.

Alternative 5 consists of construction and operation of a dual phase extraction (DPE) system on the 24-acre Necco Park landfill. The DPE system consists of extraction wells, pumps, piping, and vapor- and liquid-phase treatment to remove and destroy organic constituents. The DPE system would also provide a level of hydraulic control through removal of groundwater from the A zone and upper bedrock zones. A pilot test would be required to determine the most effective design for a DPE system. This alternative assumes that the DPE system would be in operation for approximately five years and that the system would be shut down during November through March (DPE does not operate efficiently in extremely cold conditions). Also included in this alternative is groundwater recovery from wells RW-1, RW-2, and RW-3, groundwater treatment at CECOS, and groundwater monitoring. During operation of the DPE system, groundwater recovery rates from wells RW-1 and RW-2 may be reduced or halted because the DPE system would recover groundwater from upper bedrock zones. Once DPE operation is complete, total recovery rate from wells RW-1, RW-2 and RW-3 would be approximately 20 gpm. The cap would be upgraded upon completion of the DPE system. The current DNAPL extraction program would continue. The existing grout curtain would remain in place. The cap would be maintained to ensure integrity. Access controls (fencing and security personnel) would continue to be maintained by CECOS. The utility drains would continue to intercept a portion of the far-field groundwater. Natural attenuation of far-field groundwater would continue to occur. Estimated percent reduction of loadings to the far-field is approximately 40%. Total groundwater pumped would vary with the operation of the DPE system between 20 - 30 gpm.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 6

Capital Cost: $3,760,774
O & M Cost: $2,897,775/yr
O & M Present Worth Cost: The 30-year present worth costs are $35,958,490
Total Cost: $39,719,000

Construction Time: This alternative would require less than one year to construct.

The goal of Alternative 6 is to reduce constituent loading to the far field by 80 percent compared to Alternative 1. Alternative 6 includes installation of additional recovery wells to increase the groundwater recovery rate to achieve an 80% reduction in constituent loadings to the far field compared to the no action alternative. The estimated total recovery rate to achieve the 80% reduction is approximately 70 gpm. Recovered groundwater would be treated at the CECOS WWTP and discharged to the POTW. In addition, a new, dedicated DNAPL extraction well would be installed. The cap would be upgraded in this alternative to meet NYS 360 or equivalent standards through permeability testing and placement of additional low-permeability material as necessary. Also included in this alternative is the continued O & M of existing systems described in Alternative 2, above.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 7

Capital Cost: $6,074,011
O & M Cost $3,162,400/yr
O & M Present Worth Cost: The estimated 30-year present worth costs are $39,242,222.
Total Cost: $45,316,000
Construction Time: It is estimated that the time to construct this alternative would be approximately one year.

In Alternative 7, a slurry wall would be installed in the overburden along the southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park facility Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within Necco Park overburden, contain overburden groundwater, and function as collection points for DNAPL removal. Alternative 7 includes an increase in groundwater recovery rates to achieve an approximately 80% reduction in constituent loadings to the far field compared to Alternative 1. To increase ground-water recovery, additional recovery wells would be installed Recovered groudwater would be treated at the CECOS WWTP and discharged to the POTW. The cap would be upgraded in this alternative to meet NYS 360 or equivalent standards through permeability testing and the placement of additional low-permeability material, as necessary Also included in this alternative is the continued O & M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field is approximately 80%. Total groundwater pumped is approximately 70 - 75 gpm.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 8

Capital Cost: $7,510,462
O & M Cost: $2,887,075/yr + $850,875 for DPE for 5 years
O & M Present Worth Cost: The estimated 30-year present worth cost is $35,825,714 + $3,448,758 5-year present worth cost for DPE
Total Cost: $46,825,000
Construction Time: It is estimated that the time to construct this alternative would be approximately one to two years.

Alternative 8 consists of construction and operation of a DPE system on the 24-acre Necco Park landfill. The DPE system consists of extraction wells, piping, and vapor- and liquid-phase treatment. The DPE system would remove groundwater from A zone and upper bedrock zones. This alternative also includes an increase in

groundwater recovery rates to achieve an approximate 80% reduction in constituent loading to the far field compared to the no action alternative. To increase groundwater recovery, additional recovery wells would be installed. The estimated recovery rates to achieve an 80% reduction in constituent loading to the far field compared to the no action alternative is 70 gpm. Recovered groundwater would be treated at the CECOS WWTP and discharged to the POTW. A pilot test would be required to determine the most effective design for a DPE system. This alternative assumes that the DPE system would be in operation for approximately five years and that the system would be shut down during November through March. The cap would be upgraded upon completion of the DPE system, as necessary. Also included in this alternative is the continued O & M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field are approximately 80%. Total groundwater pumped would vary with the operation of the DPE system between 25 - 70 gpm.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 9

Capital Cost: $15,564,011
O & M Cost: $3,080,275/yr
O & M Present Worth Cost: The estimated 30-year present worth cost is $38,223,132.
Total Cost: $53,787,000
Construction Time: It is estimated that one to five years would be required to construct this alternative.

Alternative 9 consists of installing a grout curtain in the bedrock (on the southern, southeastern, and southwestern boundaries of the source area) that would be tied into the existing grout curtain (also called the subsurface formation repair or SFR which was installed on the northern, northeastern and northwestern boundaries of the source area), around the source area, extending from B through F zones (approximately 80 feet deep). Groundwater would be recovered in B through F zones to maintain an inward hydraulic gradient across the curtain. Estimated flow rate to achieve an inward hydraulic gradient in B through F zones in the source area is approximately 65 gpm. Extracted groundwater would be treated at the CECOS WWTP and discharged to the POTW. In this alternative, a slurry wall would be installed in the overburden along the southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park landfill. Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within the Necco Park property overburden, contain overburden groundwater, and function as collection points for DNAPL removal. Groundwater extraction from inside the grout curtain and slurry wall would result in total hydraulic control of source area groundwater in A through F zones. The cap would be upgraded in this alternative to meet NYS 360 or equivalent standards as necessary. Also included in this alternative is the continued O & M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field is approximately 90%. Total ground-water pumped is approximately 65 - 75 gpm.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 10

Capital Cost $7,837,136
O & M Cost: $4,614,775/yr
O & M Present Wortin Cost: The estimated 30-year present worth cost is $57,264,743.
Total Cost: $65,102,000
Construction Time: It is estimated that the time to construct this alternative would be approximately one year.

As with Alternatives 2 through 13, Alternative 10 consists of groundwater extraction from the existing wells RW-1, RW-2, and RW-3 as well as additional extraction to achieve total hydraulic control of the A

through F zones in the source area. The approximate pumping rate required to create a complete hydraulic barrier in A through F zones in the source area is approximately 155 gpm. Recovered groundwater would be treated at CECOS and discharged to the POTW. The CECOS WWTP has an available capacity of 110 gpm and would require expansion, at an estimated cost of $1,050,000 (this is included in the total cost), to treat the additional 50 gpm. In this alternative, a slurry wall would be installed along this southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park landfill. Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within Necco Park overburden, contain overburden groundwater, and function as collection points for DNAPL removal. Groundwater extraction from B through F zones and overburden groundwater recovery would result in total hydraulic control of source area groundwater in A through F zones. The cap would be upgraded in this alternative to meet NYS or equivalent standards as necessary. Also included in this alternative is the continued O & M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field is approximately 95%. Total groundwater pumped is approximately 155 - 160 gpm.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 11

Capital Cost: $9,354,723
O & M Cost: $4,421,575/year + $768,750 for DPE for 5 years
O & M Present Worth Cost: The estimated 30-year present worth cost is $54,867,324 + the 5-year present worth cost of $3,152,029 for DPE.
Total Cost: $67,374,000
Construction Time: It is estimated that the time to construct this alternative would be approximately one year.

Alternative 11 consists of construction and operation of a DPE system on the 24-acre Necco Park landfill. The DPE system consists of extraction wells, pumps, controls, piping, and vapor- and liquid-phase treatment. The DPE system would remove groundwater from A zone and upper bedrock zones. This alternative includes an increase in groundwater recovery rates to achieve total control of source area groundwater in A through F zones. Estimated recovery rate to achieve total hydraulic control in the source area is approximately 160 gpm. Recovered groundwater would be treated at CECOS and discharged to the POTW. The CECOS WWTP has an available capacity of 110 gpm, and would require expansion, at an estimated cost of $1,050,000 (this is included in the total cost), to treat the additional 50 gpm. A pilot test would be required to determine the most effective design for a DPE system. This alternative assumes that the DPE system would be in operation for approximately five years and that the system would be shut down during November through March. The cap would be upgraded upon completion of the DPE system, as necessary. Also included in this alternative is the continued O & M of existing systems described in Alternative 2, above. Estimated reduction in loadings to the far-field is approximately 95%. Total ground-water pumped would vary with the operation of the DPE system between 140 - 160 gpm.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 12

Capital Cost: $39,051,761
O & M Cost: $3,218,650/year
O & M Present Worth Cost: The estimated 30-year present worth cost is $39,940,228
Total Cost: $78,992,000
Construction Time: It is estimated that the time to construct this alternative would be approximately one to five years.

Alternative 12 consists of installing a grout curtain in the bedrock that would be tied into the existing grout curtain (also called the subsurface formation repair or SFR), around the source area, extending from B through G zones (approximately 120 - 140 feet deep). A total pumping rate of approximately 70 gpm would be necessary to maintain an inward hydraulic gradient in B through G zones within the source area extracted groundwater would be treated at the CECOS WWTP and discharged to the POTW. In this alternative, a slurry wall would be installed in the overburden along the southern boundary and southern sections of the eastern and western boundaries of the 24-acre Necco Park facility. Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within Necco Park overburden, contain overburden groundwater, and function as collection points for DNAPL removal. Groundwater extraction from inside the grout curtain and slurry wall would result in total hydraulic control of source area groundwater in the A through G zones. The cap would be upgraded in this alternative to meet NYS 360 or equivalent standards as necessary. Also
included in this alternative is the continued O & M of existing systems described in Alternative 2, above Estimated percent reduction in loadings to the far-field is approximately 96%. Total groundwater pumped is approximately 70 -75 gpm.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 13

Capital Cost: $19,343,761
O & M Cost: $6,214,525/year
O & M Present Worth Cost: The estimated 30-year present worth cost is $77,116,041
Total Cost: $96,460,000
Construction Time: It is estimated that the time to construct this alternative would be one to five years.

Alternative 13 consists of installing a grout curtain in the bedrock that would be tied into the existing grout curtain (also called the subsurface formation repair or SFR), around the source area, extending from B through F zones (approximately 80 feet deep). The grout curtain would be tied into the existing grout curtain. Groundwater would be recovered in B through F zones to maintain an inward hydraulic gradient. The estimated flow rate needed to achieve an inward hydraulic gradient is approximately 65 gpm. Extracted groundwater would be treated at the CECOS WWTP and discharged to the POTW. In this alternative, a slurry wall would also be installed in the overburden along the southern boundary and southern sections of the eastern and western boundaries of the 24-scre Necco Park facility. Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within Necco Park overburden, contain overburden groundwater, and function as collection points for DNAPL removal. The goal of groundwater extraction from inside the grout curtain and slurry wall would be total hydraulic control of source area groundwater in the A through F zones. Groundwater would also be pumped from the far field in an effort to intercept and remove 100 percent of groundwater constituents from the Necco Park area prior to entering the NYPA conduit system. Appmximately 400 gpm would be extracted in the far field to attempt to intercept 100 percent of the far-field groundwater. This water would be treated at the POTW. The cap would be upgraded in this alternative to meet NYS 360 or equivalent standards as necessary. Also included in this alternative is the conbnued O & M of existing systems described in Alternative 2, above. Estimated percent reduction in loadings to the far-field is approximately 96.5%.Total groundwater pumped is approximately 465 - 475 gpm.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, overall protection of human health and the environment compliance with applicable or relevant and appropriate requirements, long-term effectiveness and permanence, reduction of

toxicity, mobility, or volume, short-term effectiveness, implementability, cost, and state and community acceptance.

The evaluation criteria are described below.

- Overall protection of human health and the environment addresses whether or not 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.

- Compliance with applicable or relevant and appropriate reguirements (ARARs) addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

- Reduction of toxicity, mobility, or volume through treatment is The anticipated performance of the treatment technologies a remedy may employ.

- 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.

- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost includes estimated capital and operation and maintenance costs, and net present worth costs.

- State acceptance indicates whether, based on its review of the Investigation and Analysis of Alter natives reports and Proposed Plan, the state concurs, opposes, or has no comment on the preferred alternative at the present time.

- Community acceptance will be assessed in the Record of Decision (ROD) following a review of the public comments received on the Investigation and Analysis of Alternatives reports and the Proposed Plan.

The following is a brief comparative analysis of these alternatives based upon the evaluation criteria noted above:

- Overall Protection of Human Health and the Environment

The no action alternative (Alternative 1) would not provide protection of human health because the contaminants in the landfill would continue to leach into the groundwater and therefore, degrade the groundwater quality. The potential for exposure through the groundwater migration pathway would then present a human health risk. All alternatives except the no action alternative provide some level of protection to the environment by reducing constituent loadings to the far-field and therefore the Niagara River. The loading reduction from the source area to the far-field is quantified in Table 2. Constituent levels in the source area will be similar for each alternative because DNAPL in fractured bedrock and in overburden cannot be fully removed. DPE (Alternatives 5, 8 and 11) will result in greater source removal, but the resultant effect on source area groundwater cannot be quantified.

Assuming that the aquifer will not be used as a potable source, no current unacceptable risk to human health exists for all alternatives. However, a future risk does exist. Under the future residential use scenario all identified alternatives except for no action will reduce risk to varying degrees, This risk reduction is the result of a reduction of constituent loading to the far-field. Alternatives 2 through 5 reduce the loadings to the far-field the least. Alternatives 6 through 8 provide a greater reduction in loadings while Alternatives 9 through 12 accomplish the largest reduction in loadings. Alternative 13

reduces loadings to the far-field and captures all the contaminants in the far-field groundwater that are not contained in the source area. It should be noted that the loadings reductions provided for the remedial alternatives are estimates based on groundwater modeling performed for the Analysis of Alternatives Report. These estimates are subject to errors inherent in the assumptions made in applying the models to a complex fractured bedrock system. These complexities of the modeling process also present uncertainties with respect to the potential success in some of the alternatives ability to achieve RAOs in the far field.

The cap will be maintained or upgraded in all alternatives except for no action. This cap would protect human health by preventing contact with contaminated soil. The cap also acts to minimize precipitation percolation through contaminated soil and thus minimize constituent migration

- Compliance with ARARs

There are currently no promulgated standards for contaminant levels in soils. The EPA is instead using the soil cleanup values developed by NYSDEC that are considered protective of groundwater quality, as a TBC criteria for organic chemicals in soil. The TBC values, as discussed above, are taken from NYSDEC's TAGM.

Alternative 1, no action, would not meet the TBC soil criteria, Contaminants in the soil would not be treated or contained in any manner, resulting in continued leaching into the groundwater system. Alternatives 2 through 13, which involve upgrading the existing cap, would not meet the TBC criteria either. However, the mobility of the contaminants would be reduced by eliminating the exposure to infiltrating precipitation.

In the source area, none of the identified alternatives would achieve the groundwater chemical-specific limits identified in the following ARARs: New York Safe Drinking-Water Act Standards, New York Surface-Water and Groundwater-Quality Standards and Effluent Standards, Federal Safe Drinking-Water Act, National Primary Drinking-Water Standards and Amendments, National Secondary Drinking Water Standards, Niagara County Drinking-Water Standards, and the Coastal Zone Management Act. The presence of the surficial waste materials (landfill) and DNAPL in fractured bedrock in the source area makes attainment of the groundwater ARARs technically impracticable. Therefore, a waiver of the groundwater ARARs would be required for the source area (See Remedial Action Objectives, above).

No alternative completely complies with the Coastal Zone Management Act. Specifically, the Coastal Zone Management Policy 38 states that "the quality and quantity of surface-water and groundwater supplies will be conserved and protected, particularly where such waters constitute the primary or sole source of water supply." Alternatives 2 through 13 would provide increasing incremental compliance with the CZMA through increasing groundwater remedial action and therefore, increasing incremental benefits to the groundwater resource.

As discussed above, Alternatives 2 through 13 reduce far field constituent loading from the source area to varying degrees. It is expected that contaminants in the far-field groundwater would naturally attenuate over time to eventually reach the groundwater standards. However, based on limited existing information and the- complexities of modeling groundwater in a fractured bedrock medium, a degree of uncertainty exists whether the groundwater will or will not eventually achieve the MCLs in the far-field. Additional information will be required to fully evaluate the potential for ARARs to be achieved in the far-field.

The second RAO is control of source material (DNAPL and contaminated soil) to minimize direct exposure and impact on groundwater quality. Alternatives 2 through 13 reduce far-field contaminant loading through groundwater extraction, thereby improving groundwater quality, however, only some of these alternatives (9 and 12) effectively contain the migration of DNAPLs. Alternatives 9 through 11 and 13 include total hydraulic control of the A through F zones in the source area. Alternative 12 includes hydraulic control of A through G zones in the source area. In addition to active remedial measures, all alternatives include interception of a portion of far-field groundwater by the existing utility drains where a portion of collected groundwater is then treated at the Niagara Falls POTW.

Based on the remedial activities that have been taken at Necco Park to date, and the treatment of the portion of groundwater from Necco Park that infiltrates into the Falls Street tunnel and is treated at the POTW, the Analysis of Alternatives Report estimated that discharges from the Site have been reduced by at least the 50 percent which corresponds to the interim percentage reduction commitment lot 1996 established In the Four-Party Agreement. However, the interim commitment and the final goal of "virtual elimination," established in the Great Lakes Water Quality Agreement, are applicable to the total loadings from all point sources as well as non-point sources, which include surface runoff, atmospheric deposition, and unaccounted for loadings. All non-point sources must be addressed to reduce loadings to the Niagara River to the maximum extent practicable to address the goal of "virtual elimination." Alternatives 1 through 13 incrementally decrease loadings to the far-field and ultimately to the Niagara River. Alternative 13 therefore would best address the goal of "virtual elimination."

- Long-Term Effectiveness and Permanence

Alternative 1 would not be effective or permanent in providing protection to public health over the long-term. Contaminated groundwater would continue to migrate from the Site posing a risk to potential receptors. Monitoring would be required to track the presence and concentration of contaminants in groundwater entering and leaving the Du Pont, Necco Park property. Contaminants would remain in the groundwater posing a potential risk to a receptor.

Permanence of protection would be achieved by removal of the contaminants from the groundwater through treatment, Alternatives 2 through 13 provide increasing capture and subsequent treatment of contaminated groundwater. Alternative 2 captures and treats the least amount of contaminated groundwater while alternative 13 captures and treats all of the contaminant plume.

Operation and maintenance of the extraction and treatment system would be required including the servicing of pumps and motors, periodic well development and treatment operation. The extraction and treatment system would be monitored to measure its performance.

Alternative 1 would not provide any long-term effectiveness or permanence. Contaminants in the soil would continue to enter the groundwater system and pose a risk to potential receptors. Alternatives 2 through 13 would increasingly reduce contaminant mobility in the ground-water and, therefore, be increasingly effective in preventing the down-gradient migration of contaminants in the ground water.

Alternatives 5, 8 and 11. that Include DPE, would provide long-term effectiveness for some of the contaminants by permanently removing them from the soil. However, other contaminants at the Site are not effectively removed by DPE due to their low volatility. These remaining contaminants may possess solubilities that would allow them to be transported into the groundwater. DPE would be required to be shut down during the winter months which limits it's effectiveness in contaminant removal. Following the application of the DPE, capping of the soils would be expected to reduce or eliminate the mobility of the remaining contaminants.0 & M Would be required to operate the DPE system and maintain the cap. Periodic monitoring would be required to evaluate the performance of the DPE.

The constituent loading reductions for each alternative are included in Table 2. All alternatives, except for no action, rely on pump-and-treat technology and a grout curtain (either existing or additional) for hydraulic control. Pump-and-treat systems require periodic maintenance to maintain effectiveness of the hydraulic control system. Alternatives 9, 12 and 13 include a downgradient grout curtain. Attempts to control DNAPL hydraulically (i.e., pump and-treat) have proven to be ineffective since DNAPL may move independently from the groundwater flow. The grout curtain provides a more permanent and reliable barrier to DNAPL migration. However, these alternatives do not contain DNAPL that may have migrated under the BFI landfill.

Alternatives with a downgradient slurry wall or DPE (alternatives 4, 5, and 7 through 13) limit DNAPL migration in A zone. Alternatives with a complete source area grout curtain (alternatives 9 and 13) limit horizontal DNAPL migration in B through F zones through the use of a vertical barrier. Alternative 12 includes a source area grout curtain to limit horizontal DNAPL migration in the B through G zones. Because of the unpredictable nature of DNAPL movement and the potential that DNAPL exists under the BFI

landfill, no proposed alternative can completely contain DNAPL.

A low-permeability cap, which is included in alternatives 2 through 13, is effective in reducing potential contact with constituents and minimizing precipitation percolation into the landfill. With maintenance, the cap is a reliable containment technology.

- Reduction in Toxicity, Mobility, or Volume

Alternative 1 does not reduce the toxicity, mobility or volume of contaminants present in the groundwater. The movement of contaminated groundwater would be unrestricted allowing downgradient migration and the existence of a potential exposure pathway. Such an exposure pathway would create an unacceptable risk to human health. If no action were taken at the Site, contaminants in the landfill would continue to leach into the groundwater resulting in greater mobility. While the contaminant concentrations would decrease in the soil and bedrock, the resultant volume of contaminated material would also increase as contaminants spread through the groundwater. Contaminant compounds would remain in the soils and act as potential sources to groundwater contamination. The existing clay cap would not be maintained and would degrade creating a possible direct contact exposure risk to Site workers.

All alternatives, except for no action, include technologies to reduce constituent toxicity once it is removed from the environment. Alternatives that include groundwater extraction (alternatives 2 through 13) reduce aqueous constituent toxicity through treatment at the CECOS WWTP and further treatment at the Niagara Falls POTW The CECOS WWTP treats aqueous-phase constituents by metal precipitation, air stripping, vapor-phase carbon adsorption, and liquid-phase carbon adsorption. The POTW treats aqueous-phase constituents through physical-chemical treatment. Liquid-phase toxicity is reduced in Alternatives 2 through 13 through the use of an off-Site incinerator that destroys DNAPL. Vapor-phase toxicity is reduced in DPE alternatives (Alternatives 5, 8, and 11) by treatment

Existing utility drains impact the reduction of constituent mobility because they intercept groundwater flow in D through G zones and partially intercept flow in B and C zones. Some of the flow in these utility drains are then treated by the Niagara Falls POTW. Effects of the utility drains are considered as part of all alternatives but have not been fully quantified.

