2021 Hazardous Waste Scanning Project

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REMEDIAL INVESTIGATION (RI) REPORT
VOLUME I - TEXT

Niagara County Refuse Site
Wheatfield, New York

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JULY 1992

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CONESTOGA-ROVERS & ASSOCIATES

EXECUTIVE SUMMARY

Purpose of the Remedial Investigation

The primary objectives of the Remedial Investigation (RI) at the Niagara County Refuse Landfill Site (Site) were:

- To determine the nature and extent of any threat to the public health, welfare or to the environment by the release of hazardous substances and/or pollutants or contaminants from the Site.
- To compile a database to provide the basis upon which to conduct a feasibility study for any appropriate remedial courses of action for the Site.

Site Background Information

The Niagara County Refuse Landfill Site (Site), comprised of approximately 50 acres, is located along the eastern border of the Town of Wheatfield, Niagara County, New York and the western border of the City of North Tonawanda. The southern edge of the Site lies approximately 500 feet north of the Niagara River.

Refuse disposal operations were commenced at the Site in 1969 by the Niagara County Refuse Disposal District (NCR). The landfill was operated by completing excavations into the clay/upper till underlying the Site. The excavations were then filled with compacted solid waste. Wastes reported to have been disposed of at the Site include solid household, yard, institutional, commercial, industrial, demolition and construction, agricultural, sewage treatment plant sludges, street sweepings and tires. Municipal refuse and industrial wastes were comingled throughout the landfill.

In 1973 it was reported that NCR Disposal District constructed a Compacted Clay Barrier Perimeter Seal (Clay Seal) around the Site to seal off the shallow silt unit around the Site. In addition, two feet of clay were reported to have been placed on the side slopes and one foot of clay placed over the top of the landfill. The Site continued to be operated by NCR Disposal District until October 1976 at which time it was officially closed. Any exposed refuse was reported to have been covered with about 20 inches of dirt and clay and was graded.

The Town of Wheatfield acquired ownership of the Site on June 30, 1977.

Scope of Remedial Investigation

The characterization of the nature and extent of contamination at the Site was achieved through the completion of the following RI and additional field investigation activities:

i) Site reconnaissance visit;

ii) Topographic survey of the Site and surrounding areas;

iii) Property survey of the Site;

iv) Geophysical investigation consisting of an electromagnetic survey around the Site perimeter;

v) Collection of air samples from six points at two "worst case" areas of emission from the landfill for specific Target Compound List VOCs and SVOCs analysis;

vi) Completion of a qualitative biota survey at the Site and the immediately surrounding areas;

vii) Installation of two weirs to quantify surface water runoff from the Site;

viii) Excavation of three test pits;

ix) Installation of five shallow overburden, nine deep overburden and nine bedrock monitoring wells at the Site;

x) Collection of 26 subsurface borehole soil samples and three duplicate soil samples during monitoring well drilling for complete Target Compound List/Target Analyte List (TCL/TAL) analyses;

xi) Collection of two additional subsurface soil samples subsequent to monitoring well drilling from one monitoring well location for TCL VOC analyses;

xii) Collection of nine leachate samples and one duplicate leachate sample from seeps at the Site for complete TCL/TAL analyses;

xiii) Collection of 18 sediment samples and two duplicate sediment samples from the drainage swales at the Site for complete TCL/TAL analyses;

xiv) Collection of ten surface water samples and one duplicate surface water sample from drainage swales at the Site for complete TCL/TAL analyses;

xv) Completion of a minimum of 15 hand auger borings around the perimeter of the Site and submission of five discrete soil samples from the hand auger borings for complete TCL/TAL analyses;

xvi) Collection of two complete sets of discrete groundwater samples from the 23 new monitoring wells installed at the Site for complete TCL/TAL analyses;

xvii) Completion of purging and re-sampling of monitoring well location NCR-12D;

xviii) Completion of field permeability testing of all new wells by packer testing or slug or falling head tests; and

xiv) Completion of a field tile investigation in the field west of the Site.

Baseline Risk Assessment (BRA)

In accordance with the POP (CRA, 1990a), a Baseline Risk Assessment (BRA) was conducted using the RI and additional field activity data. The BRA characterized the current and potential threats to human health and the environment that may be posed by contaminants migrating to groundwater or surface water, releasing to air, leaching through soil, and bioaccumulating in the food chain. The results of the BRA will be used to help establish acceptable exposure levels for use in developing remedial alternatives in the feasibility study.

Summary of Major Findings

Based on the results of the RI and BRA, the following summary of major findings is presented:

1) Geologic units identified beneath the Site include:

   i) Comingled municipal and industrial solid wastes were disposed throughout landfill cells. The landfill cells are completed in the clay/upper till units.

   ii) A silt unit was present across the entire Site, outside the limits of the landfill cells, varying in thickness from approximately 1 to 8 feet with an average thickness of 4.2 feet. The perimeter of the landfill cells may also be surrounded by a Clay Seal which extends from the low permeable cap material down to the underlying clay unit.

iii) A clay unit was present beneath the silt unit at most locations, varying in thickness, where present, from 5.7 feet to 32 feet with an average thickness of 17.1 feet.

iv) An upper till unit was present beneath the clay unit across the entire Site varying in thickness from 3.5 feet to 30.5 feet with an average thickness of 12.9 feet.

v) A lower till unit was present beneath the upper till unit across the entire Site varying in thickness from 0.6 feet to 27 feet with an average thickness of 15.7 feet.

vi) The Vernon Formation, a highly weathered gray shale, was present beneath the lower till unit across the southern end of the Site.

vii) The Oak Orchard Formation, a highly weathered and fractured dolomitic bedrock was present beneath the lower till unit and/or the Vernon Formation across the entire Site.

2) Hydrogeologic units identified beneath the Site include:

i) Intermittent perched groundwater in the silt unit. This unit exhibited a horizontal hydraulic conductivity on the order of 10^{-6} cm/sec. This unit is not considered to be a productive, usable aquifer.

ii) The clay unit and the upper till unit are considered to be an aquitard. The clay unit exhibits a vertical hydraulic conductivity on the order of 10^{-8} cm/sec and is considered non-water bearing. The upper till unit exhibits a horizontal hydraulic conductivity on the order of 10^{-6} cm/sec which is not considered sufficient to be a reliable water supply unit. Horizontal groundwater flow in the clay/upper till aquitard is minimal. The principal direction of groundwater flow is downward, however, even this is minimal.

iii) The lower till unit exhibits a horizontal hydraulic conductivity on the order of 5×10^{-4} cm/sec and is considered water bearing. Horizontal groundwater flow in this unit is to the west/northwest, however, the flow rate is minimal due to a shallow gradient and the hydraulic conductivity. The lower till unit is not considered to be a viable, usable aquifer compared to the highly fractured underlying bedrock unit.

iv) The upper bedrock unit (Vernon and Oak Orchard Formations) is considered to be the uppermost usable aquifer beneath the Site. The upper bedrock aquifer is highly fractured and exhibits a hydraulic conductivity on the order of 10^{-3} cm/sec. The principal pathway for upper bedrock groundwater flow is via the fracture network within the rock. Horizontal groundwater flow in this unit is to the west/northwest, however, the flow rate is minimal due to a shallow gradient. The upper bedrock aquifer, in the vicinity of the Site, is recharged by the Niagara River.

v) Leachate mounding, approximately five feet above original ground surface, occurs within the landfilled material. The naturally low hydraulic conductivity of the surrounding shallow silt unit, and the Clay Seal if present, effectively limits horizontal migration of leachate into the silt unit. The clay/upper till aquitard underlying the landfilled material effectively limits vertical migration of leachate into the underlying upper bedrock aquifer. Leachate seeps, in the form of toe discharge from the side slopes, have ultimately developed.

3) 2,4,5-trichlorophenol was not confirmed in any of the chemical samples analyzed, therefore, a dioxin screening program is not required at the Site.

4) The ambient air quality across the Site is not expected to be above acceptable ambient air levels. Additional air monitoring for landfill gases may be necessary during the remedial design process.

5) The silt unit, and the Clay Seal if present, around the perimeter of the landfill, have minimized the potential for horizontal migration of chemicals in the silt unit from the Site. The clay/upper till aquitard underlying the Site has minimized the potential for vertical migration of chemicals from the Site. Therefore, the Site has had a limited adverse effect on surrounding subsurface soils.

6) The leachate generated at the Site is similar in characteristics to that generated in other municipal solid waste landfills in the United States. The leachate seeps have had, at most, a limited adverse effect on surface water or surface sediments in the on-Site perimeter swales.

7) The Site has had a limited impact on groundwater beneath the Site. The natural conditions (low hydraulic conductivity of the clay/upper till aquitard) at the Site have served to protect the upper bedrock aquifer in the area.

8) The clay/upper till aquitard underlying the Site has not been penetrated by landfilling operations and consequently, due to natural attenuation, provides an excellent barrier to leachate migration from the Site. The lack of prominent gradients in the upper bedrock aquifer and lower till unit have also greatly reduced the potential of groundwater to migrate from the Site. Consequently, any leachate entering the overburden groundwater flow regime will remain in place within the area of the landfill cells.

9) Ambient air quality across the Site was not expected to be above acceptable ambient air levels and bedrock groundwater quality was representative of background conditions. All remaining exposure pathways (e.g. surface water, surface sediments and leachate seeps) had calculated potential incremental cancer risks not greater than 1.0E-06 and Hazard Indices below 1.0. Therefore, all potential current or future exposure pathways at or near the Site are not considered to pose a threat to human health.

10) Leachate seeps are the principal media by which terrestrial animals and birds are potentially exposed to Site-related chemicals. The Site leachate seeps have had, at most, a limited adverse effect on surface water in the vicinity of the Site. Therefore, there is limited impact to flora and fauna.

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1.0 INTRODUCTION

The Niagara County Refuse Landfill Site (Site), comprised of approximately 50 acres, is located along the eastern border of the Town of Wheatfield, Niagara County, New York and the western border of the City of North Tonawanda. The southern edge of the Site lies approximately 500 feet north of the Niagara River. Figure 1.1 shows the location of the Site and Figure 1.2 presents a Site Plan of existing topographic conditions.

Refuse disposal operations were conducted at the Site by the Niagara County Refuse Disposal District (NCR) between 1969 and 1976. Wastes reported to have been disposed of at the Site include solid household, yard, institutional, commercial, industrial, demolition and construction, agricultural, sewage treatment plant sludges, street sweepings and tires.

The Site historically has been subject to both State and United States Environmental Protection Agency (EPA) studies and evaluations (see Section 2.3). The historical studies and Site evaluations contributed to ranking the Site under the National Priorities List (NPL) in 1983, with a Hazard Ranking System (HRS) score of 39.85 (40 CFR Part 300, Appendix B).

Pursuant to the Administrative Order on Consent Index #II CERCLA-90209 (AO), a Remedial Investigation (RI) of the Site was conducted between May 1990 and June 1991 by Conestoga-Rovers & Associates (CRA) on behalf of the PRP Committee.

The RI activities were conducted in accordance with the EPA-approved "Project Operations Plan", (POP) (CRA, 1990a), Quality Assurance Project Plan (QAPP) (CRA, 1990b) and the Health and Safety Plan (H&S Plan) (CRA, 1990c). As transmitted to the EPA in a letter dated May 25, 1990, the successful completion of the public meeting on May 23, 1990 served as the final approval date for the POP, QAPP and H&S Plan.

In October 1991, two additional Site investigation activities, outside the scope of the POP (CRA, 1990a), were conducted by CRA on behalf of the PRP Committee. The additional Site investigation activities were conducted in accordance with the EPA approved QAPP (CRA, 1990b) and H & S Plan (CRA, 1990c).

The primary objective of the RI and the additional Site investigation activities was to determine the nature and extent of any threat to the public health, welfare or to the environment by the release of hazardous substances and/or pollutants or contaminants from the Site.

This report is intended to summarize and present the information collected during the RI and the additional Site investigation activities and to provide the basis upon which to conduct a Feasibility Study for any appropriate remedial courses of action for the Site.

1.1 ELEMENTS OF RI REPORT

This RI report summarizes the data collected and the conclusions drawn from the investigated areas at the Site and includes, pursuant to the POP (CRA, 1990a), the following information:

- an updated Site description;
- Site maps;
- field investigation results;
- results of the hydrogeological modeling effort;
- chemical analyses results; and
- results of the baseline risk assessment.

1.2 BASELINE RISK ASSESSMENT (BRA)

In accordance with the POP (CRA, 1990a), a Baseline Risk Assessment (BRA) has been conducted using the RI data. The BRA, as specified in 40 CFR Section 300.430(d)(4), is required to characterize the current and potential threats to human health and the environment that may be posed by contaminants migrating to groundwater or surface water, releasing to air, leaching through soil, and bioaccumulating in the food chain. The results of the BRA will help establish acceptable exposure levels for use in developing remedial alternatives in the FS.

The BRA has been prepared and is presented in Section 7.0 of this report.

1.3 FEASIBILITY STUDY (FS)

The purpose of the Feasibility Study (FS) is to identify and evaluate potential remedial alternatives in order to select the appropriate Site remedy.

A FS Report will be prepared by CRA, on behalf of the PRPs, and submitted to the EPA under separate cover, following EPA approval of the RI Report. The FS Report will be prepared in accordance with the EPA's Guidance Documents for performing an RI/FS for CERCLA Sites (EPA, 1988a) and for performing an RI/FS for CERCLA Municipal Landfill Sites (EPA, 1991a).

2.0 BACKGROUND

This section provides a summary of the Site history and historic data base. Information presented in this section has been excerpted from the Ebasco Services Incorporated report prepared for the EPA (Ebasco, 1988), the Woodward-Clyde report (WCC, 1988) the Krehbiel-Guay-Rugg-Hall report (Krehbiel et al, 1973), and Draft Environmental Impact Statement, Wheatfield Lakes Project, (Pentad, 1988).

2.1 SITE LOCATION/LANDUSE

The Site, comprised of approximately 50 acres, is located along the western border of the Town of Wheatfield, Niagara County, New York and the eastern border of the City of North Tonawanda. The southern edge of the Site lies approximately 500 feet north of the Niagara River. Figure 1.1 shows the location of the Site and Figure 1.2 presents a Site Plan of existing topographic conditions.

The Site is situated in an area designated as "Zone C" by the Federal Emergency Management Agency under the National Flood Insurance Program. "Zone C" is outside the 100-year and 500-year flood boundaries and is defined as "areas of minimal flooding". Figure 2.1 presents the flood zones in the vicinity of the Site, as determined by the Federal Emergency Management Agency.

The drinking water intakes for the City of North Tonawanda, the City of Tonawanda and the Town of Lockport are located in the Tonawanda Channel of the Niagara River approximately two miles upstream of the Site. The Town of Wheatfield receives its water supply from the Niagara County Water Supply. The intake for the Niagara County Water Supply is located in the Chippawa Channel of the Niagara River on the west side of Grand Island. The Site is located approximately three miles upstream of the Niagara River drinking water intake for the City of Niagara Falls.

The Site is not serviced by any open public roads. The Site is accessed via an east-west paved roadway just south of the Site. Access to this roadway is restricted by a chainlink fence and locked gate located just off of Witmer Road, east of the Site. The chainlink fence and locked gate were installed by the City of North Tonawanda in 1990. Warner Avenue, an east-west street in the City of North Tonawanda, dead ends just to the east of the Site. A chainlink fence and locked gate were also installed at the end of Warner Avenue by the City of North Tonawanda in 1990. Only authorized personnel have keys for the gates. A gravel haul road exists to the south and west of the Site. This haul road is used primarily by transport trucks servicing the clay-mining operation to the north of the Site. Access to the Site is, therefore, restricted to authorized vehicular traffic, however, the Site may be accessed overland from adjacent lands by unauthorized personnel.

The Site is generally surrounded to the west by active farmland for the production of wheat and/or corn; to the north by wooded wetlands, a clay-mining operation, a Niagara Mohawk Power Corporation transmission line, and a right-of-way owned by the New York State

Department of Transportation (NYSDOT) which was intended for construction of an extension of the existing Lasalle Expressway; and to the east by woodlands and low density housing which is approximately 1,000 feet from the edge of the Site; and to the south by access roads, railroad tracks, River Road (NYS Route 265/384) and the Niagara River. Figure 2.2 presents a copy of the 1989 aerial photograph for the Site and surrounding area.

The lands to the immediate west of the Site consist of three active farm fields. An active field also exists to the immediate east of the Site, at the approximate midpoint of the landfill. The soils on these lands are classified as "prime farmland" and "additional farmland of state wide importance" by the Niagara County Soil Conservation Service.

To the immediate north of the Site is an emergent freshwater marsh. Stagnant water is present in this area throughout most of the year. Within this emergent marsh exists an area of vegetation which exhibits vegetative stress. The stressed vegetation consists mainly of mature upland species now within the limits of the emergent freshwater marsh. The fact that these mature trees are now in an area of standing water indicates that there has been some change in the surface drainage in the area. The landfilling operations are the likely cause for the drainage configuration changes. The resultant ponding is the probable cause of the vegetative stress.

A Niagara Mohawk Power Corporation transmission line runs east-west approximately 700 feet north of the Site. Also approximately 700 feet to the north and northwest of the Site there exists a major clay-mining operation. The clay-mining operation is being undertaken to create man-made lakes in support of future residential development as part of the Summit Park Development. The location of the Summit Park Development is shown on Figure 3.2. The lands to the west of the Site, including the three farm fields immediately west of the Site, are also part of the same development.

The lands to the immediate south of the Site include the gravel and paved access roads, as discussed above, a set of railroad tracks and River Road. Commercial and light industrial development exists along River Road in the vicinity of the Site.

The Gratwick-Riverside Park is located approximately 900 feet southeast of the Site. The Gratwick-Riverside Park is currently used as a public park, however, as will be discussed in Section 3.2, it was formerly a landfill site which operated between the period 1938 through 1968. The location of Gratwick-Riverside Park is shown on Figure 3.2.

Along Warner Road, approximately 1000 feet east of the Site, the landuse primarily consists of single and two-family dwellings with some commercial and light industrial development.

The remaining lands immediately adjacent to the Site consist primarily of woodlands and dry shrub-grassland. The woodlands consist primarily of deciduous hardwoods bordered by plants characteristic of transition areas between open and forested areas. The dry shrub grasslands include annual and perennial herbs and grasses and a number of trees and shrubs. Vegetation surrounding and on the Site is discussed in detail in the Vegetation and Faunal Survey Report presented in Appendix D.

2.2 SITE HISTORY

The area comprising the Site was part of a large farm (Demler Farms) until 1969. In 1969, the Niagara County Refuse Disposal District (NCR), formerly the Niagara County Solid Waste Disposal Agency, commenced refuse disposal operations at the Site. The NCR Disposal District services the entire County of Niagara excepting the Towns of Niagara, Cambria, Wilson and Newfane.

Solid waste was hauled to the Site by either municipal or privately operated collection systems. Refuse reported to have been disposed of at the Site includes solid household, yard, institutional, commercial, industrial, demolition and construction, agricultural, sewage treatment plant sludges, street sweepings and tires. Table 2.1 summarizes the types of industrial wastes reported to have been disposed of at the Site.

The Site was operated by NCR Disposal District until October 1976 at which time it was officially closed. Any exposed refuse was reported to have been covered with about 20 inches of dirt and clay and was graded.

The Town of Wheatfield acquired ownership of the Site on June 30, 1977.

Historical aerial photographs were obtained during the RI for the following dates: September 1951, August 1958, June 1966, May 1978 and May 1985. No historical aerial photographs were available during the period of operation of the Site (1969 to 1976). The historical aerial photographs confirm the area of the Site was farmed as early as 1951. The historical aerial photographs for 1978 and 1985 indicate that Site conditions are similar to those observed during the RI. As part of the RI, the Site and surrounding area was flown in 1989. A copy of the 1989 aerial photograph is presented as Figure 2.2.

2.2.1 Site Operations

As of October 1973, approximately 39 acres of the total 50 acres were landfilled. The area landfilled as of October 1973 is delineated on Figure 2.3. As shown on Figure 2.3, three excavated areas (Excavations 1, 4 and 5) were actively being landfilled (approximately 3 acres) in 1973. This included one disposal area at the northeast corner of the easternmost cell (Excavation 1), one disposal area near the center of the Site (Excavation 4) and one disposal area running north to south in the location of the waterline easement (Excavation 5). Based on the 1973 Operating Plan (Krehbiel et al, 1973) for the Site it is indicated that the waterline formerly crossing the Site has been excavated and was being backfilled with solid waste. This condition was confirmed by the test pit program conducted during the RI (see Sections 4.7 and 5.3.3).

The 1973 Operating Plan indicates that excavations for solid waste disposal were completed in clay/upper till at approximately 11 feet below original ground surface. Rock was not encountered in any of the landfill excavations. The excavations were then filled with compacted solid waste. All disposed solid waste was covered on a daily basis with approximately six inches of daily cover.

Prior to 1973, the top surface of the landfill was reported to be rough with numerous potholes in which water collected and led to excessive infiltration into the fill material. Since the landfill cells were completed in the clay/upper till units (which exhibit low hydraulic conductivity as determined during the RI), the infiltration resulted in significant leachate mounding within the landfill cells. Prior to July 1973, leachate was reported present in the standing water in the surrounding drainage swales, especially to the north and east sides of the Site.

2.2.2 Landfill Design/Operations Improvement

The NCR Disposal District undertook the following work, as specified in the 1973 Operating Plan (Krehbiel et al, 1973) commencing in July 1973, to minimize infiltration into the solid waste and leachate migration to surrounding drainage swales:

1. Application of a minimum of one foot of impervious cover material over the top surfaces of the entire Site except those areas being actively worked.

2. Application of a minimum of two feet of impervious cover on the side slopes of the Site.
3. Sealing the edges of the landfill with a clay barrier from the toe of the side slopes down to original clay soil.
4. Grading the top surface of the landfill to prevent accumulation of surface water including swale cleaning and other drainage improvements.
5. Removing all tires, barrels and other loose material to the working face for proper burial.

The above work was completed on previously landfilled areas in late 1973. It is important to note, as identified in Item 3. above, that a compacted clay barrier seal was installed around the perimeter of the landfill from the toe of the side slopes down to the top of the underlying clay. A typical detail of the Compacted Clay Barrier Perimeter Seal (Clay Seal) construction is illustrated on Figure 2.4. As shown on Figure 2.4, the Clay Seal is five feet wide with a variable depth, extending from the overlying compacted clay cover down to the underlying native clay.

Subsequent to issuance of the Operating Plan (Krehbiel et al, 1973) in October 1973, the northernmost cell (approximately eight acres) as shown on Figure 2.3, was excavated and filled with solid waste. It is presumed that this cell was constructed similarly to the previously landfilled areas, however, documentation of whether a Clay Seal was constructed around the northern cell is not available.

The northernmost cell was historically identified in the Ebasco report (Ebasco, 1988), as a "suspected industrial dump cell". However, no records are available which indicate that this area received exclusively industrial waste nor was it the only area to receive industrial waste. This was the only operating disposal cell at the Site between approximately 1974 to closure in 1976. Municipal type refuse has been identified in historical borings (EAST-C and -D) and new RI boring NCR-12D completed within this cell. These facts indicate that this cell received wastes similar to those disposed of in the other cells; that is, industrial waste and municipal waste were comingled. Analytical data generated during the RI also supports that the northernmost cell received wastes similar to those disposed of in the other cells. These data are discussed in Section 6.0.

2.3 HISTORIC SITE INVESTIGATIONS

Subsurface drilling and sampling programs have been conducted during various investigative programs conducted at the Site. These include borings completed by the United States Geologic Survey (USGS), NUS Corp., and EA Science and Technology (EAST) and are listed as follows:

April 1973:	Niagara County Health Department - sampling and testing of surface water. Samples were analyzed by NYS Department of Health (NYSDOH) in June 1973.
September 1980:	Surface water and sediment samples were taken and tested by the USEPA Region II Source Monitoring Program.

March 1981:	Surface water and sediment samples were taken and tested by Fred C. Hart Associates for USEPA Region II.
June 1981:	Surface water and sediment samples were taken and tested by NYSDEC.
1982:	Ten boreholes were drilled, samples taken and tested by USGS. Monitoring wells were installed in two of the boreholes.
1980, 1981, 1983:	Sediment, surface and groundwater samples were collected and tested by NUS Corporation for USEPA. In 1983 NUS installed five bedrock monitoring wells.
November, 1985, 1987:	EAST installed four monitoring wells within the landfill for NYSDEC. Samples were collected and tested.

In total, monitoring wells were reported to have been installed in 11 of the completed soil borings. However, only the following wells were located in the field during RI activities: EAST-A, -B, -C and -D and NUS 3 and NUS 5.

Figure 2.5 shows the approximate location of all historic soil borings and monitoring wells which were previously completed at the Site, including those completed by NCR Disposal District in 1969. Appendix A presents a summary of the available historic soil boring notes (notes are not available for all historic borings). The drilling and sampling programs are further discussed below.

In 1983, under the EPA (Field Investigation Team) FIT program, NUS Corporation installed five bedrock monitoring wells around the perimeter of the Site (locations shown on Figure 2.5). The monitoring wells were drilled ten feet into bedrock. The depth to bedrock varied between 35 feet and 55 feet below the ground level. Bedrock was found to be fractured in all five wells, and all were reported to have high rates of recharge.

In 1985, under a project for NYSDEC, EAST installed four monitoring wells within the landfill area. One well (EAST-C) installed in the northernmost cell was reported to be completed at approximately 551 feet AMSL. The fill in boring EAST-C was identified as gray ash, paper, oil, wire, plastic, gray solids, etc., resting directly on bedrock. However, based on data collected during the RI, bedrock in this area (NCR-12) was encountered at a depth of approximately 527 feet AMSL which is consistent with the elevation of bedrock noted across the Site. It is, therefore, presumed that the historic boring (EAST-C) encountered a large boulder, as was encountered during the drilling at location NCR-2 as part of the RI program. This presumption is also supported by the observations from a second monitoring well completed by EAST (EAST-D) in the northernmost cell which had not yet encountered bedrock by its completion at approximately 555 feet AMSL. The other two boreholes completed by EAST in other landfill cells indicate that the refuse varies in thickness from 15 to 39 feet, and rests on clay and till.

The Site has been the focus of several investigations by USEPA, NYSDEC and USGS since 1980, as summarized above. These investigations have focussed on limited sampling of on-Site soils, groundwater, drainage swale surface water and sediments, as well as some off-Site soil, surface water and sediment sampling. However, as discussed in the Ebasco report (Ebasco, 1988), historical analytical results are conflicting, and quality control is lacking in several instances. Therefore, the RI was designed to investigate the Site conditions without prejudicing it by basing it on conflicting historic data.

Table 2.2 presents a summary of the historical chemical data available for the Site. A sampling history is discussed below.

In 1973, the NYSDOH reported finding concentrations of heavy metals in leachate discharging into the Niagara River and in the River water 50 feet downstream of the discharge. A control sample taken from the River, 50 feet upstream of the Site, also was reported to contain significant concentrations of inorganic contaminants.

On September 9, 1980, USEPA Region II Source Monitoring Section collected two surface water samples and five surface sediment samples from the drainage swales on the Site and the discharge into the Niagara River. These analyses were reported to show negligible surface water contamination while the sediments showed the presence of bis(2-ethylhexyl)phthalate (2.3 mg/kg to 6.9 mg/kg), polycyclic aromatic hydrocarbons (PAHs) (0.017 mg/kg to 3.2 mg/kg) as well as low levels of PCBs (0.08 mg/kg to 0.32 mg/kg) (Ebasco, 1988). These sediment samples were collected from drainage swales at the Site, the ponded marshy area along the northern edge of the Site, and from the end of the storm drain pipe passing under River Road and into the Niagara River. Samples are reported to have been taken from areas with "good sediment deposition".

On March 18, 1981, Fred C. Hart Associates collected five surface water, three surface sediment samples and five soil samples in and around the Site. These samples were analyzed for priority pollutants. Surface water samples were reported to contain similar pollutants to samples taken in 1980 (phthalates, phenols, methylene chloride and others). Soil samples collected were reported to contain phthalates, PAHs, PCBs and other compounds. Also during 1981, Recra Research collected limited surface water samples at the Site and found few contaminants except for elevated concentrations of phenol (34 mg/L) (Ebasco, 1988).

In 1981, four surface sediment and four surface water samples were collected from drainage swales by the NYSDEC. The surface water samples were reported to contain copper, zinc, phenol, ethylbenzene, toluene and heptachlor (Ebasco, 1988).

In 1982, the USGS completed a series of ten boreholes and installed monitoring wells in two of the boreholes. Most samples collected within the landfill area indicated elevated concentrations of organic compounds, however, most samples collected along the perimeter landfill area did not. Three priority pollutants were found in surface sediment samples taken along the southern drainage swale and in groundwater from a well located on the eastern perimeter of the Site (Ebasco, 1988).

In 1983, NUS Corporation collected and analyzed five groundwater and nine surface sediment and water samples from drainage swales at the Site. No organic compounds were reported present in surface water samples, with the exception of methylene chloride, and no significantly elevated concentration of inorganic elements were reported to have been detected. Methylene chloride was also detected in several groundwater samples; however, as discussed in the Ebasco report (Ebasco, 1988), this may have been an artifact due to field decontamination procedures. Bis(2-ethylhexyl)phthalate was detected in one groundwater sample at 35 µg/L. NUS Corporation also reported endosulfan sulfate in one sediment sample at 268 µg/kg. No other organic compounds were reported to have been detected. Inorganic element concentrations in sediment and groundwater were reported not to be significantly above background concentrations (Ebasco, 1988).

In 1985, EAST sampled four monitoring wells installed within the landfill area. Elevated concentrations of volatile organic compounds (toluene, benzene, 4-methyl-2-pentanone, ethylbenzene, etc.) were detected. Elevated concentrations of semi-volatile organic compounds (phenols) were also detected. Wells in the northernmost cell of the landfill exhibited higher organic concentration levels. Metal concentrations (arsenic, barium, chromium, iron, lead, manganese and zinc) above NYS quality standards for class GA groundwater (drinking water source) were also detected. Total cyanide was detected at low levels. Ignitable substances were found in some of the drums sampled by EAST. Three wells were resampled in 1987 and analyzed for PCBs and pesticides. Available results indicated that no pesticides or PCBs were detected (Ebasco, 1988).

2.4 PRESENT CONDITIONS

The Site, consisting of six distinct landfill cells based on topography, is an elongated Site, approximately 50 acres in size, running north to south. It has a maximum length of 3,800+ feet and a maximum width of 720+ feet. The topography of the area surrounding the Site is flat, with an elevation of approximately 575 feet above mean sea level (AMSL). The landfill cover has eroded in several places causing solid waste to be exposed in some of the northern areas. Vegetation on the landfill cells includes annual and perennial grasses and pioneering herbs, shrubs, and trees. Plant species are identified in the Vegetation and Faunal Survey Report presented in Appendix D.

The six distinct landfill cells are mounded above the surrounding land and have a maximum elevation of approximately 597 feet AMSL. The six cells are separated and/or bounded by drainage swales and the on-Site access road, as shown on Figure 1.2 and Plan 1.

Perimeter drainage swales also surround the entire Site. Many of the swales are vegetated and/or heavily silted in. The swales contain both obligate and facultative wetland plant species, and also plant species characteristic of drier upland areas. This mixed plant community is a result of both the seasonally wet condition of the swale bottoms and the availability of higher and drier growing locations for opportunistic plants on the banks of the swales. Plant species found in the drainage swales are identified in Appendix D.

Only a small section of the perimeter swales contain water year-round. This is the N-S swale along the east side of the Site, adjacent to the NCR-6 well nest. All other swales contain water seasonally or after a heavy rain. Off-Site flow for surface drainage is possible from two points: a 30-inch diameter culvert beginning at the southwest corner of the Site which runs under River Road and discharges to the Niagara River; and, a 24-inch diameter culvert running under the Summit Park Development access road, 700 feet northwest of the Site.

At the north end of the Site an emergent freshwater marsh and wooded border exists. This area is dominated by Cattails and Purple Lossestrife. The wooded border of this emergent marsh contains Willow, Ash, Dogwood, and Arrowwood. Plant species found in this area are identified in Appendix D.

This emergent freshwater marsh is at the head of the Black Creek watershed. Water quality of Black Creek is designated as "Class C" by NYSDEC water quality classification standards, since it is a tributary of Bergoltz Creek, which is a tributary of Cayuga Creek. Cayuga Creek discharges into the Niagara River downstream of the Site.

Black Creek is a highly channelized, intermittent stream, flowing generally from east to west. Black Creek originates east of Ward Road, with smaller tributaries originating from Witmer Road south of Homeyer Road, and eventually empties into Cayuga Creek (Pentad, 1988). Much of Black Creek is nearly dry during large portions of the year except for isolated depressed areas in the woodlands along the Niagara Mohawk Power

Corporation right-of-way. These areas act to collect and hold water for the majority of the year, with flows being associated primarily with the wetter seasons and particularly rainfall events (Pentad, 1988).

As part of the Site reconnaissance performed during the RI, a total of approximately 30 leachate seeps were noted and documented at the Site. The leachate seeps observed at the Site are shown on Plan 2.

The Site was not secured by a security fence at the commencement of RI field activities. However, fence gates were installed during the RI at the southern entrance to the Site via the main access road and at the eastern entrance to the Site on Warner Avenue. Although the Site had been closed in 1976, refuse continued to be placed by unknown parties along the access road until the fence gates were installed. As specified in the POP (CRA, 1990a), a fence will be installed around the entire perimeter of the Site.

During the course of the RI, a total of approximately 40 metal warning signs bearing the legend "Danger - Hazardous Area - Authorized Personnel Only" were posted on and around the perimeter of the Site. The last 25 signs installed at the Site in November 1990 consisted of metal signs bolted to 7-foot long steel posts, which were set in concrete a minimum of two feet below ground surface. Due to vandalism, only eight signs remain posted at the Site as of August 20, 1991.

2.5 SOLID WASTE VOLUME

The volume of solid waste historically disposed of at the Site has been estimated utilizing the following information:

1. historic Site operation information;
2. historic borehole data;
3. new well NCR-12D borehole data; and
4. 1989 topographic conditions.

The volume of solid waste historically disposed of at the Site was also estimated based on the assumption that the landfill cell sidewalls were excavated at a slope of 1:1 (horizontal to vertical).

The volume of solid waste was then calculated for each landfill cell at the Site. Figure 2.5 identifies each of the six cells by number and Table 2.3 presents a summary of the area, estimated average solid waste depth and total solid waste volume for each cell. As summarized in Table 2.3, the total estimated volume of solid waste disposed of at the Site is on the order of 1,800,000 cubic yards.

2.6 CONCEPTUAL SITE MODEL

Based on the historical Site data, a conceptual Site model has been developed for the Site. Figure 2.6 presents a schematic diagram of the conceptual Site model. The conceptual Site model illustrates potential contaminant release and transport mechanisms and receptors potentially affected by the Site. The RI and additional field investigation activities were conducted to evaluate the potential contaminant release and transport mechanisms at the Site. The potential contaminant release and transport mechanisms are discussed in Sections 5.0 and 6.0 and potential receptors and associated potential risks are discussed in Section 7.0.

3.0 REGIONAL CHARACTERISTICS

3.1 PHYSIOGRAPHY

This section has been excerpted from the document entitled "Draft Final Remedial Investigation and Feasibility Study at the Gratwick-Riverside Park Site" dated September 1990 (URS 1990). The Gratwick-Riverside Park Site is located approximately 900 feet southeast of the Site, lying between River Road and the Niagara River and is within the same physiographic area as the Site.

As illustrated on Figure 3.1, the Site is located within the extreme western portion of the New York State physiographic province designated as the Erie-Ontario Lowlands (University of the State of New York, 1976). This province forms a band across the western half of New York State, lying east of Lake Erie and largely south of Lake Ontario. The province extends southward to the boundary with the hilly, higher relief province of the Appalachian Uplands. The Erie-Ontario Lowlands are characterized by relatively flat-lying, low relief topographic features. Surface elevations increase gently eastward and southward from Lake Erie and Lake Ontario and their respective lake levels of 570.5 feet and 244 feet AMSL. The major physiographic feature of the area is the east-west trending Niagara Escarpment which extends westward into Ontario and becomes discontinuous towards Rochester, New York to the east. The Middle Silurian Lockport Group (Dolostone) forms the Escarpment's resistant caprock.

Glacial erosion and deposition has significantly modified the topography of the Erie-Ontario Lowlands. In contrast with the Appalachian Uplands to the south, this region has undergone more extensive glaciation, in terms of both duration and frequency. The area has experienced repeated southward advance and northward retreat of the glacial ice margin, resulting in the deposition of a variety of glacial sediments. Regionally, the Erie-Ontario Lowlands are characterized by a series of long, parallel, elliptical-shaped hills termed drumlins, as well as recessional moraines and shoreline deposits.

3.2 REGIONAL GEOLOGY

A discussion of the regional geology is presented in this section. The regional geologic discussion includes a summary of previous geologic investigations conducted in the region and a presentation of the overburden and bedrock geology.

The information presented in this section and in Section 3.3 has been primarily excerpted from the following documents:

i) "Draft Final Remedial Investigation and Feasibility Study at the Gratwick-Riverside Park Site" dated September 1990 (URS 1990);

ii) "Remedial Investigation, Draft Final Report, 102nd Street Landfill Site, Niagara Falls, New York", dated November 4, 1988 (CRA, 1988a);

iii) "Hydrogeologic Evaluation of the 102nd Street Landfill, Final Report to Niagara Steering Committee, Ontario Ministry of the Environment" dated June 1984 (GTC, 1984); and

iv) "Draft Final SDCP Report, Revision 2, Buffalo Avenue Plant" dated October 1991 (CRA, 1991).

The Gratwick-Riverside Park Site is located approximately 900 feet southeast, or upstream, of the Site, lying between River Road and the Niagara River. The Gratwick-Riverside Park Site was formerly a landfill site operation between the period of 1938 and 1968. From 1968 to present time, the site is used as a public park adjacent to the Niagara River. Recreational water activities and on-Site facilities include boating, fishing, swimming, picnic and cooking areas.

The 102nd Street Landfill is located adjacent to the Niagara River, north of River Road, approximately two miles due west, or downstream, of the NCR Site. The 102nd Street Landfill was an old waste disposal Site operated by Occidental Chemical Corporation and Olin Corporation. A municipal landfill (Griffon Park) historically operated by the City of Niagara Falls is located immediately adjacent to the 102nd Street Landfill.

The Occidental Chemical Corporation's Buffalo Avenue Plant is located adjacent to the Niagara River, approximately five miles due west, or downstream, of the NCR Site. The Buffalo Avenue Plant is a manufacturing plant that has been in operation since 1911 and is approximately 130 acres in size. In the past, some areas of the plant were used for landfilling and dewatering.

Figure 3.2 shows the locations of the three sites in relationship to the NCR Site.

Due to the proximity of the Gratwick-Riverside Park Site, the 102nd Street Landfill and the Buffalo Avenue Plant with respect to the NCR Site, their regional geology and hydrogeology is similar to that at the NCR Site. In addition to these three sites, information gathered from the Summit Park Development (SPD) site, which is located approximately 700 feet northwest of the Site, and the Bell Aerospace Textron site, which is located approximately 1.9 miles northwest of the Site, has also been utilized in the following discussions. The SPD site and the Bell Aerospace Textron site are also located on Figure 3.2.

3.2.1 Surficial Geology

The Quaternary Geology Map of New York (Muller, 1977) indicates that the unconsolidated materials of the region predominantly consist of Pleistocene deposits of glacial origin, and lesser area of Holocene sediments. The distribution of these units is shown on Figure 3.3 and the stratigraphic relationship is presented on Figure 3.4. The Pleistocene deposits largely include morainal deposits and glaciolacustrine sediments, as well as a variety of sand and gravel deposits. The Holocene deposits consist primarily of lacustrine sediments. Other post-glacial deposition includes minor amounts of alluvium, beach sand and gravel, wetland deposits (peat and muck) and artificial fill. Excluding areas of artificial fill, the total overburden thickness is generally less than 50 feet in the area (LaSala, 1968).

The lacustrine/glaciolacustrine unit includes lake sediments deposited in meltwater ponds during and after the glacial retreat (Muller, 1977). Further detail on depositional environments associated with these deposits, and others subsequently discussed, may be obtained by LaSala (1968) and Muller (1977). Collectively, the lacustrine unit consists of fine-grained sediments including clay, silt and fine sand. The unit is described as thin-bedded to massive, and commonly possesses characteristics of cyclic bedding. Subsurface investigations conducted by the U.S. Geological Survey in 1982 also identified clay beds containing discontinuous sand and silt stringers (less than three feet thick) in the area (EPA, 1985).

The glacial till is mapped by Muller(1977) and LaSala(1968) as a widespread unit deposited predominantly as ground moraine with substantial amounts of end moraine. The ground moraine is largely lodgment till comprised of clay, silt, sand and larger grain sizes. Lodgment till, which is transported by and deposited beneath the glacial ice, is a typically poorly-sorted, compact and low permeable deposit. The end moraine deposits consist of stoney and gravelly ablation and lodgment till of variable thickness. Deposition is the result of melting of the glacial-ice edge. Deposits are poorly sorted and of variable permeability. The till unit generally overlies bedrock in the region.

3.2.2 Bedrock Geology

3.2.2.1 Lithology

The Niagara Region is underlain by a thick succession of Paleozoic sedimentary rocks which form the northern flank of the Alleghany basin. The Paleozoic strata dip toward the southeast at a slope of approximately 40 feet per mile. Bedrock exposure is controlled by glacial erosion as expressed by broad west trending bands, as shown on Figure 3.3, subparallel to the south shore of Lake Ontario. This pattern is interrupted by the Niagara Escarpment where much of the succession is exposed.

The stratigraphic succession beneath the region consists of rock ranging in age from Upper Silurian to Upper Ordovician. A schematic stratigraphic section illustrating the characteristics of these rock units and their stratigraphic relationships is presented on Figure 3.4. Stratigraphic nomenclature has been based upon the recommendations of Rickard (1975).

The uppermost regional bedrock units belong to the Salina and Lockport Groups and are illustrated on the generalized stratigraphic section presented as Figure 3.4. The characteristics of each formation are discussed in the following sections.

Salina Group

The Upper Silurian rocks of the Salina Group are exposed at surface along a broad east-west trending band extending from the northernmost tip of Grand Island to Buffalo (see Figure 3.5). The total thickness of this Group is approximately 350 feet; however, surface exposure is minimal in the Niagara Region. The Salina Group includes four formations. The uppermost, the Bertie Formation, consists of massive bedded to laminated, fine-grained, gray dolostones. The lower three formations, the Camillus, Syracuse and Vernon Formations, are primarily shale with some dolostone, siltstone, anhydrite and halite. The characteristics and thicknesses of these units are summarized on Figure 3.4.

The Geologic Map of New York (Rickard and Fisher, 1970) identifies the Camillus Shale as the youngest formation in the region. The Camillus Shale is found below the Bertie formation of the Salina Group which was deposited during the Upper Silurian System. The Camillus is a predominantly greenish-gray, thin-bedded shale interbedded with massive carbonate mudstone (green limestone and dolomite). Lenticular beds of gypsum are common and occur up to five feet in thickness and may extend three to four miles laterally. Thin lenses and veins of gypsum are also present in the formation. The estimated total thickness of the Camillus Shale ranges between 80 to 100 feet (Figure 3.4). The Vernon Formation is primarily green shale and is described as massive and poorly stratified. The average thickness of the Vernon Formation is approximately 200 feet (Figure 3.4). The Vernon Formation was the youngest (uppermost) formation encountered beneath the southern end of the NCR Site (see Section 5.1). The lower contact of the Salina Group with the underlying Lockport Group is conformable.

Lockport Group

In the Niagara Region, the Lockport Group consists of four distinct dolostone formations. In descending order, the formations are Oak Orchard, Eramosa, Goat Island and Gasport Formations. The stratigraphic characteristics of these formations are summarized on Figure 3.4.

The Oak Orchard Formation is considered to be time equivalent with the Guelph Formation in southern Ontario, but is distinguished due to minor textural variations (Zenger, 1965). The Lockport Group and particularly the Oak Orchard Formation are exposed at the surface beneath the region, except in the vicinity of the Niagara River Gorge. The hard resistant Oak Orchard Formation forms the caprock of the Niagara Escarpment and underlies most of the Niagara Falls area. The Oak Orchard Formation was encountered beneath the entire NCR Site (see Section 5.1). The estimated thickness of the Oak Orchard Formation ranges from 120 to 140 feet and is characteristically described on Figure 3.4.

3.2.2.2 Structure

The stratigraphic units in the area are generally flat lying between the Niagara Escarpment and Niagara Falls, New York. The regional dip is to the southeast at approximately 40 feet per mile between Niagara Falls and Lake Erie. A weathered and highly-fractured bedrock surface is common throughout the region and apparently occurs independent of bedrock lithology (Novakowski and Lapcevic, 1987).

Successive periods of tectonic activity during the Paleozoic, particularly the Appalachian Orogens (Acadian, Alleghenian), were responsible for the changes in the stress fields that have resulted in the fracturing of the bedrock underlying the Niagara Region. Glacial rebound is also a factor in the development of bedrock fractures. The fracture system may also be affected by the contemporary regional stress field in the Michigan and Allegheny Basins. The fractures in the Silurian bedrock consist of joints and faults. Two types of joints have been mapped in the region: bedding joints, which are parallel to the bedding of the rock, and vertical joints which cut across the bedding at approximately right angles (Johnston, 1964). These fractures are responsible for the waterbearing capacity of the bedrock. The waterbearing capacity of the bedrock is also enhanced by the glacial rebound and solutioning.

In the Lockport Group, Johnston (1964) mapped up to seven separate horizontal fracture zones during the construction of the New York Power Authority (NYPA) Power Conduits, which were excavated using open cut methodology. The bedding fractures are planar structures that are laterally extensive and were found to extend over distances of one to four miles. The bedding fractures consist of single joints or areas of rock up to one-foot thick which contain several individual joints.

Vertical joints in the bedrock are most common where fractures have been enlarged or created through stress relief. Previous studies of vertical joint sets in the Niagara Falls area have consisted of limited outcrop mappings. Johnston (1964) reported two prominent vertical joint sets in the Niagara Falls area, one oriented N 65°E and the other N 30°W.

The vertical jointing in the Lockport Group and other bedrock formations was formed parallel to a horizontal compressive stress field. The stress field was possibly due to paleotectonic events. However, a contemporary stress field exists in the Niagara Falls area and is oriented between N 50°E and N 60°E (International Joint Commission, 1974). Gross and Engelder (1991) suggest that the northeast orientation of joint sets in the Niagara Falls area are directly related and parallel to the N60°E contemporary stress field and concluded that the joints set were caused by neotectonic events.

3.3 REGIONAL HYDROGEOLOGY

The following subsections present regional data pertaining to the hydraulic properties and groundwater flow in the various geologic units, pertinent to the NCR Site.

3.3.1 Overburden Hydrogeology

The overburden materials in the Niagara Falls area are not important sources of domestic or industrial water. For the most part, the overburden materials consist of fine-grained lacustrine and glacial deposits. Given the low hydraulic conductivities of these materials, they are considered regional aquitards and groundwater flow within these units is restricted. Thin seams of silty or sandy materials within these units allow minor horizontal groundwater movement, although the seams are infrequent and typically not laterally extensive.

From the 102nd Street Evaluation performed by Geologic Testing Consultants Ltd. (GTC, 1984) the fine grained lacustrine and glacial deposits typically exhibit hydraulic conductivities ranging from 6.0×10^{-9} to 1.0×10^{-7} cm/sec and 7.0×10^{-9} to 6.0×10^{-6} cm/sec, respectively, as summarized in Table 3.1. Given the low hydraulic conductivities of these materials, they are considered regional aquitards and groundwater flow within these units is generally directed downward. The general hydraulic characteristics of the lacustrine silty clay at the NCR Site are similar to those at the Summit Park Development (SPD) located approximately 700 feet northwest of the NCR Site (see Figure 3.2). The lacustrine silty clay unit at the SPD was encountered at depths ranging from 0.5 feet to 11 feet BGS (Pentad, 1988). The hydraulic conductivity of lacustrine silty clay at the SPD is estimated to be less than 1×10^{-6} cm/sec (Pentad, 1988). Test borings conducted at the SPD indicate that the lacustrine silty clay is approximately 40 percent silt and approximately 60 percent clay (Pentad, 1988).

Although vertical flow of groundwater from the overburden to the bedrock occurs, particularly where the natural soil has been disturbed, vertical flow rates are generally not sufficient to significantly impact regional flow conditions in the bedrock. Groundwater obtained from the glacial deposits, on the Niagara Peninsula, has been dated at the age of the formation of these deposits (Desauliniers et al, 1981).

The recent alluvium material overlying the fine-grained lacustrine deposits exhibits a seasonally perched waterbearing zone. Due to the thin and shallow nature of the recent alluvium, it is primarily dependent upon surface water infiltration for its water source. The horizontal migration of groundwater through the recent alluvium does occur but is greatly reduced by the flat slope of the land surface and the groundwater preference to remain isolated in the depressed areas formed by the surface of the fine grained lacustrine deposits. From the 102nd Street Evaluation (GTC, 1984) the alluvium exhibits hydraulic conductivities ranging from 5.0×10^{-4} to 8.0×10^{-7} cm/sec.

Eleven surficial soil samples, representative of the alluvium, were collected at the Summit Park Development (SPD) site between March and September 1991. The soil samples were collected from stockpiled soils which had been excavated from 1 foot to 5 feet below ground surface (Mentley, National Corp., 1992). Grain size distribution and permeameter tests were performed on these samples. The results of the grain size distribution analysis are summarized in Table 3.2. Due to the proximity of the SPD site to the NCR Site, the surficial soils (alluvium) are assumed to be similar to those at the NCR Site.

The percent distribution range for gravel was 0 to 1.7 percent, sand was 4.5 to 48.4 percent, silt was 50.6 to 64.3 percent, clay was 24.5 to 39.1 percent and silt with clay was 50.6 to 56.6 percent (Huntington Analytical Services (HAS) Empire Soils Investigations, 1991). Permeameter tests were also performed on the surficial soil samples which indicated a hydraulic conductivity of 6.6×10^{-8} cm/sec at a differential gradient range of 2.7 to 5.1 lbs/in^2 (psi) (HAS - Empire Soils Investigations, 1991). Based on the grain size tests performed on the surficial soils from the SPD site, the alluvium in the vicinity of the Site is expected to exhibit 50 to 95 percent silt and clay content. Based on the permeameter tests performed on the surficial soils from the SPD site, the alluvium in the vicinity of the Site is expected to exhibit a hydraulic conductivity towards the lower limiting regional value of approximately 10^{-7} cm/sec.

3.3.2 Bedrock Hydrogeology

Groundwater sources are not extensively utilized in the Niagara County area due to the naturally poor water quality and the proximity of the Niagara River (see Section 3.6).

The general direction of regional groundwater flow in the Vernon Formation of the Salina Group is north toward Lake Ontario. Various forms of porosity typically provide the major portion of water bearing openings in the Vernon Formation. These include vertical fractures, and more commonly horizontal fractures (which primarily occur along bedding planes), carbonate solution cavities, and to a lesser extent, faults. The Vernon Formation (approximately 200 feet thick) underlies the unconsolidated sediments in the area, and is considered the most productive bedrock unit in the region. The Vernon Formation contains large amounts of gypsum, a highly soluble, calcium-sulfate mineral which plays an important part in the waterbearing properties of this formation. When gypsum is exposed to groundwater, the mineral is dissolved and rock openings are widened. In the Vernon Formation, gypsum largely occurs in thin beds and lenses; thus, the water bearing zones formed by solution processes are primarily horizontal. The Vernon Formation was encountered beneath the southern end of the NCR Site, and where encountered ranged from 7.5 to 23.0 feet in thickness (see Section 5.1).

A waterbearing zone consisting of weathered and fractured bedrock with gypsum solution openings exists at the bedrock/till contact and extends several feet below the bedrock surface. Well yields are reported as high as 1,200 gpm for industrial wells in the area (LaSala, 1968).

The Oak Orchard Formation belonging to the Lockport Group underlies the Vernon Formation. Transmissive fracture zones in the Lockport Group are capable of relatively high yields. However, groundwater obtained from the Lockport often contains elevated sulfur and other mineral content and is not used as a potable water supply (see Section 3.6). Groundwater from the Lockport is used for industrial purposes (i.e. cooling) within the region. Groundwater occurs within the Oak Orchard Formation in the following types of openings:

i) weathered surface fractures;
ii) bedding joints;
iii) vertical joints; and
iv) small cavities and vugs.

There are essentially two ways in which groundwater can flow through bedrock, horizontally and vertically. Horizontally, groundwater moves primarily through bedding plane fractures but also to some extent through small cavities and vugs. Johnston (1964) identified that bedding joints are the primary conduits of groundwater flow through this unit. The bedding plane fractures have been found to be areally extensive over several miles and that these fractures are known to affect groundwater flow several miles away. Several waterbearing bedding planes have been identified in the Niagara Falls area. The Oak Orchard Formation was identified to be present beneath the lower till unit and/or Vernon Formation at the NCR Site (see Section 5.1).

Vertically, groundwater flows through vertical fractures or faults generally created through stress relief caused by tectonic events and glacial rebound. Vertical movement of groundwater within the Lockport bedrock is quite prevalent. Hydraulic monitoring of well clusters at various sites within the region have shown both upward and downward vertical gradients throughout the Lockport. Some wells show gradient reversal due to the effect of the Power Conduits and Niagara River. Downward migration of groundwater from the Lockport Group to underlying bedrock formations, however, is minimal because of the immediately underlying Rochester Shale (Clinton Group). The Rochester Shale acts as a confining layer or aquitard, restricting downward groundwater migration.

In general, regional groundwater flow in the Lockport Group is toward the Niagara Gorge and Niagara River. Recharge occurs at the Niagara Escarpment and groundwater flows towards the Niagara River.

Individual well yields of the Lockport Group generally range from four to 90 gpm. Well yields in excess of 90 gpm are possible, however, their occurrence is rare.

The primary natural influences are the Niagara River and Gorge. Recharge from the River to the bedrock is most prevalent immediately upstream of the Falls where swift currents have eroded sediments from the river bed exposing the bedrock surface. Regional hydraulic conductivities found in the Lockport Group are summarized in Table 3.3 (GTC, 1984). The hydraulic conductivities range from 3.7×10^{-4} to 2.4×10^{-2} cm/sec.

3.4 REGIONAL SURFACE WATER FLOW

The following information pertaining to regional surface water flow has been excerpted from the Gratwick-Riverside Park Site Report (URS, 1990).

The Niagara River, with an average flow of 2,00,000 cubic feet per second (cfs), lies south of the Site. The River drains an area of about 88,000 square miles and is approximately 37 miles long. Between Lake Erie and Lake Ontario, the River drops about 328 feet with about one-half of the drop occurring at Niagara Falls.

