Record of Decision
Cherry Farm Site
Site No. 915063

Department of Environmental Conservation

Division of Hazardous Waste Remediation

Amended Record of Decision

Niagara Mohawk - Cherry Farm Site

I.D. Number 9-15-063

October 1993

New York State Department of Environmental Conservation

MARIO M. CUOMO, *Governor* THOMAS C. JORLING, *Commissioner*

DECLARATION STATEMENT - AMENDED RECORD OF DECISION

Niagara Mohawk - Cherry Farm Inactive Hazardous Waste Site
Town of Tonawanda, Erie County, New York
Site No. 9-15-063

STATEMENT OF BASIS AND PURPOSE

This amended Record of Decision (ROD) presents the selected remedial action for the Niagara Mohawk - Cherry Farm inactive hazardous waste disposal site which was chosen in accordance with the New York State Environmental Conservation Law (ECL), and consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Site and upon public comments received regarding the amended ROD. A listing of the documents that comprise the Administrative Record is included as Exhibit A.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Amended Record of Decision, may present a current or potential threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

Based upon the Remedial Investigation/Feasibility Study (RI/FS) for the Site, subsequent field investigations, and the criteria used to evaluate remedial alternatives, the NYSDEC has selected a remedy to contain site wastes and contaminated groundwater by installing a cover over the site and using groundwater extraction wells to recover groundwater and prevent its discharge to the Niagara River. The components of the selected remedy include:

- **Consolidation of wastes** to minimize the size of the final footprint of the site and to pull wastes back from the Niagara River shoreline and from the drainage channels on the north and south sides of the site.

- As a part of slope reconstruction, the **contaminated sediments from the ditches will be removed and consolidated** within the landfill material before installing the cover. Sampling and analysis of sediments in the Niagara River near the site will be conducted to determine if river sediments should be removed and consolidated on the site.

- Installation of a cobble (or equivalent) **barrier layer** over the site to prevent intrusion into wastes by people or wildlife.

- Installation of a **soil cover** to further separate potentially exposed people and wildlife and to serve as a vegetative support layer.

- Installation and operation of a series of **groundwater extraction wells** to eliminate the discharge of contaminated groundwater into the Niagara River.

- o **Discharge of groundwater** to the local publicly owned treatment works after any necessary pretreatment.

- o Take actions needed to obtain **deed restrictions** to prevent activities that would intrude into wastes or otherwise diminish the effectiveness of the remedy.

The elements of the selected remedy that differ from those in the original February 1991 ROD include:

- o The cover design will not include an impermeable hydraulic barrier. The original ROD indicated that this change was being contemplated but that additional field studies were needed to demonstrate that this alternate design would function properly and be protective of human health and the environment.

- o Collected groundwater will not be discharged into the Niagara River but shall be pretreated (if necessary) and discharged to a local water treatment plant.

- o Fencing will not be installed around the site as part of the remedy. Since future plans for the site include making it compatible for use as a public recreation area or park and the cover will be designed to prevent contact with wastes, a fence is not necessary.

NEW YORK STATE DEPARTMENT OF HEALTH ACCEPTANCE

The New York State Department of Health concurs with the amended remedy selected for this site as being protective of human health.

DECLARATION

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. In accordance with the provisions of 6 NYCRR 360-1.7(c) and 373-1.1(e), the conditions at this site make it appropriate to grant a waiver to the standard landfill cover design. This will have no significant adverse impact on human health or the environment.

Because this remedy will not allow for unlimited use and unrestricted exposure within five years after commencement of remedial action, a five year policy review will be conducted. This evaluation will be conducted within five years after the components of the remedy have been constructed and thereafter as necessary to ensure that the remedy continues to provide adequate protection of human health and the environment.

Oct. 7, 1993
Date

Ann Hill DeBarbieri
Deputy Commissioner
Office of Environmental Remediation
New York State Department of Environmental Conservation

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Glossary of Acronyms

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act
ECL: Environmental Conservation Law
IRM: Interim Remedial Measure
NAPL: Non-Aqueous Phase Liquid
ND: Not Detected
NYCRR: N.Y. Codes, Rules, and Regulations
NYSDEC: N.Y. State Department of Environmental Conservation
NYSDOH: N.Y. State Department of Health
O&M: Operation and Maintenance
PAHs: Polycyclic Aromatic Compounds
PCBs: Polychlorinated Biphenyls
PNAs: Poly Nuclear Aromatic Compounds
ppb: parts per billion
ppm: parts per million
PRAP: Proposed Remedial Action Plan
RI/FS: Remedial Investigation and Feasibility Study
ROD: Record of Decision
SARA: Superfund Amendments and Reauthorization Act
SCG: Standards, Criteria, and Guidance
SPDES: State Pollution Discharge Elimination System
VOC: Volatile Organic Compound
ug/kg: microgram per kilogram
mg/kg: milligram per kilogram
ug/l: microgram per liter

Notice

The mention of any trade names or commercial products in this document does not constitute any endorsement or recommendation for use by the New York State Department of Environmental Conservation.

AMENDED RECORD OF DECISION
NIAGARA MOHAWK-CHERRY FARM SITE
SITE ID NO. 9-15-063

1. INTRODUCTION

After completing a series of investigations culminating with a Remedial Investigation and Feasibility Study (RI/FS), a site remedy was selected consisting mainly of covering with an impermeable cap along with groundwater containment, collection, treatment, and disposal. This remedy, incorporated into a February 15, 1991 Record of Decision (ROD) produced by the New York State Department of Environmental Conservation (Department), is the subject of this ROD amendment.

The 1991 ROD contained a conceptual design of the remedy. It was noted that additional hydrogeological information was needed before the full scale design could be completed. This led to the performance of a pump test completed at the site during 1992. It was also noted that, "[t]he proposed capping system is also being viewed as a component of this recovery system to assist in the capture of the contaminated groundwater. The future design activities may reveal that the capping system design can be modified (ROD p. 18)."

The elements and results of the additional investigations completed in 1992 are summarized in Section 4.1 below. The major conclusions are that it is possible to construct and operate a groundwater containment system capable of preventing the discharge of contaminated groundwater to the Niagara River and that a permeable site cover may be substituted for an impermeable cover without reducing protectiveness to human health and the environment.

There are a number of site specific features that led to this conclusion. First, whether the cap is permeable or impermeable, all groundwater that currently discharges to the Niagara River will be intercepted. An impermeable cover would reduce the volume of groundwater to collect and treat but would not obviate the need for collection. Secondly, up to one-half of the wastes at the site are underneath the permanent water table. Therefore, the use of an impermeable cover would not significantly reduce the production of leachate from these already saturated soils. Third, the permeable cover system will provide a physical barrier to contact with contaminants much as the hydraulically impermeable system would. This addresses the threat to human health and the environment by the direct contact pathway. Lastly, it is possible that the "soil washing" that will occur by using a permeable cover may result in a faster attenuation of contaminants in the waste making the eventual shut-off of the groundwater containment system possible.

Although the changes in the site remedy documented by this ROD Amendment are not major, Department procedure does not currently provide a mechanism for making changes of this nature to the selected remedy. Therefore, the Department has prepared this formal Amendment to the 1991 Record of Decision and has made it available for public inspection and comment. To avoid duplication, the 1991 ROD is incorporated into this document as Exhibit B.

2. SITE LOCATION AND DESCRIPTION

The Cherry Farm Site is an inactive landfill located between River Road and the Niagara River in the Town of Tonawanda, New York (see Figure 1). The site encompasses approximately 56 acres, 80% of which is covered by various fill materials.

The fill material consists primarily of foundry sand, slag, and cinders. The surface of the fill is between 10 to 20 feet above the original surrounding land surface. The present topography of the filled area is essentially flat. The Site is accessible from River Road through a locked gate which leads to the fill entrance driveway.

The fill area is surrounded by intermittent surface water. A wetland designated as BW-6 by the NYSDEC is present on the eastern portion of the Site. This wetland drains into the drainage ditches which flow along the southern and northern boundaries of the property and ultimately discharge to the Niagara River which forms the western side of the Site (Figure 2).

3. SITE HISTORY AND ENFORCEMENT STATUS

Information provided to the NYSDEC by the Colorado Fuel and Iron Steel Corporation (CF&I) revealed that between 1945 and 1963, dust and slag from the CF&I blast and open hearth furnace operations were disposed of at the Site. Operations ceased in 1963. CF&I then entered into an agreement with INS Equipment Company (INS) which allowed INS to dispose of foundry sand and sandcast from a nearby Chevrolet Plant on the property.

The site was purchased by Niagara Mohawk Power Corporation (NMPC) in 1970. At the time of purchase, foundry sand was exposed at the surface of the fill area. To prevent erosion, the surface of the fill was capped with approximately six inches of clay and seeded. Several environmental investigations have been conducted at the site since 1978.

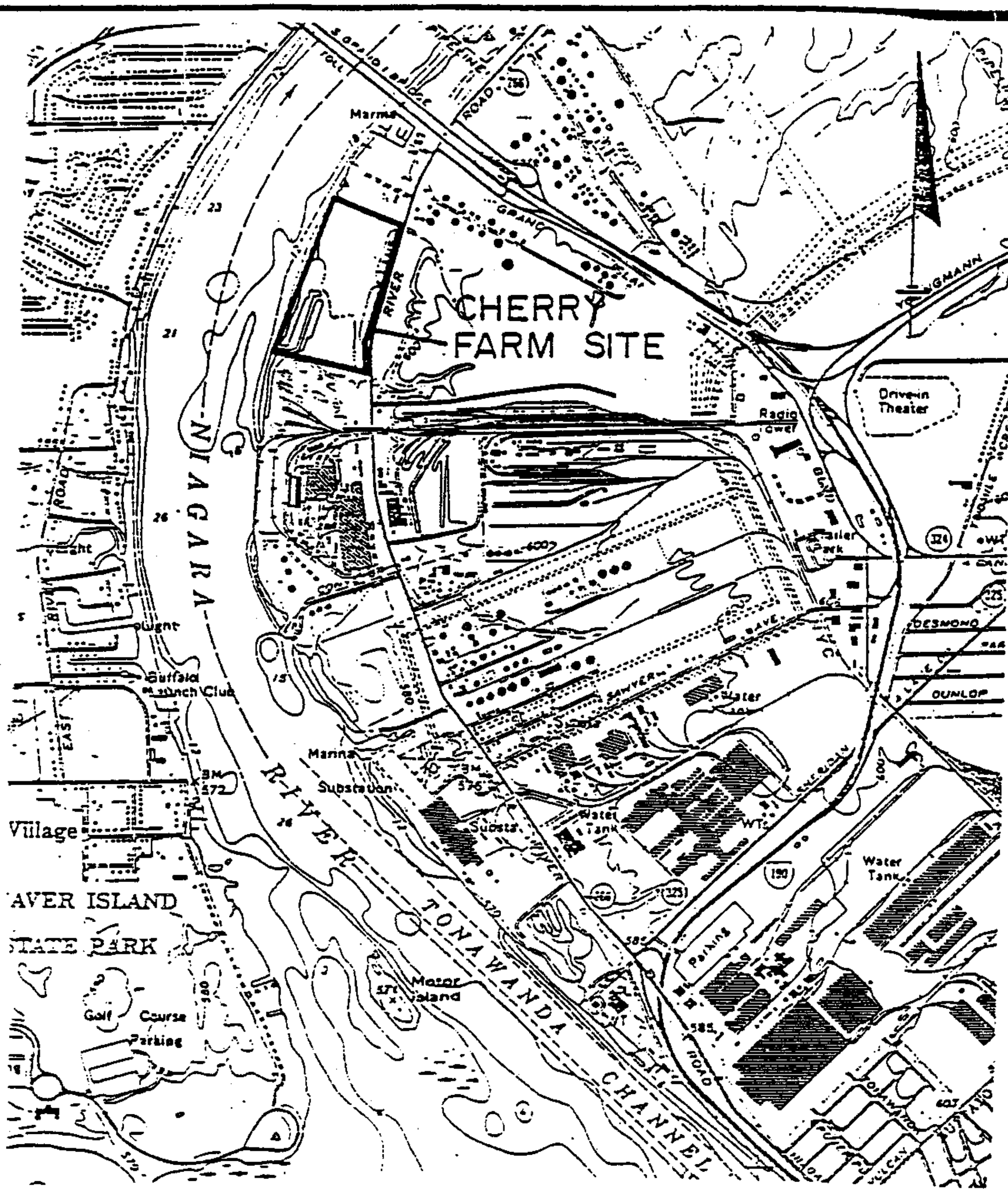
Previous Investigations

1. An initial investigation was performed between 1978 and 1980 as part of a State wide program conducted by the New York State Interagency Task Force on Hazardous Waste. These initial investigations indicated that various industries may have deposited waste materials, some of which may have been hazardous, at the site.

2. Phase I Investigation - June 1983, Engineering Science: The NYSDEC contracted with Engineering Science to perform a Phase I Study. Borings completed during the Phase I investigation indicate that the site is man made land. A shallow aquifer was found to exist within the fill material approximately 10 feet below the fill surface. Groundwater movement within this aquifer is towards the Niagara River.

3. Phase II Investigation - April 1986, O'Brien & Gere: In April 1985, Niagara Mohawk retained O'Brien and Gere Engineers to conduct a Phase II Investigation in accordance with NYSDEC guidelines. The Phase II investigation included a geophysical survey, installation of seven monitoring wells, completion of five soil borings and collection and analysis of soil, groundwater, surface water and sediment samples. According to the Phase II Study, the groundwater flow in both the upper perched and lower groundwater tables is generally towards the northeast in the direction of the Niagara River.

FIGURE-1



CHERRY FARM
SITE LOCATION MAP
NIAGARA MOHAWK POWER CORP.
TONAWANDA, NEW YORK

ADAPTED FROM U.S.G.S. (7.5 MIN.) BUFFALO NW N.Y.-
ONTARIO QUADRANGLE 1965

SCALE 1" = 2,000'

O'BRIEN & GERE ENGINEERS, INC.

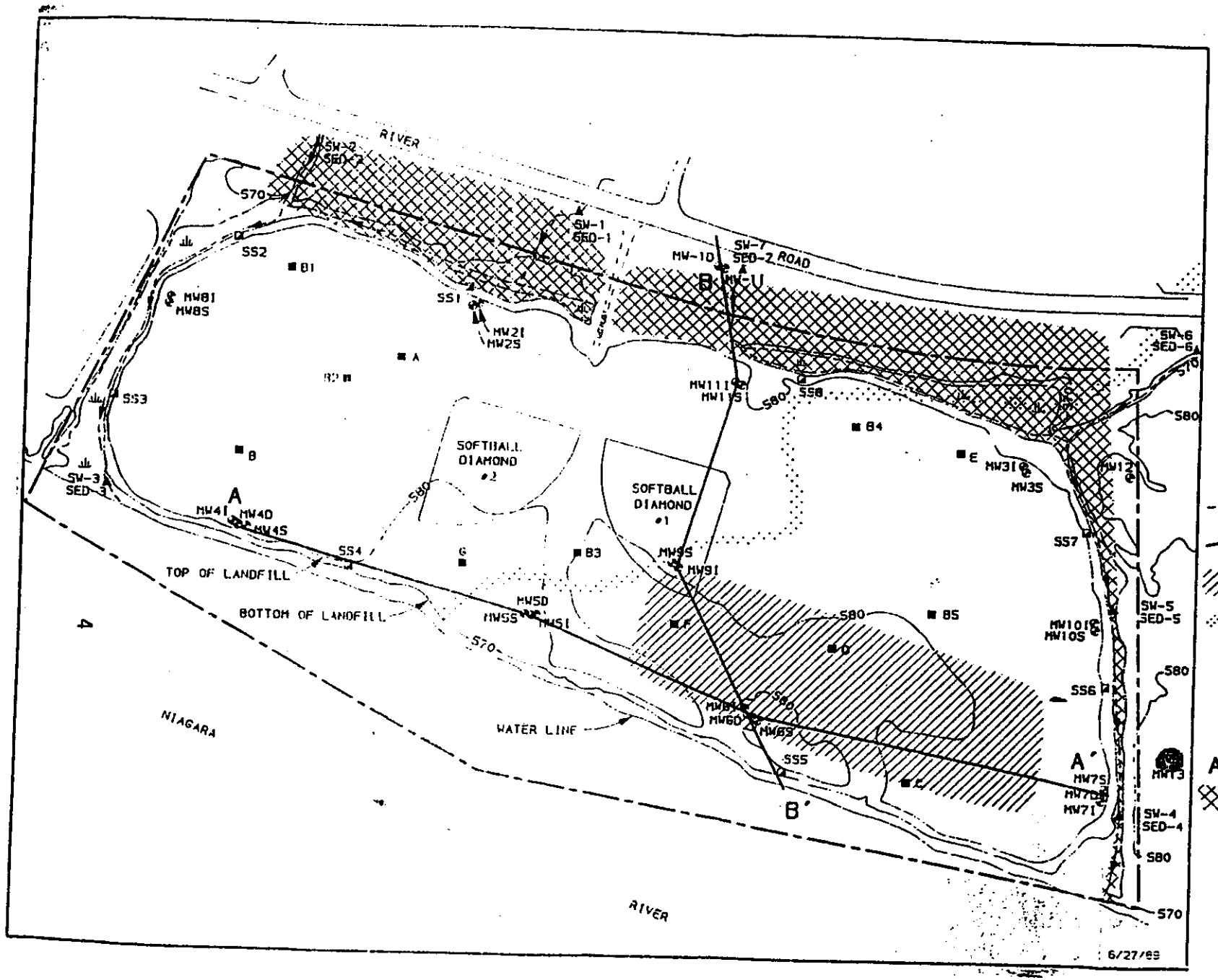


FIGURE 2

REMEDIAL / INVESTIGATI
CHERRY FARM SITE
TONAWANDA, NEW YORK

SITE MAP

LEGEND

- DRAINAGE DITCH
- APPROXIMATE PROPERT LINE
- GENERAL AREA OF FOR SETTLING PONDS
- FORMER STREAM CHANN
- MONITORING WELL
- LANDFILL FACE SAMPL
- SOIL BORING
- SURFACE WATER/SED M SAMPLING
- A-A' GEOLOGIC CROSS-SEC T
- DESIGNATED WETLAN

0 200

SCALE IN FEET

O'BRIEN & GE
ENGINEERS, INC.

The chemical analysis completed on the fill material revealed the presence of phenolic compounds, and polynuclear aromatic compounds (PNAs) in addition to a variety of metals. Additionally, polychlorinated biphenyls (PCBs) were detected in the soils. The metals were attributed to the abundance of foundry sand and furnace slag known to have been used as fill material. PCBs were once largely used in electrical switchgear and industrial machinery.

The results of groundwater analyses revealed trace levels of some metals, PNAs, and phthalates, all of which were found in the fill material. Elevated levels (up to 529 ug/l) of aromatic compounds (benzene, toluene and xylene) were found in one well.

The analysis of surface water and sediments samples revealed the presence of a number of metals, phenolics and PNA's.

Enforcement Status

A chronological review of the enforcement status is as follows:

1. NYSDEC entered into a Consent Order with Niagara Mohawk Power Corporation (NMPC) on December 3, 1985 for a Phase II Investigation.
2. Based on the Phase II Report, NYSDEC determined that a significant threat to the environment exists.
3. NMPC submitted a work plan for an RI/FS in October 1986.
4. NMPC submitted a revised work plan in September 1987.
5. January 1988: Administrative costs submitted.
6. April 1988: NMPC enters into an agreement (Consent Order) with NYSDEC to conduct an RI/FS.
7. July 1989: RI Report submitted.
8. August 1989: RI Report accepted by the NYSDEC.
9. October 1989: FS Report submitted.
10. May 1990: FS Report accepted by the NYSDEC.
11. The ROD was signed on February 15, 1991.

Of the Potentially Responsible Parties (PRPs) identified for this site, only NMPC entered into an order on consent to complete the RI/FS. Subsequent to the February 1991 ROD, other PRPs including Allied-Signal, Inc., General Motors, and TRW, Inc. joined NMPC to form a working group. This group is currently negotiating with the Department for a consent order for remediation of the site.

4. SUMMARY OF SITE CHARACTERISTICS

4.1 New Information

Subsequent to the signing of the Record of Decision (ROD), Remcor, on behalf of the PRP group, designed a hydrogeologic investigation of the site consisting of a pump test and sand delta evaluation.

In October 1991, Remcor collected a total of 18 sediment samples from the river near the two discharge points from the wetland located on the Cherry Farm Site. Three samples were obtained in the Niagara River upstream from the site in order to act as controls. Examination and classification of these samples detected no difference between the upstream controls and those from the area of the outlets. This led to the conclusion that no significant "sand delta" accumulations are present near the wetland outlets to the Niagara River.

Also in October, Remcor installed one recovery well and six observation wells to be used in the performance of the pump test. On October 31st, a step drawdown test was conducted to determine the performance range of the recovery well.

A three day constant rate pump test was conducted during November 1991. The test was preceded by several days of data collection to provide a static baseline. After the conclusion of the pump test, water levels were monitored until they reached 90% recovery.

The test results indicated that the combination of an interceptor trench and a series of eight recovery wells would control the migration of groundwater across the site preventing the discharge of contaminated water to the Niagara River. The interceptor trench would act to collect water from the shallow aquifer which is basically unaffected by deeper pumping wells. The eight recovery wells would induce an inward flow from the river in the intermediate and deep zones and capture the contaminated groundwater.

The pump test results indicate that hydraulic control of the site can be achieved without an impermeable cap. This allows for the use of soil cap over the site to prevent direct contact with fill materials.

4.2 Site Geology

The geology of the Cherry Farm site begins with a surface cover consisting of clay rich soil (~ 6" thick) emplaced in 1970. This layer covers the fill material across most of the site. The fill ranges from 15-20 feet in thickness and is primarily comprised of foundry sands, cinders, and pieces of slag. The fill is underlain by alluvial deposits ranging from 10-25 feet thick. The upper foot of this deposit consists of marsh sediments containing a significant organic fraction. A glacial till deposit four feet thick separates the alluvial from the underlying Camillus shale.

Groundwater flow in the shallow, intermediate, and deep zones all trend toward the Niagara River in a west-northwest direction. Groundwater is generally encountered between ten and fifteen feet below grade.

4.3 Media Specific Summary

Five classes of media were sampled at the site, groundwater, surface water, surface soils, subsurface soils, and sediment. All of the media show some degree of contamination. Selected results of the organic, inorganic, PCB, and pesticide analysis are summarized below. For complete results see Tables 5 through 15 in the February 1991 Record of Decision.

Groundwater

Two rounds of samples were taken for analysis. Among the volatile organic compounds detected, there was vinyl chloride (22-124 ppb), trichloroethene (11-14 ppb), toluene (12-140 ppb), xylene (7-170 ppb), and benzene (260-350 ppb).

Semi-volatiles detected include phenol (8-510 ppb), phenolic compounds (14-2500 ppb), naphthalene (1-38 ppb), 2-Methylnaphthalene (1-23 ppb), and various PAHs whose concentrations ranged as high as 90 ppb. Detected PCB concentrations ranged from 0.5 to 180 ppb.

Inorganics detected in excess of groundwater standards included aluminum (121-761 ppb), arsenic (5-48 ppb), iron (16-36,100 ppb), lead (7-28 ppb), manganese (2-2,150 ppb), and vanadium (4-112 ppb). These samples were filtered due to excessive turbidity. Additional metals detected in excess of standards in unfiltered samples include barium, beryllium, cadmium, chromium, cobalt, copper, mercury, nickel, silver, and zinc. For specific concentrations see Table 14 of the 1991 ROD.

Surface Water

Organic compounds which were detected in surface water collected from the ditches and wetland adjacent to the site include phenol (12,000 ppb), 2-chlorophenol (16 ppb), 4-chlorophenol (250 ppb), and bis (2-Ethythexyl) phthalate (24-27 ppb). PCBs (Aroclor 1242) were detected (18 ppb) in one surface water sample (SW-6) taken from the stream feeding into the wetland.

Inorganics detected above standards include aluminum (63-33,800 ppb), lead (8-124 ppb), iron (236-40,700 ppb), manganese (152-2,200 ppb), nickel (16-97 ppb), and vanadium (6-67 ppb).

Surface Soils

Organic compounds detected include naphthalene (150-770 ppb), bis (2-Ethylhexyl) phthalate (42-1900 ppb) and various PAHs as high as 1100 ppb. PCBs were detected at a maximum concentration of 44 ppm in soil sample SS-3 located on the north fill face of the site.

Inorganic constituents detected above the average for Eastern Soils include cadmium (2-22 ppm), chromium (6-633 ppm), copper (8-129 ppm), lead (2-499 ppm), magnesium (518-6,880 ppm), mercury (0.58 ppm), nickel (18-502 ppm), and zinc (9-2,390 ppm).

Subsurface Soils

Organic contamination includes phenol and phenolic compounds (410-5600 ppb), naphthalene (920-73000 ppb), and numerous PAHs ranging to a maximum level of 22,000 ppb.

PCBs were detected at concentrations ranging from 280-89000 ppb.

Inorganics detected above average for Eastern Soils include arsenic (2-44 ppm), beryllium (0.6-2 ppm), cadmium (2-6 ppm), chromium (7-155 ppm), copper (13-235 ppm), lead (15-651 ppm), magnesium (830-8,850 ppm), mercury (0.5-0.6 ppm), nickel (7-63 ppm), and zinc (29-2,950 ppm).

Sediment

In the drainage channels to the north and south of the site, PCBs were found in concentrations ranging from non-detect to one part-per-million (ppm).

Inorganics detected in excess of Aquatic Sediment Criteria include arsenic (8-77 ppm), cadmium (2.2-2.4 ppm), chromium (25-158 ppm), copper (24-53 ppm), lead (41-121 ppm), manganese (496-5,750 ppm), nickel (20-47 ppm), and zinc (88-3,970 ppm).

Sediments in the Niagara River adjacent to the site have not yet been characterized. Sampling and analysis of sediments upstream, adjacent to, and downstream of the site will be conducted early in the design phase of the remedy. If site related PCB contamination is found in these sediments at levels considered to present a significant threat to the environment, these sediments will be removed from the river and consolidated on site under the final cover.

Summary of Impacted Media

There are widespread contraventions of groundwater and surface water standards at the site.

Organic contaminants such as vinyl chloride, phenols, naphthalene, trichloroethane, benzene, and xylene are present at levels which exceed ambient water quality standards and guidance values for groundwater.

Metals exceeded surface and groundwater standards in numerous cases.

Aquatic Sediment criteria were exceeded for PCBs found in one sediment sample and metals exceeded these criteria in several samples.

A risk assessment was conducted during the Remedial Investigation which included an analysis of the impact of contaminated soils on human health. The site parameters used in the assessment were arsenic, cadmium, chromium, copper, lead, manganese, nickel, zinc, toluene, bis (2-ethylhexyl) phthalate, trichloroethene, PCBs, and benzo(a)pyrene. From this assessment it was determined that an elevated chronic human health risk was posed by direct contact with fill materials and contaminated soil.

5. REMEDIATION GOALS

The following general remedial objectives were identified for the Niagara Mohawk Cherry Farm site:

- Adequately protect against ingestion of, or contact with, contaminated soil;
- Minimize damage to and provide adequate protection of groundwater from contaminants migrating through soil;
- Adequately protect against the discharge of contaminated groundwater into the Niagara River;
- Adequately protect against ingestion of, or contact with, contaminated groundwater;
- Adequately protect against the erosion of the side slopes by precipitation runoff which could release contaminants to surface water; and
- Adequately protect against contaminated dust emissions into ambient air.

The amended alternative has been evaluated (see section 6.3 below) to determine its ability to achieve these goals.

6. CHANGES TO THE SELECTED REMEDY

6.1 Summary of the Original Remedy:

The original remedy as outlined in the Record of Decision (ROD) was selected based upon Alternative Number 3 described in the April 1990 Feasibility Study Report prepared by O'Brien & Gere for Niagara Mohawk Power Corporation. This alternative provides for the collection of groundwater utilizing extraction wells, physical/chemical treatment of contaminated groundwater utilizing precipitation and activated carbon, and containment of the landfill material, including contaminated ditch sediments, with a multi-layer impermeable clay cap. This alternative also includes groundwater monitoring, fencing, and land use deed restrictions.

