OCC-DUREZ PETTIT CREEK INLET COVE
RECORD OF DECISION

Prepared by:
New York State Department of
Environmental Conservation

MARCH 1992

DECLARATION STATEMENT - RECORD OF DECISION

Site Name and Location:

Occidental Chemical Corporation's Durez Manufacturing Facility

Pettit Creek Inlet Cove

City of North Tonawanda, Niagara County, New York

Site Code: 9-32-018

Classification Code: 2

Statement of Purpose:

This Record of Decision sets forth the selected Remedial Action Plan for the OCC-Durez Pettit Creek Inlet Cove (Inlet Cove) Site. This Remedial Action Plan was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Re-authorization Act (SARA) of 1986, and the New York State Environmental Conservation Law (ECL).

Statement of Basis:

This decision is based upon the Administrative Record for the OCC-Durez Inlet Cove site and upon public input to the Proposed Remedial Action Plan (PRAP). A copy of the Administrative Record is available at the North Tonawanda Public Library, 505 Meadow Drive, North Tonawanda, New York and at the New York State Department of Environmental Conservation, 50 Wolf Road, Albany, New York. A bibliography of those documents included as part of the Administrative Record is contained in Appendix 1, infra. A Responsiveness Summary that documents the public's expressed concerns, the State's responses to those concerns, and ensuing changes to the Remedial Action Plan has been included as Appendix 2, infra.

Description of the Selected Remedies:

The selected remedial action provides for protection of public health and safety, protection of our environment, technical feasibility and performance, and compliance with statutory requirements. Briefly, the selected remedial action includes:

- Relocation of the Lockport Water Intake Line (LWL) currently under construction by OCC via an Interim Remedial Measure (IRM) Order on Consent

- Permanently divert the Pettit Creek Flume Storm Sewer to the north of the Inlet Cove

- Remove all Soft Sediment within the Inlet Cove together with all visual DNAPL contamination contained within the Sediment

- Slot excavation within the Inlet Cove of the old LWL and surrounding silt clay fill bedding material and all visual DNAPL

- Containment and extraction of DNAPL north of the Inlet Cove

- Dewatering sediments and fill material

- Interim storage of dewatered sediment pending final treatment and/or disposal

- Treatment of wastewater during construction

- Construction of Inlet Cove bottom blanket made of highly impermeable material to control and isolate residual contamination

- Restoration of the Inlet Cove to an acceptable aquatic environment

Declaration

The selected Remedial Action Plan is protective of human health and the environment. The remedy selected will meet the substantive requirements of the Federal and State laws, regulations and standards that are applicable or relevant and appropriate to the remedial action. The remedy will satisfy to the maximum extent practicable the statutory preference for remedies that employ treatment that permanently reduces toxicity, mobility or volume as a principal element. This statutory preference will be met by eliminating contaminants with a direct pathway of migration to the Niagara River, by excavation of contaminated sediment and DNAPL to reduce the volume, and by ultimately requiring permanent destruction or detoxification of those hazardous sediments and soils to reduce toxicity.

A limited amount of residual subsurface contamination in certain areas of Inlet Cove would remain. Any residual contamination would be isolated and controlled by a combination of barrier walls and Inlet Cove clay bottom cap. Because the selected remedies result in hazardous substances remaining within the Inlet Cove boundaries, detailed long term monitoring is required. Additionally, to ensure that the remedy continues to provide adequate protection of human health and the environment, a review of the effectiveness of the remedies will be conducted every five (5) years, or at any time that monitoring data indicates a flaw in the remedies.

Date

Edward O. Sullivan
Deputy Commissioner
Office of Environmental Remediation
New York State Department of
Environmental Conservation

TABLE OF CONTENTS

List of Appendices

SECTION 1 - SITE LOCATION and DESCRIPTION

Inlet Study Area:

The Inlet study area is a privately-owned, vacant, approximately three-acre parcel located between the east shore of the Little Niagara River and the City of Lockport Pump Station on River Road in North Tonawanda, New York. The study area is divided into two major areas, the Inlet Cove and shore, and the Inlet perimeter. The Inlet Cove and shore is an approximately three-quarter acre lowland enbayment area located at the outfall of the Pettit Creek Flume (PCF) immediately west of the pump station. Water depths in the cove fluctuate in response to water level fluctuations in the Little Niagara River but typically range up to 2-3.5 feet deep. The general location and boundaries of the site are shown on Figure 1.

The Inlet study area is in a sparsely populated area and has been designated part of the North Tonawanda water front development district. Access is restricted by posted warning signs and a chain-link fence around the landward periphery. Neighboring properties include a large vacant lot to the north (former site of Tonawanda Iron Works), an Off-Track Betting facility to the northeast, the Lockport Pump Station to the east, and a marina to the south (formerly a lumberyard and automobile junkyard). The Little Niagara River along the west side of the site is approximately 20-25 feet deep and 200-feet wide.

SECTION 2 - SITE HISTORY

The OCC-Durez Site remedial program is divided into three operable units, the Durez Plant Property, the City of North Tonawanda sewers, and the Inlet Cove. Remedial investigations conducted at the Plant Property and City Sewers in 1977-1988 adequately defined the nature and extent of chemicals in those areas, and enabled cleanup of the plant and sewers to proceed jointly to the remedial stage. An Approved Remedial Plan is presently being implemented to remediate certain conditions existing on the Plant Property and affected City Sewers. The Approved Remedial Plan is annexed to the Partial Consent Judgment (PCJ) executed by the U.S. Western District Court on June 21, 1989.

Final investigations at the Inlet Cove, which were initiated in 1986, have continued as the remedial negotiations, plans, design and construction have proceeded for the plant and sewers. The complete results of these most recent site investigations can be found in the Remedial Investigation Report for the Durez Site Inlet Cove; Dunn GeoScience, May 1991. A copy of the RI Report is available for review at the North Tonawanda City Library and at the NYSDEC Region 9 Office in Buffalo.

In the late 1920's a concrete box culvert was installed along the bed of the Pettit Creek during development of the North Tonawanda storm sewer system. This box culvert became known as the Pettit Creek Flume (PCF). The PCF is a municipal storm sewer whose drainage area of approximately 1.1 square miles includes the Occidental Chemical Corporation (OCC) Durez Division plant and commercial, industrial and residential portions of North Tonawanda. The PCF discharges urban runoff into the Inlet cove. This runoff has included Durez-type chemicals, primarily volatile and semi-volatile chlorobenzene compounds, which subsequently have migrated and contaminated the sediment, the subsurface soil and groundwater adjacent to the Inlet cove. The Durez-type compounds are designated as the site-specific compounds (SSCs). Three floating booms, a silt curtain, and relic timber piling across part of the Inlet mouth trap and help contain debris, sediment and chemicals and prevent them from escaping the Inlet Cove and into the Little Niagara River.

The Lockport Water Line (LWL) is a raw water intake for the City of Lockport Water System. The LWL, a 48-inch diameter, approximately 2600-foot long steel intake pipe was constructed in 1907-1908 and conveys raw River water under gravity flow from an intake structure in the East Branch (Tonawanda Channel) of the Niagara River to a wet well in the nearby City of Lockport Pump Station. From the wet well the water is pumped 13 miles northeast to the City of Lockport. The LWL is located within an easement corridor through the central part of the Inlet cove. The LWL passes beneath the Inlet cove at depths ranging from approximately 15 to 23 feet. Typical flow through the pipe is five to nine million gallons per day.

A 40-inch (nominal) diameter polyethylene liner was installed by the City of Lockport along the entire length of the LWL in 1977 as a health and safety precaution after chemicals were observed in the wet well in a localized depression at the sluice gate near the junction with the LWL. An extension to this liner was placed at the pump station end of the liner in 1979 when it was discovered that the thermal properties of the liner caused it to contract in cold water. A conceptual sketch of the LWL in the Inlet is presented on Figures 2 & 5. Over the past 10 years, the water supply quality has consistently met or exceeded State standards. During the past 18 months, the frequency of the monitoring was increased as a result of Durez contamination found along the bedding of a portion of the LWL located beneath the cove. The liner has been visually inspected and water quality continues to meet all regulatory requirements.