Alternatives 2 through 13 include maintaining a cap that limits precipitation percolation, thus limiting mobility of overburden constituents. Groundwater pumping and treatment also reduces constituent mobility, The extent of aqueous constituent mobility reduction can be measured by the constituent loading reduction (see Table 2).

Alternatives with slurry walls (Alternatives 4, 7, 9, 10, 12, and 13) reduce mobility of aqueous and DNAPL constituents in A zone. Alternatives with no slurry wall will allow DNAPL and contaminated groundwater to migrate beyond the property boundaries. Grout curtain alternatives (alternatives 9, 12, and 13) are the only alternatives that reduce mobility of DNAPLs in B through F zones, and B through G zones (alternative 12), through the use of a vertical barrier. All other alternatives would allow DNAPLs to continue to migrate potentially expanding the size of the source area.

The reduction of aqueous-phase constituent volume can also be measured by the constituent loading reduction (see Table 2). Alternatives 2 through 13 include extraction of DNAPLs, which reduces DNAPL volume. Alternatives that include DPE (alternatives 5, 8, and 11) may result in greater DNAPL volume reduction through the use of vacuum extraction in overburden and upper bedrock zones. Treatability studies are required to determine the extent of reduction and effect on groundwater quality.

- Short-Term Effectiveness

No immediate risks to human health have been identified through exposure to contaminated groundwater beneath or downgradient of the Necco Park property because there is currently no use of the groundwater. Therefore, all of the groundwater alternatives should be effective in protecting human health and the environment in the short-term (i e., until construction is complete). For alternatives 2 through 13, no short term risks to the public are expected to be created by constructing the groundwater extraction and

treatment systems. The operation of the extraction and treatment systems is expected to be a long-term activity which is not anticipated to present a risk to the public.

Alternative 1, no action, would not present any risk due to the fact that the contaminants are present at depth which leaves no opportunity for short-term exposure. Alternative 2 is not expected to present any short-term risks through the construction and implementation of the remedy. Alternative 3 through 13 may involve a slight increase in truck traffic in the area to transport in materials to construct the cap. This impact is expected to be minimal as the area is industrial and truck traffic is a routine occurrence, Alternatives 5, 8 and 11 would not present any risks during construction, however, the operation of the DPE system may generate volatile organic vapors by extracting them from the soil. These vapors depending on their concentration, may require treatment in the form of carbon adsorption or a burn unit to destroy the vapors. The DPE system is not expected to present a risk when properly monitored and operated. However, a malfunction of the vapor recovery system could create a potential hazard to workers at the Site.

Once completed all alternatives will require a similar amount of time to attain full effectiveness (steady-state constituent concentrations in the far-field). Alternative 13 may reach a steady-state condition in a slightly shorter time period due to far-field pumping.

Alternatives that physically disturb overburden material may create short-term risks due to organic constituent volatilization. A significant amount of overburden material is disturbed in alternatives that include a slurry wall (alternatives 4, 7, 9, 10, and 13).

Alternatives that include a grout curtain (Alternative's 9, 12, and 13) or that require expansion of the CECOS WWTP (Alternatives 10 and 11) will require the longest time to implement (up to five years) because of the need for extensive construction activities. DPE alternatives (Alternatives 5, 8, and 11) require one to three years to construct because of the need for a pilot study.

- Implementability

The no action alternative, Alternative 1, would not involve construction or the use of technologies of any kind. No modifications to the Site would be required to be made. Therefore, this alternative would be easily implemented. However, the downgradient migration of contaminants in the groundwater would continue to occur, creating a potential risk to receptors.

Alternatives 2 through 13 involve the extraction and treatment of groundwater. This type of technology has been applied at a variety of sites with mixed results, From a geologic and hydrologic viewpoint the groundwater aquifers under Necco Park which are characterized by fractured bedrock would make it difficult to operate a pump and treat system with a high degree of confidence in success. However, adequate control of groundwater beneath the Necco Park property could be established through the use of a system of extraction and monitoring wells. The treatment systems required in these alternatives would all be the same Many standard water treatment technologies exist that have been employed at other sites. It would be expected that these same technologies would be able to treat the groundwater at this Site.

Alternatives 1 and 2 require no further construction and, therefore, are the easiest to implement. Alternative 3 requires a cap upgrade and an additional DNAPL extraction well to implement.

Alternatives 4, 7, 9. 10, 12, and 13 include a slurry wall. A slurry wall may be difficult to implement because of the need to excavate through contaminated overburden but the technology has been widely used at landfill sites.

DPE alternatives (Alternatives 5, 8, and 11) require treatability studies to determine the effectiveness of the system on Necco Park and to complete the detailed design. DPE alternatives also include an extensive well, piping, and vapor-phase treatment system.

Alternatives 10 and 11 require expansion of the CECOS WWTP. This will require agreement to expand by CECOS, followed by design and construction. Negotiations between CECOS and Du Pont would be required to

determine if this alternative is implementable.

Grout curtain alternatives require a long time (up to five years) to implement. The grout curtain may be difficult to implement due to physical limitations and the use of right-of ways, however, a partial grout curtain has already been installed at the Site to these limitations are not impossible to overcome.

Alternative 13 would be the most difficult to implement because it includes installation of a grout curtain and construction of an extensive far-field pump-and-treat system. The far-field pump-and-treat system requires permission from commercial or residential property owners to install extraction wells. Right-of-ways are also necessary for connection to the sanitary sewer system.

- Cost

The costs for all of the alternatives are presented in the description of the Summary of Alternatives Section above. For comparison purposes the costs of the various alternatives are presented as follows:

Looking at the various groundwater alternatives, Alternative 1, no action, presents the lowest costs at $ 0 for capital, present-worth and O & M. This alternative provides a baseline to compare the costs of other alternatives. Alternative 13, is the most expensive alternative to implement with a total cost of $ 96,460,000. The costs of all other alternatives fall in between these two.

The alternatives costs are included in Table 3. Alternative 1 has the lowest total cost followed by Alternatives 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13.

- State Acceptance

After review of all available information the NYSDEC has indicated that they support the selection of the preferred alternative.

- Community Acceptance

Community acceptance of the preferred alternative will be assessed in the Responsiveness Summary portion of the ROD following review of the public comments received on the Investigation and Analysis of Alternatives reports and the Proposed Plan.

PREFERRED ALTERNATIVE

Based upon an evaluation of the various alternatives, EPA and the NYSDEC recommend Alternative 9, containment of the source area with monitoring of the far-field groundwater to collect additional data to determine the potential for natural attenuation to occur over time. The key components of the preferred alternative as the preliminary choice for the Site remedy include the following:

- Containment of the source area by: 1) constructing NYS Part 360, or equivalent, cap over the maximum surficial area of the source area possible, 2) extending the existing grout curtain around the source area in the B through F zones 3) installing a slurry wall in the overburden (A zone) on the southern, and portions of the eastern and western Necco Park properly boundaries and 3) using groundwater extraction to maintain an inward gradient within the grout curtain and control the movement of contaminated groundwater from migrating past the source area boundary. The control of the groundwater would be achieved through the installation of the grout curtain and groundwater extraction wells. Control of DNAPL migration will be achieved by extending the grout curtain around the source area and installing the slurry wall. The exact number, size, depth and pumping rates of these wells would be determined in the remedial design of the preferred alternative. Existing monitoring wells on the Necco Park property would be used to monitor the performance of the groundwater extraction system and establish that sufficient control occurs. Additional monitoring wells may be required. The need for additional monitoring wells would be determined during the design and implementation of the groundwater extraction system.

- Treatment of the extracted groundwater from the source area by the adjacent CECOS wastewater treatment plant to achieve the appropriate POTW discharge standards,

- Collection of DNAPL in the source area by 1) utilizing the existing monitoring wells, 2) utilizing any groundwater recovery wells placed in the source area, and 3) the installation of an additional dedicated DNAPL recovery well. Collected DNAPL would be disposed of off-Site at an appropriate facility.

- Operation and Maintenance of the existing systems.

- Periodic monitoring of the groundwater extraction systems to ensure that adequate control is maintained. Periodic sampling of the groundwater treatment system discharge, to ensure that treatment standards are achieved. Periodic sampling of the groundwater in the far-field area to measure the progress of the preferred alternative in achieving the cleanup standards.

- Institutional controls in the form of deed restrictions and groundwater use restrictions at the Necco Park property. The deed restrictions would be required to permanently prevent the Necco Park property from residential development as long as contaminants remain on the property and the treatment systems are in place Ground-water use restrictions in addition to the existing NiagaraCounty Ordinance, would be implemented through deed restrictions as well.

The preferred alternative addresses the principle threats posed by contaminated groundwater at the Necco Park Site, which are the potential human health risk and prevention of further groundwater contamination down-gradient (source control).

The preferred alternative also combines the groundwater remediation with the soils remediation to address the principle threat posed by the soils, which is the further contribution to groundwater degradation from contaminants in the soil.

The groundwater extraction and treatment portion of the preferred alternative is expected to meet the appropriate discharge ARARs.

EPA believes that the ARARs for groundwater quality cannot practicably be attained within the source area due to DNAPL contamination. It is uncertain whether or not the implementation of this source containment remedy will enable the aquifer outside the source area to be restored to a usable quality. The potential diffusion of contaminants from the Site in the bedrock, as well as the presence of groundwater contaminants upgradient of the landfill, may exacerbate or prevent the attainment of groundwater ARARs in the far-field. Therefore, groundwater in the far-field will be monitored to determine the effectiveness of the source containment efforts and to collect further data to evaluate the future potential for natural processes to achieve ARARs in the far field.

It is not anticipated that any significant short-term impacts on human health or the environment would occur during the construction and implementation of the preferred alternative. The appropriate discharge standards for the pumped and discharged groundwater are currently being met in the CECOS treatment system which will continue to be utilized. The preferred alternative could be constructed and operational in one to two years.

The implementation of the preferred alternative is both technically and administratively feasible. The alternative relies on established technologies that are widely used and available. The construction of the various components of the remedy could be accomplished with some difficulty but relatively quickly once the predesign/design work is completed.

The total cost of the preferred alternative would be:

Capital cost $ 15,564,011;
Annual O&M cost $ 3,080,275;
O & M 30-year present worth cost $ 38,223,132;

and a Total Cost of $ 53,787,000.

Due to the presence of waste materials and DNAPLs in the source area, and the lack of present-day technology to remove those materials from the fractured bedrock medium, none of the alternatives are capable of achieving the ARARs in a cost effective manner in the source area. Therefore, it is imperative that those materials be contained to prevent further spread of the source area and to prevent the source area from further degrading ground-water quality downgradient.

While the alternatives that employ solely hydraulic controls (Alternatives 2, 3 and 6) may capture some of the contaminants, they can not prevent the migration of DNAPLs in the overburden or bedrock. Some of the alternatives (Alternatives 4, 7, and 10) utilize a slurry wall in the overburden which will provide effective containment of groundwater and DNAPLs in the overburden only. DNAPLs would still be able to migrate in bedrock, further spreading the contamination. Alternatives 9, 12 and 13 are the only Alternatives that provide both physical and hydraulic containment of the source area through the use of a grout curtain and pumping wells in the bedrock, and a slurry wall in the overburden.

In addition to containing the source area, Alternative 13 captures all of the contaminated groundwater in the far-field, however, the capture of the far-field contamination bears a significant cost. Since the groundwater is not currently being utilized as a drinking water source and there may be potential for the far-field aquifer to naturally attenuate, this alternative was not selected.

Alternatives 9 and 12 also involve the installation of a grout curtain in the bedrock. Alternative 12 proposes a grout curtain in the B through G zones, while Alternative 9 proposes to grout the B through F zones. To install the grout curtain from the F to G zones (the difference between the two alternatives), would require drilling an additional 40 to 60 feet into the bedrock and installing an additional 478,000 square feet of grout curtain at an additional cost of approximately 14.4 million dollars. Alternative 12 was determined to be less cost effective than Alternative 9 for several reasons, including the following: the G zone is less hydraulically conductive than the other zones; the loadings to the far-field from the G zone are relatively low compared to the other zones; no DNAPL has been observed in the G zone to date; and historic use of the groundwater has been from the upper bedrock zones (B and C).

None of the alternatives achieves ARARs within the source area, however, the preferred alternative (Alternative 9) achieves the maximum amount of containment, at less cost than other alternatives. Therefore, the preferred alternative will provide the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA and the NYSDEC believe that the preferred alternative will be protective of human health and the environment, will fully comply with ARARs to the maximum extent practicable, will be cost effective, and will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy also will meet the statutory preference for the use of treatment as a principal element.

GLOSSARY

This glossary defines the technical terms and acronyms used in this Proposed Plan. The terms and abbreviations contained in this glossary are often defined in the context of hazardous waste management, and apply specifically to work performed under the Superfund program. Therefore, these terms may have other meanings when used in a different context.

Acids: Substances, characterized by low pH (less than 7.0) that are used in chemical manufacturing. Acids in high concentration can be very corrosive and react with many inorganic and organic substances. These reactions may possibly create toxic compounds or release heavy metal contaminants that remain in the environment long after the acid is neutralized.

Administrative Order on Consent (AOC): A legal and enforceable agreement between EPA and the potentially responsible parties (PRPs). Under the terms of the Order, the PRPs agree to perform or pay for site studies or cleanup work. It also describes the oversight rules, responsibilities and enforcement options that the government may exercise in the event of non-compliance by the PRPs. This Order is signed by the PRPs and the government; it does not require approval by a judge.

Administrative Order: A legally binding document issued by EPA directing the potentially responsible parties to perform site cleanups or studies (generally, EPA does not issue unilateral orders for site studies).

Administrative Record File: The file containing all Site findings and reports that were considered in the Agency's decision regarding the preferred alternative. Typically these documents are available for public review at a convenient location within the town or city where a site is located as well as at EPA Region 2 headquarters.

Adsorption: The adhesion of molecules of a gas, liquid or dissolved matter to the surfaces of solid bodies or liquids with which they are in contact.

Air Stripping: A process whereby volatile organic chemicals are removed from contaminated material by forcing a stream of air through it In a pressurized vessel. The contaminants are evaporated into the air stream. The air may be further treated before it is released into the atmosphere.

Alluvial: An area of sand, clay, or other similar material that has been gradually deposited by moving water, such as along a river bed or the shore of a lake.

Ambient air: Any unconfined part of the atmosphere. Refers to the air that may be inhaled by workers or residents in the vicinity of contaminated air sources.

AOA: Analysis of Alternatives (See Feasibility Study, FS)

Aquifer: An underground layer of rock, sand, or gravel capable of storing water within cracks and pore spaces, or between grains. When water contained within an aquifer is of sufficient quantity and quality, it can be tapped and used for drinking or other purposes. The water contained in the aquifer is called groundwater.

Backfill: To refill an excavated area with removed earth; or the material itself that is used to refill an excavated area.

Bases: Substances characterized by high pH (greater than 7.0), which tend to be corrosive in chemical reactions. When bases are mixed with acids, they neutralize each other, forming salts.

Bioaccumulate: The process by which some contaminants or toxic chemicals gradually collect and increase in concentration in living tissue, such as in plants, animals, or humans as they breathe contaminated air, drink contaminated water, or eat contaminated food.

Bioremediation: A cleanup process using naturally occurring or specialty cultivated microorganisms to digest contaminants naturally and break them down into nonhazardous components.

Borehole: A hole drilled into the ground used to sample soil and groundwater.

Cap: A layer of material, such as clay or a synthetic material, used to prevent rainwater from penetrating and spreading contaminated materials. The surface of the cap is generally mounded or sloped so water will drain off.

Carbon adsorption/carbon treatment: A treatment system in which contaminants are removed from groundwater and surface water by forcing water through tanks containing activated carbon, a specially treated material that attracts and holds or retains contaminants.

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act (See Superfund).

Closure: The process by which a landfill stops accepting wastes and is shut down under federal or state guidelines that ensure the public and the environment is protected.

Consent decree: A legal document, approved and issued by a judge, formalizing an agreement between EPA and the potentially responsible parties (PRPS). The consent decree describes cleanup actions that the PRPs are required to perform and/or the costs incurred and/or will be incurred by the government that the PRPs will reimburse, as well as the roles, responsibilities, and enforcement options that the government may exercise in the event of non-compliance by PRPs. If a settlement between EPA and the PRPs includes cleanup actions, it must be in the form of a consent decree. A consent decree is subject to a public comment period.

Consent Order: (See Administrative Order on Consent).

Containment: The process of enclosing or containing hazardous substances in a structure, typically in ponds and lagoons, to prevent the migration of contaminants into the environment.

Culvert: A pipe under a road, railroad track, path, or through an embankment used for drainage.

Dewater: To remove water from wastes, soils, or chemicals.

DNAPL: Liquids that do not readily dissolve in water and are more dense than water.

DPE: Dual Phase Extraction.

Downgradient/downslope: A downward hydrologic slope that causes groundwater to move toward lower elevations. Therefore, wells downgradient of a contaminated groundwater source are prone to receiving pollutants,

Effluent: Wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

French drain system: A crushed rock drain system constructed of perforated pipes, which is used to drain and disperse wastewater.

Feasibility Study (FS): The second part of a two-part Remedial Investigation/Feasibility Study (RI/FS). The FS involves identifying and evaluating the most appropriate technical approaches for addressing contamination problems at a Superfund site.

Generator. A facility that "generates" hazardous wastes.

Grout Curtain: A physical barrier in soil or bedrock created by the injection of one of a variety of fluids. The fluids set in place and reduce water flow through existing pore spaces and fractures. Grout

curtains formulated from cement clay, bentonite, alkali silicates, silicates or organic polymers may be used to reduce DNAPL flow and constituent mobility.

Halogens: Reactive non-metals, such as chlorine and bromine. Halogens are very good oxidizing agents and, therefore, have many industrial uses. They are rarely found by themselves; however, many chemicals such as polychlorinated biphenyls, some volatile organic compounds, and dioxin are reactive because of the presence of halogens.

Hazard Index: The Hazard Index reflects noncarcinogenic health effects for an exposed population and is the fraction of the chronic daily intake of a chemical divided by the calculated daily dose believed to be protective of human health including sensitive sub-populations. If the HI exceeds one (1.0), there is a possibility of adverse health effects.

Hot Spot: An area or vicinity of a site containing exceptionally high levels of contamination.

Hydrogeology: The geology of groundwater, with particular emphasis on the chemistry and movement of water.

Influent: Water, wastewater, or other liquid flowing into a reservoir, basin, or treatment plant

Intake: The source where a water supply is drawn from, such as from a river or waterbed.

IR: Investigation Report (See Remedial Investigation, RI)

Lagoon: A shallow pond where sunlight, bacterial action, and oxygen work to purify wastewater. Lagoons are typically used for the storage of wastewaters, sludges, liquid wastes, or spent nuclear fuel.

Landfill: A disposal facility where waste is placed in or on land.

Leachate: The liquid that trickles through or drains from waste, carrying soluble components from the waste.

Leach/Leaching: The process by which soluble chemical components are dissolved and carried through soil by water or some other percolating liquid.

Long-term remedial phase: Distinct, often incremental, steps that are taken to solve site pollution problems. Depending on the complexity, site cleanup activities can be separated into a number of these phases.

Migration: The movement of contaminants, water, or other liquids through porous and permeable rock.

Mitigation: Actions taken to improve site conditions by limiting, reducing, or controlling toxicity and contamination sources.

NCP: National Contingency Plan

Neutrals: Organic compounds that have a relatively neutral pH, complex structure and, due to their organic bases, are easily absorbed into the environment. Naphthalene, pyrene, and trichlorobenzene are examples of neutrals.

NPL: EPA's National Priorities List.

NYSDEC: New York State Department of Environmental Conservation.

O+M: Operation and maintenance.

Outfall: The place where wastewater is discharged into receiving waters.

Percolation: The downward flow or filtering of water or other liquids through subsurface rock or soil layers, usually continuing downward to groundwater.

Phenols: Organic compounds that are used in plastics manufacturing and are by-products of petroleum refining, tanning, textile, dye, and resin manufacturing. Phenols are highly poisonous and can make water taste and smell bad.

Plume: A body of contaminated groundwater flowing from a specific source. The movement of the groundwater is influenced by such factors as local groundwater flow patterns, the character of the aquifer in which groundwater is contained, and the density of contaminants.

Polycyclic Aromatic Hydrocarbons or Polyaromatic Hydrocarbons (PAHs): PAHs, such as pyrene, are a group of highly reactive organic compounds found in motor oil. They are common component of creosotes and can cause cancer.

Polychlorinated Biphenyls (PCBs): A group of toxic chemicals used for a variety of purposes including electrical applications, carbonless copy paper, adhesives, hydraulic fluids, microscope emersion oils, and caulking compounds. PCBs are also produced in certain combustion processes. PCBs are extremely persistent in the environment because they are very stable, non-reactive, and highly heat resistant. Uncontrolled combustion of PCBs produces even more toxins. Chronic exposure to PCBs is believed to cause liver damage. It is also known to bioaccumulate in fatty tissues. PCB use and sale was banned in 1979 with the passage of the Toxic Substances Control Act.

Polynuclear Aromatic Hydrocarbons (PNAs): PNAs, such as naphthalene, and biphenyls, are a group of highly reactive organic compounds that are a common component of creosotes, which can be carcinogenic,

Potentially Responsible Parties (PRPs): Parties, including owners, who may have contributed to the contamination at a Superfund site and may be liable for costs of response actions. Parties are considered PRPs until they admit liability or a court makes a determination of liability This means that PRPs may sign a Consent Decree or Administrative Order on Consent (see Consent Decree and Administrative Order on Consent) to participate in site cleanup activity without admitting liability.

Remedial Action (RA): A series of steps taken to monitor, control, reduce, or eliminate risks to human health and the environment. These risks were caused by the release or threatened release of contaminants at a Superfund site.

RD: Remedial Design

Remedial: A course of study combined with actions to correct site contamination problems through identifying the nature and extent of cleanup strategies under the Superfund program.