The groundwater extraction and treatment system would collect site groundwater and treat it to meet or exceed the drinking water standards before discharging it to the nearest surface water body (on-site drainage channel or Niagara River). The treatment system would be designed to achieve effluent limitations established pursuant to the technical requirements of the State Pollution Discharge Elimination System (SPDES) Program. The groundwater treatment system would be operated until such time that the groundwater contaminant concentrations were at or below the effluent limitations. However, the groundwater extraction system would continue to operate until such time that groundwater contamination was at or below the ground water standards.

6.2 Changes to the Remedy:

The elements of the selected remedy that differ from those in the original February 1991 ROD include:

- The cover design will not include an impermeable hydraulic barrier. The original ROD indicated that this change was being contemplated but that additional field studies were needed to demonstrate that this alternate design would function properly and be protective of human health and the environment.

- Collected groundwater will not be discharged into the Niagara River but shall be pretreated (if necessary) and discharged to a local water treatment plant.

- Fencing will not be installed around the site as part of the remedy. Since future plans for the site include making it compatible for use as a public recreation area or park, and the cover will be designed to prevent contact with wastes, a fence is not necessary.

6.3 Comparative Analysis:

The remedial alternative selected for the site by the NYSDEC was developed in accordance with the New York State Environmental Conservation Law (ECL) and is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC Section 9601, et. seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The criteria used in evaluating the potential remedial alternatives can be summarized as follows:

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

1. Protection of Human Health and the Environment--This criterion is an overall and final evaluation of the health and environmental impacts to assess whether each alternative is protective. This evaluation is based upon a composite of factors assessed under other criteria, especially short/long-term effectiveness and compliance with SCGs (see below).

   The original remedy, Alternative 3 (groundwater extraction & treatment and containment of the landfill material with a multi-layer clay cap), would offer overall protection of human health and the environment by: (a) preventing ingestion and direct contact exposure to contaminants; (b) eliminating the potential for erosion of waste materials resulting in transport of the contaminants to surface water; (c) preventing the transport of contaminants with groundwater. The amended remedy (Alternative 3A, groundwater extraction & treatment and containment of the landfill material with a barrier layer and pervious soil cover), will offer the same overall protection of human health and the environment in a similar manner. The use of a permeable cover will make it necessary to collect larger amounts of groundwater to prevent contaminated groundwater from discharging to the Niagara River. This increased volume presents no significant additional operation and management problems. There may be a benefit of increased contaminant removal due to enhanced leaching through the waste.

2. Compliance with Standards, Criteria, and Guidance (SCGs)--Compliance with SCGs addresses whether or not a remedy will meet all Federal and State environmental laws, regulations, and policies, and if not, provides grounds for invoking a waiver.

The chemical-specific SCGs for the Niagara Mohawk Cherry Farm site are as follows: (a) For groundwater and surface water - 6NYCRR Parts 700-705, water quality regulations for surface water and groundwater; (b) For soils - Guidance values given in NYSDEC Division of Hazardous Waste Remediation Technical and Administrative Guidance Memorandum: "Determination of Soil Cleanup Objectives and Cleanup levels" (TAGM 92-4046); (c) For Sediments - Guidance values given in NYSDEC document entitled "Cleanup Criteria for Aquatic Sediments - December 1989).

The action specific ARARs for the Niagara Mohawk Cherry Farm site are given in Table 1.

The most significant of the SCGs at the site is the New York State groundwater standards. State regulations define the best usage of groundwater as a source of drinking water. Therefore, the assigned standards are stringent. Alternatives 3, and 3A include provisions for directly addressing groundwater contamination. These alternatives also address soil contamination as a source of contaminants to the groundwater by leaching.

Action-Specific SCGs include primarily the 6NYCRR Part 360 and Part 373-2 requirements for the closure of a landfill. The standard cover requirement includes an impermeable cover to minimize the amount of precipitation that can infiltrate into a landfill and result in the production of leachate and subsequently, contaminated groundwater. At this site, between 25% and 50% of the wastes are below the permanent water table. This in conjunction with the determination that a properly designed and operated groundwater collection system can prevent groundwater from migrating off-site into the Niagara River led to the conclusion that a waiver of the standard design criteria for this site was appropriate. Therefore, in accordance with the provisions of Sections 360-1.7(c) and 373-1.1(e), a variance is granted allowing for the use of an impermeable cover with the special condition that a groundwater collection and treatment system must be indefinetely operated and maintained that is capable of collecting all groundwater that would otherwise discharge into the Niagara River.

The location-specific SCGs identified for the Cherry Farm Site (namely, protection of wetlands) is satisfied under both Alternative 3 and 3A.

The State of New York has developed guidance values for evaluating sediment contamination. The concentration of several contaminants in ditch sediments at the site somewhat exceed these guidance values. Alternatives 3 and 3A would directly clean up sediments by removing the sediments from the contaminated ditch(es).

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

3. Short-term Impacts and Effectiveness--The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment is evaluated.

The length of time needed to achieve the remedial objectives is estimated and compared with other alternatives.

The time required to complete the construction under Alternatives 3A will be same or slightly less than that required for Alternative 3. Therefore the short term effectiveness will not be impacted by the amended remedy. Alternatives 3 and 3A would involve some soil excavations and handling which would expose remediation workers to the contaminated soils, vapor emissions, and contaminated particulates. Each of these potential short-term effects can be controlled by using proper engineering controls.

4. Long-term Effectiveness and Permanence--If wastes or residuals will remain at the site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude and nature of the risk presented by the remaining wastes; 2) the adequacy of the controls intended to limit the risk to protective levels; and 3) the reliability of these controls.

   Following completion of the remedial efforts, Alternatives 3 and 3A would provide very similar long-term effectiveness and permanence. The installation of a cap would prevent exposure to the contaminants under both alternatives. Groundwater extraction and treatment would be required indefinitely for these alternatives. This activity would prevent contaminants from leaving the site via groundwater, thus eliminating transport. Contaminated groundwater would be treated, resulting in no ingestion of contaminants. The quantity of contaminated groundwater extracted and treated under the amended remedy would be increased considerably as compared with the originally selected remedy. This would result in flushing the contaminants out of the soil more rapidly.

5. Reduction of Toxicity, Mobility, or Volume--Preference is given to alternatives that permanently and by treatment significantly reduce the toxicity, mobility, or volume of the wastes at the site. This includes assessing the fate of the residues generated from treating the wastes at the site.

   For Alternatives 3 and 3A, the mobility of contaminants would be reduced due to the provision of the cap and the collection of contaminated groundwater. For these alternatives, no reduction in volume of the waste would occur. The removal of the contaminated groundwater will result in reduction of the toxicity of some of the compounds in the waste material. Treatment of the groundwater would result in a permanent reduction in volume of contaminated water, contaminant mobility, and off-site migration.

6. Implementability--The technical and administrative feasibility of implementing the alternative is evaluated. Technically, this includes the difficulties associated with the construction and operation of the alternative, the reliability of the technology, and the ability to effectively monitor the effectiveness of the remedy. Administratively, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining special permits, rights-of-way for construction, etc.

   Both Alternative 3 and 3A are easily implementable, are straightforward, and use standard construction equipment. Many vendors would be available to provide these services. A cap can be constructed relatively quickly if the ground is not frozen or saturated. Material for the cap is available locally. Liner material for Alternative 3 is

readily available from the manufacturers. Long-term monitoring and maintenance of the cap would be required.

7. Cost--Capital and operation and maintenance costs are estimated for the alternatives and compared on a present worth basis.

The total cost of remediation of Alternative 3 (1991 Remedy) is $17,150,000. The cost of remediation for the alternative 3A (Amended Remedy) is approximately $8,000,000. The comparison of the estimated capital cost, present worth cost, and the total project cost of the original and amended alternatives are as follows:

Costs:	Capital Cost	O&M(annual)	Total Present Worth
1991 Remedy	$12,397,000	310,000	$17,154,000
Amended Remedy*	$6,000,000	150,000	$ 8,000,000

* approximate

Modifying Criterion - This final criterion is taken into account after evaluation of those above. It is focused upon after public comments have been received.

8. Community Acceptance--Concerns of the community regarding the RI/FS Reports, the Proposed Remedial Action Plan, and in this case the amended remedy, are evaluated. The Responsiveness Summary (Exhibit C) for this project identifies those concerns and presents the agencies responses to those concerns.

7. AMENDED REMEDY

Based upon the Remedial Investigation/Feasibility Study (RI/FS) for the Site, subsequent field investigations, and the criteria used to evaluate remedial alternatives, the NYSDEC has selected a remedy to contain site wastes and contaminated groundwater by installing a cover over the site and using groundwater extraction wells to recover groundwater and prevent its discharge to the Niagara River. The components of the selected remedy include:

- **Consolidation of wastes** to minimize the size of the final footprint of the site and to pull wastes back from the Niagara River shoreline and from the drainage channels on the north and south sides of the site.

- As a part of slope reconstruction, the **contaminated sediments from the ditches will be removed and consolidated** within the landfill material before installing the cover. Sampling and analysis of sediments in the Niagara River near the site will be conducted to determine if river sediments should be removed and consolidated on the site.

- Installation of a **barrier layer** over the site to prevent intrusion into wastes by people or wildlife.

- Installation of a **soil cover** to further separate potentially exposed people and wildlife and to serve as a vegetative support layer.

- Installation and operation of a series of **groundwater extraction wells** to eliminate the

discharge of contaminated groundwater into the Niagara River.

- **Discharge of groundwater** to the local publicly owned treatment works after any necessary pretreatment.

- Take actions needed to obtain **deed restrictions** to prevent activities that would intrude into wastes or otherwise diminish the effectiveness of the remedy.

Operation and Maintenance (O&M), and monitoring will be an integral part of the amended remedy. The O&M and monitoring requirements will be finalized during the design phase. The site will be inspected periodically to verify the integrity of the cover system. This inspection will be done at least on a quarterly basis during the first two years, semi-annually for the next three years, and at least once every year thereafter. Additional inspections and corrective measures may be necessary during park development. To maintain the integrity of the cover system, access to the site will be restricted by maintaining a locked gate at the site entrance until the park is fully developed.

8. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Concurrent with the investigations performed at the site, there has been significant community involvement and input into the project. Following the signing of the original Record of Decision, the following citizen participation activities took place:

- Notice to amend the ROD was sent to the interested citizens on the mailing list for this project on August 13, 1993.

- Documents relative to the amendment to the ROD were placed in the document repository on August 16, 1993.

- Public was given the opportunity to comment on the amended ROD and a public comment period was held from August 18, 1993 to September 20, 1993.

- A responsiveness summary was prepared and is included as Exhibit C.

TABLE 1

ACTION-SPECIFIC ARARS
CHERRY FARM SITE

ACTION	REQUIREMENTS	CITATION
Capping in place - hazardous materials	Cover must be designed and constructed to: - Provide long-term minimization of migration of liquids; - Function with minimum maintenance; - Promote drainage and minimize erosion or abrasion or abrasion of the cover; - Accomodate settling and subsisdence so that the cover's integrity is maintained; and - Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.	6 NYCRR 373-2.14(g)
	Maintain the integrity and effectiveness of the final cover, including making repairs to the cap as necessary to correct the effects of settling, subsisdence, erosion or other events.	
	Prevent run-on and run-off from eroding or otherwise damaging the final cover.	
	During construction or installation, cover systems must be inspected for uniformity, damage and imperfections.	
	Immediately after construction or installation soil-based and admixed liners and covers must be inspected for imperfections that may cause an increase in the permeability of the cover.	6 NYCRR 373-2.14(e)
	The owner or operator of the landfill must record: - On a map, the exact location and dimensions, including depth, of each cell with respect to permanently surveyed benchmarks; and - The contents of each cell and the approximate location of each hazardous waste type within each cell.	6 NYCRR 373-2.14(f)
Deed Restrictions - hazardous waste unit	A survey plat indicating the location and dimensions of hazardous waste disposal units must be submitted to the local zoning authority, or the authority with jurisdiction over local land use, to the county clerk and to the commissioner. The plat filed with the local zoning authority or the authority with jurisdiction over land use must contain a note which state's the owner's or operator's obligation to restrict disturbance of the hazardous waste disposal unit.	6 NYCRR 373-2.7(f)(3)
Disposal or decontamination of equipment, or soil - hazardous waste	During closure all contaminated equipment, structures and soils must be properly disposed of or decontaminated.	6 NYCRR 373-2.7(e)

TABLE 1

ACTION-SPECIFIC ARARS
CHERRY FARM SITE

ACTION	REQUIREMENTS	CITATION
Ground water monitoring - hazardous waste unit	The owner or operator must establish a detection monitoring program for indicator parameters, waste constituents or reaction products that provide a reliable indication of the presence of hazardous constituents in ground water. This program must comply with general groundwater monitoring requirements contained in cited regulations.	6 NYCRR 373-2.6
Location Standards - hazardous materials	A facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent washout of any hazardous waste by a 100-year flood.	6 NYCRR 373-2.2(j)
Personnel Protection	A safety and health program; site characterization and analysis, site control; training program; medical surveillance; engineering controls, work practices and personal protective equipment; monitoring; informational program; proper material handling; decontamination provisions; emergency response capability; illumination; sanitation facilities; site excavation shoring or sloping; and procedures for informing contractors and sub-contractors of potential hazards must be provided.	29 CFR 1910.120
	Laborers performing construction work shall be instructed in recognition and avoidance of unsafe condtions, and provided with first aid services, medical care, personal protection equipment, and sanitary facilities. When excavation, trenching or shoring is conducted specified procedures must be complied with.	29 CFR 1926 Subparts C, D, E, and P
Post-closure care - hazardous waste unit	Post-closure care must begin after completion of closure and continue for at least 30 years and consist of maintenance and monitoring.	6 NYCRR 373-2.7(g)
Surface water discharge	The discharge shall meet effluent standards or prohibitions established under sections 301, 302, 303, 307 318, and 405 of the Clean Water Act. The discharge shall meet water quality standards established under sections 302 or 303 of the Clean Water Act and State requirements.	40 CFR 122.41 40 CFR 122.44 6 NYCRR 745.1

TABLE

ACTION-SPECIFIC ARARS
CHERRY FARM SITE

ACTION	CITATION	ALTERNATIVE 1	2	3	4	5	6
Capping in place - hazardous materials	6 NYCRR 373-2.14(g) 6 NYCRR 373-2.14(e) 6 NYCRR 373-2.14(f)	R	R	R	R	R	R
Deed Restrictions - hazardous waste unit	6 NYCRR 373-2.7(f)(2)	R	R	R	R	R	R
Disposal or decontamination of equipment, or soil - hazardous waste	6 NYCRR 373-2.7(e)		R	R	R	R	R
Ground water monitoring - hazardous waste unit	6 NYCRR 373-2.6	R	R	R	R	R	R
Location Standards - hazardous materials	6 NYCRR 373-2.2(J)	R	R	R	R	R	R
Personnel Protection	29 CFR 1910.120 29 CFR 1926 Subparts C, D, E, and P	R A	R A	R A	R A	R A	R A
Post-closure care - hazardous waste unit	6 NYCRR 373-2.7(g)	R	R	R	R	R	R
Surface water discharge	40 CFR 122.41 40 CFR 122.44 6 NYCRR 745.1	R	R	R	R	R	R

A = Applicable
R = Relevant and Appropriate

EXHIBIT A
Administrative Record

The administrative record consists of information upon which the Department bases its decision on selection of the requisite remedial technology. The following documents have been included as part of this administrative record:

1. Final RI and FS Reports (located in the document repository) prepared by O'Brien & Gere, dated July 1989 and April 1990, respectively.

2. Responsiveness Summary.

3. Proposed Remedial Action Plan.

4. Letter dated October 10, 1985 from A.R. Cooter, Esq. of CFI to Jeffrey T. Lacey, Esq. with all enclosures.

5. Letter dated July 3, 1986 from A.R. Cooter, Esq. of CFI to Jeffrey T. Lacey, Esq. with all enclosures thereto.

6. Letter dated September 5, 1986 from A.R. Cooter, Esq. of CFI to Jeffrey T. Lacey, Esq. with all enclosures thereto.

7. Letter dated October 16, 1987 from Joseph J. Zedrosser, Esq. for CFI to Maura Desmond, Esq.

8. Letter dated December 7, 1989 from William C. Robb, Esq. for CFI to Maura Desmond, Esq.

9. Letter dated December 13, 1989 from Maura Desmond, Esq. to William C. Robb, Esq. for CFI.

10. Letter dated December 15, 1989 from M.J. Brinkman, P.E. to Michael Sherman, Niagara Mohawk Power Corporation.

11. Letter dated January 25, 1990 from James Mickam, V.P., O'Brien and Gere to Michael Sherman, Niagara Mohawk Power Corporation.

12. Letter dated February 1, 1990 from John S. Cowan, Esq. for CFI to Records Access Officer (FOIL Request).

13. Letter dated February 6, 1990 from William Weiss, Esq. Niagara Mohawk Power Corporation to Maura Desmond, Esq.

14. Letter dated February 26, 1990 from M.J. Brinkman, P.E. to William Weiss, Esq., Niagara Mohawk Power Corporation.

15. Letter dated March 12, 1990 from Carl Calebrese, Councilman, Town of Tonawanda to Timothy Spellman, Niagara Mohawk Power Corporation.

16. Letter dated April 19, 1990 from William Robb, Esq., CFI to Maura Desmond, Esq. and the Remcor Report as enclosure.

17. Letter dated April 25, 1990 from Cheryl Peterson, Esq. to William Robb, Esq. for CFI.

18. Letter dated May 2, 1990 from William Robb, Esq. for CFI to Cheryl Peterson, Esq.

19. Letter dated May 2, 1990 from William Robb, Esq. for CFI to Cheryl Peterson, Esq.

20. Letter dated May 16, 1990 from Cheryl Peterson, Esq. to William Weiss, Esq., Niagara Mohawk Power Corporation.

21. Letter dated June 1, 1990 from William Weiss, Esq., Niagara Mohawk Power Corporation to Cheryl Peterson, Esq.

22. Letter dated June 5, 1990 from James Mickam, O'Brien and Gere to Michael Sherman, Niagara Mohawk Power Corporation.

23. Letter dated June 21, 1990 from Cheryl Peterson, Esq. to William Weiss, Esq., Niagara Mohawk Power Corporation.

24. Letter dated June 28, 1990 from John Cowan, Esq., CFI to Cheryl Peterson, Esq.

25. Letter dated June 29, 1990 from David P. Flynn, Esq. for Allied Signal, Inc. to Cheryl Peterson, Esq.

26. Letter dated June 29, 1990 from R. William Stephens, Esq., General Motors Corporation to Cheryl Peterson, Esq.

27. Letter dated July 3, 1990 from William Weiss, Esq., Niagara Mohawk Power Corporation to Cheryl Peterson, Esq.

28. Letter dated July 10, 1990 from William Weiss, Esq., Niagara Mohawk Power Corporation to Cheryl Peterson, Esq.

29. Letter dated September 11, 1990 from Maura Desmond, Esq. to William Weiss, Esq., Niagara Mohawk Power Corporation.

30. Letter dated September 12, 1990 from Ronald Molene, Town Supervisor, Town of Tonawanda to M.J. Brinkman, P.E.

31. Letter dated September 13, 1990 from Leo Brausch, Remcor to Michael Cruden, Esq., CFI.

32. Letter dated September 14, 1990 from William Robb, Esq., CFI to M.J. Brinkman, P.E.

33. Letter dated September 18, 1990 from David P. Flynn, Esq., for Allied Signal, Inc. to M.J. Brinkman, P.E. including attachments.

34. Report to Congress on Special Wastes from Mineral Processing Volume II: Methods and

Analyses, Office of Solid Waste, USEPA, July 1990.

35. Preliminary Master Plan for Cherry Farm prepared by Wendel Engineers for the Town of Tonawanda, dated September 1992.

36. The Record of Decision (ROD) for the Cherry Farm Site, prepared by the NYSDEC, dated February 15, 1991.

37. Predesign Evaluation Report (Remcor, February 1992).

38. Phase I Investigation, Niagara Mohawk/Cherry Farm, prepared by Engineering Science, dated April 1983.

39. Phase II Investigation, Niagara Mohawk/Cherry Farm, prepared by O'Brien and Gere, dated October 1986.

40. The Amended Record of Decision

EXHIBIT B

NIAGARA MOHAWK / CHERRY FARM

RECORD OF DECISION

FEBRUARY 1991

The Record of Decision (ROD) for the Cherry Farm Site, prepared by the NYSDEC, dated February 15, 1991 can be found in the Administrative Record for this site.

EXHIBIT C
RESPONSIVENESS SUMMARY
AMENDED RECORD OF DECISION
NIAGARA MOHAWK - CHERRY FARM SITE
SITE No. 9-15-063

The Record of Decision (ROD) for the Niagara Mohawk - Cherry Farm site was signed by New York State Department of Environmental Conservation (NYSDEC) on February 15, 1991. Based on additional investigations completed in 1992, it was proposed to change certain elements of the selected remedy. Therefore, an amendment to the ROD was prepared and presented to the public. A public comment period was held from August 18, 1993 to September 20, 1993. The purpose of the comment period was to receive written comments on the proposed amendment for consideration during the final amendment and selection of the remedy. The information below summarizes the comments and questions received and the Department's (NYSDEC's) responses to those comments.

The selected remedy addresses the principal threats posed by the site by installation of a soil cover to prevent contact with the waste material by people or wildlife and by removing contaminants from the groundwater.

The major elements of the selected remedy include:

- **Consolidation of wastes** to minimize the size of the final footprint of the site and to pull wastes back from the Niagara River shoreline and from the drainage channels on the north and south sides of the site.

- As a part of slope reconstruction, the **contaminated sediments from the ditches will be removed and consolidated** within the landfill material before installing the cover. Sampling and analysis of sediments in the Niagara River near the site will be conducted to determine if river sediments should be removed and consolidated on the site.

- Installation of a cobble (or equivalent) **barrier layer** over the site to prevent intrusion into wastes by people or wildlife.

- Installation of a **soil cover** to further separate potentially exposed people and wildlife and to serve as a vegetative support layer.

- Installation and operation of a series of **groundwater extraction wells** to eliminate the discharge of contaminated groundwater into the Niagara River.

- **Discharge of groundwater** to the local publicly owned treatment works after any necessary pretreatment.

- Take actions needed to obtain **deed restrictions** to prevent activities that would intrude into wastes or otherwise diminish the effectiveness of the remedy.

The elements of the selected remedy that differ from those in the original February

1991 ROD include:

- o The cover design will not include an impermeable hydraulic barrier. The original ROD indicated that this change was being contemplated but that additional field studies were needed to demonstrate that this alternate design would function properly and be protective of human health and the environment.

- o Collected groundwater will not be discharged into the Niagara River but shall be pretreated (if necessary) and discharged to a local water treatment plant.

- o Fencing will not be installed around the site as part of the remedy. Since future plans for the site include making it compatible for use as a public recreation area or park and the cover will be designed to prevent contact with wastes, a fence is not necessary.

I. QUESTIONS/COMMENTS RAISED IN WRITTEN LETTERS

The following comments were submitted to the Department in a letter from REMCOR, the consultant for some of the Potentially Responsible Parties (PRPs).

Letter: The Draft Amended Record of Decision (ROD) (September 1993) for the Niagara Mohawk - Cherry Farm Site includes the following statements:

> "Sediments in the Niagara River adjacent to the site have not yet been characterized. Sampling and analysis of sediments upstream, adjacent to, and downstream of the site will be conducted early in the design phase of the remedy. If site-related polychlorinated biphenyl (PCB) contamination is found in these sediments at levels considered to present a significant threat to the environment, these sediments will be removed from the river and consolidated on site under the final cover."

During the development of the Scope of Work (SOW) for the voluntary Predesign Evaluations conducted at the Site, there were a number of conversations on this issue between the New York State Department of Environmental Conservation (NYSDEC) personnel, representatives of some of the Potentially Responsible Parties (PRPs) (Allied Signal Inc., CF&I Steel Corporation, General Motors Corporation, INS, Inc., Niagara Mohawk Power Corporation, and TRW, Inc.), and the consultant (Remcor, Inc.). The discussions focused on a number of interrelated issues associated with the sediments in this area:

- During the public meeting for the Proposed Remedial Action Plan (PRAP), there were a number of concerns raised that this part of the Niagara River was an important spawning ground and that there should be no disturbance to this area.

- This area is, and has been, heavily industrialized. The detection of any constituent, including PCBs, could have dozens of sources that are not related to Cherry Farm.

- The proposed remedial action includes removal of materials from the river bank and subsequent stabilization of that bank.

- There is general agreement that the materials on the river bottom as far as 100 feet into the river are similar, even at the southern end of the site. It is unlikely, considering the river current, that materials from Cherry Farm would have migrated cross-current to these locations.

There was agreement among all parties that the issue associated with the sediments in the river was to be evaluated during the 1991 Predesign Evaluations by collecting and visually classifying samples upstream of the site and at the confluence of each of the surface drainage channels with the Niagara River (Figure 2 of the Predesign Evaluations Report).[1] This work was conducted in accordance with that agreement, and the results were presented in Chapter 4.0 of the Report. The results indicated that the river bottom was relatively hard (sampling with a ponar dredge was not successful), there was a small localized accumulation of material at the discharge of the southern drainage channel, and that there was no discernable difference between the materials sampled upstream of the site from those collected at the confluence of the drainage channels.

In summary, we feel that this issue has been addressed and that there has been no significant impact to the Niagara River directly, or solely attributable to the Cherry Farm Site. The PRPs believe that any requirement in the amended ROD pertaining to sediments in the River has been addressed as a result of the study performed in conjunction with the Pumping Test. Please contact us if this is not acceptable to NYSDEC.

*****

Issue: "During the public meeting for the Proposed Remedial Action Plan (PRAP), there were a number of concerns raised that this part of the Niagara River was an important spawning ground and that there should be no disturbance to this area."

Response: The Department recognizes that depending upon the nature and level of contamination in the sediments, the benefits of avoiding damage to the existing habitat could outweigh the benefits of active remediation.

Issue: "This area is, and has been, heavily industrialized. The detection of any constituent, including PCBs, could have dozens of sources that are not related to Cherry Farm."

Response: The detection of any constituent, including PCBs, can have other sources that are not related to Cherry Farm. However, it is evident that there is a reasonable potential for the erosion of contaminated soil from the Cherry Farm site into the Niagara River. The visual identification provided in Table 3, chapter 4.0 (Sand Delta Evaluation) of the "Predesign Evaluation Report," Cherry Farm Site, Tonawanda, New York, indicates the presence of trace metal fragments and cinder/slag fragments which can be contributed to the site. As such, it is necessary to collect additional samples for chemical analysis to characterize the sediments.

Issue: "The proposed remedial action includes removal of materials from the river bank and subsequent stabilization of that bank."

Response: The proposed remedial action which includes removal of materials from the river bank and subsequent stabilization of that bank will result in removing/isolating contaminated materials from the river bank. However, the extent of such remediation (including sediments below the low water level) is not known at this time.

Issue: "There is general agreement that the materials on the river bottom as far as 100 feet into the river are similar, even at the southern end of the site. It is unlikely, considering the river current, that materials from Cherry Farm would have migrated cross-current to these locations."

Response: The similarity of the materials on the river bottom based on visual identification will be confirmed by chemical analysis. Moreover, the upstream location where the samples were collected during sand delta evaluation falls within the southern outlet and may not represent the true upstream location. It will be necessary to collect upstream samples further south of the southern outlet.

A potential exists for the migration of contaminants from the site. Therefore, the Department will collect and analyze sediment samples from Niagara River from upstream, near site, and downstream locations. The extent of the proposed remedial action along the river bank will be based on the results of the sediment samples.

[1]Remcor, Inc., February 12, 1993, "Predesign Evaluations Report," Cherry Farm Site, Tonawanda, New York, prepared for the Cherry Farm Pump Test Potentially Responsible Parties, Project No. 91135.