The North Tonawanda Water Line (NTWL) is a 24-inch diameter, flexible joint, cast iron water main that conveys pressurized treated water from the City treatment plant on Tonawanda Island to the City's distribution system. The NTWL is estimated to be approximately 100 years old. It is located in a 12-foot wide easement through the southern part of the Inlet study area. The line is located outside the known area of contamination and pressurized. These factors would prevent any potential impact of Durez chemicals on the NTWL.

SECTION 3 - CURRENT STATUS

A remedial investigation (RI) was conducted at the Inlet by OCC as part of the remedial program for OCC's Durez Division plant in North Tonawanda, New York. Investigations at the Inlet were conducted from 1986 to 1990 in cooperation with State and local authorities. Various phases of work were conducted to characterize the Inlet site and enable development of the Remedial Alternatives Assessment.

The investigation included the installation of 51 borings, 29 monitoring wells, 54 sediment depth probes, and 230 chemical analyses of soil, groundwater and dense non-aqueous phase liquid (DNAPL), among other analyses, tests, monitoring and surveys. The results of this investigation are presented in the RI report. This section summarizes the finding of the RI.

A. **Stratigraphy:**

Four principal stratigraphic units were identified overlying shale bedrock in the Inlet perimeter area. In order of increasing depth they are: a 7-8 foot thick fill layer; a 0-26 foot thick alluvial silt, sand and gravel layer; a

0-22 foot glacio-lacustrine silt and clay layer, and a 37-47 foot thick layer of glacial till. The alluvium is thickest near the river and thins landward toward the east, in contrast to the underlying glacio-lacustrine clay which is thickest in the east, but has been completely eroded at the west by the ancestral Little Niagara River. The thickness of fill in the Inlet perimeter and the elevation of the top of the till surface are relatively uniform throughout the study area (see Figure 3).

The stratigraphy is more complex in the Inlet Cove than in the perimeter area. Construction operations for the LWL in 1907-1908 removed the fill, alluvium, glacio-lacustrine clay and some till in an approximately 120-foot wide, 30-foot deep trench. These materials were replaced with an approximately 3-foot thick silty sand bedding layer and overlying fill derived from the excavated materials. This fill is predominantly derived from the very low permeability glacio-lacustrine clay and till and is referred to as silt-clay fill.

The excavation for the LWL construction was apparently not completely backfilled, so for the past 82 years the remaining basin has been accumulating sediments and debris discharged from the PCF. The dark gray to black, silty sediment layer (Soft Sediment) deposited in the cove averages approximately five feet thick. Also, old tires, concrete-filled tanks, scrap, rubbish and other debris and fill are strewn in the cove.

B. **Hydrogeology:**

The fill/alluvium layer comprises a 15-29 feet thick unconfined water-bearing unit hydraulically connected to the river. Hydraulic conductivities for this unit average 2×10^{-3} cm/sec. Monitoring well water level data indicate that groundwater flow is normally toward the Little Niagara River under a low hydraulic gradient, but flow reversals frequently occur near the river during periods of relatively high river level. Several wells typically have groundwater levels approximately the same as river levels.

The generally westward sloping glacio-lacustrine clay surface and underlying till serve as a confining unit that isolates the water-bearing unit from bedrock. Measured hydraulic conductivities for the clay-till layer are in the 10^{-7} to 10^{-8} cm/sec range. Vertical components of groundwater flow are generally downward, though local exceptions occur. The quantity of downward flow, if any, is expected to be very low due to the very low permeability of the confining layer.

C. **Nature and Extent of Site Chemicals:**

A principal objective of the RI was to determine the nature and lateral and vertical extent of Durez chemicals at the Inlet study area. These chemicals are listed in Table 1.

Chemicals at the Inlet perimeter and cove are present principally in three physical forms: as molecules absorbed to soil or sediment particles, as dissolved constituents in groundwater or surface water, and as Dense Non-Aqueous Phase Liquids (DNAPL). Organic vapors were detected only during drilling and sampling activities when subsurface areas with relatively high concentrations of chemicals were disturbed.

In general, chemical concentrations are highest in the Soft Sediments and in the underlying fill immediately adjacent to the LWL. Chemical concentrations are also relatively elevated in soil and groundwater near the bottom of the alluvium at the Inlet cove and in the portion of the north Inlet perimeter within approximately 100 feet of the river shoreline. Figures 6 & 7 show the approximate lateral extent of Durez contamination in soil and groundwater.

D. **Chemicals in Inlet Perimeter Soils:**

A summary of chemicals detected in soil in the Inlet perimeter is presented in Figure 6. Surficial fill in the Inlet perimeter does not appear to contain significant concentrations of chlorobenzenes; most analyses were non-detectable (ND). Except for samples collected adjacent to the Inlet Cove, the highest concentration was 3 ppm near the north end of the study area. Two samples of surficial fill adjacent to the cove ranged from 13 to 99 ppm total chlorobenzenes.

The majority of alluvium around the periphery of the Inlet study area does not appear to contain significant concentrations of chemicals. However, concentrations are higher in the immediate vicinity of the Inlet Cove and in the north Inlet perimeter near the river. The highest concentrations of chlorobenzenes occur near the base of alluvium at depths of 12-36 feet, depending upon location. Concentrations were highest near the Inlet (e.g., 699 and 547 ppm) and decreased in the north Inlet perimeter with increasing distance from the cove.

E. **Chemicals in Inlet Cove Sediment and Soil:**

The highest concentrations of chemicals detected analytically at the site were in the 0-6-inch depth interval in the shallow, Soft Sediments in the Inlet Cove. Concentrations of the Durez-type compounds in 17 samples form this stratum ranged from 19 to 23,000 ppm. Concentrations were spatially variable, but generally higher north of the LWL and lower in the Soft Sediments at the south side of the cove. The location of a former boathouse on the south side of the Inlet Cove may represent an area where chemical deposition was locally concentrated. High concentrations of 2378 tetrachorodibenzodioxin (Dioxin) and various other polychlorinated dibenzodioxins and polychlorinated dibenzofurans associated with the chlorobenzene disposal were detected in the shallow Soft Sediment. These conditions will be addressed by the remedial plan. Table 1 presents a summary of chemistry in the Soft Sediment.

Soil immediately underlying the Soft Sediment layer also contains chemicals, though at typically lower concentrations than the Soft Sediment. Total chlorobenzenes in silt-clay fill in the cove typically ranged from ND to 57 ppm. Two exceptions were samples collected 11-18 feet deep from borings drilled adjacent to the LWL. Unlike other silt-clay fill samples analyzed, these two samples contained DNAPL and had high concentrations of 246 and 5010 ppm, total chlorobenzenes.

F. **Chemicals in Groundwater**

Groundwater chemical results are summarized in Table 2. Chemicals in groundwater are restricted to the immediate vicinity of the Inlet Cove and the northwest portion of the Inlet perimeter adjacent to the river.

Ground water in these areas picks up chemicals as it flows toward the Inlet and Little Niagara River. The chemicals occur predominantly in the deepest parts of the alluvium near the underlying confining layer. The highest concentration of chemicals in groundwater, 219 ppm chlorobenzenes (including 170 ppm monochlorobenzene and 46 ppm benzene), was measured in a monitoring well adjacent to the northwest corner of the Inlet Cove. However, this occurrence may not be representative of dissolved chemical load, as DNAPL was observed in this well. The groundwater plume, which generally coincides with the lateral extent of soil chemistry, extends along the river from the Inlet Cove approximately 200 feet to the north.

G. **Chemical Loadings to Little Niagara River:**

The principal off-site migration pathways for dissolved chemicals are groundwater and surface water flow toward the river. Groundwater loadings to the river were estimated for SSCs based on 1) a calculated groundwater flux of 2700 gallons per day from the fill/alluvium unit below the Inlet cove, and 2) chemical concentrations measured in representative Inlet perimeter monitoring wells. The estimated groundwater chemical loading is 1.8 pounds per day.

Surface water loading was estimated based on the diffusion of Soft Sediment pore water into the overlying surface water column. Chemical concentrations in the pore water were calculated based on equilibrium partitioning theory. The estimated chemical loading through this pathway is 0.1 pounds per day.