Remedial Investigation (RI): The first part of a two-part Remedial Investigation/Feasibility Study (RI/FS). The RI involves collecting and analyzing technical and background information regarding a Superfund site to determine the nature and extent of contamination that may be present. The investigation also determines how conditions at the site may affect human health and the environment through a risk assessment

Record of Decision (ROD): The document that present EPA's final selection of a response action.

Runoff: The discharge of water over land into surface water. It can carry pollutants from the air and land into receiving waters.

Sediment: The layer of soil, and minerals at the bottom of surface waters, such as streams, lakes, and rivers that absorb contaminants

Sludges: Semi-solid residues from industrial or water treatment processes that may be contaminated with hazardous materials.

Slurry Wall: Barier used to contain the flow of contaminated groundwater or subsurface liquids. Slurry walls are constructed by digging a trench around a contaminated area and filling the trench with an impermeable material that prevents water from passing through it. The groundwater or contaminated liquids trapped within the area surrounded by the slurry wall can be extracted and treated.

SPDES: The New York State Pollution Discharge Elimination System.

Stripping: A process used to remove volatile contaminants from a substance (see Air Stripping).

Sumps: A pit or tank that catches liquid runoff for drainage or disposal.

Superfund: The common name for the federal program established by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended in 1986. The Superfund law authorizes EPA to investigate and remediate the nation's most serious hazardous waste sites.

Trichloroethylene (TCE): A stable, colorless liquid with a low boiling point. TCE has many industrial applications, including use as a solvent and as a metal degreasing agent.TCE may be toxic to people when inhaled, ingested, or absorbed through skin contact and can damage vital organs, especially the liver [see also Volatile Organic Compounds].

Unilateral Order: (See Administrative Order). Upgradient/Upslope: Upstream; an upward slope. Demarks areas that are higher than contaminated areas and, therefore, are not prone to contamination by the movement of polluted groundwater.

Vegetated Soil Cap: A cap constructed with graded soils and seed for vegetative growth to prevent erosion. ()see cap.)

Volatile Organic Compounds (VOCs): VOCs are made as secondary petrochemicals. They include light alcohols, acetone, trichloroethylene, perchloroethylene, dichloroethylene, benzene, vinyl chloride. toluene, and methylene chloride. These potentially toxic chemicals are used as solvents, degreasers, paints, thinners, and fuels. Because of their volatile nature, they readily evaporate into the air, increasing the potential exposure to humans. Due to their low water solubility, environmental persistence, and wide spread industrial use, they are commonly found in soil and groundwater.

Wetland: An area that is regularly saturated by surface or groundwater and, under normal circumstances, capable of supporting vegetation typically adapted for life in saturated soil conditions. Wetlands are critical to sustaining many species of fish and wildlife. Wetlands generally include swamps, marshes, and bogs. Wetlands may be either coastal or inland. Coastal wetlands have salt or brackish (a mixture of salt and fresh) water, and most have tides, while inland wetlands are non-tidal and freshwater. Coastal wetlands are an integral component of estuaries.

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Table 1

NECCO PARK AQUEOUS INDICATOR PARAMETER LIST

Inorganic and General Water-Quality Parameter	Volatile Organic Compounds	Semivolatile Organic Compounds
pH	Vinyl chloride	Hexachloroethane
Specific conductivity	1,1-dichloroethene	Hexachlorobutadiene
Temperature	Trans-1,2-dichloroethene	Phenol
Chloride	Cis-1,2-dichloroethene	4-methylphenol
Ammonia nitrogen	Chloroform	2,4,6-trichlorophenol
Soluble barium	Carbon tetrachloride	2,4,5-trichlorophenol
Cyanide	1,2-dichloroethane	Pentachlorophenol
Total organic halogens	Trichloroethene	Hexachlorobenzene
Total organic carbons	1,1,2-trichloroethane	TIC-1
Total dissolved solids	Tetrachloroethene	
Total suspended solids	1,1,2,2-tetrachloroethane	
Rhodamine		

Table 2

ZONE SPECIFIC FAR-FIELD LOADINGS
(LOADINGS TO FAR-FIELD FROM SOURCE AREA)

	LOADING TO FAR-FIELD (lb/day)						
Alternative	B zone	C zone	D zone	E zone	F zone	G zone	TOTAL
1	4.97	3.86	0.55	4.82	7.43	0.99	22.6
2	0.01	<0.01	0.53	4.61	7.14	0.98	13.3
3	0.01	<0.01	0.53	4.61	7.14	0.98	13.3
4	0.01	<0.01	0.53	4.61	7.14	0.98	13.3
5	0.01	<0.01	0.53	4.61	7.14	0.98	13.3
6	0.01	<0.01	0.13	1.11	1.61	0.97	3.8
7	0.01	<0.01	0.13	1.11	1.61	0.90	3.8
8	0.01	<0.01	0.13	1.11	1.61	0.97	3.8
9	0.09	0.10	0.03	0.25	0.38	0.89	1.7
10	<0.01	<0.01	0.00	0.01	0.01	0.96	1.0
11	<0.01	<0.01	0.00	0.01	0.01	0.96	1.0
12	0.05	0.08	0.03	0.24	0.36	<0.01	0.8
13	0.01	0.06	0.03	0.24	0.37	0.82	1.5

TABLE 3

ALTERNATIVE	CAPITAL COST	ANNUAL O&M COST	30-YEAR PRESENT WORTH COST	TOTAL COST
Alternative 1	$0	$0	$0	$0
Alternative 2	$271,785	$1,658,325	$20,578,155	$20,850,000
Alternative 3	$2,780,899	$1,669,025	$20,710,931	$23,492,000
Alternative 4	$5,094,136	$1,933,650	$23,944,663	$29,089,000
Alternative 5	$6,530,587	$1,810,450 + $768,750 for 5 years for DPE	$22,465,874 $3,152,029 for 5 years for DPE	$32,148,000
Alternative 6	$3,760,774	$2,897,775	$35,958,490	$39,719,000
Alternative 7	$6,074,011	$3,162,400	$39,242,222	$45,316,000
Alternative 8	$7,510,462	$2,887,075 + $850,875 for 5 years for DPE	$35,825,714 + $3,448,758 for 5 years for DPE	$42,825,000
Alternative 9	$15,564,0ll	$3,080,275	$38,223,132	$53,787,000
Alternative 10	$7,837,136	$4,614,775	$57,264,743	$65,102,000
Alternative 11	$9,354,723	$4,421,575 + $768,750 for 5 years for DPE	54,867,324 + $3,152,029 for 5 years for DPE	$67,374,000
Alternative 12	$39,051,761	$3,218,650	$39,940,228	$78,992,000
Alternative 13	$19,343,761	$6,214,525	$77,116,041	$96,460,000

RESPONSIVENESS SUMMARY - PART I
APPENDIX C -- MEETING SIGN-IN SHEET

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RESPONSIVENESS SUMMARY - PART I
APPENDIX D -- WRITTEN COMMENTS ON PROPOSED PLAN

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Comments on the Proposed Remedial Action Plan
for the DuPont NECCO Park site, Niagara Falls, NY
Submitted by Citizens' Environmental Coalition
September 19, 1996

Citizens' Environmental Coalition is extremely disappointed that EPA is considering a cleanup alternative for the DuPont NECCO Park site that will not meet the remedial action objective: "to protect human health and the environment." Specifically, we are deeply troubled that EPA would consider waiving ARARs and fail to call for the remediation of offsite (far field) contaminated groundwater.

Waiving ARARS

It appears that much of the argument that meeting ARAR's is "not feasible" or is "not practicable" is based on one remedial approach (pump and treat) and its failure to address DNAPLs. While it may be difficult characterize and remediate DNAPLs sites, especially where fractured bedrock is involved, it is inappropriate to abandon our goals simply because meeting them is more difficult than had been anticipated. It seems much more appropriate to keep the goals, control the site, and continue to revisit the site to deal with the problems as technology advances.

Bear in mind that New York State regulations state, "At a minimum, the remedy selected shall eliminate or mitigate all significant threats to the public health and to the environment..." (NYCRR Part 375-1.0) Also, waiving ARARs disregards New York State regulations which state that all New York State freshwater is to be considered Class GA groundwater with the best usage as a source of potable water. (Title 6 º 701.15 ECL)

We believe that it is inappropriate, and morally wrong to abandon restoration goals simply because we cannot readily meet the challenge whether it be due to insufficient technology, unwillingness to spend money, or a lack of political will.

Comments on EPA's Preferred Alternative

Alternative 9, which was EPA's selected remedial alternative, fails to address many outstanding concerns at the site.

- While placement of more monitoring wells may be helpful in assessing lateral migration, continued downward movement of contaminants at the site is undoubtedly occurring since the area bedrock is highly fractured DNAPLs are present. Some DNAPLs are known to travel through rock fractures as small as 10 microns in size. As you know, these contaminants tend to sink until they pool (temporarily) in rock crevices or indentations or continue to sink through openings until they arrive at destinations such as the Niagara River and Lake Ontario where they find their way into the food chain.

- Offsite groundwater contamination remains unaddressed and will continue to migrate until it travels to the Niagara River and ultimately to Lake Ontario. Allowing this to occur flies in the face of EPA's own policies and international agreements to protect these Great Lakes water bodies. According the TRC report prepared for this site, "No data are available concerning the seepage velocity or the

porosity of the fracture zones, but analyses for a groundwater transport model used in the risk assessment indicated that seepage velocities could be in excess of 15 feet per day in some fracture zones. If these estimates are accurate, contaminated ground water could rapidly flow downgradient for the site to the discharge areas..." (TRC, Section 3.2.1, page 3-4) This unsettling report alone should have served as the warning alarm to EPA to expedite an immediate offsite remedial plan to mitigate the downward movement of contaminated groundwater. Failure to take action on this clearly dangerous threat to public health and the environment is unconscionable.

- We realize that DuPont's argument selecting Alternative 2 is that area residents are served by public water. This is a flawed argument in that it totally ignores the hydraulic connection between groundwater and the Niagara River, from which over 1,000,000 people draw their drinking water. In addition, there are presently fish consumption advisories which warn that women of childbearing age and children under the age of 15 should eat NO fish from the Niagara River and Lake Ontario. Many of the contaminants of concern in the NECCO Park site are persistent organochlorines which will further taint the fish as contaminated groundwater finds its way to the River and in turn, into the biota. Further, the risk assessment conducted for the NECCO Park site did not take into account the cumulative effects of chemicals already in the Niagara Falls environment but rather assumed that the DuPont chemicals are the only chemicals that pose an exposure risk to public health or the environment.

CEC Recommends Alternative 13 with modifications

We believe that alternative 13, with some modification, is the best remedial option. This remedy includes placing a "grout curtain" around the main source area of contamination, at a depth of approximately 80 feet. Our suggested modification is that the depth of the grout curtain be subject to increase in the event that DNAPLs are discovered at a depth which would indicate that the barrier is insufficient at 80 feet since the barrier wall, which is to be tied to the existing grout curtain, is designed to reduce the flow of contaminants from the area. This is CEC's preferred alternative since groundwater, which DuPont is responsible for polluting, would be extracted and treated before being discharged to the public sewer system. A slurry wall would also be installed along site boundaries and groundwater extraction wells would be installed for hydraulic control of some of the source area groundwater. This remedy goes beyond Alternative 9 because it rightly calls for groundwater to be pumped from the "far field" at a rate of approximately 400 to 475 gallons per minute in an effort to intercept groundwater that is now entering the New York Power Authority conduit. As you know, once it enters the conduit, it has the potential to flow into the Falls Street Tunnel, which overflows directly to the Niagara River during periods of heavy precipitation.

At a minimum, DuPont should be required to install both onsite and offsite extraction wells to help control downward movement of contaminated groundwater and continued pollution of the Niagara River which is less than 1.5 miles from the DuPont dump. In addition, they should be required to continue to install extraction wells around the entire area to gain hydraulic control despite the cost and time required.

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1100 Mile Square Road
Mendon, NY 14506

August 15, 1996

Mr. Dale Carpenter
DuPont Site Project Manager
US EPA Region 2
#290 Broadway (20th Floor)
New York, New York 10007

Dear Mr. Carpenter:

The purpose of this letter is to address the EPA's proposal to ignore off-site contamination of groundwater at the DuPont Site in Niagara Falls, NY. This proposal is totally unacceptable. The only alternative that makes any sense is Alternative #13 of the Proposed Remedial Action Plan which calls for the placing of a "grout curtain" around the main source of contamination and the pumping of contaminated onsite and off site groundwater for treatment before being discharged into the municipal sewer system.

When will the government do what they should do and make the polluters pay and not the taxpayers!!!! DuPont made millions of dollars of profits from the low cost dumping of wastes onto NECCO Park. Those of us who reside on or near the Great Lakes should not have to subsidize those profits with our health, water and our taxes.

As residents of the Rochester community, we have already contributed significantly to the clean-up of Lake Ontario. We will in fact have thrown away our money if the EPA does anything less than a full and comprehensive clean-up. Once the contaminated groundwater reaches the Niagara River (if it hasn't already!), it is only a matter of time until Lake Ontario receives a new dose of contaminants.

We compel you to step "out of the box" and do the right thing. Cleanup the offsite contaminated groundwater and adopt Alternative #13 now. Don't let DuPont walk away from their mess with their pockets full of profits!

<IMG SRC 98144S8>

Lynches River Coalition/Clean Water
P.O. Box 1082
Lake City, South Carolina 29560

Jack Moore, President
Billy Godwin, Vice President 803-394-3558
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John Cooper
Freddie Evans
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Randal Langston
Jack Matthews
Janice McClarn
Robert E. (Pate) Poston

August 2, 1996

Mr. Dale Carpenter
DuPont Site Project Manager
US EPA Region 2
#290 Broadway (20th Floor)
New York, NY 10007

Dear Mr. Carpenter:

We write to say that EPA's proposal to ignore offsite contaminated groundwater at the DuPont site in Niagara Falls, New York is unacceptable. We support Alternative #13 of the Proposed Remedial Action Plan which calls for the placing of a 'grout curtain' around the main source of contamination and the pumping of contaminated onsite and off site groundwater for treatment before being discharged into the municipal sewer system.

DuPont made millions of dollars of profits from the low cost dumping of wastes onto NECCO Park. The people of the Great Lakes should not have to subsidize those profits with their health, their water and their taxes. As limited as it is, Alternative #13 is the most comprehensive cleanup proposal. Further, DuPont should be required to meet ARARS for all groundwater, no matter how much it costs or how long it takes. DuPont should be made to bear the full cost of a comprehensive cleanup at the DuPont site. Anything less will only encourage irresponsible corporate practices in the name of increased profits.

DO THE RIGHT THING. Clean up the offsite contaminated groundwater. Enforce Alternative #13 now. Don't let DuPont off the hook until the site is cleaned to predisposal conditions.

<IMG SRC 98144S9>
<IMG SRC 98144T>

7020 Stanley
St. Louis, MO 63143
August 2,1996

Mr. Dale Carpenter
Dupont Project Site Manager
EPA Region 11
290 Broadwav 20th Floor
NY, NY 10007

Dear Mr. Carpenter:

I am writing in regard to EPA's proposal to ignore off-site contaminated groundwater at the Dupont site in Niagara Falls, NY. This proposal is unacceptable. I support Alternative #13 of the Proposed Remedial Action Plan which calls for the placing of a "grout curtain" around the main source of contamination. It also calls for the treatment of contaminated on-site and off-site ground water before the water is discharged into the municipal sewer system

DuPont makes millions of dollars in profits, in part by shuffling the cost of clean-up onto taxpayers. That is not fair. DuPont has a responsibility to the communitv just like each of its neighbors. The community's health and well-being is at risk because of DuPont. EPA should step in to make things right for the community, and for everybody living downstream.

Anything less than DuPont paying the full cost of a comprehensive clean-up is unreasonable. That is the fair thing for a responsible neighbor to do. Don't let DuPont off the hook until the site is cleaned to pre-disposal conditions.

<IMG SRC 98144T1>

<IMG SRC 98144T2>

An international coalition to conserve and protect the
Great Lakes/St. Lawrence River ecosystem

Comments on the Proposed Remedial Action Plan
DuPont NECCO Park Site
Niagara Falls, NY
Presented by Maureen Hoellig
Prepared by Scott Sederstrom
for Great Lakes United
August 13, 1996

Great Lakes United (GLU), an international coalition of groups and individuals dedicated to protecting the Great Lakes ecosystem, is pleased to have the opportunity to comment on the DuPont NECCO Park proposed remedial action plan (PRAP). While GLU understands, that this is a public meeting and not a public hearing, it s our hope that EPA will consider comments made tonight and submitted in writing by August 20 with the same gravity as comments submitted in processes where EPA is legally obligated to do so.

GLU regrets that EPA is considering a PRAP that fails to address the issue of off-site contamination. Rather than recommending Alternative #9, EPA should require DuPont to implement Alternative #13, which represents the most thorough clean up of wastes that are both on site as well as those that have migrated off-site. Such a remedy would be most protective of the Niagara River and Lake Ontario. EPA should regard selection of Alternative #13, however, as only a first step to a final clean up of the site.

Failing to control the migration of contaminants from the "far field" into the New York Power Authority conduit the continued contamination of the Niagara River by these contaminants. The diversion of flow from the conduit into the Falls Street Tunnel during periods of "heavy precipitation" releases untreated groundwater into the river, and eventually into Lake Ontario. Eliminating this source of persistent toxic pollutants requires either that EPA incorporate elements of Alternative #13 that would control migration from both on and off-site; or the infinitely less equitable alternative of revamping the conduit system to prevent diversions into Falls Church Tunnel.

Furthermore EPA should not be recommending an alternative that waives ARAR requirements because of technical infeasibility. EPA should be requiring the maximum amount of hydraulic control both on and off-site regardless of cost and time required. Alternative #13 requirements for maximum containment of contaminated groundwater; treatment prior to discharge into the POTW; extraction of both on and off-site contaminated groundwater represents the most thorough and environmentally protective clean-up standards offered to date. EPA should, however, continue to evaluate the development of new remediation technologies and implement those that appear to have promise in adding to the extent of clean up.

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<IMG SRC 98144T3>

An EPA selection of Alternative #13 would demonstrate a commitment to implementing the International Joint Commission's Great Lakes ecosystem. Selecting Alternative #9 suggests that EPA may be theoretically committed to an eventual goal of zero discharge as expressed in draft versions of the bi-national.Virtual Elimination Strategy-but is willing to wait for it to be achieved only after the contaminated groundwater from this and other sites on the Niagara Peninsula has finally migrated into the Niagara River.

GLU urges EPA to be most protective of the Niagara River and the Great Lakes and select Alternative #13 as the first step to additional extraction wells around the entire area to gain the maximum hydraulic control at this site.

<IMG SRC 98144T4>

DUPONT COMMENTS ON EPA'S PROPOSED PLAN Necco Park Niagara Falls, New York

September 19, 1996 DERS Project No. 3759

Prepared by

DuPont Environmental Remediation Services
Barley Mill Plaza 27
P.O. Box 80027
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CONTENTS

EXECUTIVE SUMMARY

The United States Environmental Protection Agency (EPA) issued the Proposed Remedial Action Plan (PRAP) for the DuPont Necco Park site in Niagara Falls, New York, on July 18, 1996. DuPont has prepared this written comment document in accordance with the public comment process in response to the EPA PRAP.

DuPont has demonstrated its commitment to protection of human health and the environment through responsible stewardship at Necco Park through the voluntary and cooperative implementation of several technically successful response actions over the course of 20 years, at a cost of more than $40 million, and spending of $2 million annually in operation and maintenance (O&M) at the site.

As a result of the successful implementation of these response actions and the continued O&M of the site remedial systems, more than 138 million gallons of contaminated groundwater have been pumped and treated, and more than 6,300 gallons of DNAPL have been removed from the source area. No DNAPL movement is evident based on no new appearance of DNAPL at any wells and the disappearance of DNAPL at 25 wells.

Contaminant concentrations in the aquifer have decreased by more than 99 percent in the shallow fracture zones off-site, demonstrating the success of the existing hydraulic control efforts.

The EPA has proposed that Alternative 9 be implemented at Necco Park. This remedial alternative is, in general, similar to the remedy proposed by DuPont, differing largely in scale. Because none of the remedies will achieve ARARs in the far field, the EPA's preferred remedy appears to be driven by speculative concerns about potential future DNAPL mobility. Empirical evidence does not support this mobility concern. DuPont believes that Alternative 9 provides a disproportionate response to the potential risk and, at best, marginal incremental benefit over Alternative 2, at a cost of $54 million.

Additionally, DuPont believes that the EPA's proposed remedy appears to be inconsistent with the recent EPA Superfund Administrative Reforms and is also inconsistent with other Records of Decision (RODs) issued for similar sites in the Niagara Falls area.

DuPont recommends that EPA select Alternative 2 as the remedy for the Necco Park site, accompanied by further evaluations of potential DNAPL mobility. The basis for this recommendation is as follows:

- There is no current or plausible future risk to human health or the environment.
- The majority of site indicator compounds are not persistent toxic substances.
- There is no loading of persistent substances from Necco Park to the Niagara River and Lake Ontario.
- Groundwater is not currently nor plausibly will be used as a future drinking-water source.
- There is no compelling evidence of DNAPL migrating from the source area.
- Regional impact on the aquifer from numerous pollutant sources.

DuPont believes that the actions it has implemented to date have served to prevent any significant risks to human health and the environment, as documented by the EPA's own risk assessment. The EPA's proposed alternative results in an increase in groundwater capture that does not restore local or regional groundwater quality and extreme measures to address the speculative potential of DNAPL migration that are simply unwarranted.

1.0 INTRODUCTION

The United States Environmental Protection Agency (EPA) issued the Proposed Remedial Action Plan (PRAP) for the DuPont Necco Park site in Niagara Falls, New York, on July 18, 1996, The PRAP is based in part on the EPA's evaluation of several potential alternatives presented by DuPont in the October 11, 1995, Analysis of Alternatives Report (AOA) for the Necco Park site, which was approved by the EPA on July 9, 1996. DuPont has prepared this written comment document in accordance with the public comment process in response to the EPA PRAP. DuPont believes that the EPA's proposed action goes well beyond those measures necessary to ensure the ongoing protection of human health and the environment. The EPA should address the Necco Park remedy in a phased approach, comprised of Alternative 2 from the AOA, and await the results of more detailed evaluations of potential dense nonaqueous-phase liquid (DNAPL) mobility prior to any further determinations.