Declaration Statement - Record of Decision

Site Name and Location:

Niagara Mohawk/Cherry Farm Site
Town of Tonawanda, Erie County, New York
Site Registry No. 9-15-063
Classification Code: 2

Statement of Purpose:

The Record of Decision (ROD) sets forth the selected remedial action plan for the Niagara Mohawk/Cherry Farm Site. This remedial action plan was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Action (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and the New York State Environmental Conservation Law (ECL). The selected remedial plan complies to the maximum extent practicable with Applicant or Relevant and Appropriate Requirements (ARARs) of Federal and State environmental statues and would be protective of human health and the environment.

Statement of Basis:

This decision is based on the administrative record for the Niagara Mohawk/Cherry Farm Site and upon public input to the Proposed Remedial Action Plan (PRAP). A copy of the administrative record is available at the New York State Department of Environmental Conservation (NYSDEC), 50 Wolf Road, Albany, New York, 12233 and copies of the RI/FS report are available at the Riverside Branch Library in Tonawanda, New York. A bibliography of these documents included as part of the administrative record is contained in Appendix C. A response summary that documents the public's expressed concerns and related correspondence from State and local government agencies has been included as Appendix A. Appendix B contains figures and tables of importance regarding the site.

Description of Selected Remedy:

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

The selected alternative involves a series of extraction wells and containment of landfill material. The selected alternative provides for the collection of groundwater utilizing extraction wells, treatment of the contaminated groundwater utilizing precipitation and activated carbon and containment of the landfill material with a multi-layer clay cap. This alternative also includes groundwater monitoring and land use deed restrictions.

The groundwater extraction and treatment system would remove site groundwater with treatment provided for the contaminated groundwater (i.e. above drinking water standards). Any treated groundwater would be

discharged to the Niagara River. The cap would contain the landfill materials and minimize infiltration of water into the landfill materials, and the groundwater extraction system would prevent groundwater from leaving the site until it meets drinking water standards.

This alternative would be protective of both human health and the environment. Deed restrictions limiting the installation of drinking water wells and activities that would disturb the integrity of the cap would be put into affect. This alternative would result in reductions in toxicity, mobility and volume of contaminants. Periodic inspections of the cap, together with operation of the groundwater extraction system would provide for long term effectiveness and permanence of this alternative.

Installation of the cap could be implemented in a relatively short period of time while groundwater treatment is expected to be required for a considerable time period. The cap could be constructed using standard construction techniques. Activities related to construction of the cap may infringe upon part of the wetland, temporarily disturbing them, but the wetlands, would be restored upon completion of the cap. The clay cap would prevent erosion of the landfill and subsequent surface runoff from the contaminated side slopes, thereby preventing contaminants from reaching the wetlands.

The estimated cost of this alternative is approximately $17.1 million dollars.

Declaration:

The selected remedial action will meet State and Federal ARARs by providing long term minimization of migration of contaminants and preventing direct contact.

The remedy will satisfy, to the maximum extent practical the statutory preference for remedies that employ a treatment that reduces toxicity, mobility or volume as a principle element.

The selected remedial action will result in a small increase in short term risks. Workers involved in its implementation will have the potential for increased exposure to increased risks due to exposure to airborne contaminants which may escape during the implementation of the selected remedial action. Appropriate monitoring and precautions will be implemented to minimize this risk. The implementation of this alternative is a relatively straight forward procedure and poses no significant problem.

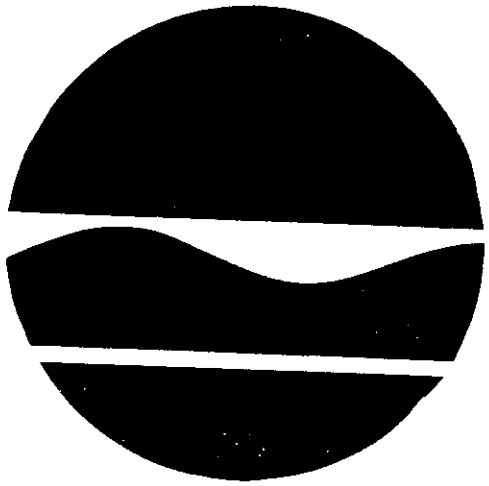
A long term groundwater monitoring program will be put into effect as part of the selected alternative. Additional protection will be required in the form of deed restrictions until such a time that groundwater standards are achieved.

2-15-91
Date

Edward O. Sullivan

NIAGARA MOHAWK / CHERRY FARM
SITE NUMBER 9 - 15 - 063
RECORD OF DECISION

FEBRUARY 1991



PREPARED BY

NEW YORK STATE

DEPARTMENTAL CONSERVATION

TABLE OF CONTENTS

Cherry Farm/Niagara Mohawk
Site No. 9-15-063

Section

Section 1. Site Location and Description

The Cherry Farm Site is an inactive landfill located between River Road and the Niagara River in the Town of Tonawanda, New York (see Figure 1). The site encompasses approximately 56 acres, 80% of which is covered by various fill materials. The elevation of the fill area is approximately 20 feet above the original land surface. The fill is surrounded on three sides by two drainage ditches which discharge to the Niagara River. The fourth, the northwest side, is bounded by the Niagara River. A designated wetland is located on the eastern side of the fill area (see Figure 2).

Section 2. Site History

Information provided to the NYSDEC by the Colorado Fuel and Iron Steel Corporation (CF&I) revealed that between 1945 and 1963 dust and slags from the CF&I blast and open hearth furnace operations were disposed at the site. Operations ceased in 1963. CF&I then entered into an agreement with INS Equipment Company (INS) which allowed INS to dispose of foundry sand from a nearby Chevrolet Plant on the property.

The site was purchased by Niagara Mohawk Power Corporation (NMPC) in 1970. At the time of purchase, foundry sand was exposed at the surface of the fill area. To prevent erosion, the surface of the fill was capped with approximately six inches of clay and seeded.

Because of alleged disposal of various industrial wastes, a number of studies have been conducted at the site since 1978. These initial studies indicated that various industries may have deposited waste materials, some which may have been hazardous at the site.

Previous Investigations

1. An initial investigation was performed between 1978 and 1980 as part of a State wide program conducted by the New York State Interagency Task Force on Hazardous Waste. This study was followed up by the combined efforts of the United States Geological Survey (USGS) and the New York State Department of Environmental Conservation (NYSDEC) between 1981 and 1983. These initial investigations indicated that various industries may have deposited waste materials, some of which may have been hazardous, at the site. Based on these efforts NYSDEC completed a Phase I investigation in 1983.

2. Phase I - June 1983, Engineering Science

   The NYSDEC contracted with Engineering Science to perform a Phase I Study. The Phase I Study indicated that the site is located in the Erie-Ontario lowlands. The bedrock of this region consists of sedimentary rocks of varying lithologies. As glacial ice retreated from the region, melt water formed lakes in front of the ice margin. This region is covered by lake sediments (see Figures 3 & 4). The sediments consist of blanket silt and sand, which are occasionally underlain by lacustrine silts and clays.

Granular deposits in this region frequently act as shallow aquifers, whereas lacustrine clays, as well as tills, often inhibit groundwater movement.

Borings completed during the Phase I investigation indicate that the site is "made land" with the uppermost natural soil layer occurs at approximately 23 feet below the landfill's surface. A shallow aquifer was found to exist within the fill material approximately 10 feet below the fill surface. Groundwater movement within this aquifer is towards the Niagara River (see Figure 5).

3. Phase II Investigation - April 1986, O'Brien and Gere

In April 1985, Niagara Mohawk retained O'Brien and Gere Engineers to conduct a Phase II investigation in accordance with NYSDEC guidelines. The Phase II investigation included a geophysical survey, installation of seven monitoring wells, completion of five soil borings and collection and analysis of soil, groundwater, surface water and sediment samples. The site investigation revealed that the site is comprised of a surface landfill area approximately 20 feet high which was placed on top of natural fine to medium sand and silt deposits. The landfill material is comprised of foundry sand, sand casts, slag and black sandy material.

The chemical analysis completed on the fill material revealed the presence of phenolic compounds, PNAs, in addition to a variety of metals. Additionally PCBs were detected in the soils. The metals were attributed to the abundance of foundry sand and furnace slag known to have been used as fill material. PCBs were once largely used in electrical switchgear and industrial machinery.

The groundwater analyses results revealed trace levels of some metals, PNAs and phthalates, all of which were found in the fill material. One of seven monitoring wells was found to contain elevated levels of aromatic compounds (benzene, toluene and xylene). In general, only some of the substances found in the soils were found to be present in the groundwater and levels of these compounds were found to be considerably lower in the groundwater.

The surface water and sediments sample analysis reveal a number of metals, phenolics and PNAs present.

Geophysical Survey Results - Phase II

The magnetic surveys were conducted over the fill area to provide information regarding the presence of buried metallic or ferrous materials. The survey results indicated that the site contained large amounts of ferrous materials.

Hydrogeology

The Phase II Study described the groundwater flow in both the upper perched and lower groundwater tables as a general northwest flow in the direction of the Niagara River. The groundwater quality analyses revealed detectable concentrations of mercury, nickel, zinc and arsenic along with the presence of aromatics (benzene, toluene and xylene). The levels of these compounds exceeded groundwater standards. Phenols were also detected above groundwater standards. The pesticide/PCB scan detected PCBs in concentrations ranging from 2.3 to 63 mg/kg.

Sediment samples from upstream and downstream in the two drainage ditches revealed the presence of several metals and phenols.

In summary, the data generated indicated that contamination of the shallow groundwater aquifer with organic chemicals and the presence of hazardous substances in the fill material. It was determined that an RI/FS would be needed to determine the full extent of the problems and scope of remediation.

Based on the Phase II Study additional information was required to supplement the existing data in order to:

- Assess the areal extent and effects of the hazardous materials in the project area;
- Identify and evaluate remedial alternatives selected to mitigate contamination problems that pose threats to the environment or to the public health as determined by the field work and risk assessment conducted during the RI;
- Recommend remedial alternatives.

Section 3. Current Status

Based on the findings of the Phase I and II investigations, general site history indicated the possibility that isolated areas of potentially hazardous material could be present within the fill material. To determine the extent of contamination at the site the work plan called for seven soil borings (see Figure 2) to be progressed to various depths. Continuous split spoon samples were conducted through the fill material (see Tables 5 and 6 for results).

To further define the horizontal and vertical groundwater flow potential and quality in the site area, 23 monitoring wells were installed at various depths. Soil samples were collected at two foot intervals through the waste fill material and then at five foot intervals at lower depths (see Tables 11-14 for results). Samples of the fill face were collected on all four sides of the landfill. Surface soil samples were also collected at the two softball fields (see Table 15 for results).

Two drainage channels flowing along the boundaries of the fill area were sampled. Seven sediment and surface water samples were taken to characterize the extent of contamination (see Tables 7-10 for results).

Remedial Investigation Results - Nature and Extent of Contamination

The chemical analytical data resulting from the Remedial Investigation indicated that the exposed surface soils along the sides of the fill contained detectable concentrations of volatile organics, phenols, PAHs and inorganics. Sand casts found along the sides of the fill contained PAHs, PCBs and phthalates. Subsurface samples of the fill material were found to contain volatile organics, phenols, PAHs, PCBs, phthalates and inorganics.

Sediment samples taken from the drainage ditches running along the sides of the site of the fill slopes indicate the presence of PCBs in the southern ditch which may be the result of the landfill face eroding or migration of a contaminant from offsite. Surface water samples, however, suggest that upstream contaminant sources of detectable phenols and PAH's exist, as surface water quality does not degrade as it moves across the site.

Groundwater analytical results indicated that the volatile organic contaminants were horizontally migrating towards the Niagara River. Concentrations of PCBs in the on site groundwater were primarily detected in the shallow wells. The PCB contamination was attributed to the sediment found in the groundwater sample. PCBs did not appear to be moving either horizontally or vertically. Tables 5 thru 15 show the complete results of all the sampling analyses completed at the site. The following chart summarizes the ranges of the various contaminants found at the site:

	Type of Analysis	Analytes	Range
A.	Organic/Subsurface Soils	Phenol	410 ppb - 5600 ppb
		Benzene	4 ppb - 200 ppb
		Napthalene	920 ppb - 73,000 ppb
		PCB (Aroclor 1248)	280 ppb - 89,000 ppb
B.	Inorganic Analysis/Surface Soils	Arsenic	2 ppm - 44 ppm
		Chromium	7 ppm - 155 ppm
		Lead	15 ppm - 651 ppm
C.	Inorganic Analyses/Surface Water	Arsenic	25 ppb - 49 ppb
		Chromium	9 ppb - 45 ppb
		Lead	9 ppb - 69 ppb
D.	Organic Analyses/Sediment	PCBs (Aroclor)	1000 ppm
E.	Inorganic Analyses/Sediment	Arsenic	7 ppm - 77 ppm
		Lead	41 ppm - 121 ppm
		Magnesium	9360 ppm - 18,200 ppm
F.	Volatiles/Groundwater	Vinyl Chloride	22 ug/l - 124 ug/l
		Trichloroethene	11 ug/l - 14 ug/l
		Toluene	12 ug/l - 140 ug/l
		Xylene	9 ug/l - 170 ug/l

	Type of Analysis	Analytes	Range
G.	PCB/Groundwater	(Aroclor 1248)	1 mg/l - 180 mg/l
H.	Inorganic/Surface Soils	Arsenic	1 ppm - 11 ppm
		Chromium	6 ppm - 633 ppm

Contaminant Fate and Transport

The results of the evaluation of the site related contaminant fate and transport indicated two pathways for potential human exposure to site contaminants. These pathways are: 1) the direct contact exposure pathway, with exposed surface soils containing site contaminants providing a source for incidental ingestion of site contaminants and 2) the surface water exposure pathway, which could result from exposed surface soils being eroded into surface water.

Based on the analytical results the major identified pathway for migration of substances from the Cherry Farm Site is the groundwater system. Based on data collected, the receptor for migration of substances from the site appears to be the Niagara River. This river has been identified as an area of concern to NYSDEC as well as to Erie and Niagara Counties and Canada as discussed in the Niagara River Toxics Committee Report of 1984 (NRTCR). Of the 261 NRTCR substances 47 have been identified in the groundwater at the Cherry Farm Site. These substances can be divided into five general groups: volatiles organics, PAHs, phenols, PCBs and inorganics. To assess the potential impact of the site on the Niagara River, loading calculations were completed for these groups of substances. The results are presented below:

Chemical Class	Loading lbs./Year
Volatile Organics	11.2
Phenols	26.4
PNA	8.24
PCB	.54
Inorganics	4.05

The groundwater pathway is considered functional by contact with the fill material and by the fact that groundwater analyses has indicated the presence of compounds consistent with those found in the fill material at the site. The groundwater pathway however, is considered incomplete since no receptor and potential uptake mechanism by which compounds can be absorbed into the living system is present. In the Town of Tonawanda each resident is supplied by municipal water. As such there is currently no potential for groundwater exposure to humans. However, groundwater standards have been exceeded for PCBs, phthalates, PAHs, VOCs and metals. It is the objective of the selected remedial alternative to eliminate and/or reduce the total loading to the Niagara River as documented by the conclusions found in the NRTCR.

Risk Assessment

It was determined based on the evaluation of sample concentrations and potential exposure routes, that only chronic exposure to the exposed soils along the sides of the fill would pose an unacceptable health risk. Lead, arsenic and PCBs represent the compounds which exceed the USEPA's acceptable range of excess cancer risk. To eliminate or reduce the potential health risk, the remedial objectives that were identified as being applicable are:

1. Reduce the potential for direct contact exposure with the landfill sites.

2. Control surface runoff.

Section 4. Enforcement Status

A chronological review of the enforcement status follows:

1. NYSDEC enters into a Consent Order with Niagara Mohawk on December 3, 1985 for a Phase II Investigation.

2. Based on Phase II Report NYSDEC determines that a significant threat to the environment exists.

3. NMPCo submits work plan for RI/FS in October 1986.

4. September 1987 NMPCo submits revised work plan.

5. January 1988 administrative costs submitted.

6. April 1988 NMPCo enters into an agreement (consent order) with NYSDEC.

7. July 1989 RI Report submitted.

8. August 1989 RI reported accepted by the NYSDEC.

9. October 1989 FS Report submitted.

10. May 1990 FS Report accepted by the NYSDEC.

Several PRPs have been offered the chance to enter into an agreement to perform the work but have declined. Several of those PRPs include Allied Signal, Colorado Fuel and Iron and General Motors.

Section 5. Goals for the Remedial Action

General objectives of the remedial activities at the site would entail controlling, minimizing or eliminating the migration of contaminants from the site.

Human health risks for contaminants in site surface water and groundwater were addressed directly by setting remedial objectives based on the applicable New York State criteria.

Compliance with ARARs

Section 121 (d) of CERCLA requires that remedial actions comply with applicable or relevant and appropriate requirements (ARARs). Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, containment, remedial action, location or circumstance at a CERCLA site. Relevant and appropriate requirements are those cleanup standards, standards of control and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law, that while not "applicable" to a hazardous substance, pollutant or containment, remedial action, location or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to that particular site.

SARA does allow selection of remedies which do not attain all ARARs, provided one or more of six waiver conditions are met and protection of human health and the environment remains assured. The six waiver conditions are: fund balancing, technical impracticability, interim remedy, greater risk to human health and the environment, inconsistent application of State standards, or attainment of equivalent standard of performance. Alternatives are developed and refined throughout the CERCLA process to ensure either that they would meet all of their respective ARARs or that there is good rationale for waiving an ARAR. There are three types of ARARs: chemical specific, location specific, and action specific ARARs.

Chemical specific ARARs are usually health or risk based numerical values or methodologies which when applied to site specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to the ambient environment. Chemical specific ARARs for this site are applicable or relevant and appropriate to air emissions, surface water and groundwater standards.

Alternatives 2, 3, 4, and 5 require installation of a vegetated, multi-layer cover on the landfill. This cover would prevent future fugitive air emissions. During construction activities the slopes of the existing side slopes of the landfill would be graded to appropriate, stable slopes. These construction activities would increase the propensity for fugitive emissions. These emissions would be minimized through the use of dust suppressants and temporary cover as needed.

Alternative 6 requires treatment of the surface landfill material, replacement of the treated material, grading to reduce side slopes, and installation of a low permeability, vegetated cover on the site. Construction activities would increase the possibility of fugitive emissions. Dust suppressants and temporary cover would be used to minimize fugitive emissions if needed.

Maximum Containment Levels (MCLs) promulgated under the Federal Safe Drinking Water Act and the New York State Public Health Law Section are applied at the point of distribution to a public water system. MCLs are not applicable to the Cherry Farm Site, as the groundwater is not used to supply a public water system. Although a future groundwater user has not been identified, MCLs are relevant and appropriate because the site groundwater could potentially be used as a drinking water source.

Discharge to a surface water body is an action which must be conducted in accordance with the chemical-specific requirements established in accordance with the Clean Water Act. The Clean Water Act requirements are implemented by the SPDES program. Direct discharges onsite would be exempt from the procedural and administrative requirements of this program. The technical requirements of this program, which require that any discharge comply with effluent limitations established in accordance with the Clean Water Act would, however, be relevant and appropriate. The effluent limitations which are relevant and appropriate to onsite discharges from the site include State Water Quality Standards based on the receiving stream and technology limitations based on best professional judgement.

In addition, the surface water bodies onsite would be required to meet Ambient Water Quality Standards (AWQS) promulgated under 6 NYCRR Part 701. The drainage channels are entermittent streams, and therefore are classified as Class D surface water. The Class D AWQS are applicable as chemical-specific ARARs for the surface water in the drainage channels. Upon completion of the remedy for the Cherry Farm Site, there would be no contributions from the site to the drainage channels which would cause excursions of the Class D AWQS. The Niagara River is a Class A surface water, as it sewers as a source of potable water. Therefore, the Class A AWQS are applicable chemical-specific ARARs for the Niagara River. Discharges from the site to the Niagara River would be of sufficient quality so as to not cause contravention of these standards or existing concentrations in the Niagara River.

Location specific ARARs set restrictions on activities based on the characteristics of the site or immediate environs. Location specific ARARs may restrict the conduct of activities solely because they occur in special locations. Two potential location specific ARARs for the site were identified pertaining to wetlands and flood plains. There is a wetland along the eastern and northern sides of the Cherry Farm Site.

All alternatives would achieve compliance with the wetland requirements by maintaining the wetland area to the extent possible. Overall the remedial alternatives are protective of the wetland, because they serve to eliminate the potential migration of contaminants to this area.

The Cherry Farm Site is located in the 100 year flood plain. However, the Niagara River 100 year flood elevation is only one (1) foot higher than the bottom of the existing landfill. Actions taken with respect to this site are not expected to further affect the flood plain. Due to the minimal rise in depth expected from the 100 year flood, washout

of the landfill or cover would not occur. Periodic inspections and maintenance as required would maintain the integrity of the landfill.

Action specific ARARs set controls or restrictions on particular types of actions related to management of hazardous substances, pollutants or contaminants. Table (16) identifies Federal and New York State action specific ARARs.

The landfill material does contain areas with PCBs in concentrations exceeding 50 mg/kg which under NYCRR Chapter 373 requires management of the site.

ARARs are alternative specific, therefore each alternative would not be impacted by each law or regulation previously discussed. Table 17 identifies alternative specific ARARs.

A brief discussion for the ARARs of the recommended remedial Alternative 3 follows. Alternative 3 requires the installation of a cap and groundwater extraction and treatment system. These containment and groundwater treatment measures would also prevent transportation of contaminants by air or surface water and achieve compliance with these ARARs.

The NYCRR Part 360 landfill closure requirements would be relevant and appropriate to the cap. These requirements would be achieved through proper design of the cap which provides for minimization of migration of liquids, promotion of controlled surface runoff, minimization of erosion, and prevention of run-on. The required amendment would be made to the site and a groundwater monitoring program would be instituted. Site groundwater presently contains some contaminants at concentrations exceeding drinking water standards. Alternative 3 would prohibit the use of site groundwater as a drinking water source through the use of deed restrictions.

Section 6. Description and Evaluation of Alternatives

The technology identification and screening process includes the development of remedial action objects; development of general response actions; identification and screening of remedial technologies and process options; and evaluation of remedial technologies and process options.

The following remedial action objectives have been developed for this site:

1. Prevent ingestion of groundwater containing volatile organics, semi-volatile organics, PCBs or metals in concentrations exceeding drinking water standards.

2. Prevent direct exposure with landfill materials which contain arsenic, lead and PCBs in concentrations exceeding the reference dose.

3. Prevent the potential for surface runoff to erode landfill materials from exposed side slopes into on site surface water channels.

4. Prevent contaminant loading of the Niagara River via subsurface groundwater contamination.

A. Technology Options

This step identifies potentially applicable remedial technologies. Process options are screened mainly on the basis of technical implementability. The technical implementability of each identified option is evaluated with respect to site contaminant information, physical characteristics, volumes of affected media, and probable exposure levels.

Technologies and process options identified for the site are described and screened for applicability in Table (1 thru 4).

All the potentially applicable remedial technologies associated with the landfill material institutional action passed the preliminary screening. These technologies included access restrictions and monitoring.

There are two remedial technologies associated with landfill material containment general response action: capping and land disposal. The volume of contaminated fill material at the Cherry Farm Site is of such a magnitude as to make removal of the entire volume of fill material technically infeasible. The total volume of fill is approximately one million cubic yards, based on a fill area of approximately 40 acres and an average depth of fill of approximately 15 feet. Assuming trucks with a 20 ton capacity approximately 50,000 truckloads would be required to complete the excavation of the site. Assuming 20 truck loads could be scheduled per day, it would take 2,500 days to transport the excavated material to an offsite facility. Thus an offsite management alternative would require approximately 10 years for transportation alone.

The remedial technologies associates with the general response action for on site treatment of landfill material include: thermal treatment, chemical/physical treatment, and biological treatment. Biological treatment is not expected to be an effective technology for the treatment of fill material.

The thermal treatment technologies under consideration for the landfill materials are incineration and jn-situ vitrificaton. Onsite thermal treatment is not expected to be feasible for the entire volume of landfill material. It would take approximately 20 years to treat 1.0 million cubic yards. Furthermore, incineration would not provide treatment for the inorganic constituents contained in the fill material.

In-situ vitrification at a rate of 800 tons per week would require 52 years to treat the entire landfill volume.

Onsite chemical/physical treatment options include stabilization and soil washing/extraction. Stabilization of one million cubic yards would take between 8 to 27 years. There are several commercial soil washing/extraction units in operation. If two 20 ton per hour units are used it would take approximately 20 years to treat the landfill material.

Based on the time required for treatment, chemical/physical of all landfill materials is considered technically infeasible.

Removal and/or offsite treatment or containment of part of the landfill material may be technically feasible, as the time frame required is greatly reduced. Treatment of the surface landfill material, followed by replacement of the treated material would satisfy the remedial objective that requires prevention of direct contact exposure.

Elimination of the general response action of treatment of landfill material as it applies to all landfill material, based on the large volume of low concentration landfill material is consistent with USEPA guidance.

Removal and on/off site treatment or containment of part of the landfill material, however, may be technically feasible as the time frame required for the action may be reduced substantially. Treatment of the surface landfill material, followed by replacement of the treated landfill material would satisfy the remedial objective that requires prevention by direct exposure. The remedial technologies for treatment of surface landfill material are thermal treatment, physical/chemical treatment and biological treatment. With the exception of physical/chemical treatment the other remedial technologies are not acceptable for this site.

A discussion of each remedial technology process option which passed the technology screening follows.

1. Institutional Actions

The groundwater institutional remedial technologies which passed the initial screening include deed restrictions and groundwater monitoring. The landfill material institutional remedial technologies which passed the screening include access restrictions (deed restrictions and fencing) and groundwater monitoring. A description of the process options which passed the screening follows.

Deed Restrictions

Deed restrictions incorporated into a property deed might include land use restrictions that would preclue the conduct of activities which would expose contaminated materials and thereby limit direct contact exposure. Restrictions precluding the placement of drinking water wells until such time as the groundwater attains drinking water standards.

Fencing

Fencing would consist of placing a fence around the contaminated area to limit access and thereby reduce risks of direct contact with contaminated materials.

Groundwater Monitoring

Periodic sampling and analysis of groundwater would be initiated. Monitoring provides a means of excessing the conditions and the rate of improvement of the groundwater.

2. Containment Actions

The groundwater containment options which passed the initial screening are caps and slurry walls. The landfill material containment technology which passed the screening is caps. A description of the process options which passed the screening follows.

Caps

Capping techniques are used to cover contaminated materials. Capping will minimize surface water infiltration, provide for control of erosion and isolate and contain wastes. This is accomplished by the construction of relatively impermeable material over the contaminated material. The construction of a cap at this site will include grading of the side slopes or landfill faces to an acceptable grade.

A multi-layered cap will be considered for containment at this site. The cap would be a three layered system consisting of an upper vegetative layer, underlain by a drainage layer over allow permeability layer. The low permeability layer would consist of two feet of clay with a maximum permeability of 1×10^{-7} cm/sec. The drainage layer would be comprised of six inches of gravel and sand with a permeability greater than 1×10^{-3} cm/sec. The drainage layer would be isolated from the vegetated layer and low permeability layer with filter fabric to prevent clogging by soil fines and would serve to convey infiltering rainwater. The surface of the landfill would be comprised of a six inch vegetative layer underlain by a 24 inch soil layer for vegetative support and frost protection. The cap would prohibit direct contact with contaminated materials and would minimize infiltration by encouraging controlled surface runoff.

Slurry Wall

Slurry walls are vertical subsurface barriers with low permeabilities used to isolate contaminated groundwater.

3. Collection Actions

The groundwater collection remedial technologies which passed the initial screening are extraction wells and subsurface drains.

Extraction Wells

Extraction wells would be used at the site to either contain or remove contaminated groundwater.

4. Landfill Material Treatment Actions

The landfill material treatment technologies which passed the initial screening are the physical/chemical treatment technologies of soil washing and stabilization.