The total estimated loading of Durez chemicals to the river from groundwater and surface water is approximately 1.9 pounds per day. An additional chemical loading is potentially by transport of non-dissolved chemicals or chemicals sorbed to solids resuspended by erosion of surficial soil by surface water runoff, water currents or wave action. This episodic loading has not been quantified but estimates attempted have indicated resuspension could be a significant source. However, the cove does appear to be a general depositional environment. Depositional characteristics are increased by the silt booms. Airborne particulates containing chemicals are not considered a concern at the Inlet under existing conditions.

H. **Dense Non-Aqueous Phase Liquids:**

Dense non-aqueous phase liquid (DNAPL) comprised of Durez chemicals is present in localized zones of the Inlet study area. DNAPL is an oily sludge-like substance that has a density greater than water, and therefore sinks. The lateral and vertical extent of DNAPL has been estimated based on the observation of all wells and borings made during investigations. DNAPL was observed in seven borings and wells shown on Figure 9. Given a sufficient volume, DNAPL tends to migrate downward through permeable soil, leaving behind a residue, until it encounters a barrier, at which point they may accumulate or spread laterally. Approximately 96 percent of the DNAPL consisted of chlorobenzene compounds, mostly mono- and dichlorobenzenes. Results of DNAPL analysis are presented on Table 3.

DNAPL was observed at the Inlet perimeter and cove as relatively immobile residual blobs in alluvium, and as local accumulations of free DNAPL confined in pockets in silt-clay fill or in depressions on the clay/till confining layer. The estimated lateral extent of free DNAPL is generally restricted to the immediate vicinity of the LWL beneath the Inlet Cove and to a depression in the till surface contiguous with the northwest corner of the Inlet. The best estimate of mobile DNAPL volume is approximately 16,000 gallons.

Soil samples collected from four boreholes drilled into LWL bedding material below the silt-clay fill and within four feet of the LWL had total chlorobenzene concentrations ranging from 398 to 7274 ppm. Three of these four borings encountered DNAPL; the only sample that did not was at the mouth of the Inlet. Borings drilled outside of 12 feet from the LWL did not encounter DNAPL nor where significant concentrations of chlorobenenes detected.

I. Site Utilities Easements:

Utility easements through the Inlet study area include the Lockport Water Line (LWL), North Tonawanda Water Line (NTWL), and the Pettit Creek Flume storm sewer. The LWL is a 48-inch diameter polyethylene-lined steel raw water intake pipe for the nearby Lockport Pump Station. The LWL passes beneath the Inlet at depths ranging from approximately 15 to 23 feet. Chemicals, including DNAPL, were discovered during the RI in the bedding material outside and adjacent to the LWL. Based on past routine inspections, recent continuous water quality monitoring by the City of Lockport, and on inspections conducted during the RI, the LWL line continues to supply good quality water. There are no identified adverse impacts to the Lockport drinking water quality that can be attributed to chemicals in the Inlet.

The NTWL is a 24-inch diameter cast iron water pipe that conveys treated water under pressure from the City's treatment plant on Tonawanda Island to the City's distribution system. The NTWL passes through the southern part of the study area, south of the cove area. The line was found to be outside the plume of contamination. However, its location conflicts with the relocation of the LWL. Therefore, the NTWL will also be relocated further south during the LWL project.

J. Relocation of Lockport Raw Water Line:

The City of Lockport's raw water line (LWL) consists of about 2,500 linear feet of 48-inch (nominal) rolled and riveted steel pipe extending from the intake structure west of the Inlet Cove to a raw water pump station located east of the cove. The pump station is capable of delivering 12 million gallons per day of raw water through a 30-inch raw water transmission main to Lockport's Water Treatment Plant, 13 miles away. In 1977, the 48-inch raw water line was slip-lined with 40-inch outside diameter polyethylene pipe extending from the intake to the pump station.

Soils and bedding material adjacent to the LWL contain Durez-type chemicals. The presence of DNAPL has been detected within the LWL bedding. The LWL liner has been physically inspected and found to be intact; no infiltration from the Inlet through the liner has been observed or detected to be occurring through the liner. The finished water supplied to the residents of Lockport has been and continues to be regularly tested and found to be free of Durez-type chemicals. However, to insure continued long-term safety of the public water supply, OCC has agreed to replace the LWL to avoid any possibility of future contamination of the LWL by Durez chemicals. This action is being undertaken as an Interim Remedial Measure (IRM). Each remedial alternative addressed in this Proposed Remedial Action Plan (PRAP) is premised on completion of the relocation of the LWL. OCC is currently completing its efforts to secure a construction contractor and initiate construction during the Fall of 1991.

SECTION 4 - ENFORCEMENT STATUS

Remediation of the OCC Durez site is proceeding under a lawsuit brought by the State against the Occidental Chemical Corporation. This lawsuit was filed in May of 1983 and seeks relief based on the New York State Environmental Conservation Law (ECL), the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and on the common law of public nuisance.

In January of 1987, the City of North Tonawanda became party to the lawsuit when the City was granted intervenor status by the Court. This status provides for City input into development of actions taken pursuant to the lawsuit.

Implementation of the previous two operable units, the Durez Plant site and city sewers, was made pursuant to a Partial Consent Judgment. This Partial Consent Judgment made it possible to expedite remediation while additional investigations at Inlet Cove proceeded. A final consent judgement will be prepared and sent to OCC to address remediation of the Inlet Cove and to address any other issues that are not discussed in the Partial Consent Judgment.

SECTION 5 - GOALS for the REMEDIAL ACTION

1. Minimize the potential for both the short and long-term human exposure to Durez chemical waste within the Inlet Cove and its surrounds.

2. Reduce to the maximum extent practicable the exposure of Durez chemicals to the aquatic environment by removing availability of the chemical waste to the Inlet Cove and the Niagara River.

3. Minimize the potential for further off-site migration of chemical waste.

4. Permanently treat and/or dispose of waste in a manner consistent with all State and Federal regulations.

5. Restore the affected area to a productive aquatic environment.

6. Restore the site to a condition allowing productive use in accordance with local zoning laws and with minimal site restrictions or institutional controls.

SECTION 6 - DESCRIPTION and EVALUATION of REMEDIAL ALTERNATIVES

Remedial alternatives, ranging from no action to complete contamination removal and disposal have been evaluated. The remedial alternatives developed for the site are discussed below relative to the evaluation criteria. The evaluation criteria are self-explanatory with the exception of SCGs and ARARs. SCGs are the State Standards, Criteria and Guidelines for chemical specific, location specific and action specific standards. ARARs are the Federal Applicable, Relevant and Appropriate requirements for the same and are inclusive of SCGs. Chemical specific ARARs would include surface and groundwater standards for the site specific chemicals. Location specific ARARs would deal with any special requirements that may be necessary due to site location such as a navigable waterway (e.g., Army Corps of Engineer permits). Action Specific ARARs would be any requirements that would have to be met during implementation of the remedy. A listing of site specific and chemical specific ARAR's are presented in Table 5.

In order to facilitate any remedial action for the Inlet cove, a number of steps will have to be taken in advance of remedial construction. The relocation of the Lockport Water Line (LWL), as previously discussed, and the relocation of the North Tonawanda Water Line (NTWL) are being undertaken by OCC as an Interim Remedial Measure (IRM). In addition, it will be necessary to divert the Pettit Creek Flume (PCF). The most feasible relocation alignment would be along the northern edge of the property, beyond the extent of chemistry migration. Conditions and elevations are generally adequate to allow the PCF to be diverted along the general alignment as described above. As necessary, culverts would be used to provide crossing for an access road.

Remedial Alternative 1 - No Action Alternative

- DESCRIPTION OF ALTERNATIVE 1

Under this alternative, no further action would be taken to remediate or limit access to the Inlet Cove area. This alternative is retained to serve as a baseline for comparison against other alternatives. Should the no-action alternative be selected, the Inlet Cove site conditions would remain as they are at present. Long-term groundwater monitoring would be required.

- EVALUATION OF ALTERNATIVE 1

Short-Term Effectiveness

Since no action would be taken to control or remediate the Inlet Cove under this alternative, implementation would not impose any added short-term risk to the community, environment or workers.