DuPont has demonstrated its commitment to protection of human health and the environment through responsible stewardship at Necco Park through the voluntary and cooperative implementation of several technically successful response actions over the course of 20 years and at a cost of more than $40 million. DuPont continues to spend $2 million annually in operation and maintenance (O&M) at the site.

As a result of the successful implementation of these response actions and the continued O&M of the site remedial systems, more than 138 million gallons of contaminated groundwater bave been pumped and treated, and more than 6,300 gallons of DNAPL ave been removed from the source area. Site monitoring data from more than 120 wells shows a general decline in groundwater plume concentrations. DNAPL recovery rates declined dramatically (by two orders of magnitude) between 1991 and 1994, indicating the successful removal of the mobile DNAPL phase. No DNAPL movement is evident based on no new appearance of DNAPL at any wells and the disappearance of DNAPL at 25 wells. Contaminant concentrations in the aquifer have decreased by more than 99 percent in the shallow fracture zones off-site, demonstrating the sucess of the existing hydraulic control efforts.

Through extensive remedial investigation and engineering and hydrogeological evaluation, DuPont has determined that continuing the existing successful response actions in place at Necco Park (Alternative 2) will result in no human exposure and no unacceptable risk and will provide protection of human health and the environment. The EPA's own risk assessment reached the same conclusion, indicating that the existing response actions have been effective and that no significant human or ecological risks exist under current conditions. The EPA-proposed selection of Alternative 9 is unnecessary to protect human health and the environment and is a disproportionate response for the minimal incremental benefits it provides.

The conclusions were based on the fact that access to the site is controlled, there is no direct exposure to wastes, and that groundwater is not currently used as a source for potable water. In addition, the EPA developed a Hazard Ranking Score for the site that indicated that the Necco Park site did not present sufficient potential risk to be listed on the National Priorities List NPL). Groundwater in the Niagara Falls area is not currently nor likely to be used as a future drinking-water source for the following reasons:

- Significant infrastructure and abundant, inexpensive potable water is supplied by the city of Niagara Falls from the Niagara River.

- Installation of private wells is controlled by county ordinance. Currently, permits to install drinking-water wells are not being issued.

- Groundwater quality is degraded from a century of industrial operations in the region.

Even the EPA's proposed alternative does not restore groundwater to a potable condition. As such, restoration is both impracticable and not necessary to protect human health and the environment.

According to the August 19, 1996, Draft Canada--United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes Basin, only three Necco Park indicator compounds are listed as "persistent." These three constituents are relatively immobile and are insignificant contributors to the contaminant plume; only very few low-level detections of two of these compounds have ever been documented in the far-field groundwater monitoring program at Necco Park. Analytical results from 18 off-site,

downgradient monitoring wells since 1992 indicate that only two such constituents, hexachlorobutadiene and pentachlorophenol, have been detected.

Hexachlorobenzene has not been detected during this period of the monitoring program. The trend in the analytical data from these wells since 1993 has shown a sharp decline in concentrations of these two compounds by more than an order-of-magnitude. This trend indicates that the success of the effective hydraulic control at Necco Park combined with potential intrinsic biodegradation appears to be significantly reducing the level of these compounds in the far field aquifer.

Based on the contaminant concentrations in the far-field plume and the potential for diffusion of constituents from the aquifer matrix to act as a continuing source of contamination, DuPont believes that restoration of the far-field aquifer cannot be accomplished (as the EPA has noted) within a reasonable time frame, regardless of the remedial alternative that is implemented (Parker et al. 1994).

The EPA has proposed that Alternative 9 be implemented at Necco Park. This remedial alternative is, in general, similar to the remedy proposed by DuPont, differing largely in scale. Because none of the remedies will achieve ARARs in the far field, ihe EPA's preferred remedy appears to be driven by speculative concerns about potential future DNAPL mobility. Empirical evidence does not support this mobility concern DuPont believes that Alternative 9 provides a disproportionate response to the potential risk and, at best, marginal incremental benefit over Alternative 2, at a cost of $54 million. Additionally, DuPont believes that the EPA's proposed remedy also appears to be inconsistent with the recent EPA Superfund Administrative Reforms and the proposed New York, State groundwater strategy program.

The EPA-proposed remedy is inconsistent with other Records of Decision (RODs) issued for similar sites in the Niagara Falls area. To our knowledge, no similar sites in the area are using an extensive grout curtain physical barrier as specified for Necco Park in the EPA's proposed alternative. In fact the New York State Department of Environmental Conservation (NYSDEC) recently issued the PRAP for the Solvent Chemical site in Niagara Falls on August 16, 1996. The Solvent Chemical site environmental issues are very analogous to those at Necco Park. The NYSDEC has proposed a remedy for the site that is entirely consistent with the remedy proposed in Alternative 2 for Necco Park.

There is no compelling evidence of potential DNAPL migration. Further, DuPont has been unable to find examples of the use of grout curtains as a physical barrier to DNAPL migration. Beyond the fact that it appears unnccessary, the effectiveness of a grout curtain for this unproven application is questionable. DuPont stands ready to analyze the potential for DNAPL migration in the detail necessary to support any remedial decision making in this regard. DuPont also notes that the construction of a grout curtain surrounding the source area would be extremely difficult because of the inability to verify the completion of an integral barrier and the significant engineering obstructions in the vicinity of the proposed grout curtain alignment.

DuPont recommends that EPA select Alternative 2 as the remedy for the Necco, Park site, accompanied by further evaluations of potential DNAPL mobility. The basis for this recommendation is its follows:

- There is no current or plausible future risk to human health or the environment.
- The majority of site indicator compounds are not persistent toxic substances.
- There is no loading of persistent substances from Necco Park to the Niagara River and Lake Ontario.
- Groundwater is not currently nor plausibly will be used as a future drinking-water source, as evidenced by the availability of abundant, inexpensive fresh water supply for potable purposes and county ordinance controlling the installation of private groundwater wells.
- There is no compelling evidence of DNAPL migrating from the source area.
- Regional impact on the aquifer from numerous pollutant sources.

DuPont believes that the actions it has implemented to date have served to prevent any significant risks to human health and the environment, as documented by the EPA's own risk assessment, The EPA's proposed remedial action is grossly disproportionate to the potential risks, and largely result in incremental measures beyond the DuPont remedial efforts. Those increments, an increase in groundwater capture that does not restore local or regional groundwater quality, and extreme measures to address the speculative potential of DNAPL migration, are simply unwarranted.

2.0 GENERAL COMMENTS

2.1 Background

DuPont has demonstrated its commitment to protection of human health and the environment through responsible stewardship at Necco Park through the voluntary and cooperative implementation of several technically successful response actions over the course of 20 years and at a cost of more than $40 million. In fact, the voluntary installation of the groundwater recovery and treatment system at Necco Park in 1982 was the first such remedial system in the Niagara region, DuPont continues to spend $2 million annually in operation and maintenance (O&M) at the site. The highly effective response actions taken by DuPont to date include:

- A clay cap constructed over the entire site to limit surface-water infiltration and prevent direct exposure to wastes.

- Groundwater recovery and treatment to provide a high degree of hydraulic control to prevent aqueous-phase contaminant migration in shallow bedrock aquifer zones and partial control in deeper zones.

- A successful DNAPL recovery and disposal program for source reduction and containment that has removed 6,300 gallons of DNAPL, reduced the presence of mobile DNAPL from 35 to 10 wells, and resulted in no DNAPL migration to wells where it was not previously present.

- An upgradient grout curtain for hydraulic control to enhance groundwater recovery and reduce off-site contamination migration.

As a result of the successful implementation of these response actions and the continued O&M of the site remedial systems, more than 138 million gallons of contaminated groundwater have been pumped and treated, and more than 6,300 gallons of DNAPL have been removed from the source area. Site monitoring data from more than 120 wells shows a general decline in groundwater plume concentrations. DNAPL recovery rates declined dramatically (by two orders of magnitude) between 1991 and 1994, indicating the successful removal of the mobile DNAPL phase. No DNAPL movement is evident based on no new appearance of DNAPL at any wells and the disappearance of DNAPL at 25 wells. These observations are consistent with the low conductivity of natural glacial deposits in the overburden. As such, the EPA's concerns about potential DNAPL migration appear highly speculative. Contaminant concentrations in the aquifer have decreased by more than 99 percent in the shallow fracture zones off-site, demonstrating the success of the existing hydraulic control efforts.

Through extensive remedial investigation and engineering and hydrogeological evaluation, DuPont has determined that continuing the existing successful response actions in place at Necco Park (Alternative 2) will result in no human exposure and no unacceptable risk and will provide protection of human health and the environment. The EPA's own risk assessment reached the same conclusion, indicating that the existing response actions have been effective and that no significant human or ecological risks exist under current conditions. Only under the wholly hypothetical and unrealistic scenario of groundwater exploitation for drinking-water use could meaningful risks be envisioned, DuPont recommends that Alternative 2 be implemented at Necco Park. The EPA-proposed selection of Alternative 9 is unnecessary to protect human health and the environment and is a disproportionate response for the minimal incremental benefits it provides.

2.2 Risk

The EPA evaluated potential risk to human health and the environment at Necco Park in 1993. This risk assessment, conducted by an EPA contractor, concluded that there is no risk to human health or to fish and aquatic life in the Niagara River under current conditions. The conclusions were based on the fact that access to the site is controlled, there is no direct exposure to wastes, and that groundwater is not currently used as a source for potable water, In addition, the EPA developed a Hazard Ranking Score for the site that indicated that the Necco Park site did not present sufficient potential risk to be listed on the National Priorities List (NPL). The use of an assumption of future human consumption of groundwater in Niagara Falls as a basis for remedy selection is entirely hypothetical and inappropriate. Groundwater in the Niagara Falls area is not currently nor likely to be used as a future drinking-water source for the following reasons;

- Significant infrastructure and abundant, inexpensive potable water is supplied by the city of Niagara Falls from the Niagara River.

- Installation of private wells is controlled by county ordinance. Currently, permits to install drinking-water wells are not being issued.

- Groundwater quality is degraded from a century of industrial operations in the region.

Even the EPA's proposed alternative does not restore groundwater to a potable condition, As such, restoration is both impracticable and not necessary to protect human health and the environment.

The EPA cites the Great Lakes Water-Quality Agreement of 1978 and the "virtual elimination" of persistent toxic substances in the Great Lakes ecosystem as a driver for its selection of the preferred remedy. In the first instance, the agreement is not an applicable or relevant and appropriate requirement (ARAR) as defined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Second, the primary objective of this agreement is to focus on pollution prevention in the manufacture, transportation, and use of persistent toxic substances, not to address remadiation sites.

As presented in the EPA Necco Park risk assessment, most of the indicator parameters (volatile organic compounds [VOCs] and semivolatile organic compounds [SVOCs]) are not persistent in surface water; they are readily volatilized or are biodegradable.

According to the August 19, 1996, Draft Canada-United States Strategy for the Virtual Elimination of Persisitent Toxic Substances in the Great Lakes Basin, only three Necco Park indicator compounds are listed as "persistent": hexaclorobenzene, hexachlorobutadiene, and pentachlorophenol. Only hexachlorobenzene is listed as a Level 1, or "critical pollutant." Hexachlorobenzene, although included on the site indicator list, has shown only very few, low level historic detections.

Hexachlorobutadiene and pentachlorophenol are listed as Level II substances, targeted for voluntary actions by stakeholders. Hexachlorobutediene detections are primarily limited to the source area; very few detections have been observed in the far field. Finally, no known source of pentachlorophenol exists at Necco Park. Field data confirms that there is no obvious source area in shallow zones in the vicinity of the site. Most pentacblorophenol detections are centered on the former CECOS lagoons located immediately west of the current treatment facility. These three constituents are relatively immobile, insignificant contributors to the contaminant plume and we unlikely to ever reach potential ecological receptors. Only very few low-level detections have ever been documented in the far-field groundwater monitoring program at Necco Park.

Analytical results from 18 off-site, downgradient monitoring wells sampled in 1995 indicate the following:

- Zero detections of hexachlorobenzene.

- Four detections of hexachlorobutadient ranging from 12 - 29 Ig/l.

- Two detections of pentachlorophenol ranging from 64 - 160 Ig/l.

All analytical data for these 18 wells since 1992 shows no detections of hexachlorobenzene.

The trend in the analytical data from these wells since 1993 has shown a sharp decline in concentations of hexachlorobutadiene and pentachlorophcnol by more than an order-of magnitude. This trend indicates that the combination of effective hydraulic control at Necco Park and potential intrinsic biodegradation appears to be significantly reducing the level of these compounds in the far field aquifer.

Furthermore, the EPA evaluated these three compounds in the Necco Park ecological risk assessment and concluded that the site does not pose an unacceptable ecological risk to the Niagara River. A similar conclusion can be extended to downstream water bodies.

The EPA has determined that, in the source area, groundwater restoration to drinking-water quality is a technical impracticability and suggested that it may well be impracticable for the plume as well. Recent research by Ms. Beth Parker at the University of Waterloo and field application of that research has indicated that matrix diffusion can be a significant process at fractured bedrock sites with DNAPL-type contaminants, in both the aqueous and nonaqueous phases, and is an important consideration in remediation of such sites (Parker et al. 1994). Based on the contaminant concentrations in the far-field plume and the potential for diffusion of constituents from the aquifer matrix to act as a continuing source of contamination, DuPont believes that restoration of the far-field aquifer cannot be accomplished (as the EPA has noted) within a reasonable time frame, regardless of the remedial alternative, that is implemented.

However, intrinsic biological degradation has been documented to reduce contaminant concentrations in the Necco Park groundwater plume. The intrinsic anaerobic biodegradation study conducted by DuPont at Necco Park has been cited as a successful case study by the EPA (Wilson et al. 1996)

2.3 EPA's Proposed Remedy

The EPA has proposed that Alternative 9 be implemented at Necco Park. This remedial alternative is, in general, similar to the remedy proposed by DuPont, differing largely in scale. It consists of an upgraded cap, attempted additional DNAPL recovery, and installation of significant subsurface physical barriers (including a slurry wall) in downgradient overburden soil and 3,500 linear feet of grout curtain to a depth of greater than 80 feet into bedrock. Additional lower bedrock zone pumping wells would also be required with subsequent treatment of nearly four times the quantity of groundwater to maintain hydraulic control within the grout curtain enclosure.

DuPont has spent $40 million to date on measures to protect human health and the environment and has committed to additional expenditures of $20 million to ensure their ongoing effectiveness. DuPont believes that Alternative 9 provides a disproportionate response to the demonstrated risk and, at best, marginal incremental benefit over Alternative 2, at a cost of $54 million. The EPA's own risk assessment determined that the site poses no risk to human health and the environment under current conditions. As such, there is no evidence of additional benefit to this significant expenditure. Additionally, DuPont believes that the EPAs proposed remedy also appears to be inconsistent with the recent EPA Superfund Administrative Reforms and the proposed New York State groundwater strategy program. The administrative reforms address a number of remedy selection issues, including the use of risk assessment grounded in reality, controlling remedy costs, and promoting cost-effectiveness.

The EPA-proposed remedy is inconsistent with other Records of Decision (RODs) issued for similar sites in the Niagara Falls area. To our knowledge, no similar sites in the area are using an extensive grout curtain physical barrier as specified for Necco Park in the EPA's proposed alternative. DuPont believes that the EPA-preferred remedy for Necco Park, goes well beyond remedial action required at other sites in the area with similar environmental issues. In fact, the New York State Department of Environmental Conservation (NYSDEC) recently issued the PRAP for the Solvent Chemical site in Niagara Falls on August 16, 1996. The Solvent Chemical site enviromental issues are very analogous to Necco Park:

- DNAPL in overburden soil and in the fractured bedrock
- Dissolved-phase organic contamination in the bedrock aquifer

The NYSDEC PRAP specifies

- A site cover.
- Overburden and B zone groundwater hydraulic control.
- Monitoring of lower bedrock zones for hydraulic control.
- No physical subsurface barrier or lower zone recovery wells.

The Solvent Chemical PRAP cites:

> "Based upon site investigations and regional data, it is likely that B-Zone bedrock groundwater migrating north from Solvent Chemical is intercepted by the Falls Street Tunnel"
>
> "Under current conditions, the Falls Street Tunnel and the NYPA conduit drain system likely provide a hydraulic boundary for much of the contaminant plume which has migrated off-site."
>
> "Overburden and bedrock groundwater contaminant concentrations on-site would be expected to gradually decrease through operation of a hydraulic control and treatment system, but due to the persistence of DNAPL within the bedrock fracture zones, bedrock groundwater would likely never achieve groundwater standards."
>
> "None of the four alternatives would fully comply with SCGs for groundwater. However, a waiver from groundwater SCGs would be appropriate for the on-site bedrock groundwater."

At the public meeting for the Solvent Chemical site, held September 11, 1996, the NYSDEC representatives presented the PRAP and provided the following comments in support and justification on their remedy selection:

- There is no human use of groundwater in Niagara Falls.
- There is a county ordinance controlling the issuance of well installation permits and permits are not being granted.
- Poor natural groundwater quality.
- Minimal risk to human health and environment.
- Plume is at equilibrium.
- Matrix diffusion of DNAPL in bedrock will sustain contaminant concentrations above drinking water standards.
- Cannot restore aquifer to drinking water standards.
- There is no current or planned future use of groundwater for human consumption.

The current remedial measures at the Necco Park site are consistent with these requirements for the Solvent Chemical site.

Implementation of additional source control measures at Necco Park will not result in additional risk reduction and will not result in restoration of the aquifer to drinking-water standards. There is no compelling evidence of potential DNAPL migration. Further, DuPont has been unable to find examples of the use of grout curtains as a physical barrier to DNAPL migration. Beyond the fact that it appears unnecessary, the effectiveness of a grout curtain for this unproven application is questionable. DuPont stands ready to analyze the potential for DNAPL migration in the detail necessary to support any remedial

decision making in this regard. Dupont also notes that the construction of a grout curtain surrounding the source area would be extremely difficult because of the inability to verify the completion of an integral barrier and the significant engineering obstructions in the vicinity of the proposed grout curtain alignment (e.g., existing subsurface utilities). The EPA's own guidance, Consideration in Groundwater Remediation at Superfund Site and RCRA Facilities-Update (May 27, 1992), recommends avoiding drilling through DNAPL areas.

The implementability evaluation in the PRAP understates the potential difficulties of installing vertical barriers (e.g., slurry wall and grout curtain) at the site and how these implementability concerns could impact barrier effectiveness. Slurry walls are typically tied into underlying confining clay units to isolate contaminant sources. However, based on existing site geological data, the site overburden zone will not serve as an adequate confining unit into which to tie the slurry wall. The slurry wall would have to be tied into the upper bedrock zone, which is more difficult to accomplish because of the need for specialized construction equipment. The effectiveness of a slurry wall tied into fractured bedrock is also uncertain.

A grout curtain surrounding the source area would be extremely difficult to construct because of the large number of obstructions in the vicinity of the proposed grout curtain alignment. Leachate and gas collection systems for BFI's landfill are presently located along the proposed alignment for the eastern wall of the grout curtain (along the property boundary). Extending the grout curtain into the landfill is not technically practical.

The proposed alignment for the southern wall of the grout curtain extends into BFI property. Installation along this boundary requires obtaining property right-of-ways as well as several significant physical obstructions, including power lines and extremely small clearance between these lines and the underground Texas Brine lines. Railroad lines are also present along the proposed western grout curtain alignment. The length and associated cost of the grout curtain increases significantly based on the presence of the CECOS hazardous waste disposal cells.

Permeation grouting of fractured rock is commonly used for hydraulic control (reducing groundwater flow) in applications such as dam foundations. However, according to conversations that DuPont has had with major United States grouting contractors, there are no known published case histories where grouting of fractured rock was used for waste containment. The primary objective of grouting for hydraulic control is to reduce the flow of groundwater (volume and velocity) and, thus, reduce seepage and related seepage forces for stability reasons (i.e., dam applications). Reducing groundwater flow in a waste containment application to the same degree considered acceptable for hydraulic control would not be effective or acceptable in a waste containment application. A much "tighter" barrier is required for waste containment applications. Achieving this is difficult in most cases and incrementally more difficult in fractured rock because of a number of reasons such as no control over grout flow paths and groundwater flow, Grout
can be leached away by high groundwater seepage or attacked chemically or biologically, causing deterioration and higher permeabilities. According to Kipko et al. (1993), general deficiencies in the., use of hardened grout mixtures in underground workings (and applicable to subsurface containment walls) in saturated rocks include

- High cost of the grouting materials, particularly resulting ftorn large volumes of cement needed where erosion of the cement grout by groundwater occurs.
- Brittleness and low plasticity of the solidified materials.
- Potential for the grouting compound to set up during placement if the project is delayed.
- Staged grout injections, resulting from cement grout contraction.
- Poor success because of grout erosion and spreading during isolation of large fractures.

In addition to the potential problems and concerns regarding the effectiveness of a grouted barrier in fractured rock, cost-effective and reliable techniques do not exist to verify the overall effectiveness of

the completed barrier. Verification techniques for conventional vertical, barriers in soil are limited and are newly nonexistent in rock.

According to the Assessment of Barrier Containment Technologies, A , Comprehensive Treatment for Environmental Remediation Applications, a publication of the International Containment Technology Workshop that was prepared under the auspices of the United States Department of Energy, USEPA, and DuPont,

> "Soil and cement-based barrier walls are generally considered compatible with a wide range of organic and inorganic contaminants, if at relatively low concentrations. However, should organic contaminants be present as nonaqueous-phase liquids, the potential for wall deterioration increases and should be carefully evaluated. Cement-bentonite and cement-bentonite-slag are subject to cracking, if allowed to dry excessively."

In addition, this publication cites that

> "The permeation of organic contaminants at low concentrations generally has little negative impact on the hydraulic conductivities of clayey barriers (Mitchell and Madsen 1987). However, concentrated organic contaminants (e,g., nonaqueous-phase liquids) may cause increases in hydraulic conductivity (Day 1993; Rumer and Ryan 1995)....At present, containment barriers are not designed to inhibit advective and diffusive transport..."

Furthermore, the publication indicates that

> "The integrity of vertical barrier systems has been verified by excavating from within the barrier at many projects constructed for groundwater and/or structural control. Much less is known about the integrity of vertical barriers installed for environmental remediation applications. Additional monitoring and testing is needed to verify the integrity for these latter applications and to establish if there are differences in reliability for walls constructed of different materials."