At Grand Island, the River divides into two channels, the Chippawa Channel and the Tonawanda Channel, located west and east of

Grand Island, respectively, as shown on Figure 3.6. The Tonawanda Channel which passes south of the Site, is approximately 15 miles long and carries about 43 percent of the total River flow (86,000 cfs). During the navigation season (April/May through November/December), the Tonawanda Channel and Barge Canal, located upstream from the Site, withdraws an average of 1,100 cfs from the Tonawanda Channel.

The confluence of the Chippawa and Tonawanda Channels occurs at the north end of Grand Island to form the Chippawa-Grass Island Pool. The Niagara River level drops about three feet between the southern end of Grand Island and the Pool. At the present time, the Niagara River Treaty, as signed into effect in 1950 by the U.S. and Canada, mandates that the water level in the Pool be maintained as nearly as may be practicable to its long-term average elevation of 561 feet AMSL. This level is maintained with the aid of a control structure at the northern end of the Pool. The control structure consists of 18 gates and extends from the Canadian shore partway across the River. It is operated by the New York Power Authority (NYPA) and Ontario Hydro, under the direction of the International Joint Commission's International Niagara Board of Control.

3.5 CLIMATE

The following information pertaining to regional climate has been excerpted from the Ebasco report (Ebasco, 1988).

The reported mean annual precipitation in the region is 37.5 inches. August is typically the wettest month (4.2 inches) and February the driest (2.4 inches). On the average, the area receives measurable precipitation (greater than 0.01 inches) on 169 days of the year. Snowfall averages 93.2 inches annually with 68.4 inches being the maximum amount recorded in a single month. The mean annual temperature in the area is 47.6 degrees F. Temperatures remain above freezing an average of 150 days per year. The prevailing wind direction is from the west at 10 knots during the winter, and from the southwest at 9 to 10 knots during the summer.

3.6 WATER RESOURCES

No private or public wells are known to be in use in the vicinity of the Site (Ebasco, 1988). Surface water from the Niagara River is the sole source of water for the Town of Wheatfield (Ebasco, 1988), the City of North Tonawanda, the City of Tonawanda, the Town of Lockport and the City of Niagara Falls. The intakes for the City of North Tonawanda, the City of Tonawanda and the Town of Lockport are located in the Tonawanda Channel approximately two miles upstream of the Site. The Town of Wheatfield receives its water supply from the Niagara County Water Supply. The intake for the Niagara County Water Supply is located in the Chippawa Channel on the west side of Grand Island. The Site is located approximately three miles upstream of the Niagara River drinking water intake for the City of Niagara Falls.

As discussed in Section 5.2, the fractured bedrock (Vernon and Oak Orchard Formations) aquifer is considered to be the uppermost usable aquifer beneath the Site. Although the NYS Classification of the bedrock groundwater is Class GA (Drinking Water Source), there are no known existing private or public wells present in the vicinity of the Site due to naturally poor water quality and the proximity of the Niagara River.

The USGS monitors groundwater quality in the Lockport Group in the Niagara Falls area. Three USGS Lockport Group monitoring locations exist in the vicinity of the NCR Site: WF-1, WF-2 and PN-1. Monitoring location WF-1 is located approximately 2.8 miles to the northeast of the NCR Site, monitoring location WF-2 is located approximately 1.5 miles due west of the Site, and PN-1 is located approximately 4.5 miles east of the Site. Each monitoring location consists of multilevel piezometers. Figure 3.2 shows the locations of the multilevel piezometers relative to the NCR Site.

General groundwater quality data for the three multilevel piezometers, for the period October/November 1988, were obtained from the USGS. Table 3.4 summarizes the general groundwater quality data for each piezometer level at each monitoring location. Table 3.4 also lists the corresponding NYS Maximum Contaminant Levels (MCLs) or (MCLGs) for each parameter. Table 3.4 shows that the following parameters consistently exceed their respective NYS MCLs or MCLGs in the Lockport Group groundwater:

Sodium
Iron
Chloride
Total Dissolved Solids
Bromide
Sulphate
Sulfide

In most cases, the above parameters exceed their respective NYS MCLs or MCLGs by orders of magnitude.

The presence of these parameters, primarily sulphates, produce strong odors and forms a black precipitate when the groundwater is exposed to air. The water is generally only used for industrial purposes (i.e. non-contact cooling) within the region, and is unlikely to ever be used as a drinking water source based on groundwater quality.

3.7 CULTURAL CHARACTERISTICS

The Site is located along the eastern border of the Town of Wheatfield, Niagara County, New York and the western border of the City of North Tonawanda. The southern edge of the Site lies approximately 500 feet north of the Niagara River. Figure 1.1 shows the location of the Site.

The Site is bounded to the east by low density housing which is approximately 750 to 1,000 feet from the edge of the Site; to the north by wooded wetlands, a clay mining operation and a right-of-way owned by the NYSDOT which was intended for construction of an extension of the existing Lasalle Expressway; to the west by active farmland for the production of wheat and/or corn; and to the south by railroad tracks and River Road (NYS Route 265/384).

The City of North Tonawanda is the closest population center to the Site, and lies approximately 1.5 miles east of the Site. Total population of North Tonawanda, as reported by the town office, is 36,000 (Ebasco, 1988). The Site is located in the Town of Wheatfield which has a population of 9,600 (Ebasco, 1988).

4.0 RI ACTIVITIES

The characterization of the nature and extent of contamination at the Site was achieved through the completion of the field investigation activities as summarized below, designed to meet the specific objectives of the RI. The field activities included the following:

i) Site reconnaissance visit;
ii) Topographic survey of the Site and surrounding areas;
iii) Property survey of the Site;
iv) Geophysical investigation consisting of an electromagnetic survey around the Site perimeter;
v) Collection of air samples from six points at two "worst case" areas of emission from the landfill for benzene, chlorobenzene, vinyl chloride, methylene chloride, toluene and phenol analyses;
vi) Completion of a qualitative biota survey at the Site and the immediately surrounding areas;
vii) Installation of two weirs to quantify surface water runoff from the Site;
viii) Excavation of three test pits;
ix) Installation of five shallow overburden, nine deep overburden and nine bedrock monitoring wells at the Site;
x) Collection of 26 subsurface borehole soil samples and three duplicate soil samples during monitoring well drilling for complete Target Compound List/Target Analyte List (TCL/TAL) analyses;
xi) Collection of two additional subsurface soil samples subsequent to monitoring well drilling from one monitoring well location for TCL VOC analyses;

xii) Collection of nine leachate samples and one duplicate leachate sample from seeps at the Site for complete TCL/TAL analyses;

xiii) Collection of 18 sediment samples and two duplicate sediment samples from the drainage swales at the Site for complete TCL/TAL analyses;

xiv) Collection of 10 surface water samples and one duplicate surface water sample from drainage swales at the Site for complete TCL/TAL analyses;

xv) Completion of a minimum of 15 hand auger borings around the perimeter of the Site and submission of five discrete soil samples from the hand auger borings for complete TCL/TAL analyses;

xvi) Collection of two complete sets of discrete groundwater samples from the 23 new monitoring wells installed at the Site for complete TCL/TAL analyses;

xvii) Completion of purging and re-sampling of monitoring well location NCR-12D;

xviii) Completion of field permeability testing of all new wells by packer testing (bedrock wells) or slug or falling head tests (overburden wells); and

xix) Completion of a field tile investigation in field west of the Site.

A summary of the RI and additional field activities, with commencement and completion dates is presented in Table 4.1. The following subsections present detailed discussions of the RI and additional field activities. All RI and additional field activities, unless otherwise noted, were conducted in accordance with the EPA-approved POP (CRA, 1990a), the QAPP (CRA, 1990b) and the H&S Plan (CRA, 1990c).

It is to be noted that the initial analytical laboratory (Radian Laboratories Inc.) significantly exceeded acceptable holding times for the leachate, sediment, surface water, groundwater and test pit samples collected in September and October 1990. All samples for which holding times were exceeded are summarized in Table 4.2. As a result, these samples were recollected and reanalyzed on the dates specified in Table 4.1. All references to collection and analysis of the above samples in the following subsection, therefore, pertain only to recollected samples, where applicable.

It is also to be noted that Radian Laboratories Inc. ceased performing commercial analytical services part way through the RI field activities. It was, therefore, necessary to secure a second laboratory, Compu Chem Laboratories Inc., to perform analytical services for groundwater samples and a recollected test pit soil sample. The EPA approved the use of Compu Chem in a letter dated March 7, 1991. Although scheduling for the collection of two rounds of groundwater samples and performance of slug testing packer injection testing of monitoring wells were delayed as a result of the above, the overall schedule, as presented in the POP (CRA, 1990a) has been maintained.

4.1 SITE RECONNAISSANCE OVERVIEW

On Thursday, June 14, 1990, a Site inspection with representatives of CRA and Alliance Technologies Corporation (EPA oversight subcontractor, herein referred to as EPA representative) was conducted at the Site. The general layout and conditions at the Site were observed and the locations for the two surface water weirs were selected and mutually agreed to by CRA and the EPA representative. The weir locations are discussed in Section 4.6.

4.2 TOPOGRAPHIC AND PROPERTY SURVEY

A topographic survey of the Site and surrounding areas was completed October 6, 1989 by Abrams Aerial Survey Corporation of Lansing, Michigan. Plan 1, enclosed, presents a topographic map of the Site and surrounding area generated from the topographic survey data. The topographic map is drawn at a scale of 1" = 200', with ground surface contours provided at one-foot intervals.

The topographic map encompasses an area of approximately 300 acres; bounded on the south by the Niagara River, on the east to include residences on the east side of Witmer Road, on the north by the Niagara Mohawk Corporation right-of-way, and to the west by the access road to the Summit Park Development.

The Site, consisting of six distinct landfill cells, based on topography, is an elongated Site, approximately 50 acres in size, running north to south. It has a maximum length of 3,800+ feet and a maximum width of 720+ feet. The topography of the area surrounding the Site is flat, with an elevation of approximately 575 feet AMSL. The six distinct landfill cells are mounded above the surrounding land and have a maximum elevation of approximately 597 feet AMSL. The six cells are separated and/or bounded by drainage swales and the on-Site access road, as shown on Plan 1.

In June 1990, Niagara Boundary and Mapping Services of Lewiston, New York, a licensed land surveying firm in the State of New York, was contracted to survey the Site. As an integral part of this contract, a legal property survey was completed and the property lines and corners re-established in the field. Plan 3 shows the property boundaries of the Site. As illustrated on Plan 3, the landfill cells encroach upon properties to the west, east and south of the Site.

4.3 GEOPHYSICAL INVESTIGATION

As part of the RI at the Site, a geophysical investigation employing terrain conductivity instrumentation was performed between June 5, 1990 and June 9, 1990. The objectives of the survey were to define the extent of the landfill cells; to aid in the determination of the distribution of any subsurface contamination at the Site; and to establish a basis for the relocation of the groundwater monitoring well installations proposed in the POP (CRA 1990a).

The survey was conducted along a baseline placed by a licensed land surveyor and marked at 25-foot intervals, running parallel to the landfill cells. The survey was run at 10 meter (30-foot) spacing, with both vertical and horizontal dipole readings around the perimeter of the landfill. In areas exhibiting anomalous readings, a second parallel baseline was established 100 feet further from the landfill cells and additional readings were taken at 25-foot intervals along this second baseline for a distance sufficient to define the anomalous area. If anomalous readings were obtained along the second baseline, additional baselines at 100-foot offsets were run until readings were normal. A total of 14,410 feet of geophysical survey line was run at 10 meter (30-foot) separation around the landfill. Of this 14,410 feet, 5,200 feet were repeated at 20 meter (60-foot) separation on the 100-foot baseline marks. A detailed report of the results of the electromagnetic conductivity survey containing the data collected and an interpretation of same is presented in Appendix B.

The electromagnetic (EM) survey was successful in delineating the landfill cell boundaries and fill characteristics (i.e. metallic objects or highly conductive materials). The EM survey did not identify any subsurface contamination migrating from the Site; thus, the monitoring wells were installed at the proposed locations as identified in the POP (CRA, 1990a). Completion of resistivity soundings to assist in the assessment of subsurface distribution of contamination was determined not to be required.

4.4 AMBIENT AIR SAMPLING

Between July 5, 1990 and July 19, 1990, prior to the initiation of drilling activities at the Site, ambient air sampling was performed at two "worst case" areas of emission from the landfill, in accordance with the POP (CRA, 1990a) and the QAPP (CRA, 1990b). The two areas selected were mutually agreed to by the CRA and the EPA representative. The locations were based on a Site reconnaissance, which included real-time monitoring with instruments to assess potential emissions from sources such as leachate seeps and fissures in the cover of the landfill cells. As part of the Site reconnaissance performed for the air monitoring program, a total of approximately 30 leachate seeps were noted and documented at the Site. Plan 2, enclosed, locates all the leachate seeps observed at the Site.

Appendix C presents an Ambient Air Sampling report which details all air sampling activities. Section 4.11.1 discusses samples collected for quantitative chemical analyses.

4.5 BIOTA INVENTORY

Between July 17, 1990 and August 2, 1990, a qualitative inventory of vegetation and wildlife occurring on and immediately adjacent to the Site was performed in accordance with the POP (CRA 1990a) by Auld Environmental Associates (Auld). A copy of the report, prepared by Auld, which was previously submitted to the EPA in the progress report dated September 18, 1990, is presented in Appendix D. The results of this quantitative assessment of the Site and its environs were utilized to complete the environmental assessment portion of the Baseline Risk Assessment, discussed in Section 7.0 of this report.

4.6 WEIR INSTALLATION

On August 17, 1990, two wooden 90° V-notch weirs were installed at the drainage outflow points from the Site, selected during the initial Site reconnaissance visit (see Section 4.1). Figure 4.1 presents the weir locations.

One weir, herein referred to as the south weir, was installed across the north-south drainage swale, west of the Site, approximately 100 feet north of the inlet of a 30-inch diameter culvert pipe passing under River Road. This location was selected because it is upstream of a 24-inch diameter culvert pipe passing under the Summit Park Development project access road which carries off-Site drainage from the development site into the north-south swale along the east side of the access road. At this point, the development site drainage combines with any surface drainage from the Site. From here, the combined drainage flows in a southerly direction and passes through the 30-inch diameter culvert under River Road, ultimately discharging into the Niagara River, as shown on Figure 4.1.

A second weir, herein referred to as the north weir, was installed across the inlet of a 24-inch diameter culvert under a Summit Park Development access road off the northwest corner of the Site. This was determined to be the only point from which surface water flow from the north end of the Site can cross the Summit Park Development access road in a northwestward direction.

No flow over the south weir was observed until October 4, 1990. Thereafter, when flow over the south weir was observed, it was intermittent, and occurred only during heavy or prolonged rain events.

No flow over the north weir was observed until March 26, 1991. This occurred subsequent to a wet March, with approximately 1.2 inches of rain falling prior to this flow occurrence (March 23 to 26, 1991). From April 22/23, 1991, the flows over the north weir occurred after 3.99 inches of rain fell over a 72-hour period (ref.: NOAA Climatological Data Summaries for March and April 1991, Buffalo International Airport).

Over the winter months, both weirs were either frozen in or covered with snow and no measurement of flow over either weir was possible.

Table 4.3 summarizes the weir flow data collected during the RI field activities. Utilizing the height of water measured in the 90° V-notch weirs, the instantaneous and cumulative flow volume over the weirs can be calculated using the following equation (ref.: Fluid Mechanics):

$$Q = C_d 8/15\sqrt{2g}\tan\frac{\theta}{2}H^{5/2}$$

where, Q is the instantaneous flow over the weir;

θ is the angle of the V–notch (90°);

g is the gravitational constant (32.2 feet/sec^2);

H is the measured height of water in the V-notch (ft); and

C_d is the drag coefficient.

A 90° angle for the weir was selected because the variance in the coefficient C_d is low over a wide range of head heights. Based on the low flow rates over the weirs, C_d varied from approximately 0.58 to 0.60. Therefore, an average value for C_d of 0.59 was utilized for all calculations. Using the average value of 0.59 for the C_d, the above equation is reduced to:

$$Q = 2.524\, H^{5/2}\ (\text{ft}^3/\text{sec}).$$

Based on the maximum flows calculated and summarized in Table 4.3, it is estimated that the volume of surface water which flowed over the weirs over the period of August 17, 1990 to August 8, 1991 was 110,000 gallons over the south weir and 960,000 gallons over the north weir for a total of 1,070,000 gallons, with approximately 90 percent of the flow occurring in the period between March 26, 1991 and April 23, 1991.

4.7 TEST PITS

On September 20, 1990, three test pits were excavated at the Site using a Case 580E Extendable Backhoe. The locations of the test pits are shown on Figure 4.1. Stratigraphic logs for the three test pits are contained in Appendix E.

Test Pit #1 was excavated in a farm field, located approximately 300 feet west of the Site. This test pit was excavated to approximately 3.5 feet below ground surface (BGS) (0.5 feet into the native clay) to investigate the presence of desiccation cracks in the clay unit. The hole was extended by hand shovel an additional 0.5 feet to approximately four feet BGS. The condition of the clay observed Test Pit #1 is discussed in Section 5.1.

Test Pit #2 was excavated across a north-south swale at the south-end of the Site, situated between the two cells located south and west of the Site access road (see Figure 4.1). This test pit was excavated in an attempt to locate an abandoned waterline route which was reported to run along an easement through the Site in a north-south direction and to evaluate the potential for chemical migration along this abandoned utility route. Figure 4.1 illustrates the reported routes of the abandoned and the active waterlines at the Site. Figure 4.1 and Plan 3 identify the waterline easement location running through the Site. The excavation of Test Pit #2 was outside the scope of the POP (CRA, 1990a). The potential for preferential migration of contaminants along the abandoned waterline is discussed in Section 5.3.3.

Test Pit #3 was excavated at the northwest corner of the northernmost landfill cell to evaluate the potential for chemical migration along the active Town of Wheatfield waterline which runs in an east-west direction at this location (see Figure 4.1). This excavation extended to a depth of approximately five feet BGS. The Clay Seal presumed to have been installed around the northern cell, as discussed in Section 2.2.2, was not encountered during the excavation of Test Pit #3. As discussed above, the objective of Test Pit #3 was to evaluate the potential for chemical migration along the active Town of Wheatfield waterline; not to determine the presence of the Clay Seal. The potential for preferential migration of contaminants along the active waterline is discussed in Section 5.3.3.

4.8 MONITORING WELL INSTALLATIONS

Monitoring wells were installed at the Site between July 23, 1990 and September 12, 1990. All drilling activities and well installations followed the procedures specified in the POP (CRA, 1990a).

Empire Soils of Hamburg, New York installed all the monitoring wells using a variety of drilling rigs, including a CME 850 track-mounted rotary rig, a Failing F-10, an Acker AD-II, and a CME 55; the latter three being truck-mounted.

A total of 23 groundwater monitoring wells were installed at the Site; five monitoring the shallow silt unit, two monitoring the clay/upper till aquitard, seven monitoring the lower till unit, three monitoring the Vernon Formation (shale) unit, and six monitoring the upper 15-foot Oak Orchard bedrock interval encountered beneath the Site.

Figure 4.2 and Plan 4 present the locations of all monitoring wells installed as part of the RI activities. Monitoring well completion details are summarized in Table 4.4. Borehole stratigraphic logs and monitoring well instrumentation diagrams are presented in Appendix E. A summary of the stratigraphy encountered at the Site is presented in Table 4.5.

At the beginning of drilling activities at the Site, a sample of the potable water used for drilling and cleaning was submitted for analysis of the Target Compound List (TCL) and Target Analyte List (TAL) parameters. The sample was sent, under chain-of-custody, to Radian Laboratories, Inc. (Radian). The laboratory analytical data report is presented in Appendix F.

4.8.1 Decontamination/Drum Storage Facility

Prior to commencing drilling activities, Empire Soils constructed a decontamination/drum storage facility on the Site. The decontamination/drum storage facility was constructed in accordance with the POP (CRA, 1990a). The decontamination facility was utilized to perform all drilling decontamination activities. The drum storage area was utilized to store all drummed generated waste (soil cuttings, decontamination water and personnel protective equipment).

4.8.2 Drilling and Installation Procedures

Prior to initiating drilling at each location, an exclusion zone was established around the drill rig in accordance with the H&S Plan (CRA, 1990c).

To eliminate the potential for cross-contamination between drilling locations, the drill rig and all drilling equipment were steam-cleaned at the decontamination facility. Split spoons used for collection of soils for chemical analysis were also cleaned in accordance with the protocol specified in the QAPP (CRA, 1990b).

All soils cuttings from each location were placed into Department of Transportation-approved 55-gallon drums at the time of generation. Soil and protective wear were drummed separately and labelled accordingly. At completion of drilling at a well location, all drums were transferred to the drum storage area adjacent to the decontamination facility.

Every drilling location was accurately logged as to geologic conditions encountered, soil classification, stratigraphy, blow counts and moisture content. Soil samples were described and classified according to the Unified Soil Classification System (USCS). All soil and rock samples were retained for geologic record.

Air monitoring was conducted during active augering, soil sampling and coring. Soils from each borehole were screened using an HNU PI-01 photoionization detector to check for the presence of organic vapors. The results of this screening are noted on the stratigraphic logs contained in Appendix E.

4.8.2.1 Overburden/Vernon Formation Well Installations

At each well location, unless otherwise noted, the initial borehole was completed by continuous split spoon sampling in advance of

4 1/4-inch inside diameter hollow stem augering until spoon and auger refusal were encountered. A representative portion of each split spoon sample was retained for geological record, as discussed above.

Overburden/Vernon Formation boreholes were converted to overburden/Vernon Formation monitoring wells in the following manner:

A. Deep Overburden/Vernon Formation Monitoring Wells

A total of 12 deep overburden/Vernon Formation monitoring wells were installed to monitor the clay/till/Vernon Formation zones beneath the Site. These wells are designated NCR-1M, NCR-2I, NCR-2M, NCR-3M, NCR-4M, NCR-5M, NCR-6M, NCR-7M, NCR-8M, NCR-9M, NCR-10M and NCR-11M. Wells NCR-1M, NCR-2M, NCR-3M, NCR-4M, NCR-5M, NCR-6M and NCR-10M were installed in the lower till unit immediately above the Oak Orchard bedrock encountered beneath the Site. Wells NCR-7M, NCR-8M and NCR-9M were completed within the highly fractured shale (Vernon Formation) encountered beneath the southern end of the Site. Wells NCR-2I and NCR-11M were installed in the lower portion of the clay and the upper till units encountered beneath the Site. The wells were constructed and installed as discussed below.

A 5-foot long, 2-inch diameter #10 slot stainless steel well screen was threaded onto a 2-inch diameter stainless steel well riser. The assembled well was lowered through the 4 1/4-inch ID hollow stem auger to the bottom of the borehole. A sandpack, consisting of a #4 quartzite sand, and the bentonite seal and cement/bentonite grout, were then placed around the screen and riser through the augers, in conjunction with the removal of the augers from the borehole. The sandpack extended approximately two feet above the screened interval. The bentonite seal was approximately two feet thick. The wells were completed with aboveground lockable protective casings.

Two of the 12 wells installed monitor the lower portion of the clay and the upper till units encountered beneath the Site. These wells are NCR-2I and NCR-11M. Well NCR-2I was the first well installed at the Site. This well was installed to auger and spoon refusal at approximately 24 feet BGS. Subsequently, upon installation of the Oak Orchard bedrock well at this location, it was discovered that the top of the Oak Orchard bedrock was at approximately 50 feet BGS. It is presumed that well NCR-2I encountered a large boulder above the top of bedrock. Therefore, a supplemental deep overburden well was installed to monitor the lower till interval, and NCR-2I was maintained and added to the program. Monitoring well NCR-11M was also installed to auger and spoon refusal at approximately 19 feet BGS. The Oak Orchard bedrock well at this location, however, revealed that the top of the Oak Orchard bedrock to be at approximately 45 feet BGS. Six attempts to complete monitoring well NCR-11M below 19 feet were made without success due to bouldery till at this location.

Three of the 12 wells installed monitor a highly fractured shale (Vernon Formation) unit encountered beneath the southern end of the

Site. These wells are NCR-7M, NCR-8M and NCR-9M. The wells were installed at the base of the Vernon Formation at auger and spoon refusal, immediately above the underlying Oak Orchard bedrock.

B. Shallow Overburden Monitoring Wells

Five shallow overburden monitoring wells were installed to monitor the shallow silt unit beneath the Site. These wells were designated as NCR-2S, NCR-3S, NCR-4S, NCR-5S and NCR-13S and extended in depth from approximately five to 8.6 feet BGS. These wells were constructed and installed as discussed below.

A 2-foot long, 2-inch diameter, #10 slot stainless steel screen attached to a 2-inch diameter stainless steel riser was lowered through the auger to the bottom of the borehole. Monitoring well NCR-5S, which extended to 8.6 feet, had a 5-foot screen. A sandpack of #4 quartzite sand and a bentonite seal were placed through the augers in conjunction with auger removal. The cement/bentonite grout was poured into the borehole above the bentonite seal after pulling the augers. The sandpack extended from 0.5 to 1.0 foot above the screened interval and a 0.5 to 1.0-foot bentonite seal was installed. The shallow overburden monitoring wells were completed with aboveground lockable protective casings.

4.8.2.2 Oak Orchard Bedrock Well Installations

Oak Orchard bedrock monitoring wells were installed at six locations around the Site to monitor the upper 15-foot fractured Oak Orchard bedrock zone. These six wells, designated as NCR-2D, NCR-5D, NCR-6D, NCR-8D, NCR-11D and NCR-12D, were installed as discussed below. All wells were installed in conjunction with deep overburden/Vernon Formation wells, with the exception of well NCR-12D. Continuous split spoon sampling was conducted during augering of the overburden/Vernon Formation wells.

At each well location, 6 1/4-inch ID hollow stem augers were advanced to refusal. No split spoon sampling was performed during auger advancement, except at well NCR-12D or to collect a soil sample for a specific interval for chemical analysis (based on observations during overburden well installation). At well NCR-12D, continuous split spoon samples were taken as this was the only well installed at this location. At auger refusal, a 5 7/8-inch roller bit was used to drill a pilot hole at least two feet into the rock in which to seat the overburden casing.

A 4-inch diameter stainless steel casing was installed into the top of the Oak Orchard bedrock and grouted into place. Grouting was completed using the following procedures:

- A quick-set grout plug was placed into the bottom end of the 4-inch casing and allowed to fully harden. The 4-inch casing string was lowered through the augers and a tremie tube was placed to the bottom of the borehole, also inside the augers. To prevent the casing from floating, it was filled with water. The grout was then pumped to the bottom of the borehole through a tremie tube until grout was observed at the ground surface and the augers were removed from the borehole. Additional grout was added as the augers were pulled and the grout level was observed to drop. When the augers were fully removed, grout was added to approximately five feet below ground surface and the grout was allowed to harden for a minimum of 24 hours.

After the grout had cured for at least 24 hours, the Oak Orchard bedrock below the overburden casing was cored with a 3-inch diameter NX core barrel. The actual cored intervals ranged from 14.6 to 16.0 feet. The Oak Orchard bedrock coreholes were flushed with clean water at completion of coring to remove any rock flour and/or fragments from the hole. The Oak Orchard bedrock wells were completed without well screens, with the open coreholes being the monitored interval. Water return was collected for recirculation during coring and the approximate amount of water lost during each core run was measured. The Oak Orchard bedrock monitoring wells were completed with aboveground lockable protective casings.

4.8.3 Geotechnical Soil Samples

Thin-wall tube (Shelby Tube) soil samples of the undisturbed soils were collected during borehole completion from four locations at the Site. These samples were sent to Buffalo Drilling Company for geotechnical testing (grain size distribution, organic content, moisture content, bulk density, porosity and laboratory hydraulic conductivity).

Shelby Tube samples were successfully collected from NCR-2 (6 to 8 feet BGS), NCR-6 (18 to 20 feet BGS), NCR-7 (14 to 16 feet BGS) and NCR-10 (12 to 14 feet BGS). Unsuccessful attempts to collect Shelby Tube samples were made at NCR-1M (14 to 16 feet BGS) and NCR-4M (18 to 20 feet BGS), with both samples having no recovery. No attempt was made to take Shelby Tube samples from the remaining seven locations, due to the hardness and/or type of soil material encountered. Results of Shelby Tube geotechnical analysis are contained in Appendix G and are summarized in Table 4.6. The laboratory vertical hydraulic conductivities determined for the four Shelby Tube samples collected ranged from 4.1 x 10^{-8} cm/sec to 1.4 x 10^{-8} cm/sec, with a geometric mean of 3.0 x 10^{-8} cm/sec. Section 5.2 discusses the laboratory hydraulic conductivity results.

4.8.4 Well Development

Following installation, all monitoring wells with standing water were developed. The wells were developed in September/October 1990 using the well development protocols specified in the QAPP (CRA, 1990b). Four of the five shallow silt wells at the Site, NCR-2S, NCR-3S, NCR-4S, and NCR-13S, were dry at the time development was attempted. These four wells, however, were purged to dryness during subsequent sampling activities on at least three separate occasions.

All development was conducted using either a stainless steel bottom loading bailer, a peristaltic pump, a purge (airlift) pump, a bladder pump or a combination of these methods. Teflon tubing was used in all wells. Development equipment was decontaminated prior to use in each well in accordance with the protocols specified in the QAPP (CRA, 1990b).

Well development logs for all of the wells are presented in Appendix H. As noted on the logs, groundwater from two of the Oak Orchard bedrock wells NCR-5D and NCR-6D exhibited slight to strong sulfide odors. As discussed in Section 3.6, groundwater obtained from the Lockport Group contains elevated sulfide and other mineral content on a regional basis. Therefore, the sulfide odors noted at wells NCR-5D and NCR-6D are considered to be natural for this region.

4.9 HYDRAULIC CONDUCTIVITY TESTING

All monitoring wells were tested for in situ hydraulic conductivity of the materials within the monitored intervals, in accordance with the POP (CRA, 1990a). These tests involved the performance of falling and rising head tests in the overburden/Vernon Formation wells and packer injection tests in the Oak Orchard bedrock wells.

4.9.1 Overburden/Vernon Formation Conductivity Testing

The slug tests of the overburden/Vernon Formation wells were completed using a PVC slug of known volume which was quickly lowered until completely submerged in the well, resulting in a sudden rise in the water level equal to the displacement volume of the slug. The change in water level was then monitored until the original static level was reached. The slug was then quickly removed from the well, resulting in a comparable lowering of the water level. The rising water level was then measured until the original static level was again reached.

A pressure transducer and data logging system were used for the collection of hydraulic data for all overburden and Vernon Formation monitoring wells. Data was periodically transferred from the data logging unit to computer disk for use in later calculations.

Hydraulic conductivity values were calculated for all wells from the test data using the method developed and revised by Bouwer and Rice (1976) and revised by Bouwer (1989). The equation used was of the form:

$$K = \frac{r_c^2 \ln (R_e/r_w)}{2L} \frac{1}{t} \ln \frac{y_o}{y_t}$$

where,

$$\ln\left(\frac{R_e}{r_w}\right) = \left[\frac{1.1}{\ln(H/r_w)} + \frac{A + B\ln[(D - H)/r_w]}{L/r_w}\right]^{-1} \text{ for } D = H$$

$$\ln\left(\frac{R_e}{r_w}\right) = \left[\left(\frac{1.1}{\ln(H/r_w)}\right) + \left(\frac{C}{L/r_w}\right)\right]^{-1} \text{ for } D = H$$

K = Horizontal hydraulic conductivity of screened interval (cm/sec)
L = Height of the portion of well through which water enters (cm)
R_e = Effective radius over which y is dissipated (cm)
r_w = Horizontal distance from well center to original aquifer (cm)
r_c = Inside radius of casing if water level is above the perforated or otherwise open portion of the well (cm)
w_s = Static water table below top of casing (cm)
R = Difference from bottom of well screen to water table (cm)
D = Difference from impermeable zone to water table (cm)
y = Vertical distance between water level in well and equilibrium water table in aquifer (cm)
y_o = Determine off graph of $\ln y_t$ vs. t (cm)
y_t = Change of y with time (cm)
t = Time (sec)
A = From value of $L/{}^{r}{}_{w}$ (taken from Figure 3, Bouwer and Rice, 1976)
B = From value of $L/{}^{r}{}_{w}$ (taken from Figure 3, Bouwer and Rice, 1976)
C = From value of $L/{}^{r}{}_{w}$ (taken from Figure 3, Bouwer and Rice, 1976)

The data collected, the slug test calculations and the data graphs are presented in Appendix I, and the results of the calculations are summarized in Table 4.7. In the shallow overburden wells (silt unit) the water table was above the top of the well screens. In the wells completed in the lower portion of the clay and the upper till units, the lower till unit and the Vernon Shale, the piezometric surface was above the top of the well screens.

Table 4.7 shows that the hydraulic conductivity values for the shallow overburden (silt unit) wells range from 8.3 x 10^{-7} cm/sec to 2.8 x 10^{-5} cm/sec, with a geometric mean of 4.2 x 10^{-6} cm/sec; the clay/upper till unit wells range from 1.4 x 10^{-6} cm/sec to 2.2 x 10^{-6} cm/sec, with a geometric mean of 1.8 x 10^{-6} cm/sec; the lower till unit wells range from 3.6 x 10^{-6} cm/sec to 7.4 x 10^{-3} cm/sec, with a geometric mean of 3.1 x 10^{-4} cm/sec; and the shale unit wells range from 2.4 x 10^{-4} cm/sec to 7.0 x 10^{-3} cm/sec, with a geometric mean of 1.7 x 10^{-3} cm/sec.

4.9.2 Bedrock (Oak Orchard Formation) Well Hydraulic Conductivity Testing

Between June 3, 1991 and June 5, 1991, Empire Soils performed packer injection tests in all of the bedrock wells completed in the Oak Orchard Formation at the Site. The packer injection tests were performed in the following manner.

A single packer test assembly was lowered to the bottom of the well using a stem of drill rods until the packer was seated at the bottom of the overburden casing and the transducer inlet and water flow outlet was positioned at the approximate midpoint of the monitoring interval of the well. Attached to the packer assembly was a Telog pressure transducer which records the pressure exerted upon the transducer head by a column of water. Potable water was introduced into the hole using the drill rig pump to force water through the rods into the interval tested. Water was pumped at different flow rates based on the line pressures read at the surface and on the downhole pressures reflected by the pressure transducer. The rates of flow were measured using a water flow meter.

In general, five pressures were used to determine the rates at which water was introduced into the well. At least three different flow rates (or test steps) were used to comprise a valid test, with each of the test steps lasting between 10 to 20 minutes. At 1-minute intervals during each test step, a reading of the downhole pressure and the flow through the water meter were made and periodic verifications of the line pressure were made. The data from the packer injection tests are contained in Appendix J.

The data were used to calculate a hydraulic conductivity for the monitored interval of the well based on the changes in pressure observed and the water flow rates over a 5-minute period during each test step. The equation used (USBR, 1963) was of the form:

$$K = \frac{Q}{2 \pi L H_o} \ln \ (L/r_o) \quad \text{where } L \geq 10 r_o$$

or

$$K = \frac{Q}{2 \pi L H_o} \ln \ (L/2r_o) \quad \text{where } 10 r_o > L \geq r_o$$

where,
K = hydraulic conductivity (gpd/ft^2)
Q = rate of injection (gpm)
L = interval length (ft)
H_o = test borehole pressure (psi)
r_o = radius of the corehole (ft)

Where the pressure downhole exceeded the maximum readable pressure on the transducer, a value for H_o was derived by adding the pressure measured at the surface gauge, converted to feet, and the height of the water column in the discharge pipe above the static water level without consideration of friction losses in the discharge pipe (U.S. Department of Commerce, 1976).

The calculations for determining hydraulic conductivities are contained in Appendix J, along with the associated test data. A summary of the results are summarized in Table 4.7.

Table 4.7 shows the hydraulic conductivity values for the Oak Orchard bedrock wells range from 2.7×10^{-4} cm/sec to 3.4×10^{-3} cm/sec, with a geometric mean of 1.4×10^{-3} cm/sec.

4.10 WATER LEVEL MONITORING

Water level monitoring activities commenced at the Site on October 30, 1990, subsequent to completion of drilling activities and well development, and continued until April 19, 1991. A total of five water level monitoring events were performed over the approximate six-month period.

Water levels were measured in all monitoring wells installed as part of the RI, in four existing monitoring wells within the landfill cells (EAST-A, EAST-B, EAST-C and EAST-D) and in the Niagara River, immediately south of the Site. The water level data collected during the RI are summarized in Table 4.8 and are discussed in Section 5.2.

Water levels were measured in all monitoring wells to the nearest 0.01 foot using a QED Model 6000 electronic water level indicator. Prior to measuring the water level in each well, the water level probes were cleaned in accordance with the protocol specified in the QAPP (CRA, 1990b). Water levels in the Niagara River were measured to the nearest 0.01 foot relative to a surveyed point elevation along the shore of the Niagara River.

4.11 RI CHEMICAL SAMPLE COLLECTION

This section of the report presents a discussion of the type, quantity and collection methods used for the samples submitted for chemical analysis. Each type of sample collected, including air samples, soil samples (subsurface, sediments, hand-auger and test pit) and liquid samples (leachate seeps, surface water and groundwater) is discussed in the following subsections. Each subsection, where relevant, contains a discussion of the method of sample collection, quantity of samples collected and references and a summary table of samples submitted for chemical analysis.

All sampling locations for each type of sample collected are shown on Plan 5, enclosed with this report, as well as on individual figures referenced in the following subsections. The analytical data are discussed and assessed in Section 6.0.

4.11.1 Ambient Air Sampling

During July 1990, prior to initiation of drilling activities at the Site, ambient air sampling was performed, in accordance with the POP (CRA, 1990a), during two separate sampling events:

Air quality sampling was performed in two stages; the first stage was a Site reconnaissance with real-time monitoring instruments to assess potential emissions from sources such as leachate seeps and fissures in the cover of the landfill cells. The second stage was a chemical quantification of emissions from two selected sources agreed on by CRA and the EPA representative (Seep #5 and Seep #16) using solid and liquid sorbent methods for Site-specific parameters. Appendix C presents an Ambient Air Sampling report which details all air sampling activities.

During Round I, on July 11-12, 1990, the air in the vicinity of Seep #5, located on the northeast corner of the industrial cell, was sampled with air samplers set up directly over the seep, upwind of the seep and downwind of the seep. During Round II, on July 18-19, 1990, the air in the vicinity of Seep #16, located along the east side of the easternmost cell at the Site, was similarly sampled. In addition, a duplicate sampling setup was placed above Seep #16 to provide field quality assurance/quality control

(QA/QC) data. Plan 5, enclosed, shows the location of the air sampling stations.

The samples collected for chemical analysis are summarized in Table 4.9 for Round I samples and in Table 4.10 for Round II samples. The QA/QC samples collected are summarized in Table 4.11.

4.11.2 Subsurface Soil Sampling

Between July 26 and September 12, 1990, 26 subsurface soil samples and three duplicate soil samples were collected for chemical analysis. These subsurface soil samples were collected during installation of the monitoring wells at the Site using precleaned split spoon samplers in advance of hollow stem augering. The location of the monitoring wells are shown on Figure 4.2.

Soil samples for chemical analyses were selected based on HNU readings, visual evidence of contamination, soil grain size and water content. However, during the course of subsurface soil sample collection, the HNU meter exhibited functional problems due to humid weather conditions. In cases where the HNU experienced functional problems, visual evidence of contamination, soil grain size and water content were used as the basis for selecting samples for chemical analyses. All samples were selected with mutual agreement of both the CRA and the EPA field representatives and were considered to be those most likely to exhibit contamination and thus represent worst case conditions. The samples collected for chemical analysis are summarized in Table 4.12. Soil boring QA/QC samples collected are summarized in Table 4.13.

Based upon a review of the subsurface soil data (see Section 6.1.3) collected from NCR-5 (44.0 to 47.0 ft BGS), NCR-9 (2.0 to 6.0 ft BGS) and NCR-13 (0 to 0.8 ft BGS and 2.5 to 3.5 ft BGS), two additional soil samples were collected on August 8, 1991, from location NCR-13.

The samples were collected by hand excavating a hole immediately adjacent to well NCR-13S to a depth of approximately four feet BGS. A pre-cleaned stainless steel spoon was used to collect soil samples from the side of the excavation from the same intervals sampled during monitoring well installations. The two samples were analyzed for TCL VOC parameters.

4.11.3 Sediment Sampling

On November 27 and 28, 1990, 18 sediment samples were collected for chemical analysis from the drainage swales surrounding and traversing the Site. The sample locations are shown on Figure 4.3.

The samples were collected using a pre-cleaned stainless steel soil knife and/or spoon. Any surficial vegetation present was removed and the soil was dug out to a depth of six inches. This material was placed into a pre-cleaned stainless steel mixing bowl for homogenization prior to being placed into the sample container. No homogenization of soils for volatile organic analysis was performed. The soil material for volatile organic analysis was cut from the side of the 6-inch hole and placed directly into the appropriate jars.

Table 4.14 summarizes the samples collected for chemical analysis. Sediment QA/QC samples collected are summarized in Table 4.15.

4.11.4 Leachate Seep Sampling

On November 26 and 27, 1990, samples from nine of the leachate seeps present at the Site were collected for chemical analysis. Of the nine samples collected, seven were liquid and two were soil material. The sampling locations are shown on Figure 4.4.

The liquid seep samples were collected by digging a small hole downstream of the point at which the leachate breaks out of the landfill. These holes were allowed to sit for approximately one week, over which time leachate collected into the holes. The leachate was scooped out of the holes and poured directly into the appropriate sample containers using a separate clean wide-mouth glass jar for samples collected from each seep. The leachate was checked for the presence of sulfides using lead acetate test paper pre-moistened with acetic acid. The presence of oxidizers was also checked using potassium iodide-starch test paper. All leachate samples were non-positive for sulfides and oxidizers. Reagents and preservatives were added to the liquid samples as appropriate, per the specifications in the QAPP (CRA, 1990b). Samples collected for volatile organic analyses were not preserved with hydrochloric acid as the liquid effervesced upon addition of the acid. The samples were preserved at approximately 4°C until analyzed. Even though all the samples effervesced upon addition of the acid, the leachate samples, measured during the initial sampling event in September 1990, exhibited pH values ranging from 6.7 to 8.6 with a mean of 7.7. As such, the leachate varies from slightly acidic to slightly caustic.

At Seep #1 and Seep #3, no active seepage of liquids occurred during sample collection. At these locations, the stained soil from the area of the seep was collected, using a precleaned stainless steel spoon, in lieu of the liquid.

Table 4.16 summarizes the leachate samples submitted for chemical analysis. Leachate QA/QC samples collected are summarized in Table 4.15.

A seep (Seep #10) was noted along the north bank of an east-west trending swale along the west side of the landfill. The seep is located approximately 450 feet west of the closest landfill cell (see Figure 4.4). On July 16, 1991, CRA personnel excavated with hand shovels around Seep #10 location. Upon digging approximately six inches below the seep, a vitreous tile drainage line was discovered. This tile appeared to have an outside diameter of approximately six inches. The soil surrounding the tile underlying the seep was gray to black fine clayey-silt with an abrupt change to a silty sand, brown in color, away from the seep. A distinct leachate odor was noted emanating from the seep. Water under pressure was observed to be flowing upward from the tile as the tile was exposed.

The angle at which this tile intersected the swale indicated it originated in the direction of the south slope of the large soil mound located approximately half-way along the west length of the landfill. The actual extent, condition and route of this tile was determined during an additional Site investigation activity, performed outside the scope of the POP (CRA, 1990), in October 1991. This additional investigation activity is discussed in Section 4.12.2.

4.11.5 Surface Water Sampling

On November 28 and 29, 1990, samples of the surface water present in swales and wet areas surrounding the Site were collected for chemical analysis. Twelve sample locations were proposed for surface water sampling, however, two of these locations were dry at the time of sample collection. Therefore, ten surface water samples were collected and submitted for chemical analysis. The locations are shown on Figure 4.3.

All surface water samples were collected by immersing the sample containers directly into the water. All samples were checked for the presence of sulfides and oxidizers, as discussed for leachate samples. All surface water samples were non-positive for sulfides and oxidizers. The surface water exhibited pH values ranging from 6.7 to 7.8 with a mean of 7.4. Reagents and preservatives were added to surface water samples, as appropriate per the specifications in the QAPP (CRA, 1990a).

Table 4.17 summarizes the surface water samples collected for chemical analysis. Surface water QA/QC samples collected are summarized in Table 4.15.

4.11.6 Hand Auger Sampling

On November 30 and December 3, 1990, 17 soil samples of the shallow silt unit present at the Site were collected from various locations as shown on Figure 4.5. With the exception of hand auger sample locations 9, 10, and 11, which were collected from the farm field approximately 450 feet west of the landfill cells, it is not known whether the hand auger samples were collected from locations outside or inside the Clay Seal presumed to be present at the Site. After screening these samples with an HNU meter, five sample locations were selected based on the highest HNU readings, and one soil sample was subsequently collected using a hand bucket auger from each of these five locations for chemical analysis.

Table 4.18 summarizes the hand auger soil samples submitted for chemical analysis. Hand auger soil QA/QC samples collected are summarized in Table 4.15.

4.11.7 Test Pit Sampling

As discussed in Section 4.7, three test pits were excavated at the Site on September 20, 1990 at the locations shown on Figure 4.1. Two of these test pits were dug to investigate the potential for contaminant migration along abandoned and active waterlines in the vicinity of the Site, and the third test pit was excavated to investigate the presence of desiccation cracks in the clay material underlying the Site.

One sample from beneath the active waterline at Test Pit #3 was initially collected for chemical analysis on September 20, 1990. Due to laboratory exceedance of holding times, this sample was not analyzed by the laboratory. A replacement sample from the same location was collected, using a hand bucket auger, on April 30, 1991 during the second round of groundwater sample collection.

4.11.8 Groundwater Sampling

Two rounds of groundwater samples were collected from the monitoring wells installed at the Site as part of the RI, and submitted for chemical analysis. Round I groundwater samples were collected between March 14 and March 26, 1991. Round II groundwater samples were collected between April 23 and May 2, 1991. Each round included 23 groundwater samples and three duplicate groundwater samples. Groundwater samples were collected following monitoring well purging, using either precleaned stainless steel bottom loading bailers or bladder pumps. The locations of the monitoring wells are shown on Figure 4.2. An additional set of groundwater samples was collected from well NCR-12D in October 1991, as discussed in Section 4.12.1.

All groundwater samples were collected according to the following protocols, unless otherwise noted:

1. The water level in each well was measured to the nearest 0.01 foot prior to sampling that well. In some cases, water levels from recent groundwater measurement rounds were used to calculate the well volume.

2. Purging was conducted using a stainless steel bailer or a stainless steel bladder pump with a teflon bladder and teflon discharge tubing and air line. Purging and sampling equipment, with the exception of the tubing, was non-dedicated. Prior to use in each well, the non-dedicated equipment was decontaminated as per the procedures of the QAPP (CRA, 1990b). NCR-2I was purged using a peristaltic pump with dedicated tubing during Round I. A bailer was used during Round II.

3. Each monitoring well was purged of three to five well volumes, prior to sampling. Purging was considered complete when consistent pH, specific conductance and temperature measurements were obtained. If stability was not achieved, a maximum of five well volumes were removed from the well. Purging records were recorded in a bound field log book.

4. Any well in which the above purging procedures could not be used due to insufficient recharge was pumped or bailed to "dryness" and samples were obtained over a maximum of four days as recovery occurred.

5. All purge water was discharged onto the ground surface a sufficient distance from the well.

6. Upon completion of purging, groundwater samples were collected using a stainless steel bottom loading bailer or a stainless steel/teflon bladder pump with teflon tubing. All samples were collected directly into pre-cleaned laboratory supplied sample containers.

7. Samples were collected in the following order:
   - Volatile Organics;
   - Semi-Volatile Organics;
   - Pesticides and PCBs;
   - Cyanides;
   - Total Metals; and
   - Soluble Metals.

All samples were properly preserved after collection using reagents supplied by the laboratory. Preservatives were placed into the VOC vials prior to collecting VOC samples. A titration using Hydrochloric Acid (HCl) was performed to ascertain the VOC sample would have a pH of <2. All samples were checked for the presence of sulfides and oxidizers in accordance with the QAPP (CRA, 1990b).

No oxidizers were found in any of the groundwater samples. Sulfides were detected only in samples from NCR-6D. Additionally, pH, temperature and specific conductance were measured and recorded for each well during groundwater sampling. Field instruments for measurement of pH and specific conductance were calibrated each morning prior to use.

8. Samples for soluble metals analysis were field filtered prior to preservation to pH <2 with HNO_3. Field filtration was carried out using a disposable 45-micron in-line filter on wells sampled with a bladder pump and a field portable vacuum filtration kit and 45-micron disposable filter disks. The flasks were rinsed before use with a 10 percent nitric acid solution and deionized water. Sediment laden samples were pre-filtered prior to filtering with the 45-micron filter disks.

Round I and Round II groundwater samples collected for chemical analysis are summarized in Tables 4.19 and 4.20, respectively. Round I and Round II groundwater QA/QC samples collected are summarized in Tables 4.21 and 4.22, respectively.

4.12 ADDITIONAL SITE ACTIVITIES

Two additional Site investigation activities, outside the scope of the POP (CRA, 1990a), were conducted at the Site in early October 1991. These two activities included:

1) the purging and resampling of monitoring well NCR-12D; and
2) further investigation of the field tile identified west of the Site.

The following subsections summarize the objectives and field activities associated with the two additional investigations. Assessment of the data from the two additional Site investigations is discussed in Section 6.0.

4.12.1 Purging/Resampling Well NCR-12D

Well NCR-12D was installed through the northernmost solid waste landfill cell at the Site and monitors the upper bedrock (Oak Orchard) groundwater beneath the landfill. Figure 4.2 shows the location of well NCR-12D.

As discussed in Section 6.9.1, it was suspected that the presence of TCL parameters detected in well NCR-12D during Round I and Round II groundwater sample collection events (see Section 4.11.8) were probably due to leachate entering the bedrock during well installation. Therefore, the objective of resampling well NCR-12D was to determine if the TCL parameters measured in the well during the RI were due to leachate entering the well during installation.

In June 1991, a packer injection test had been carried out on well NCR-12D (see Section 4.9.2). During the test, approximately 500 gallons of potable water had been injected into the monitored bedrock interval to determine the hydraulic conductivity of the upper bedrock (Oak Orchard). It was recognized that this water could affect the concentrations of the parameters in the groundwater in the immediate vicinity of the well unless the well was first purged. Therefore, as agreed to by the EPA field representative, it was decided that in order to provide representative groundwater samples from well NCR-12D, at least three times the amount of water injected into the well would be removed prior to sample collection. That is, the well would be purged of at least 1,500 gallons prior to sample collection.

On October 1, 1991, the initial purging was accomplished using a Trico electric submersible pump. The pump was positioned approximately five feet from the bottom of the well and a pumping rate of 5 gallons per minute (average) was attained. Water quality was checked and recorded for each 250 gallons (on average) pumped. Table 4.23 summarizes water clarity, odor, pH and conductance recorded. The discharge from this pump was directed onto the top of the northernmost cell. No runoff to Site drainage channels was permitted to occur during pumping.

Pressure transducers were installed in well NCR-12D and well East-C to monitor water level fluctuations during the pumping. A drawdown of approximately 0.5 feet was observed in well NCR-12D. No drawdown was observed in well East-C. Telog Graphs and water elevation data are presented in Appendix O.

Approximately 1,680 gallons of water were pumped from well NCR-12D over a six-hour period. Subsequently, a groundwater sample and a blind duplicate sample were collected for chemical analysis. These samples were collected using a precleaned bottom loading stainless steel bailer lowered to the bottom of the overburden casing. During collection of the samples it was noted that the quality of the water was not the same as that pumped from the bedrock interval during purging. The water pumped during purging was clear and colorless with a slight to moderate sulfide odor; pH ranged from 6.8 to 7.5; conductance ranged from 230 to 330 µmhos/cm. In contrast, the water collected for chemical analysis was yellow and slightly cloudy with a leachate odor; with a pH of 9.0 and a conductance of 480 µmhos/cm. It became apparent that, due to the placement of the pump near the base of the well and to the low drawdown during purging, the stagnant water within the well casing above the top of the bedrock had not been removed. It was, therefore, decided not to submit these samples for chemical analysis and to purge the well again with the pump located near the top of the water column to remove stagnant water from the well.

Therefore, on the afternoon of October 2, 1991, approximately 980 additional gallons of groundwater were pumped from well NCR-12D over a 4 1/2-hour period. Again, a groundwater sample and a blind duplicate sample, NCR-12D-III and NCR-22D-III, respectively, were collected from the well for chemical analysis. The water quality during purging and sampling, as summarized in Table 4.23 was consistent: clear, colorless, slight H_2S odor, pH of 6.7, conductance of 810 µmhos/cm.

The two samples were analyzed for TCL/TAL parameters. The VOC samples were collected using a precleaned bottom loading stainless steel bailer. All other samples were collected using the submersible pump.

4.12.2 Field Tile Investigation

As discussed in Section 4.11.4, a seep (Seep #10) was noted along the north bank of an east-west trending swale located along the west side of the Site. The seep is located approximately 450 feet west of the closest landfill cell (see Figure 4.4). As part of the RI activities, CRA personnel excavated with hand shovels around Seep #10 location. Upon digging approximately six inches below the seep, a vitreous clay tile drainage line was discovered. This tile appeared to have an outside diameter of approximately six inches. The soil surrounding the tile underlying the seep was gray to black fine clayey-silt with an abrupt change to a sandy silt, brown in color, away from the seep. A distinct leachate odor was noted emanating from the seep. Water was observed to be flowing from the tile as the tile was exposed.

The angle at which this tile intersected the swale indicated that the tile originated in the direction of the landfill. The actual extent, condition and route of this tile was not determined during the RI activities. The tile was observed to terminate or be broken off in the swale.

As discussed in Section 6.4, a leachate sample, identified as Seep 10-R, was collected from Seep #10 during the RI. Two TCL parameters were detected in the sample, both below their respective NYS Ambient Water Quality Standards. Arsenic, however, was detected in the sample at a concentration of 0.0586 ppm, which is above its NYS Ambient Water Quality Standard of 0.05 ppm.

Therefore, the objectives of the additional field tile investigation were to determine:

1) the extent, condition and route of the field tile; and
2) whether the liquid within the tile had impacted soils around the tile or the sediments within the swale at the discharge point of the tile.

On October 2, 1991, the presence of the field tile leading to Seep #10 was investigated by excavating four test pits. Test pit locations are shown on Figure 4.6.

Test Pit #4 was excavated just south of the large soil mound at the Site, approximately 50 feet west of the landfill access road (see Figure 4.6). The test pit started approximately 15 feet south of the mound and ran to about 75 feet south of the mound. A vitreous clay drain tile was encountered at a depth of 5.2 feet BGS at the location shown on Figure 4.6. This tile was broken open and found to be dry. No odor was associated with the sediment deposited inside the tile. The angle and alignment indicated that this tile was not the one being investigated. The area around the tile was backfilled with clay and compacted using the bucket of the backhoe. Test Pit #4 was then backfilled using the excavated soil material.