Long Term Effectiveness and Permanence

No controls would be implemented. Therefore, site contamination would pose a long-term risk to human health and the environment. The aquatic environment would continue to be severely impacted and long term site restrictions preventing human access would be required.

Reduction of Toxicity, Mobility or Volume of Waste

The no action alternative would not reduce the toxicity, mobility, or volume of the chemicals.

Implementability

The no-action alternative is easily implemented compared to the other alternatives.

Compliance with ARARs

Implementation of this alternative will not result in compliance with chemical specific ARARs, nor any appropriate agency advisories, guidelines or criteria.

Overall Protection of Human Health and the Environment

The no-action alternative is not protective of human health and the environment. This alternative does not restore use of the land and water of the Inlet Cove. Potential risks to human health currently exist through exposure pathways that are the result of SSCs in the Inlet Cove sediments. Additionally, there is an environmental risk to aquatic and benthic organisms in the Inlet Cove and the adjacent Little Niagara River that would not be addressed by the no-action alternative.

Remedial Alternative 2 - Site Containment

- DESCRIPTION OF ALTERNATIVE 2

Under this alternative [Fig. 13 & 14], the Inlet Cove sediments would be contained in place by means of backfilling with clean soil, constructing a composite cap and installing a perimeter cut-off wall. Additionally, a limited amount of DNAPL removal is included in this alternative. This alternative would be implemented as follows:

- o Divert the Pettit Creek Flume (PCF) to the north of the Inlet.
- o Construct treatment or storage facilities to manage water and DNAPL generated during the remediation.
- o Install a steel sheet pile Z-wall across the mouth of the Inlet Cove extending north and south of the Cove. The Z-wall will extend landward to the pinch-out line of the alluvium.
- o Construct a fluid collection layer over Soft Sediments using geotextile, granular media, and sumps.
- o Backfill the Inlet Cove with clean granular soil to above existing water level, and compact clay soil above water table and grade to two to five percent to allow placement of a cap.
- o Remove 20 to 30 foot sections of both the Lockport and North Tonawanda water lines at the mouth of the Inlet and near the pump station to allow installation of a perimeter cut-off wall.

- Install a perimeter cut-off wall across the mouth of the Inlet Cove, encircling all contaminated areas and keyed at its base into the clay till or glacio-lacustrine layer at depths ranging from 15-40 feet.

- Install monitoring wells at low spots in the till encountered during installation of the cut-off wall and monitor for DNAPL.

- Construct a soil and geomembrane composite cap over portions of the site enclosed by the cut-of wall.

- Install a shallow interceptor trench at the seasonal low water table to produce permanent groundwater gradients in towards the contained area. Extracted groundwater will be treated and disposed of properly.

- Monitor the water table surface inside and outside the cut-off wall using piozometers to assure groundwater gradients are in towards the contained areas.

- Install closely placed short-term recovery wells along the LWL to extract DNAPL. Close and abandon the wells which do not produce appreciable recoveries and upgrade any wells which are to be used for long-term recovery. DNAPL would be stored and/or treated.

After construction is completed, continuing operation and maintenance would include monitoring of piezometric levels, maintenance of the cap, storage and incineration of DNAPL, treatment and disposal of any extracted groundwater, and maintenance of physical and institutional controls for on-site access.

EVALUATION OF ALTERNATIVE 2

Short-Term Effectiveness

Community protection: Soft sediment would be closed in place; however, some disturbance would occur as the fluids collection layer is placed. This disturbance may result in fugitive air emissions from the Inlet site. Air monitoring for SSCs would be performed to ensure that emissions are below permissible health-based levels.

Worker protection: This alternative would pose increased risks to workers in two areas. First, placement of the fluids collection layer would require workers to enter the Inlet and work in close proximity to Soft Sediment containing high levels of chemicals. Second, removal of a section of the LWL at the mouth of the Inlet poses risks of physical injury and chemical exposure, particularly to divers involved in cutting the LWL pipe. Stringent health and safety procedures would need to be utilized during this work to prevent potential accidental exposure to chemistry.

Environmental impacts: This alternative poses a risk of sediment and contamination release to the Little Niagara River. This risk would be controlled by diverting the PCF, installing a sheet pile Z-wall across the mouth of the Inlet Cove prior to disturbance of sediments and by collecting and treating all construction water and surface water runoff generated during remediation.

Long-Term Effectiveness

Residual risk: This alternative would attempt to control all unacceptable exposure pathways. Since this alternative would rely completely on containment, some risk would remain due to the potential for failure of the containment systems. The alternative does not utilize permanent treatment technologies to significantly reduce site toxicity, therefore a residual risk for site contamination remains.

Adequacy of controls: The risk of direct exposure to sediments would be controlled by physical isolation (capping). Subsurface migration would be controlled by the cut-off and sheet pile walls. In conjunction with the cut off wall and sheet pile barriers, a recovery trench would also be employed to maintain an inward hydraulic gradient to further contain chemistry. DNAPL migration would be controlled through a combined program of source removal, subsurface barrier walls, and monitoring/recovery points at any topographic lows in the clay till. These combined measures would attempt to control potential chemical migration pathways and minimize human exposure.

Reliability of controls: This alternative would use a cut-off wall, a sheet pile wall, a groundwater interceptor trench, and a composite cap as controls. All of these technologies are demonstrated to be reliable at numerous other site closures. Of these components, the cap is the most likely to experience difficulties. Soft Sediments are likely to undergo appreciable subsidence as they dewater. For this reason, periodic inspection and repairs will be important factors in maintaining performance of the cap. The cap will also be located within the 100 year flood plain and therefore could be impacted by high river elevations, potential erosion and wash out. In addition, subsurface barrier walls will require compatibility testing with site chemicals.

Aquatic Restoration and Site Restrictions: The containment remedy will backfill the cove and therefore result in the loss of the cove as an aquatic environment. Site access will remain forever restricted and would prevent future development and/or potential recreational use of the area.

Reduction of Toxicity, Mobility, or Volume of Waste

This alternative would not result in a significant overall reduction in the toxicity and volume of SSCs at the Inlet. DNAPL removal/incineration and groundwater extraction/treatment would provide a limited reduction in the toxicity and volume. Recovery of DNAPL via closely spaced short-term and selective long-term wells would be effective primarily in the north lobe area where the DNAPL overlies the clay till in a thin gravel layer. Recovery of 50 to 60 percent of the estimated 3,000 gallons of DNAPL in the north lobe is possible. Conversely, mobile DNAPL recovery within the silt clay fill and LWL bedding would be much less successful. However, all groundwater or DNAPL that is not collected would be controlled by the circumferential cut-off wall and connected composite cap. The containment would therefore significantly reduce the mobility of site contaminants.

Implementability

Ability to construct and operate: With two exceptions, all components of Alternative 2 could be constructed with minimal difficulty. Removal of a section of the LWL at the mouth of the Inlet and placement of the fluid consolidation layer may both pose difficulties in construction. Operation will consist mainly of recovering and treating water from the interceptor trench and DNAPL from wells. Recovery of DNAPL is expected to be extremely slow and difficult and require long-term operation of 30 years or more.

Reliability: The control and containment measures would have a high degree of reliability if materials are thoroughly tested to ensure compatibility with site chemicals. The cap would require periodic inspection and repair. DNAPL extraction wells would unlikely recover substantial amounts of DNAPL except from the north lobe area where DNAPL is found in a thin gravel layer overlying clay till.

Ease of undertaking additional actions: This alternative would generally not complicate or prevent additional containment or groundwater recovery measures. If future actions required removal and direct treatment of sediments, the implementation of Alternative 2 would pose major complications since material to be handled and processed would be greatly increased.

Ability to monitor: The cut-off and sheet pile walls and the interceptor trench would be monitored in two ways, by piezometric levels and by groundwater quality sampling. The cap would be monitored by visual inspection and subsidence monitoring (surveying). These monitoring methods are reliable and simple to perform.

Availability of services: The only aspect of the alternative which may require specialized services is the removal of sections of the LWL. However, the project is not likely to be delayed by the unavailability of materials or services.

Compliance with ARARs

Groundwater ARARs will not be achieved at the time of implementation. Meeting these ARARs inside the cut-off wall is technically impracticable from an engineering perspective. Extraction of DNAPL could accelerate the reduction of chemicals in groundwater inside the cut-off wall.