Finally, this publication states that

> "Limitations of cutoff wall technologies are principally related to depth, obstruction, site access, ability to excavate the formation, reuse of the excavation spoils, exposure of the excavation spoils leading to contamination in another medium, uncertainties about the long-term properties and integrity of barrier walls, concern about potential incompatibility between the wastes and wall material, and lack of acceptance by regulatory agencies and the public. Reliability issues can be classified in two groups: defects that occur during construction and changes that can occur with time. Defects occurring during construction results from inadequate mixing and placement of materials and include holidays (gaps in the continuity of the wall), leakage at panel joints, leakage at the connection to the bottom aquitard, and the possible development of a gap between the cutoff wall and cap. Long-term effects can include property changes of the intact barrier material and structural changes (i.e., cracking) in the wall that could be caused by excessive ground movements, dryng, and the like."

2.4 Summary

DuPont recommends that EPA select Alternative 2 as the remedy for the Necco Park site, accompanied by futher evaluations of potential DNAPL mobility. The basis for this recommendation is as follows:

- There is no current or plausible future risk to human health or the environment.
- The majority of site indicator compounds are not persistent toxic substances.
- There is no loading of persistent substances from Necco Park to the Niagara River and Lake Ontario.
- Groundwater is not currently nor plausibly will be used as a future drinking-water source, as

evidenced by the availability of abundant, inexpensive fresh water supply for potable purposes and county ordinance controlling the installation of private groundwater wells.

- There is no compelling evidence of DNAPL migrating from the source area

- Regional impact on the aquifer from numerous pollutant sources.

DuPont believes that the actions it has implemented to date have served to prevent any significant risks to human health and the environment, as documented by the EPA's own risk assessment. The EPA's proposed remedial action is grossly disproportionate to the potential risks, and largely result in incremental measures beyond the DuPont remedial efforts. Those increments, an increase in groundwater capture that does not restore local or regional groundwater quality, and extreme measures to address the speculative potential of DNAPL migration, are simply unwarranted.

3.0 SUPERFUND FACT SHEET COMMENTS

3.1 Superfund Update Fact Sheet

EPA Fact Sheet Page 2, first paragraph

DuPont strongly objects to the characterization of existing, response actions at Necco Park as limited. Describing existing response actions in this fashion within a background section incorrectly characterizes the significant and successfal response actions implemented at Necco Park by DuPont and implies that substantial additional action will be required for a final remedy, biasing the AOA process. DuPont has committed considerable resources and approximately $40 million funding to date and $2 million annually for remediation at Necco Park over two decades and does not consider such action as limited. In fact, DuPont has worked cooperatively with the USEPA and NYSDEC and believes that its voluntary and proactive response actions were a first of its kind in the Niagara frontier.

EPA Fact Sheet page 2, Scope of Roles and Action, last bullet item

It is inappropriate to refer to all contamination within the far-field area as attributable to Necco Park. As the EPA has stated on several occasions within the Necco Park PRAP, groundwater quality in the Niagara Falls area has been impacted regionally by a large number of industrial sources. Therefore, it is not possible to attribute all contamination in the far-field area solely to Necco Park. In addition, several Necco Park indicator list constituents cannot be established as being derived from Necco Park.

EPA Fact Sheet page 2, Summary of Actvities Completed, seventh paragraph

EPA figures are correct as of the AOA. However, according to most recent DuPont records, a total of greater than 139 million gallons of groundwater has been pumped and treated through June 1996.

4.0 NECCO PARK PROPOSED PLAN SPECIFIC COMMENTS

4.1 Site Background

EPA Necco Park Proposed Plan Page 2, sixth paragraph, last sentence

Because all disposal activities at Necco Park predate promulgation of RCRA regulations in 1980, no RCRA hazardous wastes were disposed of at Necco Park.

EPA Necco Park Proposed Plan Page 3, sixth paragraph

It is inappropriate to refer to all contamination within the far-field area as attributable to Necco Park. As the EPA stated on several occasions within the Necco Park PRAP, groundwater quality in the Niagara Falls area has been impacted regionally by a large number of industrial sources. Therefore, it is not possible attribute all contamination in the far-field area solely to Necco Park.

EPA Necco Park Proposed Plan Page 3, sixth paragraph

DuPont believes the early remedial actions have effectively addressed rather than partially addressed the contaminated soil and groundwater. Response actions implemented by DuPont also include installation of a bedrock grout curtain to enhance hydraulic control of groundwater recovery wells installed in the B, C, D, E, and F zones.

4.2 Remedial Investigation Summary

EPA Necco Park Proposed Plan Page 3, Surface Water

It should be specified that the Necco Park landfill is capped; therefore; the low chemical concentrations in the drainage swale surface water between Necco Park landfill and the CECOS-BFI landfill are the result of surface-water runoff from the surrounding landfill areas.

EPA Necco Park Proposed Plan Page 3, Drainage Swale Sediments

It should be specified that the Necco Park landfill is capped; therefore, the low chemical concentrations in the drainage swales sediment are the result of surface water runoff from the surrounding landfill areas.

EPA Necco Park Proposed Plan Page 4, Drainage Swale Sediments

The reference to contaminated sediment and routine removal of sediment should be deleted. DuPont does not routinely remove the sediment.

EPA Necco Park Proposed Plan Page 4, Soils and DNAPL

DuPont agrees that the soil and DNAPL may act as a continuing source of groundwater contamination; however, data indicates that the extent of migration is presently at equilibrium and has been effectively controlled by the present remedial actions, which have eliminated infiltration and reduced contaminant migration.

EPA Necco Park Proposed Plan Page 4, Man-made Passageways

The compounds found in the Falls Street Tunnel, the New Road tunnel, and the NYPA drain system, while possible Necco Park indicators, are also found in other known groundwater source areas in the far field (i.e., tetrachloroethene [PCE] and trichloroethene [TCE] from other regional sites).

EPA Necco Park Proposed Plan Page 4, Hydrogeology, last paragraph

The future use of groundwater is unlikely because of the abundant fresh surface-water supply and infrastructure.

EPA Necco Park Proposed Plan Page 5, Man-made Passageway Capture Zone, fifth paragraph

For clarification, groundwater in the middle and lower zones would enter the NYPA conduit drainage system, not the conduits.

EPA Necco Park Proposed Plan Page 5, Loadings to the Niagara River and Lake Ontario, first paragraph

The Great Lakes Water-Quality Agreement of 1978 focuses on the "virtual elimination" of persistent toxic substances in the Great Lakes ecosystem. The primary emphasis of the program will be on pollution prevention to eliminate the use, generation, or release of persistent toxic substances resulting from human activity involving the manufacture, transportation, and use of such substances. As presented in the EPA Necco Park risk assessment, most of the indicator parameters (volatile organic compounds [VOCs] and semivolatile organic compounds [SVOCs]) are not persistent in surface water; they are readily volatilized or are biodegradable. According to the Draft Canada--United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes Basin, only three Necco Park indicator compounds are listed

as "persistent:" hexachlorobenzene, hexachlorobutadiene, and pentachlorophenol. Only hexachlorobenzene is listed as a Level I, or "critical pollutant." Hexachlorobenzene, although included on the site indicator list, has shown only very few, low level historic detections. Hexachlorobutadiene and pentachlorophenol are listed as Level II substances, targeted fof voluntary actions by stakeholders. Hexachlorobutadiene detections are primarily limited to the source area; very few detections have been observed in the far field. Finally, no known source of pentachlorophenol exists at Necco Park. Field data confirms that there is no obvious source area in shallow zones in the vicinity of the site. Most pentachlorophenol detections are centered on the former CECOS lagoons located immediately west of the current treatment facility. These three indicator compounds were evaluated in the Necco Park ecological risk assessment. Based on the potential future scenario of groundwater constituents entering the Niagara River at two locations and very conservative assumptions, the EPA risk assessment concluded that the site does not pose an unacceptable eeological risk in the Niagara River.

EPA Necco Park Proposed Plan Page 6, Groundwater and DNAPLs, last paragraph

It should be clarified that other significant sources to groundwater contamination exist in the vicinity of Necco Park.

4.3 Summary of Site Risk

EPA Necco Park Proposed Plan Page 6, first paragraph, second sentence

This sentence should be modified as follows: "The baseline risk assessment estimates the human health and ecological risk which could potentially result from exposure to contamination at the site if no remedial action were taken." Because the majority of the Necco Park constituents are not persistent and do not bioaccumulate, the rest of the opening paragraph, starting with "Contamination of the fish and ecosystem....," should be eliminated. This paragraph should also state that no significant ecological risks resulting from Necco Park constituents were found, even with the use of very conservative model assumptions.

4.4 Human Health Risk Assessment

EPA Necco Park Proposed Plan Page 7, second paragraph

This paragraph is misleading and does not adequately present the hazard identification. It is recommended that the paragraph be rewritten to include the following information. Vinyl chloride is the only compound listed that is classified as a Group A human carcinogen. Carbon tetrachloride, chloroform, and hexachlorobenzene are listed in the Integrated Risk Information System (IRIS) as Group B2 (sufficient evidence in animals or inadequate or no evidence in humans). PCE and TCE are currently under review but were previously listed as Group B2. 1,1-dichloroethene and 1,1,2,2-tetrachloroethane are listed as Group C or possible carcinogens.

EPA Necco Park Proposed Plan Page 7, fifth and seventh paragraphs

It should be restated that there is no current exposure to groundwater; therefore, there is no risk to human health. Clarification is needed for future risk "...poses an unacceptable risk to human health" if groundwater was to be used as a potable water supply. It should be specified that potential inhalation exposure is related to showering only under hypothetical conditions.

EPA Necco Park Proposed Plan Page 7, last paragraph

This paragraph should be removed. The human health risk assessment only presents potential future risk to human health if groundwater were to be used as a potable water supply. It did not address welfare or the environment. In addition, risk management was not addressed in the risk assessment, but rather in the AOA.

4.5 Scope and Role of Action

EPA Necco Park Proposed Plan Page 9, second paragraph

DuPont is aware of source control measures such as capping and hydraulic control utilized at numerous sites in the Niagara Frontier. To our knowledge, none are using an extensive grout curtain physical barrier as specified for Necco Park in EPA's proposed alternative. DuPont believes that the EPA-preferred remedy for Necco Park goes well beyond remedial actions required at other sites in the Area with similar environmental issues. In fact, the NYSDEC recently issued the PRAP for the Solvent Chemical site in Niagara Falls on August 16, 1996. The Solvent Chemical site environmental issues are very analogous to Necco Park, and the NYSDEC-selected remedy is consistent with Necco Park Alternative 2. Implementation of additional source control measures at Necco Park will not result in additional risk reduction, are not necessary to protect human health and the environment, will not result in restoration of the aquifer to drinking-water standards.

4.6 Remedial Action Objectives

EPA Necco Park Proposed Plan Page 9, Remedial Action Objectives

The PRAP incorrectly refers to the objectives as the remedial action objectives. The correct name of the objectives is response action objectives. This distinction is important because the site scored too low for listing on the NPL and therefore has not been deemed a high priority site because of the low potential risk from site contaminants.

EPA Necco Park Proposed Plan Page 9, Groundwater, second paragraph

The RAO for groundwater is presented as "...the reduction of risks to human health associated with potential exposure to site-related compounds by reducing the quantity of source materials (i.e., DNAPLs) to the extent practicable, and attaining the groundwater cleanup criteria." The remedial action objective (RAO) approved by the EPA in the AOA is "....restoration of groundwater to its designated use--potable drinking water--as impacted by Necco Park contamination." DuPont believes the risks to human health are controlled by the existing systems. It should also be noted that it is highly unlikely the RAO of groundwater restoration to drinking-water quality can be achieved by any of the alternatives.

4.7 Evaluation of Alternatives

4.7.1 Overall Protection of Human Health and the Environment

EPA Necco Park Proposed Plan Page 15, first paragraph

This paragraph should clarify that exposure would only occur if groundwater were used for potable purposes. "The potential for exposure through the groundwater migration would then present a human health risk" if used as a potable water supply. Currently groundwater is not used as a potable water supply, nor is it likely that it will be used in the future.

4.7.2 Compliance with ARARs

EPA Necco Park Proposed Plan Page 16, first paragraph

The AOA indicated that the intent of the NYSDEC TAGM's would be met for soil by using a cap to prevent contact and minimize infiltration.

4.7.3 Long-term Effectiveness and Permanence

EPA Necco Park Proposed Plan Page 17, first paragraph

The statement for Alternative 1 that "Contaminants would remain in the groundwater posing a potential risk to a receptor" would apply to all alternatives if the hypothetical future exposure scenario is assumed. This statement is used by USEPA throughout the Evaluation of Alternatives text. However, all alternatives

do not pose a current risk since there is no exposure to groundwater. The presence of a contaminant in groundwater can not pose a risk unless an exposure pathway exists. Therefore, contaminants in the groundwater present a potential for exposure not potential risk.

EPA Necco Park Proposed Plan Page 17, second paragraph

Alternative 2 captures 99 percent of contaminant load in the upper aquifer zones.

EPA Necco Park Proposed Plan Page 17, sixth paragraph

The existing Necco Park pump-and-treat system has achieved greater than 90 percent uptime during 1996.

4.7.4 Reduction in Toxicity, Mobility, or Volume

EPA Necco Park Proposed Plan Page 18, third full paragraph

The potential for the source area to expand is not supported by existing data. DuPont does not agree that DNAPL and contaminated groundwater will migrate beyond the property boundaries for all alternatives that do not include a slurry wall considering the low conductivity of natural glacial deposits. Data collected to date indicates that migration of DNAPL and aqueous contamination beyond the Necco Park property boundary has been extremely limited in the low conductivity overburden.

4.7.5 Implementability

EPA Necco Park Proposed Plan Page 19, second and fifth full paragraphs

The implementability evaluation understates the potential difficulties for installing vertical barriers (slurry wall and grout curtain) at the site and how these implementability concerns could impact barrier effectiveness. Slurry walls are typically tied into underlying confining clay units to isolate contaminant sources. However, based on existing site geological data, the site overburden zone will not serve as an adequate confining unit to tie the slurry wall into. The slurry wall would have to be tied into the upper bedrock zone, which is more difficult to accomplish because of the need for specialized construction equipment. The effectiveness of a slurry wall tied into bedrock is also uncertain because potential pathways may exist between the wall and bedrock fractures.

The effectiveness of grout curtains to physically contain DNAPL is questionable was previously discussed. Additionally, a grout curtain surrounding the source area would also be extremely difficult to construct because of the large number of obstructions in the vicinity of the proposed grout curtain alignment. Leachate and gas collection systems for BFI's landfill are presently located along the proposed alignment of eastern wall of the grout curtain (along the property boundary). Extending the grout curtain into the landfill is not technically practical.

The proposed alignment for the southern wall of the grout curtain extends into BFI property. Installation along this boundary requires obtaining property right of ways as well as several significant physical obstructions, including power lines and extremely small clearance between these lines and the underground Texas Brine lines. Railroad lines are also present along the proposed western grout curtain alignment.

4.8 Preferred Alternative

EPA Necco Park Proposed Plan Page 19, next to last paragraph

This paragraph states that "control of DNAPL migration will be achieved by extending the grout curtain around the source area and installing a slurry wall." The effectiveness of a grout curtain in containing DNAPL is unproven. Installation of a grout curtain may potentially increase migration of DNAPL, if present. Additionally, only partial control of DNAPL may be achieved by extending the grout curtain around the

source area and installing a slurry wall.

EPA Necco Park Proposed Plan Page 20, first paragraph

This paragraph states that "the installation of an additional dedicated DNAPL recovery well" will collect DNAPL in the source area. Alternative 9 in the AOA did not include a dedicated DNAPL recovery well. Alternative 9 in the AOA stated DNAPL recovery would be enhanced through overburden wells installed upgradient of the slurry wall.

EPA Necco Park Proposed Plan Page 20, fourth paragraph

It should be noted that the implementation of deed restrictions in conjunction with the existing Niagara County ordinance controlling groundwater well permits would clearly eliminate potential future exposure to contaminated groundwater.

EPA Necco Park Proposed Plan Page 20, ninth paragraph

This paragraph states that "the preferred Alternative could be constructed and operational in one to two years." Because of the difficulties described previously, DuPont believes that the implementation of Alternative 9 would require three to five years. Additionally, the proposed alignment may not be physically possible because of the many obstructions present.

EPA Necco Park Proposed Plan Page 20, tenth paragraph

DuPont believes that the description of the implementability of Alternative 9 on page 20 of the PRAP understates that difficulties in constructing the grout curtain. The AOA stated the following regarding Alternative 9:

> "Construction of a grout curtain around the source area will be difficult due to existing landfills, utilities, and lack of access. Construction of a source area grout curtain presents considerable construction difficulties. Construction of new grout curtains to the east of Necco Park would be difficult because only a narrow strip of land is accessible for use as a working area. A nearby methane-recovery system could limit construction. Construction of a new grout curtain section to the south would be difficult because the adjacent access road is the only available working area. This would require construction of new access roads and diversion of private traffic. A drainage ditch and close proximity to underground Texas Brine lines will further complicate construction. A grout section to the west would be limited by railroad tracks.
>
> Prior to installation, soil borings would be needed to determine the proper location of a grout curtain. Permission would also need to be obtained from CECOS and BFI prior to constructing such a grout curtain. In the past, CECOS has shown concern about the effects of a grout curtain on water levels beneath its facilities. Specifically, a concern was expressed that a grout curtain spanning B zone would result in an unacceptable increase in the elevation of overburden water table on the CECOS property north of Necco Park. If construction of a new grout curtain is challenged, it would significantly delay implementation of this alternative."

EPA Necco Park Proposed Plan Comment Page 21, last paragraph

DuPont does not agree with this summary of why Alternative 9 was selected for the following reasons:

- The PRAP understates the fact that there are presently no risks to human health and the environment. The PRAP should therefore emphasize that the site does not post an unacceptable risk to human health and the environment.

- The PRAP does not clearly indicate that groundwater will not be drinkable even after implementing Alternative 9 or any other alternative. Therefore, the PRAP should indicate that the implementation of the proposed alternative would still not achieve the goal of drinkable groundwater since it is

not technically practicable.

- The use of grout curtains to physically prevent DNAPL migration is not proven. Therefore, the effectiveness of the grout curtain to physically contain DNAPL is questionable.

- The implementability evaluation understates the potential difficulties for installing vertical barriers (slurry wall and grout curtain) at the site and how these implementability concerns could impact barrier effectiveness. Therefore, total containment of the DNAPL along the source area boundary can not be achieved.

- DuPont does not believe that Alternative 9 is a cost effective remedy. This alternative has the third highest capital cost (almost $16 million) and O&M costs are almost double the present O&M costs. The high capital cost for the grout curtain is excessive given the lack of present risks and unproven effectiveness in physically controlling DNAPL.

4.9 Glossary

EPA Necco Park Proposed Plan Page 23, Grout Curtain

The glossary states that a grout curtain "may be used to reduce DNAPL flow." The use of a grout curtain to reduce DNAPL flow is unproven.

EPA Necco Park Proposed Plan Page 23, Lagoon

The glossary states that lagoons are typically used for storage of "spent nuclear fuel."
DuPont would like to clarify that at no time were spent nuclear fuels placed at the Necco Park site.

4.10 Tables

Table 3

Costs presented in the PRAP have been taken from Appendix E of the AOA. These costs are approximate (plus 50 or minus 30 percent). Citing estimated costs to the dollar presents more accuracy than intended by the engineer. DuPont recommends that costs be rounded to the nearest $100,000 as was presented in the AOA. Additionally, DuPont recommends that the EPA state that all costs presented in the PRAP are approximate

5.0 REFERENCES

Frappa, R. H., A. M. McManus, and B. L. Parker. 1996. The Use of Nonconventional Investigative Methods in the Development of a Conceptual Site Model. Proceedings of the 28th Midatlantic Industrial and Hazardous Waste Conference.

Golder Associates, Inc. 1991. Corrective Measures Study. Bell Aerospace Textron Wheatfield Plant, Niagara Falls, New York.

____. 1992. Corrective Measures Implementation Plan Off-Site System. Bell Aerospace Textron Wheatfield Plant, Niagara Falls, New York.

Kipko, E. et al. 1993. Integrated Grouting and Hydrogeology of Fractured Rocks in the Former USSR. Society for Mining, Metallurgy, and Exploration, Inc., Littleton, Colorado.

Parker, B. L., et al. 1994. "Diffusive Disappearance of Dense, Immiscible Phase Organic Liquids in Fractured Geologic Media," in Groundwater. Volume 32, pages 805-820.

Rumer, R. R. and J. K. Mitchell. August 1995. Assessment of Barrier Containment Technologies, A Comprehensive Treatment for Environmental Remediation Applications. Prepared under the auspices of the United States Department of Energy, The United States Environmental Protection Agency, and DuPont.

Sudicky, E. A. and E.O. _____ 1982. Contaminant Transport in Fractured Porous Media: Analytical Solutions for a System of Parallel Fractures.

Sudicky, E. A. 1988. "CRAFLUSH , Parallel Crack Model D>)," in Waterloo Center for Groundwater Research.

Wilson et al. September 1996. Environmental Chemistry and the Kinetics of Biotransformation of Chlorinated Organic Compounds in Groundwater. United States Enviromnental Protection Agency.

Woodward-Clyde Consultants. 1985. Phase II Remediation Studies, Necco Park

____. 1991. Necco Park Interpretive Report.

Yager, R. M. 1993. Simulated Three-dimensional Groundwater Flow in the Lockport Group, A Fractured Dolomite Aquifer near Niagara Falls, New York. United States Geological Survey Water Resources Investigation Report 92-4189.

APPENDIX VI

RESPONSIVENESS SUMMARY
PART II

DUPONT NECCO PARK SITE

TOWN OF NIAGARA AND CITY OF NIAGARA FALLS

NIAGARA COUNTY, NEW YORK

The U.S. Environmental Protection Agency (EPA) established a public comment period from February 28, 1998 through March 29, 1998, which was extended through May 29, 1998, for interested parties to comment on EPA's revised Proposed Plan for remediation of the DuPont, Necco Park Superfund Site (Necco Park Site). The Site is located within the Town of Niagara and the City of Niagara Falls, New York. The revised Proposed Plan was developed by EPA with support from the New York State Department of Environmental Conservation (NYSDEC).