Test Pit #6, located just north of the NCR-5 well nest, was then excavated in an attempt to locate the field tile in this area. The field tile was found at 3.4 feet BGS (invert of tile) resting on top of red-brown silty clay. The tile was broken open with the backhoe bucket, and flow from the tile into the excavation occurred. There was a distinct leachate odor noted and a dark black silt was apparent within the tile. A temporary clay plug was packed over the exposed tile to reduce the flow into the excavation. No samples for chemical analysis were collected from this pit location.

Test Pit #5 was excavated on the southeast side of the soil mound. Again, the field tile was located at a depth of 3.2 feet BGS (invert of tile) resting upon the top of the red-brown silty clay. When broken open, this tile was found to contain water and had a moderate leachate odor. A pH of this water measured 6.9; specific conductance was 1,080 µmhos/cm. A sample was collected from the liquid in the tile for analysis of the full TCL/TAL parameters. One soil sample (Tile 1) was collected from visibly stained soils immediately surrounding the tile and the second sample (TP5) was collected from visibly clean soils one foot beside and six inches above the tile. Both soil samples were collected for analysis of the full TCL/TAL parameters.

In Test Pit #5 and Test Pit #6 the field tile was severed and the area around the field tile in each pit was dug out and backfilled with clay to plug off any flow along the tile. The clay was compacted into this dug-out area with the bucket of the backhoe. The clay was obtained by skimming off the top of the native red-brown silty clay layer at the bottom of the test pit. Subsequently, each test pit was backfilled with the excavated materials.

Test Pit #7 was excavated on the east side of the soil mound to determine whether the field tile extended into the refuse material in the westernmost landfill cell. The field tile was encountered resting upon the red-brown silty clay at a depth of approximately 5.8 feet BGS (invert of tile). The test pit was then extended in a northeast direction toward the landfill cell, along the alignment of the field tile. At the west edge of the road, bordering the cell, refuse material consisting of rusted material, broken glass, rubber, etc. was encountered. The tile extended into this material. The digging was halted at the west edge of the road when the refuse material became wet and the seepage into the test pit increased. Again, the area around the tile was dug out and backfilled with clay to plug off any flow along the field tile. The clay was compacted into the excavated area with the bucket of the backhoe. The remainder of the test pit was backfilled with excavated soil material. No samples for chemical analysis were collected from the test pit location.

In the vicinity of Seep #10, one sediment, one soil and one surface water sample were collected as part of the field tile investigation for arsenic analysis. Sample Swale-1 was a composite sediment sample comprised of three aliquots collected from visibly stained sediments in the east-west swale, within a 1-foot radius of the tile discharge. Sample Seep-10R was a soil sample collected at the discharge point of the tile. Sample Seep-10 was a surface water sample collected from the discharge of the tile. This liquid was dark green in color, with a leachate odor; a pH of 7.4 and a specific conductance of 560 μmhos/cm were measured.

5.0 SITE CONDITIONS

5.1 SITE GEOLOGY

Based on data obtained during drilling activities, the Site geology can be divided into four stratigraphic units. They are:

1) Silt Unit;
2) Clay Unit;
3) Till Unit;
    a) Upper Till,
    b) Lower Till; and
4) bedrock
    a) Shale (Vernon Formation); and
    b) Dolostone (Oak Orchard Formation).

Geologic cross-sections A-A' through D-D', presented on Figures 5.2 through 5.4, illustrate the stratigraphy of the Site. Figure 5.1 illustrates the cross-section locations. Table 4.5 presents a stratigraphic summary for all RI monitoring well locations. The Site stratigraphy is consistent with the regional geology discussed in Section 3.2 and is further described below.

Silt Unit

A shallow, dark surface layer of organic loam material was typically present at a depth of up to approximately one foot below ground surface acrross the Site. Underlying the loam material, the silt unit was present across the entire Site and varied in thickness from approximately one foot at NCR-3S to eight feet at NCR-5S, with an average thickness of 4.2 feet. The soils ranged from dry to wet, but were predominantly dry at the surface, becoming moist or wet just above the underlying clay unit. The silt unit was typically orange to brown, fine to medium grained and based on initial visual observations during borehole completion (as noted in the logs in Appendix E) exhibited a trace to some silt and a trace to little clay. However, upon review of the archived soil samples and subsequent grain size analyses performed on five samples in July 1992 (see Table 4.6 and Appendix G), the silt unit exhibited medium to high amounts of silt ranging from 43 to 63 percent, some clay ranging from 6 to 26 percent and some sand ranging from 11 to 40 percent. As noted in Table 4.6, the silt unit samples submitted for grain size analyses were collected at depths ranging from 0 to 4 feet below ground surface (BGS). The high combined silt and clay content is confirmed by the low hydraulic conductivity values (geometric mean of 4.2×10^{-6} cm/sec) measured in the Site wells in this unit, as discussed in Section 5.2, and is supported by grain size analyses performed on surficial soil samples collected from the adjacent Summit Park Development (SPD) site. The SPD soil samples exhibited silt content ranging from 50.6 to 64.3 percent and clay content ranging from 24.5 to 39.1 percent (see Section 3.3.1 and Table 3.2). The surficial soil samples collected at the SPD site were taken from stockpiles which had been excavated from 1 foot to 5 feet BGS (Mentley, National Corp., 1992). As discussed in Section 3.3.1, due to the proximity of the SPD site to the NCR Site, the surficial soils at the SPD site are assumed to be similar to those at the NCR Site.

Clay Unit

A clay unit was found beneath the silt unit at most locations, with the exception of well locations NCR-5, NCR-8 and NCR-9. Where present, the clay unit varied in thickness from 5.7 feet at NCR-11M to 32 feet at NCR-6M with an average thickness of 17.1 feet. The clay was typically red-brown in color, soft, massive, with varying amounts of silt and occasional thin layers of fine sand. The clay unit was typically moist to wet. As discussed in Section 4.8.3, grain size analysis were performed on four clay soil samples obtained from well locations NCR-2, NCR-6, NCR-7 and NCR-10. As summarized in Table 4.6 the samples exhibited clay content ranging from 85.0 to 89.0 percent and silt content ranging from 9.8 to 14.2 percent.

As discussed in Section 4.7, Test Pit #1 was excavated approximately 300 feet west of the Site (see Figure 4.1) into the clay unit to investigate the presence of desiccation cracks in the clay unit. Based on Test Pit #1, no visual evidence of the presence of vertical cracking was observed (i.e. no vertical discoloration of the clay, no open or sand-filled vertical fissures), however, the upper 0.4 feet of clay was weathered (evidenced by horizontal gray and light brown streaking).

Till Unit

Till was encountered underlying the clay unit across the entire Site. The till was divided into two separate geologic units: upper till and lower till. The interpreted boundaries between the two till units were based on the borehole log information (ie. blow counts, visual descriptions of density and moisture content and silt/clay content). The criteria for defining the upper till unit were based on the following: blow counts per split spoon ranging between 20 and 49 blows; descriptions of the density and moisture content as medium dense to dense and dry to moist, respectively and fine to medium grained with a higher clay than silt content. The criteria for defining the presence of the lower till unit were based on the following: blow counts per split spoon greater or equal to 50; descriptions of the density and moisture content as extremely dense (hard) and moist to wet, respectively and medium to coarse grained with a higher silt than clay content. The upper and lower till units are subsequently described below.

a) Upper Till

Immediately underlying the clay unit under most of the Site, with the exception of well locations NCR-5, NCR-8 and NCR-9 where the clay unit is not present, is a horizon of medium dense, red-brown silty-sand or sandy-silt till (upper till unit). At well locations NCR-5, NCR-8 and NCR-9, the upper till unit immediately underlies the silt unit. The upper till unit contains varying amounts of clay and fine to medium subround or round gravel. At monitoring well locations NCR-5, NCR-8, NCR-9 and NCR-12, the coarseness of the till unit increases with depth (see Appendix E). The upper till was present in all monitoring locations with the exception of NCR-2 and NCR-7 (where only the lower till was present directly underlying the clay unit). The upper till unit ranged in thickness from 3.5 feet at NCR-1M to 30.5 feet at NCR-5M, with an average thickness of 12.9 feet. The upper till unit was typically dry to moist.

Top of clay and upper till unit contours have been constructed for the Site and are presented on Plan 6. The top of clay and upper till unit contours have been combined on Plan 6 because the clay was not present in all areas (NCR-5, NCR-8, NCR-9) and both the clay unit and the upper till unit exhibit similar hydrogeologic properties, as discussed in Section 5.2. The combined average thickness of the clay/upper till units is approxiatley 30 feet. The top of the clay unit and upper till unit contours could only be constructed for areas to the west and north of the Site. Past excavation and disposal operations have altered the top of the clay unit and upper till unit elevations beneath the Site and insufficient data are available to plot the contours to the east of the Site. Along the western side and northern end of the Site, the top of the clay/upper till gently slopes to the west and north, respectively, at approximately one foot per 100 feet, or one percent.

b) Lower Till

Immediately below the upper till, the coarseness increases with depth which consists of extremely dense, hard red-brown silty-sand or sandy-silt till (lower till unit). At well location NCR-8 augering through boulders was experienced within the lower till unit from 12.5 to 30 feet BGS. The lower till unit ranged in thickness from 0.6 feet at NCR-10M to 27 feet at NCR-11M, with an average thickness of 15.7 feet. The lower till unit was typically moist to wet.

Bedrock

a) Shale (Vernon Formation)

A highly weathered gray shale was encountered beneath the lower till unit at three well locations: NCR-7, NCR-8 and NCR-9. These wells are located in the southern portion of the Site, as shown on Figure 5.1. At these three locations, the shale bed ranged from 7.5 to 23.0 feet in thickness. The shale contained high amounts of interstratified fine sands and silts, and trace amounts of gypsum and fine rounded gravel. The shale bed was identified as the Vernon Formation of the Salina Group (see Section 3.2.2). The shale bed was found to be waterbearing.

b) Dolostone (Oak Orchard Formation)

Below the lower till unit and/or shale is the Oak Orchard Formation of the Lockport Group; a dolomitic bedrock, which is a hard, dense, massive and fine to medium grained stone. The upper portion of this formation is highly weathered and contains numerous fractures. Occasional gypsum and chert was found, as were interbedded thin shale units. The monitored portion of this bedrock (upper 15 feet) was found to be waterbearing.

Top of bedrock contours have been plotted for the Site and are presented on Plan 7. The top of the Vernon Shale found in monitoring wells NCR-7M,-8M and -9M and the top of the Oak Orchard Formation in the other bedrock wells were used to construct the contours on Plan 7. The depth to the top of the Oak Orchard Formation is typically on the order of 50 feet below the original ground surface, with an elevation of approximately 525 feet AMSL while the Vernon Shale, where present, is typically 30 feet below the original ground surface with an elevation of approximately 545 feet AMSL. The presence of the Vernon Formation and the Oak Orchard Formation encountered beneath the Site is consistent with regional bedrock lithology discussed in Section 3.2.2.1.

5.2 SITE HYDROGEOLOGY

The four geologic units identified at the Site are categorized into the following four hydrostratigraphic units:

1) Silt Unit;
2) Clay Aquitard;
3) Till Unit;
    a) Upper Till Aquitard,
    b) Lower (Basal) Till; and
4) Bedrock Aquifer;
    a) Shale (Vernon Formation),
    b) Dolostone (Oak Orchard Formation).

The clay and upper till are considered to be one hydrostratigraphic unit because of similar hydrogeologic properties. Similarly, the Vernon Formation and the Oak Orchard Formation are considered to be one hydrostratigraphic unit because of similar hydrogeologic properties. The four hydrostratigraphic units are discussed below.

Silt Unit

The silt unit is a perched groundwater stratum. The unit has limited available groundwater as evidenced by the fact that some of the monitored wells completed in this unit are dry at certain times of the year (see Table 4.8). The maximum saturated thickness in this unit was measured in well NCR-5S, and varied from 4.2 feet to 6.6 feet, over the course of the RI. A review of Table 4.8 indicates that the seasonal groundwater fluctuations in the silt unit ranged between approximately 0.6 feet and 6.5 feet within particular wells, over the course of the RI. The low water levels were exhibited in the fall monitoring events and the high water levels were exhibited in the spring monitoring events (see Table 4.8). The primary source of water in this unit is from infiltration of precipitation. This is consistent with the regional overburden hydrogeology discussed in Section 3.3.1.

The limited availability of water in this unit is also consistent with the conditions encountered in the Summit Park Development (SPD) site, approximately 700 feet northwest of the Site. At the SPD site, large excavations have been cut into the upper overburden units penetrating through the silt unit and well into the underlying clay. The contractor performing the excavations has noted that there has been very little groundwater entering into the excavations. In fact, almost all of the contractor's water handling activities within the excavations are the result of precipitation events. The contractor expects that once the excavations are complete and transformed into lakes, the lakes will be entirely dependent upon surface water flow.

As discussed in Section 4.9.1, the geometric mean horizontal hydraulic conductivity of the silt unit is 4.2 x 10^{-6} cm/sec (see Table 4.7). The low hydraulic conductivity of this unit is attributed to the unit's silt (43 to 63 percent) and clay (6 to 26 percent) content (see Section 5.1).

The hydraulic conductivity value of 4.2 x 10^{-6} cm/sec is at the low range of the regional values presented in Section 3.3 (4.0 x 10^{-4} cm/sec to 8.0 x 10^{-7} cm/sec), however, it is higher than the vertical hydraulic conductivity (6.6 x 10^{-8} cm/sec) determined for similar material collected from the SPD site. Horizontal hydraulic conductivities in fine-grained materials are typically approximately one order of magnitude higher than vertical hydraulic conductivities, therefore, the geometric mean hydraulic conductivity determined for the Site is consistent with that determined for the SPD site.

Based on the low hydraulic conductivity exhibited by this unit and due to the fact that there is a limited source of water, very little lateral groundwater flow is expected to occur in this unit. Any horizontal groundwater movement that does occur in this unit will follow the topography of the underlying clay/upper till aquitard at the Site. Similarly, the low hydraulic conductivity of the silt unit should effectively limit the migration of leachate that may enter this unit. Horizontal migration of leachate in this unit is discussed further in Section 5.3.3.

Based on the top of the clay/upper till aquitard contours presented on Plan 6, groundwater flow in the silt unit along the western and northern edges of the Site will be towards the west and north, respectively. The slope of the top of the clay/upper till aquitard to the east and south of the Site is not known, therefore, groundwater flow direction in the silt unit in these areas cannot be predicted. The horizontal hydraulic gradient in this unit was not determined because the placement of the shallow wells was constrained to the perimeter of the landfill.

As would be expected, a downward vertical hydraulic gradient exists between the silt unit and the underlying clay, till and bedrock units. However, due to the low vertical hydraulic conductivities exhibited by the clay (10^{-8} cm/sec) and upper till (10^{-6} cm/sec), very little vertical movement of groundwater is expected to occur.

Due to the limited saturated thickness of this unit, its low hydraulic conductivity and the fact that groundwater is intermittently present in this unit, the silt unit is not considered to be a productive usable aquifer.

Clay/Upper Till Aquitard

The clay unit and the upper till unit encountered beneath the Site are considered to be hydrostratigraphically connected since they exhibit similar hydrogeologic characteristics. As discussed in Section 4.9.1, the two clay/upper till unit wells installed at the Site exhibit horizontal hydraulic conductivities of 1.4×10^{-6} cm/sec and 2.2×10^{-6} cm/sec with a geometric mean of 1.8×10^{-6} cm/sec. As discussed in Section 4.8.3, the vertical hydraulic conductivities determined from four Shelby Tube samples from the clay unit ranged from 4.1 x 10^{-8} cm/sec to 1.4 x 10^{-8} cm/sec, with a geometric mean of 3.0 x 10^{-8} cm/sec. These are approximately two orders of magnitude lower than the horizontal hydraulic conductivities calculated for the clay/upper till unit wells, NCR-2I and NCR-11M for the slug test data. The lower vertical hydraulic conductivity is typical of many geologic deposits, especially glacial till. The difference in the hydraulic conductivities between the two test methods may also be attributed to the fact that well NCR-2I is completed at a depth where the clay is interspersed with sandy layers. Well NCR-11M is completed in the upper till unit. On the other hand, the Shelby Tube samples were taken from soil strata that were basically clay.

The hydraulic conductivities for the clay unit and the upper till unit are consistent with the regional values (6.0 x 10^{-6} cm/sec to 6.0 x 10^{-9} cm/sec) presented in Section 3.3.1 and summarized in Table 3.1.

Based on the hydraulic conductivity exhibited by the clay unit and the upper till unit, they are considered to be an aquitard and are considered to be non-waterbearing. As discussed in Section 3.3.2, groundwater within the glacial deposits on the Niagara Peninsula has been dated at the age of the formation of the deposits (Desaulniers et al, 1981).

Lower Till Unit

The lower till unit is coarser than the upper till unit and consequently exhibits a higher hydraulic conductivity. As discussed in Section 4.9.1, the hydraulic conductivity of the lower till unit ranges from

3.6×10^{-6} cm/sec to 7.4×10^{-3} cm/sec, with a geometric mean of 3.1×10^{-4} cm/sec. The lower till unit is, therefore, considered to be waterbearing.

Groundwater level measurements (see Table 4.8) taken in the lower till unit wells over the course of the RI show the potentiometric levels are higher than the elevation of the top of this unit. These data suggest or may be indicative of confined or semi-confined conditions in the lower till. Piezometric contours, based on April 19, 1991 data, for the lower till unit wells, have been constructed and are presented on Plan 8. As illustrated on Plan 8, groundwater flow in the lower till unit is to the southwest in the southern half of the Site and towards the north/northwest in the northern half of the Site. The groundwater flow direction in the lower till unit is similar to that of the underlying bedrock aquifer discussed later in this section.

Based on the contours presented on Plan 8, the horizontal hydraulic gradient in the lower till unit is approximately 0.0002 ft/ft. An estimate of the horizontal average linear groundwater velocity in the lower till unit may be calculated using the modified Darcy flow equation:

$$v = \frac{K_h i}{n}$$

where:

v = average horizontal linear groundwater velocity (cm/sec);
K_h = horizontal hydraulic conductivity (cm/sec);
i = horizontal hydraulic gradient (ft/ft); and

n = effective porosity.

An effective porosity of 0.2 is assumed to be representative of the lower till. Therefore, based on a geometric mean hydraulic conductivity of 3.1×10^{-4} cm/sec, a horizontal hydraulic gradient of 0.0002 and a porosity of 0.2, the average horizontal linear groundwater velocity in the lower till unit is estimated at 3.1×10^{-7} cm/sec or 0.3 ft/yr. The horizontal groundwater flow in this unit is minimal due to the flat gradient across the Site.

In order to estimate the vertical groundwater flow velocity across the lower till unit, the vertical hydraulic gradient across the lower till must be estimated. An estimate of the vertical hydraulic gradient across the lower till unit, based on existing data, may be made utilizing the two well nests (NCR-2 and NCR-11) that have both clay/upper till unit wells and bedrock unit wells. Table 5.1 presents a summary of the seasonal vertical hydraulic gradients at these two well nests. As summarized in Table 5.1, the average vertical hydraulic gradient across the till unit (upper and lower till) is 0.057.

An estimate of the average vertical linear groundwater velocity through the till unit may be calculated using the modified Darcy flow equation:

$$v = \frac{K_V i}{n}$$

where:

v = average vertical linear groundwater velocity (cm/sec);
K_V = vertical hydraulic conductivity (cm/sec);
i = vertical hydraulic gradient (ft/ft); and
n = effective porosity.

The average vertical linear groundwater velocity across the lower till unit will be controlled by the overlying lower permeable upper till aquitard. Therefore, assuming an effective porosity value of 0.2, a geometric mean hydraulic conductivity in the upper till of 1.8×10^{-6} cm/sec and a vertical gradient of 0.057, the average vertical linear groundwater velocity across the lower till unit is estimated to be 5.1×10^{-7} cm/sec or 0.5 ft/yr. The vertical groundwater flow velocity in this unit is minimal due to the low hydraulic conductivity of the overlying upper till aquitard.

Although the lower till unit is waterbearing, it is not considered to be a viable usable aquifer, compared to the highly fractured underlying bedrock units discussed below.

Bedrock Aquifer

As discussed in Section 5.1, two bedrock formations exist beneath the Site (Vernon Formation and Oak Orchard Formation). However, based upon their similar hydrogeologic properties, these formations are grouped as one hydrostratigraphic unit. As discussed in Sections 4.9.1 and

4.9.2, the geometric mean of the horizontal hydraulic conductivity for the Vernon Formation is 1.7 x 10^{-3} cm/sec and for the Oak Orchard Formation is 1.4 x 10^{-3} cm/sec. The hydraulic conductivities for the upper bedrock aquifer are consistent with the regional values for the Lockport Group (2.4 x 10^{-2} cm/sec to 3.7 x 10^{-4} cm/sec) presented in Section 3.3.2 and summarized in Table 3.3

Groundwater level measurements taken over the course of the RI in the upper bedrock wells have shown the potentiometric levels are higher than the unit's elevations, indicating confined aquifer conditions. Piezometric contours, based on April 19, 1991 data, for the upper bedrock wells have been generated and are presented on Plan 9.

As discussed in Section 3.3.2, the principal pathway for upper bedrock aquifer groundwater flow is via the primarily horizontal fracture network within the rock.

As illustrated on Plan 9, groundwater flow in the upper bedrock aquifer is towards the west beneath the southern two-thirds of the Site and is toward the north-northwest beneath the northern one-third of the Site. The upper bedrock aquifer groundwater flow directions are similar to the groundwater flow directions exhibited by the lower till unit and are consistent with the regional bedrock groundwater flow direction, as discussed in Section 3.3.2, which is toward the Niagara River and Niagara Gorge.

Based on the contours presented on Plan 9, the horizontal hydraulic gradient in the bedrock is 0.0002 ft/ft. The horizontal hydraulic gradient in the upper bedrock aquifer is the same as determined for the lower till unit, as would be expected since the lower till unit immediately overlies the upper fractured bedrock and both units exhibit confined conditions. An estimate of the horizontal average linear groundwater velocity in the upper bedrock aquifer may be calculated using the modified Darcy flow equation:

$$v = \frac{K_h i}{n}$$

where:

v = average horizontal linear groundwater velocity (cm/sec);
K_h = horizontal hydraulic conductivity (cm/sec);
i = horizontal hydraulic gradient (ft/ft); and
n = effective porosity.

A bedrock porosity value of 0.02 is assumed to be representative of the upper (Oak Orchard) bedrock to account for the high degree of the fracturing (CRA, 1988). Therefore, based on a geometric mean horizontal hydraulic conductivity of 1.4×10^{-3} cm/sec, a horizontal hydraulic gradient of 0.0002 and a porosity of 0.02, the average linear groundwater velocity in the upper bedrock aquifer beneath the Site is estimated to be 15 ft/yr. Therefore, even though the fracture network within the rock is primarily horizontal and the geometric mean horizontal hydraulic conductivity of the upper bedrock aquifer is 1.4×10^{-3} cm/sec, horizontal groundwater flow velocity in this unit is small due to the flat gradient across the Site. Assuming that this Site has similar hydraulic characteristics to those noted at other sites in the area (Section 3.3.2) there will be a continued downward gradient through the Lockport Group.

A review of the piezometric bedrock elevations in Table 4.8 indicates that the upper bedrock aquifer is hydraulically interconnected with the Niagara River. The piezometric elevations in the upper bedrock wells fluctuated by only a maximum of 0.4 feet during the course of the RI. The fluctuations in piezometric elevation in the upper bedrock wells are directly related to surface water fluctuations measured in the Niagara River. In most upper bedrock wells, the piezometric elevations are slightly less than the surface water elevation measured in the Niagara River. It is indicated, therefore, that the upper bedrock aquifer, in the vicinity of the Site, is recharged by the Niagara River.

As discussed in Section 3.2.3, the upper bedrock aquifer is capable of providing a sustained water supply. However, as discussed in Section 3.6, the water quality is considered to be poor due to the naturally occurring levels of sodium, iron, magnesium, chloride, bromide, sulphate and sulfide above their respective Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs).

5.3 LANDFILL CELLS

5.3.1 Existing Conditions

The Site consists of six distinct landfill cells, as shown on Plan 1, enclosed. It has a maximum length of 3,800± feet and a maximum width of 720± feet. The topography of the area surrounding the Site is flat, with an elevation of approximately 575 feet above mean sea level (AMSL). The landfill cover has eroded in several places causing solid waste to be exposed in some of the northern areas. The six distinct landfill cells are mounded above the surrounding land and have a maximum elevation of approximately 597 feet AMSL (22 feet above surrounding grade). The six cells are separated and/or bounded by drainage swales and the on-Site access road, as shown on Figure 1.2 and Plan 1.

As part of the Site reconnaissance performed during the RI, a total of approximately 30 leachate seeps were noted and documented at the Site. The leachate seeps observed at the Site are shown on Plan 2.

As discussed in Section 2.2.1, excavations for solid waste disposal in the southern five cells were completed in the clay/upper till aquitard at approximately 11 feet below ground surface, or at about 560 feet AMSL. As shown on Plan 7, the top of the bedrock beneath the southern end of the Site ranges in elevation from approximately 520 feet AMSL (Oak Orchard Formation) to approximately 545 feet AMSL (Vernon Formation). Therefore, excavation of the southern five cells was completed from approximately 15 to 40 feet above the top of the bedrock.

Data for well EAST-C indicates that excavation in the northernmost cell was extended down to approximately 551 feet AMSL. The data for well EAST-C initially suggested that solid waste was placed directly on the top of bedrock at this location (see Section 2.3). As shown on Plan 7, the top of the bedrock (Oak Orchard Formation) beneath the northern most cell ranges from approximately 520 feet AMSL to 530 feet AMSL. As discussed in

Section 2.3, it is presumed that the boring for well EAST-C encountered a large boulder, as was encountered during the drilling at location NCR-2, and erroneously identified it as top of bedrock. Based on the current data, it is apparent that the excavation of the northernmost cell was completed approximately 20 to 30 feet above the top of bedrock.

As discussed in Section 4.7, Test Pit #2 was excavated across a north-south swale at the south-end of the Site, situated between the two cells located south and west of the Site access road (see Figure 4.1). This test pit was excavated in an attempt to locate an abandoned waterline route which was reported to run along an easement through the Site in a north-south direction and to evaluate the potential for chemical migration along this abandoned utility route. Figure 4.1 illustrates the reported routes of the abandoned and the active waterlines at the Site. Figure 4.1 and Plan 3 identify the waterline easement location running through the Site.

Test Pit #2 was excavated to the top of the native clay unit which was encountered at a depth of approximately eight to nine feet BGS. The test pit traversed the swale for a length of approximately 27 feet across the waterline easement. The material excavated included approximately one to three feet of cover material, consisting of a mixture of sand, silt, and clay with some to little assorted debris overlying a fill layer consisting of assorted landfill solid waste, including wire, glass, paper, plastic, wood, sand, etc. The solid waste extended to the top of the clay unit. Leachate was observed trickling from the sides of the test pit into the excavation from the landfill cells at approximately seven feet BGS.

Evidence of the abandoned waterline was not observed. Discussions with personnel from the Town of Wheatfield Water Department, who were on Site at the time of test pit excavation, indicated that the excavation was at the proper location. This was further confirmed by a sign approximately 200 feet south of the test pit, indicating the waterline right-of-way. The absence of any evidence of the abandoned waterline confirms the discussion presented in Section 2.2 that the waterline utility was excavated and removed by NCR Disposal District and backfilled with refuse.

Also as discussed in Section 4.7, Test Pit #3 was excavated at the northwest corner of the northernmost landfill cell to evaluate the potential for chemical migration along the active Town of Wheatfield waterline which runs in an east-west direction at this location (see Figure 4.1). This excavation extended to a depth of approximately five feet BGS.

The top of the waterline was encountered at approximately 4.5 feet BGS. The waterline was further exposed by hand digging around the pipe. The line is constructed of 8-inch diameter Transite material. The waterline appeared to be installed using excavated material as bedding. During excavation of Test Pit #3, some solid waste material (plastic, metal, glass) with black discoloration was intermixed within the backfill material at approximately two to 4.5 feet BGS. The backfill material consists primarily of a red-brown dense, stiff clay and silt. The soil was observed to be dry to moist to 4.5 feet BGS, at which point it became moist to wet.

5.3.2 Leachate Mounding

A comparison of water level data for existing landfill cell monitoring wells EAST-A, -B, -C and -D, to the water level data from shallow silt unit monitoring wells installed around the landfill cells, indicates sustained leachate mounding within the cells. Water level data for the Site are summarized in Table 4.8.

Leachate levels within the landfill are mounded to a maximum elevation of approximately 579 feet AMSL at wells EAST-B and EAST-D. Groundwater in the surrounding shallow silt unit is intermittent. When present, the groundwater has ranged in elevation from approximately 569 feet AMSL to 576 feet AMSL. Plan 10, enclosed, illustrates leachate mounding within the landfill cells as measured on October 30, 1990.

5.3.3 Potential Vertical Leachate Migration

As discussed above, leachate mounding occurs within the landfill cells to a maximum elevation of approximately 579 feet AMSL. A review of the water level data, summarized in Table 4.8, for the bedrock wells around and beneath the Site indicates that the groundwater piezometric elevation for the upper bedrock aquifer is consistently at an elevation of approximately 564 feet AMSL. Due to the significant potentiometric difference between the leachate and the bedrock groundwater, the potential for vertical migration of leachate to the upper bedrock aquifer exists. However, as discussed below this migration is severely limited.

If there was direct contact between the solid waste and the bedrock, the solid waste would hydraulically behave in a manner similar to that of the upper bedrock aquifer. As discussed above, however, a maximum potentiometric difference of approximately 13 feet exists between the leachate within the landfill at locations EAST-B and EAST-D and the bedrock groundwater. Therefore, the solid waste and the bedrock are not directly hydraulically interconnected. This is further supported by the lack of Site-related groundwater contamination in the upper bedrock aquifer, as discussed in Section 6.9.

It is concluded, therefore, that the low permeable clay unit (10^{-8} cm/sec) and/or the low permeable upper till unit (10^{-6} cm/sec), ranging from approximately 13 to 25 feet thick underlays the solid waste in the northernmost cell and a layer of low permeable clay unit and/or the low permeable upper till units, ranging from approximately 7 to 35 feet thick underlays the solid waste in the southern five cells. The extent of vertical migration of leachate to the bedrock aquifer is, therefore, considered to be severely limited across the entire landfill.

5.3.4 Potential Horizontal Leachate Migration

As discussed in Section 5.3.2, leachate in the landfill cells is mounded to a maximum elevation of approximately 579 feet AMSL and groundwater in the surrounding shallow silt unit, when present, has exhibited elevations ranging from approximately 569 feet AMSL to approximately 576 feet AMSL. Consequently, there is a potentiometric difference ranging from three to ten feet between the leachate and the groundwater in shallow silt unit. Therefore, the potential for horizontal migration of leachate from the landfill to the shallow silt unit exists. However, this migration is severely limited, as discussed below.

As discussed in Section 5.2, the horizontal hydraulic conductivity geometric mean of the shallow silt unit is 4.2×10^{-6} cm/sec due to significant silt and clay content. Therefore, potential leachate migration into this unit is severely limited due to its naturally low hydraulic conductivity. In addition, as discussed in Section 2.2.2, a Clay Seal was reported to have been installed around the perimeter of the southern five cells in 1973 and it was presumed to have been installed around the northernmost cell. The Clay Seal was reported to be a minimum of five feet wide, extending from the overlying clay cover down to the underlying native clay/upper till units. During the RI activities, no indication of leachate migration from the landfill cells to the silt unit (i.e. visual or olfactory) was noted in the shallow wells installed immediately adjacent to the landfill. Also, as discussed in Section 6.9, leachate migration from the landfill cells to the silt unit was not indicated by chemical analyses of groundwater collected from the shallow wells. These data indicate that the naturally low hydraulic conductivity of the silt unit, and the Clay Seal if present, have effectively controlled off-Site horizontal leachate migration into the shallow overburden regime.

As discussed in Section 5.3.1, Test Pit #2 supports the discussion presented in Section 2.2.1, that the inactive waterline formerly running along an easement through the Site was excavated and removed by NCR Disposal District and backfilled with refuse. Also, as discussed in Section 2.2.1, the perimeter of the southern five landfill cells was reported retrofitted with a Clay Seal from ground surface to the top of the underlying native clay unit. Therefore, the potential for preferential migration of leachate along the abandoned waterline to areas outside of the Site is expected to be limited due to the Clay Seal presumed to be present.

Based on Test Pit #3 observations, the potential for preferential horizontal migration of chemicals along the active pipeline appears to be limited. The soil material surrounding the pipeline is a dense silty clay. This waterline is separated from the northernmost landfill cell by the shallow silt unit which exhibits a geometric mean hydraulic conductivity of 4.2×10^{-6} cm/sec. The Clay Seal, presumed to be present around the northernmost landfill cell, as discussed in Section 2.2, would also serve to isolate the waterline from the landfill. Therefore, preferential leachate migration from the northernmost landfill cell to the bedding material is highly unlikely. It is to be expected, however, that the solid waste material intermixed with the backfill material may result in some chemicals to be present. However, lateral movement of any chemicals in the bedding material would be hampered by the inherent low hydraulic conductivity of the backfill (stiff clay and silt).

As discussed in Section 4.12.2 and as shown on Figure 4.6, three of the four test pits excavated as part of the field additional tile investigation located the field tile. The tile, which terminates in the east-west swale on the west side of the landfill at location Seep #10, runs on a northeast route towards the landfill. The tile was confirmed present right up to the access road running north-south down the western limit of the landfill. In all three test pits which encountered the tile contained liquid which exhibited visual and olfactory characteristics of leachate.

As discussed in Section 5.3.2. leachate mounding occurs within the landfill cells to a maximum elevation of approximately 579 feet AMSL. The maximum invert elevation of the field tile encountered is estimated to be at approximately 565 feet AMSL or approximately 14 feet below the maximum leachate elevation within the landfill. Now, if the tile extends into and is hydraulically connected directly to the landfill, it would be reasonable to expect that substantial leachate flow under pressure would exist within the field tile. However, liquid was observed to be flowing within the field tile slowly and under very little pressure. Therefore, it can be concluded that the field tile exhibits poor hydraulic connection to the landfill and the potential horizontal leachate migration in the field tile is limited. This is supported by the analytical data presented and discussed in Section 6.6.

5.3.5 Leachate Seeps

Given the limited ability of leachate to migrate vertically through the clay/upper till aquitard underlying the Site or horizontally through the shallow silt unit surrounding the Site, and the Clay Seal if present, leachate breakouts in the form of toe discharge from the slopes have developed at the Site. As discussed in Section 4.4, approximately 30 leachate seeps have been identified at the Site.

5.4 SURFACE WATER FLOW

As discussed in Section 6.5, the leachate seeps have had, at most, a limited adverse effect on surface water quality on and in the vicinity of the new Site. Parameters which exceeded their respective NYS Ambient Water Quality Standards in the surface water samples were detected infrequently and when detected were just above their NYS Ambient Water Quality Standards.

As discussed in Section 4.11.5, the surface water samples were collected on November 28 and 29, 1990. Table 4.3 shows that no surficial water flow occurred over either weir for 22 days prior to the surface water sample collection, during sample collection or for 118 days after sample collection. As discussed in Section 4.6, surface water flow from the Site was intermittent, and occurred only during heavy or prolonged rain events. The total surface water flow leaving the Site over the course of the RI was estimated to be 1,070,000 gallons, with most of this flow occurring (approximately 930,000 gallons) over a two-day period in April 1991, after 3.99 inches of rain fell over a 72-hour period. Therefore, even though the standing surface water samples exhibited a few parameters which exceeded their respective NYS Ambient Water Quality Standards, the parameter concentrations would be significantly lowered during any off-Site flow event, due to dilution by the heavy or prolonged rains.

5.5 SITE CONDITIONS SUMMARY

This section presents a summary of the Site conditions discussed in Sections 5.1 through 5.4.

5.5.1 Geology Summary

The Site geology (see Section 5.1) can be subdivided into four stratigraphic units based on data collected during drilling activities: silt unit, clay unit; till unit (upper and lower till unit) and bedrock. The bedrock is comprised of the Vernon Formation and Oak Orchard Formation.

The average thickness of the silt unit is 4.2 feet. The average thicknesses of the clay unit and the upper till unit are 17.1 feet and 12.9 feet, respectively, with a combined average thickness of 30 feet. The average thicknesses of the lower till unit is 15.7 feet. Along the western side and northern end of the Site, the top of the clay and upper till units gently slopes downward to the west and north, respectively.

The Vernon Formation, a highly weathered gray shale was encountered underlying the lower till unit, at three well locations beneath the southern end of the Site and ranged in thickness from 7.5 to 23.0 feet thick. The Oak Orchard Formation, a highly weathered and fractured dolomite, underlies the lower till unit and/or shale at the Site.

5.5.2 Hydrogeology Summary

The four geologic units present at the Site are categorized (see Section 5.2) into the following four hydrostratigraphic units: silt unit; clay/upper till aquitard; lower till unit and bedrock aquifer (Vernon and Oak Orchard Formations).

The silt unit is a perched groundwater stratum whose primary source of water is from infiltration of precipitation. The unit's geometric mean horizontal hydraulic conductivity is 4.2×10^{-6} cm/sec. The low hydraulic conductivity exhibited by this unit is due to its high silt and clay content. Due to the low hydraulic conductivity of this unit and limited water source, very little horizontal groundwater flow is expected to occur. Very little vertical groundwater movement is also expected to occur due to the low hydraulic conductivities in the underlying clay/upper till aquitard (10^{-8} cm/sec to 10^{-6} cm/sec). Since the saturated thickness of the silt unit is limited, its hydraulic conductivity low, and the intermittent presence of groundwater, the silt unit is not considered to be a productive usable aquifer.

The clay unit and upper till unit encountered beneath the Site are considered to be hydrostratigraphically connected since they exhibit similar hydrogeologic characteristics. The geometric means of the hydraulic conductivity in the clay and upper till are 3.0×10^{-8} cm/sec (vertical) and 1.8×10^{-6} cm/sec (horizontal). Based on the hydraulic conductivities exhibited, the clay and upper till units are considered an aquitard.

The lower till unit is coarser and consequently exhibits a higher hydraulic conductivity than the upper till unit. The lower till unit is a confined aquifer and exhibits a geometric mean hydraulic conductivity of 3.1×10^{-4} cm/sec. Horizontal groundwater flow in this unit is to the southwest in the southern half of the Site and towards the north/northwest in the northern half of the Site. The average horizontal linear groundwater velocity in the lower till unit was found to be minimal; 0.3 ft/yr, due to the flat gradient (0.0002 ft/ft) across the Site. The average vertical linear groundwater velocity in the lower till unit was found to be minimal; 0.5 ft/yr, due to low hydraulic conductivity of the overlying lower permeable clay/upper till aquitard. Although the lower till unit is waterbearing, it is not considered to be a usable aquifer, compared to the highly fractured underlying bedrock aquifer.

The two upper bedrock formations, Vernon and Oak Orchard, are grouped as one hydrostratigraphic unit since they exhibit similar hydrogeologic properties. The upper bedrock aquifer exhibits confined conditions. The geometric mean of the horizontal hydraulic conductivities for the Vernon and Oak Orchard Formations are 1.7×10^{-3} cm/sec and 1.4×10^{-3} cm/sec, respectively. The flow direction is towards the west beneath the southern two-thirds of the Site and is toward the north-northwest beneath the northern one-third of the Site. The groundwater flow direction in the upper bedrock aquifer is similar to the flow direction exhibited by the overlying lower till unit and is consistent with the regional bedrock groundwater flow direction. The average horizontal linear groundwater velocity within the upper bedrock aquifer beneath the Site was estimated to be 15 ft/yr. The upper bedrock aquifer is hydraulically interconnected with the

Niagara River and in the vicinity of the Site is considered to be recharged by the Niagara River.

5.5.3 Landfill Cells Summary

The Site consists of six distinct landfill cells mounded above the surrounding land. The six cells are separated and/or bounded by drainage swales and the on-Site access road.

Sustained leachate mounding occurs within the cells. As such, the potential for vertical and horizontal leachate migration exists at the Site. The extent of the vertical migration of leachate to the upper bedrock aquifer is, however, severely limited across the entire landfill due to the underlying clay/upper till aquitard (10^{-8} cm/sec to 10^{-6} cm/sec).

The potential for horizontal leachate migration from the landfill to the shallow silt unit is also limited due to the low horizontal hydraulic conductivity (4.6×10^{-6} cm/sec) of the silt unit which surrounds the landfill and the Clay Seal, if present.

The field tile, which terminated in the east-west swale on the west side of the landfill, was confirmed present up to the access road running north-south down the western limit of the landfill. However, it did not exhibit hydraulic connection to the landfill as supported by the analytical data presented and discussed in Section 6.6. Therefore, the potential for horizontal leachate migration in the field tile is limited.

Given the limited ability of leachate to migrate vertically through the clay/upper till aquitard underlying the Site or horizontally through the shallow silt unit surrounding the Site, and the Clay Seal, if present, leachate breakouts in the form of toe discharge from the slopes have developed at the Site. Approximately 30 leachate seeps have been identified at the Site.

5.5.4 Surface Water Flow Summary

Surface water flow from the Site occurs only during heavy or prolonged rain events. Therefore, the limited impact the leachate seeps have had on the surface water quality on Site would be significantly lowered during any off-Site flow event, due to dilution by the heavy or prolonged rains.

6.0 SITE CHARACTERIZATION

6.1 RI DATA BASE

The RI and additional Site investigation data base consists of physical information described and documented in Sections 2.0 through 5.0 and the analytical results of samples collected from the various media.

6.1.1 Analytical Data Base

The analytical data base generated during the RI and the additional Site investigation activities is discussed in Sections 4.11 and 4.12, respectively.

Ambient air samples collected during the RI were analyzed for benzene, chlorobenzene, vinyl chloride, methylene chloride, toluene and phenol. All other samples collected from subsurface soils, sediments, surface water, leachate and groundwater during the RI were analyzed for TCL/TAL parameters, with the exception of the two additional soil samples collected from location NCR-13 which were analyzed only for TCL VOC parameters.

Groundwater samples, field tile liquid samples and test pit soil samples collected during the additional Site investigation activities were analyzed for TCL/TAL parameters. One additional surface soil sample, sediment sample and the field tile liquid sample collected during the additional Site investigation activities were also analyzed for total arsenic.

6.1.2 Analytical Methods and Validation

All ambient air, subsurface soil, (with the exception of the two additional soil samples collected from location NCR-13), hand auger, leachate, sediment and surface water samples collected during the RI, were analyzed by Radian Laboratories, Inc. These samples include:

i) Two sets of investigative ambient air samples for chlorobenzene, benzene, methylene chloride, toluene, vinyl chloride and phenol analyses. Each set consisted of three sample locations: upwind of seep; over seep; downwind of seep;

ii) 26 investigative sub-surface borehole soil samples from 13 drilling locations for TCL/TAL analyses;

iii) Five investigative sub-surface hand auger soil samples from 17 auger locations for TCL/TAL analyses;

iv) 18 investigative surface sediment samples from 18 locations for TCL/TAL analyses;

v) Eight investigative surface sediment water samples from 18 locations for TCL/TAL analyses; and

vi) Nine investigative leachate seep samples from approximately 30 locations for TCL/TAL analyses.

Groundwater samples, a test pit soil sample and the two additional soil samples collected during the RI were analyzed by Compu Chem Laboratories. These samples include:

i) One investigative test pit soil sample (Test Pit #3) for TCL/TAL analyses;
ii) Two investigative subsurface soil samples from location NCR-13 for TCL VOC analyses; and
iii) Two rounds of 23 investigative groundwater samples from 23 monitoring well locations for TCL/TAL analyses.

Groundwater samples, field tile test soil samples, field tile liquid samples, and the surface soil and sediment samples collected during the additional Site investigation activities were analyzed by Compu Chem laboratories. These samples include:

i) One investigative groundwater sample from location NCR-12D for TCL/TAL analyses;
ii) Two investigative liquid samples from two field tile locations for TCL/TAL analyses;
iii) Two investigative soil samples from one field tile test pit location for TCL/TAL analyses; and
iv) One surface soil, one surface sediment and one surface water sample from location Seep-10 for total arsenic analyses.

Analyses of the foregoing samples were performed using the following methods:

Matrix	*Parameter*	*Analytical Method*	*Method Reference*
Air	Phenol	TO-8	1
	Benzene	TO-2	1
	Chlorobenzene	TO-1	1
	Methylene Chloride	TO-2	1
	Vinyl Chloride	TO-2	1
	Toluene	TO-2	1
Soil/Sediment/ Surface Water	TCL-VOCs	8240	2
	TCL-BNAs	8270	2
	TCL-Pesticides/PCBs	8080	2
	TAL-Metals	6010/7000 series	2
	Cyanide	9010	2
Groundwater	TCL-VOCs	USEPA-CLP	3
	TCL-BNAs	USEPA-CLP	3
	TCL-Pesticides/PCBs	USEPA-CLP	3
	TAL-Metals	USEPA-CLP	4
	Cyanide	USEPA-CLP	4

References:

(1) Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. EPA Document No. 600/4-84-041.

(2) Test Methods for Evaluating Solid Waste, USEPA SW-846, 3rd Edition, November 1986.

(3) USEPA Contract Laboratory Program (CLP) Low Concentration Water for Organics, April 1990 (Document # OLC01) with modification December 5, 1990.

(4) USEPA CLP "Statement of Work (SOW) for Inorganics Analyses", April 1988 with revision of 2/89.

The laboratory analytical data summary sheets are presented separately in Volume III of this report. Summaries of complete analytical data are presented in tables presented in Appendix K.

The laboratory reports were assessed and validated by CRA's quality assurance/quality control (QA/QA) officer based upon a review of standard quality control criteria established by the QAPP (CRA, 1990b). The criteria for the data assessment were taken from the referenced "Contract Laboratory Program Statement of Work for Inorganic and Organic Analyses". Application of the criteria was consistent with the guidelines presented in the following documents:

i) "CLP Organics Review and Preliminary Review", SOP No. HW-6, Revision #6, March 1989.
ii) "Evaluation of Metals Data for the Contract Laboratory Program (CLP)", SOP No. HW-2, Revision VIII, December 1988.

The data assessment and validation reports for all RI and additional Site investigation activities data are presented in Appendix L.

On the basis of the formal data validation identified in the foregoing discussion, all data presented on the tables have been qualified as appropriate.

6.1.3 Qualified Soil Data

Subsurface soil samples collected from location NCR-5 (44.0 to 47.0 ft BGS), NCR-9 (2.0 to 6.0 ft BGS) and from location NCR-13 (0 to 0.8 ft BGS and 2.5 to 3.5 ft BGS) in 1990 were analyzed by Radian Laboratories, Inc. (Radian). These four soil samples were analyzed by Radian on the same day by the same instrument. No other samples from the Site were analyzed on this day using this instrument. The locations of NCR-5, NCR-9 and NCR-13 are all greater than 600 feet apart.

The primary VOCs detected in samples NCR-5 (44.0 ft-47.0 ft BGS), NCR-9M (2.0 ft-6.0 ft BGS), NCR-13 (0.0 ft to 0.8.0 ft BGS) and NCR-13 (2.5 ft to 3.5 ft BGS) were 1,2-dichloroethene (total) (390 µg/kg, 440 µg/kg, ND6.0 µg/kg and 320 µg/kg, respectively) and vinyl chloride (190 µg/kg, 240 µg/kg, 210 µg/kg and ND11 µg/kg, respectively). A review of all other subsurface soil samples (22 samples) including samples from NCR-12D, shows that 1,2-dichloroethene (total) was detected in one other sample at an estimated concentration of 160 µg/kg and that vinyl chloride was not detected in any other samples. The soil sample collected from NCR-5 (44.0 ft to 47.0 ft BGS), exhibited VOC contamination (1,2-dichloroethene (total) of 390 µg/kg and vinyl chloride of 190 µg/kg) however, no TCL VOCs were detected in the subsurface soil sample collected from location NCR-5 (5.4 to 7.0 ft BGS), which was analyzed on a different day by the laboratory. Also, a well (NCR-5M) installed at this location is screened from 44.5 to 49.5 feet BGS. Two rounds of groundwater monitoring did not exhibit any detected concentrations of 1,2-dichloroethene (total) at a detection level of 1 µg/L or vinyl chloride at a detection level of 1 µg/L in the groundwater samples from this well or any other overburden well.

The analytical data quality assessment and validation performed on the four soil samples results showed minimal quality control problems that would call into question the validity of the data; a field rinsate blank and a laboratory method blank did not detect any VOC compounds. However, a review of the above results suggested that the presence of vinyl chloride and 1,2-dichloroethylene might have been due to some non-Site related factor. Therefore, on August 8, 1991, two additional soil samples were collected from NCR-13 at the shallow intervals corresponding to the previously collected samples (see Section 4.11.2 for sample collection protocols). Samples were not recollected from NCR-5 or NCR-9, since the initial samples were collected at greater depths. The two additional subsurface soil samples collected from NCR-13 were submitted to Compu Chem Laboratories for analyses of TCL VOC parameters. The laboratory analytical data summary sheets for these two additional samples are presented separately in Volume III of this report. The analytical data are summarized on the subsurface soil data table presented in Appendix K. The data assessment and validation report for these two additional samples is presented in Appendix L. The analyses performed by Compu Chem Laboratories on these two soil samples did not detect any TCL VOC parameters in either sample, thus it was suspected that the samples may have been the result of laboratory contamination.

A subsequent review of the Form IV laboratory report for the original four soil samples indicated that the field rinsate blank was analyzed on a different instrument than the four soil samples from the Site and that other soil samples, external to the Site were analyzed coincidental with the four soil samples from the Site. The Form IV report indicated that the method blank for the instrument was analyzed first. Then a soil sample external to the Site was analyzed followed by the sample from NCR-5 (44.0 ft to 47.0 ft BGS). Then five soil samples external to the Site were analyzed followed by the three samples from NCR-13 (0.0 ft to 0.8 ft BGS); NCR-13 (2.5 ft to 3.5 ft BGS) and NCR-9M (2.0 ft to 60.0 ft BGS), respectively.

Based on information obtained from the analytical laboratory in April 1992, the external soil sample that was analyzed after the method blank sample and before the NCR-5 (44.0 ft to 47.0 ft BGS) sample contained the following VOCs:

1,2-dichloroethane	180 µg/kg	toluene	1,600 µg/kg
vinyl chloride	1,700 µg/kg	acetone	1,200 µg/kg
1,2-dichloroethene (total)	4,800 µg/kg	carbon disulfide	2,300 µg/kg
trichloroethene	760 µg/kg	benzene	200 µg/kg
tetrachloroethene	850 µg/kg	styrene	2,100 µg/kg
methylene chloride	1,100 µg/kg	xylenes	7,100 µg/kg

The VOCs detected in the external soil sample which was analyzed before the four NCR soil samples exhibits all the VOCs detected in the four NCR soil samples and all at higher concentrations, specifically vinyl chloride (1,700 µg/kg) and 1,2-dichloroethene (total) (4,800 µg/kg). This data supports that the apparent presence of selected VOCs in the subject four NCR soil samples may have been the result of laboratory contamination.

In summary, the following three factors bring into question the validity of the initial VOC data for the four soil samples:

i) Resampling of soils at NCR-13 did not exhibit any detected VOCs;

ii) Analytical data from other soil samples and Site media do not correspond to the VOCs detected; and

iii) Potential introduction of VOC contamination at the laboratory.

Therefore, the VOC data for the four soil samples have been qualified as questionable on the data summary tables and were not considered in the Site assessment or utilized in the Baseline Risk Assessment (BRA).

6.1.4 Dioxin Indicator Parameter

It is to be noted that 2,4,5-trichlorophenol was not confirmed in any of the chemical samples analyzed. As discussed in Section 4.5.2.4 of the POP (CRA, 1990a), dioxin is a by-product of 2,4,5-trichlorophenol production, thus, 2,4,5-trichlorophenol is considered as an indicator parameter for dioxin. Since 2,4,5-trichlorophenol was not confirmed in any chemical samples analyzed, a dioxin screening program is not required at the Site.

6.2 AMBIENT AIR ASSESSMENT

As discussed in Sections 4.4 and 4.11.1, and Appendix C, ambient air sampling was performed at two "worst case" areas of emission from the landfill. The sampling locations included Seep #5, located in the northeast corner of the northernmost cell, and Seep #16, located along the east side of the easternmost cell at the Site (see Figure 4.4 for seep locations). During the sampling activities, air samplers were set up directly over, upwind of, and downwind of each seep. Each sample was analyzed for benzene, chlorobenzene, methylene chloride, toluene, vinyl chloride and phenol.

A summary of the samples collected is presented in Table 4.9 for Round I samples (Seep #5) and in Table 4.10 for Round II samples (Seep #16). A summary of the analytical results for Round I samples (Seep #5) is presented in Table 6.1 and for Round II samples (Seep #16) is presented in Table 6.2. In addition to summarizing the ambient air data, Tables 6.1 and 6.2 also summarize the corresponding leachate seep data for the ambient air compounds analyzed for and acceptable ambient air levels as referenced from "New York State Air Guidelines for the Control of Toxic Ambient Air Contaminants, 1985-1986 Edition".

A review of the ambient air data for Seep #5 indicates that the data for chlorobenzene and vinyl chloride is qualified as unusable. However, the leachate seep data for these compounds indicates that neither compound was detected in the leachate seep sample collected from Seep #5. A review of the usable data from this location indicates that all compounds that were detected (benzene, methylene chloride and toluene) were a minimum of one order of magnitude below the acceptable ambient levels. A comparison between the concentration of detected air parameters to actual leachate seep concentrations indicates that the ambient air concentrations (µg/m^3) are approximately one order of magnitude below the leachate seep concentrations (µg/L).

A review of the ambient air data for Seep #16 indicates that no compounds were detected in the ambient air samples, however, the data for benzene, methylene chloride and toluene are qualified as unusable. Since methylene chloride was not detected in the leachate seep sample collected at this location, the fact that the methylene chloride data is unusable is inconsequential. However, benzene and toluene were detected in the leachate seep sample from this location at concentrations of 50 μg/L and 350 μg/L, respectively. Applying the correlation between ambient air data and leachate seep data for benzene and toluene, as discussed above for Seep #5 data, ambient air concentrations for benzene and toluene are expected to be on the order of 5 μg/m^3 and 35 μg/m^3, respectively. This estimated concentration for benzene is approximately one order of magnitude below its acceptable ambient level and the estimated concentration for toluene is approximately two orders of magnitude below its acceptable ambient level.