There would be an environmental loss of the Inlet Cove wetland, however, an environmental gain would result from cutting off exposure pathways. A DNAPL storage tank would have to be constructed and monitored in accordance with State design criteria (6 NYCRR Part 372). The incineration of DNAPL would need to satisfy the RCRA permit for such a facility. Discharge of treated groundwater would have to comply with existing POTW pretreatment requirements or a SPDES permit. A U.S. Army Corp of Engineers dredge and fill permit would also be required.

Overall Protection of Human Health and the Environment

Alternative 2 is protective of human health and the environment in that it would eliminate exposure pathways from the Inlet Cove site that may present potential risks to human health or the environment. The shallow groundwater interceptor trench installed just inside the perimeter cut-off wall would create an inward hydraulic gradient. Maintaining the gradient towards the contained area would further reduce the potential for groundwater flow outward through the cut-off wall.

Since large quantities of highly toxic material would remain at the site and adjacent to the River, there exists the potential for a future release of chemicals from the site. This threat to human health and the environment is not reliably quantifiable. Perpetual monitoring of the site after remediation will be required to ensure continued protection should this alternative be implemented. Additionally, implementation of Alternative 2 would result in permanent loss of the Inlet Cove's aquatic environment.

Alternative 3 - Excavation and Treatment

Description of Alternative 3

Under Alternative No. 3 [Fig. 15 & 16], all Soft Sediments as well as those selected sections of the silt clay fill and Lockport Water Line (LWL) bedding containing DNAPL would be excavated, dewatered and stored pending final treatment and disposal. Additionally, DNAPL in the north lobe area would be contained by a barrier wall and extracted by recovery wells. This alternative would be implemented as follows:

- Divert the PCF to the north of the Inlet Cove.
- Install a steel sheet-pile Z-wall across the mouth of the Inlet.
- Construct a temporary wastewater treatment plant on-site, utilize Durez, or apply for discharge to the City of North Tonawanda sewer system.
- Remove and stockpile overburden from buried soft sediments along the southern edge of the Inlet.
- Remove soft sediments and the upper 12 inches of silt-clay fill using a hydraulic dredge and/or conventional earthmoving equipment.
- Place a layer of clean compacted fill to serve as an operating pad for the slot removal.
- Install temporary sheet pile walls so as to form controlled slots for removal of sections of the LWL and surrounding bedding.
- Remove silt-clay fill and bedding from each slot, backfill with clean soil and remove sheet piles.
- Install a barrier wall and recovery wells north of the Inlet to extract DNAPL for incineration.
- Dewater excavated materials at the Inlet or in existing filter press at OCC Durez, and store pending final treatment and/or disposal.
- Backfill the Inlet area to a selected level with clean, low permeability soil and drive the Z-wall across the mouth of the Inlet to approximately the level of the restored bottom.

- Restore the Inlet Cove to an acceptable aquatic environment.

After construction is completed, operation and maintenance would include recovery and storage/incineration of DNAPL, and maintenance of physical and institutional controls for on-site access. In addition, continue monitoring to assure effectiveness of the remedy would be required.

TREATMENT AND DISPOSAL OPTIONS

Excavated sediment/soil from the Inlet Cove will be managed as a hazardous waste having the characteristic of toxicity. DNAPL will be treated as a hazardous waste requiring incineration. Aqueous liquid will be managed as a hazardous or non-hazardous waste depending upon the source fo the wastestream and its characteristics.

These wastes will be handled as described on page 24.

EVALUATION OF ALTERNATIVE 3

Short-Term Effectiveness

Community protection: Excavation and handling of approximately 12,000 cy soil containing chemicals has a high potential to result in fugitive air emissions with strong odors during implementation of this alternative. Due to the prevailing southwest wind and the proximity of residential areas downwind, monitoring and control of air emissions during implementation will be important. A number of construction procedures such as the use of vapor suppressing foam, water cover, or plastic sheeting can be utilized to control emissions. If construction practices are not adequate to control emissions, it may become necessary to place a temporary structure over portions of the Inlet. Should OCC agree to undertake the remediation, approximately 600 truck loads of soil and sediments would have to be transported from the Inlet Cove site. This amount of traffic (10 to 20 truck loads per day) poses a potential risk of accidental spills and may cause a temporary disruption to the surrounding community. A spill contingency plan would be developed to insure continued public safety against possible accidents and truck routes will be selected that minimize traffic impacts.

Worker protection: Implementation of this alternative would pose risks to workers due to the potential for accidental chemical exposure or physical injury. Stringent health and safety procedures would need to be utilized during this work to prevent exposure to contaminants. Such measures have been routinely implemented at numerous sites, including the OCC-Durez Plant and North Tonawanda sewer projects, and have proven effective.

Environmental impacts: Implementation of this alternative poses risks of chemical release to the Little Niagara River since extensive work would be performed in the Inlet Cove over a period of several months. To address the risk of chemical release during construction several actions will be taken. First, the Pettit Creek Flume would be diverted away from the cove to isolate the work area. A sheet pile Z-wall will then be constructed across the mouth of the Inlet Cove. Additionally, all surface water runoff and construction waters generated during remediation will be collected and treated.

Time to implement: This alternative would require one full construction season to implement. Dewatering of sediments and fill, management of soils removed for treatment may require additional time. Final treatment and disposal of excavated soil and sediment would be several years in the future.

Long-Term Effectiveness

Residual risk: This alternative would dramatically reduce or eliminate all identified potential exposure pathways. This alternative would rely almost exclusively on removal and treatment of large quantities from concentrated areas of chemicals. Removal of these chemicals and permanent destruction via treatment is in conformance with EPA and State criteria for permanent reduction of site contamination. There would remain some post-remediation potential for the subsurface migration of residual contamination to the river. The excavation remedy would remove over 100 tons of organic chemical contamination from the Inlet Cove. This removal is greater than 98 percent of the currently identified contamination (Table 4) that currently exists at the Cove. Any residual contamination would be isolated and controlled by the Z-wall, barrier walls and Inlet clay bottom cap.

Adequacy of controls: Since this alternative relies principally on chemical contamination removal and treatment, the need for long-term controls would be reduced. However, a limited amount of residual contamination would remain and would require long-term isolation. The Z-wall will be left in place to control migration of residual contamination to the river and a clay layer and/or synthetic membrane will be used to isolate the Inlet Cove and repatriated biota from any remaining residuals. Additionally, the alternative would include a cutoff wall and DNAPL recovery wells north of the Cove to limit chemical migration. DNAPL recovery at this location would be effective because DNAPL is generally located in an isolated pocket of coarse sand and gravel.

Reliability of controls: The alternative would create use a low permeability base layer for the restored Inlet Cove. The clay layer and/or synthetic membrane would be a reliable barrier. The cut-off wall and DNAPL recovery wells to be installed north of the Cove would also be a reliable means of controlling migration.

Aquatic Restoration and Site Restrictions: This alternative would fully meet the remedial objective to restore the aquatic environment of the Inlet Cove and recreate an valuable wetland biota. The site will require only minimal restrictions to prevent degradation of the segregation bottom layer in the Cove and the north lobe extraction wells and barrier wall.

Reduction of Toxicity, Mobility, or Volume of Waste

Alternative 3 would result in a massive reduction of toxicity and volume of site contamination. Approximately 12,000 yd^3 of soft sediment, soil and DNAPL containing approximately 100 tons of chemicals will be removed from the site. Site contamination as estimated by the RI report will be reduced by over 98 percent once the removal is completed. Residual contamination would be in two forms - DNAPL in the north lobe which will be contained and extracted, and residual soil contamination in the silt clay fill below the Inlet bottom clay layer. In addition, long term DNAPL recovery wells in the north lobe will further reduce the site chemical mass. Residual contamination will be isolated by the Z-wall along the river, the clay barrier at the base of the Inlet and the barrier wall around the north lobe.

Implementability

Ability to construct and operate: Construction difficulties may be encountered in excavation of the slot and placement of properly compacted backfill. These problems would arise mainly out of dewatering difficulties,and possible soil instabilities. Installation of sheet piling would address these concerns and allow construction to proceed. Post construction operation would be limited to recovery wells north of the Inlet and would not be likely to experience other than minor problems.