The revised Proposed Plan amended the 1996 Proposed Plan which identified Alternative 9 as the preferred remedial alternative. Alternative 9 consisted of containment of the source area by upgrading the existing cap, extending the grout curtain around the source area in the B through F bedrock zones of the aquifer, groundwater extraction to maintain an inward gradient within the grout curtain, and containment of groundwater in the overburden through construction of a slurry wall. At the close of the 1996 public comment period, EPA received extensive comments from both the general public, who felt the preferred remedial alternative was not comprehensive enough, and DuPont, which felt that additional remedial actions beyond the existing containment system were not required. As a result, EPA reconsidered the preferred remedial alternative and, following discussions with DuPont, while considering the comments of the public, developed a modified preferred alternative that is protective of human health and the environment and is supported by DuPont in its commitment to implement the modified remedy. On February 28, 1998, EPA issued a revised Proposed Plan and a Responsiveness Summary to address comments received during the original public comment period (July 22 - September 19, 1996).

The revised Proposed Plan identified Alternative 10A as the preferred remedial alternative. Alternative 10A consisted of a variation on Alternative 10, which was presented in the original Feasibility study and 1996 Proposed Plan. Alternative 10 differed from Alternative 9 by substituting increased pumping rates to achieve hydraulic containment of the bedrock source area in place of the bedrock grout curtain. Alternative 10A retained all of the components of Alternative 10 except that containment in the overburden (A zone) could be achieved either through hydraulic (pumping) or physical containment (slurry wall). EPA held a public meeting on March 12, 1998 at the Best Western Inn on the River, Niagara Falls, New York to present EPA's and NYSDEC's preferred remedial alternative to remediate the Necco Park Site as presented in the revised Proposed Plan.

The Responsiveness Summary is prepared for the purpose of providing a summary of public comments and concerns about the Site raised during the public comment period and EPA's responses to those comments and concerns. All comments summarized in this document were considered in EPA's final decision for selection of the remedial alternative for remediation of the Necco Park Site. The Responsiveness Summary is organized into the following sections:

- Section I: Comments Received During the Public Meeting
- Section II: Written Comments Received During the Comment Period
- Appendices:

    A. Meeting Agenda
    B. Revised Proposed Plan (February 1998)
    C. Meeting Sign-in Sheet

D. Written Comments on Revised Proposed Plan

SECTION I: COMMENTS RECEIVED DURING THE PUBLIC MEETING

1. COMMENT: A resident asked for clarification on the differences between Alternative 10 and 10A.

EPA RESPONSE: The difference between the two alternatives is how containment will be achieved in the A zone groundwater aquifer. Alternative 10 specified that the containment would be achieved through the construction of a slurry wall; Alternative 10A provides for the option of either achieving A zone containment through the construction of a slurry wall or through pumping and treating of the groundwater. Essentially, this provides an option of implementing either a physical barrier or a hydraulic barrier to achieve containment.

2. COMMENT: A member of the public asked what time frame was used to generate the cost estimate for the modified preferred alternative.

EPA RESPONSE: The cost estimates for all the alternatives are based on a capital cost component, which is the initial dollar outlay for design and construction, and an operation and maintenance (O&M) component. The cost figure for O&M is based on thirty years of system operation.

3. COMMENT: The same person asked if DuPont would be required to provide financial assurance of its ability to carry out the remediation.

EPA RESPONSE: Yes, EPA's Superfund program requires proof of financial assurance as a condition to allowing the potentially responsible party (PRP) to implement the work.

4. COMMENT: A resident asked if there would be any provision in the Necco Park settlement to address the costs of treating groundwater that migrates into the Falls Street Tunnel and New York Power Authority (NYPA) conduits, as this cost is currently at the expense of Niagara Falls taxpayers.

EPA RESPONSE: No. The Falls Street Tunnel and NYPA conduits intercept contaminated groundwater from several hazardous waste sites in Niagara Falls, including Necco, Park. In May 1993, the United States and the State of New York reached a settlement with the City of Niagara Falls resolving 11 years of litigation concerning the Niagara Falls Wastewater Treatment Plant (NFWWTP). This 1993 settlement required the City to divert all remaining dry weather flow in the Falls Street Tunnel to the NFWWTP for treatment. At the time of this settlement, City representatives stated that the major portion of increased treatment costs from conveyance of the Falls Street Tunnel flows to the NFWWTP would be assessed to industrial sewer users since the chemical contamination came from industrial sources.

5. COMMENT: A member of the public asked that given the surrounding topography and the presence of adjacent waste dumps at Necco Park, would the action proposed for the Necco Park Site change the hydrogeological gradient and groundwater flow of the surrounding area.

EPA RESPONSE: The preferred alternative at the Necco Park Site is intended to alter localized groundwater flow patterns to prevent further off-site migration of contaminants. The actual effects will be examined more closely in the design phase of the remedy. The design will attempt to integrate existing monitoring programs with the Necco Park remedy so that there will be minimal disruption to those systems in place, consistent with the attainment of the response action objective of controlling the migration of groundwater downgradient from the Necco Park property and the source area.

6. COMMENT: The same individual asked that if the local hydrology were to change, would it be possible for the characteristics of the waste stream to change and if new contaminants were identified that had not previously been detected in the influent to the Necco Park treatment system, would that cause a shutdown in the system, particularly if treatment costs were to go up.

EPA RESPONSE: EPA believes that the groundwater in the vicinity of the Site has been sufficiently characterized and it is unlikely any new contaminants would appear in the influent which would result in

modifications to the treatment system. Nevertheless, chemical analysis is required as part of the treatment process. If additional chemical constituents are found that would require adjustments to the treatment system, then the treatment system would either be upgraded to address them or an alternative remedial strategy would be implemented.

7. COMMENT: The same resident clarified his comment by stating his concern that without a grout curtain, an element of the original preferred alternative which would have segregated the Necco Park wastes from surrounding wastes, there may be a possible disagreement between potentially responsible parties as to whose waste is being treated which could lead to an interruption in the treatment process.

EPA RESPONSE: The intention of the grout curtain, which was an element of the original preferred alternative, was to contain the source area. Implementation of the grout curtain would have encompassed wastes to the south of the Necco Park landfill on CECOS' property. Therefore, CECOS' wastes within the source area would have been encompassed by the grout curtain and the waste stream would not have been segregated under the original remedy.

At the Necco Park Site, EPA has identified wastes specifically attributable to DuPont at all the areas addressed by this remedial action. EPA would not authorize an interruption in the treatment process due to a dispute between potentially responsible parties over their respective responsibilities for cleaning up wastes at a site. The Superfund law establishes joint and several liability of persons who owned or operated a site where hazardous substances were disposed of and those persons who generated the hazardous substances so disposed of at a site. In essence, this means that even if a party were responsible for only part of the waste at a site, it is potentially liable for cleaning up all of it. EPA would, therefore, require that the system operate uninterrupted even if such a dispute were to exist among potentially responsible parties concerning their respective responsibilities at the site. If a party feels that other parties are potentially liable for site contamination and not participating in the cleanup, it has the right to seek legal recourse to get them to contribute to the costs of the cleanup, but this should not interrupt the remedial process.

8. COMMENT: A resident asked for verification that the modified preferred alternative would essentially substitute an up-front capital expense for a long-term operating expense, and absolute containment (i.e., slurry wall and grout curtain) for a hydraulic system that would require constant monitoring and treatment.

EPA RESPONSE: This is essentially correct, although implementation of a slurry wall would also require pumping and treatment, but at a lower rate since the wall would keep clean water out of the pumping zone. An operation and maintenance activity (treatment and monitoring) would be required both with a slurry wall remedy as well as with a hydraulic remedy. It should also be noted that the modified preferred alternative calls for containment of contaminated groundwater in the overburden through the application of physical and/or hydraulic methods. Should one of these employed methods (e.g. , pumping and treatment) fail to achieve containment, the other (e.g., slurry wall) would be implemented in order to prevent contaminant migration from the source area in the overburden. During discussions with DuPont, the company expressed its commitment to EPA to implement the modified preferred alternative.

SECTI0N II. WRITTEN COMMENTS RECEIVED DURING THE COMMENT PERIOD

The only written comments EPA received on the DuPont, Necco Park revised Proposed Plan were from CECOS International Incorporated. The following summarizes those comments and EPA's responses.

1. COMMENT: CECOS believes that the remedy selection process to develop the proposed remedy was flawed and inconsistent with the NCP, and may have resulted in the proposal of a remedy which does not satisfy the NCP protectiveness criteria. Additionally, EPA's decision to involve parties [i.e., representatives from CECOS, BPI, and NYSDEC] after it had identified a preferred alternative is inconsistent with public participation goals.

EPA RESPONSE: EPA selects remedial actions in accordance with the requirements contained in the National

Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CPR Part 300). The NCP was promulgated to effectuate the statutory requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA). Under the CERCLA remedy selection process, alternatives for remediation of a site are developed and evaluated using nine specific criteria. These criteria are: overall protection of human health and the environment; compliance with Applicable or Relevant and Appropriate Requirements (ARARs-which reflect standards from other environmental statutes and regulations); long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; cost; State acceptance; and community acceptance. The first two criteria, i.e., protection of human health and the environment and compliance with ARARs, are threshold requirements which must be met before an alternative will be retained for further consideration. In evaluating the alternatives that meet the threshold criteria, the objective is to select, through a consideration of the remaining criteria, the alternative that provides the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA evaluated all of the final 13 alternatives, and the modified preferred alternative, using these criteria. As a result of this evaluation, in accordance with the NCP, EPA determined that the modified preferred alternative was protective of human health and the environment, and was cost-effective.

It should also be noted that at comparable sites in Niagara Falls, such as Occidental Chemical Corporation's (OCC) Hyde Park, 102nd Street, S-Area and Buffalo Avenue sites, EPA and NYSDEC have taken similar remedial approaches to the one identified in EPA's modified proposed alternative for the Necco Park Site. All of these sites employ maximum source containment and mitigation efforts through some combination of the use of caps, overburden barrier walls or drains, pumping and treatment for the overburden and bedrock groundwater, DNAPL extraction and collection in the bedrock, monitoring, and in some cases, soil/sediment excavation and additional site characterization. EPA's approach at Necco Park, i.e., maximum source area containment, is consistent with remedies in place at similar Superfund sites.

EPA does not agree with CECOS' assessment that public participation goals have not been met, specifically with respect to the involvement of NYSDEC, CECOS, and BFI. As stated in the revised Proposed Plan, EPA has conferred with NYSDEC throughout the remedial process and received NYSDEC's concurrence on the modified preferred alternative. CECOS and BFI are both included on the EPA mailing list for the Site and, as such, have been informed of EPA actions with regard to Site studies and have been notified of all public meetings. Representatives from CECOS and BFI have attended public meetings for the Site and a CECOS representative has inspected the administrative record maintained at EPA's Niagara Falls Public Information Office. CECOS and BFI have been invited to comment on both the 1996 preferred alternative, as well as the 1998 modified preferred alternative, as part of EPA's public participation process. EPA granted CECOS/BFI's request for an extension of the public comment period on the revised Proposed Plan. CECOS/BFI's comments have been received, and EPA is responding to those comments in this Responsiveness Summary.

2. COMMENT: EPA's revised Proposed Plan must include an evaluation of the impacts of Alternative 10A on the CECOS monitoring program. If the evaluation shows that Secure Chemical Management Facility (SCMF) 1, 2, and 3 or any other impacted CECOS unit cannot be monitored effectively, the preferred remedy must propose an alternative to monitoring.

EPA RESPONSE: The Record of Decision (ROD) indicates that there is currently a monitoring system in place on the CECOS/BFI property to assure protection of human health and the environment. Impacts that the Necco Park remedy might have on CECOS' monitoring system will be evaluated during the design phase of the remediation, and steps will be taken to minimize those impacts to the extent that they are consistent with the attainment of the response action objective of controlling the migration of groundwater downgradient from the Necco Park property and the source area.

3. COMMENT: The revised Proposed Plan and supporting documentation do not evaluate the impacts of the proposed remedy on CECOS' monitoring systems, nor is there a cost analysis of actions that may be required to mitigate any impacts to these systems.

EPA RESPONSE: EPA's objective is to remediate the Necco Park Site in a cost-effective, fully protective manner. To that end, it is EPA's intention to integrate the Necco Park remedial action with CECOS', monitoring system, to the maximum extent practicable and to minimize any disruptions to this system. EPA

recognizes that implementation of the Necco Park remedy will impact local groundwater flow; the extent of these impacts will not be known until evaluated in the design phase of the remedy. Therefore, the integration of the Necco Park remedial action with CECOS' monitoring system will be developed during the design and EPA will afford CECOS the opportunity to provide input during the design of the Necco Park remedy. EPA does not believe that a cost analysis of actions to mitigate any impacts to CECOS' monitoring system is required at this time.

4. COMMENT: The CECOS monitoring program is developed to protect human health and the environment. The revised Proposed Plan does not evaluate risks to human health or the environment from potential disruptions to CECOS' monitoring system, nor costs that may be incurred by these disruptions.

EPA RESPONSE: It is EPA's intention to minimize any disruptions that might result to CECOS' monitoring system in pursuing the response action objective of controlling the migration of groundwater downgradient from the Necco Park property and the source area. To the extent that there are disruptions to CECOS' monitoring systems, EPA will ensure that protection of human health and the environment will not be compromised. This will be accomplished through the design and implementation of the Necco Park remedy in a manner that will maintain or replace any elements of the monitoring systems that were disrupted. As stated in the previous response, EPA will afford CECOS the opportunity to provide input during the design of the Necco Park remedy. It should be noted that CECOS' monitoring system does not in itself protect human health and the environment, but rather is designed to detect any failures of the containment system in place.

5. COMMENT: An increase from the current pumping rates of 6-8 gpm to 155-160 gpm cited in the revised Proposed Plan will significantly change the groundwater flow regimes in the vicinity of SCMF 1, 2, and 3 and will potentially change groundwater flow over a large portion of the CECOS/BFI site, rendering CECOS' current monitoring program useless and requiring a new monitoring program to replace the impacted one. The new monitoring program will be expensive and difficult to implement in that the phased approach to the Necco Park preferred alternative will constantly change groundwater flow and direction.

EPA RESPONSE: Increasing pumping rates from the current 6-8 gpm to rates that could be as high as 155-160 gpm is intended to impact local groundwater flow conditions in order to control the off-site migration of contaminants. The extent of that impact is currently undefined and will be evaluated during the design process. One purpose of the phased approach to remediation is to attempt to achieve full containment at some pumping rate less than 155-160 gpm. Additionally, a phased implementation will allow for incremental adjustments to CECOS' monitoring program (if any adjustments are warranted), thereby creating minimum disruption to the CECOS monitoring system. As previously stated, it is EPA's intention to integrate the Necco Park remedy with CECOS' monitoring program. During the design phase of the Necco Park remedy, modeling will be conducted in an effort to ascertain any possible impacts of the Necco Park remedy on CECOS' system. The design will be developed, with input from CECOS, with the goal of minimizing any impacts on CECOS' systems and integrating the Necco Park remedy with CECOS' systems to the maximum extent practicable.

6. COMMENT: EPA's determination that achieving groundwater ARARs in the source area is technically impracticable is inconsistent with the groundwater cleanup goals on the CECOS/BFI property and does not consider the future land use of CECOS' property, including exposure scenarios for workers that may have cause to excavate into the subsurface.

EPA RESPONSE: This comment involves three distinct issues: a) EPA's basis for a technical impracticability determination; b) a perceived inconsistency with cleanup goals on CECOS/BFI property; and c) the impact of a technical impracticability determination on land use, and is responded to accordingly.

a) A technical impracticability waiver of ARARs has been invoked because current engineering science does not exist to treat the source area at Necco Park to levels specified by ARARs. As a result, limitations to land use must be accomodated accordingly. The process for this determination is described in Section 300.430(f)(1)(ii)(C) of the NCP and EPA's guidance concerning groundwater restoration at sites containing Dense Non-Aqueous Phase Liquids (DNAPLs) (OSWER Directive 9200.4-14 and EPA's Guidance for Evaluating the Technical Impracticability of Groundwater Restoration). The Office of Solid Waste and Emergency Response

(OSWER) Directive 9200.4-14 states that "while EPA remains firmly committed to restoring contaminated groundwater to beneficial uses at Superfund sites, it is also important to recognize that technical limitations to achieving this goal may exist. The Directive also states that "...complete restoration of many groundwater contaminated sites in the Superfund program might not be technically practicable with available remediation technologies due to the presence of non-recoverable DNAPLs, or for other reasons related to complex site hydrogeology or contaminant characteristics." The source area at the Necco Park Site contains DNAPLs in the soil and bedrock. At present, no available technology has been identified to fully remove these DNAPLs from the environment; and, therefore, remediation of the DNAPL contaminated soils, bedrock and groundwater in the source area of the Necco Park Site is considered to be technically impracticable. Consequently, a waiver of the federal and State drinking water standards and State groundwater quality standards for the groundwater in the source area beyond the limits of the landfill where DNAPLs are present is warranted.

b) Cleanup goals on the CECOS/BFI property where groundwater is being extracted and treated are New York State Ambient Water Quality Criteria (NYSAWQC). The area of the CECOS/BFI property where groundwater extraction and treatment takes place is upgradient (north and east) of the Necco Park Site. Groundwater in this area is not characterized by the presence of DNAPLs nor does it exhibit aqueous constituent levels which would theoretically indicate the presence of DNAPLs. Federal and State groundwater standards, including NYSAWQC, are applicable for all areas of the Necco Park Site where DNAPLs are not present, which is consistent with the cleanup goals for the CECOS/BFI property (i.e., State groundwater standards).

c) As stated above, since a technical impracticability waiver is warranted, limitations to land use must be accomodated accordingly. Institutional controls, which are land-use restrictions imposed by the local government, are an element of the preferred alternative. The controls will account for wastes left in place in the source area, including precautions workers would need to take if subsurface excavation is required. Based on current land use, namely that the CECOS property consists of a hazardous waste containment facility, such precautions already must be heeded. Also, given the current land use, future land use is not expected to vary widely. Additionally, EPA's risk assessment for the Site did not consider current and future worker exposure scenarios from soil ingestion, inhalation, or dermal contact because the Site is capped, access is restricted, disturbance is expected to be minimal, and historical data indicate that the Site does not contribute significantly to airborne contaminant levels.

7. COMMENT: The installation of an improved cap will likely result in increased runoff from the Site, taxing a drainage system which already experiences problems with capacity. If the additional runoff requires improvements to the drainage structures, this should be mandated by the remedy.

EPA RESPONSE: During the design of the Necco Park remedy, increased runoff potential will be evaluated and all necessary modifications to existing drainage structures will be made.

8. COMMENT: All of the alternatives presented assume access to, over, and through CECOS property. CECOS states that it does not desire to impede progress in achieving remediation for the Necco Park Site, but nevertheless expects to be compensated for any costs it incurs in taking additional actions to accommodate the remediation.

EPA RESPONSE: EPA appreciates CECOS' intention to cooperate with the Necco Park remediation. CERCLA provides for access to properties, among other reasons, when access is necessary to effectuate it response action. Access to CECOS' property will be necessary to effectuate the response action at the Necco Park Site; and it initially will be DuPont's responsibility to secure all necessary access for the remediation of the Necco Park Site. Issues concerning compensation for access to one's property in taking actions to accommodate such access sometimes can be addressed in written access agreements. The negotiation and entry of an access agreement between CECOS and DuPont, however, must not serve to delay response actions necessary to protect human health and the environment. If agreements cannot be reached in a timely fashion, it should be noted that CERCLA provides authority for securing access to ensure that human health and the environment are protected.

9. COMMENT: CECOS is concerned that DuPont will be conducting a major portion of the remedial program on CECOS property which, at the very least, will effect CECOS, ability to use its property.

EPA RESPONSE: Again, an access agreement to carry out the remedy will be initially DuPont's responsibility. To the extent that it is consistent with the attainment of the response action objective of controlling the migration of contaminants from the source area, the remedy will be designed to minimize impacts to CECOS' monitoring systems and property, thereby minimizing impacts on CECOS' ability to use its property.

RESPONSIVENESS SUMMARY - PART II
APPENDIX A -- MEETING AGENDA

Agenda

Public Meeting

The Best Western Inn on the River
7001 Buffalo Avenue
Niagara Fall, New York

Thursday, March 12, 1998 at 7:00 pm

Topic: Revised Proposed Plan for the DuPont, Necco Park Site

I.	Introduction	Michael Basile Community Relations Coordinator U.S. EPA, Region II
II.	The Superfund Process	Kevin Lynch Section Chief, Western New York Remediation Section U.S. EPA, Region II
III.	Site Update and Revised Proposed Plan	Michael Negrelli, Remedial Project Manager DuPont, Necco Park Site U.S. EPA, Region II
IV.	Questions and Answers	
V.	Closing	

RESPONSIVENESS SUMMARY - PART II
APPENDIX B -- REVISED PROPOSED PLAN (FEBRUARY 1998)

<IMG SRC 98144T5>

The U.S. Environmental Protection Agency (EPA) is issuing this revised Proposed Plan to update concerned residents and local officials on the current status of the DuPont Necco Park Site (the "Site"), located in Niagara Falls, New York. This update describes a modification to the preferred alternative presented to the public in August 1996 for the remediation of the Site and offers the public the opportunity to comment on the modified proposed remedy.

PURPOSE OF REVISED PROPOSED PLAN

This revised Proposed Plan describes the modification to the preferred remedial alternative for the remediation of the DuPont Necco Park Site based on comments received by EPA on the July 1996 Proposed Plan. The Proposed Plan was developed by EPA, as lead agency, with support from the New York State Department of Environmental Conservation (NYSDEC), and was issued as part of the Agency's public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f) of the National Contingency Plan (NCP).

The Proposed Plan identified a preferred remedy for the Site but indicated that EPA might modify the preferred remedy or select another remedy if public comments or additional date indicated that such a change would result in a more appropriate remedial action. Upon consideration of the comments received. EPA is proposing a modification to the preferred remedy presented in the July 1996 Proposed Plan. The details of this modification are outlined below. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments, including those concerning the modifications to the proposed remedy described in this revised Proposed Plan.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the Investigation and Analysis of Alternatives Reports, Proposed Plan, Responsiveness Summary, supporting documentation, and this revised Proposed Plan have been made available to the public for a public comment period which begins on February 28, 1998 and concludes on March 29,1998.

A public meeting will be held during the public comment period at the Best Western Inn on the River, 7001 Buffalo Avenue, Niagara Falls, New York on March 12, 1998 at 7:00 pm to present the contents of this revised Proposed Plan, to elaborate further on the reasons for modifying the preferred remedial alternative, and to receive public comments.