B. Summary of the Evaluation of the Alternatives

Process options are evaluated using the criteria of effectiveness, implementability and cost. Effectiveness refers to the potential effectiveness of process options in handling the estimated areas or volumes of media and meeting the remediation goals. Implementability encompasses both the technical and administrative feasibility of implementing a technology option. Cost is assessed in the form of relative capital and O & M costs.

Alternatives are developed by assembling general response actions, and the process options chosen to represent the various technologies types for each media, into combinations which address the site. Based on the technical infeasibility of the general response actions of landfill material removal and treatment, development of treatment alternatives for the entire volume of landfill material is not considered practicable for this site. Treatment of a portion of the landfill material, however, may be practicable. Therefore, with respect to the entire volume of landfill materials, alternatives will address only containment, limited action and no action.

An additional alternative will address treatment of a portion of the landfill material. Six alternatives have been developed for the site. These alternatives which include a no action, a containment, and four treatment alternatives are described below:

Alternative #1 - No Action Alternative

This alternative would provide for an assessment of the risk to humans and the environment if no remedial actions are implemented. The no action alternative would require implementation of a groundwater monitoring program.

Alternative #2 - Containment Alternative

This alternative would contain the waste and result in minimizing the contaminant transport mechanisms by which the contaminants may leave the site. This alternative provides containment through installation of a circumferential slurry wall surrounding the contaminant plume and installation of a cap over the landfill material. Also included in this option are groundwater monitoring and deed restrictions. The slurry wall would be composed of soil bentonite slurry and would be keyed to the till and/or bedrock. The cap would contain the landfill materials and minimize infiltration of water into the landfill materials, and the slurry wall would minimize horizontal flow of groundwater beneath the site.

Alternative #3 - Groundwater Extraction and Containment of Landfill Material

This provides for the collection of groundwater utilizing extraction wells, treatment of the contaminated groundwater utilizing precipitation and activated carbon, and containment of the landfill material with a multi-layer clay cap. This alternative also includes groundwater monitoring and land use deed restrictions.

The groundwater extraction and treatment system would remove site groundwater with treatment provided for the contaminated groundwater (i.e. above drinking water standards). Any treated groundwater would be discharged to the Niagara River. The cap would contain the landfill materials including contaminated ditch sediments and minimize infiltration of water into the landfill materials, and the groundwater extraction system would prevent groundwater from leaving the site until it meets drinking water standards.

Alternative #4 - Extraction Wells, Upgradient Slurry Wall, Cap

This alternative provides for collection of site groundwater utilizing extraction wells, treatment of the extracted groundwater, installation of an upgradient slurry wall to prevent intrusion of offsite groundwater and installation of a multi-layer clay cap over landfill materials. This alternative also includes groundwater monitoring and land use deed restrictions.

Following treatment, groundwater would be discharged to the Niagara River. The cap would contain the landfill materials and minimize infiltration of water into the landfill materials, and the upgradient slurry wall and groundwater extraction system would prevent contaminated groundwater from leaving the site.

Alternative #5 - Groundwater Collection System, Extraction Wells and Capping

Alternative #5 is similar to Alternative #4, except that intrusion of upgradient groundwater is prevented through use of a collection system instead of a barrier. Alternative #5 provides for collection of site groundwater utilizing extraction wells, treatment of the groundwater, installation of an upgradient interceptor trench to prevent intrusion of offsite groundwater and installation of a multi-layer clay cap over landfill materials. This alternative also includes groundwater monitoring and land use deed restrictions.

The upgradient groundwater interceptor trench would reduce the amount of groundwater to be collected and treated by minimizing upgradient contributions to site groundwater. Groundwater collected by the interceptor trench would be discharged to the nearest surface water body.

Alternative #6 - Soil Washing

Alternative #6 provides for treatment of the surface four to six feet of landfill material utilizing a soil extraction/washing technology. Treated soil would be returned to the site and capped with a layer of low permeability soil. Residuals generated from the soil washing process would be treated, with ultimate disposal in an approved offsite facility. Alternative #6 also provides for groundwater collection and treatment.

The groundwater extraction and treatment system would be identical to that of Alternative #3, with the exception of size. The

groundwater extraction system would require greater capacity to provide treatment for precipitation which infiltrates through the landfill.

Cost

The following table gives a detailed cost breakdown for each of the six (6) alternatives:

Alternative	Capital Cost	Annual O & M	Total Present Worth
1	$ 106,285	$ 35,466	$ 651,486
2	17,783,044	300,783	22,406,837
3	12,396,711	309,489	17,154,333
4	15,471,204	370,396	21,165,115
5	21,885,748	462,414	28,997,204
6	86,645,475	921,910	100,817,529

Selection of Recommended Alternative

Remedial Alternative #3 has been recommended for implementation at the Cherry Farm Site. Alternative #3 would protect human health and the environment through collection and treatment of contaminated groundwater and containment of the landfill materials. The groundwater collection system would collect contaminated groundwater for subsequent treatment. These measures, in conjunction with deed restrictions preventing the installation of wells and activities which would disturb the integrity of the cap would eliminate the potential for direct contact exposure to contaminants and transport of the contaminants with groundwater. This alternative would result in reductions in toxicity, mobility, and volume of contaminants. Periodic inspection of the cap, together with operation of the groundwater extraction system would provide for long term effectiveness and permanence of this alternative.

Installation of the cap could be implemented in a relatively short period of time while groundwater treatment is expected to be required for a considerable time period. The cap could be constructed using standard construction techniques. Activities related to construction of the cap may infringe upon part of the wetland, temporarily disturbing them, but the wetlands would be restored upon completion of the cap. The clay cap would prevent erosion of the landfill and subsequent surface runoff from the contaminated side slopes, thereby preventing contaminants from reaching the wetland.

Conceptual Design

The recommended Alternative #3 includes the installation of a multi-layer clay cap over the landfill, groundwater extraction wells, and a treatment system for contaminated groundwater. Groundwater monitoring, fencing, and deed restrictions will also be implemented.

Construction activities would be initiated by establishing proper grades on the landfill. This would entail cutting the existing sides of the landfill to slopes no greater than approximately one vertical on 4.5 horizontal. Additional clean backfill would be brought on site to establish

top slopes of at least 5%. Once the final grade has been established the groundwater extraction wells would be installed. Piping would lead from the wells to the groundwater treatment system.

At this point, the multi-layer cap would be constructed. The groundwater treatment plant would be installed, with discharge piping leading to the drainage channel. Start up of the groundwater extraction system would occur after the cap construction is completed. Based on site hydrogeology, the groundwater extraction and treatment system would be operated at a flow rate of approximately 10 gallons/minute.

The extraction system would consist of four wells which would be used to treat the approximate 12,500 gallons/day flowing beneath the site.

Site fencing would be installed consisting of a six foot high chain link fence. Property deed restrictions could be imposed at any point during implementation of the remedy but these deed restrictions would not preclude future use of the site provided appropriate measures are taken during the design and construction of the remedial action. Rather they would provide additional protection against potential exposure to low level contaminants at the site. The deed restrictions would include measures to prevent the installation of drinking wells at the site, and restrict activities which could affect the integrity of the cap.

Standard construction methods would be used to implement this alternative. Level C or D protection is expected to be adequate to protect on site workers during construction.

Supplemental Considerations

The Town of Tonawanda is presently considering developing the Waterfront Region along the Niagara River. Representatives of the Town of Tonawanda foresee the development of the Cherry Farm Site as a public park which would include the following items:

- 8-10 Boat Launching Ramps
- Public Marina (150-200 slips)
- Fishing Piers
- Picnic Area
- Band Shell
- Concession Stands
- Restrooms
- Boat Supplies and Services

No design details for the development of such a public park are available at this time. Should the Town decide to undertake such a venture it must be made clear that construction activities related to the buildings, marina, and park facilities would require careful planning and would only be acceptable if the integrity of the cap is maintained. Design details which would impact final topography, such as road locations, buildings and utility locations, drainage pathways, river access and other factors would have to be incorporated into the cap design. During and subsequent to construction, inspections of the cap and repair of any damage caused during construction would be required.

Development of marina facilities would require excavation of landfill materials excavated for marina construction could be utilized as fill material without compromising park or landfill cover topographic requirements.

Regardless of the land use at the site, to ensure the integrity of the cap a deeper vegetative support layer would be required. Construction of foundations and underground utilities would not be allowed unless sufficient embankment materials were provided to prevent the structures from impacting the integrity of the cap.

Any future development of the site by the Town of Tonawanda following the proposed remediation by Alternative #3 would require a deeper vegetative support layer in the cap and reduced slopes. This would result in an increase in the height of the landfill, however, this would not preclude development of the site.

The Town should be made aware of that the above provisions have not been provided for in the conceptual design. Niagara Mohawk is constrained by conflicting regulatory policy, in addition to financial consideration, to limit its response activity to measures contemplated to meet the requirements of the National Contingency Plan. Niagara Mohawk is willing to provide the Town of Tonawanda whatever reasonable assistance it can, short of incurring additional financial liability.

Section 7. Summary of the Government's Decision

Remedial Alternative #3 has been recommended for implementation at the Cherry Farm Site. Alternative #3 would protect human health and the environment through collection and treatment of contaminated groundwater and containment of the landfill materials. The groundwater collection system would collect contaminated groundwater for subsequent treatment. These measures, in conjunction with deed restrictions preventing the installation of wells and activities which would disturb the integrity of the cap would eliminate the potential for direct contact exposure to contaminants and transport of the contaminants with groundwater. This alternative would result in reductions in toxicity, mobility, and volume of contaminants. Periodic inspection of the cap, together with operation of the groundwater extraction system would provide for long term effectiveness and permanence of this alternative.

Further evaluation of the hydrogeology within and near the landfill will need to be performed before the final design of the pumping system can be completed. Pump tests and modelling will be needed to provide assurances that the pumping system will maintain an inward gradient and prevent further contaminant migration to the Niagara River. This work was not done as part of the RI/FS. The proposed capping system is also being viewed as a component of this recovery system to assist in the capture of the contaminated groundwater. The future design activities may reveal that the capping system design can be modified.

Installation of the cap could be implemented in a relatively short period of time while groundwater treatment is expected to be required for a considerable time period. The cap could be constructed using standard construction techniques. Activities related to construction of the cap may infringe upon part of the wetland, temporarily disturbing them. Once the final grade has been established the groundwater extraction wells would be installed. Piping would lead from the wells to the groundwater treatment system and/or municipal sewage treatment plant.

At this point, the cap would be constructed. The groundwater treatment plant would be installed, with discharge piping leading to the drainage channel. Start up of the groundwater extraction system would occur after the cap construction is completed. Based on site hydrogeology, the groundwater extraction and treatment system would be operated at a flow rate of approximately 10 gallons/minute.

As proposed, the extraction system would consist of four wells which would be used to treat the approximate 12,500 gallons/day flowing beneath the site.

Site fencing would be installed consisting of a six foot high chain link fence. Property deed restrictions could be imposed at any point during implementation of the remedy but these deed restrictions would not preclude future use of the site provided appropriate measures are taken during the design and construction of the remedial action. Rather they would provide additional protection against potential exposure to low level contaminants at the site. The deed restrictions would include measures to prevent the

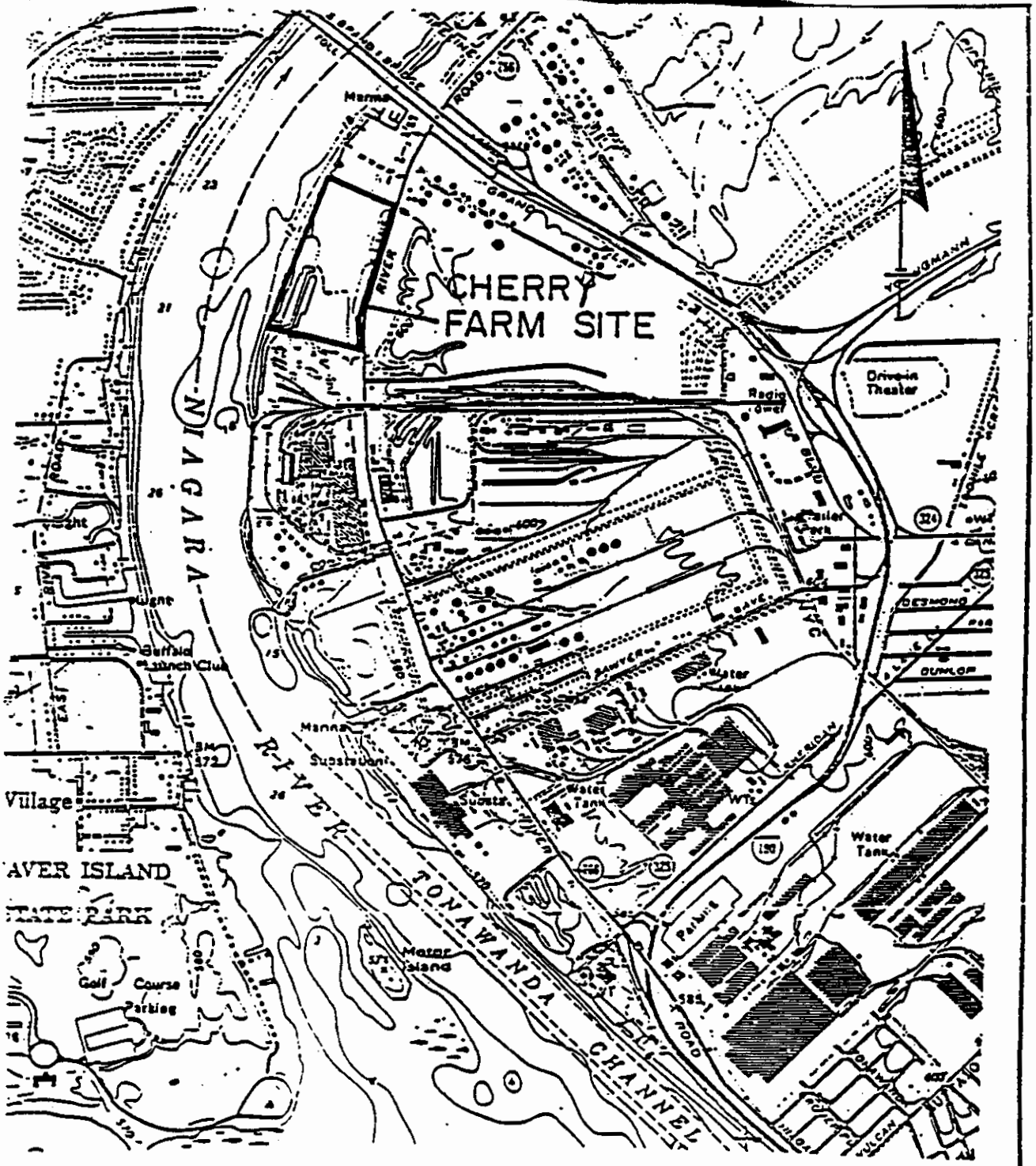
installation of drinking wells at the site, and restrict activities which could affect the integrity of the cap.

Standard construction methods would be used to implement this alternative. Level C or D protection is expected to be adequate to protect on site workers during construction.

APPENDIX

Section 8. Table and Figures Documenting the Screening Process

FIGURE 1



CHERRY FARM
SITE LOCATION MAP
NIAGARA MOHAWK POWER CORP.
TONAWANDA, NEW YORK

ADAPTED FROM U.S.G.S. (7.5 MIN.) BUFFALO NW N.Y.-ONTARIO QUADRANGLE 1955

SCALE 1" = 2,000'

O'BRIEN & GERE ENGINEERS INC.

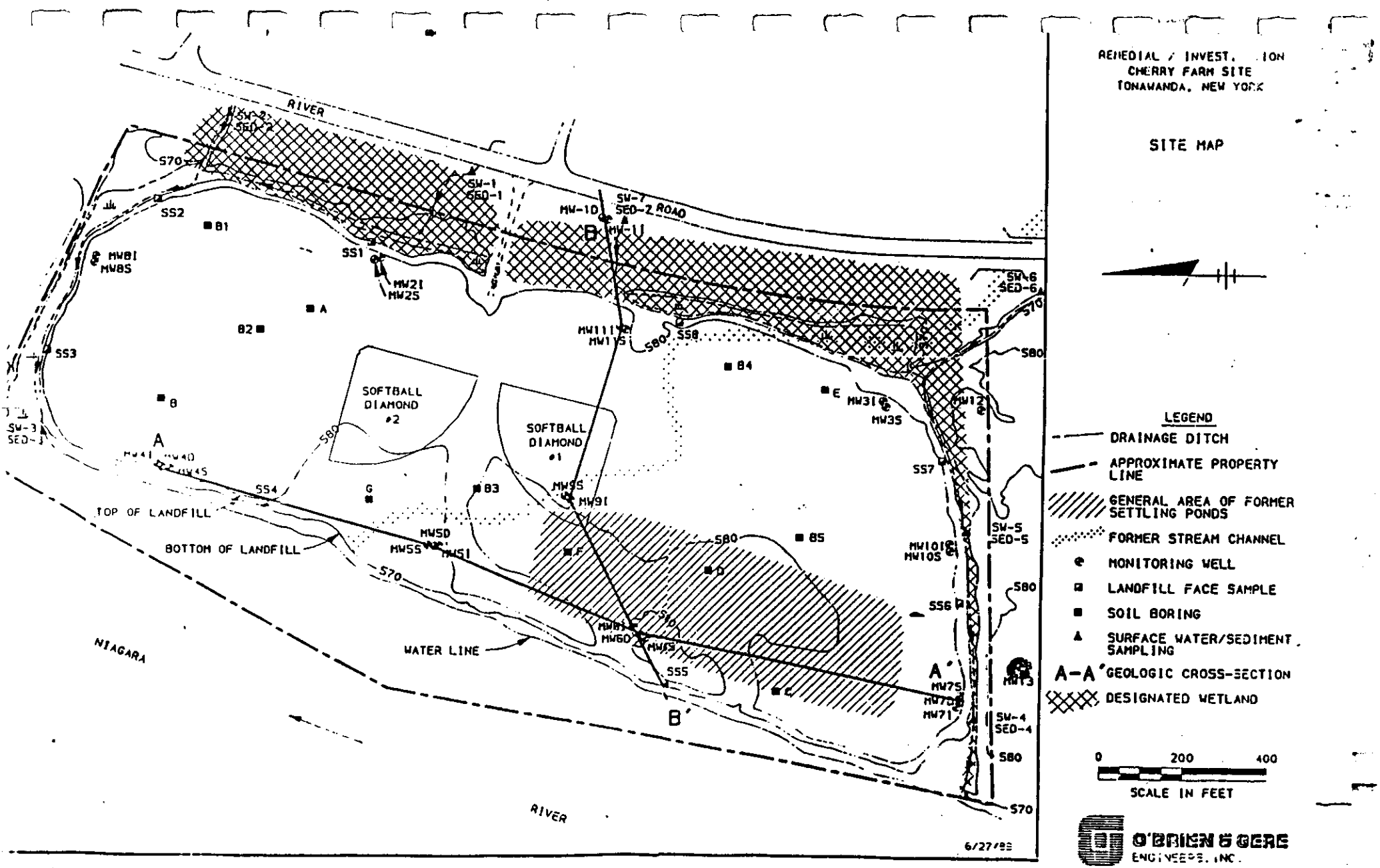
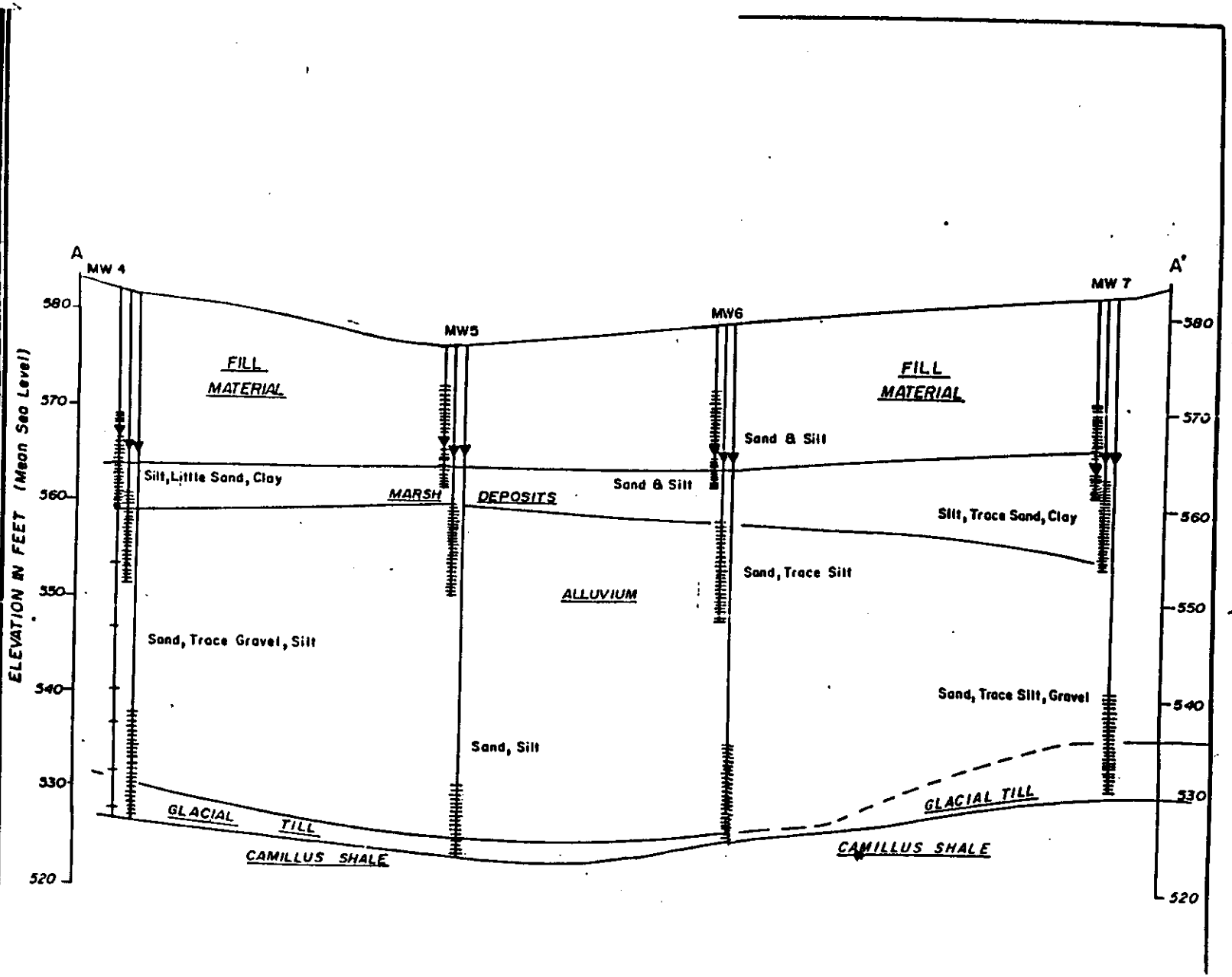

REMEDIAL / INVEST. ION
CHERRY FARM SITE
TONAWANDA, NEW YORK
SITE MAP
LEGEND
DRAINAGE DITCH
APPROXIMATE PROPERTY LINE
GENERAL AREA OF FORMER SETTLING PONDS
FORMER STREAM CHANNEL
MONITORING WELL
LANDFILL FACE SAMPLE
SOIL BORING
SURFACE WATER/SEDIMENT SAMPLING
A-A' GEOLOGIC CROSS-SECTION
DESIGNATED WETLAND
0 200 400
SCALE IN FEET
O'BRIEN & GERE
ENGINEERS, INC.
RIVER
SOFTBALL DIAMOND #2
SOFTBALL DIAMOND #1
TOP OF LANDFILL
BOTTOM OF LANDFILL
WATER LINE
NIAGARA
SW-7 SED-2 ROAD
6/27/88

Figure 2

FIGURE 3

REMEDIAL INVESTIGATION
CHERRY FARM SITE
TONAWANDA, NEW YORK

GEOLOGIC CROSS-SECTION
A — A'



LEGEND

- SCREENED INTERVAL
- GROUND WATER ELEVATION
- LITHOLOGIC BOUNDARY

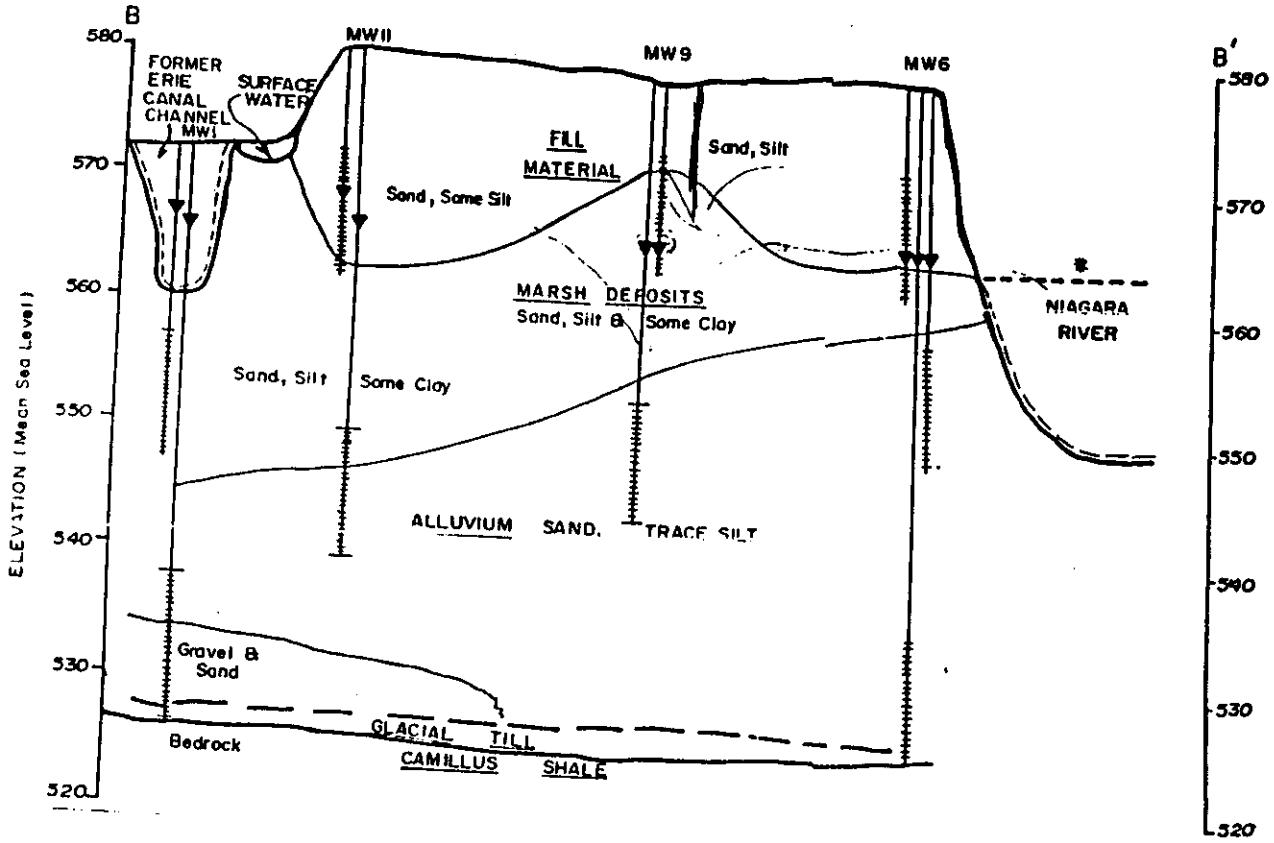
SCALE:
HORIZONTAL: 1" = 200'
VERTICAL : 1" = 10'

0 100 200
SCALE IN FEET

FIGU 4

REMEDIAL INVESTIGATION
CHERRY FARM SITE
TONAWANDA, NEW YORK

GEOLOGIC CROSS-SECTION
B — B'



LEGEND

- SCREENED INTERVAL
- GROUND WATER ELEVATION
- LITHOLOGIC BOUNDARY
- ESTIMATED SURFACE WATER ELEVATION

SCALE

HORIZONTAL : 1" = 200'
VERTICAL : 1" = 10'