The above review shows that the concentrations of detected compounds in the ambient air, directly over the two "worst case" leachate seep locations, are significantly less than acceptable ambient air levels, however, much of the data is qualified as unusable, based on the data assessment and validation. As presented in subsequent subsections, parameters corresponding to those collected and analyzed for in the air samples are detected infrequently and at low concentrations in other Site media. Therefore, the ambient air quality across the Site is not expected to be above acceptable ambient air levels. Additional air monitoring for landfill gases may be necessary, however, during the remedial design phase.

6.3 PHTHALATE/PHENOL/PAH DISCUSSION

Phthalate isomers, phenolic compounds and PAHs are the organic compounds consistently detected at the Site. As such, a general discussion, including environmental fate, pertaining to each class of compounds is presented in this subsection, prior to the data assessment for various Site media.

6.3.1 Phthalate Isomers

The phthalate isomer most frequently detected and at the highest concentrations at the Site is bis(2-ethylhexyl)phthalate (BEHP). Therefore, BEHP provides the basis for the phthalate isomer discussion.

General Characteristics and Uses

Bis(2-ethylhexyl)phthalate (BEHP) is a colorless, oily liquid with a very faint odor (Mellan, 1963). BEHP has a very low solubility in water and volatilizes very slowly at standard temperature and pressure (Mellan, 1963).

BEHP has been used in large quantities as a plasticizer for polyvinyl chloride (PVC) and other polymers (Mellan, 1963, Howard, 1989). As a result of its common use, BEHP may be found in goods as diverse as upholstery material, hospital sheeting, shower curtains, food packaging materials and various plastic products used daily by the general public. Subsequent to the banning of PCBs in dielectric fluids for transformers and capacitors, BEHP was selected by many manufacturers as the preferred material for dielectric fluids. BEHP is currently used in the transformer and capacitor industry.

Presence and Persistence in the Environment

BEHP is ubiquitous in the environment. According to recent studies, the average daily air intake of BEHP is approximately 0.33 μg (Howard, 1989). Through water consumption, the average daily intake of BEHP from municipal water supplies in U.S. cities ranges from 0.08 μg to 60 μg (Howard, 1989). BEHP has been suggested as a possible natural product in animals and plants (Howard, 1989). Typical body burdens of BEHP have been noted to range from 0.30 to 1.15 ppm (Howard, 1989).

Various studies have been performed to determine the concentration of BEHP in several environmental matrices. Sediment/soil samples collected from Lake Superior have been found to contain concentrations of BEHP as high as 200 ppm (Howard, 1989). Surface water samples collected from various locations within industrialized areas of the U.S. were found to contain levels of BEHP ranging from 1 to 80 ppb. Rainwater samples collected from the North Pacific have had concentrations of BEHPs ranging from 5 to 213 ppt (Howard, 1989). Food samples in Japan were found to contain BEHP levels ranging from 0 to 68 ppm due to contact with packaging materials (Howard, 1989). BEHP is reported to bioconcentrate in fish, and in Canada, processed canned tuna and salmon have been reported to contain levels of BEHP from 40 to 160 ppb (Howard, 1989). Human exposure can also occur during blood transfusions from PVC blood bags (Howard, 1989).

BEHP is introduced into the environment by means of artificial sources (Howard, 1989). Introduction of BEHP by artificial sources may result from use or disposal (incineration, landfill, etc.) of BEHP. BEHP, released into soil will neither evaporate nor leach into groundwater (Howard, 1989). BEHP has a strong tendency to adsorb to soils and sediments (Howard, 1989). Biodegradation may occur in soil systems under aerobic conditions once acclimation has occurred (Howard, 1989). In surface water systems, BEHP will biodegrade quite rapidly (half-life 2 to 3 weeks) (Howard, 1989) following an acclimation period. In unacclimated systems, no biodegradation occurs. As referenced previously, BEHP has a very low solubility, will adsorb strongly to sediments and will bioaccumulate in biological systems (Howard, 1989). Limited or hydrolysis has been noted in aquatic systems (Howard, 1989). One study has shown a hydrolysis half-life of 2,000 years at a pH 7. The photolysis half-life of BEHP in water is estimated at 143 days (Howard, 1989).

The probable behavior, environmental fate of and ultimately the potential exposure and carcinogenic effects from BEHP can be assessed, to some extent, by evaluating the physical and chemical properties of the constituent. The mobility and persistence of these constituents are of primary importance in this evaluation. Mobility is the potential for a chemical to migrate away from the Site. Persistence is a measure of how long a chemical will remain in the environment. Factors that affect the mobility and persistence of BEHP include, but are not limited to:

i) physical properties;
ii) chemical properties;

iii) moisture levels;
iv) presence of microorganisms; and
v) water chemistry.

The water solubility is the maximum concentration of a compound that can dissolve in water at a specific temperature and pH. Compounds with high solubilities generally exhibit increased mobility.

Vapor pressure and Henry's Law Constants provide an indication of the volatility of a compound. High vapor pressures and Henry's constants indicate a greater tendency for a compound to volatilize from water and soil. Compounds with high Henry's constants generally do not persist in surface water and soil environments.

The organic carbon partitioning coefficient (K_{OC}) indicates the tendency of a compound to be adsorbed to organic materials in soils or sediments. High K_{OC} indicate lower mobility. BEHP has a very high K_{OC} and is virtually immobile in organic-rich soils.

The following provides a description of the environmental fate of BEHP.

- <u>Atmospheric Fate Processes</u>

Atmospheric levels of BEHP are caused by volatilization of BEHP during the manufacture and waste disposal of plastic products. BEHP's high boiling point of 230°C (Howard, 1989) and low vapor pressure of

6.45 x 10^{-6} mm Hg at 25°C (Howard, 1989) indicate a strong affinity to adhere to atmospheric particulate matter especially organic matter and soot. A significant removal process from the atmosphere is by rain washout. Direct photolysis and photoxidation are atmospheric processes that might occur but to a very limited extent (Howard, 1989, ATSDR, 1988).

- Aquatic Fate Processes

In the presence of a direct pollution source, the extent of BEHP contamination in water systems is influenced by the compound's water solubility. The water solubility for BEHP ranges from a minimum value of 47 ppb to maximum value of 400 ppb (0.4 ppm) (Montgomery, 1990). The low water solubility will limit the amount of BEHP entering this media and BEHP will generally exhibit decreased mobility in an aqueous system.

Biodegradation in aquatic systems is quite rapid with a half-life of two to three weeks following a period of acclimation (Howard, 1989).

Primary removal of BEHP from water systems is through adsorption to suspended matter and sediments as indicated by the high organic carbon partitioning coefficient (K_{OC}). As discussed earlier, high K_{OC}s generally indicate increased likelihood for the chemical to bind to soil or sediment rather than to remain in water. Thus, chemicals with high K_{OC}s generally exhibit lower mobility.

BEHP has a Henry's law (constant of 1.1 x 10^{-5} atm - m^3/mole (Howard, 1989). This is indicative of the extent of chemical partitioning between air and water at equilibrium. Due to BEHP's low Henry's law constant, its volatilization to the atmosphere from water is likely to be negligible (ATSDR, 1988). This is true even under conditions, such as aeration, conducive to contaminant evaporation. For BEHP, evaporation and hydrolysis are not significant aquatic processes (Howard, 1989, Woodward, 1988, ATDSR, 1988).

- Terrestrial Fate Processes (Biodegradation)

The phthalate esters, including BEHP, have a strong affinity for soil solids, including organic, humic fraction of soil. Both the mineral and organic fraction of solid soil particles tend to bind BEHP.

Degradation of BEHP in soil is mediated by a wide variety of microorganisms capable of metabolizing phthalates to simpler molecules. Several microorganisms including the saprophytic bacterium Serratia, Penicillium lilacinuns and Enterobacter aerogenes, have been shown to degrade BEHP (Woodward, 1988, ATSDR, 1988). Serratia can use the compound as a sole source of carbon and energy.

The rates of degradation appear to increase with decreasing alkyl chain length. Biodegradability of BEHP is less biodegradable than short (less than 6 carbons) carbon-chain length phthalate esters but more biodegradable than several other long-carbon chain phthalates (i.e.

>7 carbons) and more biodegradable than persistent organic compounds such as chlorinated hydrocarbon pesticides and PCBs (ATSDR, 1988).

Microbial transformation of phthalate esters undoubtedly accounts for the major part of their biodegradation in the environment. Phthalates are biodegraded in water, sludge and soil under aerobic conditions (Woodward, 1988). The degradation of BEHP in soil occurs under aerobic conditions, but only slowly, if at all under anaerobic conditions. Studies with ^{14}C- carbonyl-labeled BEHP in aerobic freshwater hydrosoil yielded a degradation half-life of approximately 14 days (ATSDR, 1988).

Presence as a Laboratory Contaminant

BEHP is a common laboratory contaminant (EPA, 1988d). Many studies have shown commercial organic solvents to be contaminated with BEHP (Howard, 1989). Various investigators have noted the general contamination of laboratory supplies, solvents, and reagents with BEHP to the extent that the detection limit for BEHP in investigative samples is determined by the reagent-laboratory blank (Page 1987).

Due to ambient conditions within the laboratory setting, BEHP contamination of investigative samples is a common occurrence (EPA, 1988d). Based on this fact, BEHP concentrations determined in investigative samples must be carefully scrutinized for validation purposes. If BEHP is detected in an investigative sample and a laboratory blank, the concentration in the investigative sample must exceed the concentration found within the blank by a factor of 10 to be considered present (i.e. multiply concentration found in laboratory blank sample by 10 to determine detection limit for investigative sample) (EPA, 1988d).

6.3.2 Phenolic Compounds

The phenolic compound most frequently detected and at the highest concentrations at the Site is phenol. Therefore, phenol provides the basis for the phenolic compound discussion.

General Characteristics and Uses

Phenol is a colorless to white solid when pure, but the commercial product is a liquid. It has a distinct odor that is sickeningly sweet and acrid. It will evaporate more slowly than water and it is moderately dissolvable in water (Howard, 1989, ATSDR, 1989).

Phenol is found naturally in animal wastes and decomposing organic material (Howard, 1989). It is a common industrial chemical, largely used as an intermediate in the production of caprolactam (an intermediate in the manufacture of nylon 6 and other synthetic fibers) and bisphenol A (an intermediate in the manufacture of epoxy and other resins). It is also used as a slimicide (a chemical toxic to bacteria and fungi characteristic of aqueous slimes), as a disinfectant, and in medicinal preparations (ATSDR, 1989).

Small releases of phenol do not remain in the air long (generally half is removed in less than one day), and usually do not remain in the soil for long periods (generally complete removal in two to five days), but can remain in water for longer than nine days (Howard, 1989). High levels of phenol found in surface waters and air are connected with phenol released from industrial activity and commercial use of products containing phenol. The levels of phenol found in the environment are usually below 100 ppb, although much higher levels have been reported. One ppb or less of phenol has been found in relatively unpolluted surface and ground waters (ATSDR, 1989).

Presence and Persistence in the Environment

Phenol is found naturally in animal matter. Reported levels of phenol in rabbit muscles range from 0 to 1.6 ppm (Howard, 1989). It is identified in mountain cheese, fried bacon and fried chicken. Smoked summer sausage and smoked pork belly contains 7 ppm and 28.6 ppm phenol, respectively (Howard, 1989). People will also be exposed to phenol through the use of disinfectants and the ingestion of medicinal products such as throat lozenges (ATSDR, 1989).

The following provides a description of the environmental fate of phenols.

- Atmospheric Fate Processes

If phenol is released to the atmosphere, it will predominantly exist in the vapor phase. Phenol absorbs light in the region of 290 to 330 nm and, therefore, photodegradation occurs readily. Phenols react relatively rapidly with sunlight via reaction with photochemically produced hydroxyl and peroxyl radicals. Reaction with hydroxyl radicals in air results in an estimated half-life of 0.61 days (Howard, 1989). Reaction of phenol with nitrate radicals during night time may be a significant removal process based on a rate constant of 3.8×10^{-12} cm^2/molecule-sec, which corresponds to a half-life of 15 minutes at an atmospheric concentration of $2 \times 10^{+8}$ nitrate radicals per cm^3 (Howard, 1989).

- Aquatic Fate Processes

Phenol undergoes rapid biodegradation in water, especially under aerobic conditions. Data suggest that degradation will take on the order of hours to days in freshwater systems and up to a few weeks in estuarine waters. Degradation rates may be directly related to acclimation periods of resident microorganisms which, under aerobic conditions, are faster and may take a few weeks under anaerobic conditions.

Direct photolysis, hydrolysis and evaporation of phenol are not significant removal processes as compared with biodegradation. Natural sunlight causes degradation in water via reaction with photochemically produced hydroxyl and peroxyl radicals. Typical half-lives for hydroxyl and peroxyl radical reactions are on the order of 100 and 19.2 hours of sunlight, respectively (Howard, 1989). In water, phenol will not be expected to significantly adsorb to sediment or bioconcentrate in aquatic organisms. Based on the dissociation constant (Pka), phenol will exist in a partially dissociated state in water and moist soils and, therefore, its transport and reactivity may be affected by pH.

- Terrestrial Fate Processes (Biodegradation)

Phenol released to surface soil will rapidly biodegrade (two to five days). Degradation will also occur in subsurface soils, however, will be much slower under anaerobic conditions than under aerobic conditions. Despite its high solubility and poor adsorption to soil, biodegradation is sufficiently rapid that most groundwater is generally free of this pollutant. The exception would be in the cases of spills where high concentrations of phenol destroy degrading microbial populations.

6.3.3 PAH Compounds

The following 15 PAHs are considered as a group in this review of the chemical and physical properties of PAHs.

- acenapthene
- acenapthylene
- anthracene
- benz(a)anthracene
- benzo(a)pyrene
- chrysene
- dibenzo(a,h)anthracene
- fluoranthene
- fluorene
- indeno (1,2,3-cd)pyrene

- benzo(b)fluoranthene
- benzo(g,h,i)perylene
- benzo(k)fluoranthene
- phenanthrene
- pyrene

The PAHs are grouped according to molecular size as follows:

- Low molecular weight compounds (152-178 grams/mole) - acenapthene, acenapthylene, anthracene, fluorene, and phenanthrene;
- Medium molecular weight compounds (202 grams/mole) - fluoranthene and pyrene; and
- High molecular weight compounds (228 - 278 grams/mole) - benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene.

General Characteristics and Uses

Polycyclic aromatic hydrocarbons (PAHs) are a group of chemicals formed during the incomplete combustion of coal, oil, gas, garbage or other organic substances. Some PAHs are used in medicines and others are used to make dyes, plastics and pesticides. PAHs are ubiquitous throughout the environment in the air, water and soil. As pure chemicals, PAHs generally exist as colorless, white or pale yellow-green solids. Most PAHs do not occur alone in the environment, rather they are found as mixtures of two or more PAHs. PAHs can occur either in the air attached to dust particles, or in soil or sediment as solids. PAHs can also be found in substances such as crude oil, coal tar pitch, creosote and road and roofing tar. PAHs generally exhibit low solubility in water, but some may readily volatilize in air.

Presence of Persistence in the Environment

There are two different types of background levels of chemicals. Naturally-occurring levels are defined as ambient concentrations of chemicals present in the environment that have not been influenced by humans, and anthropogenic levels are concentrations of chemicals that are present in the environment due to human-made, non-site non-specific sources such as industry in general and automobiles.

PAHs are formed during incomplete combustion of virtually all forms of organic materials. Therefore, they are present in the environment as both natural and anthropogenic background. The combustion of fuels in our cars and in our furnaces produces PAHs. Waste incinerators and forest fires produce PAHs. A major source of exposure for humans is cigarette smoking, both active and passive. PAHs are ubiquitous in our environment and the increasing levels found in the environment generally parallel industrial and urban development. The impact of urban sources (furnace fuels and vehicle exhaust, for example) on PAH levels in surface soil is presented in Table 6.18.

As shown in Table 6.18, benzo(a)pyrene has been reported in rural or agricultural soil at concentrations ranging from 40 to 1,300 ppb dry weight. This is probably the source for part of the benzo(a)pyrene in our food supply although some is added to food products due to fall-out of PAH particulates from the air which settle on leafy vegetables and some is formed in food preparation (smoking meats, broiling meats and fish).

Annual oral intake of benzo(a)pyrene in food products is estimated at 0.35-1.5 mg/year (Woo and Arcos). This is equivalent to 0.96 to 4.1 µg benzo(a)pyrene per day. Much of the study of PAHs has focussed on the presence of benzo(a)pyrene because it is one of the most toxic. Monitoring its presence has been used to monitor the general level of PAHs in the environment.

The source of benz(a)pyrene in soils is due, to a large degree, to the emissions from internal combustion vehicles. The combustion of one gallon of gasoline in a car will emit 20-30 µg benzo(a)pyrene (emissions controls) or 45-70 µg (no controls). This creates increased levels of benzo(a)pyrene and numerous other PAHs in areas of heavy traffic (Woo and Arcos). During "smoggy" conditions, a commuter on an expressway may inhale 0.01 µg benzo(a)pyrene per hour. A resident near the freeway is estimated to have an intake of 0.02 µg per day (Woo and Arcos).

Cigarette smoke is a major source of PAHs in the indoor environment. It is estimated that smoking one cigarette releases 0.10 to 0.15 µg benzo(a)pyrene into room air. One study showed PAH concentration in the non-smoker was 27 percent of the concentration of the same PAH in the smoker. The PAH concentration dropped to non-detect in the non-smokers' urine after two weeks without exposure. Smoking one pack of cigarettes results in an intake of 0.4 µg benzo(a)pyrene.

Industrial sites and those sites in urban and suburban areas will contain much higher anthropogenic background levels of PAHs than may be found in rural areas. Even in rural areas it is necessary to evaluate natural sources (natural fires or coal deposits) which will cause apparently elevated concentrations of PAHs in the absence of anthropogenic sources.

Environmental Fate

PAHs released to the environment are subject to a number of environmental fate processes including volatilization, sorption, biodegradation and bioaccumulation (ATSDR, 1990). PAH compounds tend to be removed from the water column by volatilization to the atmosphere, adsorption to particulates or sediments, or by being accumulated by or sorbed into aquatic organisms. Adsorption of PAHs to soil and sediments increases with increasing organic carbon content, and is also directly dependent on particle size (ATSDR, 1990).

Atmospheric Fate Processes

PAHs are present in the atmosphere in the gaseous phase or sorbed to particulate. Atmospheric residence time and transport distance depends on the size of PAH particulates (ATSDR, 1990). Larger molecules tend to settle out and become part of urban runoff.

Aquatic Fate Processes

The primary removal processes from surface waters are volatilization to the atmosphere, adsorption to sediments and bioaccumulation or sorption onto aquatic biota. The low molecular weight PAHs have Henry's law constants in the range of 10E-03 to 10E-05 atm-m^3/mole; medium molecular weight PAHs have constants in the 10E-06 range; and high molecular weight PAHs have constants in the 10E-05 to 10E-08. Compounds with values ranging from 10E-03 to 10E-05 are associated with significant volatilization, while compounds with values less than 10E-05 volatilize from water only to a limited extent (ATSDR, 1990).

Because of their low water solubility, PAHs in the aquatic systems are primarily found adsorbed to particles. The aquatic fate of PAHs is described by USEPA in the document "Ambient Water Quality Criteria for Polynuclear Aromatic Hydrocarbons" which states :

> "PAH will adsorb strongly onto suspended particulates and biota and their (PAH) transport will be determined largely by the hydrogeologic condition of the aquatic system. PAH dissolved in the water column will probably undergo direct photolysis at a rapid rate. The ultimate fate of those which accumulate in the sediment is believed to be biodegradation and biotransformation by benthic organisms (USEPA, 1979)."

This is restated in the USEPA document "Health Effects Assessment for Polycyclic Aromatic Hydrocarbons (PAHs)" which states :

> "The predominant mechanism that is likely to dictate the fate of most PAHs in aquatic media is sorption to particulate matter and subsequent sedimentation and microbial degradation."

Terrestrial Fate Processes

Since PAHs are most likely to stay in the sediment or soil, microbial degradation is the most likely ultimate environmental fate in contrast to photolysis and volatilization (ATSDR, 1990). Compounds with four cyclic rings or less are most amenable to microbial degradation. Benzo(a)pyrene (five cyclic rings) has a half-life in soil inoculated with bacteria of less than eight days (ATSDR, 1990). The half-life reported for benzo(a)pyrene in soil reported in Superfund Public Health Evaluation Manual (SPHEM, 1986) is 420 days to 480 days but there is no reference to the microbial content in the soil.

The above comments indicate that terrestrial animals are unlikely to be exposed to PAH levels of concern in either the plants or the water consumed. Contact with affected soil is a potential exposure to site-related PAHs, but the low solubility and large molecular size of PAHs of concern make dermal absorption or incidental ingestion an unlikely route of exposure for terrestrial animals.

6.4 SUBSURFACE SOIL ASSESSMENT

As discussed in Section 4.11.2, two subsurface soil samples were collected from each monitoring well location and two additional subsurface soil samples were collected using a stainless steel spoon from location NCR-13. Figure 6.1 presents soil boring/monitoring well locations.

Also, as discussed in Sections 4.11.6 and 4.11.7, six subsurface soil samples were also collected using a hand auger sampler. Five samples were collected from the hand auger sampling locations shown on Figure 6.4 and the sixth sample was collected from the test pit location shown on Figure 6.5. The soil samples collected for chemical analysis were selected based on HNU readings, visual evidence of contamination, soil grain size and water content. Therefore, the soil samples are considered to represent "worst case" conditions. Soil samples collected for chemical analyses were analyzed for the complete TCL/TAL parameters, with the exception of the two additional subsurface soil samples collected from location NCR-13, which were analyzed for TCL VOC parameters.

Summaries of the subsurface soil samples collected for chemical analyses are presented in Tables 4.12 and 4.18. Complete summarizes of the TCL/TAL parameter analyses for subsurface soil samples are presented in Appendix K. A summary of detected TCL/TAL parameters for borehole soil samples is presented in Table 6.3. Summaries of detected TCL/TAL hand auger samples are presented in Tables 6.7 and 6.8.

Tables 6.3 , 6.7 and 6.8 show that few TCL VOCs, SVOCs and pesticides were detected in the subsurface soil samples. In cases where chemicals were detected, they were sporadic. Several TAL metals were also detected in most samples. Specific compounds detected are discussed below.

The TCL VOC compounds detected include acetone, 1,2-dichloroethene (total), methylene chloride, toluene, 1,1,1-trichloroethane, and trichloroethene. The maximum TCL VOC parameter concentration detected was for 1,2-dichloroethene (total) at an estimated concentration of 0.16 ppm. Toluene was the only TCL VOC parameter detected in borehole NCR-12 which was completed through the northernmost landfill cell. The toluene concentration was estimated at 0.015 ppm. The high HNU readings measured during hand auger sample collection are attributed to organic (vegetation) decomposition off gases in the soils.

The TCL SVOC compounds detected include benzoic acid, butylbenzophthalate, bis(2-ethylhexyl)phthalate, and phenol. The maximum TCL SVOC parameter concentrations were detected in the soil sample from boring location NCR-12, collected directly below the disposed solid waste. This was the only sample which exhibited detected concentrations of phenol (4.3 ppm) and benzoic acid (3.5 ppm). No TCL PAHs were detected in any of the subsurface soil samples.

The TCL pesticides detected include only alpha-BHC and heptachlor epoxide. The maximum pesticide concentration detected was for heptachlor epoxide at an estimated value of 0.00058 ppm. Polychlorinated biphenyl (PCB) Aroclor 1254 was detected in only one soil sample, from boring location NCR-12, at an estimated concentration of 0.047 ppm. This sample was collected directly below disposed solid waste (22 to 26 feet below ground surface). It is to be noted that no TCL VOCs, SVOCs, pesticides or PCB aroclors were detected in the subsurface soil sample collected from NCR-12 at a deeper elevation (44 to 46 feet below ground surface). This supports the discussion presented in Section 5.3 that the northernmost cell is completed in the clay/till** which severely limits potential downward vertical migration of leachate.

Several TAL metals were detected in the subsurface soil samples. In order to provide a comparison of detected inorganic parameter concentration to background conditions, data from borehole locations NCR-1, NCR-2, NCR-5 and NCR-11 are used as background. These boreholes are located sufficient distances from the Site to be unimpacted by Site activities and are considered to represent background inorganic conditions. As shown on Figure 6.1, NCR-1 is located approximately 1,000 feet northeast of the Site; NCR-2 is located approximately 500 feet north of the Site; NCR-5 is located approximately 350 feet west of the Site; and NCR-11 is located approximately 500 feet southwest of the Site. Table 7.9 presents a summary of the inorganic soil data for locations NCR-1, NCR-2, NCR-5 and NCR-11 and provides a range of background concentrations. A comparison of the inorganic data summarized in Tables 6.3, 6.7 and 6.8 to the background soil inorganic concentration ranges summarized in Table 7.9 shows that the concentration of inorganic parameters detected on Site are consistent with the Site-specific background inorganic data.

To aid in the presentation of the analytical data, Figures 6.1, 6.2 and 6.3 present parameter concentrations for total VOCs, phthalate isomers, phenol isomers and PAHs. Figure 6.1 presents the data in plan view and Figures 6.2 and 6.3 present the data in cross-sectional view. Figure 5.1 presents the cross-section locations.

As indicated on Figures 6.1, 6.2 and 6.3, total VOC, phthalate isomer and phenolic compound concentrations are sporadically distributed both horizontally and vertically in the subsurface soils.

The concentration of VOCs detected in the subsurface soil samples immediately surrounding the perimeter of the landfill indicate that these soils may have been slightly impacted by leachate migration from the landfill cells. It is to be noted, however, that 1,2-dichloroethene (total), 1,1,1-trichloroethane, and trichloroethene were not detected in any leachate samples collected during the RI (see Section 6.6) nor were any TCL VOCs detected in either round of groundwater samples collected from the shallow wells (see Section 6.9).

Based upon the review of the subsurface soil data and the discussion presented in Section 5.3, it is concluded that the shallow silt unit surrounding the landfill and the clay/upper till aquitard, underlying the landfill, limit horizontal and vertical migration of leachate from the landfill. The Clay Seal, if present, would also serve to limit horizontal migration of leachate from the landfill.

6.5 LEACHATE SEEP ASSESSMENT

As discussed in Section 4.11.4, a total of seven liquid leachate seep samples and two stained soil samples were collected for chemical analyses. Figure 6.6 presents leachate seep sample locations. All samples were analyzed for the complete TCL/TAL parameters.

A summary of the leachate seep samples collected for chemical analyses is presented in Table 4.17. A complete summary of the

TCL/TAL parameter analyses for the leachate seep samples is presented in Appendix K. A summary of detected TCL/TAL parameters is presented in Table 6.6.

Table 6.6 shows that various TCL VOCs, SVOCs, pesticides and metals were detected in the leachate samples. To aid in the presentation of leachate data, Figure 6.6 presents total VOC, PAH, phenolic compound and phthalate isomer concentrations.

The data shows that TCL VOCs, PAHs, phenolic compounds and phthalate isomers are present above New York State (NYS) Ambient Water Quality Standards in most leachate samples collected within the perimeter of the landfill. The maximum concentrations detected in the seep samples for total VOCs, PAHs, phenolic compounds and phthalate isomers were 2.4 ppm, 2.6 ppm, 5.8 ppm and 2.3 ppm, respectively. Various inorganic parameters were also detected in the leachate samples above their respective NYS Ambient Water Quality Standards, including barium, chromium, iron, magnesium, manganese and zinc.

A comparison of the leachate seep data (Seep #5, Seep #7) for the northernmost cell to the leachate seep data (Seep #16, Seep #13, Seep #14, Seep #21) for the southern five cells shows that the leachate exhibits similar contaminants. Total VOC concentrations in the southern five cells are higher than those in the northernmost cell, whereas, total phenolic compound concentrations are higher in the northernmost cell than in the southern five cells. Total PAH and phthalate isomer concentrations are similar between the northernmost cell and the southern five cells. The leachate seep data supports the discussion presented in Section 2.2.2, that the northernmost cell received wastes similar to those disposed of in the other cells, that is, industrial waste and municipal waste were commingled throughout the landfill.

Tables 4-21 and 4-22 (enclosed in Appendix N) contained in the EPA published document entitled "Report to Congress, Solid Waste Disposal in the United States, Volume II", Office of Solid Waste and Emergency Response, EPA/530-SW-88-011B, October 1988 (EPA, 1988c) provide organic and inorganic leachate data, respectively, for municipal solid waste landfills in the United States. A comparison of the Site leachate data to those presented in Tables 4-21 and 4-22 shows that the leachate for the Site is typical of leachate in other municipal solid waste landfills. That is, the leachate generated at the Site exhibits similar contaminants and concentrations to leachate generated in other municipal solid waste landfills in the United States. This supports the conclusion that industrial waste and municipal waste were commingled throughout the landfill.

As discussed in Section 4.11.4, one leachate sample, Seep #10, was collected in a drainage swale approximately 450 feet west of the closest landfill cell. 2-Hexanone at an estimated concentration of 0.011 ppm and bis(2-ethylhexyl)phthalate at an estimated concentration of 0.003 ppm were the two TCL organic compounds detected in the sample collected from Seep #10. Both are below their respective NYS Ambient Water Quality Standards. Arsenic was also detected in this sample at a concentration of 0.0586 ppm, above its NYS Ambient Water Quality Standards of 0.05 ppm. As discussed in Section 4.12, additional field tile investigation activities were undertaken to further investigate this seep. Section 6.6 presents the additional field tile assessment.

6.6 FIELD TILE ASSESSMENT

As discussed in Section 4.12.2, an additional field tile investigation was conducted at the Site on October 2, 1991. One objective of the additional field tile investigation was to determine whether the liquid within the tile had impacted soils around the tile or the sediments within the swale at the discharge point of the tile (Seep#10). Section 4.12.2 summarizes the activities of the additional field tile investigation. Figure 4.6 shows the location of test pits excavated during the additional Site investigation.

A liquid sample (Tile 1) was collected from the field tile at Test Pit #5 and analyzed for the complete TCL/TAL parameters. A summary of the complete TCL/TAL parameter analyses for the Tile 1 sample, plus previous leachate sample Seep 10-R is presented in Appendix K. A summary of the detected TCL/TAL parameters for sample Tile 1 and previous sample Seep 10-R is presented in Table 6.15.

Table 6.15 shows that benzene, chloroethane and vinyl chloride, all at estimated concentrations of 0.002 ppm, were the TCL VOCs detected and no TCL SVOCs were detected in sample Tile 1. These data are consistent with the data reported for sample Seep 10-R collected during the RI activities.

Table 6.15 also shows that all detected inorganic concentrations for sample Tile 1, with the exception of arsenic, are similar in concentrations to those previously detected in sample Seep 10-R. Arsenic was not detected in sample Tile 1 at a detection limit of 0.005 ppm, whereas, it was previously detected at a concentration of 0.0586 ppm in sample Seep 10-R.

As discussed in Section 4.12.2, one sediment, one soil and one surface water sample were also collected at the discharge point of the tile (Seep #10 location). These three samples were analyzed for arsenic. Table 6.16 summarizes the arsenic data for the three samples.

Table 6.16 shows that the sediment sample, Swale 1, exhibited an arsenic concentration of 22.7 ppm and soil sample Seep 10-R exhibited an arsenic concentration of 2.0 ppm. Both samples are within the background soil concentration range for arsenic (1.8 - 28 ppm) summarized in Table 7.9. The liquid sample, Seep-10, exhibited an arsenic concentration of 0.0145 ppm, below the NYS Ambient Water Quality Standard of 0.05 ppm.

Also as discussed in Section 4.12.2, two soil samples were collected from Test Pit #5. One sample (Tile 1) was collected from visibly stained soils immediately surrounding the tile and the second sample (TP5) was collected from visibly clean soils one foot beside and six inches above the tile. A summary of the complete TCL/TAL parameter analyses for the two soil samples is presented in Appendix K. A summary of the detected TCL/TAL parameters for the two soil samples is provided in Table 6.17.

Table 6.17 shows that no TCL organic compounds were detected in either soil sample and that all detected inorganic parameters in both samples are within the background soil concentration ranges summarized in Table 7.9.

Based on the additional field tile investigation data, liquid within the field tile has not adversely impacted sediments within the drainage swale or the soils surrounding the tile.

6.7 SURFACE WATER ASSESSMENT

As discussed in Section 4.11.5, a total of ten surface water samples were collected for chemical analyses. Figure 6.7 presents surface water sample locations. All samples were analyzed for the complete TCL/TAL parameters.

A summary of the surface water samples collected for chemical analyses is presented in Table 4.17. A complete summary of the TCL/TAL parameter analyses for the surface water samples is presented in Appendix K. A summary of detected TCL/TAL parameters is presented in Table 6.5.

Table 6.5 shows that limited TCL VOCs, SVOCs and pesticides were detected in the surface water samples. With the exception of carbon disulfide, toluene, di-n-butylphthalate, bis(2-ethylhexyl)phthalate and delta-BHC, all other organic parameters were single detections. The single detection parameters exhibited concentrations below or just above their respective NYS Ambient Water Quality Standards. Various inorganics were detected in the surface water samples. To aid in the presentation of surface water data, Figure 6.7 presents total VOC, phenolic compound and phthalate isomer concentrations.

The data presented in Table 6.5 and on Figure 6.7 shows a sporadic distribution of TCL VOCs, phenolic compounds and phthalate isomers across the Site and that no TCL PAHs were detected in any of the surface water samples. As discussed in Section 6.3, PAHs have a low solutility in soils or sediments. Therefore, PAHs entering the surface water specifically in the drainage swale adjacent to the access road west of the Site, would have a tendency to bind to the sediments and not be transported off Site via surface water flow. This is supported by the surface sediment data discussed in Section 6.8.

The four surface water samples (SW-1, SW-2, SW-4 and SW-5) collected near the north end of the Site exhibited limited presence of organic parameters. The maximum concentrations detected in these four samples for total VOCs, phenolic compounds and phthalate isomers were 0.004 ppm, 0.011 ppm and 0.003 ppm, respectively.

Three surface water samples (SW-7, SW-8 and SW-10) were collected from the N-S drainage swale, approximately 600 feet west of the western boundary of the landfill cells. These samples also exhibited limited presence of organic parameters. No TCL VOC or phenolic compounds were detected and the maximum concentration detected for total phthalate isomers was 0.08 ppm. No TCL organic parameters were detected in the downstream sample (SW-10).

Two surface water samples (SW-11 and SW-13) were collected from the N-S drainage swale along the eastern perimeter of the landfill cells. These samples also exhibited limited presence of organic parameters. The maximum concentrations detected in these two samples was at upstream sample location SW-11. The total VOCs, phenolic compound and phthalate isomer concentrations were 0.0107 ppm, 0.007 ppm (estimated) and 0.0809 ppm, respectively. The downstream sample location SW-10 exhibited total VOCs and phthalate isomers at concentrations of 0.002 ppm and 0.008 ppm, respectively. Phenolic compounds were not detected at this location.

The limited presence of the phthalate isomers and phenols in the surface water is expected. As discussed in Section 6.3, phthalates have a low solubility in water and have a strong tendency to adsorb to soils or sediments. Also, as discussed in Section 6.3, phthalates and phenols will biodegrade rapidly in surface water; half life of phthalates approximately 2 to 3 weeks and half life of phenols a few hours to a few weeks. As discussed in Section 5.4, surface water flow from the Site is intermittent and occurs only during heavy or prolonged rain events. Therefore, phthalates or phenols in the on-Site surface waters are expected to either adsorb to sediments in the on-Site swales or be subject to biodegradation. In addition, as discussed in Section 5.4, the concentrations of any parameters in the on-Site surface water would be significantly lowered during any off-Site flow event due to dilution by the heavy or prolonged rains.

The last surface water sample was collected from off-Site location SW-18, the point at which the 30-inch diameter culvert passing under River Road (see Section 4.6) discharges to the Niagara River. Total VOC and phthalate isomer concentrations detected in this sample were 0.012 ppm and 1.0 ppm, respectively. As discussed above, the sample collected from location SW-10 did not detect any VOCs or phthalate isomers and the sample collected from location SW-13 detected total VOCs and phthalate isomers at concentrations of 0.002 ppm and 0.008 ppm, respectively. Both locations, SW-10 and SW-13, are the closest upstream on-Site surface water sample locations to location SW-18. This indicates that the VOCs and phthalate isomers detected at location SW-18 are not attributed to the Site. This is supported by the fact that the RI surface water samples were collected on November 28 and 29, 1991 and, as discussed in Section 5.4, no surface water flow occurred from the Site for 22 days prior to sample collection or during sample collection. However, the surface water sample collected from off-Site location SW-18, was collected from flowing water at the discharge point of the 30-inch diameter culvert. Therefore, the source of water flowing out the 30-inch diameter culvert at the time of sample collection was not the Site. Potential off-Site sources at SW-18 would include surface water runoff from other areas in the vicinity of the Site that contribute surface water runoff to the 30-inch diameter culvert, such as River Road and the railroad tracks to the south of the Site and the 24-inch diameter culvert pipe passing under access road west of the Site and enters into the north-south swale, just downstream of surface water sample location SW-10.

Excluding the data from sample location SW-18, six individual organic and five inorganic parameters exceeded NYS Ambient Water Quality Standards, as summarized below:

Locations which Exceed NYS Ambient Water Quality Standards	*Parameter*	*Maximum Detected Concentration (mg/L)*	*NYS Ambient Water Quality Standards (mg/L)*
SW11	Xylene	0.006	0.005
SW11	2,4-Dimethylphenol	0.007	0.001
SW4	Phenol	0.011	0.001
SW1, SW8, SW11, SW13	Bis(2-ethylhexyl)phthalate	0.08	0.004
SW4	4,4'-DDT	0.00004	0.00001
SW8	Heptachlor epoxide	0.000014	0.000009
All locations	Iron	38	0.3
SW8, SW13	Lead	0.352	0.050
SW1, SW2, SW4, SW7 SW7, SW8, SW11, SW13	Magnesium	113	35
SW2, SW8, SW13	Manganese	1.69	0.3
SW8, SW13	Zinc	2.36	0.3

The principal sources of any Site-related surface water contamination are the leachate seeps identified at the Site. The organic parameters 2,4-dimethylphenol and bis(2-ethylhexyl)phthalate were detected in most leachate seep samples. The inorganic parameters iron, magnesium, manganese and zinc were also detected in the leachate samples above their respective NYS Ambient Water Quality Standards. Based on the surface water data, as summarized above, these parameters were infrequently detected, with the exception of iron, and when detected the parameters' concentrations were just above the NYS Ambient Water Quality Standards. The surface water data show that the leachate seeps have had, at most, a limited adverse effect on surface water quality on and in the near vicinity of the Site. However, as discussed in Section 5.4, the concentrations of any parameters in the on-Site surface water would be significantly lowered during any off-Site flow event due to dilution by heavy or prolonged rains.

6.8 SURFACE SEDIMENT ASSESSMENT

As discussed in Section 4.11.3, a total of 18 surface sediment samples were collected for chemical analyses. Figure 6.8 presents surface sediment sample locations. All samples were analyzed for the complete TCL/TAL parameters.

A summary of the surface sediment samples collected for chemical analyses is presented in Table 4.14. A complete summary of TCL/TAL parameter analyses for surface sediment samples is presented in Appendix K. A summary of detected TCL/TAL parameters is presented in Table 6.4.

Table 6.4 shows that limited TCL VOCs, SVOCs and pesticides were detected in the surface sediment samples. Phenolic compounds were not detected in surface sediments. Various inorganics were detected in surface sediment samples. To aid in the presentation of surface sediment data, Figure 6.8 presents total VOC, PAH and phthalate isomers concentrations.

A review of the data presented in Table 6.4 and on Figure 6.8 indicates the presence of VOCs and phthalate isomers at most sample locations. Maximum concentrations of total VOCs and phthalate isomers detected at the Site, with the exception of the sample collected at SW-18, were 0.138 ppm and 0.97 ppm, respectively.

The sample collected at SW-18, the point at which the 30-inch diameter culvert passing under River Road (see Section 4.6) discharges to the Niagara River, exhibited a total phthalate isomer concentration of 3.9 ppm. If the source of the phthalates at SW-18 were from the Site, one would expect phthalate isomers to be present in upstream surface sediment samples. However, as was the case for surface water, the two surface sediment samples collected from locations SW-10 and SW-17 (two closest upstream sediment sample locations) did not detect any phthalate isomers. As such, the presence of phthalate isomers at location SW-18 may not be attributed to the Site. This is supported by the fact that the phthalate isomer presence in the surface water sample collected from location SW-18 was from a source other than the Site (see Section 6.7). It is reasonable to conclude, therefore, that the phthalate isomers present in the sediment sample at SW-18 would be attributable to the same potential off-Site sources as discussed for the surface water.

PAHs were generally not detected in surface sediment samples collected on and in the immediate vicinity of the Site. PAHs were generally detected in sediments collected from the drainage swales located west of the western boundary of the landfill cells, with a maximum total concentration of 2.28 ppm. Most locations where PAHs were detected are adjacent to the access road west of the Site. Since PAHs were generally not detected in surface sediments collected on and in the immediate vicinity of the Site, the PAHs detected in sediments collected from the drainage swales located west of the Site are expected to be from other sources. The PAHs detected in the western drainage swale are all within typical concentration ranges for urban soils and most are within typical concentration ranges for agricultural soil (see Table 6.18). As discussed in Section 6.3.3 potential off-Site sources of PAHs include emission from internal combustion vehicles travelling the adjacent access road. As discussed in Section 6.3.3, the PAHs have a low solubility in water and will readily adsorb to soils or sediments, especially soils with high organic content, such as those in the drainage swales where the PAHs were encountered.

The leachate data (see Table 6.6) shows that the phenolic compounds and phthalate isomers were the SVOCs most frequently detected in the leachate seeps. Phenolic compounds were not detected in any surface sediment samples, however, as discussed in Section 6.3, phenol biogrades rapidly and is, therefore, not expected to be present in the sediments. Phthalate isomers however, have a strong tendency to absorb to soils or sediments as discussed in Section 6.3. Phthalate isomers were detected in the sediment samples collected from the perimeter drainage swales around the landfill cells at a maximum concentration of 0.97 ppm. Phthalate isomers were also detected in the surface water. As discussed in Section 6.3, phthalate isomers have a low water solubility limit, and as such the phthalate isomers would have a tendency to be adsorbed to sediments. Therefore, phthalate isomers entering the surface water in the drainage swales, via leachate seeps, would have a tendency to bind to the sediments and not be transported off Site via surface water flow. This is supported by the data, which shows phthalate isomer concentrations in the sediments to be approximately one order of magnitude higher than detected in the surface water. Therefore, it is concluded that, on and in the vicinity of the Site, the leachate seeps and surface water have had a limited adverse effect on surface sediments.

6.9 GROUNDWATER ASSESSMENT

As discussed in Section 4.11.8, two rounds of groundwater samples were collected from each of the groundwater monitoring wells installed at the Site during the RI and third set of groundwater samples were collected from well NCR-12D as part of the additional Site investigation activities. Figures 6.9, 6.10 and 6.11 present the groundwater sample locations for the silt unit, lower clay/upper till and lower till units and upper (Vernon and Oak Orchard Formations) bedrock, respectively. Each sample was analyzed for the complete TCL/TAL parameters.

Summaries of the groundwater samples collected during the RI for chemical analyses are presented in Tables 4.19 and 4.20 for Rounds I and II, respectively. Complete summaries of the TCL/TAL parameter analyses for groundwater samples collected during the RI are presented in Appendix K. A summary of detected TCL/TAL parameters for groundwater samples collected during the RI is presented in Tables 6.9 and 6.10 for

Rounds I and II, respectively. A further breakdown of the groundwater results for each individual hydrogeologic unit around the perimeter of the Site is provided as follows:

- Shallow (silt unit) overburden groundwater - Table 6.11;
- Deep (clay/upper and lower till units) overburden groundwater - Table 6.12; and
- Upper Bedrock (Vernon and Oak Orchard Formations) groundwater (does not include data for NCR-12D) - Table 6.13.

Excluding the data for well NCR-12D, the groundwater data shows that very few of the TCL parameters are present and that on those few occasions where they are present in more than one sample in their respective units, the concentrations are below their corresponding NYS and/or EPA MCLs or MCLGs. For the TAL parameters, the concentrations are consistent with groundwater quality expected in the Niagara region. That is, the groundwater consistently exhibits levels of magnesium, sodium and iron above their respective NYS and/or EPA MCLs or MCLGs (see Section 3.6).

6.9.1 On-Site (Well 12-D) Groundwater Assessment

The RI data for well NCR-12D exhibits levels of organic compounds above their corresponding NYS and/or EPA MCLs or MCLGs. This well is screened in the upper bedrock (Oak Orchard Formation) aquifer beneath the northernmost landfill cell. Four TCL VOCs and six TCL SVOCs were detected (see Table 6.10) in the groundwater from NCR-12D, with the highest measured concentration being 1.2 ppm of phenol. As discussed in Section 6.4, two subsurface soil samples were collected and analyzed for TCL/TAL parameters during installation of well NCR-12D. The first sample was collected at 22 to 26 feet below ground surface, directly below disposed solid waste. This sample exhibited detected concentrations of a limited number of VOCs, SVOCs, and a single PCB aroclor (see Table 6.3). The second sample was collected at 44 to 46 feet below ground surface, in the basal till unit. This sample did not exhibit any detected concentrations of VOCs, SVOCs or PCBs, indicating that the clay/upper till aquitard limits potential downward vertical migration of leachate. Thus, it was suspected that the limited presence of organic contaminants detected in well NCR-12D were probably due to leachate entering the bedrock during well installation. As described in Section 4.12.1, well NCR-12D was repurged and resampled to determine if the TCL parameters measured in the well during the RI were due to leachate entering the well during installation.

As discussed in Section 4.12.1, during the resampling activities at well NCR-12D, one investigative sample (NCR-12D-III) and one blind duplicate sample (NCR-22D -III) were collected for chemical analysis. A summary of the complete TCL/TAL parameter analyses for the two groundwater samples, which are referred to as Round III samples, and for the previous Round I and II groundwater samples collected from well NCR-12D, is presented in Appendix K. Summaries of the detected TCL/TAL parameters for the two Round III groundwater samples and for the Round I and II groundwater samples from well NCR-12D are presented in Table 6.14.

Table 6.14 shows that, for the Round I and II groundwater analyses for well NCR-12D, the total TCL VOCs, excluding acetone, were detected at maximum concentrations of 0.0276 ppm and 0.0199 ppm, respectively. In comparison, Round III groundwater analyses show that total TCL VOCs, excluding acetone, were detected at a maximum estimated concentration of 0.0006 ppm.

Table 6.14 also shows that acetone was detected in all groundwater samples from well NCR-12D during Round I, in no groundwater samples from well NCR-12D during Round II and in only one groundwater sample during Round III. Since acetone was not detected in the soil sample collected at 44.0 to 46.0 feet BGS and in view of the sporadic presence of acetone in the groundwater samples from well NCR-12D, it is considered that the acetone presence in the groundwater samples from NCR-12D is attributable to laboratory or field contamination and is not considered to be Site related.

Round I, II and III groundwater analyses for well NCR-12D show that total phenolic compounds were detected at maximum estimated concentrations of 1.599 ppm, 0.85 ppm and 0.159 ppm, respectively. No phthalate isomers or pesticides were detected in well NCR-12D groundwater during Round III compared to trace levels of those parameters detected in well NCR-12D groundwater during Rounds I and II.

It is also to be noted, as discussed in Section 4.12.1, that during purging of well NCR-12D on October 1, 1992, water within the well casing of well NCR-12D exhibited characteristics of leachate: yellow and slightly cloudy with a leachate odor; a pH of 9.0 and a conductance of 480 µmhos/cm. This condition was present even after previously sampling the well twice (Round I and Round II) and performing a packer injection test on the well in which approximately 500 gallons of potable water was introduced into the well. This would suggest that a preferential migration pathway has been created by the well installation and allows leachate leakage from the landfill cell to the groundwater to occur. This is supported by the fact that phenolic compounds were the main organic compounds detected in well NCR-12D groundwater. As discussed in Section 6.3, phenols will biodegrade rapidly in groundwater. Therefore, if the phenol was leaching through the clay/upper till aquitard underlying the northernmost cell it would be expected to biodegrade prior to reaching the upper bedrock aquifer. The concentrations of phenolic compounds in well NCR-12D indicate a continuous source of phenolic compounds may be present. Therefore, even though the phenolic compounds presence may have been due to leachate entering the bedrock well during installation, their presence may also be due to a potential preferential pathway created by the well installation. As such it is recommended that well NCR-12D be abandoned and sealed.

6.9.2 Off-Site Groundwater Assessment

A discussion of the chemical presence in the groundwater in each of the three hydrogeologic units outside the perimeter of the landfill is presented below.

Shallow (Silt Unit) Overburden (see Figure 6.9 and Table 6.11)

In the silt unit, comprising the uppermost 1.5 to eight feet of overburden at the Site, groundwater presence was limited and in some cases intermittent, as discussed in Section 5.2. In the five wells from which samples were collected, no TCL VOCs were detected. Phenol was detected in one well (NCR-4S), during Round I, at an estimated concentration of 0.004 ppm, which is just above the New York State MCL (0.001 ppm). Phenol was not detected at a detection limit of 0.005 ppm in any well during Round II. Pentachlorophenol was detected in one well (NCR-13S), during Round I, at an estimated concentration of 0.003 ppm, which is just above the New York State MCL (0.001 ppm). Pentachlorophenol was not detected at a detection limit of 0.02 ppm in any well during Round II. Phthalates were present in two wells (NCR-5S and NCR-13S) during Round I although the combined concentrations were below the MCL of 0.05 ppm. Phthalates were not detected during Round II. A few pesticides were detected, during Rounds I and II, but the highest measured concentration was 0.00009 ppm. A few metals (iron, magnesium, manganese and sodium) were measured to be present, during both Rounds I and II, at concentrations above MCLs or MCLGs, including wells NCR-2S and NCR-5S, both of which are located approximately 500 feet away from the Site and may be considered to represent background conditions. These inorganic parameters are associated with the high silt and clay content of this unit. Chromium was also present above its MCL in three of the wells, during both Rounds I and II, but only in the unfiltered sample. Chromium was detected in an unfiltered sample from NCR-2S at an estimated concentration of 0.128 ppm The concentrations of total chromium (unfiltered) in the other two wells that exhibited exceedances of chromium above its MCL were 0.134 ppm (NCR-3S) and 0.091 ppm (NCR-4S). Chromium was also detected in the shallow silt unit subsurface samples (see Section 6.4) at concentrations ranging from 4 pm to 31 ppm. Therefore, the presence of chromium above its MCL in the three unfiltered samples is attributed to suspended sediments. This is supported by the fact that chromium was not detected in any of the filtered samples which are considered to be more representative of groundwater flow conditions (because the effect of suspended solids is removed).

Given the proximity of the shallow (silt unit) overburden wells to the landfill cells and the lack of contaminant presence in these wells, it is apparent that the naturally low hydraulic conductivity of the silt unit and the Clay Seal, if present, have effectively controlled off-Site horizontal chemical migration through the shallow groundwater regime.

Deep (Clay/Upper and Basal Till Units) Overburden (see Figure 6.10 and Table 6.12)

In the nine deep overburden wells sampled during the RI, contaminant presence was limited to a few locations. The highest observed concentration for any TCL VOC or SVOC parameter in either round of sample collection was 0.01 ppm for bis(2-ethylhexyl)phthalate at NCR-4M. Bis(2-ethylhexyl)phthalate was not detected at a detection limit of 0.005 ppm during Round II. Similarly, the VOC concentration measured at NCR-2I in Round I (0.015 ppm) was not detected at a detection level of 0.001 ppm during Round II. Detected TCL VOCs did not exceed MCLs in Round II and one SVOC (phenol) may have exceeded its MCL (0.001 ppm) in one location

(NCR-4M) at an estimated concentration of 0.002 ppm. Limited pesticides were also observed, with the highest concentration being 0.00014 ppm of 4,4'-DDT at well location NCR-9M during Round II. 4,4'-DDT was not detected at a detection level of 0.001 ppm during Round I.

Iron, magnesium and sodium were present above MCLs at several wells, as expected for this region due to the high silt and clay content of the upper and lower till. Wells NCR-2I and NCR-11M had a few inorganic parameters above MCLs (lead, manganese, chromium, zinc and beryllium), although essentially in the unfiltered samples.

The presence of clay/till aquitard at the Site has protected the groundwater monitored by these wells to the extent, that with exceptions of limited chemical presence, these wells have not been impacted by the Site.

Upper Bedrock (Vernon and Oak Orchard Formations) (see Figure 6.11 and Table 6.13)

A total of nine bedrock wells were sampled during the RI. In the eight wells installed outside the perimeter of the landfill, limited TCL VOC and SVOC parameters were detected in either round of groundwater sampling. As discussed in Section 6.9.1, the ninth well NCR-12D, is screened beneath the landfill and its groundwater quality was probably due to leachate entering the bedrock during well installation or due to a potential preferential migration pathway created by the well installation. Therefore, the conditions in well NCR12-D are not further compared to the groundwater quality of the eight bedrock wells discussed in this subsection of the report.

Acetone was detected in one sample (NCR-11D) at an estimated concentration of 0.006 ppm. Acetone was not detected in Round II. Phenol was detected in one sample (NCR-5D) at an estimated concentration of 0.001 ppm and bis(2-ethylhexyl)phthalate was detected in two samples (NCR-5D and NCR-8D) at estimated concentrations of 0.003 ppm and 0.005 ppm, respectively. Neither was confirmed in the other round of sample collection.

Pesticides were detected in a few wells in Round II. 4,4'-DDT and a few other pesticides were detected in NCR-11D at concentrations of up to 0.00067 ppm in Round II. However, the pesticide parameters were not detected in the bedrock groundwater at a detection level of 0.00002 ppm in Round I.

Magnesium and sodium were consistently present above their MCLs or MCLGs and at two locations unfiltered iron samples also exceeded its MCL. These compounds are naturally elevated above their MCLs or MCLGs for this region (see Section 3.6). Cadmium was detected at one location at an estimated concentration equal to its MCL, however, was not detected in the unfiltered sample from the same location.

6.10 DATA ASSESSMENT SUMMARY

This section summarizes the conclusions of the data assessments presented in Sections 6.2 through 6.9.

Ambient Air Assessment

The concentrations of detected compounds in the ambient air, directly over the two "worst case" leachate seep locations, are significantly less than acceptable ambient air levels, however, much of the data is qualified as unusable. Parameters corresponding to those collected and analyzed for in the air samples are infrequently detected and at low concentrations in other Site media. Therefore, the ambient air quality across the Site is not expected to be above acceptable ambient air levels. Additional air monitoring for landfill gases may be necessary, however, during the remedial design phase.

Subsurface Soil Assessment

The naturally low hydraulic conductivity of the shallow silt unit around the landfill and the Clay Seal, if present, has limited the horizontal migration of leachate from the Site into the silt unit. The clay/upper till aquitard underlying the Site has limited the vertical migration of leachate from the landfill. Therefore, the Site has had, at most, a limited adverse effect on surrounding subsurface soils and the upper bedrock aquifer.