Comments received at the public meeting, as well as written comments, will be documented in the Responsiveness Summary section of the Record of Decision (ROD), the document which formalizes the selection of the remedy. All written comments should be addressed to:

Michael J. Negrelli
US EPA
290 Broadway, 20th Floor
New York, New York 10007
Phone Number: (212)637-4278

Dates to remember:
MARK YOUR CALENDAR

February 28, 1998 to March 29, 1998: Public comment period on the revised Proposed Plan and the modified preferred alternative.

March 12, 1998: Public meeting at the:
Best Western Inn on the River
7001 Buffalo Avenue
Niagara Falls, New York
7:00pm

Copies of the Investigation Report, Analysis of Alternatives Report Proposed Plan, Responsiveness Summary, supporting documentation, and revised Proposed Plan are available at the following repositories:

EPA's Public Information Office
345 Third Street, Suite 530
Niagara Falls, New York 14303
(716)285-8842

Hours: 8:00 am to 4:30 pm

and

U.S.EPA - Region II
290 Broadway, File Room
New York, New York 10007
(212)637-430

Hours: 9:00 am to 5:00 pm

SITE BACKGROUND

The 24-acre DuPont Necco Park Site is an inactive hazardous and industrial waste landfill located off Pine Avenue near 56th Street in a heavily industrialized section of the City of Niagara Falls and the Town of Niagara, Niagara County, New York (Figure 1). The Site was originally used as a recreational park by the Niagara Electrochemical Company (from which "Necco" is derived). The property was sold to DuPont in 1930.

The Site is bounded on three sides by commercial disposal facilities. Immediately adjacent to the north and east lies the Newco solid waste landfill, an active nonhazardous waste facility owned by Browning-Ferris Industries ("BFI facility"). Immediately adjacent to the south are three inactive secure hazardous waste landfill cells and a wastewater treatment facility owned by CECOS International, Inc. ("CECOS facility"). An access road and a Conrail right-of-way bounds the Site to the west.

The Site was used for the disposal of industrial and process wastes generated at the DuPont Niagara Plant from the mid 1930's to 1977. These liquid and solid wastes included: fly ash, sodium salts and cell bath residue, building rubble, chlorinolysis wastes, off-grade products and a variety of other organic and inorganic wastes. Liquid wastes were generally disposed of in shallow earthen lagoons on the southeastern portion of the landfill, while the remainder of the landfill functioned primarily as a solid waste landfill.

Hazardous substances from the Site have migrated in the overburden and bedrock underneath the landfill and now extend underneath the CECOS facility and a portion of the BFI facility. The Site, therefore, consists of the 24-acre landfill and the areas surrounding the landfill where hazardous substances from the landfill have come to be located.

As a result of this disposal, soils at the Site and groundwater beneath and downgradient from the Site have been contaminated. The Site Investigation identified seven principal water-bearing geologic units beneath the ground surface. These units have been letter designated as follows: the A zone refers to saturated overburden (unconsolidated rock directly below surface) and the B, C, CD, D, E, and F zones refer to bedding plane fracture zones within the Lockport Formation, a regional dolostone bedrock layer. Contamination at the Site is found as aqueous phase liquids (APL, i.e., dissolved in water) and as non-aqueous phase liquids (NAPL, i.e., occurs as a separate phase and does not readily dissolved in water,

in this case, dense NAPL or DNAPL, i.e., heavier than water). Areas of soil contamination exist above levels that would be considered protective of groundwater quality, Groundwater contamination is above New York State's groundwater standards.

In 1977, the Site was identified as a potential source of groundwater contamination and the landfill was closed. that time, DuPont's contractors commenced groundwater investigations to assess conditions in the immediate vicinity of the Site. In 1982, DuPont commenced operation of a groundwater recovery system with the installation and operation of two extraction wells. In 1988, DuPont and EPA agreed to a Consent Decree that specified additional investigations to be implemented at the Site. [The work, completed in 1989, included: an evaluation of existing monitoring wells, monitoring well seal verification, installation of new monitoring wells, development of a geologic report characterization of vertical fracturing (lineament), development and refinement of a site-specific indicator parameter list for groundwater and NAPLs, groundwater and NAPL sampling, man-made passageway investigation, historic drainage way investigation and development of a health and safety plan.] The results of these investigations are presented in the Necco Park Interpretive Report (Woodward-Clyde (WCC) 1991), which
was approved by EPA in July 1992.

In October 1989, an Administrative Order on Consent pursuant to CERCLA was signed by EPA and DuPont. This Order required DuPont to conduct additional investigations beyond those performed pursuant to the 1988 Consent Decree, and to analyze remedial alternative to address the contamination from the Site. These investigations included additional groundwater monitoring, sampling for dioxin, further investigation of vertical fracturing, assessment of the current remedial actions, sampling of underground man-made passageways and further assessment for the presence of NAPLs. This work began in May 1991 and was completed in September 1992. The results of these investigations are presented in the Necco Park Investigation Report (WCC 1993), which was approved by EPA in May 1994.

Based on the information collected during these investigations, EPA performed a Risk Assessment which examined the potential human health and environmental risks attributable to the contaminants present at the Site. EPA considered both present risks and potential future risks from the Site. The Risk Assessment determined that actual or threatened releases of hazardous substances from the Site may present a potential threat to public health and that future ecological impacts to the Niagara River may occur, if remedial actions were not implemented.

DuPont prepared an Analysis of Alternatives Report to identify, develop, screen and evaluate response action alternatives to address the contamination and potential health risks, which was approved by EPA in June 1996. EPA presented the findings of the Site Investigation and Risk Assessment and the remedial alternatives from the Analysis of Alternatives Report, including the preferred alternative, in a Proposed Plan for Site remediation. The Proposed Plan was released for public comment on July 22, 1996 and the content of the Proposed Plan was discussed at a public meeting on August 13, 1996. The public comment period closed on September 19, 1996.

Comments presented to EPA regarding the preferred remedy described in the July 1996 Proposed Plan are summarized and responded to by EPA in a Responsiveness Summary, available at the information repositories, which EPA is issuing concurrently with this revised Proposed Plan. Along with comments from area residents, EPA received extensive comments from DuPont which led to discussions with DuPont an its implementation of an alternative remedy which would remain fully protective of human health and the environment DuPont has expressed to EPA its commitment to implement the modified preferred alternative discussed in depth in this revised proposed plan. The resulting modified preferred remedy most closely resembles Alternative 10 as described in the July 1996 Proposed Plan. Summaries of the originally preferred alternative (Alternative 9) and Alternative 10 are outlined below.

SUMMARY OF ALTERNATIVES 9 AND 10 FROM THE JULY 1996 PROPOSED PLAN

Based upon an evaluation of the various alternatives, EPA and the NYSDEC had recommended Alternative 9 as the preferred remedial alternative for the Site in the July 1996 Proposed Plan. The key componeants of Alternative 9 include the following:

- Containment of the source area by: 1) upgrading the existing cap to satisfy the substantive requirements of New York State's Part 360 standards; 2) extending the existing grout curtain around the source area in the B through F zones; 3) installing a slurry wall in the overburden (A zone) on the southern, and portions of the eastern and western Site boundaries; and 4) using groundwater extraction to maintain an inward gradient within the grout curtain to control the migration of contaminated groundwater past the source area boundary. The operation of these extraction wells would lower the water table within the source area encompassed by the grout curtain and retard or prevent the contaminated groundwater from migrating past the source area. The installation of the grout curtain to encompass the entire source area would keep water from flowing back into the source area when the extraction wells were operated within the grout curtain. This would reduce the quantity of groundwater requiring treatment. The operation of these extraction wells would also serve as collection points for DNAPL removal.

  The exact number, size, depth and pumping rates of the extraction wells would be determined during the remedial design. Existing monitoring wells on-Site would be used to monitor the performance of the groundwater extraction system to verify that sufficient hydraulic control occurs. Additional monitoring wells also may be required if they are determined to be necessary during the design and implementation of the groundwater extraction system.

- Treatment of the extracted groundwater from the source area at the adjacent CECOS wastewater treatment plant (WWTP) to achieve the appropriate discharge standards to two publicly owned treatment works (POTW).

- Expansion of the existing DNAPL monitoring well network with the removal of any recoverable DNAPL encountered. Collected DNAPL would be disposed of off-Site at an appropriate facility.

- Operation and Maintenance (O&M) of the existing systems.

- Periodic monitoring of the groundwater extraction systems to ensure that adequate control is maintained. Periodic sampling of the groundwater treatment system discharge to ensure that treatment standards are achieved. Periodic sampling of the groundwater in the far-field area to measure the progress of the preferred alternative in achieving the cleanup standards.

- Institutional controls in the form of deed restrictions and groundwater use restrictions at the Site property. The deed restrictions would be required to permanently prevent the Site property from residential development as long as contaminants remain on the property and the treatment systems are in place. Groundwater use restrictions in addition to the existing Niagara County Ordinance, would be implemented through deed restrictions as well.

The total cost of this alternative is estimated at:

Capital cost:	$15,564,011;
Annual O&M cost:	$ 3,080,275;
0 & M 30-year present worth cost:	$38,223,132;
Total Cost:	$53,787,000.

Construction Time: It is estimated that the time to construct this alternative would be approximately one year from design completion.

The Proposed Plan had also presented Alternative 10, which included all of the elements of the preferred alternative with the exception of the installation of the bedrock grout curtain. The components of Alternative 10 consisted of the following:

- Groundwater extraction from the existing wells RW-1, RW-2, and RW-3 as well as additional extraction to achieve total hydraulic control of the A through F zones in the source area. The estimated pumping rate required to create a complete hydraulic barrier in the A through F zones in the source area is approximately 155-160 gallons per minute (gpm). Recovered groundwater would be treated at

CECOS and discharged to the POTW. The CECOS WWTP has an available capacity of 110 gpm and would require expansion, at an estimated cost of $1,050,000 (this is included in the total cost), to treat the additional 45-50 gpm.

- Installation of a slurry wall in the overburden along the southern boundary and southern sections of the eastern and western boundaries of the Site. Overburden collection wells would be installed in the landfill near the slurry wall to maintain an inward hydraulic gradient across the slurry wall, prevent mounding within the overburden, contain overburden groundwater, and function as collection points for DNAPL removal.

- Expansion of the existing DNAPL monitoring well network with the removal and off-Site disposal of any DNAPL recovered.

- Groundwater extraction from the B through F zones and overburden groundwater recovery would result in total hydraulic control of source area groundwater in the A through F zones.

- The cap would be upgraded to satisfy the substantive requirements; of New York State's Part 360 standards.

- Continued 0 & M of existing systems.

- Periodic monitoring of the groundwater extraction systems to ensure that adequate control is maintained. Periodic sampling of the groundwater treatment system discharge to ensure that treatment standards are achieved. Periodic sampling of the groundwater in the far-field area to measure the progress in achieving the cleanup standards.

- Institutional controls in the form of deed restrictions and groundwater use restrictions at the Site property.

The total cost of this alternative is estimated at:

Capital cost:	$ 7,837,136;
Annual O&M cost:	$ 4,614,775;
0 & M 30-year present worth cost:	$57,264,743;
Total Cost:	$65,102,000.

Construction Time: It is estimated that the time to construct this alternative would be approximately one year from design completion.

Comparison of Alternatives 9 and 10:

The primary difference between Alternatives 9 and 10 is that Alternative 9 calls for an extension of the existing bedrock grout curtain to contain contamination while Alternative 10 eliminates the need for a grout curtain by relying on groundwater pumping to create a hydraulic containment barrier. For the hydraulic barrier to achieve a similar degree of effectiveness as the physical grout curtain barrier in controlling contaminant migration, additional groundwater extraction wells would be required. The amount of groundwater pumped would be estimated increase from 65-75 gpm under Alternative 9 to 155-160 gpm under Alternative 10.

Both Alternative 9 and Alternative 10 also include requirements for installing a slurry wall in the overburden along the southern boundary and the southern sections of the east and west boundaries of the landfill. Based on comments received during the public comment period and DuPont's commitment to operate and maintain an equivalent hydraulically based remedy, the requirement for the slurry wall in Alternative 10 was reassessed using the same principal of replacing a physical barrier with a hydraulic one through the installation and operation of additional pumping wells. As a result it is estimated that an additional 5 gpm of groundwater would need to be pumped and treated from the A zone to achieve hydraulic containment. Although it is EPA's belief that overall cost would not change dramatically with this

modification, a considerable capital cost saving would be realized. DuPont has indicated a preference to distribute remediation costs over time rather than incur a large capital cost outlay at the time of construction. The implementation of containment through hydraulic means rather than physical means also allows a greater degree of flexibility in the phased approach can be utilized to achieve containment
That is, the installation of additional wells and the adjustment of pumping rates, the configuration of which will be determined in the remedial design, will be assessed periodically during the remedial action and modified, as necessary, to achieve containment. This flexibility also has bearing on the O&M costs of the modified preferred alternative. Although EPA believes that the original cost estimate of Alternative 10 also corresponds to the modified proposed remedy, the costs expressed for all the alternatives in the AA Report represent a range of +50 to -30 percent of that which is stated since conceptual design and construction costs have been found to vary within such a range from actual costs. DuPont, in its commitment to implement a hydraulic containment remedy, believes that the flexibility of a phased approach (i.e., installing additional wells and adjusting pumping rates during monitoring assessment) will result in a more economical remedy, probably closer to the lower end of the implied cost range.
In theory, this would be realized by starting with a lower pumping rate and increasing it, if monitoring data indicate the need. The same principal would be applied to well placement. The preference for cost distribution and greater flexibility, along with assurances that appropriate monitoring techniques could be employed to confirm the efficacy of establishing such a hydraulic barrier, supported reevaluation of the preferred alternative.

MODIFIED PREFERRED ALTERNATIVE

The application of the concept of replacing a physical barrier with a hydraulic barrier resulted in the modified preferred alternative. The modified preferred alternative most closely resembles Alternative 10 presented in the July 1996 Proposed Plan and summarized above with the modification that a slurry wall or additional groundwater pumping wells can be used to attain hydraulic containment in the A zone. As stated above, DuPont, which has expressed to EPA its commitment to achieving a fully protective hydraulic containment remedy, also believes that the cost of the modified alternative should be less than the cost of Alternative 10. Hereinafter, the modified preferred alternative will be referred to as Alternative 10A. The components of this alternative are as follows:

1) upgrading of the existing cap to satisfy the substantive requirements of New York State's Part 360 standards;

2) prevention of contaminated groundwater flow from the source area to the far-field in the overburden (i.e., A zone) through the application of physical and/or hydraulic methods;

3) prevention of contaminated groundwater flow from the source area to the far-field in the bedrock (e.g., B through F zones) through hydraulic containment/control methods;

4) a hydraulic monitoring program to verify that hydraulic control of the source area has been achieved for each of the aforementioned water-bearing zones (i.e., A through F zones);

5) treatment of all extracted contaminated groundwater. either on-Site or off-Site, to meet all appropriate discharge standards;

6) a chemical monitoring program to monitor DNAPL occurrence, demonstrate the effectiveness of the remedial measures, and assess the long-term effects of the implemented remedial measures on far-field groundwater quality;

7) expansion of the existing DNAPL monitoring network with removal of any recoverable DNAPL encountered;

8) continued O&M of existing systems; and

9) development and implementation of institutional controls to restrict Site access, the use of groundwater at the Site, and control land use such that it is consistent with Site conditions.

Because this alternative would result in contaminants remaining on-Site, CERCLA requires that the Site be reviewed every five years. As part of this review process, EPA will determine whether the hydraulic controls are effectively containing source area contamination. If not, other remedial actions (including modifications to well placement and pumping rates and/or the installation of other physical barriers) may be implemented to contain, remove, or treat the wastes.

EVALUATION OF MODIFIED ALTERNATIVE

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria, namely, overall protection of human health and the environment compliance with applicable or relevant and appropriate requirements (ARARs), long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment short-term effectiveness, implementability, cost and state and community acceptance. Extensive evaluation of each assessed alternative has been presented in the Proposed Plan. The following is a brief analysis of the modified preferred alternative based upon the evaluation criteria noted above.

- Overall Protection of Human Health and the Environment

The modified preferred alternative (Alternative 10A), along with each previously evaluated alternative, except the "no action" alternative, provides increased protection to the environment by reducing constituent loadings to the far field and therefore the Niagara River. Constituent levels in the source area will be similar for each alternative because DNAPL in fractured bedrock and in overburden cannot be fully removed.

Assuming that the aquifer will not be used as a potable source, no currently unacceptable risk to human health exists for all alternatives. However, a future risk does exist. Under the future residential use scenario, all identified alternatives, except for "no action" will reduce risk to varying degrees. This risk reduction is the result of a reduction of constituent loading to the far-field. Alternative 10A is among those alternatives that accomplish the largest reduction in loadings.

The cap will be maintained or upgraded in all alternatives except for "no action". This cap would protect human health by preventing contact with contaminated soil. The cap also acts to minimize precipitation percolation through contaminated soil and thus minimizes constituent migration.

- Compliance with ARARs

There are currently no promulgated standards for contaminant levels in soils. The EPA is instead using the soil cleanup values developed by NYSDEC that are considered protective of groundwater quality, as "to be considered" (TBC) criteria for organic chemicals in soil. Alternative 10A, along with each of the other alternatives which include upgrading the existing cap, would not meet the TBC criteria but the mobility of the contaminants would be reduced by eliminating the exposure to infiltrating precipitation.

In the source area, none of the identified alternatives would achieve the groundwater chemical-specific limits identified in the following ARARs: New York Safe Drinking Water Act Standards, New York Surface Water and Groundwater Quaity Standards and Effluent Standards, Federal Safe Drinking Water Act National Primary Drinking Water Standards and Amendments, National Secondary Drinking Water Standards, Niagara County Drinking Water Standards, and the Coastal Zone Management Act. The presence of the surficial waste materials (landfill) and DNAPL in fractured bedrock in the source area makes attainment of the groundwater ARARs technically impracticable. Therefore, a waiver of the groundwater ARARs would be required for the source area.

No alternative completely complies with the Coastal Zone Management Act (CZMA). Specifically, the Coastal Zone Management Policy 38 states that "the quality and quantity of surface-water and groundwater supplies will be conserved and protected, particularly where such waters constitute the primary or sole source of water supply." However, all of the alternatives with the exception of "no action" provide increasing incremental compliance with the CZMA through increasing groundwater remedial action and, therefore, increasing incremental benefits to the groundwater resource.

Regarding ARARs in the far-field, each alternative with the exception of "no action" reduces far-field constituent loading from the source area to varying degrees. It is expected that contaminants in the far-field ground at would naturally attenuate over time to eventually reach the groundwater standards. However, based on limited existing information and the complexities of modeling groundwater in a fractured bedrock medium, a degree of uncertainty exists whether the groundwater will or will not eventually achieve the maximum contaminant levels (MCLs) in the far-field. Additional information will be required to fully evaluate the potential for ARARs to be achieved in the far-field.

One of the remedial action objectives is to control source material (DNAPL and contaminated soil) in order to minimize direct exposure and impact on groundwater quality. Each of the alternatives with the exception of "no action" reduce far-field contaminant loading through groundwater extraction, thereby improving groundwater quality. In addition to active remedial measures, all alternatives include interception of a portion of far-field groundwater by the existing utility drains where a portion of collected groundwater Is then treated at the Niagara Falls POTW.

- Long-Term Effectiveness and Permanence

Alternative 10A, along with the other alternatives (except "no action"), provide permanence of protection by removal of the contaminants from the groundwater through treatment. Alternatives 2 through 13 are listed in the Proposed Plan in ascending order of volume of contaminated groundwater captured for subsequent treatment (i.e., Alternative 2 captures and treats the least amount of contaminated groundwater while Alternative 13 captures and treats all of the contaminant plume).

Operation and maintenance of the extraction and treatment system would be required including the servicing of pumps and motors, periodic well development and treatment operation. The extraction and treatment system would be monitored to measure its performance.

The constituent loading reductions for Alternative 10A rely on pump-and-treat technology for hydraulic control. Pump-and-treat system require periodic maintenance to maintain effectiveness of the hydraulic control system. It should be noted, though, that attempts to control DNAPL hydraulically (i.e., pump-and-treat) are unproven since DNAPL may move independently from the groundwater flow. Additionally, because of the unpredictable nature of DNAPL movement it is uncertain whether any of the proposed alternatives can completely contain DNAPL.

A low-permeability cap, which is included in all alternatives except "no action," is effective in reducing potential contact with constituents and minimizing precipitation percolation into the landfill. With maintenance, the cap is a reliable containment technology.

- Reduction in Toxicity, Mobility, or Volume through Treatment

Except for "no acton," which has no provisions for reducing toxicity, mobility, or volume, all alternatives include technologies to reduce constituent toxicity once it is removed from the environment. Additionally, each of these alternatives include groundwater extraction to reduce aqueous constituent toxicity through treatment at the CECOS WWTP and further treatment at the Niagara Falls POTW. The CECOS WWTP treats aqueous-phase constituents by metal precipitation, air stripping, vapor phase carbon adsorption, and liquid-phase carbon adsorption. The POTW treats aqueous-phase constituents through physical-chemical treatment. Liquid-phase toxicity is reduced in each of the alternatives through the use of an off-site incinerator that destroys DNAPL.

Existing utility drains impact the reduction of constituent mobility because they intercept groundwater flow in the D through F zones and partially intercept flow in the B and C zones. Some of the flow in these utility drains are then treated by the Niagara Falls POTW. Effects of the utility drains are considered as part of all alternatives but have not been fully quantified.

All alternatives maintain a cap that limits precipitation percolation, thus limiting mobility of overburden constituents. Groundwater pumping and treatment also reduces constituent mobility. The extent of aqueous constituent mobility reduction can be measured by the constituent loading reduction.

Alternatives with physical barriers reduce mobility of aqueous and DNAPL constituents; Alternative 10A offers the option of achieving this same reduction through hydraulic methods. The reduction of aqueous-phase constituent volume under Alternative 10A can also be measured by the constituent loading reduction.