0 100 200
SCALE IN FEET

DONIENGGENE

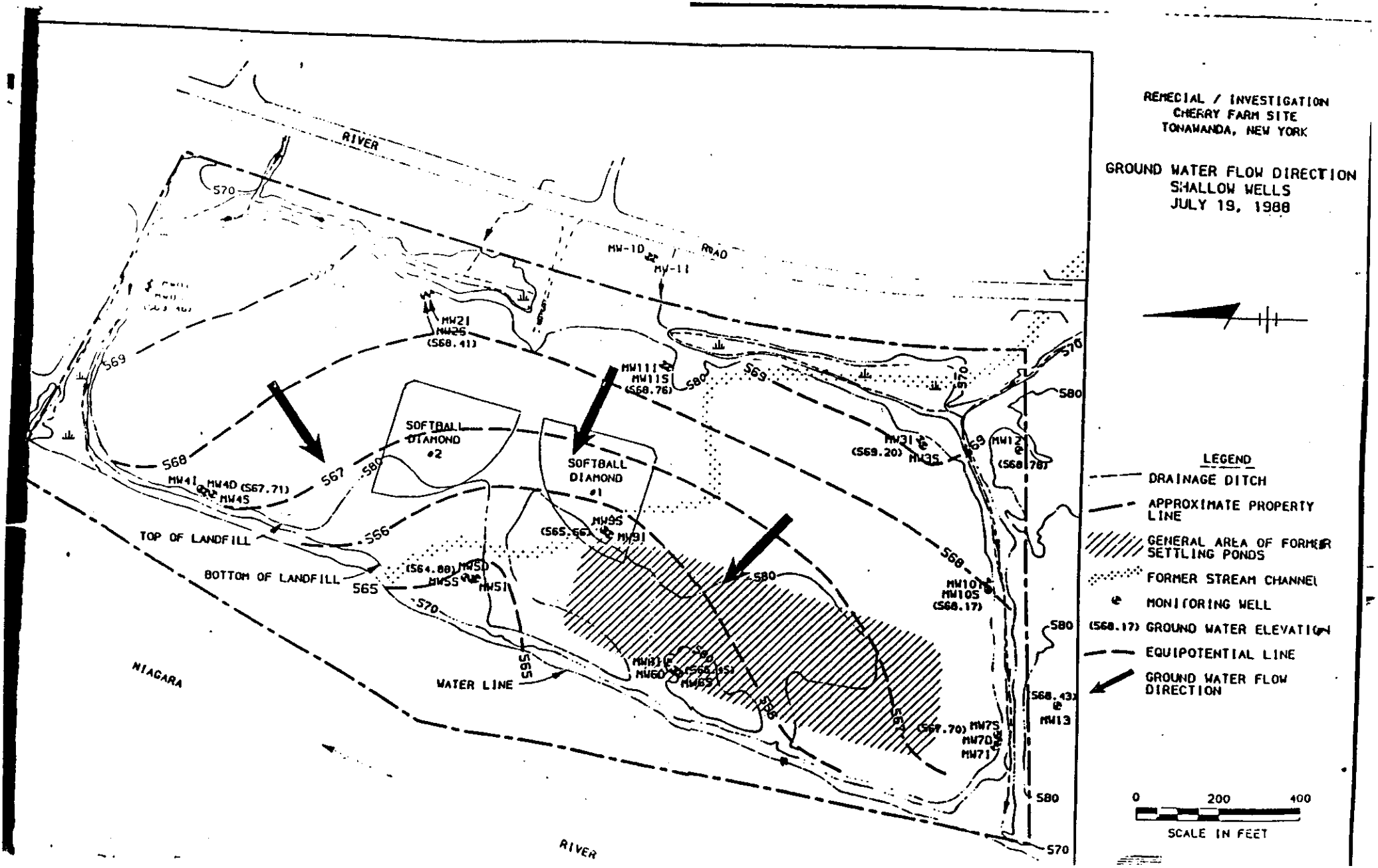

REMECIAL / INVESTIGATION
CHERRY FARM SITE
TONAWANDA, NEW YORK
GROUND WATER FLOW DIRECTION
SHALLOW WELLS
JULY 19, 1988
LEGEND
DRAINAGE DITCH
APPROXIMATE PROPERTY LINE
GENERAL AREA OF FORMER SETTLING PONDS
FORMER STREAM CHANNEL
MONITORING WELL
(568.17) GROUND WATER ELEVATION
EQUIPOTENTIAL LINE
GROUND WATER FLOW DIRECTION
0 200 400
SCALE IN FEET
RIVER
NIAGARA
RIVER
ROAD
SOFTBALL DIAMOND #1
SOFTBALL DIAMOND #2
TOP OF LANDFILL
BOTTOM OF LANDFILL
WATER LINE
MW-1D
MW-1I
MW21
MW2S
(568.41)
MW11I
MW11S
(568.76)
MW41
MW4D (567.71)
MW4S
MW5D
MW5S
(564.88)
MW5I
MW9S
(565.66)
MW9I
MW3I
(569.20)
MW3S
MW1I
(568.78)
MW10I
MW10S
(568.17)
MW6I
MW6D
(566.45)
MW6S
MW7I
(569.70)
MW7S
MW7D
MW7I
568.43
MW13
570
565
566
567
568
569
580

TABLE 1

(Page 1 of)

CHERRY FARM SITE
SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS
GROUND WATER

Ground Water General Response Action	Remedial Technology	Process Options	Description	Screening Comments
NO ACTION	None	Not applicable	No action	Required for consideration by NCP
INSTITUTIONAL ACTIONS	Access restrictions	Deed restrictions	Property deeds in the area of influence would include restrictions on wells	Potentially Applicable
	Alternate water supply	Municipal water supply	Extension of municipal water supply to area of influence	Not applicable because no used wells in area
		New community well	New uncontaminated wells in area of influence	Not applicable because municipal water supply in place
	Monitoring	Ground water monitoring	Continued monitoring of wells	Potentially applicable
CONTAINMENT ACTIONS	Cap	Clay and Soil	Compacted clay covered with soil over areas of contamination	Potentially applicable
		Asphalt	Application of a layer of asphalt over areas of contamination	Potentially applicable
		Concrete	Installation of a concrete slab over areas of contamination	Potentially applicable
		Multimedia Cap	Clay and synthetic membrane covered by soil over areas of contamination	Potentially applicable
	Subsurface Barriers	Slurry wall	Soil or cement bentonite slurry trench surrounding area of influence	Potentially applicable but may not be feasible if impervious layer is not located
		Grout curtain	Pressure injection of grout into soil or rock	Not applicable to alluvial deposits and glacial till at site

TABLE 1

CHERRY FARM SITE
SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS
GROUND WATER

Ground Water General Response Action	Remedial Technology	Process Options	Description	Screening Comments
[illegible]	Extraction	Extraction Wells	Series of wells to extract contaminated ground water	Potentially applicable
		Extraction/Injection Wells	Injection wells inject uncontaminated water to increase flow to extraction wells	Potentially applicable
	Subsurface Drains	Interceptor Trenches	Preforated pipe in trenches backfilled with media to collect contam-	Potentially applicable
	Physical/Chemical Treatment	Carbon Adsorption	Adsorption of contaminants onto activated carbon	Potentially Applicable
		Ion Exchange	Exchange of ions between ion exchange resin and water	Potentially Applicable
		Oxidation	Detoxification of contaminants by oxidation-reduction reactions	Potentially Applicable
		Precipitation	Alteration of chemical equilibria to reduce contaminant solubility	Potentially Applicable
		Reverse Osmosis	Use of high pressure to force water through a membrane, separating con-	Potentially Applicable
		Stripping	Mixing large volumes of air or steam with water to promote transfer of volatile organics	Potentially applicable
[illegible]	Thermal treatment	(continued on page 3)		
	Biological treatment	(continued on page 3)		
	In-situ treatment	(continued on page 3)		

TABLE 1

CHERRY FARM SITE
SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS
GROUND WATER

Ground Water General Response Action	Remedial Technology	Process Options	Description	Screening Comments
REATMENT ACTIONS ontinued)	Biological treatment	Aerobic	Degradation of organic contaminants by aerobic microorganisms.	Not feasible for combination of organic and inorganic contaminants present in ground water
		Anaerobic	Degradation of organic contaminants by anaerobic microorganisms.	Not feasible for combination of organic and inorganic contaminants present in ground water
	Thermal treatment	Rotary kiln	Combustion of waste in rotating horizontal cylinder	Not applicable for site dilute contaminants in ground water
		Fluidized bed	Combustion of waste in hot sand bed	Not applicable for site dilute contaminated ground water
	In-Situ treatment	Bioreclamation	Injection of microorganisms and nutrients into ground water to biodegrade contaminants	Not feasible for combination of organic and inorganic contaminants present in ground water
		Aeration	Injection of air into wells to strip contaminants from ground water	Not feasible for combination of organic and inorganic contaminants present in ground water
		Permeable treatment beds	Adsorption of contaminants in trenches filled with adorbent material	Not feasible for combination of organic and inorganic contaminants present in ground water
		Oxidation	Injection of oxidizer into wells to oxidize contaminants.	Not feasible for combination of organic and inorganic contaminants present in ground water

TABLE 2

CHERRY FARM SITE
SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS
LANDFILL MATERIAL

Landfill Material General Response Action	Remedial Technology	Process Options	Description	Screening Comments
NO ACTION	None	Not applicable	No action	Required for consideration by NCP
INSTITUTIONAL ACTIONS	Access restrictions	Deed restrictions	Property deeds in the area of the landfill would include restrictions on land use	Potentially applicable
		Fencing	Installation of fence surrounding area of contamination	Potentially applicable
	Monitoring	Ground water monitoring	Continued monitoring of wells	Potentially applicable
CONTAINMENT ACTIONS	Cap	Clay and Soil	Compacted clay covered with soil over areas of contamination	Potentially applicable
		Asphalt	Aplication of a layer of asphalt over areas of contamination	Potentially applicable
		Concrete	Installation of a concrete slab over areas of contamination	Potentially applicable
		Multimedia Cap	Clay and synthetic membrane covered by soil over areas of contamination	Potentially applicable
	Land Disposal	On-site landfill	Placement of waste in on-site landfill	Infeasible for entire site due to volume of contaminated material; Potentially applicable to limited areas
		Commercial landfill	Placement of waste in off-site landfill	Infeasible for entire site due to volume of contaminated material; Potentially applicable to limited areas

TABLE 2

CHERRY FARM SITE
SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS
LANDFILL MATERIAL

Landfill Material General Response Action	Remedial Technology	Process Options	Description	Screening Comments
REMOVAL ACTION	Removal Action	Excavation	Removal of waste using applicable construction equipment such as: backhoes, cranes, front-end loaders, etc.	Infeasible for entire site due to volume of contaminated material; Potentially applicable to limited areas
TREATMENT ACTIONS	Thermal treatment	Rotary kiln	Combustion of waste in rotating horizontal cylinder	Does not provide treatment for combination of contaminants present in landfill
		Fluidized bed	Combustion of waste in hot sand bed	Does not provide treatment for combination of contaminants present in landfill
		In-situ vitrification	Vitrification in place	Infeasible for entire site due to volume of contaminated material; Potential problems due to presence slag
	Chemical/Physical	Stabilization	Solidification of material	Not demonstrated for all contaminants of concern; Infeasible for entire site due to volume of contaminated material; Potentially applicable to limited areas
		Soil Washing	Extraction of contaminants	Innovative technology; Infeasible for entire site due to volume of contaminated material; Potentially applicable to limited areas
	Biological treatment	Aerobic	Degradation of organic contaminants by aerobic microorganisms.	Not feasible for combination of organic and inorganic contaminants present in landfill
		Anaerobic	Degradation of organic contaminants by anaerobic microorganisms	Not feasible for combination of organic and inorganic contaminants present in landfill.

TABLE 3

CHERRY FARM SITE
EVALUATION OF PROCESS OPTIONS
GROUND WATER

ound Water General ponse Action	Remedial Technology	Process Options	Effectiveness	Implementability	Cost
ACTION	None	Not applicable*	Does not reduce contamination	Readily implementable	None
ITUTIONAL CTIONS	Monitoring	Ground water monitoring*	Effective for observation of conditions Does not reduce contamination or prevent exposure	Readily implementable	Low capital, Medium O & M
NTAINMENT CTIONS	Cap	Clay and Soil*	Effective in minimizing infiltration, Susceptible to cracking, but has self-sealing properties	Readily implementable	Low capital, Low O & M
		Asphalt	Effective in minimizing infiltration, Susceptible to weathering and cracking	Readily implementable	Low capital, High O & M
		Concrete	Effective in minimizing infiltration, Susceptible to weathering and cracking	Readily implementable	Moderate capital, High O & M
		Multimedia Cap	Effective in minimizing infiltration, Least susceptible to weathering and cracking	Readily implementable	Moderate capital Moderate O & M
	Subsurface Barriers	Slurry wall*	Effective aid to ground water	Specially formulated slurry material required to withstand organics in ground water	High capital, Very low O & M

resentative Process Option

TABLE 3

CHERRY FARM SITE
EVALUATION OF PROCESS OPTIONS
GROUND WATER

nd Water neral nse Action	Remedial Technology	Process Options	Effectiveness	Implementability	Cost
CTION IONS	Extraction	Extraction wells*	Effective collection method for small	Readily implementable	Low capital, Low O & M
		Extraction/ Injection wells	Effective collection/recharge method for large quantities of ground water	Readily implementable	Medium capital, Low O & M
	Subsurface Drains	Interceptor Trenches*	Effective for flow interception	Readily implementable	High capital, Low O & M
ITMENT IONS	Physical/Chemical Treatment	Carbon Adsorption*	Effective treatment for most organic contaminants, Carbon regeneration or disposal required, Effective for removal of organics and selected inorganics	Readily implementable	Medium capital, High O & M
		Ion Exchange	Effective removal for ionic species including metals and inorganic anions, Organic acids and amines may be removed pretreatment; Regenerant requires disposal	Readily implementable	Medium capital, High O & M
		Oxidation	Documentation indicates variable effectiveness in organic reduction, Treatability study required to determine effectiveness, UV/ozone oxidation considered innovative treatment	Readily implementable	Medium capital, Medium O & M
		Precipitation*	Effective for removal of metals; Sludge disposal required	Readily implementable	Medium capital, High O & M
		Reverse Osmosis	Effective for removal of charged anions and cations and high molecular weight organics	Readily implementable, Subject to chemical attack, fouling and plugging (may not be an issue issue with ground water)	High capital, Medium O & M
		Stripping	Effective treatment for volatile organic contaminants, Air pollution control may be required	Readily implementable, Attainment of air discharge limits required	Medium capital, Medium O & M

entative Process Option

TABLE 4

(Page 1. of 2.)

CHERRY FARM SITE
EVALUATION OF PROCESS OPTIONS
LANDFILL MATERIAL

Landfill Material General Response Action	Remedial Technology	Process Options	Effectiveness	Implementability	Cost
NO ACTION	None	Not applicable*	Does not reduce contamination	Readily implementable	None
INSTITUTIONAL ACTIONS	Access restrictions	Deed restrictions*	Minimizes direct contact exposure by precluding various activities Does not reduce contamination	Readily implementable	Very low capital
		Fencing	Limits direct contact exposure of humans and large wildlife to contaminants	Readily implementable	Low Capital, Very low O & M
	Monitoring	Ground water monitoring*	Effective for observation of conditions Does not reduce contamination or prevent exposure	Readily implementable	Low capital Medium O & M
CONTAINMENT ACTIONS	Cap	Clay and Soil*	Effective in minimizing direct contact exposure, Susceptible to cracking, but has self-healing properties	Readily implementable	Low capital, Low O & M
		Asphalt	Effective in minimizing direct contact exposure, Susceptible to weathering and cracking	Readily implementable	Low capital, High O & M
		Concrete	Effective in minimizing direct contact exposure, Susceptible to weathering and cracking	Readily implementable	Moderate capital, High O & M
		Multimedia Cap	Effective in minimizing direct contact exposure, Least susceptible to weathering and cracking	Readily implementable	Moderate capital, Moderate O & M

*Representative Process Option

TABLE 4

CHERRY FARM SITE
EVALUATION OF PROCESS OPTIONS
LANDFILL MATERIAL

lfill Material General sponse Action	Remedial Technology	Process Options	Effectiveness	Implementability	Cost
TEATMENT ACTIONS	Chemical/Physical	Stabilization	Minimizes direct contact exposure by immobilization of contaminents. Proven technology for inorganics. Long-term effectiveness not demonstrated for PCBs. Does not reduce volume of contaminants.	Readily implementable	Moderate capital Low O & M
		Soil Washing/Extraction*	Eliminates direct contact exposure by removal of contaminants. Effectiveness of process is site- and contaminant-specific and must be demonstrated by treatability testing. Process including residuals treatment may be complex. Processing rate is limited.	Fairly implementable	High capital Very low O & M

esentative Process Option

TABLE 5

ORGANIC ANALYSES - SUB-SURFACE SOILS
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	Boring A	Boring B	Boring C	Boring D	Boring E	Boring F	Boring G
Phenol	410	5600	6900 U	370 U	600	1400	570
4-Methylphenol	390 U	2300	6900 U	370 U	430 U	530	1400
2,4-Dimethylphenol	580	830	6900 U	370 U	1400	410 U	1100
Naphthalene	920	5800	73000	350 J	320 J	390 J	1500
2-Methylnaphthalene	1100	1600	6300 J	290 J	150 J	790	2100
Acenaphthylene	390 U	360 U	5400	370 U	430 U	410 U	760 U
Acenaphthene	55 J	360 U	6900 U	370 U	430 U	410 U	760 U
Dibenzofuran	260 J	360 U	2900 J	73 J	430 U	70 J	360 J
Phenanthrene	870 U	890	19000	300 J	85 J	310 J	1400
Anthracene	130 J	360 U	7900	38 J	430 U	55 J	280 J
Di-n-butylphthalate	390 U	360 U	6900 U	370 U	46 J	410 U	760 U
Fluoranthene	390 U	360 U	22000	370 U	51 J	410 U	760 U
Pyrene	200 J	100 J	12000	130 J	48 J	200 J	370 J
3,3'-Dichlorobenzidine	790 U	720 U	14000 U	740 U	860 U	830 U	1500
Benzo(a)anthracene	130 J	360 U	9700	120 J	430 U	200 J	210 J
Chrysene	180 J	360 U	9000	370 U	430 U	410 U	270 J
bis(2-Ethylhexyl)phthalate	990	1000	6900 U	540	400 J	660	1600
Benzo(b)fluoranthene	390 U	360 U	6900 U	370 U	430 U	160 J	760 U
Benzo(k)fluoranthene	390 U	360 U	6900 U	370 U	430 U	150 J	760 U
Benzo(a)pyrene	390 U	360 U	2800 J	370 U	430 U	120 J	760 U
Acetone	260 B	93 B	690 B	580 B	350 B	11000 B	1600 B
Carbon Disulfide	30 U	27 U	53 U	26	32 U	780 U	57 U
Chloroform	30 U	27 U	15 J	28 U	32 U	780 U	57 U
1,2-Dichloroethane	30 U	27 U	53 U	28 U	32 U	780 U	57 U
2-Butanone	47 JB	45 B	79 B	56 U	65 U	1600 U	56 JB
Benzene	30 U	4 J	53 U	200	32 U	780 U	57 U
Toluene	30 U	18 J	53 U	82	32 U	780 U	57 U
Ethylbenzene	30 U	27 U	53 U	40	32 U	780 U	57 U
Xylene(total)	30 U	59 U	53 U	190	32 U	780 U	57 U
PCB *	7000	900 U	2300	9500	280	89000	39000

NOTES: All concentrations in ug/kg (ppb), dry weight.
Samples collected 6/17/88 - 6/19/88.
Analyses by OBG Labs, Inc.
U - Compound analyzed but not detected
J - Indicates an estimated value.
B - Compound detected in blank.
* - The predominant aroclor is 1248.

TABLE 6

INORGANIC ANALYSES - SUB-SURFACE SOILS
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	Boring A 10'-12'	Boring B 4'-6'	Boring C 2-4'	Boring D 14'-16'	Boring E 8'-10'	Boring F 6'-8'	Boring G 14'-16'
Aluminum	9890	1800	11900	6280	3760	2400	6030
Arsenic	7.05	3.17	43.7	8.32	2.08	4.64	9.84
Barium	45	(21.9	120	1.5	(26	42.2	58.3
Beryllium	0.598	(0.547	2.05	0.615	(0.65	(0.627	(1.14
Cadmium	4.53	(0.547	2.03	2.18	(0.65	(0.627	6.27
Calcium	11100	2090	56600	26800	1430	13100	14600
Chromium	86.3	8.8	67.5	71.7	7.22	155	92.2
Copper	74.1	23	235	52.6	12.6	73.6	91.6
Iron	34300	8150	197000	33400	6610	40100	46100
Lead	103	23.1	651	103	15.3	26.6	265
Manganese	1340	117	4620	1770	118	1700	2080
Magnesium	1290	830	8850	1140	(650	3050	1630
Mercury	(0.12	(0.109	0.637	(0.113	0.535	(0.126	(0.229
Nickel	27	9.95	62.8	25.8	6.88	28.7	34.3
Silver	2.21	(1.09	9.58	2.67	(1.3	(1.25	2.35
Vanadium	12.5	(5.47	48.2	11.3	(6.5	22.8	(11.4
Zinc	640	30.8	2950	518	29	124	1270
Cyanide	(0.119	(0.109	36.5	0.247	(0.13	(1.125	0.24

NOTES: All concentrations in mg/kg, dry weight.
Samples collected 5/17/88 - 5/19/88.
Analyzed by OBG Labs, Inc.

TABLE 7

ORGANIC ANALYSES - SURFACE WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS A STANDARDS	Surface Water 1		Surface Water 2		Surface Water 3		Surface Water 4		Surface Water 5		Surface Water 6		Surface Water 7	
		7/18/88	12/11/88	7/18/88	12/11/88	7/18/88	3/3/89	7/18/88	12/11/88	7/18/88	12/11/88	7/18/88	12/11/88	7/18/88	12/11/88
Phenol	1 H	11 U	10 U	11 U	10 U	11 U	13 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	12000 D
2-Chlorophenol	---	11 U	10 U	11 U	10 U	11 U	13 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	16
Benzyl alcohol	---	11 U	10 U	7 J	10 U	11 U	13 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
4-Methylphenol	---	11 U	10 U	11 U	10 U	11 U	13 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	10
2-Nitrophenol	---	11 U	10 U	11 U	10 U	11 U	13 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	32 T
2,4-Dichlorophenol	---	11 U	10 U	11 U	10 U	11 U	13 U	11 U	10 U	11 U	10 U	11 U	10 U	6 J	10 U
4-Chlorophenol	---	11 U	9.52 U	11 U	10 U	11 U	13 U	11 U	9.52 U	11 U	9.52 U	11 U	9.52 U	11 U	250
4-Nitrophenol	---	53 U	48 U	53 U	48 U	56 U	67 U	53 U	48 U	53 U	48 U	53 U	48 U	53 U	25 J
Diethylphthalate	50 * H	11 U	10 U	11 U	10 U	1 J	13 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
bis(2-Ethylhexyl)phthalate	4 * H	11 U	10 U	27	10 U	24	13 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Methylene Chloride	50 * H	5 U	8.5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	---	4 J	10 U	5 J	10 U	10 U	10 U	7 J	10 U	10 U	10 U	10 U	10 U	6 B	10 U
1,2-Dichloroethene(total)	---	5 U	5 U	5 U	15	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chloroform	0.2 H	2 J	9.8	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 J	5 U	5 U
Bromodichloromethane	50 * H	1 J	3.3 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U

NOTES: All concentrations in ug/l (ppb).
7/18/88 samples analyzed by OBG Labs, Inc.
12/11/88 & 3/3/89 samples analyzed by Versar Inc.
U - Indicates compound analyzed but not detected.
J - Indicates an estimated value.
T - The mass spectrum does not meet EPA CLP criteria for confirmation, but compound presence is strongly suspected.
D - Value from target analyte was calculated from a dilution.
H - Human based.
* - Guidance value.

TABLE 8

INORGANIC ANALYSES - SURFACE WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS A STANDARDS	Surface Water 1		Surface Water 2		Surface Water 3		Surface Water 4		Surface Water 5		Surface Water 6		Surface Water 7	
		7/18/88	12/11/88	7/18/88	12/11/88	7/18/88	3/3/89	7/18/88	12/11/88	7/18/88	12/11/88	7/18/88	12/11/88	7/18/88	12/11/88
Aluminum	---	683	2700	28400	[153]	33800	453	951	[178]	1390	[98]	709	[63]	1170	4320
Arsenic	50 H	(10	10 U	25.3	49	24.2	[6.8]	(10	10 U	(10	10 U	(10	10 U	41.6	26
Barium	1,000 H	(200	[47]	251	[36]	232	[38]	(200	[47]	(200	[49]	288	[58]	(200	[70]
Calcium	---	46700	64600	47200	388000	40100	115000	124000	132000	126000	131000	133000	130000	179000	420000
Chromium	50 H	9	[8.6]	39	4 U	45	[5.9]	13	4 U	14	4 U	20	4 U	18	13
Cobalt	---	(50	5 U	(50	[46]	(50	[7.1]	(50	5 U	(50	5 U	(50	5 U	(50	[6.7]
Copper	200 H	36	[11]	79	[5.3]	67	6 U	39	4 U	(25	4 U	26	4 U	38	[18]
Iron	300 H	1220	3920	35300	2940	40700	586	1620	236	2350	252	895	422	1660	6210
Lead	50 H	9.7	12	68.5	14	124	59 N	6.5	5 UN	8.7	5 UN	8.3	5 UN	12.7	29
Manganese	300 H	213	186	444	2200	414	318	172	187	213	232	318	350	152	797
Magnesium	35,000 H	9290	15300	17200	204000	17600	46700	18000	18300	18300	18200	18500	19700	18600	42500
Nickel	---	(40	9 U	44	97	47	[16]	(40	9 U	(40	9 U	(40	9 U	(40	9 U
Potassium	---	(5000	[2670]	13300	557000	14900	66400	23000	27100	22600	27200	16700	18900	95400	267000
Silver	50 H	(10	4 U	(10	4 U	(10	3 U	(10	4 U	(10	4 U	(10	4 U	(10	4 U
Sodium	---	13900	17400	17000	449000	12400	87200	59500	119000	59600	120000	66200	154000	126000	338000
Vanadium	---	(50	[5.7]	53	[30]	67	[7.6]	(50	[7.3]	(50	[6.7]	(50	[6]	(50	[40]
Zinc	300 H	29	40	231	81	184	22	35	[14]	38	[13]	75	30	30	107

NOTES:

All concentrations in ug/l (ppb)
7/18/88 samples analyzed by OBG Labs, Inc.
12/11/88 & 3/3/89 samples analyzed by Versar Inc.
U - Compound analyzed but not detected.
[ ] - Greater than or equal to instruments detection limit, but less than required detection limit.
N - Associated spike recovery outside control limits.
H - Human based.

TABLE 9

ORGANIC ANALYSES - SEDIMENT
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	SED 1 12/11/88	SED 2 12/11/88	SED 3 3/3/89	SED 4 12/11/88	SED 5 12/11/88	SED 6 12/11/88	SED 7 12/11/88
Di-n-butylphthalate	670 U	420 U	170 J	520 U	650 U	450 U	490 U
bis(2-Ethylhexyl)phthalate	670 U	420 U	50 J	520 U	650 U	450 U	490 U
Methylene Chloride	6 J	6 U	8 U	8 U	10 U	7 U	7 U
Acetone	21 U	13 U	17 U	9 J	20 U	14 U	15 U
Aroclor-1254	540 U	340 U	440 U	420 U	1000	360 U	400 U
Aroclor-1260	540 U	340 U	440 U	420 U	150 J	360 U	400 U

NOTES: All concentrations in ug/kg, dry weight.
Analyzed by Versar Inc.
U - compound analyzed but not detected.
J - Indicates an estimated value.