Reliability: The removal of an estimated 98 percent of site contamination make this a highly reliable permanent remedy.

Ease of undertaking additional actions: The restoration of the Inlet Cove would not hinder the use of additional measures such as cap and cut-off walls. Successful implementation of this removal alternative would remove the need for any future significant additional actions.

Ability to monitor: Post construction conditions could be easily monitored with a long-term monitoring program.

Availability of services: Specialized equipment and services are likely required to complete the removal due to the complexity of the construction. However, these services would generally be available and would not be likely to delay or prevent implementation of the removal. However, a treatment facility for removed sediments and soils has not been identified and may not be readily available at the time of removal. To allow the remedy to proceed, interim storage will be provided as needed while pursuing a permanent treatment facility.

Compliance with ARARs

Implementation of Alternative 3 would be in compliance with the specified location-specific and action-specific ARARs. In the vicinity of the north lobe, it would not result in a near term compliance with chemical-specific ARARs for groundwater. This area would be monitored to assess both the decrease in containment levels and the need for further actions. There are no Federal or promulgated State criteria for the SCCs in either soils or sediment.

Overall Protection of Human Health or the Environment

Implementation of Alternative 3 is fully protective of human health and the environment. Baseline cancer risk for the site are within federal guidelines for additional cancers posed by the identified exposure pathways. Two principal exposure pathways, direct human contact with sediment and consumption of fish contaminated by the Inlet Cove, that present an incremental risk to human health would be eliminated. Groundwater beneath the Inlet Cove area would remain mostly uncontrolled with the exception of the north lobe and could contribute to chemical loadings into the Little Niagara River. However, approximately 75 percent of the chemical loading via groundwater eminates from the north lobe and would be eliminated and/or controlled. Outside the north lobe area, future loadings totaling less than 0.3 lb./day to the River are expected to dissipate over time with the removal of source contamination and not result in a unacceptable human health risk. Additionally, once the Inlet is restored, an environmental gain to the River's ecosystem is expected once the Inlet is restored to the point where it can safely support fish and wilflife.

Comparative Analysis of Alternatives

This analysis involves a comparative evaluation among the three alternatives to determine which one best meets the remedial program objectives. Consistent with Section 300.430(f)(1)(A) of the NCP, USEPA Guidance for Conducting RI/FS Under CERCLA and NYSDEC TAGM 40-30 for Selecting Remedial Actions at Inactive Hazardous Waste Sites, overall protection of human health and the environment is a threshold criterion that an alternative must meet to be selected as a proposed remedy, compliance with ARARs is also a threshold criterion. The five primary balancing criteria include long-term effectiveness and permanence; reduction of toxicity, mobility, or volume of waste; short-term effectiveness; implementability; and present worth of capital and operating costs. Modifying criteria consists of State and community acceptance. The comparative analysis focuses mainly on those aspects of the three alternatives that are unique for each. Upon completing this evaluation, it will then be possible to select the proposed remedy for the Inlet Cove site.

Overall Protection of Human Health and the Environment

This criterion is used to evaluate how well the alternatives protect health and the environment after remediation.

Alternative 1 is not protective of human health and the environment due to the continued risk of exposure to Soft Sediments containing chemicals. Alternative 2 is protective of human health but does not meet the objective for restoration of the Inlet Cove's aquatic environment. Although the risks of human contact with exposed chemicals would be reduced, the long-term potential for remedy failure could result in future contaminant migration to the river and groundwater. Alternative 3 would be additionally protective of health and the environment due to its removal and treatment of the vast majority of contaminants and subsequent elimination of the exposure pathways and vast reduction in chemical loading to the river.

Compliance with ARARs

This criterion is used to assess how successful an alternative is in attaining chemical, location, or action-specific standards and requirements.

Due to the large volume of chemical contamination at the site, it will not be technically practicable from an engineering perspective to attain certain ARARs. Numerical groundwater quality standards cannot be readily attained for any alternative beneath the north lobe area due to the presence of pockets of potentially unrecoverable DNAPL. Alternatives 1 and 2 are unlikely to meet site specific ARAR's for chemicals in sediment and/or groundwater. Alternatives 1 and 2 would also unlikely meet location specific ARAR's for Wetland Protection and River Dredge and Fill requirements. Alternative 3 would be more successful in attaining chemical and location specific ARARs due to removal, treatment and/or disposal of most site contaminants, and the restoration of the site's aquatic environment.

Short-Term Effectiveness

This criteria is used to evaluate how effective an alternative is in mitigating immediate site hazards, and to determine whether implementation will result in risks to the community, workers, or the environment.

With the exception of Alternative 1, all alternatives effectively eliminate the immediate risk posed by exposed soft sediment containing chemicals in the Inlet. In general, alternatives requiring progressively greater degrees of excavation and handling of chemistry result in progressively greater risks to the community and workers. Alternative 3 poses greater short-term risks than Alternative 2 but are manageable through proven construction practices, an appropriate health and safety plan for worker and community protection.

Long-Term Effectiveness and Permanence

This criterion is used to evaluate the residual risk posed by the site and the long-term adequacy and reliability of controls.

The residual risk posed by Alternative 2 and 3 would be acceptable, while that posed by Alternative 1 would not be acceptable. Alternative 3 would provide the greatest assurance of acceptable long-term risk reduction due to removal of source contamination. The technologies for implementing Alternatives 2 and 3 are adequate and reliable. The controls provided by Alternative 2 are generally reliable technology, however, due to proximity to the river channel, the potential exists for remedial failure and uncontrolled chemical releases and migration.

Reduction of Toxicity, Mobility or Volume of Waste

This criterion is used to evaluate how well the alternative satisfies the regulatory preference towards treatment.

The toxicity, mobility and volume of contaminants are significantly reduced by Alternative 3 through removal and permanent treatment of contaminated sediments and fill, and through extraction and permanent treatment of DNAPL from the north lobe area. Alternative 3 provides the greatest reduction of toxicity and volume, an estimated 100 tons of identified site contamination will be removed, treated and/or disposed. The mobility of contaminants is effectively eliminated by containment under Alternative 2, however little reduction of toxicity and volume will be achieved. Alternative 1 does not provide any significant reduction of the toxicity, mobility, or volume of chemistry.

Implementability

This criterion is used to evaluate the ease with which an alternative can be constructed, operated, monitored, maintained, or upgraded, if necessary.

Alternative 2 could be readily constructed. Alternative 3 would be somewhat more difficult to construct, but would use routinely available equipment and technologies. Long-term operation and maintenance requirements would be required for each of the alternatives. Alternative 3 would require substantially less long-term attention than either Alternatives 1 or 2. Alternative 2 would add a significant volume of materials on top of the Inlet sediments and could complicate further treatment options.

The implementation of a remedial program for the inlet cove has been discussed with the potentially responsible party, the Occidental Chemical Coorporation (OCC). Should OCC agree to implement the remedy, facilities located at OCC's Durez Plant and OCC's Main Plant in Niagara Falls will simplify implementation. However, should OCC not agree to implement the remedy, implementation of the remedy will likely require construction of a sediment processing and interim storage facility at the site.

Present Worth of Capital and Operating Costs

This criteria is used to evaluate costs and cost uncertainties associated with implementing and maintaining an alternative.

Alternative 1 - No cost will be incurred to implement this alternative. However, continued monitoring of existing wells and sampling locations would be required.

Alternative 2 - Total cost to implement the containment alternative is approximately $11.5 million dollars. Cost estimates are included in Appendix A1.

Alternative 3 - OCC and the State estimate that the excavation and treatment will range from $16.5 to $23.5 million. The wide range is a factor of the amount of sediment/soil by segregation which will require incineration or treatment.

SECTION 7 - SUMMARY OF THE GOVERNMENT'S DECISION

The proposed remedial action selection is based on the seven NCP decision criteria, the ability to meet remedial objectives, and the State's preference for permanent remedial actions. As previously discussed, Alternative 3 would significantly reduce the volume, toxicity, and mobility of Inlet contamination while addressing requirements of ARARs. Alternative 3 is consistent with CERCLA as amended by SARA; and the NCP. Alternative 3 is also consistent with the City of North Tonawanda Waterfront Revitalization Plan.