- Short-Term Effectiveness

No immediate risks to human health have been identified through exposure to contaminated groundwater beneath or downgradient of the Necco Park property because there is currently no use of the groundwater. Therefore, all of the groundwater alternatives should be effective in protecting human health and the environment in the short-term (i.e., until construction is complete). For all alternatives, no short-term risks to the public are expected to be created by constructing the groundwater extraction and treatment systems. The operation of the extraction and treatment systems is expected to be a long-term activity which is not anticipated to present a risk to the public. Those alternatives involving a cap upgrade, including Alternative 10A, may involve a slight increase in truck traffic in the area to transport materials to construct the cap. This impact is expected to be minimal as the area is industrial and truck traffic is a routine occurrence.

- Implementability

Each alternative except "no action" includes the extraction and treatment of groundwater. This type of technology has been applied at numerous sites with a variety of results. Adequate control of groundwater beneath the Necco Park property could be established through the use of a system of extraction and monitoring wells. The treatment systems required in these alternatives would all be the same. Many standard water treatment technologies exist that have been employed at other sites; in fact, contaminated groundwater from this Site has been successfully treated at the CECOS facility. It would be expected, then, that these same technologies would be able to treat the additional volume of groundwater at this Site. The need to treat a greater volume of groundwater under Alternative 10A will either require expansion of the CECOS WWTP or the utilization of an alternative source of on-site or off-site treatment for contaminated groundwater.

- Cost

The costs for all of the alternatives are available in the Analysis of Alternatives Report. For comparison, Alternative 1, no action, presents the lowest costs at $ 0 for capital, present-worth and O & M. This alternative provides a baseline to compare the costs of other alternatives. Alternative 13 is the most expensive alternative to implement with an estimated total cost of $96,460,000. The costs of all other alternatives fall in between these two. It should be noted, though, that all costs actually fall in a range of +50 to -30 percent of that which is stated since conceptual design and construction costs have been found to vary within such a range from actual costs.

It is EPA's belief that the overall cost of the modified preferred alternative is comparable to that of Alternative 10, presented in the July 1996 Proposed Plan (i.e., $65,102,000). However, by replacing a physical barrier with a hydraulic one, a considerable capital cost saving would be realized. That is, monies that would be spent on construction costs in the initial year can be disbursed over time for the operation and maintenance of the hydraulic containment and monitoring systems. Additionally, since the modified preferred alternative can be implemented in a phased approach, DuPont believes that the O&M costs can also be reduced by achieving the equivalent hydraulic containment with a lower pumping rate. This would bring the overall cost down to a figure probably closer to the lower end of the implied cost range. This ultimately makes the modified preferred alternative more attractive to DuPont than an alternative which includes a physical barrier.

- State Acceptance

After review of all available information, the NYSDEC has indicated that it supports the selection of the modified preferred alternative.

- Community Acceptance

Community acceptance of the modified preferred alternative will be assessed in the Responsiveness Summary portion of the ROD following review of the public comments received on this revised Proposed Plan. Responses to comments received on the July 1996 Proposed Plan will also be included in the ROD.

SUMMARY OF MODIFIED PREFERRED ALTERNATIVE

Based upon its evaluation of the modified alternative against the previously evaluated alternatives and the public comments received in response to the original Proposed Plan for the Necco Park Site, EPA and the NYSDEC recommend the modified alternative, Alternative 10A, as outlined in this revised Proposed Plan. The key components of the preferred remedial alternative for the Site include the following:

- Containment of the source area by: 1) upgrading the existing cap to satisfy the substantive requirements of a New York State Part 360 cap; 2) prevention of contaminated groundwater flow from the source area to the far-field in the overburden (i.e., A zone) through the application of physical and/or hydraulic methods, 3) prevention of contaminated groundwater flow from the source area to the far-field in the bedrock (e.g., B through F zones) through hydraulic containment/control methods; and 4) a hydraulic monitoring program to verify that hydraulic control of the source area has been achieved for each of the aforementioned water-bearing zones (i.e., A through F zones). The exact number, size, depth and pumping rates of these wells would be determined in the remedial design of the preferred alternative. Existing monitoring wells on-Site would be used to monitor the performance of the groundwater extraction system and establish that sufficient control occurs. Additional monitoring wells may be required. The need for additional monitoring wells would be determined during the design and implementation of the groundwater extraction system.

- Treatment of all extracted contaminated groundwater, either on-Site or off-Site, to meet all appropriate discharge standards.

- A chemical monitoring program to monitor DNAPL occurrence, demonstrate the effectiveness of the remedial measures, and assess the long-term effects of the implemented remedial measures on far-field groundwater quality.

- Periodic monitoring of the groundwater extraction systems to ensure that adequate control is maintained. Periodic sampling of the groundwater treatment system discharge, to ensure that treatment standards are achieved. Periodic sampling of the groundwater in the far-field area to measure the progress of the modified preferred alternative in achieving the cleanup standards.

- Expansion of the existing DNAPL monitoring network with removal of any recoverable DNAPL encountered.

- Continued O&M of existing systems.

- Development and implementation of institutional controls to restrict Site access, the use of groundwater at the Site, and control land use such that it is consistent with Site conditions.

The modified preferred alternative addresses the principle threats posed by contaminated groundwater at the Site, which are the potential human health risk and prevention of further groundwater contamination downgradient (source control).

The modified preferred alternative also combines the groundwater remediation with the soils remediation to address the principle threat posed by the soils, which is the further contribution to groundwater degradation from contaminants in the soil.

The groundwater extraction and treatment portion of the modified preferred alternative is expected to meet the appropriate discharge ARARs.

EPA believes that the ARARs for groundwater quality cannot practicably be attained within the source area due to DNAPL contamination. It is uncertain whether or not the implementation of this source containment remedy will enable the aquifer outside the source area to be restored to a usable quality. The potential diffusion of contaminants from the Site in the bedrock, as well as the presence of groundwater contaminants upgradient of the landfill, may exacerbate or prevent the attainment of groundwater ARARs in the far-field. Therefore, groundwater in the far-field will be monitored to determine the effectiveness of the source containment efforts and to collect further data to evaluate the future potential for natural processes to achieve ARARs in the far-field.

It is not anticipated that any significant short-term impacts to human health or the environment would occur during the construction and implementation of the modified preferred alternative. The appropriate discharge standards for the pumped and discharged groundwater are currently being met by the CECOS treatment system which will continue to be utilized. The modified preferred alternative could be constructed and operational in one to two years from design completion.

The implementation of the modified preferred alternative is both technically and administratively feasible. The alternative relies on established technologies that are widely used and available.

The capital cost expenditure associated with the modified preferred alternative would be less than the previous preferred alternative due to the elimination of physical barrier construction. Hydraulic means for containment offers a greater degree of flexibility over physical means, resulting in a potential for cost reduction.

Due to the presence of waste materials and DNAPLs in the source area, and the lack of present-day technology to remove those materials from the fractured bedrock medium, none of the alternatives are capable of achieving the ARARs in a cost-effective manner in the source area. Therefore, it is imperative that those materials be contained to prevent further spread of the source area and to prevent the source area from further degrading groundwater quality downgradient. The modified preferred alternative will accomplish this control by hydraulic means.

Although none of the alternatives achieves ARARs within the source area, the modified preferred alternative is expected to achieve the maximum amount of containment, at less capital cost than other alternatives. Therefore, the modified preferred alternative will provide the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA and the NYSDEC believe that the modified preferred alternative will be protective of human health and the environment, will fully comply with ARARs to the maximum extent practicable, will be cost-effective. and will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy also will meet the statutory preference for the use of treatment as a principal element.

<IMG SRC 98144T6>

RESPONSIVENESS SUMMARY - PART II
APPENDIX C -- MEETING SIGN-IN SHEET

<IMG SRC 98144T7>
<IMG SRC 98144T8>

RESPONSIVENESS SUMMARY - PART II
APPENDIX D -- WRITTEN COMMENTS ON PROPOSED PLAN

<IMG SRC 98144T9>

Dear Mr. Negrelli:

As the member of the community surrounding the DuPont Necco Park Superfund site most directly affected, CECOS International, Inc, (CECOS) has reviewed the available information relating to the Modification to, Proposed Remedy as well as the originally proposed remedy.

As a result of this review, CECOS wishes to express serious concerns and reservations related to not only the proposed remedy, but also to the process which took place. CECOS believes that the remedy selection process used to develop the proposed remedy was seriously flawed, was inconsistent with the National Contingency Plan (NCP), and may have resulted in the proposal of an inappropriate or less preferred remedy. It appears that USEPA and DuPont have approached this remediation as if the land use and ownership surrounding the Necco Park site was irrelevant ("The Necco Park property is fully developed as a landfill facility, and is surrounded by similar types of land use", July 1996 Proposed Plan). Nowhere in the plan is there reference to the fact thal the surrounding land use is environmentally sensitive due to the fact that there are environmental monitoring systems and programs present that are required to assure protection of human health and the environment. Had the USEPA followed the NCP and included participation of interested and impacted parties such as the NYDEC RCRA Section, the NYDEC Landfill Section, and CECOS, the appropriate preferred remedy might have been proposed. USEPA's and Dupont's decision to involve the parties only after a preferred remedy has been identified is inconsistent with public participation goals and has clearly resulted in an incomplete remedy alternative analysis and selection process that does not satisfy NCP protectiveness criteria.

Nowhere in the plan or in any, of the documentation available to CECOS is there reference to the unique characteristics of surrounding land uses nor is there an evaluation of the impacts of the proposed remediation on these monitoring systems and programs. Additionally, no cost estimates are presented for actions that would be required to address mitigation of any adverse impacts to these environmental monitoring systems.

The proposed plan also does not evaluate the risks to human health or the environment resulting from potential disruption of the CECOS monitoring systems by the selected remedy, nor does it consider or evaluate the reasonably anticipated costs associated with the disruptions that will be caused by the selected remedy.

In addition to the potential problems related to CECOS' ability to operate an effective environmental monitoring system, CECOS is concerned that DuPont and USEPA have concluded that restoration of groundwater in the source area to ARARs is considered technically impracticable for a number of reasons. Although CECOS is presently not in a position to support or refute this conclusion, USEPA and Dupont have made an impracticability determination without adequately considering the impacts that such a determination will have on potential future use of the CECOS property within the source area. This is especially troublesome in view of the fact that remedial activities involving groundwater pumping taking place in other areas of the BFI site have specific stated cleanup objectives. At a minimum and for regulatory consistency, similar cleanup objectives to those in place for CECOS facilities should be put in place for similar transmissive zones (A, B and C zones.)

Unfortunately, the information available is not of sufficient detail to enable CECOS to develop

comprehensive comments related to the proposed action. We have, however, been able to develop general comments that define some of CECOS' concerns in more detail. Those comments are enclosed and submitted on behalf of CECOS.

While CECOS supports remedial efforts at the Necco Park site, there are a significant number of issues that must be adequately addressed before a modified remedy can be selected. CECOS believes that USEPA should withdraw its Modified Proposed Remedy and complete the alternatives analyses consistent with the NCP. Only then should the USEPA propose a Modified Proposed Remedy. Further, CECOS requests that we be provided a meaningful opportunity to participate in the remedy selection process and be copied on all future correspondence between the Agency and DuPont that discuss issues which impact the CECOS /BFI property either directly or indirectly. In addition, we request that CECOS be offered the opportunity to be present at any meetings, work sessions nr other activities where actions on CECOS/BFI property or that could impact CECOS /BFI responsibilities under existing or future permits are discussed. Similarly, it is essential that USEPA include appropriate NYDEC representatives in the process.

If you have any questions please contact me at 716-282-2676 x210.

<IMG SRC 98144U1>

Comments Regarding Modified Alternative 10A for Remediation of the DuPont Necco Park Superfund Site

Background:

CECOS International, Inc. (CECOS) and BFI are the owners/operators of properties that abut the DuPont Necco Park site (NECCO) on the north, east and south. These properties are being used and have been used for waste management activities. The activities are permitted pursuant to New York State Department of Environmental Conservation (DEC) and United States Environmental Protection Agency (EPA) permits and authorizations. The vast majority of activities authorized by these regulatory agencies include groundwater monitoring activities as an integral part of their operation. As such, CECOS is directly impacted by groundwater contamination from the DuPont Necco Park site and by remedial activities at that site. All of the CECOS property has been incorporated as part of the "source area" defined in the remedial plan. In addition to the CECOS property, BFI owns the parcel of land abutting the eastern and northern boundaries of the NECCO site. This parcel also is used for waste disposal activities and has units that may be impacted by the proposed remedy depending on the areal impact of the pumping program proposed in the remedy.

CECOS operated three hazardous waste landfills (SCMF's 1,2 and 3) on its property located south of and downgradient of NECCO from 1976 through 1980 and continues to operate a wastewater treatment facility which is providing treatment capacity for groundwater currently being pumped. The CECOS site is, in fact, the southern portion of the area designated as the "source area" requiring capture of DuPont pollutants. The CECOS landfill cells and wastewater treatment facility are regulated pursuant to the federal TSCA and federal and state RCRA (Resource Conservation and Recovery Act) programs and are the units most directly affected by the contamination and by the proposed remedial actions.

In the mid 1980's, the DEC and the EPA performed inspections at the CECOS site. The agencies determined that, because of the presence of contaminants in the groundwater in the vicinity of these units, there was the possibility of a release and that additional studies were required to determine if, in fact, these units were impacting the environment.

CECOS performed these additional studies pursuant to the requirements of a RCRA 3013 order at a cost approaching $ 1 million. The studies concluded, and DEC and EPA concurred, that SCMF's 1,2 and 3 were not impacting the environment and that the contamination in the vicinity of the units was related to releases from NECCO. The studies also resulted in the development of monitoring programs for SCMF's 1,2 and 3 that were approved by USEPA and NYDEC and were implemented pursuant to the RCRA program. These monitoring programs were designed based on groundwater information developed in the studies and are significantly more complex and expensive than programs for sites where there is no existing contamination present. At the time these studies were performed and during the initiation of the monitoring programs, DuPont had not instituted any groundwater pumping program. Thus the monitoring programs developed for these landfills did not and could not have addressed the impacts from a groundwater pumping program at NECCO. Until 1998, DuPont, even in its interim program, has never come close to achieving the types of pumping rates projected for alternative 10A. During the past year, the pumping rate for the interim measures has averaged 6 to 8 gpm. CECOS's evaluations of groundwater flow and direction have shown only minimal impacts in the A, B and C zones from the DuPont interim pumping program.

The information made available to CECOS indicates that EPA has identified the pumping rate of the proposed remedy to be 160 gpm and that details of how capture will be achieved will be developed at a later time. This absence of details about the proposed remedy makes it extremely difficult for CECOS to provide detailed technical comments.

Nevertheless, enough is known at this time to frame the issues that CECOS expects will develop as the remediation program moves forward.

Issues of Concern:

CECOS has a number of concerns related to the implementation of the hydraulic control measures proposed in alternative 10A. These concerns can be generally classified into the following categories:

- Impacts related to significant change in groundwater flow regimes in the vicinity of SCMF 1,2 and 3 and potential for changes in groundwater flow over a large portion of the CECOS/BFI site and the negative impact on the CECOS monitoring programs.

- Impacts on surface water flow related to increased runoff from an improved cap.

- Access to CECOS property for installation of pumping wells and impacts on CECOS by discharge Of treated groundwater if treated on the NECCO site or if piped off site for treatment.
- Impacts on any future use of CECOS property from the residual contamination allowed under the selected alternative.

Specific details related to the above general categories are presented below:

- Impacts related to significant change in groundwater flow regimes in the vicinity of SCMF 1,2 and 3 and potential for changes in groundwater flow over a large portion of the CEC0S/BFI site.

The potential impact on CECOS' ability to monitor SCMF's 1,2 and 3, as well as other units on our site, is directly related to protection of human health and the environment.

Alternative 10A proposes to eliminate the slurry wall (which would have been installed on CECOS property) and proposes to replace it with "increased hydraulic control". The volumes predicted by the documentation provided as part of the public participation process are in the range of 160-170gpm. This significant increase in pumping rates (from 6-8 gpm to 160-170gpm) raises concerns with respect to impact on monitoring programs at the CECOS/BFI site. The monitoring programs at SCMFs 1,2 3, and Wastewater Treatment, Phase II will certainly be impacted given the stated objective of the remedial effort. In very real terms the monitoring program CECOS has spent close to 15 years and in excess of a million dollars to develop will be rendered useless. As a result a new monitoring program will have to be developed to replace the impacted monitoring program. Development of a new program will be difficult and expensive given the fact that the proposed remedy will create fluctuations in the groundwater regime as the remedy is being implemented.

Other units at our site, including SSMF, Sanitary Landfills area III and V, may also be affected depending on the areal impact of pumping in the upper zones.

In addition to the impacts of the effective capture program envisioned by the selected remedy, CECOS is also concerned about the impacts of the implementation of program as envisioned by both DuPont and the agency. It is our understanding that the program will be implemented in a stepwise fashion and will approach total capture from the lower end of the pumping volume range. This would mean installation of some pumping capacity, evaluation of the efficacy of that pumping and additional fine tuning to achieve the desired areal range of capture. While this approach may make sense from the DuPont point of view of installing only the pumping capacity that is needed to achieve capture, this approach will play havoc with the monitoring programs for SCMF's 1,2 and 3. Groundwater flow and direction will likely be constantly changing as a result of DuPont's manipulation of the groundwater regime to achieve capture in the desired area.

Even if DuPont does establish a pumping program that can capture groundwater in the source area, CECOS has a concern regarding the ongoing efficacy of that program. CECOS has experience with groundwater pumping programs both at our Niagara Falls, New York site as well as other locations. We understand the difficulty of maintaining the performance of recovery wells and have found that a great deal of effort is required to achieve a relatively high "up time" for a pumping system.

The agency must take this potential impact into consideration in determining if the proposed remedy (and associated cost savings) is truly protective of human health and the environment. At a minimum, evaluation of the efficacy and cost of alternative 10A must include an evaluation of the impacts of this alternative on the CECOS monitoring program for SCMFs 1,2 and 3 and any other potentially impacted units on the CECOS site. Further, if the result of the evaluation show that any of these cells can no longer be effectively monitored, either while DuPont is trying to achieve capture in the affected area or in the long run, the remedial plan must propose an alternative to monitoring. Whatever alternative DuPont proposes must

be equally protective of human health and the environment as the current monitoring program.

Impacts on surface water flow related to increased runoff from an improved cap:

As presently configured, the runoff from the Necco Park site is channeled through a swale that runs along the north, east and west Necco property line. This swale is shared with CECOS and BFI. This drainage system is already experiencing problems with capacity. The installation of an improved cap will likely result in additional runoff from the site and further exacerbate these problems. The remedial plan must require that the quantity of additional runoff be calculated. If the additional runoff requires improvements in drainage structures, these improvements must be mandated as part of the remedial effort.

Access to CECOS property:

All of the alternatives proposed assume that access to, over and through CECOS property is a given. CECOS does not desire to impede progress in achieving remediation for the NECCO site. Nevertheless, the proposed remedial activities have the potential to result in substantial additional actions to be taken by CECOS to accommodate the remediation. These actions will cost CECOS money and CECOS expects to be compensated for costs it incurs to accommodate the remediation.

EPA failed to consider impacts on any future use of CECOS property from the residual contamination allowed under the selected alternative:

DuPont and USEPA have unilaterally decided that the CECOS property is part of the "source area". They have further determined that, because of the nature of the contamination and the geology of the area, cleanup to ARARs is considered technically impracticable. No mention is made of the fact that this decision will permanently impact the future use of CECOS property. For example, were CECOS to expand the on-site wastewater treatment plant, foundation work would be required with associated exposure potential for construction workers from both soils and groundwater. CECOS may also install additional underground utilities such as leachate transfer lines, water lines etc. on the CECOS property. This would also expose construction and possibly maintenance personnel to contaminated soils and groundwater. Neither of these scenarios was considered in the Human Health Risk Assessment. The presence of these contaminants will, at best, require additional resources be expended for any improvements made on the CECOS property and, at worst, could preclude use of the property.

Summary:

CECOS has a stake in the selection of remedial activities at the DuPont Necco Park Site from two perspectives as follows:

1. CECOS (and BFI) operate landfill units on properties adjacent to the Necco Park site pursuant to permits and authorizations under various state regulatory programs. Common to all these landfill units is the requirement to monitor groundwater to assure that the facility is not adversely affecting human health and the environment. These monitoring programs have been adversely affected by the contamination from the DuPont site. As a result of the contamination, CECOS has expended significant funds beyond what is normally needed to conduct these required monitoring programs. The activities proposed in the revised proposed plan will, at best, require a total revision to the monitoring programs at certain facilities (SCMF's 1,2 and 3) and may, at worst, make these facilities essentially unmonitorable.

2. As the abutting property owner whose property has been designated as part of the "source area", CECOS is concerned that the selected remedy does not address cleanup of our property. While we understand the technical difficulty of setting and achieving cleanup standards, we are dismayed that DuPont and the EPA have unilaterally determined to not clean up the CECOS parcel. This decision has potentially significant effects on CECOS' ability to utilize its property. Additionally, CECOS is concerned that DuPont is proposing to conduct a major portion of the remedial program on the CECOS property. This will also effect CECOS' ability to use its property. DuPont has not, as yet, had meaningful discussions with CECOS on issues related to access of those portions of our property that will be required to carry out the remedial plan.

ROD FACT SHEET

SITE
Site name: DuPont Necco Park Site

Site location: City of Niagara Falls and Town of Niagara, Niagara County, New York

NPL Status: Non-NPL Site

Site ID#: NYD980532162

ROD
Date Signed: September 18,1998

Selected remedy: Source containment through upgrading and expanding the existing cap, optional installation of an overburden physical barrier, groundwater pump and treat, additional DNAPL collection and additional Site characterization.

Operable Unit#: OU1

Capital cost: $7,837,136.
O&M cost: $4,614,775.
30-year present-worth cost: $57,264,743.
Total Cost: $65,102,000.

LEAD
Enforcement Site - USEPA Lead

Primary Contacts: Michael Negrelli, (212) 637-4278
Linda Ross, (212) 637-4271

Secondary Contact: Kevin M. Lynch, (212) 637-4287

Main PRP: DuPont Chemical Corporation
PRP Contact: Paul Mazierski, (716) 278-5496

WASTE
Waste type: Various industrial and hazardous wastes including volatile, semi-volatile, inorganics and tentatively identified compounds (TICs).

Contaminated medium: Groundwater, soils, and bedrock.
Waste origin: Chemical manufacturing and processing.

Estimated waste quantity: Groundwater: Estimated volume to be pumped and treated annually is 73,584,000 gal. Contaminated Landfill Soils: approximately 1,000,000 cubic yds.