Leachate Seep Assessment

The leachate generated at the Site is similar in characteristics to that generated in other municipal solid waste landfills in the United States (EPA, 1988b). The leachate seeps on the Site have not had an adverse effect on vegetation at the Site. The area of stressed vegetative (mainly upland species) to the north of the Site is believed due to flooding as a result of surface grading changes.

Surface Water Assessment

The leachate seeps on the Site have had, at most, a limited adverse effect on surface water quality in the on-Site perimeter swales.

Surface Sediment Assessment

The leachate seeps on the Site have had a limited adverse effect on surface sediment quality in the on-Site perimeter swales.

Groundwater Assessment

The presence of the landfill has had a limited impact on the quality of groundwater at the Site. Inside and immediately around the perimeter of the landfill, excluding the data from well NCR-12D, the groundwater quality has not been impacted. Inside and immediately around the perimeter of the landfill, including the data from NCR-12D, the groundwater exhibits a limited impact due to phenolic compounds. Outside the limits of the landfill, including or excluding the data from well NCR-12D, the groundwater has not been impacted.

The low hydraulic conductivity of and the natural attenuation characteristics of the shallow silt unit surrounding the landfill and clay/till aquitard underlying the Site provide excellent barriers to leachate migration from the Site. The Clay Seal, if present, would also serve to limit horizontal leachate migration into the shallow silt unit around the Site. The lack of a prominent gradient in the upper bedrock aquifer and the lower till unit has also greatly reduced the potential of groundwater containing Site-related compounds to migrate from the Site.

7.0 BASELINE RISK ASSESSMENT

This risk assessment provides an examination of the potential impact, if any, to public health, welfare or to the environment which would result from the release of hazardous substances and/or pollutants or contaminants from the Site. The risk assessment presented herein is consistent with the current USEPA guidance document: "Risk Assessment Guidance for Superfund" [(RAGS) Interim Final, December 1989] and the Supplemental guidance provided in OSWER Directive: 9285.6-03, March 25, 1991. These documents provide guidance with respect to the following issues:

- Identification of primary chemicals of concern.
- Identification of potential exposure pathways.
- Estimates of exposure point concentrations.
- Characterization of estimated cancer risks and non-cancer hazards related to the exposures and estimated exposure point concentrations.

7.1 GENERAL SITE DESCRIPTION

The Site description was previously presented in Sections 1.0 to 6.0 of this report.

7.2 IDENTIFICATION OF POTENTIAL PARAMETERS OF CONCERN

This section discusses the process for establishing the potential parameters of concern which include chemicals most likely to be related to the Site, and with the greatest potential to result in risk to public health or welfare or to the environment. In general, parameters were identified as potential parameters of concern based upon their detection frequency, concentrations, and known toxicity characteristics.

Surface soil is not evaluated as a media of concern in this evaluation nor was it identified as a media of concern in the POP (CRA, 1990a) or in the Ebasco report (Ebasco, 1988). Surface soil, with the exception of sediment in drainage swales, beyond the limits of the landfill is not considered as a potential exposure pathway. The surface soils above the landfill cells have been capped with clay which is considered to be clean. Leachate seeps and surface sediments are evaluated as potential exposure pathways.

7.2.1 Subsurface Soils

Table 7.1 summarizes the detection frequencies, the range of detected concentrations, the mean, maximum detected concentration and the upper confidence limit (i.e. the 95 percent upper confidence limit) on the arithmetic mean concentrations (95 percent UCL) for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides and metals detected in the subsurface soil samples. Potential parameters of concern in the subsurface soils are also identified in Table 7.1.

Generally, parameters were identified as potential parameters of concern if they were detected in more than one subsurface soil sample. The concentrations of inorganic parameters in the subsurface soils are consistent with the site specific background inorganic data summarized in Table 7.9. Hence, inorganics are not considered to be potential parameters of concern for the evaluation of subsurface soil exposures.

7.2.2 Sediments

Table 7.2 presents the frequency of detection, the range of detected concentrations, the mean, maximum detected concentration and the 95 percent UCL for VOCs, SVOCs, pesticides and metals detected in the sediment samples. Potential parameters of concern in the sediments are also identified in Table 7.2.

In general, if a chemical was detected in a single sample, it was not included as a potential parameter of concern. The concentrations of inorganic parameters in the sediments were consistent with the Site-specific background inorganic data summarized in Table 7.9, with the exception of cadmium and mercury. Thus, both cadmium and mercury are considered as potential parameters of concern.

7.2.3 Leachate

Table 7.3 presents the frequency of detection, the range of detected concentrations, the mean, maximum detected concentration and the 95 percent UCL for VOCs, SVOCs, pesticides and metals detected in the leachate samples. Potential parameters of concern in leachate are also identified in Table 7.3.

Generally, parameters were identified as potential parameters of concern if they were detected in more than one sample and if the maximum detected concentration for the individual parameter exceeded the New York State (NYS) Ambient Water Quality Standards or Guidance Values.

Although arsenic was detected in seven of seven samples, the maximum detected concentration for arsenic of 0.0586 mg/L (ppm) is only slightly higher than the NYS Ambient Water Quality Standard of 0.050 ppm. Resampling of this location (Seep #10) did not detect arsenic at a detection level of 0.005 ppm. The 95 percent UCL concentration for arsenic is 0.025 ppm. Therefore, arsenic is not considered as a potential parameter of concern. Toluene and xylene were detected in more than one sample and above the NYS Ambient Water Quality Guidance Values of 0.005 ppm for these two parameters. However, the maximum detected concentration for both parameters are an order of magnitude below the EPA Ambient Water Quality Maximum Contaminant Level (MCL). Therefore, toluene and xylene are not considered parameters of potential concern.

7.2.4 Surface Water

Table 7.4 summarizes the frequency of detection, the range of detected concentrations, the mean, maximum detected concentration and the 95 percent UCL for VOCs, SVOCs, pesticides and metals detected in surface water samples. Potential parameters of concern in surface water are also identified in Table 7.4.

In general, parameters were identified as potential parameters concern if they were detected in more than one sample and if the maximum detected concentration for the individual parameter exceeded the NYS Ambient Water Quality Standards or Guidance Values.

7.2.5 Groundwater

Tables 7.5 to 7.7 summarize the frequency of detection, the range of detected concentrations, the mean, maximum detected concentration and the 95 percent UCL for the VOCs, SVOCs, pesticides and metals detected in the shallow overburden (silt unit), deep overburden (clay/upper and lower till units) and upper bedrock (Vernon and Oak Orchard Formations) aquifer groundwater, respectively.

As discussed in Section 5.2, the clay unit and the upper till unit are considered an aquitard, and the shallow silt unit and the lower till unit are not considered to be productive useable aquifers. The upper bedrock

(Vernon and Oak Orchard Formations) aquifer is considered to be the uppermost useable aquifer beneath the Site, however, lateral movement of groundwater from beneath the Site is limited due to the shallow gradient in the upper bedrock aquifer.

Although the NYS Classification of the upper bedrock groundwater is Class GA (Drinking Water Source), there are no known existing domestic or commercial wells present in the vicinity of the Site. As discussed in Section 3.6, the Lockport Formation groundwater contains elevated levels of several inorganics above their respective NYS MCLs or MCLGs. Also, potential future wells in the area are not likely since the municipal water supplies for the City of North Tonawanda, City of Tonawanda, Town of Wheatfield, Town of Lockport and the City of Niagara Falls are withdrawn from the Niagara River.

Recognizing that the upper bedrock groundwater could be considered as a potential future exposure pathway based solely on the NYS Classification, Tables 7.5 to 7.7 show that the organic compounds in the silt unit, lower till unit and upper bedrock aquifer groundwater are detected infrequently and in those few occasions where they are present in more than one sample in their respective units the concentrations are below their corresponding NYS and/or EPA MCLs or MCLGs. It is to be noted that the data for bedrock well NCR-12D was not considered for calculation of the concentrations presented in Table 7.7. This well was completed through the refuse in the northernmost cell at Site. It is not considered reasonable that residential development will occur on the landfill cells themselves, therefore, only those bedrock wells outside the limit of the landfill were considered for inclusion in Table 7.7. Therefore, for the purpose of this evaluation, the groundwater is not considered a media of concern and parameters of potential concern have not been identified.

7.2.6 Ambient Air

Tables 6.1 and 6.2 present ambient air data collected on Site. Detected concentrations of chemicals related to the Site were a minimum of one order of magnitude below the acceptable New York State Ambient Air Limits, however, much of the data is qualified as unusable, based on the data assessment and validation. However, as discussed throughout Section 6.0, parameters corresponding to those collected and analyzed for in the air samples are infrequently detected and at low concentrations in other Site media. Therefore, the ambient air concentrations across the Site are not expected to be above acceptable ambient air levels and for the purpose of this evaluation, the ambient air is not considered a media of concern and parameters of potential concern have not been identified.

7.2.7 Summary of Media and Potential Parameters of Concern

Table 7.8 summarizes the potential parameters of concern for each media evaluated in this risk assessment.

7.3 POTENTIAL EXPOSURE PATHWAYS

The following subsections discuss potential exposure pathways and present the rationale for the selection of the particular pathways and receptor populations.

7.3.1 Subsurface Soil

Table 7.1 presents the data summary for subsurface soil. Five potential parameters of concern were identified based on their presence in more than one sampling location. As noted in Table 7.1, data from on-Site borehole NCR-12D, VOC data from NCR-5 and NCR-9 and initial VOC data from NCR-13 is not considered in the table. Exposure to the five potential parameters of concern could only occur if excavation activities exposed the subsurface soils. Excavation could occur if buildings, roads or utilities were constructed in the area surrounding the Site. There is a potential for future exposure of workers who may contact the exposed soils or inadvertently ingest soil or dust. No current exposures to chemicals in subsurface soils are identified under present conditions, and thus the potential exposure of workers to chemicals in subsurface soils is limited to future conditions.

7.3.2 Sediments

Table 7.2 presents the data summary for surface sediments collected from on- and off-Site drainage swales. Twenty-three potential parameters of concern were identified based on their presence in more than one sampling location and their concentration above typical background surface soil concentrations.

Under present conditions exposure to these chemicals could occur if individuals trespassed on the Site and adjacent land while hunting, hiking or engaged in other recreational activities. If the area immediately surrounding the Site remains undeveloped, similar trespasser exposure could also occur in the future. The future encroachment of residential and commercial developments would change the character of the area and affect the potential use by trespassers.

Also, the area surrounding the Site could potentially be developed in the future as a residential, parkland and/or commercial area. With residential and parkland development, family members, including small children, could be potentially exposed to surface sediments where the drainage swales are left open and pass along, through or near the residential lots or developed park areas.

During potential future development of the area, construction workers could be potentially exposed to drainage swale surface sediments during grading and excavation activities.

7.3.3 Leachate Seeps

Table 7.3 presents the data summary for leachate seeps collected on Site. Twenty-four potential parameters of concern were identified based on their presence in more than one sampling location and concentrations which exceeded surface water standards.

Under present conditions exposure to these chemicals could occur if individuals trespassed on the Site and adjacent land while hunting, hiking or engaged in other recreational activities. If the area immediately surrounding the Site remains undeveloped, this trespasser exposure to seeps could also occur in the future although the encroachment of residential and commercial developments would change the character of the area and affect the potential use by trespassers. The Site, as specified in the POP (CRA, 1990a), will be fenced, which would exclude casual trespass.

In the future the area surrounding the Site could also be developed as a residential, parkland and/or commercial area. The leachate seeps would be confined to areas within the fenced Site which would preclude exposure of the residents and/or park visitors. Under these conditions no potential future residential and parkland exposure to leachate seeps is likely and these exposures were not quantitatively evaluated.

7.3.4 Surface Water

Table 7.4 presents the data summary for surface water from on- and off-Site drainage swales. Twelve potential parameters of concern were identified based on their presence in more than one sampling location and concentrations which exceeded surface water standards.

Under present conditions exposure to these chemicals could occur if individuals trespassed on the Site and adjacent land while hunting, hiking or engaged in other recreational activities. If the area immediately surrounding the Site remains undeveloped, this trespasser exposure could also occur in the future although the encroachment of residential and commercial developments would change the character of the area and affect the potential use by trespassers.

In the future the area could also be developed as a residential, parkland and/or commercial area. With residential and parkland development, family members, including small children, could be potentially exposed to surface water where the drainage swales are left open and pass along, through or near the residential lots or developed park areas.

During the development of the area, construction workers could be potentially exposed to drainage swale surface water during grading and excavation activities.

7.3.5 Groundwater

Tables 7.5 and 7.6 present a data summary for groundwater collected from the shallow overburden (silt unit) and deeper overburden (clay/upper till and lower till units). Except for phenol, in the lower till unit, the concentrations of detected organic compounds in the these units are below drinking water standards or the detected organic compounds were reported in a single sample. In the case of phenol, it was detected in two out of nine wells in the lower till unit, at an estimated concentration of 0.002 ppm, just above its MCL of 0.001 ppm. A few metals (iron, magnesium, manganese and sodium) were measured to be present at concentrations above MCLs or MCLGs, however, these parameters are naturally occurring and are commonly elevated in this region. In addition, these overburden units are not considered to be productive useable aquifers. Therefore, the groundwater present in the overburden was not considered a complete exposure pathway and a quantitative health risk assessment was not conducted on the overburden groundwater.

Table 7.7 presents the data summary for groundwater collected from the upper bedrock (Vernon and Oak Orchard Formations) aquifer. The concentrations of detected organic compounds in the upper bedrock aquifer outside the landfill limits are below drinking water standards or the detected organic compounds were reported in a single sample. A few metals (iron, magnesium and sodium) were measured to be present at concentrations above MCLs or MCLGs, however, these parameters are naturally occurring and are commonly elevated in this region (see Section 3.6). Also, due to the hydrogeologic conditions of the upper bedrock aquifer, as discussed in Section 5.2, horizontal movement of groundwater in this unit is limited. Thus, little potential movement of any compounds in the groundwater is expected to occur in the future. For these reasons the reported concentrations in the upper bedrock aquifer were not quantitatively assessed for health risks and hazards.

7.3.6 Ambient Air

Ambient air samples were collected from two "worst case" areas on the Site. Tables 6.1 and 6.2 present the results. As discussed in Section 7.2.6, the ambient air concentrations are not expected to be above acceptable ambient air levels. Therefore, no quantitative health risk assessment performed for ambient air.

7.3.7 Summary of Potential Exposure Pathways

The following complete potential human exposure pathways were identified for the Site:

Subsurface soil - dermal contact and inadvertent ingestion:
    Workers (future)

Sediments - dermal contact and inadvertent ingestion:
    Trespasser (present and future)
    Residents (future)

Parkland visitors (future)

Workers (future)

Leachate seeps - dermal contact and inadvertent ingestion:

Trespassers (present and future)

Surface water - dermal contact and inadvertent ingestion:

Trespasser (present and future)

Residents (future)

Parkland visitors (future)

Workers (future)

7.4 EXPOSURE POINT CONCENTRATIONS

To quantify exposure, the potential exposure scenarios were developed using guidance presented in USEPA documents (EPA, 1991b; EPA, 1990; EPA, 1989 and EPA, 1989a). In some instances, where the EPA documents did not present necessary assumptions or where more appropriate scientific data were available, professional judgement was applied to develop conservative assumptions which are protective of health. The exposure scenarios and assumptions are presented in Appendix M together with related data and calculation tables.

Two levels of assumptions are presented for each exposure scenario. "Mean" assumptions present values considered to be average for the parameters and approximate the most probable exposure conditions. "RME" assumptions are more conservative and approximate the reasonable maximum exposure and utilize assumptions based on the 90th and 95th percentile.

To calculate the exposure point concentrations, all analytical data were used with the exception of those data qualified as unusable (R). To estimate the mean exposure level, the arithmetic mean of all results from the specific medium of concern were used as the estimated exposure point concentrations for the potentially exposed populations. In calculating the arithmetic mean concentrations, all results including non-detected values were used with the assumption that the non-detected values were equal to one half of the detection limit. To estimate the reasonable maximum exposure (RME), the upper confidence limit (i.e. the 95 percent upper confidence limit (95 percent UCL)) on the arithmetic mean concentration or the maximum detected concentration, whichever was less, were used as the exposure point concentrations. This approach is consistent with EPA guidance (EPA, 1991b).

Tables 7.11 to 7.23 present the concentrations applied to evaluate and RME exposure scenarios for all media of concern in this assessment.

7.5 ESTIMATED EXPOSURES

Different exposure scenarios were developed for each exposure media of concern and condition described in Section 7.3 and designated for quantitative risk assessment. A description of each exposure scenario and the associated assumptions are presented in the following subsections and in Appendix M.

To develop the scenarios for the various media, it is necessary to make numerous assumptions regarding who is exposed (age and body weight), the level of exposure to the media being evaluated, the length of time an individual is exposed (hours per exposure day, the number of days, the number of years) and appropriate chemical constants regarding absorption into the receptors body. Assumptions for the two levels of exposure are utilized. Mean assumptions estimate the average exposure which is the exposure that is most likely to occur RME assumptions present the upper limit or 95th percentile of the mean values and is the reasonable maximum exposure that is likely to occur. For example, ten years is considered to represent the average length of time that an individual would reside at one location (Mean assumption). The corresponding 90th percentile value is 30 years (RME assumption).

Some of the assumptions are very scenario specific and are presented in the following subsections which discuss the individual scenarios. Other assumptions are generic for all the scenarios where they apply. These assumptions are summarized in the following tabulation.

Parameter	*Mean Value*	*RME Value*
Ingestion Rate (IR)		
Residential Soil		
Adult	100 mg/day	100 mg/day
Child	200 mg/day	200 mg/day
Dermal Exposure to Soil		
Soiling Level (AF)	1.45 mg/cm^2	1.45 mg/cm^2
Area Soiled (SA)		
Adult & Older Child	1590 cm^2	1590 cm^2
Young Child	1780 cm^2	1780 cm^2
Matrix Factor (MF)		
% available	15%	15%
Years in one residence (ED)	10	30
Averaging Time (AT)		
Carcinogen Assessment	25,550 days	25,550 days
Noncarcinogen Assessment	365 days	365 days
Body Weight (BW)		
Adult	70 kg	70 kg
Older Child	48 kg	48 kg
Younger Child	16 kg	16 kg
Permeability Constant for solutions (PC for water)	0.0008	0.0008
Absorption Factor		
Oral (all chemicals)	1.0	1.0
Dermal		
VOCs	1.0	1.0
SVOCs	0.25	0.25
Metals	0.001	0.01

References for these values are generally the EPA Risk Assessment Guidance for Superfund Sites (RAGS) (EPA, 1991b) or the EPA Exposure Factors Handbook (EFH) (EPA, 1990). The specific sources are identified in Appendix M tables which present the scenario formula and the specific assumptions used.

7.5.1 Subsurface Soil Exposure

Potential exposure to subsurface soil is limited to future conditions when construction activities may occur in the area surrounding the landfill. The worker was assumed to have dermal and oral (ingestion) exposure to subsurface soil. The worker is exposed for 130 days per year, for two years (mean) or four years (RME). Because the areas showing contaminated subsurface soil are limited, the worker is assumed to be exposed to contaminated soil 25 percent (mean) and 50 percent (RME) of the time.

The complete set of assumptions, the associated references and the calculation spread sheets for calculating the estimated risk and hazard are presented in Appendix M, Tables 1 through 3.

7.5.2 Sediment Exposure

The surface sediments are present in the network of drainage swales on and surrounding the Site. Potential exposures at the present time would be limited to trespassers who may hike across the area or may hunt in the area or use the area for other recreational activities. Because the location of the Site is quite remote, trespassers would be older children and adults but not young children. Because the Site does not display any unusually attractive elements, trespass frequencies of once every two weeks (RME) or once every four weeks (mean) are conservative assumptions. The limited areas of surface sediments would suggest that the percentage of time exposed of 10 percent (mean) and 25 percent (RME) would also be conservative. It is assumed that the individuals would come to the Site as long as they were in residence in nearby homes. The specific assumptions, references, and calculations for this exposure scenario are presented in Appendix M, Tables 4 through 6.

For potential future exposure of trespassers to surface sediments it was assumed that the area immediately surrounding the Site is developed. This would eliminate many of the adult activities (hunting, nature walks) but that the proximity to residences may increase the frequency of the play activities of older children. Therefore, older children were assumed to be exposed twice as often (26 and 52 times per year) while adult exposure would be minimal. The complete scenario, assumptions, references and calculations of estimated risk and hazard are presented in Appendix M, Tables 7 through 9.

The scenario for potential exposure to sediments by residents who might build homes adjacent to the Site uses the generic assumptions for residential exposure to surface soil but because of the limited areas of surface sediments, it is assumed that the residents are exposed to the sediments only 10 percent (mean) or 25 percent (RME) of the time. The complete listing of assumptions, references and calculations of estimated risk and hazard from exposure to ditch sediments in a residential area are presented in Appendix M, Tables 10 through 12.

Potential exposure of workers to sediments in the swales ditches would result from excavation in the swales, installation of drains or similar activities. These activities would be limited to periods of acceptable weather assumed to be 30 days (mean) and 120 days (RME). The area involved is assumed to limit the project time to two years (mean) or four years (RME). The limited area of surface sediments would suggest percentage time factors of 10 percent (mean) and 25 percent (RME). The complete list of assumptions, references and calculations spreadsheets for estimated risk and hazard are presented in Appendix M, Tables 13 through 15.

The potential future use of the land as parkland was examined. The scenario utilized is similar to the scenario for residential exposure except the number of days per year are limited by time and weather to once a month during the summer months (four days per year as the mean) or to once a week for this period (16 days per year as the RME). Because of the limited time that the individuals would play in the park compared to the residential yard, the ingestion rate for soil was reduced to 100 mg/visit for the younger child and 50 mg/visit for older children and adults. The complete list of assumptions, references and the calculation spread sheets for estimated risk and hazard are presented in Appendix M, Tables 16 through 18.

7.5.3 Leachate Seep Exposure

Potential current exposure to leachate seeps would be similar to potential current exposure to sediment and surface water in the drainage swales. Therefore, potential current exposure to leachate seeps was evaluated for trespassers such as hunters and hikers. Because the area of the seeps is much less than the area of the drainage swales the potential for contact was decreased and therefore the frequency of exposure was decreased to two days per year (mean) and six days per year (RME). In other respects, the exposure assumptions were the same as for surface water which are explained in more detail in the following subsection. The scenarios, complete list of assumptions and the spreadsheets for calculation of estimated health risk and hazard related to current exposure to leachate seeps are presented in Appendix M, Table 19 through 21.

For future exposure of trespassers to leachate seeps, it was assumed that the area immediately surround the Site is developed. This would eliminate many of the adult activities (hunting, nature walks) but the proximity to residences may increase the frequency of the play activities of older children. Therefore, older children were assumed to be exposed twice as often (4 and 12 times per year), while adult exposure would be minimal. The complete scenario, assumptions, references and calculations of estimated risk and hazard related to exposure of trespassers to leachate seeps are presented in Appendix M, Tables 22 through 24.

7.5.4 Surface Water Exposure

The surface waters are present in the network of drainage swales on and around the perimeter of the Site. The areas involved are identical to those related to sediment exposure. Therefore, the potential exposures to surface water would be similar to the sediment exposures previously described. Because the surface water would not be an attractive quality and adequate quantity for water sports, there would be a general tendency for the potential receptors (hikers, hunters, young children and workers) to avoid getting wet and, therefore, avoiding the water. Exposures would therefore be primarily accidental and much decreased in frequency.

Potential current exposures would be limited to trespassers who may hike across the area or may hunt in the area. Because the location of the Site is quite remote, trespassers would be older children and adults but not young children. Because the Site and the surface water in drainage swales do not display any unusually attractive elements, trespass frequencies of once a month (RME) or once every three months (mean) are conservative assumptions. The limited areas of surface water, and the fact that surface water is not always present in the swales, would suggest that the percentage of time exposed of 10 percent (mean) and 25 percent (RME) would also be conservative. It is assumed that the individuals would come to the Site as long as they were in residence in nearby homes. The complete list of assumptions, references and calculations for this exposure scenario are presented in Appendix M, Tables 25 through 27.

For potential future exposure of trespassers to surface water, it was assumed that the area immediately surrounding the Site is developed. This would eliminate many of the adult activities (hunting, nature walks) but the proximity to residences may increase the frequency of the play activities of older children. Therefore, older children were assumed to be exposed twice as often (8 and 24 times per year) while adult exposure would be minimal. The exposure duration for older children would be 5 and 12 years for mean and RME exposures, respectively. The complete scenario, assumptions, references and calculations of estimated risk and hazard are presented in Appendix M, Tables 28 through 30.

The scenario for potential exposure to surface water by residents who might build homes adjacent to the Site uses the assumptions for residential exposure for wading in local pools. Because of the limited areas of surface water the scenario assumes that the residents are exposed to contaminated surface water only 10 percent (mean) or 25 percent (RME) of the time. Both adults and younger children are assumed to be exposed. Younger children would play in the water when the opportunity presented itself. Adults would be exposed to water in their normal yard care activities and to some degree with the children. Because of the shallow nature of the water bodies the surface area of the body exposed and the amount of water ingestion would be considerably less than assumed in a swimming scenario. The time of exposure would also be less than for a swimming experience. The frequency and duration times were assumed to be the same as the mean and RME times recommended for swimming exposures. The complete listing of assumptions, references and calculations of estimated risk and hazard from exposure to ditch surface water in a residential area are presented in Appendix M, Tables 31 through 33.

Exposure of workers to surface water in the drainage swales would result from excavation in the swales, installation of drains or similar activities. Although the circumstances surrounding the exposure to surface water would be quite similar to the exposure to sediments, construction activities would usually be scheduled for drier periods and there would be an attempt by the worker to keep dry and avoid exposure to the water. Activities would be limited to periods of acceptable weather. The attempt to stay dry would decrease the frequency which was assumed to be five days (mean) and 20 days (RME). The area involved was assumed to limit the project time to two years (mean) or four years (RME). The limited area of surface water would suggest percentage time factors of 10 percent (mean) and 25 percent (RME). The complete list of assumptions, references and calculations spreadsheets for estimated risk and hazard are presented in Appendix M, Tables 34 through 36.

The potential future use of the land as parkland was examined. The scenario utilized was similar to the scenario for residential exposure except the number of days per year was limited by available time and by weather to once a month during the summer months (four days per year as the mean) or to once a week for the summer period (16 days per year as the RME). Because of the limited time that the individuals would play in the park compared to the residential yard, the exposure time was reduced to 0.5 hours and 1.0 hour per visit. Exposure duration for older children would be 5 and 12 years for mean and RME exposures, respectively. The complete list of assumptions, references and the calculation spreadsheets for estimated risk and hazard presented by surface water in a parkland setting are presented in Appendix M, Tables 37 through 39.

7.6 ESTIMATED CARCINOGENIC RISK AND NON-CARCINOGENIC HAZARD

The estimated potential incremental carcinogenic risk and non-carcinogenic hazard are calculated by applying toxicity constants which are chemical specific to the exposures for each chemical. These exposures are calculated by applying the reported media concentrations in the exposure scenarios described in Section 7.5. The calculations for individual chemicals are presented for each exposure scenario in Appendix M. The chemical concentrations in each media and their associated estimated potential incremental carcinogenic risks and non-carcinogenic hazard quotients and indices are summarized in Tables 7.11 through 7.23.

The estimated cancer risk related to a particular chemical exposure is calculated by the following equation:

$$R = CDI \times CSF$$

where:

R = Estimated Upper Limit Cancer Risk presented by the chemical dose.

CDI = Chronic Daily Intake or dose of the chemical (mg of chemical per kg of body weight per day).

CSF = Cancer Slope Factor - 1/(mg/kg/day).

The non-carcinogenic hazard is calculated by the following equation:

HQ = RfD/CDI

where:

HQ = Hazard Quotient for the chemical.

CDI = Chronic Daily Intake or dose of the chemical (mg of chemical per kg of body weight per day).

RfD = Reference Dose (mg/kg/day).

Adding the hazard quotients for all the chemicals of a specific exposure scenario for a single media yields the Hazard Index for that exposure.

Table 7.10 summarizes toxicity information for each of the parameters of concern. Toxicity profile excerpts from available ATSDR Toxicological Profiles are presented in Appendix P.

The cancer slope factors (CSF) used to calculate the additional lifetime cancer risk are presented in Table 7.10. The CSF values are taken from the Integrated Risk Information System (IRIS), July 1991. The CSF represents the cancer potency of the chemical and when multiplied times the average daily lifetime exposure, it provides a theoretical estimate of the added cancer risk presented by the lifetime exposure.

In evaluating the potential hazard from the non-carcinogenic effects of chemicals, the average daily exposure was based on shorter-term (non-lifetime) potential exposure estimates, generally the average daily exposure for a year. The reference doses (RfDs) used to calculate the hazard indices are presented in Table 7.10. These RfD values are taken from the Integrated Risk Assessment Information System (IRIS), July 1991. The RfD represents the average daily dose which is not expected to cause adverse effects after long-term exposure.

Tables 7.24 through 7.28 summarize the cancer risks and the hazard indices for specific populations exposed. To evaluate the estimated cancer risks a potential risk level lower than 1.0E-06 is considered minimal risk. The potential risk range of 1.0E-06 to 1.0E-04 is an acceptable risk range and would not be expected to require a response action. A potential risk level greater than 1.0E-04 should be evaluated further and a remedial action to decrease the estimated risk considered.

A hazard index (HI) of less than unity (1.0) indicates that the potential exposures are not expected to cause adverse health effects. An HI greater than one requires further evaluation. For example, although the hazard quotients of the several chemicals present are added, further evaluation may show that their toxicities are not additive and when total effects are evaluated on an effects/target organ basis the concentrations are at levels below 1.0.

7.6.1 Trespassers - Present/Future Conditions

Present Conditions

Table 7.24 presents the estimated cancer risks and the hazard indices for the likely exposure (mean) and reasonable maximum exposure (RME) that were calculated for a trespasser in contact with surface sediments, surface water and leachate seeps. The potential incremental cancer risks for both levels of exposure are less than 1.0E-06 and are not a concern. The HI for levels of exposure are below 1.0 and are, therefore, not a health concern and do not require further evaluation.

Future Conditions

Table 7.25 presents the estimated cancer risks and the hazard indices for the likely exposure (mean) and reasonable maximum exposure (RME) that were calculated for a trespasser in contact with surface sediments, surface water and leachate seeps. The potential incremental cancer risk for both levels of exposure are less than 1.0E-06 and are not a concern. The HI for both levels of exposure are below 1.0 and are, therefore, not a health concern and do not require further evaluation.

7.6.2 Residential Exposure - Future Conditions

Table 7.26 presents the estimated cancer risks and the hazard indices for the likely exposure (mean) and reasonable maximum exposure (RME) that were calculated for a resident in contact with surface sediments and surface water. The potential incremental cancer risks for both levels of exposure are below or at 1.0E-06 and are not a concern. The HI for the both levels of exposure are below 1.0 and are, therefore, not a health concern and do not require further evaluation.

7.6.3 Construction Workers - Future Conditions

Table 7.27 presents the estimated cancer risks and the hazard indices for the likely exposure (mean) and reasonable maximum exposure (RME) that were calculated for a construction worker in contact with surface sediments, surface water and subsurface soils. Totaling the estimated health effects of the exposures to the three media, the potential incremental cancer risks for both levels of exposure are less than 1.0E-06 and are not a concern. The HI for both levels of exposure are below 1.0 and neither, therefore, is considered a health concern and do not require further evaluation.

7.6.4 Parkland Visitors - Future Conditions

Table 7.28 presents the estimated cancer risks and the hazard indices for the likely exposure (mean) and reasonable maximum exposure (RME) that were calculated for parkland visitors in contact with surface sediments and surface water. Totaling the estimated health effects of the exposures to the two media, the potential incremental cancer risks for both levels of exposure are less than 1.0E-06 and are not a concern. The HI for both levels of exposure are below 1.0 and are, therefore, not a health concern and does not require further evaluation.

7.7 ECOLOGICAL ENVIRONMENTAL ASSESSMENT

The objective of this assessment is to present an overview of the potential ecological impacts resulting from the presence of contaminants at the Site. On the basis of collected data and existing ecological information, an assessment of the relative bioavailability of selected contaminant groups to plant communities and resident terrestrial and aquatic species is discussed.

Guidance for completing the Environmental Evaluation is provided in Chapter 6 of the document, "Risk Assessment Guidance for Superfund, Volume II: Environmental Evaluation Manual", EPA/540/1-89/001, March 1989.

The study areas of concern for this assessment include the surficial and subsurface soils, sediments and surface water.

A survey of flora and fauna, conducted by Auld Environmental Associates, provides a qualitative inventory of vegetation and wildlife occurring on and immediately adjacent to the Site. The findings of this survey are included in Appendix D of this report.

As discussed in the biota survey, there are no endangered, threatened, or special concern wildlife species, rare plant, animal or natural community occurrences, or other significant habitats that have been identified in the immediate vicinity of the Site.

There are six identified plant communities that are existing on Site and the locations are delineated on Figure 1.0 of the survey included in Appendix D. Generally, grasslands including vegetations such as annual and perennial herbs, shrubs and trees characterize the majority of the landfill area. Drainage swales bisect the landfill and surround the perimeter of the Site. Mixed plant communities, typical of a wetland and drier upland, occurs in these areas as a result of seasonal wet and dry conditions. Immediately surrounding the disposal area are open, cultivated fields, which in turn are surrounded by primarily grasslands or woodlands.

According to the biota survey, a number of animal species exist on or immediately adjacent to the Site, or are expected to be present on Site. These terrestrial animals are listed in Table 8.0 of the survey included in Appendix D.

A variety of ecosystems could potentially be affected by contamination on Site. Each type of ecosystem may respond differently to contamination depending on the unique physical, chemical and biological characteristics of the ecosystem. Resident species may be affected by contamination to varying degrees depending on the physical and chemical structure of the respective ecosystem. Grassland meadows, for example, may have less contamination because of photolytic degradation of contaminant compounds than a densely forested region.

Exposure pathways that may be applied to terrestrial and/or aquatic animal populations include:

- direct contact with contaminated surface soil, surface water and/or sediments;
- surface water use as a drinking water source; and
- contact with contaminated subsurface soil.

The exposure of terrestrial animals to surface soils is not evaluated as a media of concern nor was it identified as a media of concern in the POP (CRA, 1990a) or in the Ebasco report (Ebasco, 1988), as discussed in Section 7.2.

Exposure to subsurface soils is limited to burrowing animals. This is not expected to be significant since, as discussed in Section 6.4, very few VOCs, SVOCs and pesticides were detected in the subsurface soils and at low concentrations.

Investigative studies indicate that leachate seeps on the Site have not significantly impacted surface sediments on and in the vicinity of the Site. Therefore, the associated threat or risks to receptor animal species from potential exposure to surface sediments is considered de minimis. However, as discussed in Section 2.4 vegetation stress is visible in an area north of the Site. This area is immediately adjacent to leachate seeps at the northeastern corner of the landfill.

Consumption and dermal contact with surface water is the predominant exposure pathway for terrestrial animals and birds to Site-related chemicals on or near the Site. Site-related chemicals can escape from the source via the seeps which, in turn, can impact surface water in the drainage swales on or near the Site. Consumption of surface water, as a drinking water source, is a probable exposure pathway for animal and bird species, however, analytical data on surface water indicate that on-Site seeps have had, at most, a limited impact on the surface water quality (see Section 6.7). Limited VOCs, SVOCs and pesticides were detected at low concentration in the surface water samples. Therefore, the associated threat or risks to receptor animal population from potential exposure to Site-related chemicals in surface water is considered de minimis.

Surface water was determined to be the principal medium by which terrestrial animals and birds are potentially exposed to Site-related chemicals. The leachate seeps on Site have had, at most, a limited adverse effect on surface water in the vicinity of the Site, therefore, there is limited impact to flora and fauna.

7.8 SUMMARY

The baseline risk assessment was conducted to characterize the estimated cancer risks and non-cancer hazards related to human exposures to chemical concentrations reported at the Site. The assessment followed the most recent EPA guidance for preparation of risk assessments for Superfund Sites.

Chemicals which appeared to be Site-related were selected for evaluation of exposures of potential receptors by the following exposure pathways:

Trespassers (Present/Future Conditions): Dermal contact and inadvertent ingestion

- Surface sediments (drainage swales)
- Surface water (drainage swales)
- Leachate seeps

Residential (Future Conditions): Dermal contact and inadvertent ingestion

- Surface sediments (drainage swales)
- Surface water (drainage swales)

Construction worker (Future Conditions): Dermal contact and inadvertent ingestion

- Surface sediments (drainage swales)
- Surface water (drainage swales)
- Subsurface soils

Parkland visitors (Future Conditions): Dermal contact and inadvertent ingestion

- Surface sediments (drainage swales)

- Surface water (drainage swales)

Ambient air concentrations at the Site are not expected to be above acceptable ambient air levels. Concentrations of chemicals reported in the upper bedrock aquifer (the only aquifer with adequate water for residential wells) were below the maximum contaminant levels published by New York State for drinking water. Therefore, quantitative risk and hazard assessments were not conducted on ambient air or groundwater.

When compared to a target risk range of 1.0E-06 to 1.0E-04, estimated cancer risks for all exposures were not greater than 1.0E-06.

When compared to a Hazard Index of 1.0 as a level of concern requiring further evaluation, all levels of exposure were below 1.0 and are, therefore, not a health concern.

The potential current or future exposures to Site-related chemicals on or near the Site do not pose an unacceptable estimated cancer risk or health hazard to identified receptors.

The leachate seeps have had, at most, a limited adverse effect on surface water quality in the vicinity of the Site, the principal media by which terrestrial animals and birds are potentially exposed to Site-related chemicals. Therefore, there is limited impact to flora and fauna.

8.0 CONCLUSIONS

Based on the results of the RI, the additional Site investigations and BRA, the following conclusions are made:

1) The naturally low hydraulic conductivity of the shallow silt unit surrounding the Site and the Clay Seal, if present, has limited the potential for horizontal migration of chemicals into the silt unit. The clay/upper till aquitard underlying the Site has limited the potential for vertical migration of chemicals from the Site. Therefore, the Site has had a limited adverse effect on surrounding subsurface soils.

2) The leachate generated at the Site is similar in characteristics to that generated in other municipal solid waste landfills in the United States and supports historical operations information that industrial and municipal wastes were comingled at the landfill, including the northernmost cell. Phenolic compounds and phthalate isomers were detected in all leachate samples.

3) The leachate seeps have had, at most, a limited adverse effect on surface water and surface sediments in the on-Site perimeter swales.

4) The Site has had a limited impact on the groundwater beneath the Site. The natural conditions (low hydraulic conductivity of the clay/upper till aquitard) at the Site have served to protect the the upper bedrock aquifer in the area as is evidenced by the lack of contaminant presence in the upperbedrock aquifer groundwater.

5) The clay/upper till aquitard underlying the Site has not been penetrated by landfilling operations and consequently, due to natural attenuation, provides an excellent barrier to leachate migration from the Site. The lack of prominent gradients in the upper bedrock aquifer and lower till unit have also greatly reduced the potential of groundwater to migrate from the Site. Consequently, any leachate entering the overburden groundwater flow regime will remain in place within the area of the landfill cells.

6) The ambient air quality across the Site is not expected to be above acceptable ambient air levels. Additional air monitoring for landfill gases may be necessary during the remedial design phase.

7) When compared to the target risk range of 1.0E-06 to 1.0E-04, estimated cancer risks for all exposures were not greater than 1.0E-06. When compared to a Hazard Index of 1.0 as a level of concern requiring further evaluation, all exposures (Mean and RME) were below this benchmark value. The potential current or future exposures to Site-related chemicals on or near the Site do not pose an unacceptable estimated incremental cancer risk or health hazard to identified receptors.

8) The leachate seeps have had, at most, a limited adverse effect on surface water in the vicinity of the Site, the principal media by which terrestrial animals and birds are potentially exposed to Site-related chemicals. Therefore, there is limited impact to flora and fauna.

REFERENCES

Agency for Toxic Substances and Disease Registry, U.S. Public Service. "Toxicological Profile for Di (2-Ethyl Hexyl) Phthalate". January 1988, (ATSDR, 1988).

Agency for Toxic Substances and Disease Registry, U.S. Public Health Service. "Toxicological Profile for Phenol". April 14, 1989, (ATSDR, 1989).

Agency for Toxic Substances and Disease Registry, U.S. Public Service. "Toxicological Profile for Polycyclic Aromatic Hydrocarbons". February 16, 1990, (ATSDR, 1990).

Bouwer, H. and Rice, R.C., 1976, "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells", (Bouwer and Rice, 1976), U.S. Water Conservation Laboratory Agricultural Research Service, U.S Department of Agriculture, Published in Water Resources Research, Vol. 12, No. 3.

Bouwer, H., 1989, "The Bouwer and Rice Slug Test - An Update", (Bouwer, 1989), Ground Water, Volume 27, No. 3, May - June 1989.

Butler, J.D., Butterworth V., Kellow C., et al. 1984. "Some Observations on the Polycyclic Aromatic Hydrocarbon (PAH) Content of Surface Soils in Urban Areas". Sci. Total Environ 38: 75-85. (Butler, 1984).

Conestoga-Rovers & Associates, 1988, "Remedial Investigation, Draft Final Report, 102nd Street Landfill Site, Niagara Falls, New York", November 1988, (CRA, 1988a).

Conestoga-Rovers & Associates, 1988, "Requisite Remedial Technology Study of Chemicals in the Overburden and Bedrock, S-Area Landfill, S-Area Remedial Program", October 1988, (CRA, 1988b).

Conestoga-Rovers & Associates, 1990, "Project Operations Plan, Remedial Investigation, Niagara County Refuse Site, Wheatfield, New York", (CRA, 1990a).

Conestoga-Rovers & Associates, 1990, "Quality Assurance Project Plan (QAPP), Remedial Investigation, Niagara County Refuse Site, Wheatfield, New York", (CRA, 1990b).

Conestoga-Rovers & Associates, 1990, "Health and Safety Plan, Remedial Investigation, Niagara County Refuse Site, Wheatfield, New York", (CRA, 1990c).

Conestoga-Rovers & Associates, 1991, "Draft Final SDCP Report Revision 2, Buffalo Avenue Plant", October 1991, (CRA 1991).

Desaulniers, D.E., Cherry, J.A. and Fritz, P., 1981. "Origin, Age and Movement of Pore Water in Argillaceous Quaternary Deposits at Four Sites in Southwestern Ontario", (Desaulniers et al, 1981), J. Hydrol., 50:231-257.

Edwards, N.T., 1983. "Polycyclic Aromatic Hydrocarbons (PAHs) in the Terrestrial Environment - A Review". J. Environ. Qual. 12: 427-441. (Edwards, 1983).

Geologic Testing Consultants (GTC) Limited, "Hydrogeologic Evaluation of the 102nd Street Landfill, Final Report to Niagara Steering Committee, Ontario Ministry of the Environment", June 1984, (GTC, 1984).

Gross, M.R., Engelder, T., "A Case for Neotectonic Joints Along the Niagara Escarpment", Tectonics, Vol. 10, No. 3, Pages 631-641, June 1991.

Howard, Philip H., "Handbook of Environmental Fate and Exposure Data for Organic Chemicals", (Howard, 1989), Lewis Publishers, Inc. 1989.

IARC. 1973. "Certain Polycyclic Aromatic Hydrocarbons and Heterocyclic Compounds. Monographs on the Evaluation of Carcinogenic Risk of the Chemical to Man". Vol. 3, Lyon, France: International Agency for Research on Cancer. (IARC, 1973).

Integrated Risk Information System, July 1991, (IRIS).

International Joint Commission, "Preservation and Enhancement of the American Falls at Niagara, Appendix C, Geology and Rock Mechanics", Niagara Falls, New York, American Falls International Board, 79p., 1974.

Johnston, R.H., 1964, "Ground Water in Niagara Falls Area, New York With Emphasis on the Water-Bearing Characteristics of the Bedrock", (Johnston, 1964), New York State Conservation Department Bulletin GW-53, 93p.

Jones, K.C., Stratford, J.A., Waterhouse K., et al. 1987. "Polynuclear Aromatic Hydrocarbons in U.K. Soils: Long-Term Termporal Trends and Current Levels". Trace Subst. Environ Health 2: 140-148. (Jones et al, 1987).

Krehbiel-Guay-Rugg-Hall Engineers-Surveyors, October 1973, "Operating Plan for Wheatfield Refuse Disposal Site, Niagara County Refuse Disposal District", (Krehbiel, et al, 1973).

LaSala, A.M., Jr., 1968, "Groundwater Resources of the Erie-Niagara Basin, New York", (LaSala, 1968), State of New York Conservation Department, Water Resources Commission, Erie-Niagara Basin Regional Water Resources Planning Report ENB-3.

Mellan, Ibert, "Industrial Plasticizers", (Mellan, 1963), Pergamon Press, New York. 1963.

Mentley, Tom, personal communication, (National Corporation, July 16, 1992).

Montgomery, J., Welkom, L., "Groundwater Chemicals Desk Reference", (Montgomery, 1990), Lewis Publishers. 1990.

Muller, Ernest H., 1977, "Quaternary Geology of New York, Niagara Sheet", (Muller, 1977), New York State Museum and Science Service, Map and Chart Series No. 28.

Niagara River Toxics Committee, 1984, "Report of The Niagara River Toxics Committee", (Niagara River Toxics Committee, 1984).

Novakowski, K.S. and P.A. Lapcevic, 1987, "Regional Hydrogeology of the Silurian and Ordovician Sedimentary Rock Underlying, Niagara Falls, Ontario, Canada (Preliminary Results)", (Novakowski and Lapcevic, 1987).

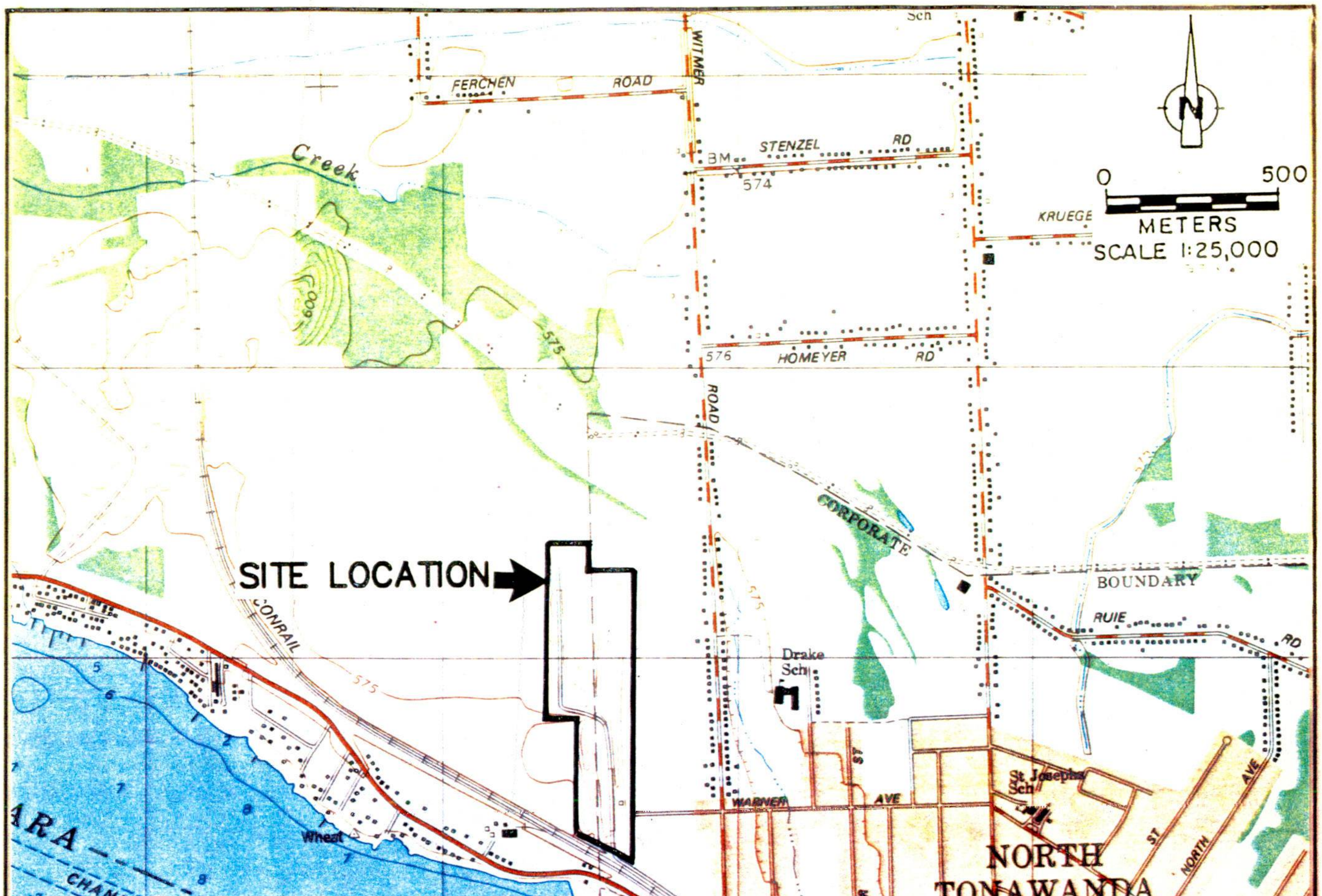
Page, B. Denis, "An Overview of Analytical Methods for Phthalate Esters in Foods", (Page, 1987), in Abstracts of Papers, 193rd ACS National Meeting, American Chemical Society, 1987

Pentad Project Management and Auld Environmental Associates, 1988, "Draft Environmental Impact Statement, Wheatfield Lakes Project, Town of Wheatfield, Niagara County, NY." (Pentad, 1988), Prepared for New York State Department of Environmental Conservation, Region 9, Lead Agency.

Rickard, Lawrence V. and Donald W. Fisher, 1970, "Geological Map of New York, Niagara Sheet", (Rickard and Fisher, 1970), New York State Museum and Science Service, Map and Chart Series No. 15.

Rickard, L.V., Correlation of the Silurian and Devonian Rocks in New York State, New York State Museum and Science Service, Map and Chart Series Number 24, Albany, New York, 1975, (Rickard, 1975).