TABLE 10

INORGANIC ANALYSES - SEDIMENT
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	SED 1 12/11/88	SED 2 12/11/88	SED 3 3/25/89	SED 4 12/11/88	SED 5 12/11/88	SED 6 12/11/88	SED 7 12/11/88
Aluminum	15600	8210	17900	10600	11500	10100	20900
Antimony	21	16 N	[17] N	22 N	12 N	[14] N	36 N
Arsenic	17	41	11	7.7	12	9.2	77
Barium	138	125	100	151	95	193	388
Beryllium	1.8	[1.3]	[.53]	[1.1]	[0.94]	[0.72]	3.3
Cadmium	1.5 U	1 U	2.2	2.2	2.3	0.99 U	2.1 U
Calcium	53900	48900	46900	66900	56900	67000	72600
Chromium	34	27	25	34	44	158	= 49
Cobalt	[12]	[12]	[11]	[8.1]	[9.4]	[9.7]	[24]
Copper	44	38	24	31	41	28	53
Iron	32100	25300	28400	23800	27400	20800	45100
Lead	108	41	15 N	121	109	71	60
Manganese	796	689	496	934	907	5750	758
Magnesium	14400	12100	13200	9360	12600	11700	18200
Mercury	0.18 U	0.13 U	0.17 U	0.15 U	0.19 U	0.12 U	0.26 U
Nickel	32	28	30	20	26	20	47
Potassium	2020	1550	4910	1730	2030	1600	3460
Selenium	1.8 U	1.3 U	17 UN	1.5 U	1.9 U	1.2 U	2.6 U
Silver	1.5 U	1 U	1 U	1.2 U	1.6 U	0.99 U	2.1 U
Sodium	[457]	[375]	[345]	[315]	[342]	[233]	[835]
Thallium	3.7 UN	2.6 UN	3.3 UN	3 UN	3.9 UN	2.5 UN	5.2 UN
Vanadium	33	34	34	34	33	72	73
Zinc	176	88	89	673	3970	118	143
Cyanide	(0.92	(0.65	0.82	(0.73	(0.95	(0.62	(1.28

NOTES: All concentrations in mg/kg (ppm). Dry weight.
Analyzed by Versar Inc.
U - Compound analyzed but not detected.
[ ] - Greater than or equal to instrument detection limit, but less than required limit.
N - Associated spike recovery outside control limits.

TABLE 11

VOLATILE ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARD	1 I		1 D		2 S		2 I		3 S		3 I		4 S		4 I		4 D	
		6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88
Vinyl Chloride	5.0	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	50.0*	5 U	3 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	—	10 U	10 U	5 JB	10 U	7 J	10 U	10 U	10 U	20	10 U	10 U	10 U	10 U	25	10 U	10 U	10 U	10 U
Carbon Disulfide	—	5 U	5 U	5 U	110	5 U	5 U	5 U	40	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	9
1,1-Dichloroethane	50.0*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	7	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethene(total)	—	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Butanone	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10	10	10 U	10 U	10 U	10 U
Trichloroethene	10.0	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Benzene	ND	5 U	5 U	5 U	5 U	1 J	5 U	5 U	5 U	1 J	5 U	1 J	5 U	2 J	5 U	5 U	5 U	5 U	5 U
Bromoform	50.0*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone	—	10 U	10 U	10 U	10 U	5 J	3 J	10 U	10 U	10 U	10 U	10 U	10 U	50	45	10 U	10 U	10 U	10 U
Tetrachloroethene	0.7*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Toluene	50.0*	5 U	5 U	5 U	5 U	2 J	5 U	5 U	5 U	5 U	5 U	1 J	5 U	1 J	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	50.0*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Styrene	331*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Xylene(total)	50.0*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	7	5 U	5 U	5 U	5 U	5 U

NOTES: All concentrations in ug/l.
6/27/88 samples analyzed by OBG Labs, Inc. & 11/28/88 analyzed by Versar Inc.
U - Compound analyzed but not detected.
J - Indicates an estimated value.
B - Compound was also found in blank.
T - The mass spectrum does not meet EPA CLP criteria for confirmation, but compound presence is strongly suspected.
* - Guidance standard.
ND - Not detectable.

TABLE II

VOLATILE ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARD	5 S		5 I		5 D		6 S		6 I		6 D		7 S		7 I		7 D	
		6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/8	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88
Vinyl Chloride	5.0	22	4 J	10 U	10 U	10 U	10 U	10 U	10 U	50 U	50 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	50 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	50.0*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	—	11	9	10 U	10 U	10 U	10 U	30	4 J	50 U	50 U	10 U	10 U	7 J	10 U	14	10 U	2 J	10 U
Carbon Disulfide	—	5 U	5 U	5 U	4 J	5 U	10	5 U	5 U	25 U	25 U	5 U	2 J	5 U	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethane	50.0*	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	25 U	5 U	5 U	10	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethene(total)	—	167	90	1 J	5 U	5 U	5 U	5 U	5 U	25 U	25 U	5 U	5 U	1 J	5 U	5 U	5 U	5 U	5 U
2-Butanone	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	50 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10.0	14	11	5 U	5 U	5 U	5 U	5 U	5 U	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Benzene	ND	1 J	5 U	5 U	5 U	5 U	5 U	3 J	5 U	260	350	5 U	5 U	1 J	5 U	5 U	5 U	5 U	5 U
Bromoform	50.0*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	1 U	5 U
4-Methyl-2-Pentanone	—	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	50 U	10 U	10 U	8 J	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	0.7*	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Toluene	50.0*	1 J	5 U	5 U	5 U	5 U	5 U	1 J	5 U	110	140	5 U	5 U	2 J	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	50.0*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	63	76	5 U	5 U	1 J	5 U	5 U	5 U	5 U	5 U
Styrene	331*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	26	36 T	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Xylene(total)	50.0*	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	120	170	5 U	5 U	3 J	5 U	5 U	5 U	5 U	5 U

NOTES: All concentrations in ug/l.
6/27/88 samples analyzed by CBG Labs, Inc. & 11/28/88 analyzed by Versar Inc.
U - Compound analyzed but not detected.
J - Indicates an estimated value.
B - Compound was also found in blank.
T - The mass spectrum does not meet EPA CLP criteria for confirmation, but compound presence is strongly suspected.
* - Guidance standard.
ND - Not detectable.

TABLE 11

VOLATILE ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARD	8 S		8 I		9 S		9 I		10 S		10 I		11 S		11 I		X 12		X 13	
		6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88
Vinyl Chloride	5.0	1 J	10 U	10 U	10 U	124	23	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	—	3 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	50.0*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	3 J	5 U	5 U	5 U	5 U
Acetone	—	10 U	10 U	10 U	10 U	10 U	15	5 U	10 U	10 U	10 U	5 U	10 U	17	10 U	6 J	10 U	32	14	39	12
Carbon Disulfide	—	5 U	5 U	5 U	52	5 U	7	5 U	19	5 U	5 U	5 U	18	5 U	5 U	5 U	3 J	3 J	5 U	5 U	5 U
1,1-Dichloroethane	50.0*	15	12	5 U	5 U	4 J	5 U	5 U	5 U	4 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2 J	5 U	8	7
1,2-Dichloroethene(total)	—	8	7	2 J	5 U	39	16	5 U	5 U	2 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Butanone	—	5 J	10 U	10 U	10 U	10 U	6 JT	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	12	10 U
Trichloroethene	10.0	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Benzene	ND	2 J	5 U	5 U	5 U	1 J	5 U	5 U	5 U	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1 J	5 U
Bromoform	50.0*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone	—	10 U	10 U	10 U	10 U	16	10 U	10 U	10 U	7 J	9 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9 J	5 J
Tetrachloroethene	0.7*	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Toluene	50.0*	12	12	1 J	5 U	2 J	5 U	5 U	5 U	4 J	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	8	3 J
Ethylbenzene	50.0*	23	22	1 J	5 U	2 J	5 U	5 U	5 U	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	3 J	5 U
Styrene	331*	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Xylene(total)	50.0*	100	110	4 J	5 U	9	5 U	5 U	5 U	5	7 T	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	18	8 T

NOTES: All concentrations in ug/l.
6/27/88 samples analyzed by OBG Labs, Inc. & 11/28/88 analyzed by Versar Inc.
U - Compound analyzed but not detected.
J - Indicates an estimated value.
B - Compound was also found in blank.
T - The mass spectrum does not meet EPA CLP criteria for confirmation, but compound presence is strongly suspected.
* - Guidance standard.
ND - Not detectable.

TABLE 12

SEMI-VOLATILE ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARDS	1 I		1 D		2 S		2 I		3 S		3 I		4 S		4 I		4 D		5 S	
		6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88
	1	11 U	5 U	11 U	5 U	1 J	5 U	11 U	5 U	31	9 U	11 U	9 U	360	880 D	11 U	5 U	11 U	5 U	22	140
lphenol	—	11 U	5 U	11 U	5 U	26	5 U	11 U	5 U	11 U	9 U	11 U	9 U	69	260 D	11 U	5 U	11 U	5 U	11 U	9 U
iphenol	—	11 U	5 U	11 U	5 U	110	5 U	11 U	5 U	11 U	9 U	11 U	9 U	360	1200 D	11 U	5 U	11 U	5 U	36	38
ethylphenol	—	11 U	5 U	11 U	5 U	120	32	11 U	5 U	11 U	9 U	11 U	9 U	100	430 D	11 U	5 U	11 U	5 U	11 U	9 U
acid	—	53 U	25 U	53 U	25 U	53 U	25 U	53 U	25 U	53 U	47 U	53 U	47 U	260 U	25 U	53 U	25 U	53 U	25 U	54 U	47 U
lene	10*	11 U	5 U	11 U	5 U	1 J	5 U	11 U	5 U	4 J	9 U	3 J	9 U	53 U	5 U	11 U	5 U	11 U	5 U	5 J	9 U
oaniline	—	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U
lnaphthalene	—	11 U	5 U	11 U	5 U	1 J	5 U	11 U	5 U	5 J	9 U	3 J	9 U	53 U	5 U	11 U	5 U	11 U	5 U	2 J	9 U
richlorophenol	—	53 U	25 U	53 U	25 U	1 J	25 U	53 U	25 U	53 U	47 U	53 U	47 U	53 U	19 T	53 U	25 U	53 U	25 U	54 U	47 U
phthalate	50*	1 J	5 U	1 J	5 U	53 U	5 U	11 U	5 U	11 U	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U
hrene	50*	11 U	5 U	11 U	5 U	1 J	5 U	11 U	5 U	4 J	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	3 J	9 U
ene	50*	11 U	5 U	11 U	5 U	2 J	5 U	11 U	5 U	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U
tylphthalate	770*	3 J	5 U	2 J	5 U	1 J	5 U	11 U	5 U	2 J	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U
thene	50*	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	5 J	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	4 J	9 U
	50*	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	2 J	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	2 J	9 U
thylhexyl)phthalate	4200*	3 JB	7 B	15 B	4 JB	29 JB	4 J	25 B	7 B	84 B	11 U	28 B	11	55 B	17 B	17 B	10 B	11 B	13 B	11 U	9 U
lfluoranthene	0.002*	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	11 U	20
lfluoranthene	0.002*	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	11 U	22
)pyrene	ND	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	11 U	15
e	0.002*	11 U	5 U	11 U	5 U	2 J	5 U	11 U	5 U	11 U	9 U	11 U	9 U	110 U	5 U	11 U	5 U	11 U	5 U	11 U	16
lanthracene	0.002*	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	11 U	16
furan	—	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U	11 U	9 U	260 U	5 U	11 U	5 U	11 U	5 U	1 J	9 U
	50*	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U
thene	20*	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U	11 U	9 U	260 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U
xylphthalate	50*	1 U	5 U	1 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U	11 U	9 U	53 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U
chlorobenzidine	—	21 U	10 U	21 U	10 U	21 U	10 U	21 U	10 U	21 U	19 U	21 U	19 U	53 U	10 U	21 U	10 U	21 U	10 U	22 U	19 U
thylene	20*	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	9 U

All concentrations in ug/l (ppb).
6/27/88 samples analyzed by CBG Labs, Inc. & 11/28/88 analyzed by Versar Inc.
U - Indicates compound analyzed but not detected.
J - Indicates an estimated value.
B - Indicates compound was also found in blank.
D - Value from target analyte was calculated from a dilution.
* - Guidance value.
ND - Not Detectable.

TABLE 12

SEMI-VOLATILE ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARDS	5 I		5 D		6 S		6 I		6 D		7 S		7 I		7 D		8 S		8 I	
		6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88
Phenol	1	11 U	9 U	11 U	9 U	18	43	11 U	17	11 U	9 U	9 J	5 U	11 U	5 U	11 U	5 U	520	1200 D	11 U	5 U
2-Methylphenol		11 U	9 U	11 U	9 U	11 U	9 U	11 U	9 U	11 U	9 U	47	5 U	11 U	5 U	11 U	5 U	140	150 B	11 U	5 U
4-Methylphenol		11 U	9 U	11 U	9 U	31	9 U	11 U	9 U	11 U	9 U	130	5 U	11 U	5 U	11 U	5 U	530	630 B	11 U	5 U
2,4,6-Trichlorophenol	--	11 U	9 U	11 U	9 U	26	14	15	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	550	500 B	5 J	5 U
Benzoic acid	--	53 U	47 U	53 U	47 U	53 U	47 U	53 U	68	53 U	47 U	54 U	25 U	53 U	25 U	53 U	25 U	53 U	25 U	53 U	25 U
Naphthalene	10*	11 U	9 U	11 U	9 U	7 J	23	35	9 U	11 U	9 U	2 J	5 U	11 U	5 U	11 U	5 U	6 J	5 U	3 J	5 U
4-Chloroaniline	--	11 U	9 U	11 U	9 U	11 U	9 U	11 U	120	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
2-Methylnaphthalene	--	11 U	9 U	11 U	9 U	3 J	9 U	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	1 J	5 U
2,4,5-Trichlorophenol	--	53 U	47 U	53 U	47 U	53 U	47 U	53 U	47 U	53 U	47 U	54 U	25 U	53 U	25 U	53 U	25 U	53 U	25 U	53 U	25 U
Diethylphthalate	50*	11 U	9 U	11 U	9 U	11 U	9 U	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Phenanthrene	50*	11 U	9 U	11 U	9 U	14	58	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	10	5 U	11 U	5 U
Anthracene	50*	11 U	9 U	11 U	9 U	3 J	25	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Di-n-butylphthalate	770*	11 U	9 U	11 U	9 U	11 U	9 U	11 U	9 U	3 JB	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Fluoranthene	50*	11 U	9 U	11 U	9 U	21	9 U	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Pyrene	50*	11 U	9 U	11 U	9 U	11 U	9 U	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
bis(2-Ethylhexyl)phthalate	4200*	30 B	9 U	31 B	9 U	11 U	9 U	32 B	9 U	20 B	9 U	27 B	13 B	25 B	9 B	20 B	7 B	30 B	14 B	36 B	1 B
Benzo(b)fluoranthene	0.002*	11 U	9 U	11 U	9 U	11 U	84	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Benzo(k)fluoranthene	0.002*	11 U	9 U	11 U	9 U	11 U	90	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Benzo(a)pyrene	ND	11 U	9 U	11 U	9 U	11 U	63	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Chrysene	0.002*	11 U	9 U	11 U	9 U	11 U	72	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Benzo(a)anthracene	0.002*	11 U	9 U	11 U	9 U	11 U	76	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Dibenzofuran	--	11 U	9 U	11 U	9 U	2 J	9 U	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Fluorene	50*	11 U	9 U	11 U	9 U	10 J	31	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Acenaphthene	20*	11 U	9 U	11 U	9 U	11 U	19	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
Butylbenzylphthalate	50*	11 U	9 U	11 U	9 U	11 U	9 U	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U
3,3'-Dichlorobenzidine	--	21 U	19 U	21 U	19 U	21 U	19 U	21 U	19 U	21 U	19 U	22	10 U	21 U	10 U	21 U	10 U	21 U	10 U	21 U	10 U
Acenaphthylene	20*	11 U	9 U	11 U	9 U	2 J	9 U	11 U	9 U	11 U	9 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U	11 U	5 U

NOTES: All concentrations in ug/l (ppb).
6/27/88 samples analyzed by OBG Labs, Inc. & 11/28/88 analyzed by Versar Inc.
U - Indicates compound analyzed but not detected.
J - Indicates an estimated value.
B - Indicates compound was also found in blank.
D - Value from target analyte was calculated from a dilution.
* - Guidance value.

TABLE 12

SEMI-VOLATILE ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARDS	9 S		9 I		10 S		10 I		11 S		11 I		12		13	
		6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88	6/27/88	11/28/88
Phenol	1	11 U	10 U	11 U	9 U	8 J	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	30	510	190
2-Methylphenol	—	11 U	10 U	11 U	9 U	22	21	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	390	110
4-Methylphenol	—	11 U	56	11 U	9 U	170	230	11 U	10 U	6 J	10 U	11 U	9 U	9 J	10 U	1600	390 D
2,4-Dimethylphenol	—	11 U	10 U	11 U	9 U	100	170	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	510	160
Benzoic acid	—	53 U	50 U	53 U	47 U	53 U	49 U	53 U	49 U	53 U	50 U	53 U	47 U	53 U	50 U	53 U	47 U
Naphthalene	10*	33	20	11 U	9 U	8 J	10 U	11 U	10 U	8 J	10 U	11 U	9 U	11 U	10 U	38	9 U
4-Chloroaniline	—	11 U	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
2-Methylnaphthalene	—	23	9 J	11 U	9 U	2 J	10 U	11 U	10 U	9 J	10 U	11 U	9 U	11 U	10 U	19	9 U
2,4,5-Trichlorophenol	—	53 U	50 U	53 U	47 U	53 U	49 U	53 U	49 U	53 U	50 U	53 U	47 U	53 U	50 U	53 U	47 U
Diethylphthalate	50*	11 U	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Phenanthrene	50*	13	10 U	11 U	9 U	11 U	10 U	11 U	10 U	6 J	10 U	11 U	9 U	11 U	50 U	11 U	22
Anthracene	50*	11 U	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Di-n-butylphthalate	770*	11 U	10 U	2 JB	9 U	11 U	10 U	2 JB	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Fluoranthene	50*	5 J	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Pyrene	50*	11 U	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
bis(2-Ethylhexyl)phthalate	4200*	55	10 U	39 B	19 U	39 B	7 J	20 B	5 J	120 B	13	21 B	13	26	10 U	11 U	16
Benzo(b)fluoranthene	0.002*	11 U	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Benzo(k)fluoranthene	0.002*	11 U	10 U	11 U	9 J	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Benzo(a)pyrene	ND	11 U	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Chrysene	0.002*	11 U	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Benzo(a)anthracene	0.002*	11 U	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Dibenzofuran	—	4 J	10 U	11 U	9 U	11 U	10 U	11 U	10 U	2 J	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Fluorene	50*	9 J	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Acenaphthene	20*	17	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
Butylbenzylphthalate	50*	11 U	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U
3,3'-Dichlorobenzidine	—	11 U	20 U	11 U	9 U	21 U	20 U	21 U	20 U	21 U	20 U	21 U	19 U	21 U	20 U	21 U	19 U
Acenaphthylene	20*	11 U	10 U	11 U	9 U	11 U	10 U	11 U	10 U	11 U	10 U	11 U	9 U	11 U	10 U	11 U	9 U

NOTES: All concentrations in ug/l (ppb).
6/27/88 samples analyzed by OBG Labs, Inc. & 11/28/88 analyzed by Versar Inc.
U - Indicates compound analyzed but not detected.
J - Indicates an estimated value.
B - Indicates compound was also found in blank.
D - Value from target analyte was calculated from a dilution.
* - Guidance value.
ND - Not Detectable.

TABLE 13

PESTICIDE/PCB ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARDS	1 I		1 D		2 S		2 I		3 S		3 I		4 S		4 I		4 D		5 S	
		6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88
Dieldrin	ND	0.10 U	0.09 U	0.10 U	0.09 U	0.10 U	0.20 U	0.10 U	0.09 U	0.50 U	0.09 U	0.10 U	0.09 U	0.50 U	0.10 U	0.10 U	0.09 U	0.10 U	0.09 U	0.50 U	0.10
Aroclor-1242	0.1	0.05 U	0.47 U	0.05 U	0.47 U	*	1.80	*	0.47 U	*	2.3	*	1.8	*	2.90 U	0.50 U	0.47 U	*	0.47 U	*	18.00
Aroclor-1248	0.1	0.05 U	0.47 U	0.05 U	0.47 U	6.5*	1.00 U	4.0*	0.47 U	11.0*	0.47 U	1.1*	0.47 U	14.0*	0.51 U	0.50 U	0.47 U	0.91*	0.47 U	8.5*	0.50
Aroclor-1260	0.1	1.00 U	0.94 U	1.00 U	0.94 U	*	2.00 U	*	0.94 U	*	0.93 U	*	0.93 U	*	1.00 U	1.00 U	0.93 U	*	0.93 U	*	1.00

NOTES:
All concentrations in mg/l.
6/27/88 samples analyzed by O86 Labs, Inc. & 12/11/88 analyzed by Versar, Inc.
U - Compound was analyzed but not detected.
I - Inflated - Sample results suspect; Value is inflated due to early complexity - use with caution.
* - The predominate aroclor is 1248.
ND - Not detectable.

TABLE 13

PESTICIDE/PCB ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARDS	5 I		5 D		6 S		6 I		6 D		7 S		7 I		7 D		8 S		8 I	
		6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88
eldrin	ND	0.10 U	0.09 U	0.10 U	0.94 U	1.0 U	0.09 U	0.10U	0.09 U	0.10 U	0.09 U	0.10 U	0.09 U	0.10 U	0.10 U	0.10U	0.09 U	1.0 U	0.20	0.10 U	0.10 U
oclor-1242	0.1	0.50 U	0.47 U	0.50 U	4.7 U	*	0.47 U	0.50U	0.47 U	*	0.47 U	0.50 U	0.47 U	*	0.49 U	0.50U	0.47 U	*	6.4	*	0.50 U
oclor-1248	0.1	0.50 U	0.47 U	0.50 U	4.7 U	24.0*	0.47 U	0.50U	0.47 U	0.91*	0.47 U	0.50 U	0.47 U	0.5*	0.49 U	0.50U	0.47 U	28.0*	0.47 U	3.80*	0.50 U
oclor-1260	0.1	1.0 U	0.94 U	1.0 U	9.4 U	*	0.94 U	1.0 U	0.94 U	*	0.94 U	1.0 U	0.93 U	*	0.98 U	1.0 U	0.93 U	*	0.93 U	*	1.00 U

NOTES: All concentrations in ug/l.
6/27/88 samples analyzed by OBG Labs, Inc. & 12/11/88 analyzed by Versar, Inc.
U - Compound was analyzed but not detected.
I - Inflated - Sample results suspect; Value is inflated due to early complexity - use with caution.
* - The predominate aroclor is 1248.
ND - Not detectable.

TABLE 13

PESTICIDE/PCB ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARDS	9 S		9 I		10 S		10 I		11 S		11 I		12		13	
		6/27/88	12/11/88	6-7/88	11-12/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88	6/27/88	12/11/88
Dieldrin	ND	0.50 U	0.10 U	0.10 U	0.10 U	0.10 U	0.09 U	0.10 U	0.10 U	2.0 U	0.09 U	0.5 U	0.09 U	0.10 U	0.09 U	50.0 U	0.47 U
Aroclor-1242	0.1	*	20.00 I	*	0.49 U	*	0.47 U	0.50 U	0.50 U	*	23.00 I	*	1.10	0.50 U	0.47 U	*	15.00
Aroclor-1248	0.1	69.0*	0.52 U	0.10*	0.49 U	1.0*	0.47 U	0.50 U	0.50 U	65.0*	0.47 U	15.0*	0.47 U	0.50 U	0.47 U	180.0*	2.4 U
Aroclor-1260	0.1	*	1.00 U	*	0.98 U	*	0.93 U	1.00 U	1.00 U	*	0.93 U	*	0.93 U	1.0 U	0.94 U	*	9.9

NOTES: All concentrations in ug/l.
6/27/88 samples analyzed by OBG Labs, Inc. & 12/11/88 analyzed by Versar, Inc.
U - Compound was analyzed but not detected.
I - Inflated - Sample results suspect; Value is inflated due to early complexity - use with caution.
* - The predominate aroclor is 1248.
ND - Not detectable.