The removal of site contamination will be accomplished to the maximum extent practicable given the limits of storage capacity, treatment and cost. However, at a minimum, all soft sediment and the LWL bedding as described below, which contains the vast majority of site source contamination, will be removed. Final limits of the removal will be established in an Approved Remedial Plan to be developed through negotiations with OCC and eventually verified during design and construction. In addition, residual contamination in the area north of the Inlet Cove (north DNAPL lobe) must be adequately addressed. Because the DNAPL is isolated in a thin gravel layer over 30 ft. below the ground surface, it is not practicable nor safe to excavate for this contamination. A second approach, proposed by Alternative 3, is to construct a barrier around the lobe and pump the DNAPL with a series of wells. The DNAPL would be highly recoverable from this lobe due to the high permeability of the gravel layer that it is contained in. In contrast, DNAPL found elsewhere on site is found in low permeable clay fill and the LWL bedding, therefore, excavation is the only practicable method to remove the contamination, and is required within the Cove to enable restoration of the aquatic environment.

Post remediation of the Inlet Cove will consist of backfilling the Cove bottom with clay and clean soil, and restoring the area as a wetland. This area has been and would continue to be available as a waterfowl resting area during winter months, and is one of the few remaining wetland areas along Niagara River on the U.S. side.

Cove restoration will allow for continued use of the area as a wetland. However, to allow for human use of the cove area, limited site restrictions will be required to assure the continued integrity of the remedy. These would include a ban on excavations into the cove bottom and no construction of subgrade structures in the north lobe area. In addition routine groundwater monitoring will be conducted to evaluate the effectiveness of source removal in restoring the quality of area groundwater.

Alternative No. 3 will consist of the following principle components:

- <u>Soft Sediment Removal</u>

  After the PCF stormwater discharge is permanently diverted and the abandoned portion of the PCF is plugged or removed, the Inlet Cove would be temporarily separated from the river by the installation of a sheet pile barrier wall at the mouth of the Inlet. The Cove would also be separated from the north lobe by installation of a permanent cut-off wall.

  Soft sediment and approximately 12 inches of the underlying silt-clay fill would be removed from the Inlet. Figure 13 is based on present data and illustrates present knowledge of the thickness of soft sediment. Final excavation depths would be determined in the field by OCC's Engineer with concurrence of the State On-site Representative.

  The excavation surface would be dewatered and areas of silt-clay fill outside the proposed slot excavation that are observed to contain mobile DNAPL would be excavated in approximately 6-inch layer increments until mobile DNAPL is no longer observed at the excavation surface or in removed soil. Previous Inlet sampling results will help guide this effort. Likely areas of the additional excavation are at the PCF outfall and the location of former building structures in the Inlet Cove. Following removal of soft sediment and the excavated areas of silt-clay fill described above, the excavated surface would be prepared to form an operating pad to support equipment during subsequent slot excavation and removal of the LWL. This preparation would include backfilling to smooth out irregularities for placement of geosynthetic material and granular fill.

- Slot Removal

Slot excavation and removal of soft sediment is expected to result in the removal of a substantial amount of the DNAPL known to be present at the Inlet Cove. The relatively impermeable bedding material adjacent to the LWL will be removed. In order to remove this bedding material effectively, the LWL pipe will be removed. The excavation of the bedding and LWL will be done in small sections each forming a narrow, approximately 25-feet long, 15- to 30-feet deep "slot" running east-west through the Inlet cove. These dimensions are based on information obtained and evaluated during the remedial investigation, and on anticipated construction techniques.

It is anticipated that the initial width of the first slot section will be 10 feet. The width of subsequent slot sections may be varied in design and/or construction. Sections may be widened if field personnnel agree that the observed distribution of DNAPL justifies handling of additional soil and removal of DNAPL by excavation rather than by extraction as described in the contingency plan. Subsequent sections may be renarrowed as appropriate to reduce the handling and contamination of clean soil without sacrificing DNAPL removal efficiency.

The length of each section will be kept short to maximize construction flexibility and efficiency. Based on anticipated construction techniques, it is anticipated that section lengths will be approximately 25 feet to safely accommodate excavation equipment. Construction techniques and section length will be reevaluated during the design phase.

Slot depth will be controlled primarily by stratigraphy and the depth to native glacio-lacustrine clay and/or till.

The conceptual plan for implementing removal of the LWL and bedding is as follows:

- isolate the Inlet Cove and abandoned LWL from the Little Niagara by driving sheet piling at the mouth or west end of Inlet Cove;
- drive temporary interlocking sheet piles into underlying native clay/till to construct a section of four vertical walls and isolate small sections of the LWL;
- excavate silt-clay fill from within each section;
- dewater the section and install wall-support bracing as appropriate;
- cut or break the LWL pipe in segment(s) and remove it from the excavation;
- excavate from each slot remaining bedding and observed DNAPL;
- backfill the slot excavation with low permeability soil; and
- remove temporary sheetpiling.

The excavation will proceed from east to west. As work in one section is completed, the sheet piling may be removed and installed to create a new section immediately to the west. The sheet piles forming a common wall between the old and new sections will remain in place.

As silt-clay fill and bedding are removed from the slot, inflow of mobile DNAPL may occur through the interlocks of the sheet piles. This DNAPL will be removed from the slot during construction.

A contingency plan has been developed in the event that a source of mobile DNAPL is suspected to be present outside the sheet piles. If, at the time the section is to be backfilled, DNAPL inflow continues into the excavation, a temporary DNAPL extraction well point, or equivalent, will be established outside of the slot at the suspected source of the mobile DNAPL. This extraction point will be operated until DNAPL recovery rates have decreased to levels that no longer justify continued operation. Extraction point(s) will be removed and properly backfilled, as appropriate, at the conclusion of the DNAPL extraction operation.

A low permeability clay blanket will be installed to serve as a cap for the excavation surface and as a bottom liner for the remediated Inlet Cove. A protective layer of granular soil will be placed over the clay blanket. As a final step, the sheetpiling at the mouth of the Inlet Cove will be cut off or advanced to open up the Inlet Cove to the river and enable direct access by river aquatic life. It is anticipated that these remedial measures will result in a substantial improvement of the Inlet's aquatic habitat as compared to its present condition.

- <u>North Lobe</u>

The area around well MW-5i is referred to here as the North Lobe. Based on the RI data, mobile DNAPL has accumulated in gravel at the location of well MW-5i. Based on wells and test borings, it appears that the gravel pocket is associated with a localized depression in the till surface in the vicinity of well MW-5i. This depression is apparently holding pooled DNAPL in the relatively permeable gravel liner over the surface of the glacio-lacustrine clay and/or till.

Existing data has roughly defined a limited extent of DNAPL. An additional investigation will be conducted in the vicinity of well MW-5i to further define the extent of DNAPL. The findings of the design investigation will largely determine the number of DNAPL extraction wells and the extent of the barrier wall. The intent will be to isolate and extract mobile DNAPL to eliminate a source of groundwater contamination.

Remediation of the North Lobe would entail the following measures:

- Install a cut-off wall to encircle the portion of the North Lobe containing DNAPL. If appreciable quantities of DNAPL are not identified in the North Lobe during the design investigation, then alternatives to the cut-off wall may be evaluated.

- Install and operate DNAPL extraction well(s) in the North Lobe area. Operation of the wells will be discontinued when the DNAPL recovery rate has decreased to levels that no longer justify continued operation.

- Monitor the effectiveness of the cut-off wall and extraction wells through the installation of monitoring well(s) and the collection of groundwater samples.

The implementation of Alternative No. 3 will provide for a permanent remedial action through the excavation and treatment of contaminated soil, sediment, and DNAPL and provide for the restoration of the Inlet Cove as a wetland area along the Little Niagara River. Exposure to any residual contamination will be controlled by placing a clay layer at the bottom of the cove prior to restoration and by imposing additional institutional measures to restrict future site development and/or access that would affect the subsurface cap or north lobe remediation. Subsurface migration of the DNAPL contamination north of the inlet will be controlled by a barrier cut off wall and removed through a series of long-term extraction wells. The loading of chemicals via groundwater to the river will be significantly reduced by the removal and/or control of source contamination.