FIGURES



SOURCE:

U.S. GEOLOGICAL SURVEY
SW/4 TONAWADA 15' QUADRANGLE

figure 1.1

SITE LOCATION
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA

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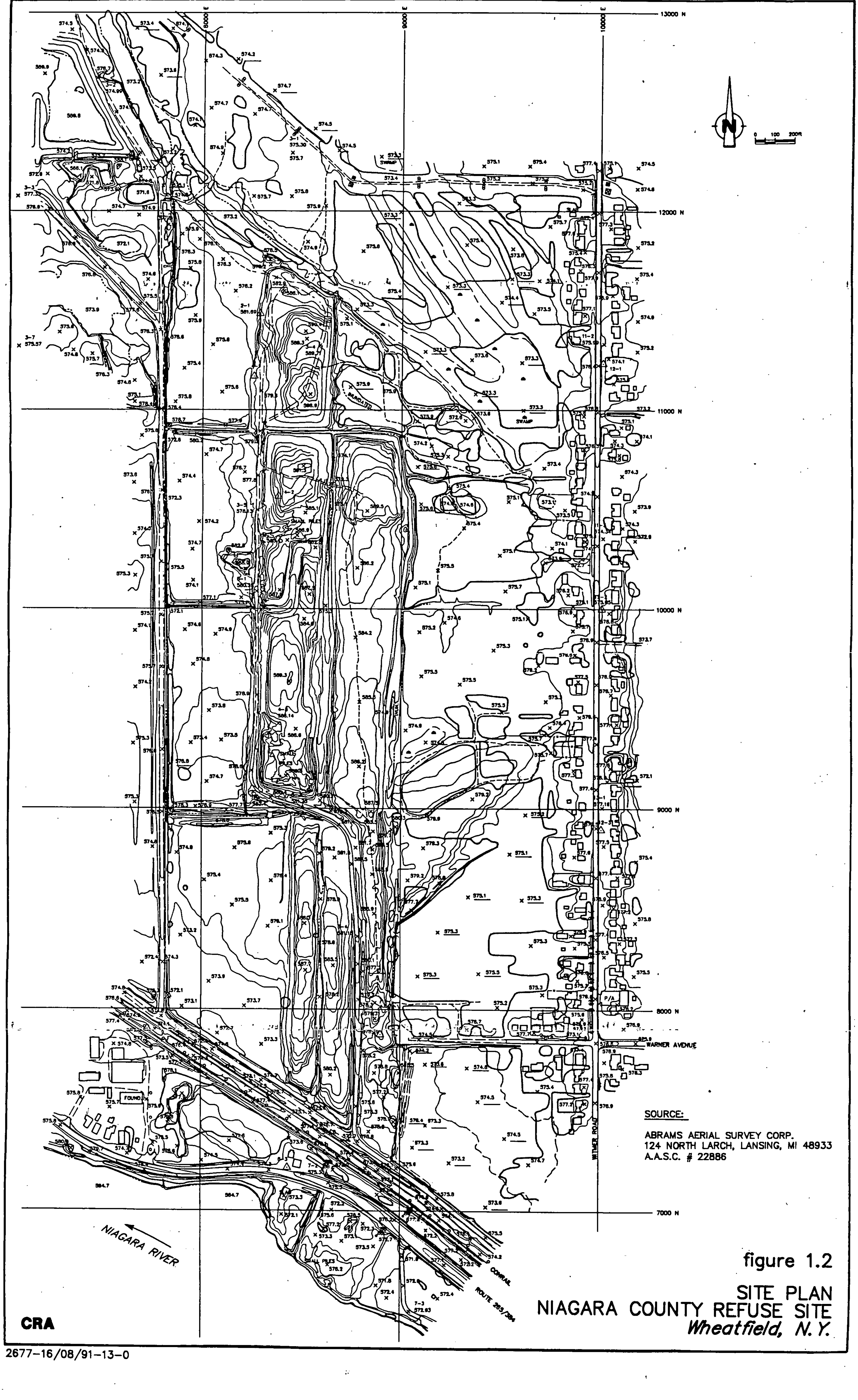


SOURCE:

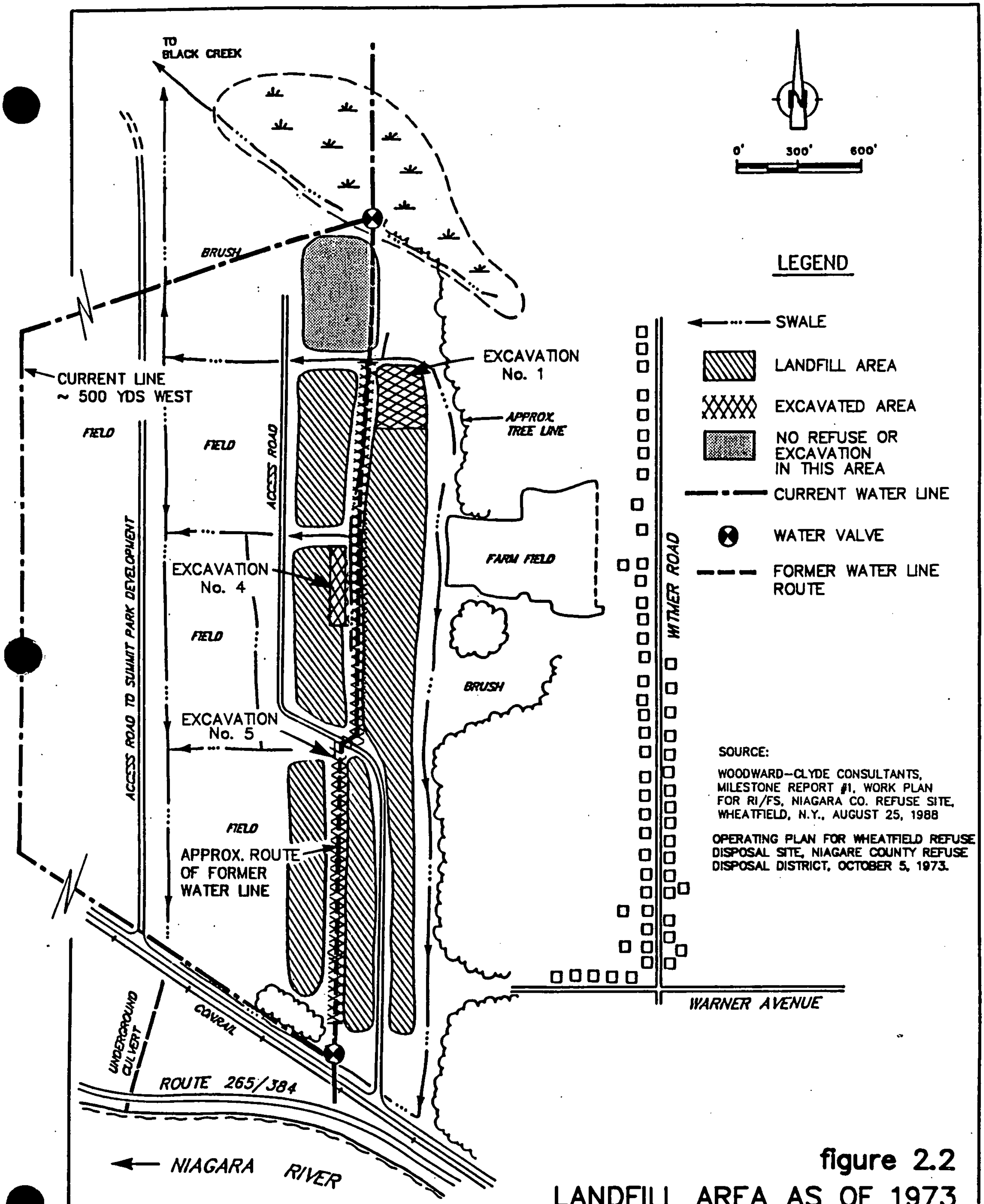
ABRAMS AERIAL SURVEY CORP.
124 NORTH LARCH, LANSING, MI 48933
A.A.S.C. # 22886

CRA

figure 1.2

SITE PLAN
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

2677-16/08/91-13-0



SOURCE:

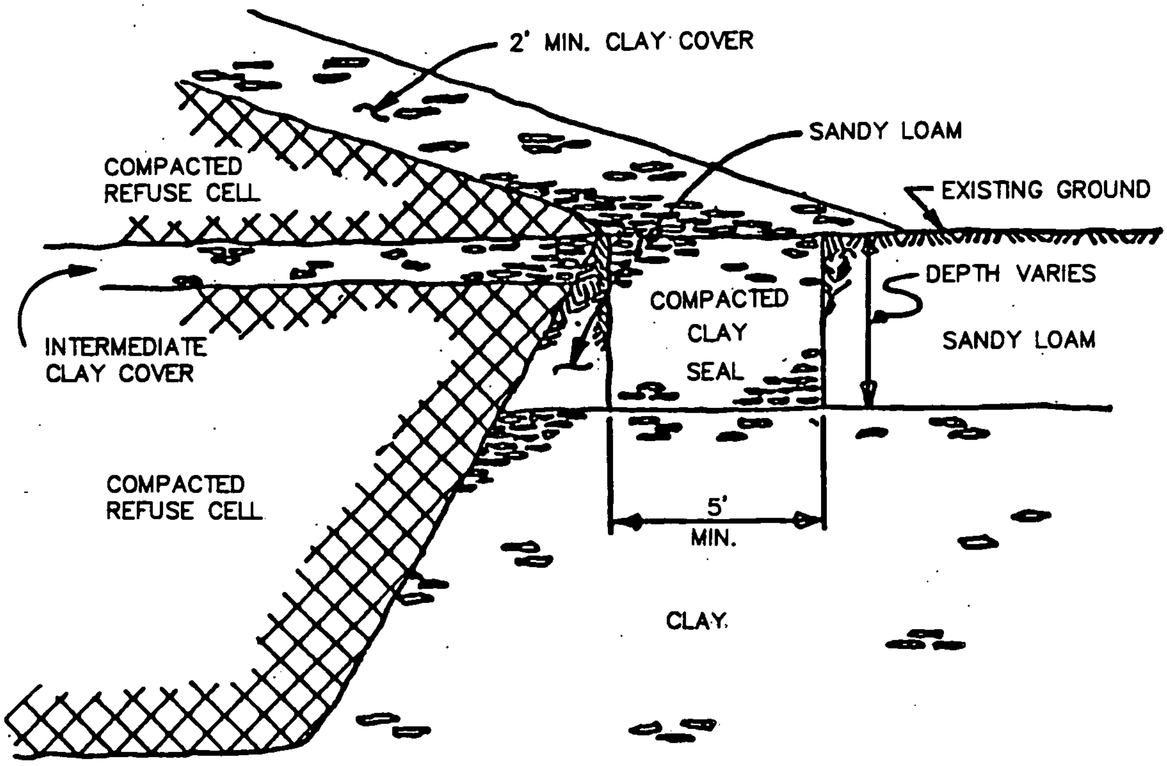
WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

OPERATING PLAN FOR WHEATFIELD REFUSE DISPOSAL SITE, NIAGARE COUNTY REFUSE DISPOSAL DISTRICT, OCTOBER 5, 1973.

figure 2.2

LANDFILL AREA AS OF 1973
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA



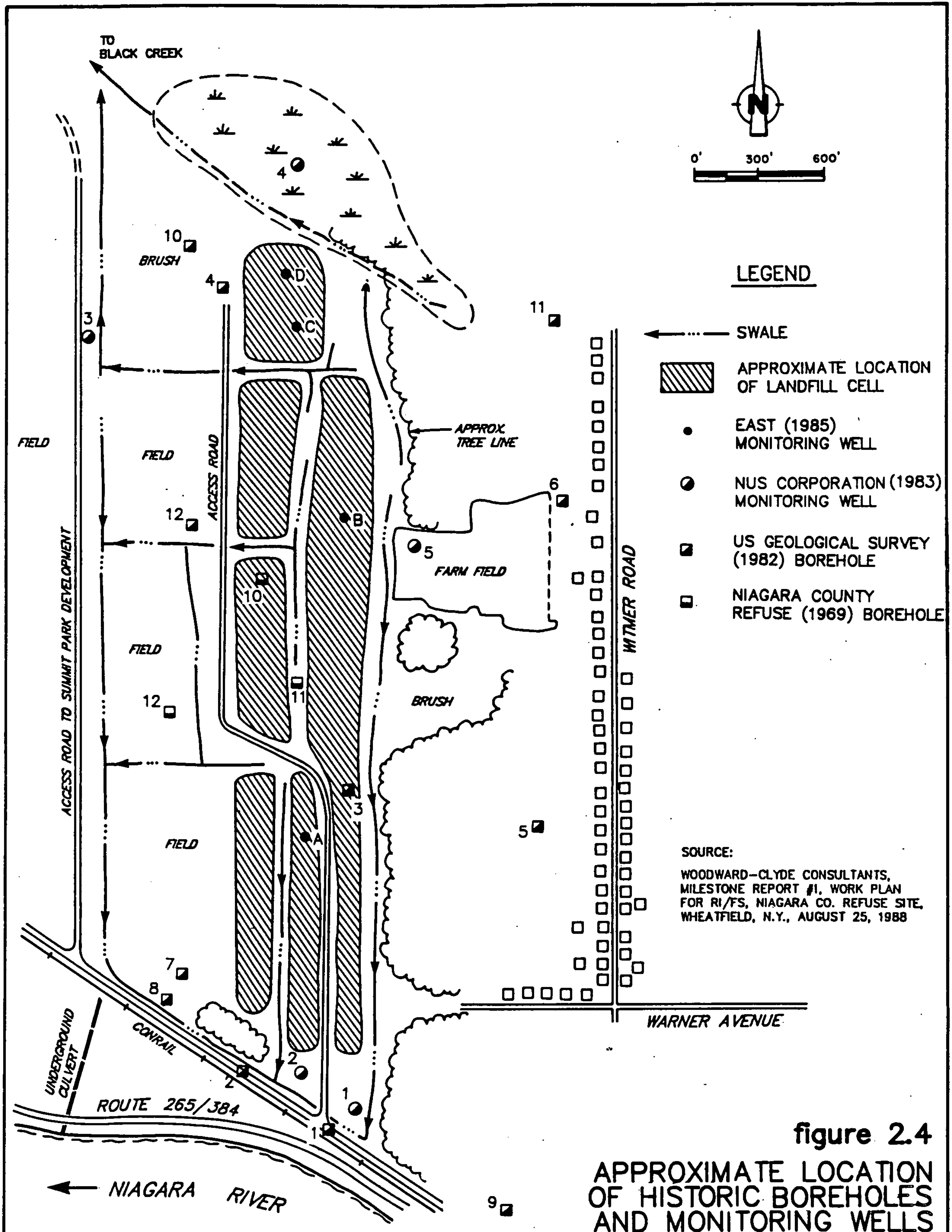
N.T.S.

COPIED FROM:
"OPERATING PLAN FOR WHEATFIELD
REFUSE DISPOSAL SITE,
NIAGARA COUNTY REFUSE DISPOSAL"
DISTRICT, 1973, KREHBIEL–GUAY–RUGG–HALL
ENGINEERS – SURVEYORS

figure 2.3

TYPICAL COMPACTED CLAY BARRIER
PERIMETER SEAL DETAIL
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA



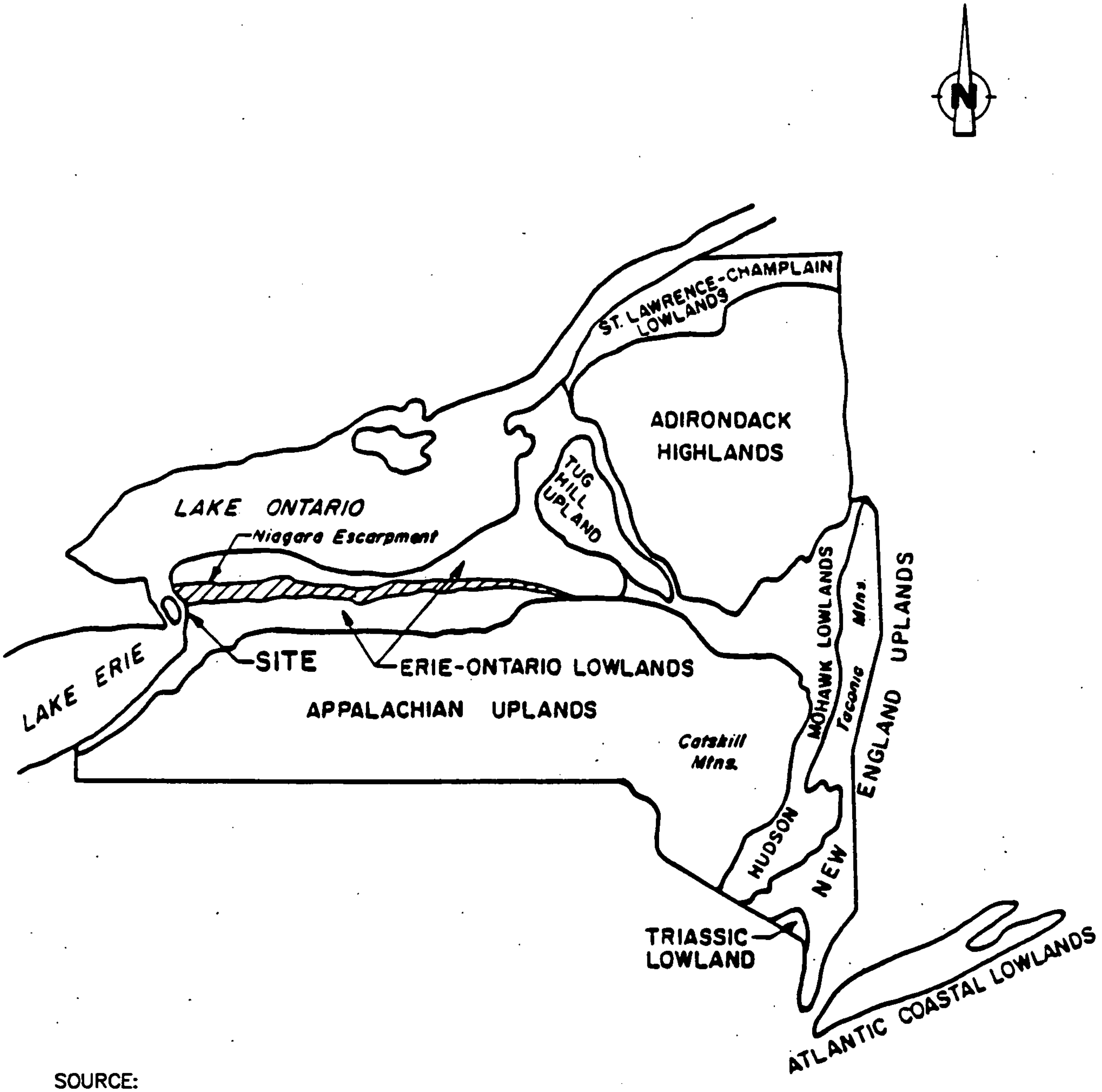
SOURCE:

WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

figure 2.4

APPROXIMATE LOCATION OF HISTORIC BOREHOLES AND MONITORING WELLS NIAGARA COUNTY REFUSE SITE *Wheatfield, N.Y.*

CRA



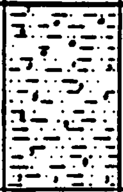
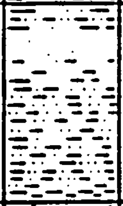
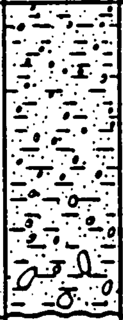
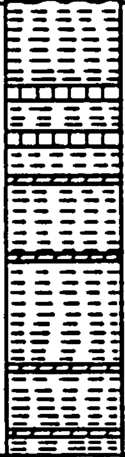
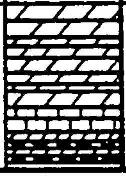
SOURCE:

DRAFT FINAL REMEDIAL INVESTIGATION AND FEASIBILITY STUDY AT THE GRATWICK–RIVERSIDE PARK SITE, SEPTEMBER 1990, URS CONSULTING, INC.

figure 3.1

PHYSIOGRAPHIC PROVINCES OF NEW YORK STATE
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA

PERIOD	EPOCH	GROUP	FORMATION	SECTION	THICKNESS (FT.)	DESCRIPTION
QUATERNARY	HOLOCENE		RECENT DEPOSITS		1-21	Lacustrine, Alluvium, Fill Lake, stream, wetland and artificial deposits of variable texture, with local organic inclusions.
	PLEISTOCENE		LACUSTRINE CLAY, SILT & FINE SAND		8-24	Predominantly reddish-brown clayey-silt to silty-clay Some reddish-brown to brown to tan fine sand grading finer with depth.
		UNCON-FORMITY	TILL		13-39	Reddish-brown gravelly silty-clay to clayey-silt. Some sand, gravel and large shale fragments near base.
UPPER SILURIAN	CAYUGA	SALINA	CAMILLUS SHALE		400	Predominantly gray, some green, thin-bedded shale and massive carbonate mudstone interbedded with dolomite. Gypsum beds, lenses and veins common.
	NIAGARA		LOCKPORT DOLOMITE		150	Light to dark gray, thin-bedded to massive dolomite. Light gray limestone near base. Shaly dolomite at base.

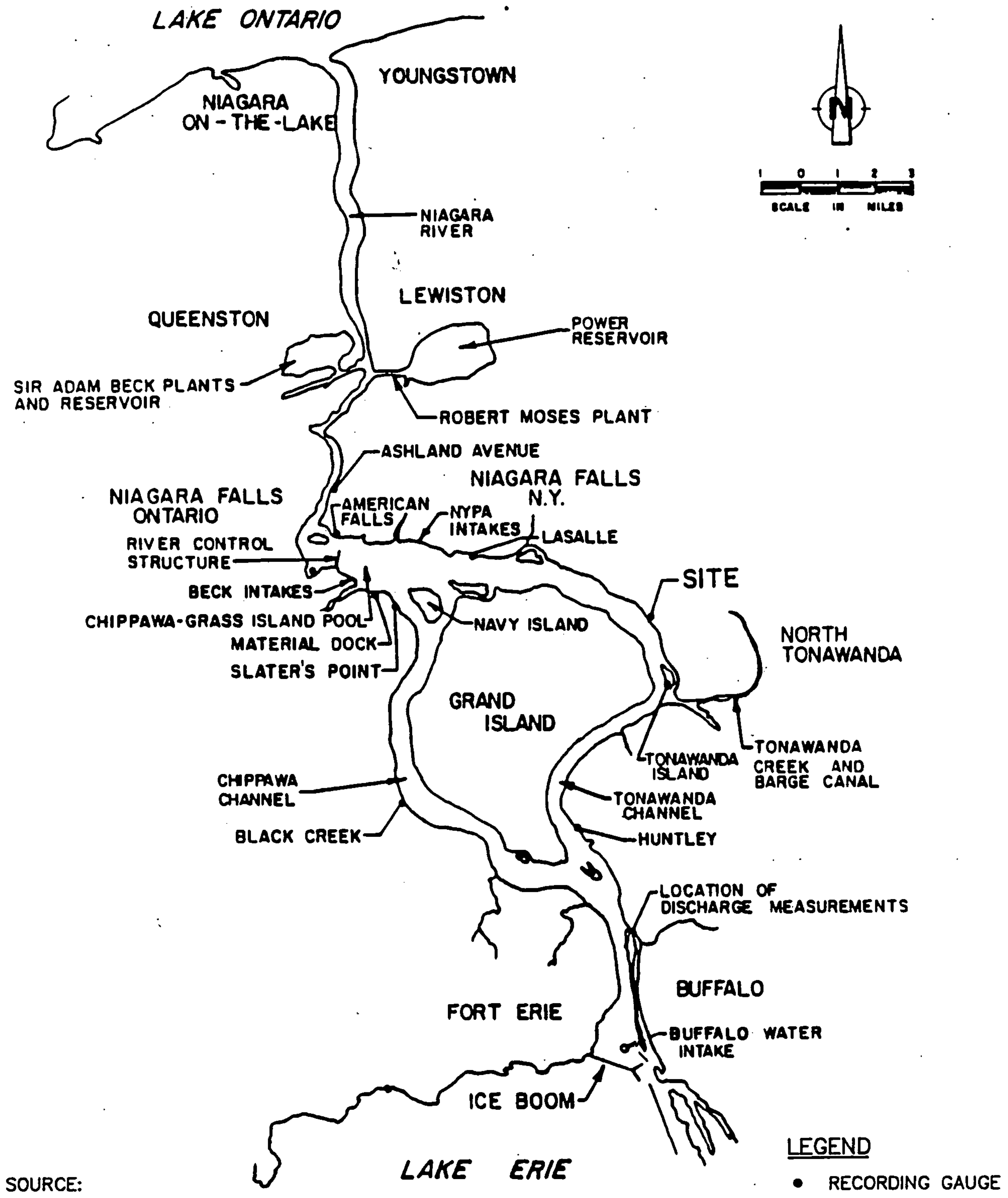
SOURCE:

DRAFT FINAL REMEDIAL INVESTIGATION AND FEASIBILITY STUDY AT THE GRATWICK-RIVERSIDE PARK SITE, SEPTEMBER 1990, URS CONSULTING, INC.

figure 3.2

GENERALIZED GEOLGIC COLUMNAR SECTION
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

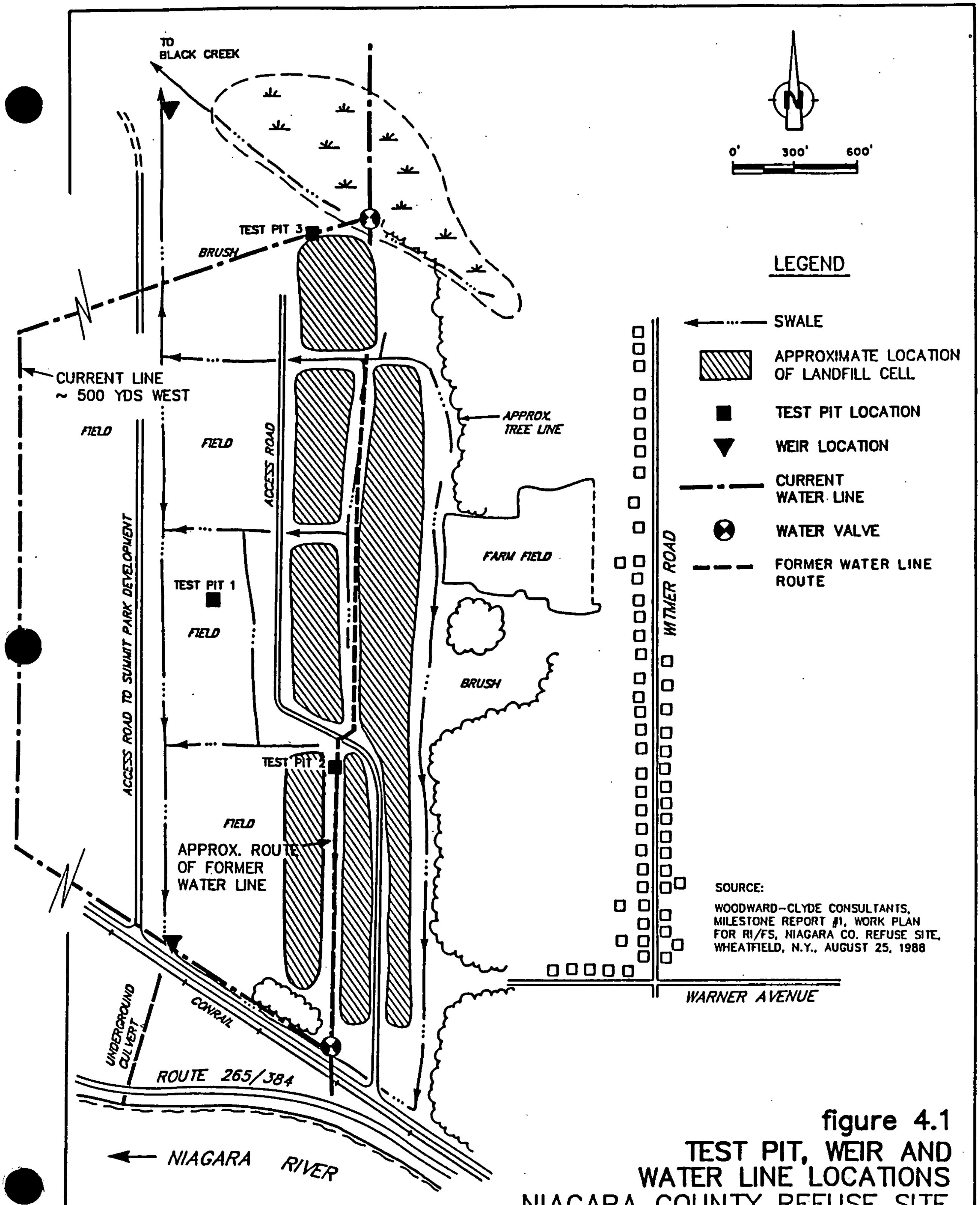
CRA



SOURCE:

DRAFT FINAL REMEDIAL INVESTIGATION AND FEASIBILITY STUDY AT THE GRATWICK–RIVERSIDE PARK SITE, SEPTEMBER 1990, URS CONSULTING, INC.

figure 3.3
MAP OF NIAGARA RIVER
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

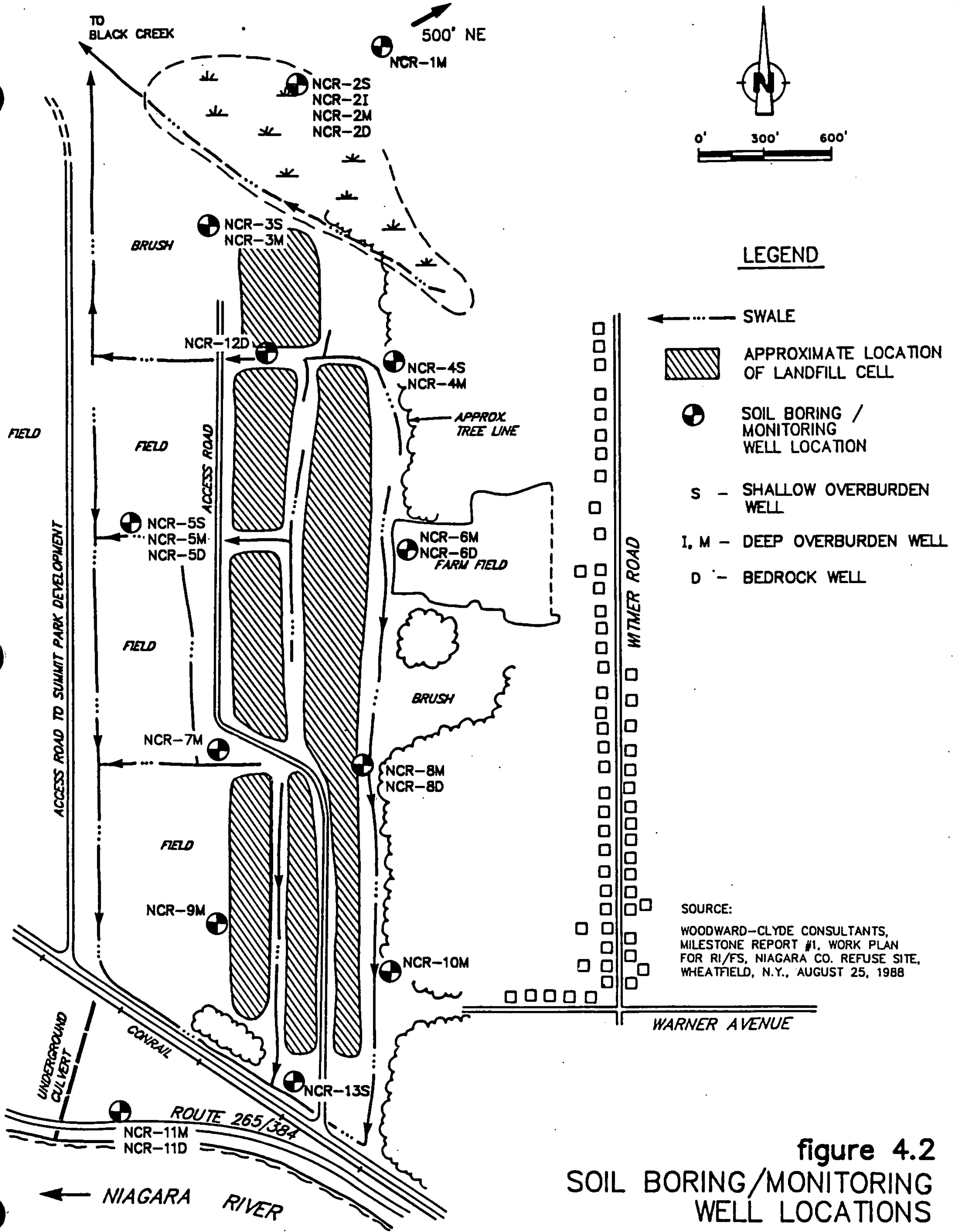


SOURCE:

WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

figure 4.1
TEST PIT, WEIR AND
WATER LINE LOCATIONS
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA



SOURCE:

WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

figure 4.2

SOIL BORING/MONITORING WELL LOCATIONS

NIAGARA COUNTY REFUSE SITE

Wheatfield, N.Y.

CRA

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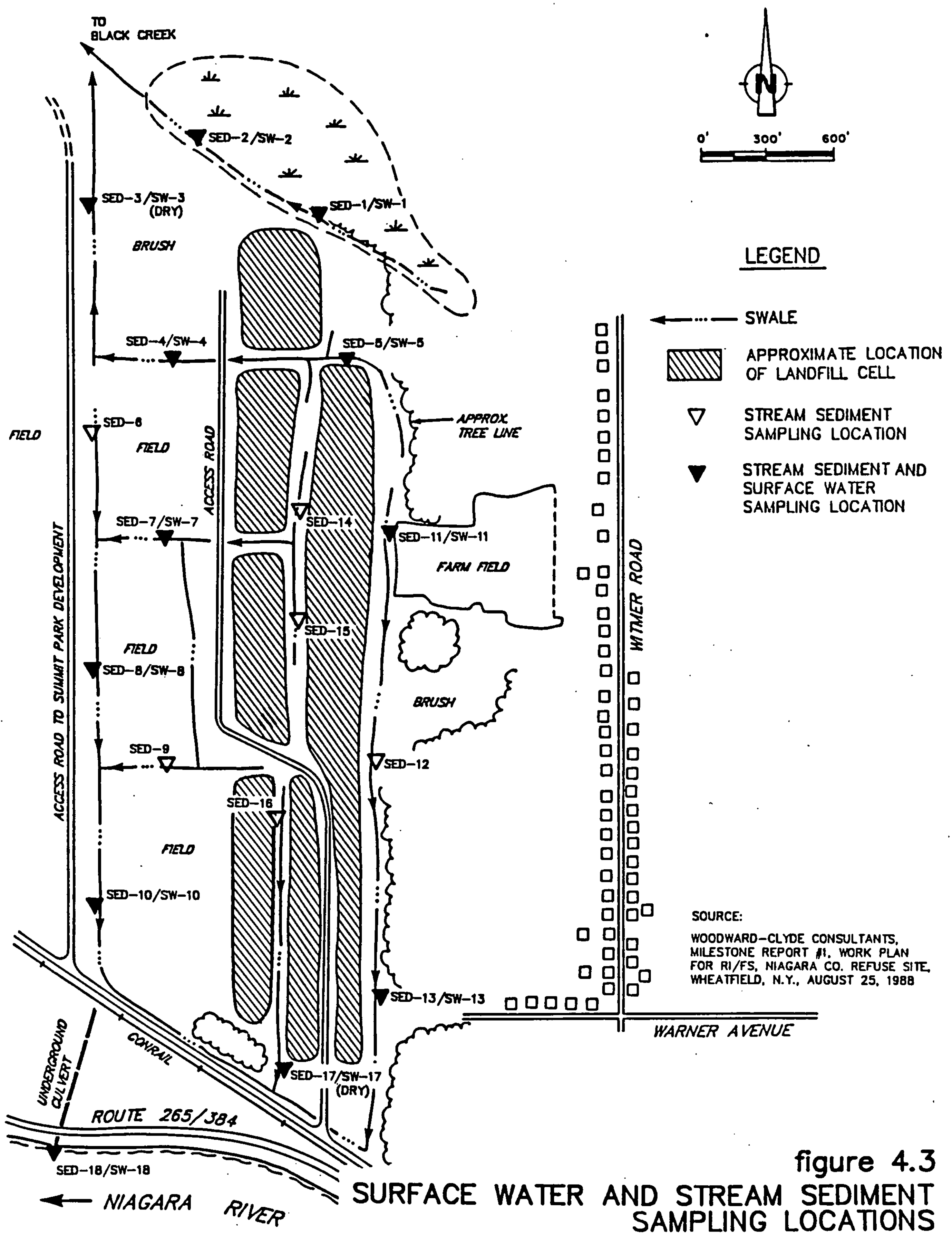


SOURCE:

WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

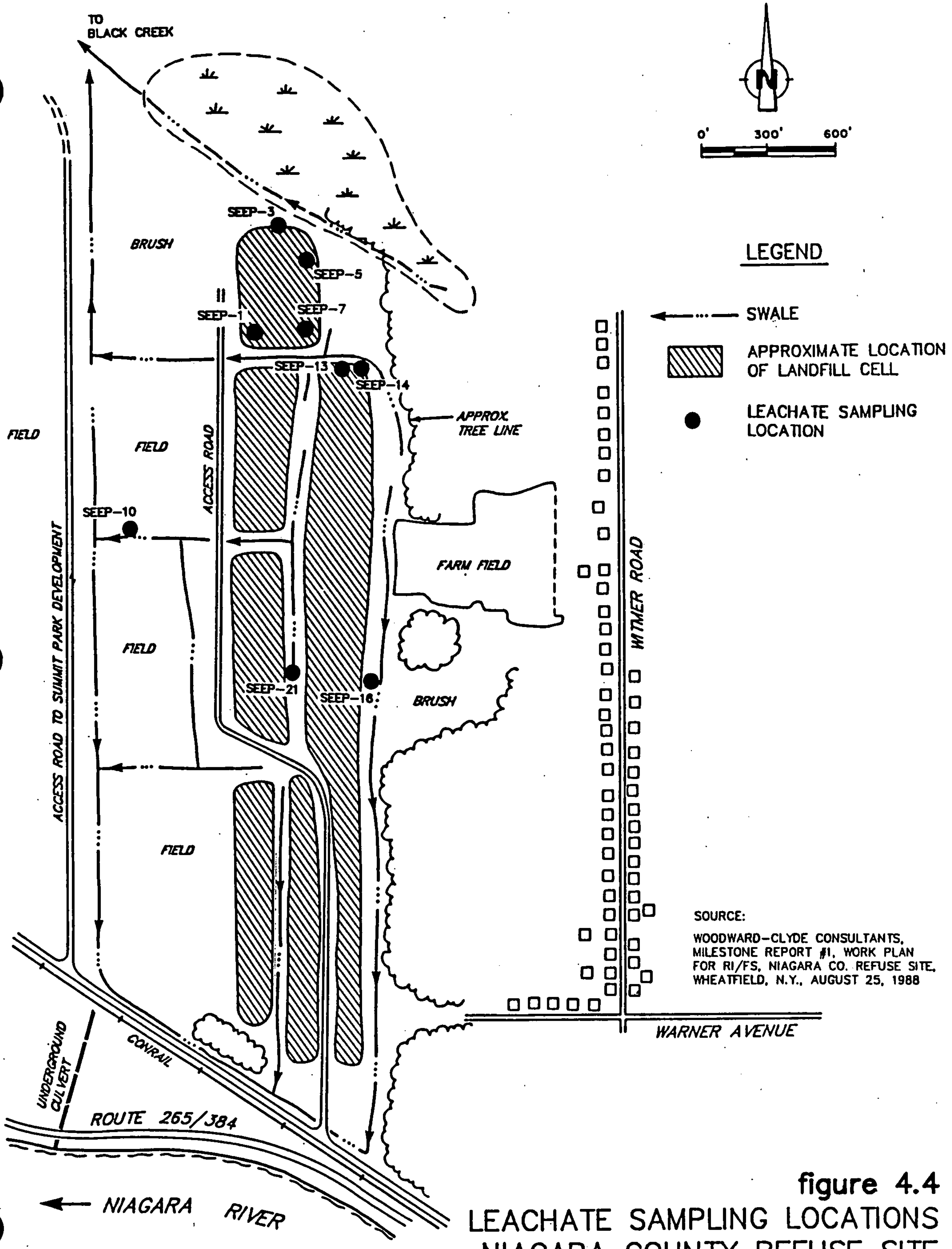
figure 4.3

SURFACE WATER AND STREAM SEDIMENT SAMPLING LOCATIONS

NIAGARA COUNTY REFUSE SITE

Wheatfield, N.Y.

CRA



LEGEND

- ←···— SWALE
- ▨ APPROXIMATE LOCATION OF LANDFILL CELL
- ● LEACHATE SAMPLING LOCATION

SOURCE:

WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

figure 4.4
LEACHATE SAMPLING LOCATIONS
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA

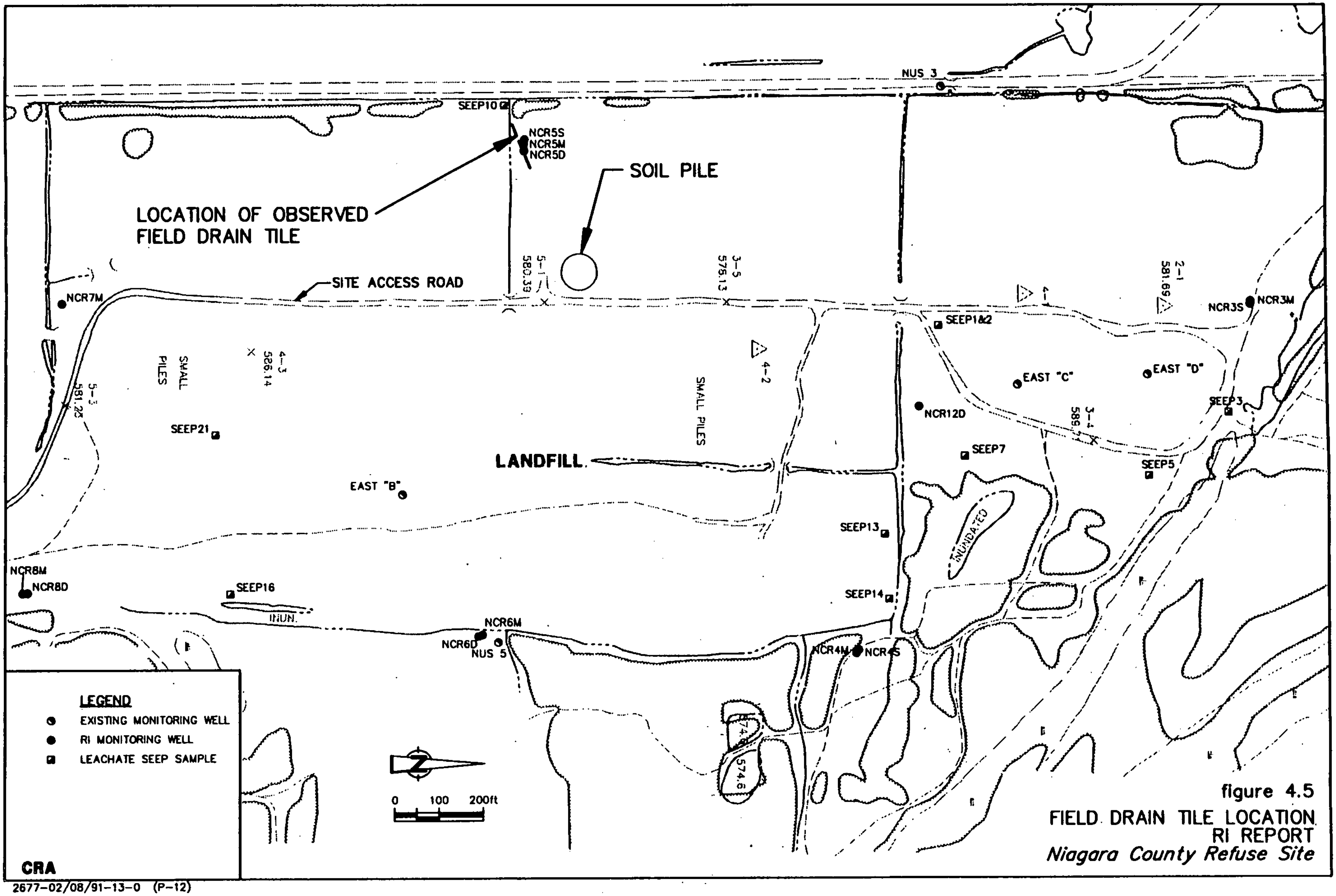
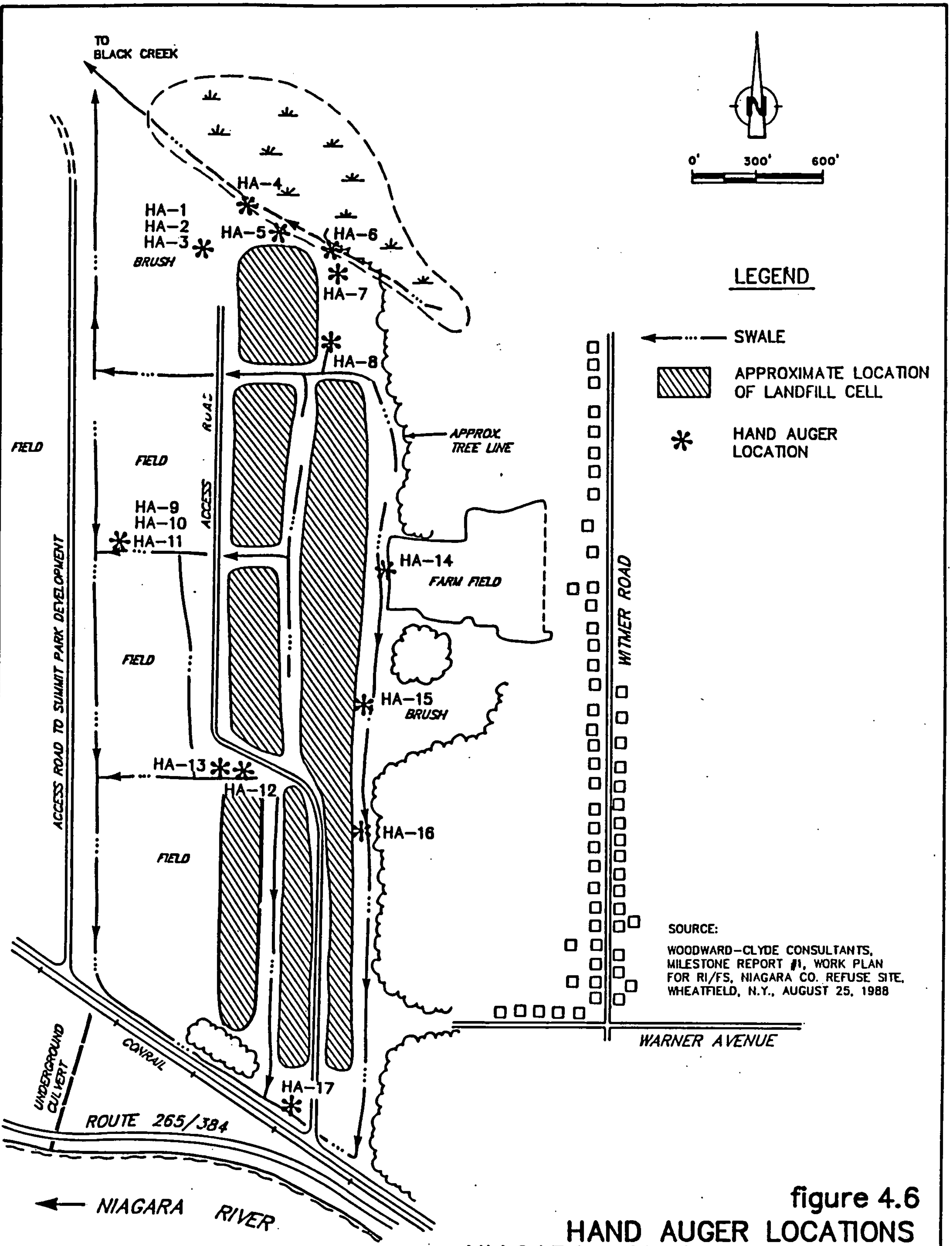


figure 4.5
FIELD DRAIN TILE LOCATION
RI REPORT
Niagara County Refuse Site

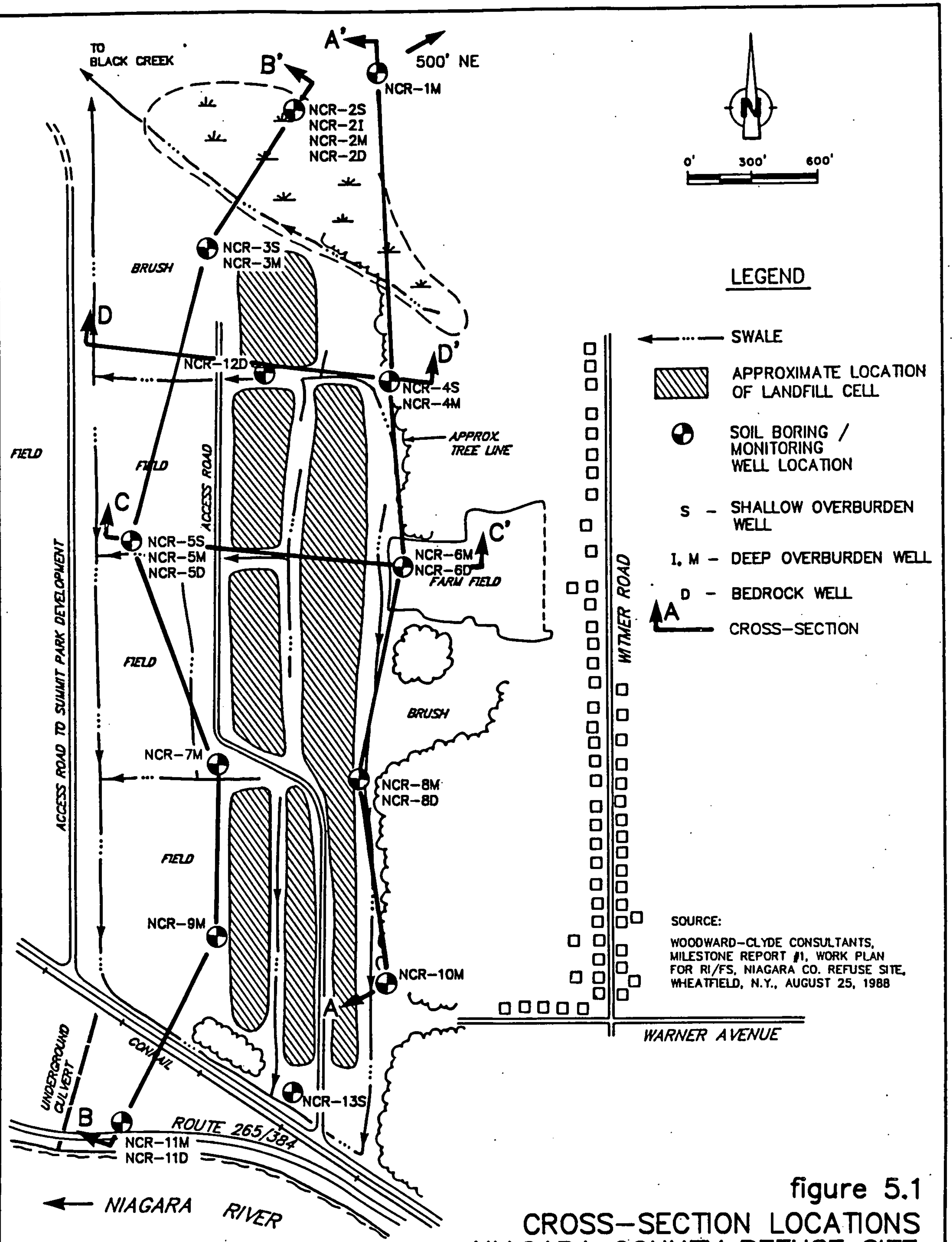
2677-02/08/91-13-0 (P-12)



SOURCE:
WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

figure 4.6

HAND AUGER LOCATIONS
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.