TABLE 14

INORGANIC ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARDS	1 I 6/27/88	1 I 11/28/88	1 D 6/27/88	1 D 11/28/88	2 S 6/27/88	2 S 11/28/88	2 I 6/27/88	2 I 11/28/88	3 S 6/27/88	3 S 11/28/88	3 I 6/27/88	3 I 11/28/88	4 S 6/27/88	4 S 11/28/88	4 I 6/27/88	4 I 11/28/88	4 D 6/27/88	4 D 11/28/88	5 S 6/27/88	5 S 11/28/88	5 I 6/27/88	5 I 11/28/88
Aluminum		57800	9420	3530	11300	33900	4610	67000	76000	123000	36400	2240	11200	183000	46200	66000	17000	64900	90200	46200	37900	3770	3580
filtered	—	(200)	20 U	226	20 U	358	(156)	(200)	(52)	504	(121)	719	504	487	892	(200)	20 U	(200)	20 U	514	313	284	20 U
Antimony		(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U
filtered	3*	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U	(60)	29 U
Arsenic		49	11	(10)	10 U	27.7	19	167	162	126	28	(10)	10	73.5	16	50.7	18	34.5	48	11.6	15	(10)	10 U
filtered	25	(10)	10 U	(10)	10 U	(10)	10 U	29.4	48	(10)	10 U	(10)	10 U	(10)	10 U	(10)	10 U	(10)	10 U	(10)	10 U	(10)	10 U
Barium		747	306	(200)	413	318	(135)	354	493	1180	415	(200)	(141)	1160	285	642	297	628	865	1200	1130	(200)	(133)
filtered	1000	244	206	(200)	360	(200)	(37)	(200)	(134)	(200)	(65)	(200)	(60)	(200)	(23)	231	277	231	304	(200)	218	(200)	(106)
Beryllium		6	1 U	(5)	1 U	(5)	1 U	6	5.1	7	(1.6)	(5)	1 U	13	(2.7)	6	1 U	6	(4.4)	5	(2.4)	(5)	1 U
filtered	*	5	1 U	(5)	1 U	(5)	1 U	(5)	1 U	(5)	1 U	(5)	1 U	(5)	1 U	(5)	1 U	(5)	1 U	(5)	1 U	(5)	1 U
Cadmium		(5)	4 U	(5)	4 U	11	4 U	(5)	4 U	12	12	(5)	4 U	225	48	8	4 U	7	4 U	21	4 U	(5)	4 U
filtered	10	(5)	4 U	(5)	4 U	(5)	4 U	(5)	4 U	(5)	4 U	(5)	4 U	(5)	4 U	(5)	4 U	(5)	4 U	(5)	4 U	(5)	4 U
Calcium		630000	275000	372000	330000	37400	19100	188000	286000	327000	133000	45700	104000	273000	55100	405000	295000	387000	481000	382000	364000	205000	243000
filtered	—	175000	198000	346000	326000	13400	10000	84500	151000	40300	66500	40200	80300	13100	8020	230000	267000	141000	180000	108000	172000	175000	217000
Chromium		238	76	69	50	135	13	228	178	1160	357	25	132	620	125	263	86	152	152	1090	960	35	31
filtered	—	12	4 U	21	4 U	110	(4.6)	(10)	4 U	(10)	(5.4)	(10)	4 U	(10)	(6.9)	17	(5.1)	17	4 U	(10)	4 U	12	4 U
Cobalt		50	(9.8)	(50)	(7.8)	(50)	6 U	50	98	72	(33)	(50)	(12)	103	(31)	67	(20)	74	77	(50)	(36)	(50)	6 U
filtered	—	(50)	5 U	(50)	5 U	(50)	5 U	(50)	5 U	(50)	5 U	(50)	5 U	(50)	5 U	(50)	5 U	(50)	5 U	(50)	5 U	(50)	5 U
Copper		194	34	26	31	238	32	249	230	575	167	(25)	50	818	171	218	44	188	189	664	985	27	(4.2)
filtered	1000	(25)	4 U	(25)	4 U	(25)	(9.4)	(25)	(4.7)	(25)	4 U	(25)	4 U	(25)	(5.4)	(25)	4 U	(25)	4 U	(25)	4 U	(25)	4 U
Iron		123000	21900	8080	16900	123000	13900	284000	184000	268000	76600	5170	29400	450000	90000	863000	85800	142000	138000	424000	332000	22500	25900
filtered	300	1410	3090	599	183	721	566	12400	21600	344	(35)	504	195	943	3100	20400	31400	4930	12000	215	(163)	10700	18400
Lead		136	23	12.7	17	490	55	212	236	(5)	538	5.6	116	11.5	925	235	47	172	117	(5)	1270	17.4	6.9
filtered	25	(5)	5 U	(5)	5 U	18	10	(5)	5 U	(5)	5 U	(5)	5 U	7.6	14	7.5	5 U	6.7	5 U	(5)	5 U	(5)	5 U
Manganese		2580	629	244	437	2360	394	4030	5700	25500	8000	270	1510	22400	4260	4390	1590	2460	3130	21600	19400	1000	1260
filtered	300	179	203	108	98	69	39	386	763	(15)	(2.4)	(15)	(7.4)	16	32	717	839	184	278	(15)	(21)	695	1100
Magnesium		140000	76800	113000	97500	15300	6370	62200	86800	80800	25200	15000	8410	103000	20600	125000	97100	136000	164000	72400	62500	30300	34600
filtered	35000*	52700	48000	108000	118000	3240	(3300)	18400	33200	15000	(2270)	15000	(720)	15000	(723)	78300	85800	25400	69400	15000	12500	25100	32100
Mercury		0.5	0.2 U	(0.2	0.2 U	0.7	0.2 U	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U	2.2	0.2 U	0.9	0.22 U	(0.2	0.26	7.2	2.9	(0.2	0.2 U
filtered	2	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U
Nickel		250	58	41	41	114	(22)	268	249	336	93	(40)	66	501	108	343	89	184	189	166	132	(40	24
filtered	—	(40	9 U	(40	9 U	(40	9 U	(40	9 U	(40	9 U	(40	9 U	(40	(9.1)	(40	9 U	(40	9 U	(40	9 U	(40	9 U
Potassium		6160	(2780)	16800	15100	12900	14300	18300	31000	43500	69700	31400	63100	32900	22800	(5000	(3750)	5800	19700	34500	33100	(5000	(4400)
filtered	—	(5000	(1000)	16200	13000	8420	13600	11100	23000	31200	69600	32800	70900	15700	16800	(5000	(1240)	5950	(2850)	28100	29800	(5000	(4170)
Silver		28	4 U	17	4 U	(10	4 U	17	(9.3)	26	(6.4)	(10	4 U	56	(9)	25	4 U	24	4 U	36	29	(10	4 U
filtered	50	(10	4 U	(10	4 U	(10	4 U	(10	4 U	(10	4 U	(10	4 U	(10	4 U	(10	4 U	(10	4 U	(10	4 U	(10	4 U
Sodium		98000	122000	117000	1850000	55100	72400	92100	129000	52400	97500	58500	95600	114000	113000	193000	162000	55700	67300	47600	34300	62400	62800
filtered	—	37100	122000	115000	124000	49000	66400	79600	130000	46300	104000	55300	107000	71300	113000	174000	161000	50900	52900	42100	34500	60100	81500
Vanadium		148	(18)	(50	(21)	80	(11)	167	181	676	249	(50	65	205	76	174	(36)	153	161	370	283	(50	9.6
filtered	—	(50	3 U	(50	3 U	(50	(3.7)	(50	3 U	61	(38)	(50	(38)	(50	(9.9)	(50	3 U	(50	3 U	(50	(4.1)	(50	3 U
Zinc		461	30	44	108	1730	163	1000	1230	4090	1260	67	433	23600	4570	1010	217	572	651	4930	3840	60	32
filtered	5000	39	(15)	34	38	50	(12)	33	24	23	(3)	23	(5.4)	39	34	37	29	87	35	30	(2.3)	31	(14)
Cyanide	200	(10	(10	(10	(10	(10	13.5	(10	(10	(10	24.4	(10	16.8	(10	29.3	(10	(10	(10	(10	(10	83.7	14	12.3

NOTES: All concentrations in ppb.
6/27/88 samples analyzed by CRA Labs, Inc. & 11/27/88 analyzed by Versar Inc.
U - Indicates compound analyzed, but not detected.
( ) - Greater than or equal to instrument detection limit, but less than required detection limit.
* - Guidance value.

TABLE 14

INORGANIC ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARDS	5 D 6/27/88	5 D 11/28/88	6 S 6/27/88	6 S 11/28/88	6 I 6/27/88	6 I 11/28/88	6 D 6/27/88	6 D 11/28/88	7 S 6/27/88	7 S 11/28/88	7 I 6/27/88	7 I 11/28/88	7 D 6/27/88	7 D 11/28/88	8 S 6/27/88	8 S 11/28/88	8 I 6/27/88	8 I 11/28/88	9 S 6/27/88	9 S 11/28/88	9 I 6/27/88	9 I 11/28/88
Aluminum		60800	27600	1230	15400	75800	54700	38400	25400	28200	1670	52500	15700	33800	32400	55600	18600	5890	6710	48600	12000	61900	21200
filtered	—	454	[20]	572	649	536	761	[200]	20 U	1020	236	[200]	20 U	[200]	20 U	568	648	[200]	20 U	[200]	605	[200]	20 U
Antimony		[60	29 U	[60	29 U	[60	29 U	[60	29 U	[60	29 U	72	29 U	[60	29 U	[60	29 U	[60	29 U	[60	29 U	[60	145 U
filtered	3*	[60	29 U	[60	29 U	[60	29 U	[60	29 U	[60	29 U	[60	29 U	[60	29 U	[60	29 U	[60	29 U	[60	29 U	[60	29 U
Arsenic		30	10	[10	23	106	34	34	15	[10	10 U	31.6	10 U	23.4	10 U	36.6	10 U	[10	10 U	47.7	[6.7]	51	10
filtered	25	[10	10 U	[10	10 U	46	49 U	[10	10 U	[10	10 U	[10	10 U	[10	10 U	[10	13	[10	10 U	[10	43	[10	10 U
Barium		564	498	[200	360	505	407	401	331	[200	[66]	427	234	564	520	670	213	312	305	635	283	670	373
filtered	1000	[200	278	[200	121	[200	[129]	[200	[123]	[200	[49]	[200	[131]	278	339	[200	[10]	269	258	[200	[73]	301	231
Beryllium		6	[1.3]	[5	[1.2]	[5	[3.2]	[5	[1.4]	[5	1 U	5	1 U	[5	[1.3]	6	1 U	[5	1 U	[5	[1.2]	[5	[1]
filtered	3*	[5	1 U	[5	1 U	[5	1 U	[5	1 U	[5	1 U	[5	1 U	[5	1 U	[5	1 U	[5	1 U	[5	1 U	[5	1 U
Cadmium		7	20 U	[5	4 U	[5	4 U	6	20 U	[5	5.1	8	4 U	[5	4 U	15	4 U	[5	4 U	16	4 U	5	4 U
filtered	10	[5	4 U	[5	4 U	[5	4 U	[5	4 U	[5	4 U	[5	4 U	[5	4 U	[5	4 U	[5	[6.7]	[5	4 U	[5	4 U
Calcium		408000	289000	169000	265000	190000	124000	444000	395000	117000	117000	290000	174000	359000	301000	137000	49400	209000	231000	187000	163000	426000	302000
filtered	—	125000	127000	171000	194000	20800	20000	151000	184000	109000	112000	137000	137000	183000	215000	31100	15200	195000	205000	105000	71600	167000	186000
Chromium		158	73	25	225	267	147	137	86	83	61	821	277	132	74	1190	262	48	48	687	237	144	49
filtered	—	14	4 U	17	4 U	[10	[8.6]	24	4 U	[10	4 U	10	4 U	[17	4 U	[10	[6.4]	12	4 U	14	[5.9]	10	4 U
Cobalt		50	[21]	[50	[14]	59	63	[50	[29]	[50	5 U	[50	[22]	[50	[21]	[50	[18]	[50	6.7	[50	[27]	[50	[20]
filtered	—	[50	5 U	[50	5 U	[50	5 U	[50	5 U	[50	5 U	[50	5 U	[50	5 U	[50	5 U	[50	5 U	[50	5 U	[50	5 U
Copper		155	56	105	275	318	152	232	82	[25	[12]	262	77	91	50	264	74	26	[19]	627	165	199	56
filtered	1000	[25	4 U	109	[8.3]	[2]	25	71	4 U	[25	[5.8]	[25	4 U	[25	4 U	[25	[6.6]	[25	4 U	27	[10]	38	4 U
Iron		111000	45100	6160	159000	221000	151000	94900	61200	6470	5780	207000	68000	104000	80100	233000	53400	31000	32200	202000	103000	213000	88600
filtered	300	488	357	462	[86]	4990	7240	7640	9500	462	[67]	15300	15300	22400	30700	815	222	8230	7310	8600	1450	24800	28700
Lead		[5	36	21.9	328	202	133	103	38	18.7	5 U	699	174	84	33	5350	316	22.7	22	964	230	135	42
filtered	25	[5	5 U	5.6	5 U	27.6	21	[5	5 U	[5	5 U	[5	5 U	[5	5 U	26.9	5 U	[5	5 U	[5	5 U	[5	5 U
Manganese		2030	1100	215	6280	4460	3280	2320	1860	1680	1240	18700	6040	2250	1790	5910	1480	1160	1350	3510	3220	3980	2080
filtered	300	71	110	115	[2.9]	214	225	142	157	115	[2.4]	2150	1830	615	678	115	[4.1]	825	872	1320	236	935	884
Magnesium		157000	108000	703000	12000	56100	32600	138000	122000	[5000	[1780]	59700	30600	124000	116000	19600	5580	42300	42400	46400	28100	99000	62700
filtered	35000*	49000	49600	[5000	[205]	[5000	[2150]	44600	47000	[5000	[614]	23300	22500	64000	81000	2350	[98]	33200	37500	16400	9720	33300	32500
Mercury		[0.2	0.2 U	[0.2	2	1	0.52	[0.2	0.2 U	[0.2	0.62	0.6	0.22	[0.2	0.22	0.5	0.2 U	[0.2	0.2 U	1.21	0.2 U	[0.2	0.2 U
filtered	2	[0.2	0.2 U	[0.2	0.2 U	[0.2	0.2 U	[0.2	0.2 U	[0.2	0.2 U	[0.2	0.2 U	[0.2	0.34	[0.2	0.2 U	[0.2	0.5 U	[0.2	0.2 U	[0.2	0.2 U
Nickel		179	67	[40	51	282	181	146	85	[40	[13]	378	135	119	66	363	90	[40	[30]	413	173	199	53
filtered	—	[40	9 U	[40	9 U	[40	[12]	[40	9 U	[40	9 U	[40	[11]	[40	9 U	[40	[11]	[40	9 U	[40	9 U	[40	9 U
Potassium		13200	9840	23800	31100	74200	50400	6350	6250	37600	51900	48200	56200	13200	22700	17800	18600	23100	30600	39000	29300	9660	5670
filtered	—	9250	[3780]	23700	29400	52800	79400	[5000	[2180]	36600	53700	43500	55400	[5000	[2800	11300	15200	23000	30100	33700	18400	[5000	[2090]
Silver		25	4 U	[10	13	13	13	20	[5.6]	[10	4 U	20	4 U	20	4 U	16	4 U	12	4 U	15	[9.3]	21	4 U
filtered	50	[10	4 U	[10	4 U	[10	4 U	11	[4.2]	[10	4 U	[10	4 U	[10	4 U	[10	4 U	[10	4 U	[10	4 U	[10	4 U
Sodium		50500	39600	28000	33100	107000	111000	30900	28000	62300	78100	59800	64400	29000	36100	89000	112000	110000	115000	92100	53000	180000	173000
filtered	—	45600	42100	30200	34700	89600	113000	25200	28300	60800	81000	56300	66600	27700	36000	70100	108000	111000	118000	95900	104000	164000	178000
Vanadium		158	53	[50	104	157	126	102	[43]	67	66	436	104	112	57	112	[36]	[50	[17]	182	67	149	[39]
filtered	—	[50	3 U	[50	[13]	[50	[26]	[50	3 U	[50	[37]	[50	[6.3]	[50	3 U	[50	[8.7]	[50	3 U	[50	[9.5]	[50	3 U
Zinc		458	196	82	1210	879	587	386	213	61	34	1160	322	286	157	4360	1160	106	179	2460	676	582	208
filtered	5000	27	[16]	87	2 U	70	36	142	[18]	18	[2.4]	35	22	33	[6.9]	34	[13]	26	21	58	[16]	30	26
Cyanide	200	[10	[10	255	112	101	195	[10	[10	[10	18.5	[10	12.3	[10	40.5	[10	[10	[10	[10	[10	24.3	[10	[10

NOTES: All concentrations in ppb.
6/27/88 samples analyzed by CRG Labs, Inc. & 11/27/88 analyzed by Versar Inc.
U - Indicates compound analyzed, but not detected.
[ ] - Greater than or equal to instrument detection limit, but less than required detection limit.
* - Guidance value.

TABLE 14

INORGANIC ANALYSES - GROUND WATER
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	NY STATE CLASS GA STANDARDS	10 S 6/27/88	10 S 11/28/88	10 I 6/27/88	10 I 11/28/88	11 S 6/27/88	11 S 11/28/88	11 I 6/27/88	11 I 11/28/88	12 6/27/88	12 11/28/88	13 6/27/88	13 11/28/88
Aluminum		32500	10900	31300	8700	47900	38200	12700	1200	32500	10100	123000	99800
filtered	—	402	248	(200	20 U	1260	1220	340	(41)	620	755	460	506
Antimony		(60	29 U	(60	29 U	(60	29 U	(60	29 U	(60	29 U	121	29 U
filtered	3*	(60	29 U	(60	29 U	(60	29 U	(60	29 U	(60	29 U	(60	29 U
Arsenic		27.1	10 U	29.1	10 U	31.4	22	10.7	10 U	40.4	(8.4)	91	38
filtered	25	(10	10 U	(10	10 U	(10	10 U	(10	10 U	(10	10 U	(10	(5.1)
Barium		303	(91)	240	(141)	318	273	(200	(116)	663	222	1940	1340
filtered	1000	(200	(41)	(200	(63)	(200	(23)	(200	(110)	(200	(84)	(200	(58)
Beryllium		(5	1 U	(5	1 U	(5	(2)	(5	1 U	(5	1 U	14	11
filtered	3*	(5	1 U	(5	1 U	(5	1 U	(5	1 U	(5	1 U	(5	1 U
Cadmium		18	4 U	5	4 U	20	14	(5	4 U	10	4 U	44	19
filtered	10	(5	4 U	(5	4 U	(5	4 U	(5	4 U	(5	4 U	(5	4 U
Calcium		194000	114000	288000	202000	68500	52200	80400	66000	235000	97300	734000	633000
filtered	—	69800	111000	170000	180000	23800	18100	61200	64500	73200	66400	151000	132000
Chromium		292	58	148	40	295	156	118	20	452	133	785	561
filtered	—	(10	(4.3)	21	4 U	(10	(8)	(10	4 U	(10	4 U	14	4 U
Cobalt		(50	5 U	(50	(7.2)	(50	(23)	(50	5 U	(50	(7.9)	(50	(38)
filtered	—	(50	5 U	(50	5 U	(50	5 U	(50	5 U	(50	5 U	(50	5 U
Copper		303	43	204	32	306	193	69	(9)	218	62	936	576
filtered	1000	(25	4 U	86	4 U	(25	(17)	(25	4	(25	(7.3)	50	4 U
Iron		107000	14500	120000	56400	116000	78900	60700	19800	69100	18100	536000	417000
filtered	300	387	(40)	33100	36100	2020	1580	15700	17400	207	146	389	690
Lead		323	49	96.6	19	34.5	489	(5	6	694	239	3210	2580
filtered	25	(5	5 U	6.5	5 U	27.3	26	(5	5 U	(5	5 U	6.7	5 U
Manganese		4230	470	2020	888	3260	2610	1280	465	8310	2170	37400	29300
filtered	300	(15	(2.3)	646	579	55	78	599	427	(15	(4.4)	(15	(3.4)
Magnesium		21000	(4250)	67200	40200	14800	11900	10700	13600	49800	8880	70400	46500
filtered	35000*	(5000	(605)	39200	36300	2020	(1780)	12700	13400	(5000	(182)	(5000	(256)
Mercury		0.6	0.2 U	0.23	0.2 U	(2	0.2 U	(2	0.2 U	0.6	0.2 U	2.2	1
filtered	2	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U	(0.2	0.2 U	(2	0.2 U	(0.2	0.2 U
Nickel		133	(31)	107	(29)	164	98	78	(14)	90	(22)	225	181
filtered	—	(40	(9.4)	(40	9 U	(40	9 U	(40	9 U	(40	9 U	(40	9 U
Potassium		40000	31200	(5000	(3140)	13300	15300	(5000	(1220)	108000	108000	54300	65700
filtered	—	37100	47400	(5000	(1840)	5640	9490	(5000	(1190)	85500	108000	43000	56200
Silver		14	4 U	14	4 U	12	(5.2)	(10	4 U	11	4 U	46	35
filtered	50	(10	4 U	11	4 U	(10	4 U	(10	4 U	(10	4 U	(10	4 U
Sodium		66400	76900	42800	46500	56800	80000	87700	102000	91300	86600	89100	79300
filtered	—	63600	76600	41800	49800	49800	69500	90400	101000	74900	90600	78900	76900
Vanadium		112	(30)	92	(17)	103	69	(5	(3.5)	239	122	484	350
filtered	—	(50	(12)	(50	3 U	(50	(12)	(5	3 U	61	112	(50	60
Zinc		1830	374	469	194	3120	2030	410	35	1260	400	9350	6710
filtered	5000	(20	(3.2)	88	24	90	51	41	(4.8)	(20	(4.1)	65	2 U
Cyanide	200	(10	(10	(10	(10	(10	(10	(10	(10	109	317	359	225

NOTES: All concentrations in ppb.
6/27/88 samples analyzed by CBS Labs, Inc. & 11/27/88 analyzed by Versar Inc.
U - Indicates compound analyzed, but not detected.
(- Greater than or equal to instrument detection limit, but less than

TABLE #5

INORGANIC ANALYSES - SURFACE SOILS
CHERRY FARM SITE
NIAGARA MOHAWK POWER CO.
TONAWANDA, NY

	Field #1 Home Plate	Field #1 1,2,3 Bases	Field #2 Home Plate	Field #2 1,2,3 Bases	Sand Cast	Surface Soil #1	Surface Soil #2	Surface Soil #3	Surface Soil #4	Surface Soil #5	Surface Soil #6	Surface Soil #7	Surface Soil #8
Aluminum	4270	8050	4360	8430	521	4940	6690	5010	3800	6680	5520	4390	5510
Arsenic	3.78	7.21	4.72	7.06	(1.0	5.45	7.67	5.3	4.22	8.48	6.93	10.7	7.56
Barium	(20	48.8	(20	44.4	(20	66.8	87.4	56	40.9	83.7	58.7	54.5	70.1
Beryllium	(0.5	(0.5	(0.5	(0.5	(0.5	(0.5	(0.5	(0.5	(0.5	0.742	(0.5	(0.5	(0.5
Cadmium	(0.5	(0.5	(0.5	(0.5	(0.5	9.11	21.7	4.97	0.848	8.44	2.18	1.61	3.06
Calcium	28,500	25,300	30,000	22,700	1640	16,600	20,100	19,300	14,900	33,900	27,800	17,100	21,100
Chromium	9.14	12.5	8.89	13.4	5.58	633	126	150	67.4	122	72.8	56	92
Copper	20.4	17.8	22.3	21.5	7.81	129	124	110	44.2	86.8	75.6	56.3	97
Iron	9,990	15,900	10,600	18,000	2830	51,900	76,100	54,400	30,700	39,100	38,800	27,900	53,200
Lead	6.58	16.1	7.3	17.6	1.97	323	499	239	57.1	277	114	73.6	147
Manganese	270	383	282	397	47	1770	3010	1840	1130	2500	1480	981	1490
Magnesium	6710	6880	6830	6100	519	1260	2100	1130	2830	1470	1830	1150	1370
Mercury	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	(0.1	0.584	(0.1	(0.1	(0.1
Nickel	18.3	17.9	17.7	19.4	(4	321	502	81	22.4	29.9	37.8	26.3	42.5
Potassium	522	(500	(500	644	(500	(500	(500	(500	(500	(500	(500	(500	(500
Silver	1.42	(1.0	1.22	1.51	(1	3.43	5.62	2.6	1.12	4.11	2.23	1.44	2.24
Sodium	(500	(500	(500	(500	(500	(500	(500	(500	(500	564	(500	(500	(500
Vanadium	13	20.7	13	20.9	(5	13.6	15.7	15.2	9.82	12.4	11.4	9.78	13.3
Zinc	51	68.4	51.2	74.5	8.81	1410	2390	788	138	1360	419	393	569
Cyanide	(0.1	(0.1	(0.1	(0.1	(0.1	5.44	3.95	3.62	1.88	6.25	7.56	3.81	5.82

NOTE: All concentrations in mg/kg, dry weight.
Samples collected 6/20/88 - 6/22/88, 7/19/88.
Analyzed by OBG Labs Inc.

Section 9. Responsiveness Summary
Niagara Mohawk/Cherry Farm
Proposed Remedial Action

Introduction

This report summarizes the public comments expressed during the public comment period for the Niagara Mohawk/Cherry Farm Site (NMCF) and the responses relative to the Remedial Investigation/Feasibility Study (RI/FS) Report.

A series of remedial investigations began in the Spring of 1983 by Engineering Science for the New York State Department of Environmental Conservation (NYSDEC). In 1986, Niagara Mohawk Power Company employed O'Brien and Gere to complete a Phase II investigation. Based on the findings of the Phase II investigation it was determined that significant comtamination existed at the site. In 1988 Niagara Mohawk entered into an Order on Consent to perform an RI/FS investigation at the site. The objectives of the RI/FS were to:

- Assess the cause, areal extent and effects of the hazardous materials in the project area;
- Identify and evaluate remedial alternatives selected to mitigate contamiantion problems that pose threats to the environment or to public health as determined by the field work and risk assessment conducted during the RI;
- Recommend remedial alternative.

A comprehensive list of remedial technologies was utilized to determine potentially feasible technologies for remediating the site. These alternatives which include a no action, a contaminant and four treatment alternatives are described below:

1. No action.
2. Containment via use of a slurry wall circumfenting the entire site.
3. Groundwater extraction and capping of landfill materials.
4. Extraction wells with an upgradient slurry wall and cap.
5. Groundwater collection system, extraction wells and capping.
6. Soil washing.

The NYSDEC has recommended Alternative 3.

The following is a summary of questions and answers brought up during the public response period.

Question: Once the construction phase is started, what is the anticipated time to complete the remediation?

Answer: Approximately 24 months would be required to complete the construction phase.

Question: Who will be responsible for the annual O & M costs associated with the project?

Answer: This will be determined as part of the consent order for upcoming design phase of the project.

Question: What authority does the State have to force responsible parties to contribute to the remediation of the site?

Answer: Under the Environmental Conservation Law, Title 13 gives the State of New York the authority to negotiate consent orders and in some instances order responsible parties to undertake remedial programs at hazardous waste sites.

If a responsible party is uncooperative the State can refer the site to the Attorney General's Office and they can sue under what is called the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Question: All the documents are not presently found in the document repository.

Answer: We will make sure all the documents are in place.

Question: Will the temperature of the river water be raised significantly by the extraction water being pumped into the river after treatment?

Answer: This issue will be addressed in the design phase. However, it is not expected to have any impact.

Question: Is the cost of the onsite treatment building included in the proposed 17 million dollars cost?

Answer: Yes it was.

Question: Is there any evidence of contaminants leaching into the former Erie Canal?

Answer: No it has been determined that groundwater is discharging towards the Niagara River and away from the former Erie Canal bed.

Question: Will all the material forwarded to the Department by CF&I be included in the administrative record?

Answer: Yes.

Question: Has anybody estimated what the cost differential will be to the selected alternative should a riverfront park be incorporated into the remedial design?

Answer: Although during the discussions with Niagara Mohawk, DEC requested the Company to look at possible future use of the site, Niagara Mohawk has certain constraints on how they can spend their money since they are a public utility.

At this point Niagara Mohawk's proposal is protective of both human health and the environment. The remedial plan as it is presented does not preclude the area to be used as a park.

Question: Are we to understand as part of the negotiations with NMPCo that they are prepared to donate this tract of land to the Town?

Answer: This question will have to be addressed in the future after remediation.

Comments from NYSDEC Division of Fish and Wildlife

Upon a recent field inspection of the site by Region 9 Fish and Wildlife personnel the following conclusion was drawn: "that an unknown amount of fill material has eroded from the face of the fill and has been deposited in the River.

It is further stated that significant concerns regarding the possibility of sediment contamination (i.e. PCBs) have arisen. Fish and Wildlife have requested additional sampling be done to determine the areal and vertical extent of contamination of the River sediments.

Additional concerns regarding the lack of comprehensive sampling of on-site wetlands are also listed. Fish and Wildlife have requested additional sampling in this area. Such sampling should identify both vertically and horizontally any migration of contaminants from the fill with specific considerations to existing drainage channels. If such sampling identifies contamination of the sediments from the fill then consideration should be given to the removal in the remedial plan for the site.

Fish and Wildlife also have made a recommendation regarding the water level in the wetland immediately south of the access road from River Road.

Response

The memorandum dated December 19, 1990 from Ken Roblee, Senior Wildlife Biologist, Region 9, to Mr. Michael Brinkman (copy attached) will become part of the official Administrative Record.

DEC feels that those comments and recommendations made by Fish and Wildlife are justifiable and will be looked into in depth once the design phase of the remediation begins. Ample opportunity will be afforded to Fish and Wildlife to review all design plans and specifications.

Comments from CF&I

Mr. William C. Robb, Esq. representing CF&I provided a September 14, 1990 letter with comments on the proposed remediation. The letter and the NYSDEC response are attached for reference.

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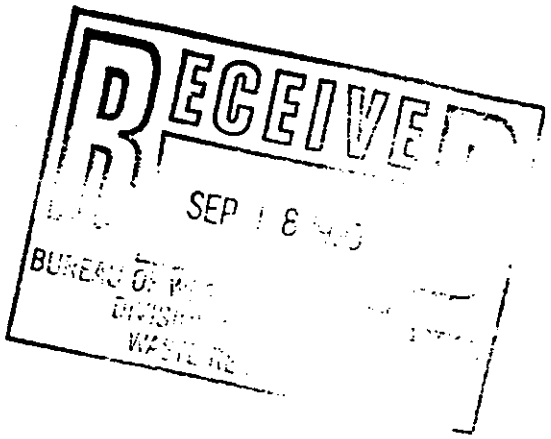
September 14, 1990

FEDERAL EXPRESS



Mr. Michael Brinkman, P.E.
New York Department of
Environmental Conservation
Division of Hazardous Waste
Remediation
50 Wolf Road, Room 222
Albany, NY 12233-7010

Re: Cherry Farm Site #915063

Dear Mr. Brinkman:

Again, we wanted to thank the Department and Niagara Mohawk Power Company for meeting with us in Buffalo on September 6, 1990 with respect to the remedial alternatives for the Cherry Farm site. We felt the meeting was quite helpful in allowing us to present our technical reasoning in support of the alternative discussed in the REMCOR report.