The combination of removal in the cove and isolation/extraction of the north lobe will be fully protective of human health and the environment. All the proposed technologies have been demonstrated to be reliable under a range of conditions.

The implementation of Alternative No. 3 is premised on the permanent relocation of the Lockport and North Tonawanda Water Lines. This relocation is being conducted by OCC as an interim remedial measure and must be completed prior to the start of inlet remedial construction.

As previously stated, Alternative No. 3 is protective of human health and the environment and recognizes the State's preference for permanent remedies and treatment technologies. The alternative will reduce exposure pathways by removal, treatment and/or disposal of contaminated soft sediment and fill, removal and incineration of DNAPL, and isolating residual chemicals through Z wall sheet pile, cut off walls and clay layers. The total amount of site chemicals to be removed is expected to be nearly 100 tons of contamination contained in approximately 12,000 yd^3 of soil and sediment, and DNAPL. The effectiveness of the source removal will be verified by post-construction assessment and a long-term groundwater monitoring program.

Implementation of Alternative No. 3 will provide for the permanent treatment of site chemicals. DNAPL excavated or removed by extraction wells will be transferred to OCC's Niagara Falls plant, and stored pending incineration at OCC's Main Plant Liquid Incinerator. This unit is currently permitted by Federal and State regulatory agencies to destroy similar liquid remedial waste from other OCC sites in the Niagara frontier.

Soft sediment would be dewatered either on site at a facility to be constructed or at OCC's existing Durez sediment processing facility. This facility currently processes sewer sediment and places it in bags for storage at OCC's Main Plant pending final treatment. Transport of sediment from the Inlet Cove to Durez would be necessary should the existing Durez facility be utilized.

All dewatered Inlet Cove sediment and soil is assumed to be hazardous waste. This material will be managed as characteristic hazardous waste in one of three ways for the purposes of disposal. Dewatered sediment/soil would be screened for total Halogenated Organic Compound (HOCs), and if necessary, for hazardous waste characteristic using USEPA's Toxic Characterization Leaching Procedure (TCLP). Sediment/soil would be classified as (1) containing greater than 1,000 ppm Halogenated Organic Compounds (HOCs), or (2) failing TCLP but containing less than 1,000 ppm HOCs, or (3) as passing TCLP. Sediment/soil above 1,000 ppm HOCs must be incinerated at a licensed facility as required by Federal land ban restrictions. Among the options for incineration are OCC's planned Thermal Destruction Unit (TDU) or mobile incineration or other licensed commercial incinerators that may become available. Until incinerator capacity is available, the sediment/soil would be stored in a licensed storage facility, preferably a storage facility to be built at OCC's Buffalo Avenue, Niagara Falls plant.

Sediment and soil failing TCLP but containing less than 1,000 ppm HOCs would be managed as characteristic hazardous waste, treated and/or disposed of in accordance with all Federal and State rules, regulations and requirements. Options for treatment of this waste other than incineration include emerging technologies such as aerobic and anaerobic biodegradation, solvent extraction and soil washing. Interim storage as described above also may be required.

Lastly, sediment and soil which passes TCLP would be disposed of at a RCRA Subtitle C landfill, or with the approval of the State, on-site at the North Tonawanda OCC-Durez site. Similar material not exhibiting hazardous characteristics was consolidated in the Panhandle section of the OCC-Durez plant during the installation of the plant site's barrier collection system. Practical on-site methods for segregating sediment/soil for different disposal options will be developed and set forth in the Approved Remedial Plan.

OCC has agreed that all DNAPL will be incinerated, preferably at OCC's existing and permitted liquids incinerator at the Niagara Falls plant. OCC has also agreed that wastewater generated during remediation will be characterized and treated and disposed of properly in accordance with that characterization. It is likely that such wastewater would be treated at the OCC Durez SPDES treatment facility, but other options may include a temporary wastewater treatment plant on-site, an existing commercial treatment facility or discharge to the City of North Tonawanda sewer system, as appropriate.

In the event OCC does not implement the proposed remedy, the State will expend Superfund money to implement the remedy by constructing an interim on site storage facility for sediment and DNAPL, on property adjacent to the inlet. Storage on site will last until either a commercial facility becomes available, the State permits a mobile incinerator, or OCC elects to accept waste generated at the site.

APPENDIX 1

Administrative Record

1. "Geotechnical Investigation of Inlet", Dunn Geoscience Corporation, Final, March 7, 1988.

2. "Work Plan for Additional Subsurface Investigation at Inlet", Dunn Geoscience Corporation, May 24, 1988.

3. "Lockport Water Line Survey", Dunn Geoscience Corporation, March 7, 1988.

4. "Health and Safety Plan for Additional Subsurface Investigations at Inlet", Dunn Geoscience, September 19, 1988.

5. "Summary of Subsurface Investigations at Inlet 1987-1988", Dunn Geoscience Corporation, October 17, 1988.

6. "Record of Decision", OCC-Durez Site Remedial Action Plan, New York State Department of Environmental Conservation, February 1989.

7. "Stipulation and Partial Consent Judgement", Civil Action 83-0552C; State of New York against Occidental Chemical Corporation, June 21, 1989.

8. "Remedial Investigation Report for the Inlet (Durez Site)" Volume 1 & 2, Dunn Geoscience Corporation, Revised May 1991.

9. "Remedial Alternatives Assessment for the Inlet" (Durez Site) Volume 1 & 2, Dunn Geoscience, December 6, 1991.

10. "Lockport Raw Water Intake Geotechnical Engineering Report", Glynn Geotechnical Engineering, February 1991.

11. "Engineering Report, Lockport Raw Waterline and North Tonawanda Relocation", R & D Engineering, April 1991.

12. "Final Technical Specifications, Lockport Raw Waterline and North Tonawanda Relocation", R & D Engineering, September 1991.

13. "Proposed Remedial Action Plan - OCC Durez Pettit Creek Inlet Cove", New York State Department of Environmental Conservation, November 1991.

14. "Transcript of the public meeting regarding the PRAP for the OCC-Durez Pettit Creek Inlet Cove site", prepared by Jack W. Hunt Associates, January 1992.

APPENDIX 2

Responsiveness Summary for Comments Received During Public Comment Period for the OCC-Durez Pettit Creek Inlet Cove Proposed Remedial Action Plan

A public meeting was held on January 7, 1992 to present the OCC-Durez Pettit Creek Inlet Cove (Inlet Cove) Proposed Remedial Action Plan (PRAP). The public comment period on the PRAP ran from December 16, 1992 to January 17, 1992. During this time, no written public comments were received. This responsiveness summary addresses the concerns raised at the public meeting held on January 7. A transcript of the public meeting is part of the Administrative Record for this Record of Decision.

1. A question was raised as to the extent and nature of Canadian and Ontario Ministry of the Environment involvement in selection of the proposed remedial plan.

   The State has worked closely with Canadian and Ontario authorities during development of the remedial plan. Their preference for permanent remedies that will significantly reduce chemical loadings to the Niagara River were taken into advisement and served the State well in our efforts to have OCC conduct an extensive removal action at the Inlet Cove.

2. Q: How will the extent of DNAPL contamination north of the Inlet Cove be determined and what criteria will be placed on DNAPL extraction wells that would justify discontinuing operation?

A: DNAPL in the north lobe is contained in a one to two feet gravel lense sitting on top of a depression in the underlying clay till. DNAPL is believed to have escaped, essentially from the Lockport water line bedding area through the contract with open gravel. The DNAPL has gravity flowed into this small pooling area in the till depression. A design investigation consisting of soil borings installed in a grid will accurately identify the extent of this pooled DNAPL. We believe a cutoff barrier wall keyed into the clay till surrounding the pooled DNAPL and extraction wells will be an effective means of remediating this small area. Effectiveness criteria for the extraction wells will be the subject of further negotiations with OCC and will be embodied into a consent order for the remediation.

3. Q: What are the State's plans for post remediation of the Inlet Cove and will they accommodate the construction of a marina at the Cove?

A: The Department plans do not presently provide for a marina or boat docking facility within the restored Inlet Cove. The placement of an impermeable bottom layer in the Cove to isolate any residual contamination makes it highly unlikely that the use of power boats in the Cove would be allowed.