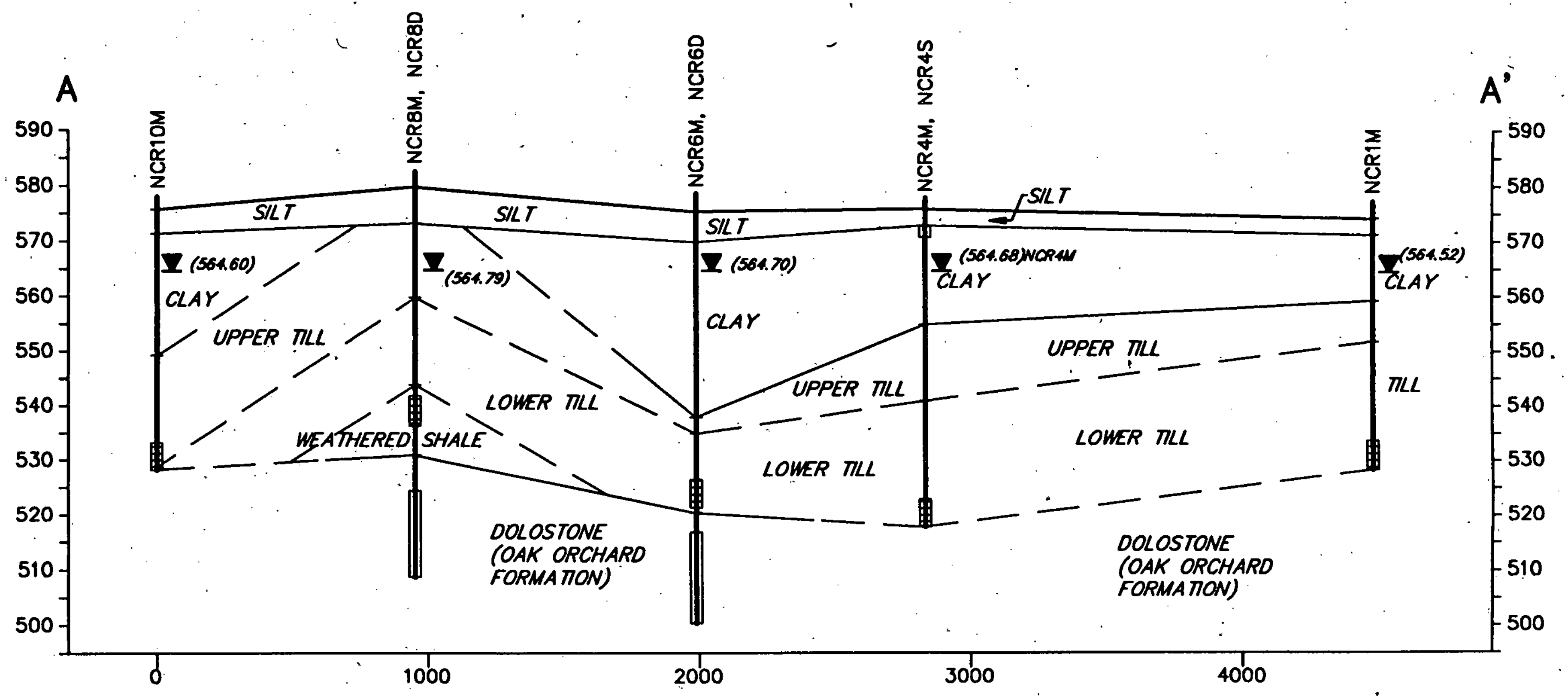
SOURCE:

WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

figure 5.1

CROSS-SECTION LOCATIONS
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA



MONITORED INTERVAL

▤ SCREENED

▯ OPEN HOLE

SCALE: VERT: 1"=30'
HORIZ: 1"=600'

NOTE:

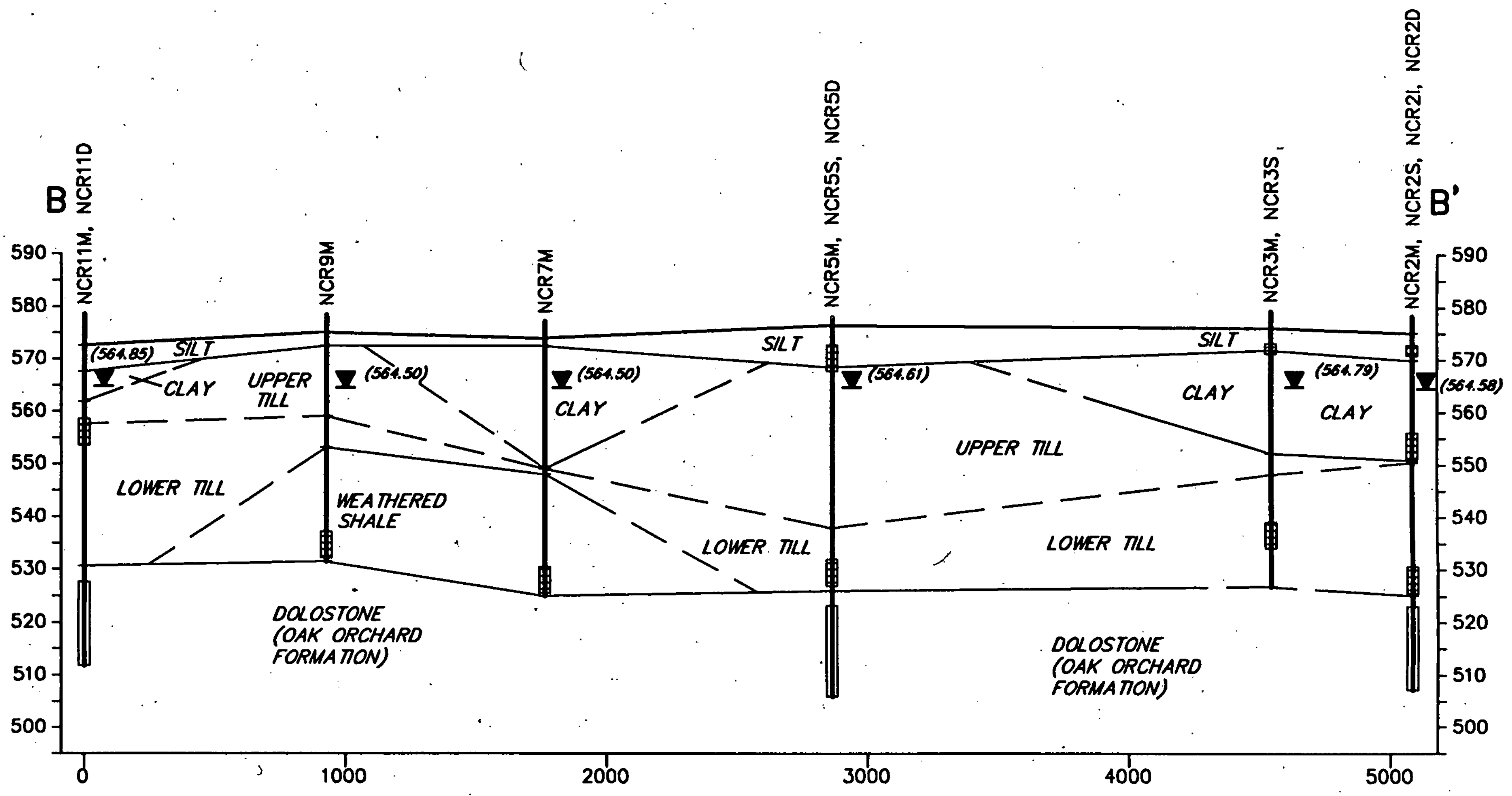
1. WATER LEVEL ELEVATIONS ARE FOR LOWER TILL / VERNON FORMATION WELLS ("M" WELLS) ON 10-30-90

figure 5.2

CROSS SECTION A – A'
NIAGARA COUNTY REFUSE SITE
Wheatfield, N,Y

CRA

2677 (13) JULY 24/92 REV.2 (X-06)



MONITORED INTERVAL

▤ SCREENED

▯ OPEN HOLE

SCALE: VERT: 1"=30'
HORIZ: 1"=600'

NOTE:

1. WATER LEVEL ELEVATIONS ARE FOR LOWER TILL / VERNON FORMATION WELLS ("M" WELLS) ON 10-30-90

figure 5.3

CROSS SECTION B – B'
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA

2677 (13) JULY 21/92 REV.2 (X-07)

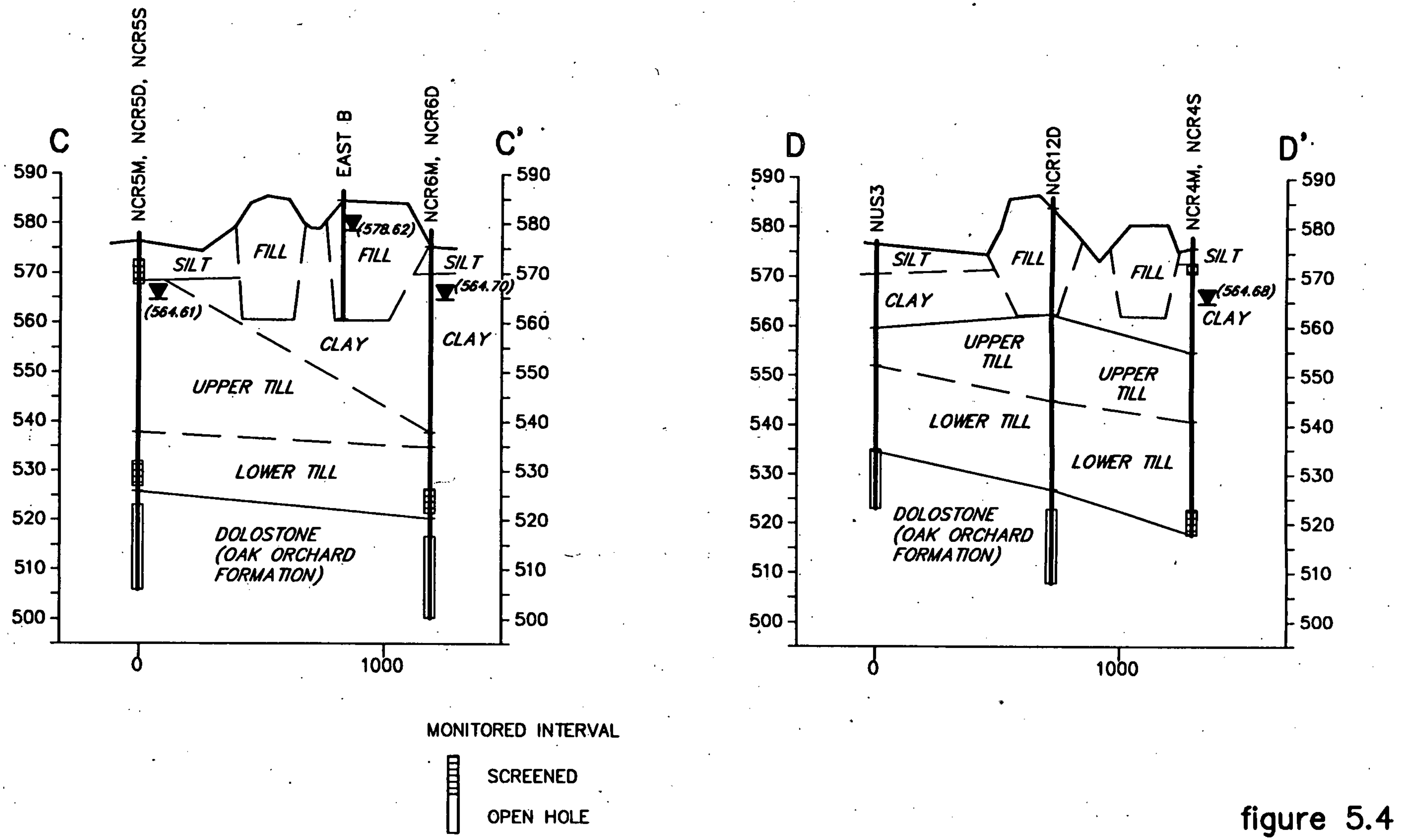


figure 5.4

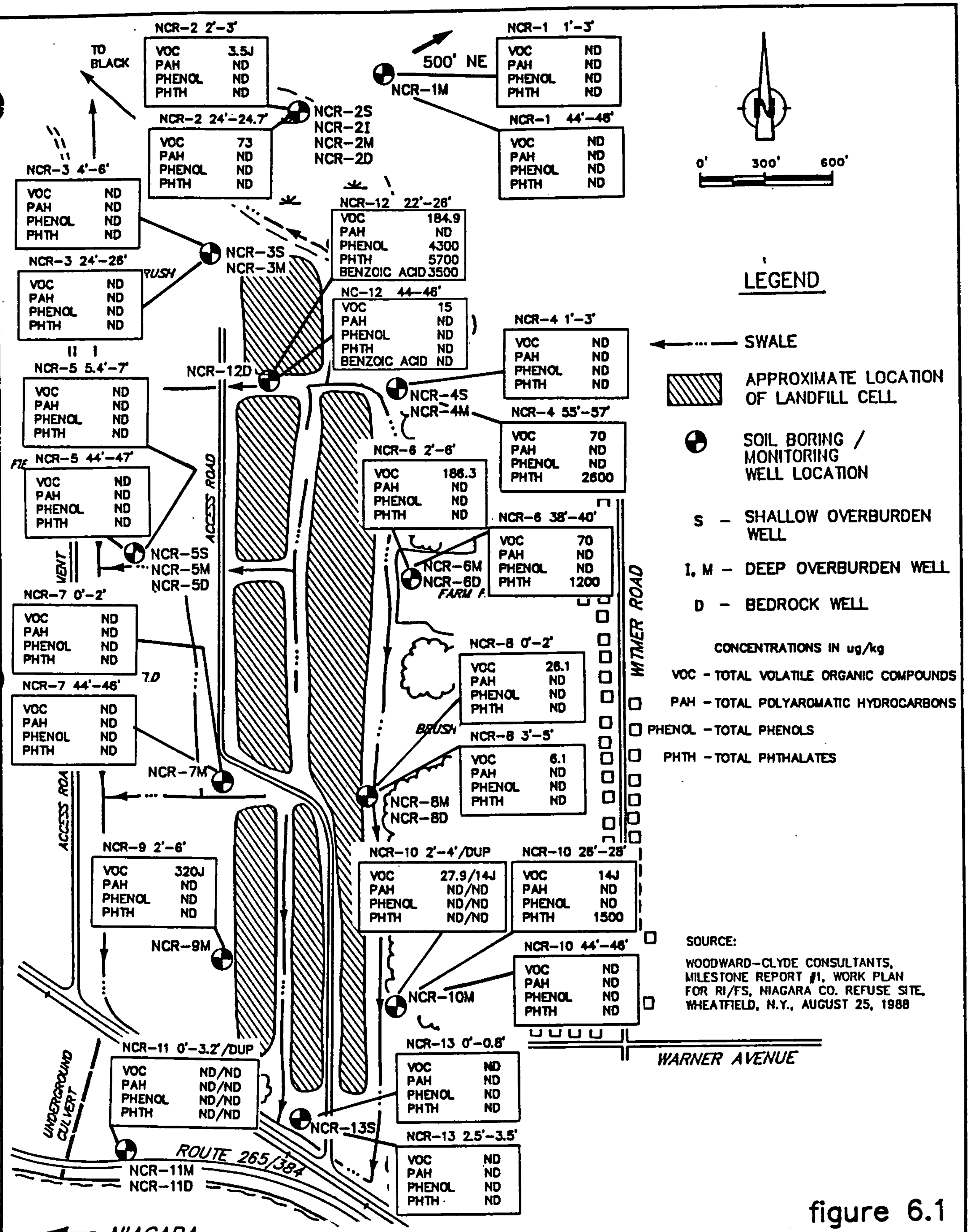
CROSS SECTION C – C' AND D – D'
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

SCALE: VERT: 1"=30'
HORIZ: 1"=600'

NOTE:

1. WATER LEVEL ELEVATIONS ARE FOR LOWER TILL / VERNON FORMATION WELLS ("M" WELLS) ON 10-30-90

CRA



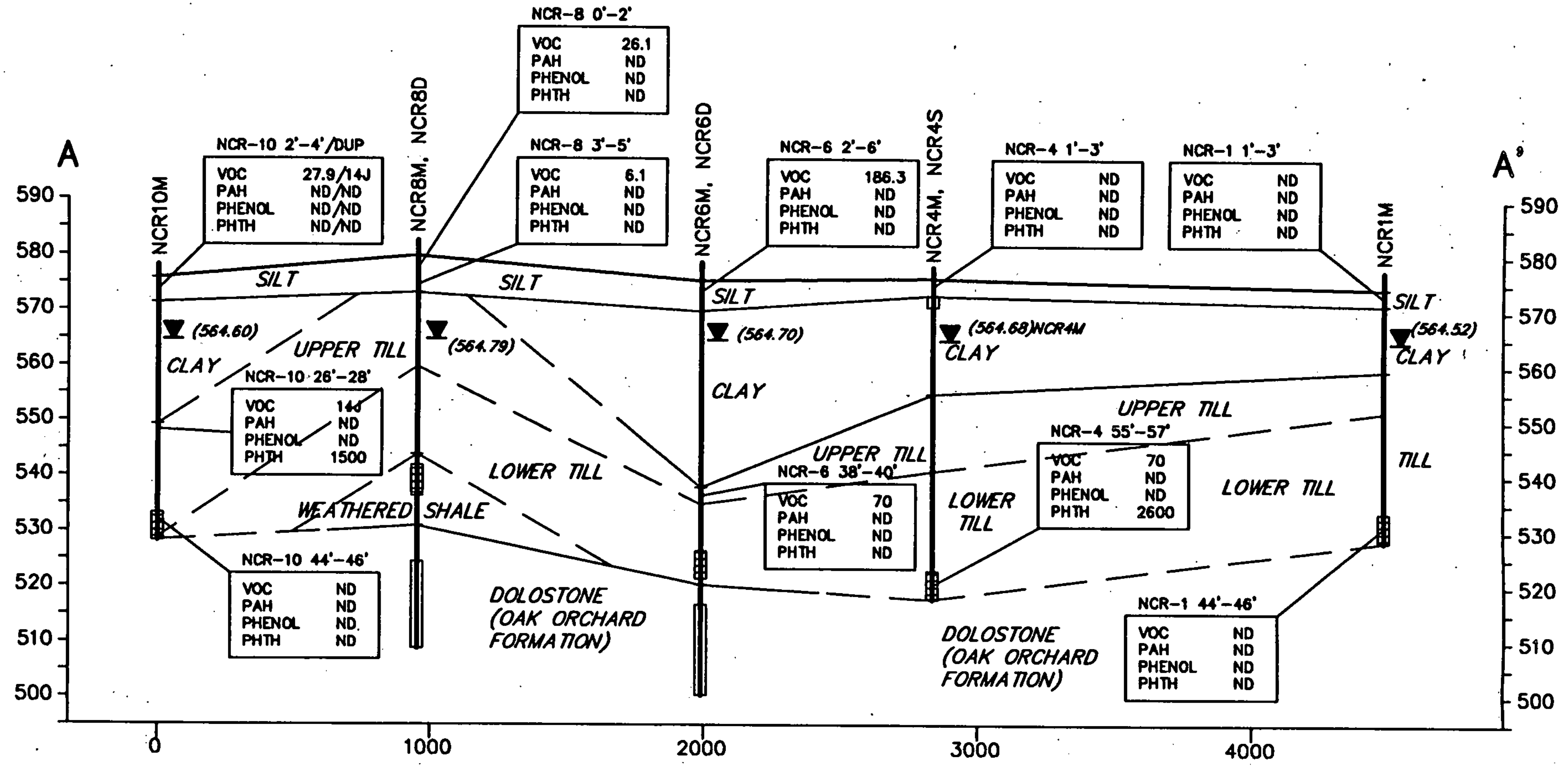
SOURCE:
WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

NIAGARA RIVER

figure 6.1

SOIL BORING CONCENTRATIONS PLAN VIEW
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA



LEGEND

MONITORED INTERVAL

SCREENED

OPEN HOLE

CONCENTRATIONS IN ug/kg

VOC – TOTAL VOLATILE ORGANIC COMPOUNDS

PAH – TOTAL POLYAROMATIC HYDROCARBONS

PHENOL – TOTAL PHENOLS

PHTH – TOTAL PHTHALATES

NOTE: 1. WATER LEVEL ELEVATIONS ARE FOR LOWER TILL/ VERNON FORMATION WELLS ("M" WELLS) ON 10-30-90

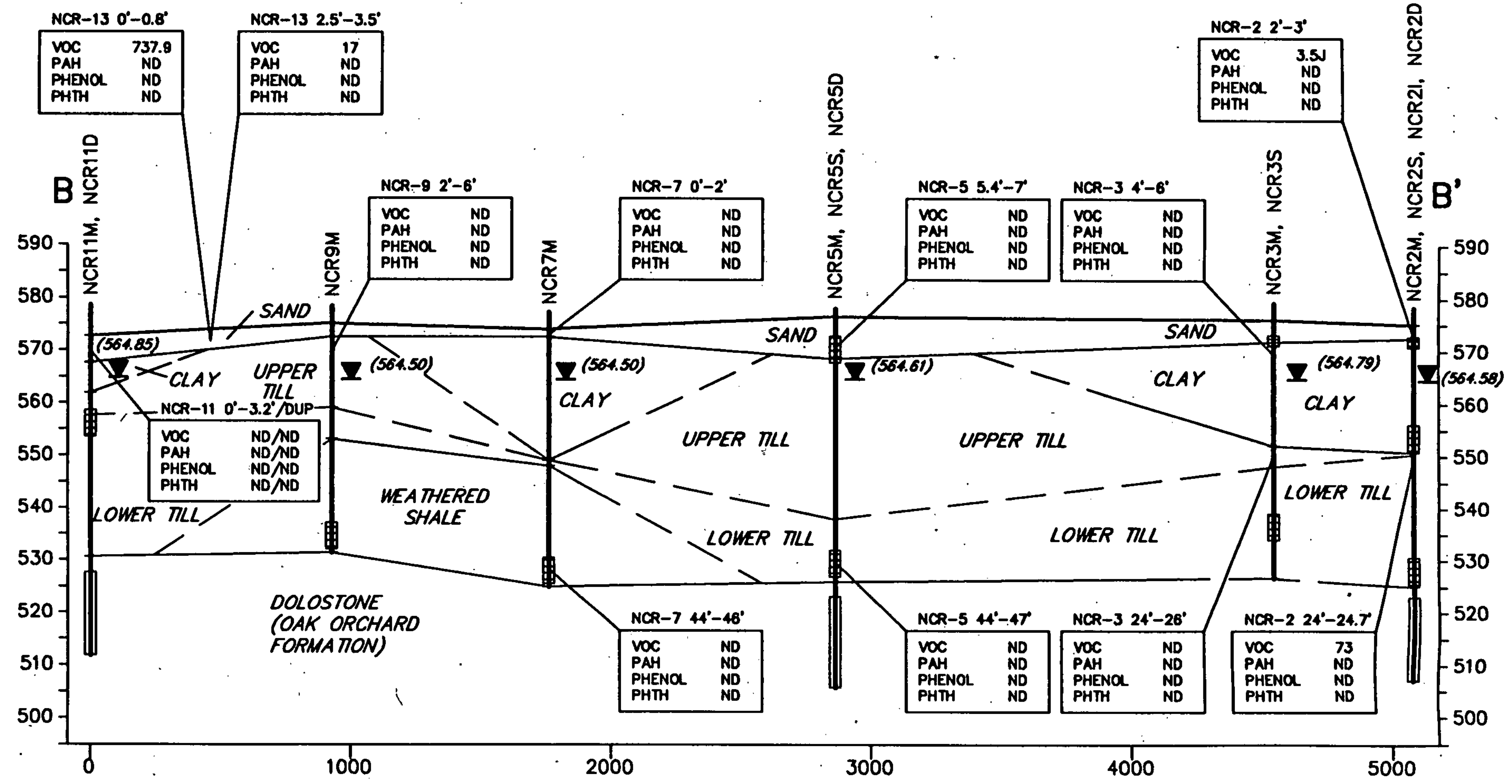
SCALE: VERT: 1"=30'
HORIZ: 1"=600'

figure 6.2

SOIL BORINGS CONCENTRATIONS CROSS SECTION A – A' NIAGARA COUNTY REFUSE SITE

Wheatfield, N.Y.

CRA



LEGEND

MONITORED INTERVAL

▤ SCREENED

▯ OPEN HOLE

CONCENTRATIONS IN ug/kg

VOC – TOTAL VOLATILE ORGANIC COMPOUNDS

PAH – TOTAL POLYAROMATIC HYDROCARBONS

PHENOL – TOTAL PHENOLS

PHTH – TOTAL PHTHALATES

NOTE: 1. WATER LEVEL ELEVATIONS ARE FOR BASAL TILL/ VERNON FORMATION WELLS ("M" WELLS) ON 10-30-90

SCALE: VERT: 1"=30'
HORIZ: 1"=600'

figure 6.3

SOIL BORINGS CONCENTRATIONS CROSS SECTION B – B' NIAGARA COUNTY REFUSE SITE

Wheatfield, N.Y.

CRA

2677 (13) JULY 24/92 REV.2 (X-10)

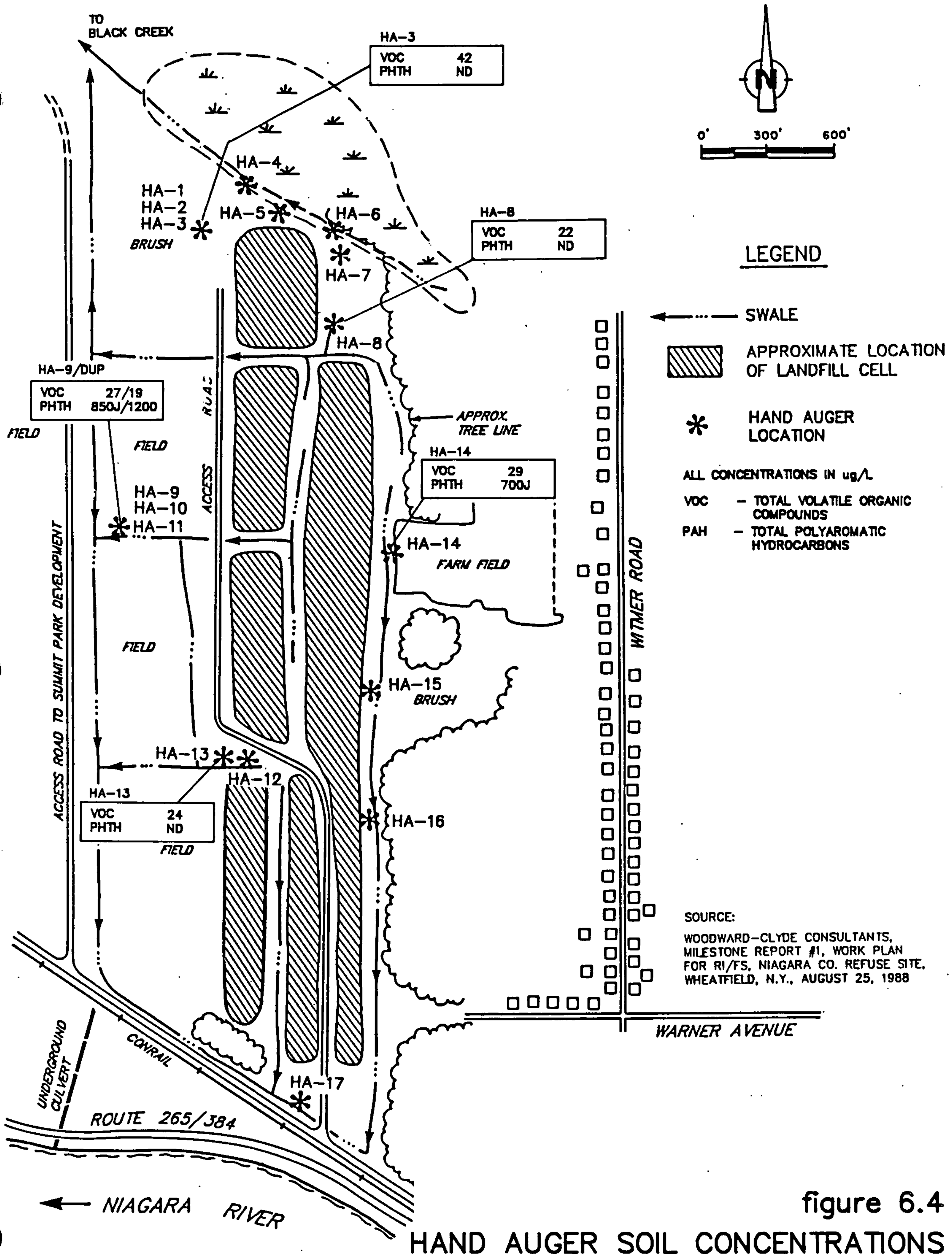


figure 6.4

HAND AUGER SOIL CONCENTRATIONS
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA

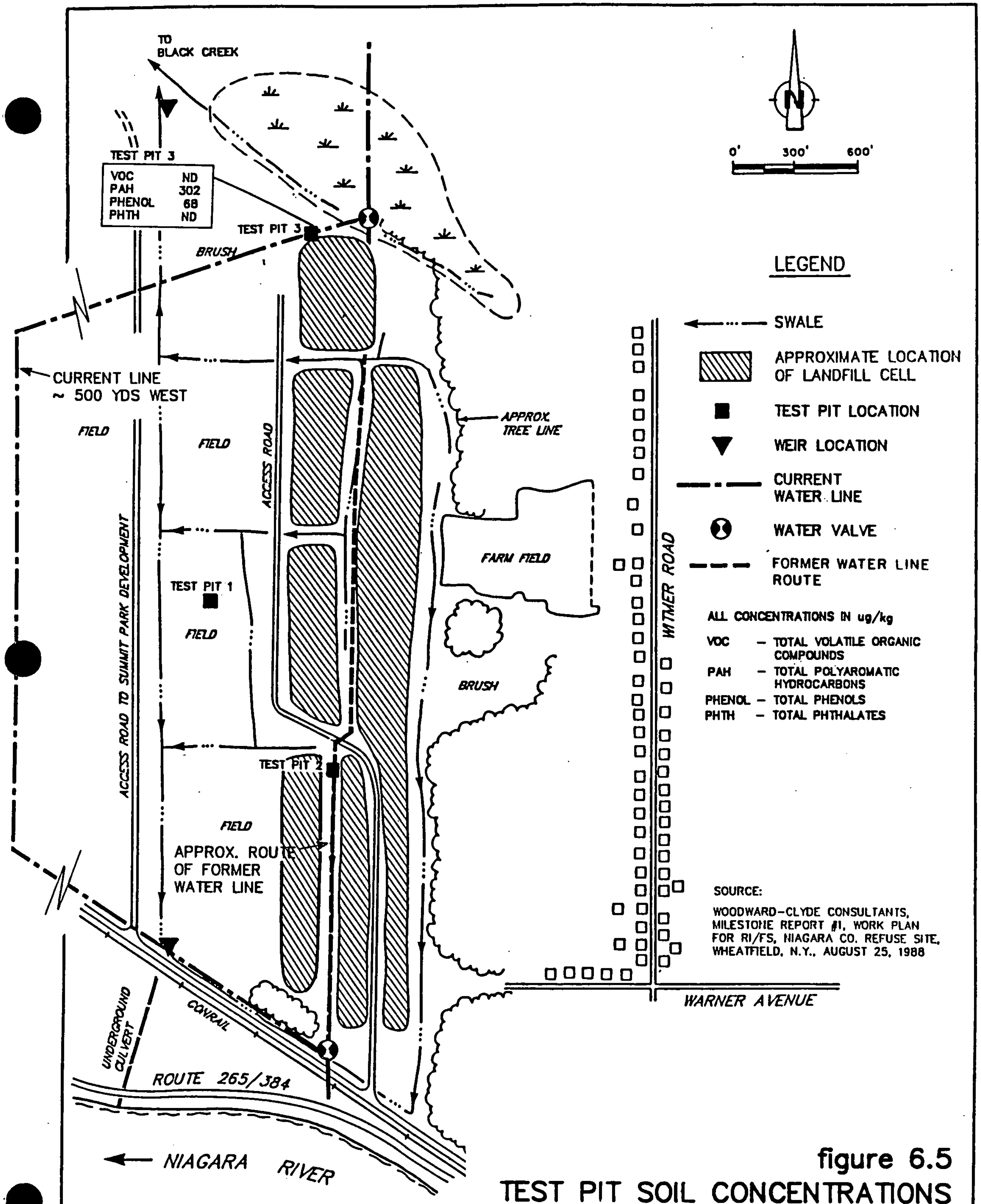


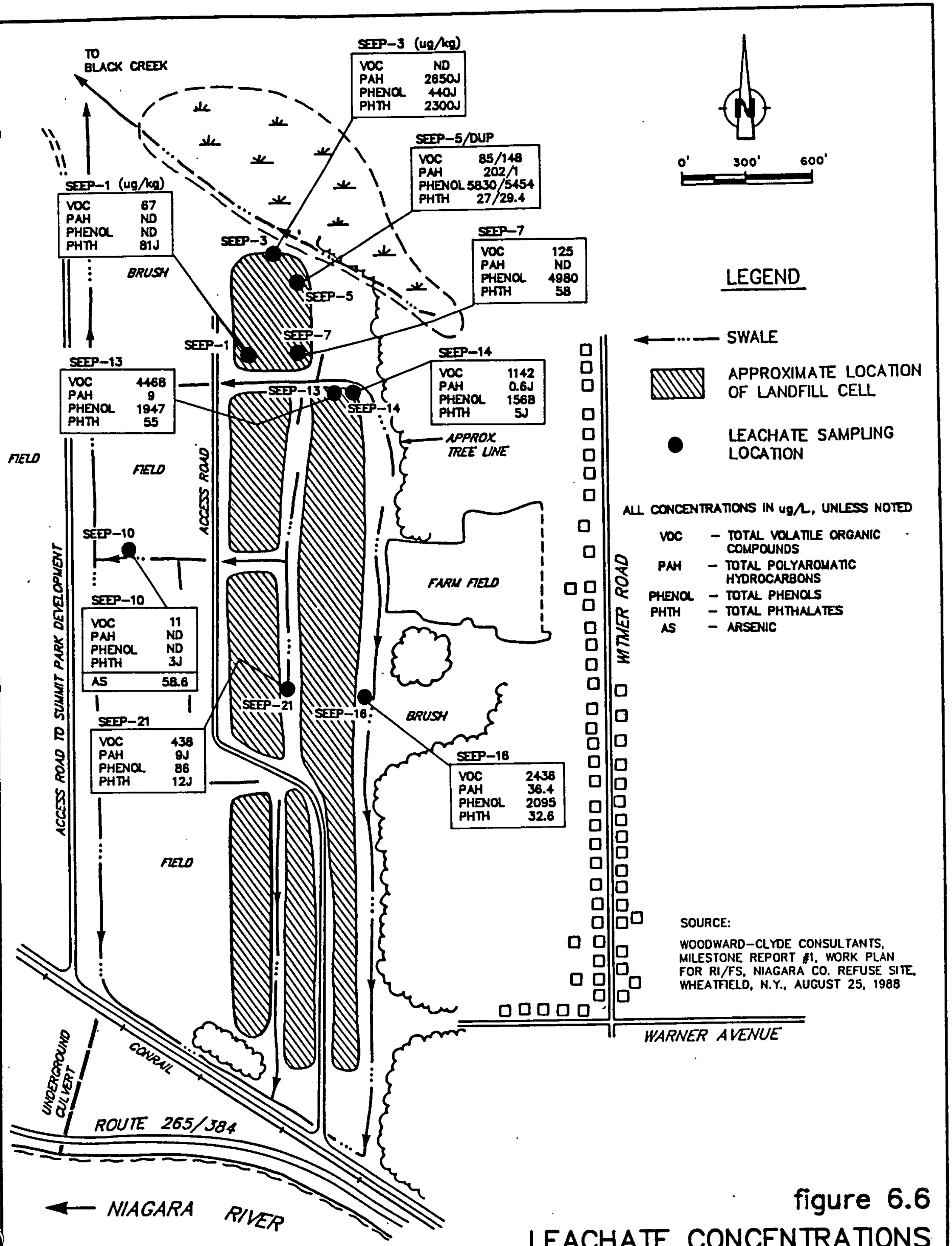
figure 6.5

TEST PIT SOIL CONCENTRATIONS

NIAGARA COUNTY REFUSE SITE

Wheatfield, N.Y.

CRA

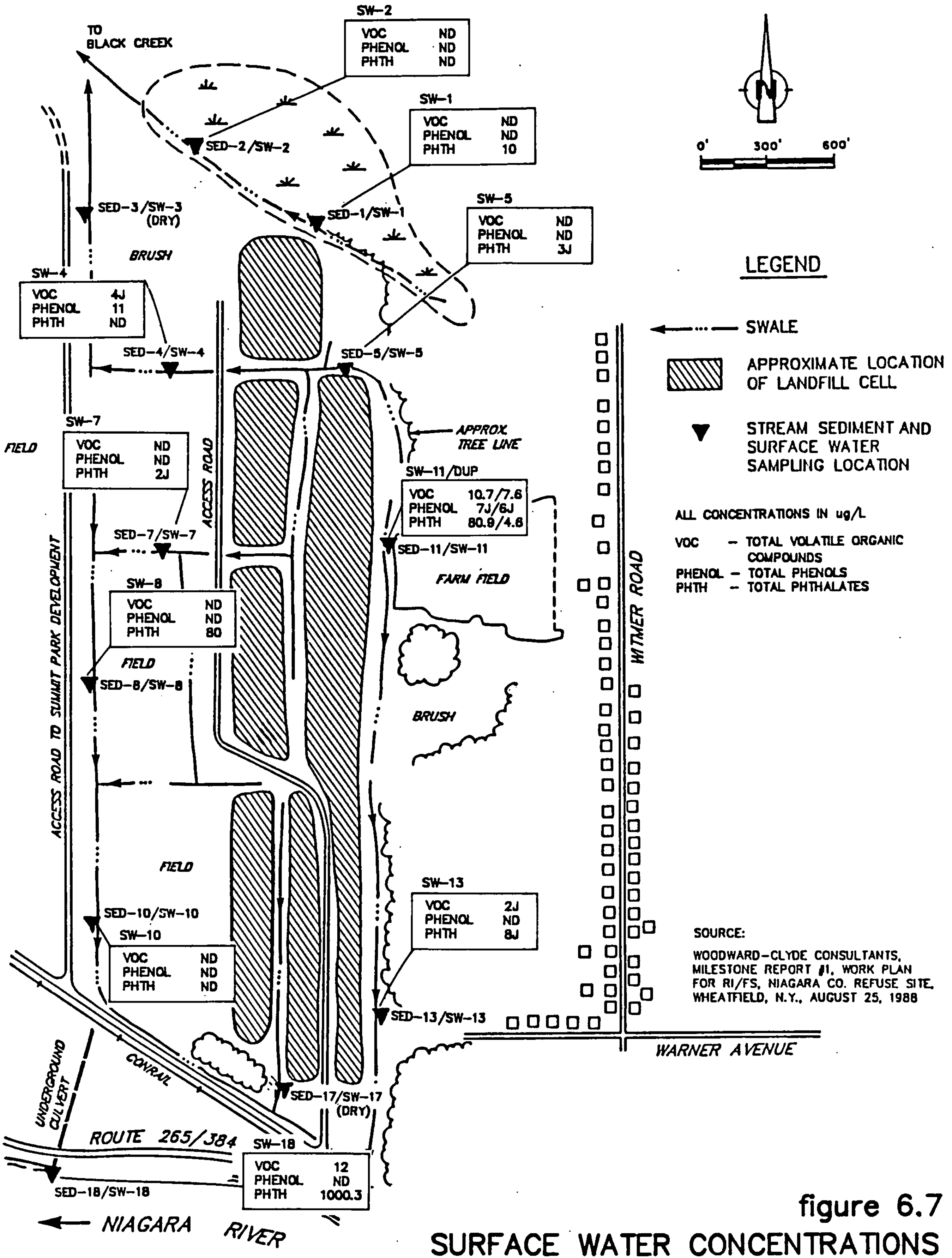


SOURCE:
WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

figure 6.6

LEACHATE CONCENTRATIONS
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA



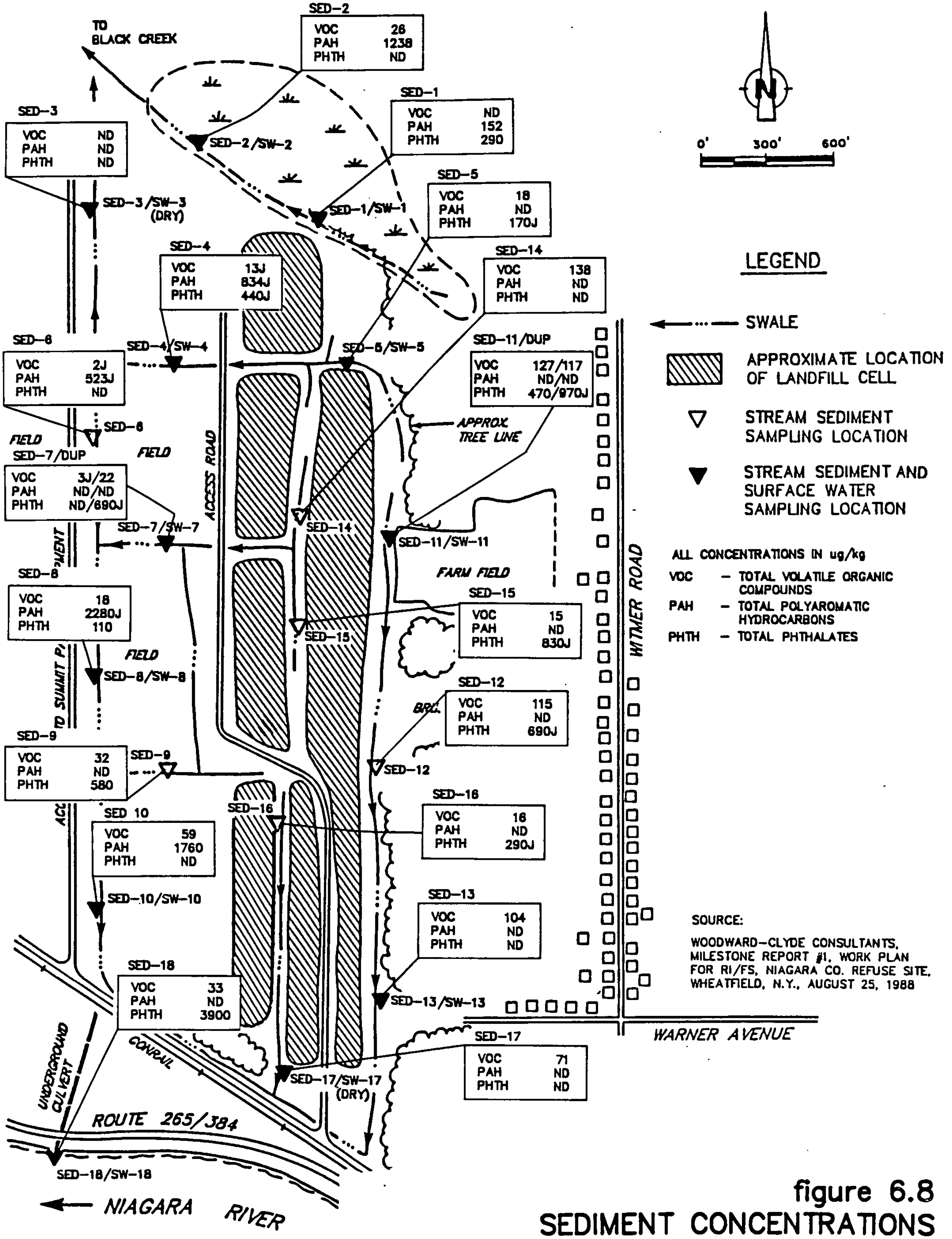
SOURCE:

WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

figure 6.7

SURFACE WATER CONCENTRATIONS
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA



SOURCE:
WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1. WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

figure 6.8
SEDIMENT CONCENTRATIONS
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA

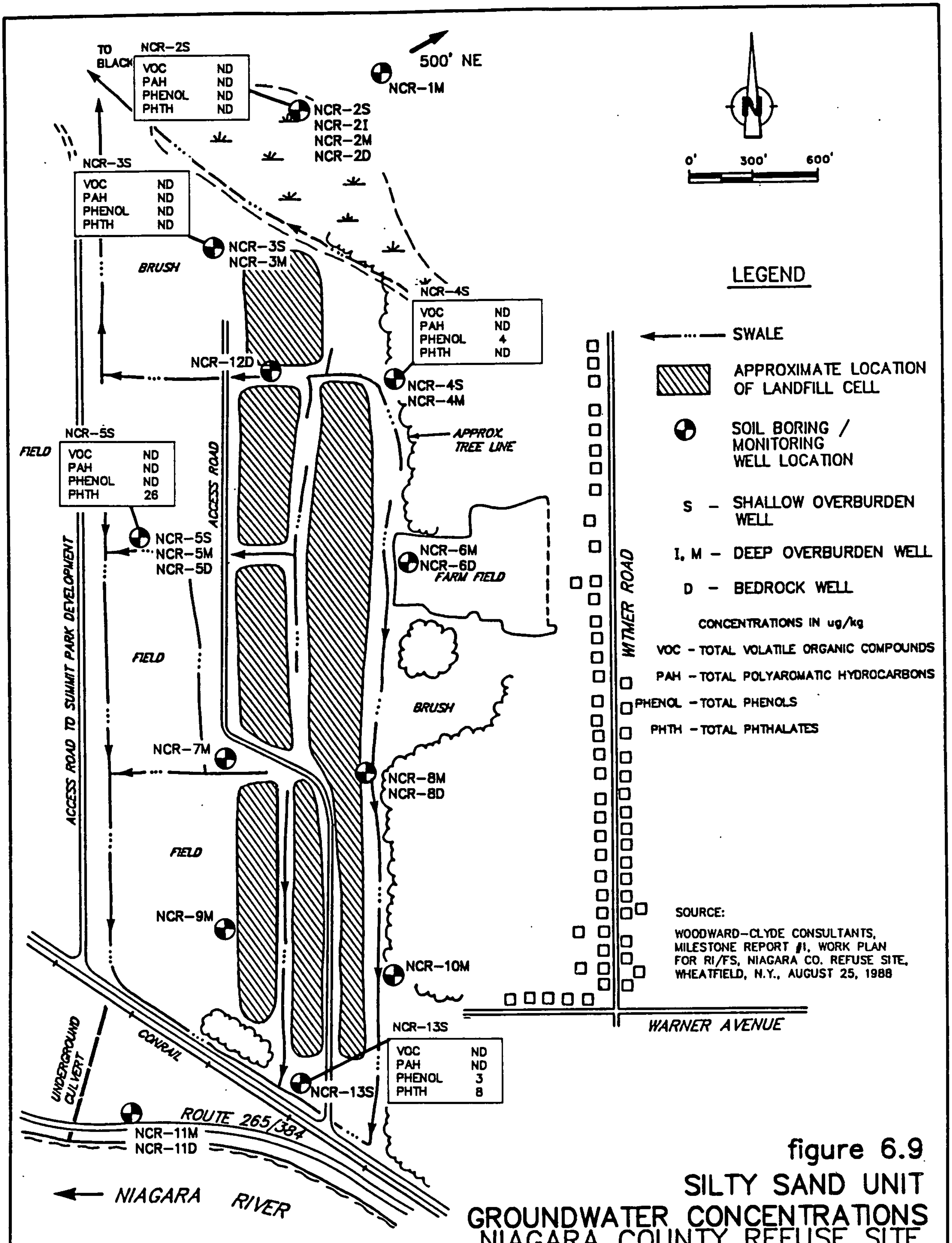
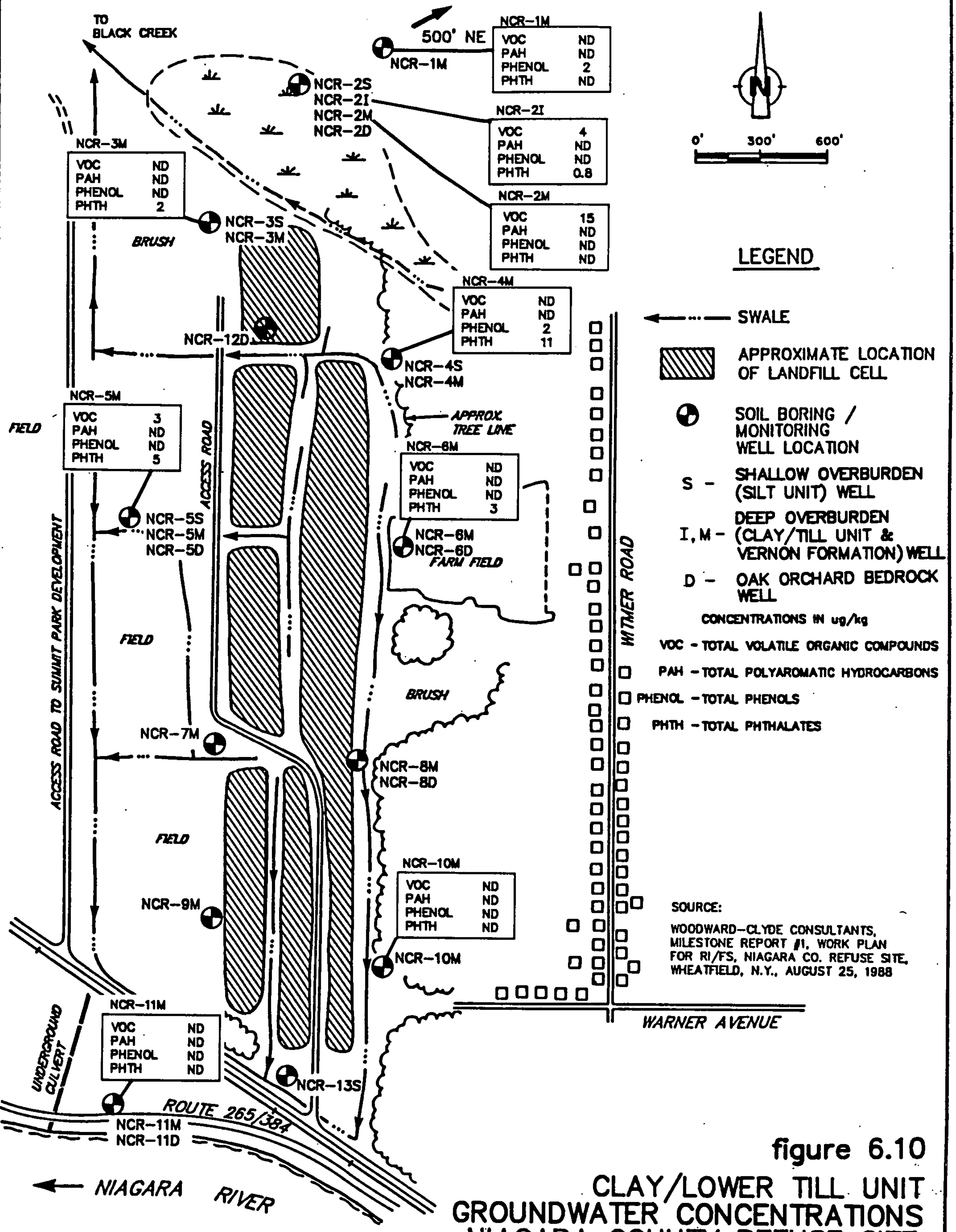


figure 6.9

SILTY SAND UNIT GROUNDWATER CONCENTRATIONS NIAGARA COUNTY REFUSE SITE

Wheatfield, N.Y.

CRA



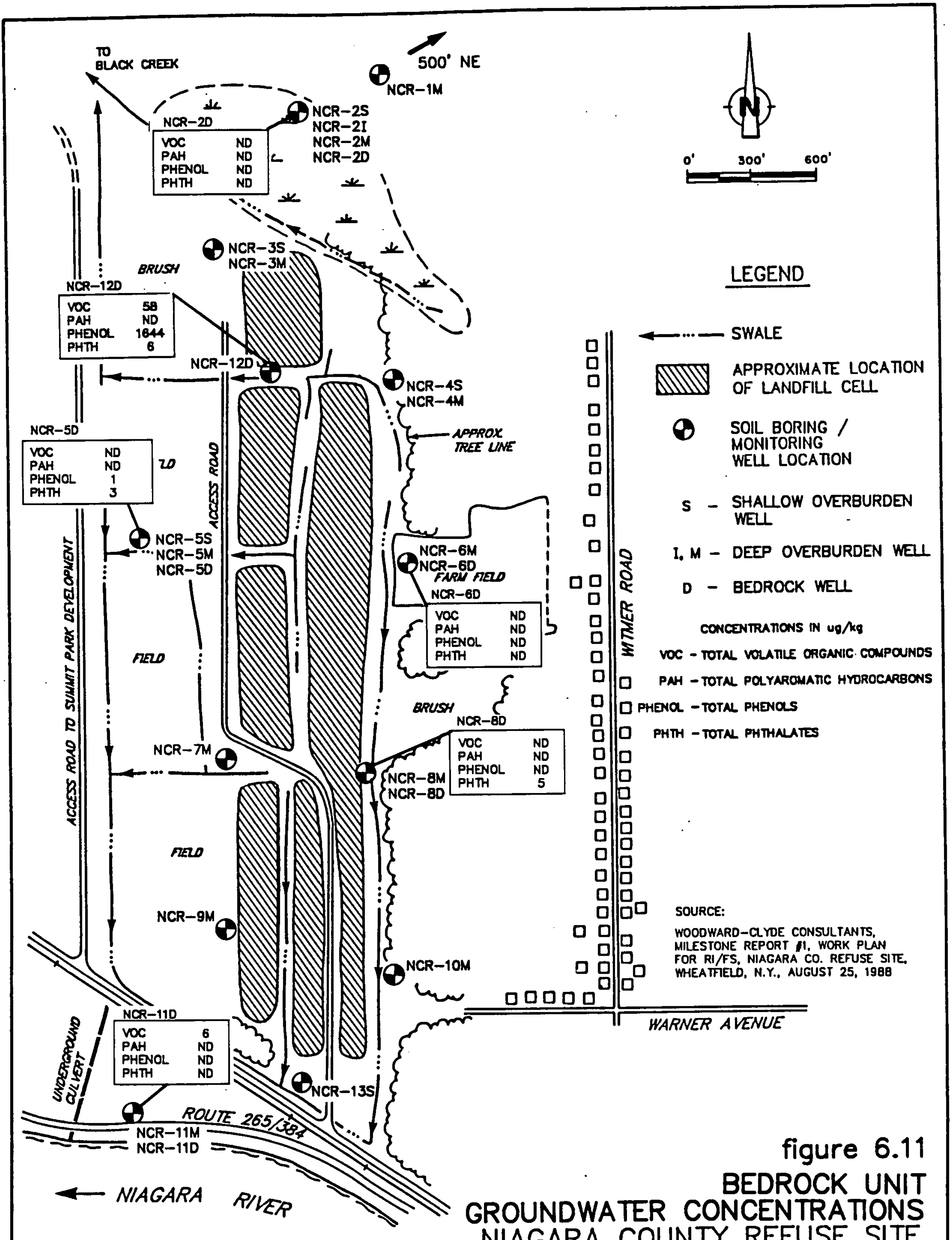
SOURCE:
WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

figure 6.10

CLAY/LOWER TILL UNIT GROUNDWATER CONCENTRATIONS NIAGARA COUNTY REFUSE SITE

Wheatfield, N.Y.

CRA



SOURCE:
WOODWARD-CLYDE CONSULTANTS, MILESTONE REPORT #1, WORK PLAN FOR RI/FS, NIAGARA CO. REFUSE SITE, WHEATFIELD, N.Y., AUGUST 25, 1988

figure 6.11

BEDROCK UNIT
GROUNDWATER CONCENTRATIONS
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA

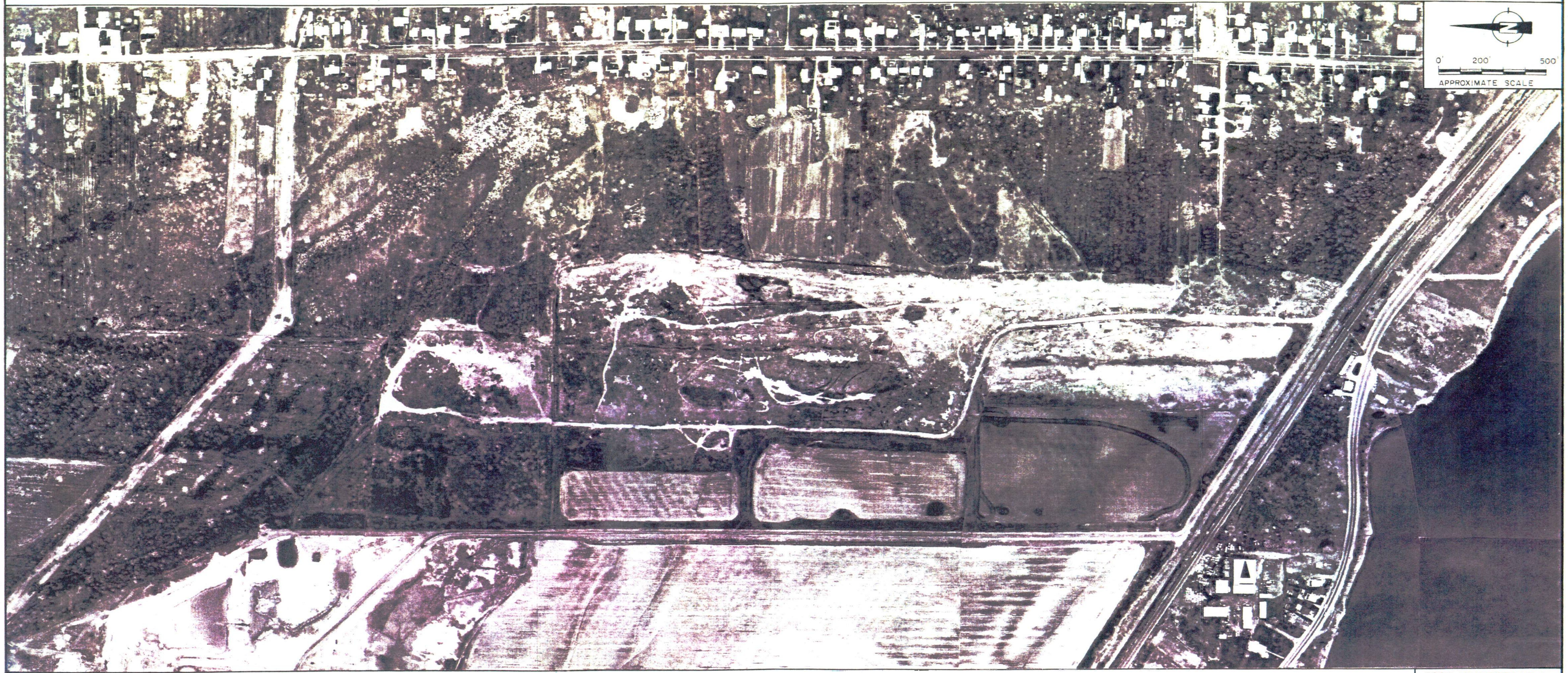


figure 2.1

1989 AERIAL PHOTOGRAPH
NIAGARA COUNTY REFUSE SITE
Wheatfield, N.Y.

CRA

TABLES

TABLE 2.1

INDUSTRIAL WASTE CHARACTERIZATION REPORTED TO HAVE BEEN DISPOSED OF AT THE SITE
NCR SITE
WHEATFIELD, NEW YORK

<u>Industrial Waste Characterization</u>

Empty containers
Abrasive grain
Scrap resins
Heat treatment salts
Plating tank sludge
Clay, fly ash
Thiazole polymer blends
Iron catalyst salts
Accelerator sewer pumps
PVC floor sweepings, skins
Emulsion berries
Off-grade polyvinyl alcohol
Oil and grease drippings
Phenolic resin
Graphite
Lime sludge
Brine sludge (with mercury)
Hypo mud
Fumed silica
Zircon - Zirconia sludge
Paper bags (metal dusts)
Flint pebbles
Fiber drums
Steel drums
Bricks
Rags
Paper
Wood
Trash/Rubbish

Source: "Remedial Action Master Plan" by Camp Dresser McKee Inc. and Others, January 5, 1983.

Notes:

a) The above table indicates the characterization of the suspected wastes that have been disposed of at the Site from available records and may not be fully exhaustive and representative of the conditions at the Site.
b) Over 100 generators disposed their wastes at the Site.
c) Over 12,000 tons have been classified as hazardous (source: "Community Right to Know" by NYDEC, April 1, 1985).
d) Total estimated wastes in landfill - 0.75 to 1 million tons.
e) Approximate waste composition by weight based on 1972 quantities:

Household	38%
Industrial	33%
Commercial	27%
Institutional	1%
Other	1%

Source: "Operating Plan for Site" by Krehbiel-Guay-Rugg-Hall, October 5, 1973.