As promised, I am enclosing a letter from REMCOR setting forth in writing the general discussion we had at the meeting regarding ARAR's. While Mr. Brausch is the first to admit he is not an attorney, he has done a good job of setting forth the regulatory and guidance positions of EPA with respect to remedial requirements and ARAR's. We have reviewed that analysis and feel it is accurate legally and sets forth the requirements of the National Contingency Plan. Also enclosed are the two REMCOR drawings discussed at the meeting. They are:

(1) Figure 1, Plan Remedial Investigation - Cherry Farm Site, Tonawanda, New York, 9/10/90, Drawing Number 90063-E5

(2) Figure 2, Proposed Remedial Alternative - Cherry Farm Site, Tonawanda, New York, 9/10/90, Drawing Number 90063-E4

As I indicated at our meeting, I would like to itemize the various documents CF&I has submitted to NYDEC with respect to the Cherry Farm site, in order that we are clear on the makeup of the Administrative Record for this site. Our files reflect that the following documents have been previously submitted:

a. Letter dated October 10, 1985 from A.R. Cooter, Esq. of CF&I to Jeffrey T. Lacey, with all enclosures. (May relate to both the Cherry Farm and River Road sites.)

b. Letter dated July 3, 1986 from Alan R. Cooter, Esq. of CF&I to Jeffrey T. Lacey, Esq. with all enclosures thereto. (May relate to both Cherry Farm and River Road.)

c. Letter dated September 5, 1986 from Alan R. Cooter, Esq. of CF&I to Jeffrey T. Lacey, Esq. with all enclosures thereto. (May relate to both Cherry Farm and River Road.)

d. Letter dated October 16, 1987 from Joseph J. Zedrosser, Esq., for CF&I to Maura Desmond, Esq.

e. Letter dated April 19, 1990 from William C. Robb, Esq. for CF&I to Maura C. Desmond, Esq. and the REMCOR report as enclosure.

f. Letter dated April 25, 1990 from Cheryl A. Peterson, Esq. for NYDEC to William C. Robb, Esq.

g. Letter dated April 27, 1990 from David P. Flynn for Allied-Signal, Inc. to Maura Desmond, Esq.

h. Letter dated May 2, 1990 from William C. Robb, Esq. for CF&I to Cheryl A. Peterson, Esq. with enclosure thereto.

i. Letter dated June 28, 1990 from John S. Cowan, Esq. for CF&I to Cheryl A. Peterson, Esq. and the July 2, 1990 response of Ms. Peterson thereto.

j. Letter dated June 29, 1990 from David P. Flynn, Esq. for Allied-Signal, Inc. to Cheryl A. Peterson, Esq.

k. Letter dated June 29, 1990 from R. William Stephens, Esq. for General Motors Corporation to Cheryl A. Peterson, Esq.

1. Chapter 8, Report to Congress on Special Wastes From Mineral Processing (Ferrous Metals Production), Office of Solid Waste, USEPA, July, 1990, three copies of which were provided to NYDEC at our September 6, 1990 meeting.

m. Shacklette, H.T. and Boerngen, J.G., 1984, USGS, Element Concentrations in Soils and Other Surficial Material of the Coterminus U.S. (including western New York), provided to NYDEC at our September 6, 1990 meeting.

We understand that the Administrative Record will include the other study information and reports developed with respect to the site investigation and remedial proposals, as well as the correspondence with other parties. Nevertheless, we wanted to be sure that the specific information submitted by CF&I was included.

We look forward to hearing from you when you have had an opportunity to digest the information discussed at our September 6, 1990 meeting and the enclosed analysis, as well as the REMCOR report submitted previously. Please don't hesitate to contact us if you have any questions.

Very truly yours,

WELBORN DUFFORD BROWN & TOOLEY, P.C.

William C. Robb

WCR/mjl

cc: Maura C. Desmond, Esq. (w/o drawings)
William C. Weiss, Esq. (w/o drawings)

0646Q/15

REMCOR, Inc. • 701 Alpha Drive • P.O. Box 38310 • Pittsburgh, PA 15238-8310 • 412-963-1106

September 13, 1990

Project No. 90063

Michael W. Coriden, Esquire
CF&I Steel Corporation
P.O. Box 316
Pueblo, Colorado 81002

Applicable or Relevant and Appropriate Requirements
Remedial Action Alternatives
Cherry Farm Site
Tonawanda, New York

Dear Mr. Coriden:

On behalf of CF&I Steel Corporation (CF&I), Remcor, Inc. (Remcor) reviewed the Proposed Remedial Action Plan (PRAP) prepared by the New York Department of Environmental Conservation (DEC) for the Cherry Farm site in Tonawanda, New York. The Cherry Farm site consists of an approximate 44-acre inactive landfill located on a 56-acre parcel along the Niagara River. The landfilled wastes included foundry sands, slag, and cinders. As described in the PRAP, the Endangerment Assessment (EA) performed for this site indicated that site contaminants in certain surface materials along the landfill outslopes could contribute to unacceptable risks via the direct contact and surface water exposure pathways postulated in the EA.

In meeting with the DEC on September 6, 1990, Remcor described the alternative remedial action plan (the "alternative plan") developed by Remcor and CF&I. This alternative plan is equally protective of human health and the environment, as the risks identified in the site Endangerment Assessment are specifically addressed. Furthermore, the alternative plan is fully compliant with applicable or relevant and appropriate requirements (ARARs). (1)

This letter summarizes Remcor's understanding of current policies for evaluating ARAR compliance under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The discussion is specifically focused on Resource Conservation and Recovery Act (RCRA) and corresponding New York state regulations defining requirements for hazardous waste landfills and surface impoundments closed as landfills. At our meeting with New York DEC on September 6, the DEC requested our analysis of ARARs be submitted in writing. This letter serves that purpose.

At the Cherry Farm site, the remedial measures of covering contaminated soils on the landfill outslopes and ground water recovery and treatment will protect public health and the environment. No further action to address identified risks or to achieve the secondary remedial objective of protecting the water quality in the Niagara River is needed. A remaining question, therefore, is whether, in the absence of a risk to public health and the environment, a RCRA-compliant cap is required due to ARARs.

In the PRAP, the DEC states that placement of a low-permeability cap over the entire former landfill area at the Cherry Farm site is required because RCRA and state hazardous waste landfill closure requirements are ARARs. The DEC has apparently misinterpreted the CERCLA statute as well as U.S. Environmental Protection Agency (EPA) and DEC regulations and guidance documents. Taken to its logical extension, the DEC's position seems to be that CERCLA requires RCRA caps at all sites, including municipal landfills, where any amount of hazardous substances may have been disposed, regardless of public health risk demonstrated by risk assessments or exceedences of environmental criteria. Such an extreme position has never been espoused by the DEC or EPA and would be inconsistent with CERCLA, the National Contingency Plan (NCP), and state programs.

Remcor's conclusion is, in the absence of risk, a multi-layer low-permeability cap (compliant with RCRA and New York state hazardous waste site closure regulations) cannot be justified as an ARAR under CERCLA. At most, capping is an action-specific ARAR, which would not be triggered unless necessary to alleviate risk or to achieve a chemical-specific ARAR.

Section 121(d) of CERCLA states that "remedial actions . . . shall attain a degree of cleanup of hazardous substances . . . which assures protection of human health and the environment." In addition, CERCLA Section 121(d)(2)(A) provides, with respect to any hazardous substance which will remain on site at the completion of the remedial action, that the cleanup must comply with standards, requirements, and criteria that are "legally applicable to the hazardous substance . . . or relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance . . .." (Emphasis added).

The NCP and EPA guidance documents establish three categories of ARARs (NCP Section 300.400(g); and EPA, 1988, "CERCLA Compliance with Other Laws Manual," Pages 1-13 through 1-56):

- Chemical-specific ARARs are usually health or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of

numerical values representing acceptable amounts of a chemical that may be found in or discharged to the environment.

- Location-specific ARARs are restrictions placed on the concentrations of hazardous substances or the conduct of activities solely because they are in specific locations.

- Action-specific ARARs are usually technology or activity-based requirements or limitations on actions triggered by particular remedial activities selected to accomplish a remedy.

The procedure for identifying ARARs, succinctly illustrated in Exhibit 1-4 of the EPA "CERCLA Compliance with Other Laws Manual" (the "1988 Manual") (EPA, 1988), shows that the necessity, if any, and type of remedial action to be undertaken at a CERCLA site is dictated in the first instance by chemical-specific ARARs. Once chemical-specific ARARs (and location-specific ARARs) are identified, remedial alternatives are evaluated for compliance with those ARARs (EPA, 1988, Page 1-56). It is only at that point in the process that action-specific ARARs are identified. In the 1988 Manual, the EPA makes clear that "action-specific requirements do not in themselves determine the remedial alternatives; rather, they indicate how a selected alternative must be achieved" (EPA, 1988, Page 1-29). Action-specific ARARs are not triggered unless remedial action is necessary to protect public health and the environment or to achieve a chemical-specific ARAR.

Ground water quality standards based on drinking water criteria (e.g., maximum contaminant levels [MCLs]) are not chemical-specific ARARs for the Cherry Farm site. The EPA has specifical stated that, in the absence of potential ground water ingestion risk, MCLs are not appropriate. In the 1988 Manual, the EPA stated (Pages 1-68 and 1-69):

> "MCLs are generally not appropriate for site-specific circumstances where a well would never be placed and groundwater would thus never be consumed (e.g., a twenty-foot strip of land between the toe of a landfill and a river, if there is no surface water contamination resulting from man-made groundwater contamination at the Site)."

The DEC may not justify placement in a low-permeability cap on the grounds that it is an ARAR required to be met under CERCLA. At most, capping is an action-specific ARAR, and action-specific requirements do not determine the remedial alternatives. The remedy specified in the alternative plan protects public health and the environment and will ensure achievement of chemical-specific and location-specific ARARs.

Even if action-specific ARARs would be triggered at the Cherry Farm site, RCRA capping is not "appropriate under the circumstances of the release" of hazardous substances. Because the PRAP and the alternative plan rely on ground water collection and treatment as the primary means of source control for ground water contamination, low-permeability capping of the former landfill is at best redundant and more likely counterproductive.

The NCP and EPA guidance documents make clear that the determination whether a requirement is relevant and appropriate is a two-step process (NCP Section 300.400(g); and EPA, 1988, Pages 1-60 through 1-70):

- It must be determined whether a requirement is relevant.
- It must be determined whether a requirement is appropriate.

As stated in the EPA 1988 Manual:

> "In general, this involves a comparison of a number of site-specific factors, including the characteristics of the remedial action, the hazardous substances present at the site, or the physical circumstances of the site, with those addressed in the statutory or regulatory requirement. In some cases, a requirement may be relevant, but not appropriate, given site-specific circumstances; such a requirement would not be ARAR for the site."

Similarly, the 1988 Manual states (Page 1-67):

> "First, the determination focuses on whether a requirement is relevant based on a comparison between the action, location, or chemicals covered by the requirement and related conditions of the site, the release, or the potential remedy. This step should be a screen which will determine the relevance of the potentially relevant and appropriate requirement under consideration. The second step is to determine whether the requirement is appropriate by further refining the comparison, focusing on the nature/characteristics of the substances, the characteristics of the site, the circumstances of the release, and the proposed remedial action."
>
> "A requirement may be relevant but not appropriate for the specific site. Only those requirements that are determined to be both relevant and appropriate must be complied with."

The EPA has indicated that landfill closure requirements are not appropriate for large landfills such as the Cherry Farm site with low levels of contamination. In the proposed NCP (53 Federal Register 245) and the preamble to the final NCP, the EPA states:

> "This requirement for closure of hazardous wastes deposited on land may be relevant because it addresses the same kinds of wastes and action proposed at a CERCLA site, but may be inappropriate because of the physical size and character of the CERCLA site. Although capping may be appropriate for smaller areas, it may not be appropriate in some circumstances for large dispersed areas of low-level soil contamination, such as may be found at many large municipal landfill facilities."

Furthermore, low-permeability capping over a waste disposal area is appropriate where waste leachates, generated through rainwater infiltration, pose a threat to ground water (i.e., potentially contaminating ground water to levels that cause a public health or environmental risk or lead to exceedences of environmental quality standards). Capping of the landfill at the Cherry Farm site would, to some extent, reduce flushing of the waste and contaminant transport to the source control ground water collection and treatment system. Under these circumstances, capping is not "appropriate" because it will retard the natural flushing of contaminated ground water that will be collected and treated or, in the absence of collection/treatment, would discharge to the Niagara River where no detectable site-contributed contamination concentrations would be found.

Finally, to the extent that the DEC would insist that RCRA closure requirements are among the ARARs for the Cherry Farm site, that determination does not require the construction of a multi-layer, low-permeability cap over the landfill. Rather, as Remcor and CF&I have suggested in the alternative plan, covering of the contaminated surface soils along the landfill outslopes would be consistent with the "hybrid closure" concept frequently utilized by EPA.

As stated in the preamble discussion to the proposed NCP, "the Superfund program has been using several different types of hybrid closure (where RCRA closure is not applicable) that give the decision maker additional choices for the long-term management of hazardous substances as well as treated residuals" (53 Federal Register 51394, 51446). One type of hybrid closure "that is used by the Superfund program," is referred to as the alternative land disposal closure. As EPA has stated:

> "This type of closure is identical to RCRA landfill disposal closure except that the cover requirements are relaxed because the wastes being contained do not pose a threat to groundwater. Direct contact and surface water threats, as well as other threats, can be adequately addressed with a soil cover. This type of closure is usually appropriate for wastes at low concentrations but still above "walk-away" levels. EPA has

found this type of closure to be useful in addressing wide areas of contaminated soils in a relatively inexpensive but very reliable manner."

A similar discussion of the hybrid closure concept under CERCLA is set forth in Directive 9234.2-04S (October 1989), prepared by the EPA Office of Solid Waste and Emergency Response ("OSWER").

The hybrid closure concept is well-suited to the Cherry Farm site because this site does not represent a threat to groundwater that could lead to unacceptable risk or exceedence of chemical-specific ARARs for the site. Even if the DEC would determine that RCRA closure requirements are "relevant and appropriate" for the site, that determination does not necessitate the construction of a multi-layer, low-permeability cap over the landfill. Rather, soil covers over the outslope areas would protect against dermal contact threats and would be consistent with the hybrid closure concept repeatedly recognized by the EPA.

We trust that this information is responsive to the DEC request made at our September 6, 1990 meeting. If you have any questions or need additional information, please do not hesitate to contact us.

Respectfully submitted,

Leo M. Brausch
Chief Operating Officer

LMB:rmv

Thomas C. Jorling
Commissioner

DEC 11 1990

William C. Robb, Esq.
Welborn, Dufford, Brown & Tooley, P.C.
Suite 1700
1700 Broadway
Denver, Colorado 80290-1701

Dear Mr. Robb:

Re: Niagara Mohawk/Cherry Farm,
Site No. 9-15-063

The following is the New York State Department of Environmental Conservation's (NYSDEC) response to issues raised in the September 13, 1990 letter from Leo Brausch, REMCOR Corporation, to Michael Coriden, Esq., Colorado Fuel and Iron (CFI).

In general it appears that REMCOR is taking issue with the type of capping proposed, not with the fact that a cap is required to satisfy the remedial objectives.

In summary the remedial objectives identified for this site are:

1. Prevent ingestion of contaminated groundwater.
2. Prevent direct exposure to the landfill contaminants.
3. Prevent contaminated runoff and erosion of contaminated soil and fill, and;
4. Prevent contaminant loading for the Niagara River from groundwater.

A cap is necessary to prevent direct contact with the waste and erosion of contaminated material. The current cap which REMCOR proposes does not provide adequate protection. A six inch soil cap is unacceptable. If it was possible to ensure that a cap only six inches thick would be uniformly installed over the entire site it would not provide sufficient long term stability and reliability. As is evidenced by the contaminants found in areas of the landfill previously capped, a six inch cap would not stand up to wind and rain erosion, much less pedestrian or vehicular traffic.

The cap proposed by Niagara Mohawk does provide long term stability and reliability. Its protection against wind and rain erosion and occasional pedestrian and vehicular traffic is acceptable. Furthermore, this cap will also reduce the generation of leachate from the landfill which will increase the reliablity and effectiveness of the pumping wells and should reduce the amount of groundwater which will have to be pumped to maintain an inward gradient in the landfill.

Further evaluation of the hydrogeology within and near the landfill will need to be performed before the final design of the pumping system can be completed. Pump tests and modelling will be needed to provide assurances that the pumping system will maintain an inward gradient and prevent further contaminant migration to the Niagara River. This work was not done as part of the RI/FS. The proposed capping system is also being viewed as a component of this recovery system to assist in the capture of the contaminated groundwater. The future design activities may reveal that the capping system design can be modified.

The NYSDEC considers the 6 NYCRR Part 360 regulations for solid waste management facilities applicable requirements for the remediation. The landfill meets the definition of an industrial/commercial landfill and the remediation must be in substantive compliance with requirements of 6 NYCRR Part 360-2.14.

Several specific issues were raised in the September 13, 1990 letter. The following addresses those issues:

- REMCOR presented an alternative remedial action plan and stated that "This alternative plan is equally protective of human health and the environment, as the risks identified in the site Endangerment Assessment are specifically addressed."

  The proposed alternative plan using a six inch cap is not equally protective of human health due largely to the inadequate level of reliability and stability provided by a minimal six inch soil cap. The six inch cap would offer only minimum protection to both human health and the environment. It has already been determined during the Remedial Investigation that contamination was found in the surface soils (i.e. the softball playing fields), this poses an unacceptable risk.

- REMCOR states that the remedial measures of covering contaminated soils on the landfill "out" slopes and groundwater recovery and treatment will protect public health and the environment. No further action to address identified risks or to achieve the secondary remedial objective of protecting the water quality in the Niagara River is needed.

  Protecting the water quality of the Niagara River is not a secondary remedial objective. The NYSDEC's policy has been to implement the findings and objectives of the Niagara River Toxics Committee Report (NRTCR) where ever possible. One of the goals of the NRTCR was to decrease by a minimum of 50%, those contaminants entering into the Niagara River. By implementing the proposed groundwater extraction and treatment system this goal reduction can be achieved for this site's contribution to the Niagara River.

- REMCOR, states that "At most, capping is an action-specific ARAR, which would not be triggered unless necessary to alleviate risk or to achieve a chemical-specific ARAR."

A cap indeed is required since it significantly eliminates risks to both health and the environment. By installing the cap the mobility of contaminants will be greatly reduced and the risk of direct contact eliminated.

- o REMCOR has concluded that in the absence of risk, a multi-layer low-permeability cap cannot be justified.

A cap is required for the landfill to eliminate the risk for direct contact with the waste and contaminated soil. The proposed multi-layer cap meets this objective and provides acceptable reliability. The capping system also serves as a component of the groundwater recovery system. By reducing infiltration through the landfill the cap will reduce leachate production and reduce the amount of water which will need to be pumped to maintain an inward gradient and prevent contaminated groundwater migration.

- o REMCOR has also started that low-permeability capping may be counterproductive since it prevents flushing of contaminants from the unsaturated overburden and fill.

The value of flushing contaminants from the landfill certainly is recognized. However, the unsubstantiated long-term benefit of flushing can be offset by the uncertainty of the hydrogeologic conditions of the landfill and the increase demands placed on the groundwater recovery system by the water from precipitation. Additional testing and evaluation during the design may lead to modifications of the proposed capping and groundwater recovery system. At that time the benefits of "flushing" will all be taken into account.

- o REMCOR states that groundwater quality standards based on drinking water criteria are not chemical specific ARARs for the Cherry Farm Site. REMCOR bases its argument on the fact that groundwater ingestion is not a potential risk.

It is the NYSDEC's position that New York State Groundwater Standards are considered an ARAR regardless of whether a public drinking water supply exists.

Groundwater Standards are applicable at all hazardous waste sites regardless of the source of drinking water. In this particular case the loading of the Niagara River also must be accounted for through applicable standards.

This response will become part of the Administrative Record supporting the Record of Decision (ROD) for the Niagara Mohawk/Cherry Farm Site. It is anticipated that the ROD will be executed by the end of December 1990.

Sincerely,

Michael J. Brinkman, P.E.
Environmental Engineer
Division of Hazardous Waste
Remediation

sediments if any are found would protect migrating and wintering waterfowl which have been observed feeding in the aquatic plant bed. Protection would also be provided to various shorebirds who may use the beach area during migration.

The wetlands located on the north and east sides of the fill were inspected to determine if sediment sampling during the remedial investigation was adequate to identify contamination from the fill. Of special concern was the location of Sediment Sample 3 of the remedial investigation. We were unable to locate any stake or flagging which identified this location. However, there was a great deal of flood debris in the area given as its location in Figure 2 of the investigation plan. If the location of this sample is correctly shown in Figure 2 then it may have been taken outside of the major drainage channel of the wetland. During our inspection, the drainage channel was observed to be approximately 20-30 meters north of the base of the fill. I personally walked upstream in this channel to the northeast corner of the fill. Here muskrat sign was evident from portions of chewed Phragmites roots and a feed bed. Approximately 50 meters south from this point a small amount of oil was observed on the water's surface at the base of the fill. This was also observed by Mr. Hyden. It is likely that this material was seeping from the base of the fill.

My concern after this inspection is that these wetlands may be contaminated with the various contaminants of the adjacent fill. I do not believe that sediment sample 3 was adequate to determine this. Various wildlife species such as muskrats, reptiles and amphibians are now found in these wetlands and may be ingesting these contaminants via sediments, plant roots and invertebrates. There is the potential for contaminants from these areas to enter the River through erosion of sediments and discharge of organic plant material and uptake of animal life into foot chains associated with the river.

My recommendation is that further sampling be done of sediments in the wetland areas. Such sampling should identify both vertically and horizontally any migration of contaminants from the fill with special consideration to existing drainage channels. (Sampling of muskrats, reptiles and amphibians is also a possibility if their is a need to document the uptake of contaminants into the wetland wildlife community.) If such sampling identifies contamination of the sediments from the fill then consideration should be given to their removal in the remedial plan for this site.

A final observation of the inspection was the water level of the wetland immediately south of the access road from River Road. The water level there is about 3 feet higher than the wetland located north of the access road. This level is nearly 5 feet higher than the level of the River and is likely a significant source of groundwater migrating through the fill to the River. This is a valuable wetlands because of the presence of standing water and emergent vegetation. However, I would be in favor of lowering the water level here to reduce the flow of surface water into the fill, providing that mitigation of lost wetland values is done on the site. The wetlands around the fill are considered collectively BW-8 by our Department. They are also regulated by the Army Corps of Engineers, Buffalo District. Any drainage of, filling of or discharge of a pollutant into this wetland would require wetland permits from these agencies.

Please realize that muskrats and beaver could possibly damage any future cap on the fill if provision is not made for protection from this type of damage where wetlands are adjacent to the fill.

A final matter is the potential for restoration of historic wetland areas which was the subject of my October 10th memo to you. I have recently discussed this with Hazardous Waste Staff in this Region. I am in agreement with them that Niagara Mohawk should not be required to restore historical wetland values which they may not have impaired. However, there may be cost effective modifications which could be done to the existing wetlands as mitigation. Mitigation for wetland losses may be required under the previously mentioned Wetland Permits.

I would be glad to discuss these various concerns for the adjacent wetlands with you or your staff. I would also be available to assist in planning any needed modification to the wetlands or required wetland mitigation. I may be reached at the Buffalo Wildlife Office (847-4550). I believe that this type of planning could result in a better containment program for the site as well protect fish and wildlife values there.

KR:slc

cc: Mr. John Spagnoli
Mr. Peter Buechi
Mr. Terry Moore

Section 10. Administrative Record

The administrative record consists of information upon which the Department bases its decision on selection of the requisite remedial technology. The following documents have been included as part of this administrative record:

1. Final RI/FS Report (located in the document repository).
2. Responsiveness Summary.
3. Proposed Remedial Action Plan.
4. Letter dated October 10, 1985 from A.R. Cooter, Esq. of CFI to Jeffrey T. Lacey, Esq. with all enclosures.
5. Letter dated July 3, 1986 form A.R. Cooter, Esq. of CFI to Jeffrey T. Laceyk Esq. with all enclosures thereto.
6. Letter dated September 5, 1986 from A.R. Cooter, Esq. of CFI to Jeffrey T. Lacey, Esq. with all enclosures thereto.
7. Letter dated October 16, 1987 from Joseph J. Zedrosser, Esq. for CFI to Maura Desmond, Esq.
8. Letter dated December 7, 1989 from William C. Robb, Esq. for CFI to Maura Desmond, Esq.
9. Letter dated December 13, 1989 from Maura Desmond, Esq. to William C. Robb, Esq. for CFI.
10. Letter dated December 15, 1989 from M.J. Brinkman, P.E. to Michael Sherman, Niagara Mohawk Power Corporation.
11. Letter dated January 25, 1990 from James Mickam, V.P., O'Brien and Gere to Michael Sherman, Niagara Mohawk Power Corporation.
12. Letter dated February 1, 1990 from John S. Cowan, Esq. for CFI to Records Access Officer (Foil Request).
13. Letter dated February 6, 1990 from William Weiss, Esq., N.M.P.Co. to Maura Desmond, Esq.
14. Letter dated February 28, 1990 from M.J. Brinkman, P.E. to [illegible]
15. Letter dated March 12, 1990 from Carl Calebrese, Councilman, Town of Tonawanda to Timothy Spellman, N.M.P.Co.
16. Letter dated April 19, 1990 from William Robb, Esq., CFI to Maura Desmond, Esq. and the Remcar Report as enclosure.
17. Letter dated April 25, 1990 from Cheryl Peterson, Esq. to William Robb, Esq. for CFI.

18. Letter dated May 2, 1990 from William Robb, Esq. for CFI to Cheryl Peterson, Esq.

19. Letter dated May 2, 1990 from William Robb, Esq. for CFI to Cheryl Peterson, Esq.

20. Letter dated May 16, 1990 from Cheryl Peterson, Esq. to William Weiss, Esq., N.M.P.Co.

21. Letter dated June 1, 1990 from William Weiss, Esq., N.M.P.Co. to Cheryl Peterson, Esq.

22. Letter dated June 5, 1990 from James Mickam, O'Brien and Gere to Michael Sherman, N.M.P.Co.

23. Letter dated June 21, 1990 from Cheryl Peterson, Esq. to William Weiss, Esq., N.M.P.Co.

24. Letter dated June 28, 1990 from John Cowan, Esq., CFI to Cheryl Peterson, Esq.

25. Letter dated June 29, 1990 from David P. Flynn, Esq. for Allied Signal, Inc. to Cheryl Peterson, Esq.

26. Letter dated June 29, 1990 from R. William Stephens, Esq., General Motors Corporation to Cheryl Peterson, Esq.

27. Letter dated July 3, 1990 from William Weiss, Engineer, N.M.P.Co. to Cheryl Peterson, Esq.

28. Letter dated July 10, 1990 from William Weiss Esq., N.M.P.Co. to Cheryl Peterson, Esq.

29. Letter dated September 11, 1990 from Maura Desmond, Esq. to William Weiss, Esq., N.M.P.Co.

30. Letter dated September 12, 1990 from Ronald Molene, Town Supervisor, Town of Tonawanda to M.J. Brinkman, P.E.

31. Letter dated September 13, 1990 from Leo Brausch, Remcor to Michael Couden, Esq., CFI.

32. Letter dated September 14, 1990 from William Robb, Esq., CFI to M.J. Brinkman, P.E.

33. Letter dated September 19, 1990 from David P. Flynn, Esq. Allied Signal, Inc. to M.J. Brinkman, P.E. including attachments.

34. Report to Congress on Special Wastes from Mineral Processing Volume II: Methods and Analyses, Office of Solid Waste, USEPA, July 1990.

35. Preliminary Master Plan for Cherry Farm prepared by Wendel Engineers for the Town of Tonawanda.

Section 11. Bibliography

Phase I Investigation

Niagara Mohawk/Cherry Farm
Prepared by: Engineering Science
April 1983

Phase II Investigation

Niagara Mohawk/Cherry Farm
Prepared by: O'Brien and Gere
October 1986

Remedial Investigation

Niagara Mohawk/Cherry Farm
Prepared by: O'Brien and Gere
July 1989

Feasibility Study

Niagara Mohawk/Cherry Farm
Prepared by: O'Brien and Gere
April 1990