TABLE 2.2

HISTORICAL CHEMICAL DATA
NCR SITE
WHEATFIELD, NEW YORK

	Chemicals Found at Site (μg/L)		
		*Surface Water ***	
<u>**VOLATILE ORGANICS**</u>	*Water Samples **	*Max.*	*Min.*
Benzene	180 B	NA	
Chlorobenzene	28 B	NA	
1,2-Dichloroethane	B	NA	
1,1,1-Trichloroethane	NA	NA	
Chloroform	NA	NA	
1,2-Trans-dichloroethylene	NA	37+	7+
Ethylbenzene	160 B	8	2
Methylene chloride	3,000 B M	2	1
Trichlorofloromethane	NA	NA	
Tetrachloroethylene	NA	56	11
Toluene	150-2,100	31	6
Trichloroethylene	NA	NA	
Vinyl chloride	NA	2	0.4
Phenol	110-270,000	34,000+	5,666+
<u>**BASE NEUTRAL EXTRACTABLES**</u>			
Acenaphthene	NA	NA	
Flouranthene	NA	NA	
Benzo (a) pyrene	NA	NA	
Benzo (a) anthracene	NA	NA	
Bis (2-ethylhexyl) phthalate	230 BM	330	57
Di-n-butylphthalate	Not Detectable	9	2
Naphthalene	B	NA	
<u>**PESTICIDES**</u>			
4-4'-DDE	NA	NA	
PCB-1254	NA	NA	
PCB-1248	NA	NA	
Heptachlor	NA	0.13+	0.04+
Endosulfan	NA	NA	
<u>**INORGANICS**</u>			
Aluminum	0.4-21.0	NA	
Antimony	0.45 D	NA	
Arsenic	0.062 D	30	25
Barium	0.05-3.10	NA	
Beryllium	Not Detectable	NA	
Cadmium	0.016 D	NA	
Chromium	0.98 D	NA	
Cobalt	0.3	NA	
Copper	0.16 D	52	20
Iron	0.38-1,400	NA	
Lead	0.36 D	160+	32+
Magnesium	18.0-1,000	NA	
Manganese	–	–	
Mercury	0.002-0.001	1.58	0.4
Nickel	0.05-0.86	100	20
Selenium	NA	NA	
Silver	D	NA	
Thallium	0.005	NA	
Vanadium	0.08-0.31	NA	
Zinc	0.06-100	174	61

<u>Source:</u>

Tables 2-3 and 2-4, Woodward-Clyde Report (WCC, 1988)

Notes:

* - from boreholes within landfill, 1985 investigation by EAST for NYSDEC
** - from USEPA (1980) and NYSDEC (1980) investigations
NA - not analyzed
D - detected below contract required detection limit
B - indicates an estimated value, detected below increased detection limit, affected by dilution
M - detected in method blank

TABLE 3.2

SUMMARY OF SURFICIAL GEOLOGY GRAIN SIZE DISTRIBUTION ANALYSIS FOR THE SUMMIT PARK DEVELOPMENT SITE
NCR SITE
WHEATFIELD, NEW YORK

	Percent Distribution				
Date	*Gravel (%)*	*Sand (%)*	*Silt (%)*	*Clay (%)*	*Description*
19/03/91	0.3	7.2	53.4	39.1	Brown, silt and clay, trace sand and gravel
19/03/91	0.7	7.5	67.3	24.5	Brown silt some clay, trace sand and gravel
19/03/91	0.0	8.8	62.5	28.7	Brown silt some clay, trace sand
19/03/91	1.7	11.2	57.6	29.3	Brown silt some clay, little sand, trace gravel

	Gravel (%)	*Sand (%)*	*Silt and Clay (%)*	
24/04/91	1.1	47.3	51.6	Brown silt, some clay, trace sand
24/04/91	0.0	43.4	56.6	Brown silt, some clay, trace sand
24/04/91	1.0	48.4	50.6	Brown silt, some clay, trace sand

	Gravel (%)	*Sand (%)*	*Silt (%)*	*Clay (%)*	
19/09/91	0.0	8.1	63.9	28.0	Brown silt, some clay, trace sand
19/09/91	0.0	7.9	59.6	32.5	Tan fines and sand, trace gravel
19/09/91	0.0	7.9	64.3	27.8	Tan fines and sand
19/09/91	1.0	4.5	63.1	31.4	Tan fines and sand, trace gravel

Note:

Samples are analyzed by Empire Soils Investigations Inc., Middleport, New York.
Samples were collected from stockpiles that were excavated at a depth ranging from 1 to 5 feet Below Ground Surface (Mentley, National Corporation, 1992).

TABLE 4.1

RI ACTIVITY SUMMARY
NIAGARA COUNTY REFUSE SITE
WHEATFIELD, NEW YORK

	Activities	*Date Started*	*Date Completed*
1.	Work Plan Approval	--	May 23, 1990
2.	Geophysical Survey	Jun. 5, 1990	Jun. 9, 1990
3.	Site Reconnaissance	Jun. 14, 1990	Jun. 14, 1990
4.	Topographic Survey	Jun. 18, 1990	Jun. 30, 1990
	A. Property Survey		Aug. 21, 1990
5.	Air Sampling		
	A. Original Round 1*	July 5, 1990	July 6, 1990
	B. Repeat Round 1	July 11, 1990	July 12, 1990
	C. Round 2	July 18, 1990	July 19, 1990
6.	Biota Inventory	Jul 17, 1990	Aug. 2, 1990
7.	Weir Installation	Aug. 17, 1990	Aug. 17, 1990
8.	Soil Borings, Sub-Surface Soil Sampling Sampling & Monitoring Well Installation	July 23, 1990	Sept. 12, 1990
9.	Test Pit Excavation	Sept. 20, 1990	Sept. 20, 1990
10.	Leachate Seep Sampling		
	A. Original Round*	Sept. 28, 1990	Oct. 1, 1990
	B. Repeat Round	Nov. 26, 1990	Nov. 27, 1990
11.	Sediment Sampling		
	A. Original Round*	Sept. 17, 1990	Sept. 19, 1990
	B. Repeat Round	Nov. 27, 1990	Nov. 28, 1990
12.	Surface Water Sampling		
	A. Original Round*	Oct. 2, 1990	Oct. 3, 1990
	B. Repeat Round	Nov. 28, 1990	Nov. 29, 1990
13.	Hand Auger Sampling	Nov. 30, 1990	Dec. 3, 1990
14.	Groundwater Sampling		
	A. Well Development	Sept. 5, 1990	Sept. 26, 1990
	B. Original Sampling*	Oct. 2, 1990	Oct. 11, 1990
	C. Round 1 Sampling	Mar. 12, 1991	Mar. 26, 1991
	D. Round 2 Sampling	Apr. 22, 1991	May 2, 1991
15.	Field Permeability Testing	May 20, 1991	Jun. 5, 1991
16.	Field Tile Investigation	July 16, 1991	ongoing
17.	Sub-Surface Soil Sampling from NCR-13	Aug. 8, 1991	Aug. 8, 1991

Notes:

* Holding times exceeded by analytical laboratory.
Resampling conducted as noted.

TABLE 4.2

INVESTIGATIVE SAMPLES SIGNIFICANTLY EXCEEDING SAMPLE HOLDING TIMES
NCR Site
Wheatfield, New York

Leachate Samples (September 21, 1990 to October 1, 1990)

Seep#1
Seep #5
Seep #10
Seep #14
Seep #21
Seep#3
Seep #7
Seep #13 and Seep #13 (Dup.)
Seep #16

Surface Water Samples (October 2, 1990 to October 4, 1990)

SW-4
SW-7
SW-11 and SW-1 (Dup.)
6 locations were dry and were not sampled
SW-5
SW-10
SW-18

Sediment Samples (September 17, 1990 to September 19, 1990)

SED-1
SED-3
SED-5
SED-7 and SED-7 (Dup.)
SED-9
SED-11 & SED-11(DUP)
SED-13
SED-15
SED-17
SED-2
SED-4
SED-6
SED-8
SED-10
SED-12
SED-14
SED-16
SED-18

Test Pit Sample (September 20, 1990)

Test Pit 3

Groundwater Round I (October 2, 1990 to October 11, 1991)

NCR-1M-I
NCR-2M-I
NCR-3M-I
NCR-5M-I
NCR-6M-I & NCR-6M-I (Dup.)
NCR-7M-I
NCR-8D-I
NCR-10M-I
NCR-11D-1
NCR-2I-I
NCR-2D-I
NCR-4M-I
NCR-5D-I
NCR-6D-I
NCR-8M-I
NCR-9M-I
NCR-11M-I
NCR-12D-I and NCR-12D-I (Dup.)

TABLE 4.3

FLOW DATA FROM WEIR LOCATIONS
NIAGARA COUNTY REFUSE SITE
WHEATFIELD, NEW YORK

		SOUTH WEIR			*NORTH WEIR*		
Date (2)	***Time***	***Water Height in Notch (Ft.)***	***Instantaneous (1) Flow Volume (GS)***	***Cumulative (1) Flow Volume (GPD)***	***Water Height in Notch (Ft.)***	***Instantaneous (1) Flow Volume (GS)***	***Cumulative (1) Flow Volume (GPD)***
10-04-90	0930	0	0	0	0	0	-
	1630	0.04	0.006	518.4	0	0	-
10-05-90	0900	0.03	0.0029	250.6	0	0	-
	1350	0.02	0.0011	95.0	0	0	-
10-09-90	1100	0.09	0.0454	3922.6	0	0	-
	1500	0.11	0.0751	6488.6	0	0	-
10-10-90	0930	0.1	0.0591	5106.2	0	0	-
	1500	0.09	0.0454	3922.6	0	0	-
10-11-90	1000	0.11	0.0751	6488.6	0	0	-
	1500	0.11	0.0751	6488.6	0	0	-
10-12-90	0800	0.07	0.0242	2090.9	0	0	-
11-05-90	0800	0.04	0.006	518.4	0	0	-
	1700	0.06	0.0165	1425.6	0	0	-
11-06-90	0900	0.09	0.0454	3922.6	0	0	-
	1830	0.07	0.0242	2090.9	0	0	-
02-28-91	-	0	0	0	0.08 (3)	Stagnant - Weir Flooded	-
03-12-91	-	0.3	0.9219	79652.2	0.1 (3)	Stagnant - Weir Flooded	-
03-26-91	-	Washed Out	-	-	0.2	0.33	28,512
04-22-91	0800	Flooded (4)	-	-	0.7	7.67	662,688
	1600	Flooded (4)	-	-	0.7	7.67	662,688
04-23-91	0730	Flooded (4)	-	-	0.49	3.14	271,296
	1100	Flooded (4)	-	-	0.45	2.54	219,456
	1600	Flooded (4)	-	-	0.40	1.89	163,296

Notes:

(1) Flow volumes calculated from "Isco Open Channel Flow Measurement Handbook", Third Edition, 1989 Table 8-5, Page 136.

(2) Dates listed are those where flow over either weir was observed and measured. No flow was observed on dates not listed.

(3) North Weir flooded until March 26, 1991.

(4) Summit Park Development Pumping Water

TABLE 4.4

MONITORING WELL COMPLETION DETAILS
NCR SITE
WHEATFIELD, NEW YORK

Well Number	*Date Completed*	*Ground Elevation (ft AMSL)*	*Top of Casing Elevation (ft AMSL)*	*Monitored/Screened Interval*		*Sand Pack Interval*		*Monitored/Screened Unit*
				Depth (ft BGS)	*Elevation (ft AMSL)*	*Depth (ft BGS)*	*Elevation (ft AMSL)*	
NCR-1M	8/30/90	574.3	577.37	40.7-45.7	533.6-528.6	38.0-56.0	536.3-528.3	Lower Till
NCR-2S	7/27/90	575.3	578.42	2.5-4.5	572.8-570.8	2.0-5.0	573.3-570.3	Silt
NCR-2I	7/25/90	575.5	578.84	19.4-24.4	556.1-551.1	17.4-24.6	558.1-550.9	Clay/Upper Till
NCR-2M	8/1/90	575.2	578.40	44.6-49.6	530.6-525.6	41.5-49.9	533.7-525.3	Lower Till
NCR-2D	8/2/90	575.4	577.39	52.3-68.3	523.1-507.1	NA	NA	Dolostone (Oak Orchard Formation)
NCR-3S	8/2/90	576.1	579.60	3.0-5.0	573.1-571.1	2.5-5.0	573.6-571.1	Silt
NCR-3M	8/2/90	576.1	579.22	37.0-42.0	539.1-534.1	34.0-43.0	542.1-533.1	Lower Till
NCR-4S	8/23/90	575.8	577.88	3.0-5.0	572.8-570.8	2.0-5.0	573.8-570.8	Silt
NCR-4M	8/22/90	575.9	577.97	53.0-58.0	522.9-517.9	50.0-58.1	525.9-517.8	Lower Till
NCR-5S	7/30/90	576.2	579.34	3.5-8.5	572.7-567.7	3.0-8.6	573.2-567.6	Silt
NCR-5M	7/30/90	576.4	577.93	44.5-49.5	531.9-526.9	41.5-50.0	534.9-526.4	Lower Till
NCR-5D	8/8/90	576.0	577.74	52.9-70.1	523.1-505.9	NA	NA	Dolostone (Oak Orchard Formation)
NCR-6M	8/16/90	575.4	578.69	49.0-54.0	526.4-521.4	46.0-54.0	529.4-521.4	Lower Till
NCR-6D	8/23/90	575.4	576.93	58.6-75.0	516.8-500.4	NA	NA	Dolostone (Oak Orchard Formation)
NCR-7M	8/6/90	574.0	577.19	43.5-48.5	530.5-525.5	40.0-49.0	534.0-525.0	Shale (Vernon Formation)
NCR-8M	8/16/90	579.8	582.56	38.0-43.0	541.8-536.8	36.0-43.5	543.8-536.3	Shale (Vernon Formation)
NCR-8D	8/20/90	579.4	581.70	55.0-70.6	524.4-508.8	NA	NA	Dolostone (Oak Orchard Formation)
NCR-9M	8/9/90	575.1	578.43	38.0-43.0	537.1-532.1	35.0-43.7	540.1-531.4	Shale (Vernon Formation)
NCR-10M	8/14/90	575.7	578.05	42.0-47.0	533.7-528.7	39.0-47.5	536.7-528.2	Lower Till/Sand
NCR-11M	9/11/90	572.6	575.58	14.0-19.0	558.6-553.6	12.0-19.2	560.6-553.4	Clay/Upper Till
NCR-11D	9/11/90	572.5	574.49	44.9-60.7	527.6-511.8	NA	NA	Dolostone (Oak Orchard Formation)
NCR-12D	8/31/90	583.9	586.05	61.0-76.0	522.9-507.9	NA	NA	Dolostone (Oak Orchard Formation)
NCR-13S	8/8/90	574.2	577.15	3.8-5.8	570.4-568.4	3.0-6.0	571.2-568.2	Silt

Notes:

All overburden and Shale (Vernon Formation) monitoring wells are of 2-inch diameter stainless steel construction with #10 slot screen and #4 sandpack. Oak Orchard Formation (Dolostone) wells are cased into competent rock using 4-inch diameter stainless steel casing. Monitored interval is 3-inch diameter corehole.

TABLE 4.5

STRATIGRAPHIC SUMMARY
NCR SITE
WHEATFIELD, NEW YORK TILL

							TILL					
	SILT			*CLAY*			*UPPER*			*LOWER*		
Well Location	*Depth (ft BGS)*	*Top Elevation (ft AMSL)*	*Thickness (ft)*	*Depth (ft BGS)*	*Top Elevation (ft AMSL)*	*Thickness (ft)*	*Depth (ft BGS)*	*Top Elevation (ft AMSL)*	*Thickness (ft)*	*Depth (ft BGS)*	*Top Elevation (ft AMSL)*	*Thickness (ft)*
NCR 1	0.0-3.0	574.3	3.0	3.0-15.0	571.3	12.0	15.0-22.5	559.3	7.5	22.5-46	551.8	23.5
NCR 2	0.0-5.3	575.2	5.3	5.3-24.3	569.9	19.0	-	-	-	24.3-50	550.9	25.7
NCR 3	0.0-4.3	576.1	4.3	4.3-24.0	571.8	19.7	24.0-28	552.1	4.0	28-49	548.1	21.0
NCR 4	0.0-3.0	575.9	3.0	3.0-21.0	572.9	18.0	21.0-35.0	554.9	14.0	35.0-58.1	540.9	23.1
NCR 5	0.0-8.0*	576.4	8.0	-	-	-	8.0-38.5	568.4	30.5	38.5-50	537.9	11.5
NCR 6	0.0-5.5	575.4	5.5	5.5-37.0	569.9	31.5	37.0-40.5	538.4	3.5	40.5-55	534.9	14.5
NCR 7	0.0-1.5	574.0	1.5	1.5-24.9	572.5	23.4	-	-	-	24.9-26	549.1	1.1
NCR 8	0.0-6.6	579.8	6.6	-	-	-	6.6-20.0	573.2	13.4	20.0-36	559.8	16.0
NCR 9	0.0-2.0	575.1	2.0	-	-	-	2.0-16.0	573.1	14.0	16-22	559.1	6.0
NCR 10	0.0-4.4	575.7	4.4	4.4-26.5	571.3	22.1	26.5-46.9	549.2	20.4	46.9-47.5	528.8	0.6
NCR 11	0.0-5.0	572.6	5.0	5.0-10.7	567.6	5.7	10.7-15.0	561.9	4.3	15-42.0	557.6	27.0
NCR 12**	-	-	-	-	-	-	21.5-38.9	562.4	17.4	38.9-57.0	545	18.1
NCR 13	0.0-3.5	574.2	3.5	3.5-6.0+	570.7	2.5+	-	-	-	-	-	-

Notes:

* Well located on berm of swale - surface is elevated above surrounding area.

** Well located on landfill cell. 0-21.5 ft BGS is refuse.

TABLE 4.5

STRATIGRAPHIC SUMMARY
NCR SITE
WHEATFIELD, NEW YORK TILL

	VERNON SHALE			*TOP OF OAK ORCHARD FORMATION*	
Well Location	*Depth (ft BGS)*	*Top Elevation (ft AMSL)*	*Thickness (ft)*	*Depth (ft BGS)*	*Top Elevation (ft AMSL)*
NCR 1	-	-	-	46.0	528.3
NCR 2	-	-	-	50.0	525.3
NCR 3	-	-	-	49.0	527.1
NCR 4	-	-	-	58.1	517.8
NCR 5	-	-	-	50.0	526.4
NCR 6	-	-	-	55.0	520.4
NCR 7	26.0-49.0	548.0	23.0	49.0	525.0
NCR 8	36.0-48.5	543.8	7.5	43.5	531.3
NCR 9	22.0-43.7	553.1	21.7	43.7	531.4
NCR 10	-	-	-	47.5	528.2
NCR 11	-	-	-	42.0	530.6
NCR 12**	-	-	-	57.0	526.9
NCR 13	-	-	-	-	-

Notes:

* Well located on berm of swale - surface is elevated above surrounding area.

** Well located on landfill cell. 0-21.5 ft BGS is refuse.

TABLE 4.6

GEOTECHNICAL SOIL TEST RESULTS
NCR SITE
WHEATFIELD, NEW YORK

	Sample Location (Depth ft. BGS)				
	NCR-2 *(0-4)*	*NCR-4* *(0-4)*	*NCR-5* *(0-4)*	*NCR-8, NCR-10* *(0-4)*	*NCR-13* *(0-4)*
Silt					
Grain Size (%)	0	0	0	0	0
• Gravel	40	30	23	11	30
• Sand	54	54	61	63	56
• Silt	6	16	16	26	14
• Clay					

	Sample Location (Depth ft. BGS)			
	NCR-2 *(6 - 8)*	*NCR-6* *(18 - 20)*	*NCR-7* *(14 -16)*	*NCR-10* *(12 - 14)*
Clay				
Average Moisture Content (%)	25.1	41.1	40.8	37.2
Atterberg Limits (%)				
• LL	45	44	41	47
• PL	24	22	22	24
• PI	21	22	19	23
Grain Size (%)				
• Gravel	0	0	0	0
• Sand	0.8	1.2	0.2	0.5
• Silt	14.2	9.8	12.8	11.5
• Clay	85.0	89.0	87.0	88.0
Organic Matter (%)	2.2	2.8	1.9	1.3
Bulk Density (g/cm3)	1.99	1.85	1.85	1.89
Porosity (%)	43.8	52.1	52.2	49.5
Hydraulic Conductivity @ 20°C (cm/sec)	1.4E-08	3.9E-08	4E-01	4.1E-08

Notes:

Samples used in silt analyses were taken from previously archived samples and tested by Glynn Geotechnical, Rochester, N.Y. on July 17, 1992.

To provide an acceptable volume for analyses silt samples from NCR-8 and NCR-10 were combined as the wells are in close proximity to each other.

TABLE 4.7

HYDRAULIC CONDUCTIVITY SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

Monitoring Well	*Hydraulic Conductivity (cm/sec)*			
	Falling Head Test	*Rising Head Test*	*Estimated*	*Average*
SHALLOW OVERBURDEN WELLS (SILTY SAND UNIT)				
NCR-2S	2.7×10^{-6}	--	--	2.7×10^{-6}
NCR-3S	--	2.8×10^{-5}	--	2.8×10^{-5}
NCR-4S	1.2×10^{-5}	--	--	1.2×10^{-5}
NCR-5S	--	2.8×10^{-6}	--	2.8×10^{-6}
NCR-13S	--	--	8.3×10^{-7}	8.3×10^{-7}
Geometric Mean				4.6×10^{-6}
INTERMEDIATE OVERBURDEN WELLS (LOWER CLAY/UPPER TILL UNIT)				
NCR-2I	1.4×10^{-6}	--	--	1.4×10^{-6}
NCR-11M	2.2×10^{-6}	--	--	2.2×10^{-6}
Geometric Mean				1.8×10^{-6}
DEEP OVERBURDEN WELLS (BASAL TILL UNIT)				
NCR-1M	--	2.7×10^{-3}	--	2.7×10^{-3}
NCR-2M	--	3.6×10^{-6}	--	3.6×10^{-6}
NCR-3M	--	1.8×10^{-5}	--	1.8×10^{-5}
NCR-4M	--	1.4×10^{-4}	--	1.4×10^{-4}
NCR-5M	--	4.2×10^{-4}	--	4.2×10^{-4}
NCR-6M	--	3.8×10^{-3}	--	3.8×10^{-3}
NCR-7M	--	7.0×10^{-3}	--	7.0×10^{-3}
NCR-8M	--	2.4×10^{-4}	--	2.4×10^{-4}
NCR-9M	--	2.7×10^{-3}	--	2.7×10^{-3}
NCR-10M	--	7.4×10^{-3}	--	7.4×10^{-3}
Geometric Mean				5.2×10^{-4}
BEDROCK WELLS (OAK ORCHARD DOLOSTONE)				
	Packer Test			
NCR-2D	4.2×10^{-4} to 1.4×10^{-3}			1.0×10^{-3}
NCR-5D	4.7×10^{-4} to 1.8×10^{-3}			1.3×10^{-3}
NCR-6D	2.7×10^{-4} to 6.8×10^{-4}			4.9×10^{-4}
NCR-8D	9.4×10^{-4} to 1.5×10^{-3}			1.3×10^{-3}
NCR-11D	1.3×10^{-3} to 1.9 to 10^{-3}			1.6×10^{-3}
NCR-12D	8.9×10^{-4} to 1.2×10^{-3}			1.1×10^{-3}
Geometric Mean				1.1×10^{-3}

TABLE 4.8

WATER LEVEL DATA
NCR SITE
WHEATFIELD, NEW YORK

Well	*TOC Elev.*	*Water Elevation (ft. AMSL)*				
Number	*(ft AMSL)*	*10/30/90*	*11/27/90*	*12/12/90*	*2/28/91*	*4/19/91*
NCR 1M	577.37	564.52	564.32	564.20	565.71	564.67
NCR 2S	578.42	Dry	573.32	574.57	574.02	575.07
NCR 2I	578.84	566.23	565.98	566.14	568.16	568.88
NCR 2M	578.40	564.58	564.60	564.80	565.49	565.37
NCR 2D	577.39	564.46	564.26	564.14	564.61	564.53
NCR 3S	579.60	574.97	575.60	575.33	575.51	575.30
NCR 3M	579.22	564.79	564.76	565.09	565.41	565.47
NCR 4S	577.88	571.43	573.67	574.10	574.67	574.61
NCR 4M	577.97	564.68	564.42	564.29	564.71	564.70
NCR 5S	579.34	571.89	572.96	574.04	574.22	573.56
NCR 5M	577.93	564.61	564.41	564.30	564.76	564.75
NCR 5D	577.74	564.56	564.34	564.15	564.61	564.64
NCR 6M	578.69	564.70	564.42	564.27	564.74	564.73
NCR 6D	576.93	564.71	564.43	564.30	564.71	564.71
NCR 7M	577.19	564.50	564.29	564.07	564.48	564.57
NCR 8M	582.56	564.79	564.49	564.27	564.76	564.74
NCR 8D	581.70	564.67	564.42	564.25	564.68	564.70
NCR 9M	578.43	564.50	564.28	564.08	564.49	564.58
NCR 10M	578.05	564.60	564.35	564.12	564.59	564.61
NCR 11M	575.58	564.85	564.64	564.48	565.13	565.31
NCR 11D	574.49	564.54	564.31	564.16	564.60	564.64
NCR 12D	586.05	564.42	563.20	564.05	564.52	564.52
NCR 13S	577.15	Dry	568.50	572.76	573.74	573.55
NUS5	576.00	564.72	564.45	564.39	564.75	564.75
NUS3	577.06	564.37	564.39	564.24	564.16	564.63
EAST-A	586.04	574.31	577.34	575.86	576.59	577.14
EAST-B	586.56	578.62	578.66	579.26	579.56	578.58
EAST-C	595.98	573.09	573.43	573.54	573.48	573.73
EAST-D	590.15	578.43	579.17	579.05	578.94	579.23
RIVER	566.12 (4)	564.66	564.38	564.26	564.71	564.66

Notes:

1) Well designation - S = shallow silty sand unit well
I = intermediate silt till well
M = sandy silt till well
D = bedrock well

2) TOC = Top of Casing

3) AMSL = Above mean sea level

4) River Water Point Elevation

TABLE 4.9

AMBIENT AIR SAMPLING SUMMARY - ROUND I
NCR SITE
WHEATFIELD, NEW YORK

Date	*Method*	*Sta. ID*	*Sample I.D.*	*Pump S/N (2)*	*Pre-Run Flow (cc/min.)*	*Post-Run Flow (cc/min.)*	*Avg. Flow Rate (cc/min.)*	*Sample Run Time (minutes)*	*Sample Volume (cubic meters)*	*Flow Rate (QA/QC) (percent variance)*	*Sample Volume (cubic meters)*
07/12/90	TO-2 Aromatics	NCR-S1	NCR-S1-2505m NCR-S1-2506b	A 05056 (4)	72.160	71.600	71.880	832	0.060	0.776	0.061
07/12/90	TO-2 Aromatics	NCR-UW1	NCR-UW1-2501m NCR-UW1-2502b	A 12662	70.180	64.230	67.205	1481	0.100	8.478	0.102
07/12/90	TO-2 Aromatics	NCR-DW1	NCR-DW1-2509m NCR-DW1-2510b	A 06437	71.800	67.340	69.570	1466	0.102	6.212	0.104
07/12/90	TO-2 Vinyl Chloride	NCR-S1	NCR-S1-2511m NCR-S1-2512b	A 08417	21.900	18.770	20.335	1512	0.031	14.292	0.031
07/12/90	TO-2 Vinyl Chloride	NCR-UW1	NCR-UW1-2507m NCR-UW1-2508b	A 04142 (2) A 05224	17.580 19.340	20.040 19.550	18.810 19.445	105 1095	0.002 0.021 0.023	-13.993 -1.086	0.002 0.022 0.024
07/12/90	TO-2 Vinyl Chloride	NCR-DW1	NCR-DW1-2504m NCR-DW1-2503b	A 11105	23.740	20.280	22.010	1467	0.032	14.575	0.033
07/12/90	TO-1 Chlorobenzene	NCR-S1	NCR-S1-2214a m NCR-S1-2216a b	A 11055	72.600	72.030	72.315	1520	0.110	0.785	0.112
07/12/90	TO-1-Chlorobenzene	NCR-UW1	NCR-UW1-2201a m NCR-UW1-2207a b	A 08416	70.630	64.110	67.370	1481	0.100	9.231	0.102
07/12/90	TO-1 Chlorobenzene	NCR-DW1	NCR-DW1-2219a m NCR-DW1-2220a b	A 05231	71.660	79.180	75.420	1467	0.111	-10.494	0.113
07/12/90	TO-8 Phenol	NCR-S1	NCR-S1-56m NCR-S1-128b	G 9422 (5)	45.170	54.970	50.070	1173	0.059	-21.696	0.060
07/12/90	TO-8 Phenol	NCR-UW1	NCR-UW1-76m NCR-UW1-126b	G 9423 (3)	44.800	24.010	34.405	1214	0.042	46.406	0.043
07/12/90	TO-8 Phenol	NCR-DW1	NCR-DW1-129m NCR-DW1-591b	G 9421	47.800	35.770	41.785	1461	0.061	25.167	0.062

Footnotes:

(1) A = Dupont Alpha 1, G = Gilian HFS 513 AUP
(2) Pump S/N 04142 failed due to low flow, replaced with pump S/N 05224 for remainder of run.
(3) Pump faulted due to low flow at 602 minutes into sampling, restarted, ran for 62 minutes due to flow fault, restarted, ran for 34 minutes, restarted, and ran for 511 minutes.
(4) Pump faulted after 832 minutes, not replaced.
(5) Pump faulted after 1169 minutes, twice restarted, ran for one minute each time, restarted third time, ran for additional minute, not restarted.

TABLE 4.10

AMBIENT AIR SAMPLING SUMMARY - ROUND II
NCR SITE
WHEATFIELD, NEW YORK

Date	*Method*	*Sta. I.D.*	*Sample I.D.*	*Pump S/N (1)*	*Pre-Run Flow (cc/min.)*	*Post-Run Flow (cc/min.)*	*Avg. Flow Rate (cc/min.)*	*Sample Run Time (minutes)*	*Sample Volume (cubic meters)*	*Flow Rate QA/QC (percent variance)*	*Corrected Sample Volume (cubic meters)*
07/19/90	TO-2 Aromatics	NCR-S2	NCR-S2-2705m NCR-S2-2713b	A 05056	71.990	64.840	68.415	1445	0.099	9.932	0.100
07/19/90	TO-2 Aromatics	NCR-S3 (S-2 Dup)	NCR-S3-2704m NCR-S3-2714b	A 12662	73.250	72.030	72.640	1446	0.105	1.666	0.106
07/19/90	TO-2 Aromatics	NCR-UW2	NCR-UW2-2715m NCR-UW2-2716b	A 05233	72.510	73.290	72.900	1487	0.108	-1.076	0.109
07/19/90	TO-2 Aromatics	NCR-DW2	NCR-DW2-2707m NCR-DW2-2708b	A 06437	74.670	71.830	73.250	1492	0.109	3.803	0.110
07/19/90	TO-2 Vinyl Chloride	NCR-S2	NCR-S2-2701m NCR-S2-2718b	A 04142	19.740	22.790	21.265	1445	0.031	-15.451	0.031
07/19/90	TO-2 Vinyl Chloride	NCR-S3 (S-2 Dup)	NCR-S3-2702m NCR-S3-2717b	A 11489	24.060	23.440	23.750	1446	0.034	2.577	0.035
07/19/90	TO-2 Vinyl Chloride	NCR-UW2	NCR-UW2-2711m NCR-UW2-2712b	A 08417	17.080	14.700	15.890	1487	0.024	13.934	0.024
07/19/90	TO-2 Vinyl Chloride	NCR-DW2	NCR-DW2-2719m NCR-DW2-2709b	A 11105	22.350	21.340	21.845	1492	0.033	4.519	0.033
07/19/90	T0-1 Chlorobenzene	NCR-S2	NCR-S2-2602m NCR-S2-2603b	A 05224 (2)	73.370	77.590	75.480	861	0.065	-5.752	0.066
07/19/90	TO-1 Chlorobenzene	NCR-S3 (S-2 Dup)	NCR-S3-2604m NCR-S3-2606b	A 05231	70.920	72.160	71.540	1446	0.103	-1.748	0.104
07/19/90	TO-1 Chlorobenzene	NCR-UW2	NCR-UW2-2609m NCR-UW2-2610b	A 11055	74.110	73.820	73.965	1488	0.110	0.391	0.111
07/19/90	TO-1 Chlorobenzene	NCR-DW2	NCR-DW2-2607m NCR-DW2-2608b	A 08416	70.960	70.390	70.675	1492	0.105	0.803	0.106
07/19/90	TO-8 Phenol	NCR-S2	NCR-S2-118m NCR-S2-128b	G 9422	37.210	39.830	38.520	1550	0.060	-7.041	0.060
07/19/90	TO-8 Phenol	NCR-S3 (S-2 Dup)	NCR-S3-129m NCR-S3-126b	A 08414	55.490	66.620	61.055	1448	0.088	-20.058	0.089
07/19/90	TO-8 Phenol	NCR-UW2	NCR-UW2-56m NCR-UW2-76b	A 11487	54.670	62.900	58.785	1488	0.087	-15.054	0.088
07/19/90	TO-8 Phenol	NCR-DW2	NCR-DW2-85m NCR-DW2-591b	G 9421	48.970	49.160	49.065	1472	0.072	-0.388	0.073

<u>Footnotes:</u>

(1) A = Dupont Alpha 1, G = Gilian HFS 513 AUP
(2) Pump failed after 861 minutes due to low battery.

TABLE 4.11

AMBIENT AIR QA/QC SAMPLING SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

Date	*Time*	*Blank I.D.*	*Method*
ROUND 1			
7/12/90	1339	NCR-S50-127 m	TO-8 phenol
7/12/90	1339	NCR-S50-2514	TO-2 aromatics
7/12/90	1339	NCR-S50-2520	TO-2 vinyl chloride
7/12/90	1339	NCR-S50-2211	TO-1 chlorobenzene
ROUND 2			
7/18/90	1425	NCR-S51-80 m	TO-8 phenol
7/18/90	1445	NCR-S51-2706 m	TO-2 aromatics
7/18/90	1445	NCR-S51-2720 m	TO-2 vinyl chloride
7/18/90	1445	NCR-S51-2619 m	TO-1 chlorobenzene

TABLE 4.12

SUBSURFACE SOIL SAMPLING SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

Sample Number	*Sample Depth*	*Sample Date*	*Sample Location*	*Comments*
NCR-1	1.0-3.0'	8/29/90	NCR-1M	
NCR-1	44.0-46.0'	8/29/90	NCR-1M	
NCR-2	2.0-3.0'	7/26/90	NCR-2M	
NCR-2	24.0-24.7'	7/26/90	NCR-2M	
NCR-3	4.0-6.0'	7/31/90	NCR-3M	
NCR-3	24.0-26.0'	7/31/90	NCR-3M	
NCR-4	55.0-57.0'	8/22/90	NCR-4M	
NCR-4	1.0-3.0'	8/23/90	NCR-4S	
NCR-5	5.4-7.0'	8/3/90	NCR-5M	
NCR-5	44.0-47.0'	8/7/90	NCR-5D	
NCR-6	2.0-6.0'	8/15/90	NCR-6M	
NCR-6	38.0-40.0'	8/17/90	NCR-6D	
NCR-7	0.0-2.0'	8/3/90	NCR-7M	
NCR-7	44.0-46.0'	8/6/90	NCR-7M	
NCR-8	0.0-2.0'	8/15/90	NCR-8M	
NCR-8	3.0-5.0'	8/15/90	NCR-8M	
NCR-9	2.0-6.0'	8/8/90	NCR-9M	
NCR-10	2.0-4.0'	8/10/90	NCR-10M	Duplicate Sample as NCR-21
NCR-10	26.0-28.0'	8/10/90	NCR-10M	
NCR-10	44.0-46.0'	8/14/90	NCR-10M	
NCR-11	0.0-3.2'	9/6/90	NCR-11M	
NCR-11	0.0-3.2'	9/12/90	NCR-11M	Repeat of 9/6/90 Sample with Duplicate Sample as NCR-23
NCR-12	22.0-26.0'	8/22/90	NCR-12D	
NCR-12	44.0-46.0'	8/23/90	NCR-12D	Duplicate Sample as NCR-12A
NCR-13	0.0-0.8'	8/8/90	NCR-13S	
NCR-13	2.5-3.5'	8/8/90	NCR-13S	
NCR-13	0.0-0.8'	8/8/91	NCR-13S(1)	
NCR-13	2.5-3.5'	8/8/91	NCR-13S(1)	

Note:

(1) Analyzed for TCL VOC only.

TABLE 4.13

SOIL BORING QA/QC SAMPLING SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

Sample Number	*Sample Date*	*Sample Location*	*Comments*
Rinse Blank 1	7/26/90	Split Spoon Samplers	
Rinse Blank 2	7/31/90	Split Spoon Samplers	
Potable Water	8/1/90	Empire Soils' Water Tank	
Rinse Blank 3	8/8/90	Split Spoon Samplers	
NCR-21	8/10/90	NCR-10M	Duplicate Sample 2.0-4.0'
Rinse Blank 4	8/10/90	Split Spoon Samplers	
Rinse Blank 5	8/16/90	Split Spoon Samplers	
Rinse Blank 6	8/21/90	Split Spoon Samplers	
DI Lot Blank	8/23/90	Reagent Grade Water	Baker Water Lot
NCR-12A	8/23/90	NCR-12D	Duplicate Sample 44.0'-46.0'
Rinse Blank 7	8/28/90	Split Spoon Samplers	
Rinse Blank 8	9/6/90	Split Spoon Samplers	
NCR-23	9/12/90	NCR-11M	Duplicate Sample -0.0-3.2'

TABLE 4.14

SEDIMENT SAMPLING (RESAMPLE) SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

Sample Number	*Sample Date*	*Sample Location*	*Comments*
SED-1R	11/27/90	Wet area NE of Site	
SED-2R	11/27/90	Wet are NW of Site	
SED-3R	11/27/90	West side swale	
SED-4R	11/27/90	E-W swale, west side	
SED-5R	11/27/90	North of Easternmost Cell	
SED-6R	11/27/90	West side swale	
SED-7R	11/27/90	E-W swale, west side	Duplicate as SED-20R
SED-8R	11/27/90	West side swale	
SED-9R	11/27/90	E-W swale, west side	
SED-10R	11/27/90	West side swale	
SED-11R	11/27/90	East side swale	Duplicate as SED-21R
SED-12R	11/27/90	East side swale	
SED-13R	11/28/90	East side swale	
SED-14R	11/27/90	Center N-S swale	
SED-15R	11/27/90	Center N-S swale	
SED-16R	11/27/90	Center N-S swale	
SED-17R	11/28/90	Center N-S swale	
SED-18R	11/28/90	30" pipe south of River Rd.	

TABLE 4.15

QA/QC SAMPLING (RESAMPLE) SUMMARY
FOR SEDIMENT, HAND AUGER, SEEP AND SURFACE WATER SAMPLES
NCR SITE
WHEATFIELD, NEW YORK

Sample Number	*Sample Date*	*Sample Location/Comments*
Seep-32R	11/26/90	Duplicate of Seep-5R
Trip Blank	11/26/90	VOCs - Seeps
Seep-16R	11/26/90	Additional Volume for MS/MSD
SED-20R	11/27/90	Duplicate of SED-7R
Rinse Blank 1	11/27/90	Sampling Equipment for Sediments
SED-21R	11/27/90	Duplicate of SED-11R
Rinse Blank 2	11/27/90	Sampling Equipment for Sediments
Trip Blank	11/27/90	VOCs - Seeps
SW-21R	11/28/90	Duplicate of SW-11R
Trip Blank	11/28/90	VOCs Surface Water
SW-5R	11/28/90	Additional Volume for MS/MSD
Trip Blank	11/29/90	VOCs - Surface Water
Rinse Blank	12/3/90	Hand Auger Sampling Equipment
HA-20	12/3/90	Duplicate of HA-9
HA-14	12/3/90	Additional volume for MS/MSD

TABLE 4.16

SURFACE WATER (RESAMPLE) SAMPLING SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

Sample Number	*Sample Date*	*pH*	*Conductivity (umho/cm)*	*Temperature (°C)*	*Sulfides Present?*	*Oxidizers Present?*	*Comments*
SW-1R	11/28/90	7.70	1,180	11.5	N	N	
SW-4R	11/28/90	7.43	1,640	10.8	N	N	
SW-5R	11/28/90	7.46	1,500	13.7	N	N	MS/MSD Sample Collected
SW-11R	11/28/90	7.80	3,480	–	N	N	Duplicate as SW-21R
SW-13R	11/28/90	7.32	1,000	12.3	N	N	
SW-18R	11/28/90	6.70	900	13.5	N	N	
SW-2R	11/29/90	7.06	1,640	3.5	N	N	
SW-7R	11/29/90	7.74	2,620	3.3	N	N	
SW-8R	11/29/90	7.43	1,710	4.3	N	N	
SW-10R	11/29/90	7.15	920	4.4	N	N	

SW3 and SW17 Dry on 11/29/90 - Not Sampled

TABLE 4.17

LEACHATE SEEP (RESAMPLE) SAMPLING SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

Sample Number	*Sample Date*	*Oxidizers Present (Y/N)*	*Sulfides Present (Y/N)*	*Comments*
Seep 1-R	11/26/90	N	N	Effervesces on Addition of Acids
Seep 3-R	11/26/90	N	N	Effervesces on Addition of Acids
Seep 5-R	11/26/90	N	N	Duplicate Taken as Seep 32R Effervesces on Addition of Acids
Seep 7-R	11/26/90	N	N	Effervesces on Addition of Acids
Seep 10-R	11/27/90	N	N	Effervesces on Addition of Acids
Seep 13-R	11/26/90	N	N	Effervesces on Addition of Acids
Seep 14-R	11/26/90	N	N	Effervesces on Addition of Acids
Seep 16-R	11/26/90	N	N	MS/MSD Sample Taken Effervesces on Addition of Acids
Seep 21-R	11/26/90	N	N	Effervesces on Addition of Acids

TABLE 4.18

HAND AUGER SAMPLING SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

Sample Number	*Date Collected*	*Date Sampled*	*HNu Reading**		*Comments*
			Headspace	*Soils Directly*	
HA-1	11/30/90	-	75	-	
HA-2	11/30/90	-	80	-	
HA-3	11/30/90	12/3/90	128	-	
HA-4	11/30/90	-	88	-	
HA-5	11/30/90	-	114	-	
HA-6	11/30/90	-	20	-	
HA-7	11/30/90	-	162	-	
HA-8	11/30/90	12/3/90	182	-	
HA-9	11/30/90	12/3/90	200*	-	Odor Noted - Duplicate Collected as HA-20
HA-10	11/30/90	-	-	-	
HA-11	12/3/90	-	-	0.6	
HA-12	12/3/90	-	-	1.2	
HA-13	12/3/90	12/3/90	-	1.4	
HA-14	12/3/90	12/3/90	-	1.4	shallow; 1.0 deep
HA-15	12/3/90	-	-	1.2	
HA-16	12/3/90	-	-	1.4	
HA-17	12/3/90	-	-	1.0	

Note:

* HNU readings of headspace in the soil record sample container after sample collection. HNU readings of the soil directly screened the soil during collection of the soil samples in the field.

TABLE 4.19

ROUND I GROUNDWATER (RESAMPLE) SAMPLING SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

Sample Number	Sample Date	Sampling Method	*Field Parameters*					Analytical Parameters
			pH	Specific Conductance (umho/cm)	Temperature (°C)	Sulfides Present?	Oxidizers Present?	
NCR-2S-I*	3/14/91	Bailer	6.66	920	4.5	N	N	All Except Metals Samples
NCR-2I-I	3/14/91	Bailer	7.69	1,110	8.0	N	N	
NCR-2M-I	3/14/91	Bladder Pump	8.23	920	--	N	N	
NCR-2D-I	3/14/91	Bladder Pump	7.77	2,450	7.96	N	N	
NCR-2S-I*	3/15/91	Bailer	--	--	--	--	--	Total and Soluble Metals Only
NCR-5M-I	3/15/91	Bladder Pump	7.55	870	10.0	N	N	
NCR-5D-I	3/15/91	Bladder Pump	7.69	2,430	9.9	N	N	
NCR-5S-I*	3/15/91	Bailer	7.49	780	6.2	N	N	VOCS and CN Only
NCR-3S-I	3/18/91	Bailer	7.12	1,910	3.8	N	N	
NCR-3M-I	3/18/91	Bailer	7.34	530	8.5	N	N	
NCR-5S-I*	3/18/91	Bailer	7.54	694	5.1	N	N	Metals, Pesticides and PCB's
NCR-7M-I	3/19/91	Bladder Pump	6.60	1,940	8.9	N	N	Duplicate as NCR 20M-I
NCR-9M-I	3/19/91	Bladder Pump	6.87	2,090	10.1	N	N	
NCR-10M-I	3/19/91	Bladder Pump	7.03	1,900	9.8	N	N	
NCR-13S-I*	3/20/91	Bailer	6.75	1,210	--	N	N	All Except Pesticides and PCBs
NCR-8M-I	3/20/91	Bladder Pump	7.85	590	10.5	N	N	
NCR-1M-I	3/20/91	Bailer	7.78	730	8.8	N	N	
NCR-8D-I	3/20/91	Bladder Pump	7.60	2,430	901	N	N	
NCR-3S-I	3/20/91	Bailer	--	--	--	--	--	1 x 1l CN to Replace Sample Broken in Transit
NCR-5S-I	3/20/91	Bailer	--	--	--	--	--	2 x 1l Semi-vol. to Replace Samples Broken in Transit
NCR-6M-I	3/21/91	Bladder Pump	7.81	2,090	11.4	N	N	
NCR-13S-I	* 3/21/91	Bailer	--	--	--	--	--	Pesticides and PCB Only
NCR-4S-I	* 3/21/91	Bailer	7.20	660	5.0	N	N	VOCs, BNAs Only
NCR-6D-I	3/22/91	Bladder Pump	6.5	5,210	8.0	Y	N	MS/MSD Taken; Sulfides Corrected with CdCO3
NCR-11M-I	3/22/91	Bladder Pump	7.36	1,760	9.1	N	N	
NCR-11D-I	3/22/91	Bladder Pump	6.90	2,830	10.1	N	N	Duplicate as NCR-21D-I
NCR-4S-I	* 3/22/91	Bailer	6.67	900	2.9	--	--	Pesticides/PCB and Total Metals
NCR-12D-I	3/25/91	Bladder Pump	7.21	2,380	9.7	N	N	Duplicate as NCR-22D-I
NCR-4M-I	3/25/91	Bladder Pump	8.42	1,420	8.3	N	N	MS/MSD Taken
NCR-4S-I	* 3/25/91	Bailer	6.70	770	3.6	N	N	CN and Filtered Metals (Samples Broken - Not Shipped)
NCR-4S-I	3/26/91	Bailer	7.02	650	4.5	N	N	CN and Filtered Metals (Replace Broken Samples)

* Denotes Partial Sample Set

TABLE 4.20

ROUND II GROUNDWATER SAMPLING SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

			Field Parameters					
Sample Number	*Sample Date*	*Sampling Method*	*pH*	*Specific Conductance (umho/cm)*	*Temperature (°C)*	*Sulfides Present?*	*Oxidizers Present?*	*Analytical Parameters*
NCR-2S-II*	4/23/91	Bailer	7.78	530	5.5	N	N	All except metals
NCR-2I-II	4/23/91	Bailer	7.73	610	14.7	N	N	
NCR-2M-II	4/23/91	Bladder Pump	8.08	520	-	N	N	
NCR-2D-II	4/23/91	Bladder Pump	7.74	1410	9.5	N	N	
NCR-3S-II	4/23/91	Bailer	7.42	2700	6.8	N	N	
NCR-3M-II	4/23/91	Bailer	8.25	410	-	N	N	
NCR-5M-II	4/23/91	Bladder Pump	7.59	490	10.3	N	N	
NCR-2S-II*	4/24/91	Bailer	-	-	-	-	-	Soluble and total metals
NCR-5S-II	4/24/91	Bailer	7.54	580	7.4	N	N	
NCR-5D-II	4/24/91	Bladder Pump	6.66	1690	7.2	N	N	MS/MSD collected
NCR-7M-II	4/24/91	Bladder Pump	6.65	1460	9.4	N	N	Duplicate as NCR 20-II
NCR-13S-II*	4/24/91	Bailer	7.19	990	7.3	N	N	VOCs and BNAs
NCR-9M-II	4/25/91	Bladder Pump	7.26	1420	9.0	N	N	
NCR-13S-II*	4/25/91	Bailer	7.31	970	-	N	N	Pesticide/PCB, CN, Metals
NCR-10M-II	4/25/91	Bladder Pump	7.13	-	12.4	N	N	
NCR-8M-II	4/25/91	Bladder Pump	7.56	450	-	N	N	Duplicate as NCR-21M-II
NCR-8D-II	4/26/91	Bladder Pump	7.95	1750	11.2	N	N	
NCR-6M-II	4/26/91	Bladder Pump	8.00	1440	11.5	N	N	MS/MSD Collected
NCR-6D-II	4/26/91	Bladder Pump	7.99	2800	11.9	Y	N	Sulfide corrected with CdCO3
NCR-4S-II*	4/29/91	Bailer	7.68	590	-	N	N	VOCs and BNAs
NCR-4M-II	4/29/91	Bladder Pump	8.75	1190	-	N	N	
NCR-1M-II	4/29/91	Bailer	7.50	690	8.9	N	N	
NCR-11M-II	4/30/91	Bailer	7.88	1650	10.3	N	N	
NCR-12D-II	4/30/91	Bladder Pump	8.02	2060	12.5	N	N	Duplicate as NCR-22D-II
NCR-4S-II*	4/30/91	Bailer	7.27	640	10.5	N	N	Pesticide/PCB, CN, Soluble Metals
NCR-4S-II*	5/1/91	Bailer	6.56	700	8.4	N	N	Total Metals
NCR-11D-II	5/1/91	Bladder Pump	7.08	2400	10.9	N	N	
NCR-4S-II*	5/2/91	Bailer	7.19	570	8.7	-	-	Resample all metals

*Denotes partial sample collected.

TABLE 4.21

ROUND I GROUNDWATER QA/QC (RESAMPLE) SAMPLING SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

Sample Number	*Sample Date*	*Sampling Location*	*Comments*
Rinse Blank	3/13/91	Bailers	–
Trip Blank	3/14/91	–	VOCs
Trip Blank	3/15/91	–	VOCs
Trip Blank	3/18/91	–	VOCs
Rinse Blank	3/19/91	Bladder Pumps	–
Trip Blank	3/19/91	–	VOCs
NCR-20M-I	3/19/91	NCR-7M	Duplicate Sample
Trip Blank	3/20/91	–	VOCs
Trip Blank	3/21/91	–	VOCs
NCR-6D-I (MS)	3/22/91	NCR-6D	MS Sample
NCR-6D-I (MSD)	3/22/91	NCR-6D	MSD Sample
NCR-21D-I	3/22/91	NCR-11D	Duplicate Sample
Trip Blank	3/22/91	–	2 x 20 mL VOCs Only
NCR-4M-I (MS)	3/25/91	NCR-4M	MS Sample
NCR-4M-I (MSD)	3/25/91	NCR-4M	MSD Sample
NCR-22D-I	3/25/91	NCR-12D	Duplicate Sample
Trip Blank	3/25/91	–	2 x 40 mL VOCs Only
Rinse Blank	3/26/91	Bailers	No Trip Blank Sent

TABLE 4.22

ROUND II GROUNDWATER QA/QC SAMPLING SUMMARY
NCR SITE
WHEATFIELD, NEW YORK

Sample Number	*Sample Date*	*Sampling Location*	*Comments*
Trip Blank	4/23/91	–	Lab water - VOCs
NCR-20M-II	4/24/91	NCR-7M	Duplicate Sample
NCR-5D-II	4/24/91	NCR-5D	MS/MSD
Trip Blank	4/24/91	–	Lab water - VOCs
Rinse Blank	4/24/91	Bailer	–
Rinse Blank	4/25/91	Bladder Pump	–
NCR-21M-II	4/25/91	NCR-8M	Duplicate Sample
Trip Blank	4/25/91	–	Lab water - VOCs
Trip Blank	4/26/91	–	Lab water - VOCs
NCR-6M-II	4/26/91	NCR-6M	MS/MSD
Rinse Blank	4/29/91	Bladder Pump	–
Trip Blank	4/30/91	–	Lab water - VOCs
NCR-22D-II	4/30/91	NCR-12D	Duplicate Sample
Trip Blank	5/1/91	–	Lab water - VOCs

TABLE 6.1

SUMMARY OF AMBIENT AIR MONITIORING DATA
ROUND I
NCR SITE, WHEATFIELD, NEW YORK

	Seep 5					
Parameter	***Up Wind Conc. (ug/m^3)***	***Over Seep Conc. (ug/m^3)***	***Down Wind Conc. (ug/m^3)***	***Acceptable Ambient Level (1) (ug/m^3)***	***Seep 5 Conc.(3) (µg/L)***	***New York State Surface Water Maximum Contaminant Level (MCLs) (2) (ug/L)***
Benzene	0.4 J	0.6 J	N/A	100	ND (5)	0.7 (G)
Chlorobenzene	ND (0.005 R)	ND (0.005 R)	ND (0.004 R)	1,167	ND (5)	20
Methylene chloride	1.9 J	0.5 J	N/A	16.7	5 U	5 (G)
Toluene	0.004 J	0.4 J	N/A	7,500	2J	5 (G)
Vinyl chloride	ND (0.1 R)	ND (0.1 R)	ND (0.1 R)	0.4	ND (10)	0.3 (G)
Phenol	ND (230 UJ)	ND (170 UJ)	ND (160 UJ)	1,000	10	1

Notes:

G	- guidance value
ND	- non-detected at provided detection limit
J	- estimated value
UJ	- estimated detection limit
R	- unusable data
N/A	- not able to be analyzed
U	- The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
(1)	- Acceptable ambient levels as referenced from "New York State Air Guidelines for the Control of Toxic Ambient Air Contaminants", 1985-1986 Edition.
(2)	- New York State ambient water standards and guidance values, September 1990.
(3)	- from Table 2.15.

TABLE 6.2

SUMMARY OF AMBIENT AIR MONITIORING DATA
ROUND II
NCR SITE, WHEATFIELD, NEW YORK

Parameter	*Seep 16* *Up Wind Conc. (ug/m³)*	*Seep 16* *Over Seep Conc. (ug/m³)*	*Seep 16* *Down Wind Conc. (ug/m³)*	*Acceptable Ambient Level(1) (ug/m³)*	*Seep 16 Conc.(3) (ug/L)*	*New York State Surface Water Maximum Contaminant Levels (MCLs)(2) (ug/L)*
Benzene	ND (0.04 R)	ND (0.05 R)	ND (0.04 R)	100	50	0.7 (G)
Chlorobenzene	ND (0.004 R)	ND (0.007 UJ)	ND (0.005 UJ)	1,167	56	20
Methylene chloride	ND (0.02 R)	ND (0.03 R)	ND (0.04 R)/0.13 J*	16.7	25 U	5 (G)
Toluene	ND (0.04 R)	ND (0.04 R)	ND (0.04 R)/0.3 J*	7,500	350	5 (G)
Vinyl chloride	ND (0.1 R)	ND (0.1)	ND (0.1 UJ)	0.4	ND (50)	0.3 (G)
Phenol	ND (115)	ND (110)	ND (140)	10	45	1

Notes:

G - guidance value
ND - non-detected at provided detection limit
J - estimated value
UJ - estimated detection limit
R - unusable data
N/A - not able to be analyzed
* - main tube showed non-detected results, while back-up tube showed detections of methylene chloride and toluene.
U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
(1) - Acceptable ambient levels as referenced from "New York State Air Guidelines for the Control of Toxic Ambient Air Contaminants", 1985-1986 Edition.
(2) - New York State ambient water standards and guidance values, September 1990.
(3) - from Table 2.15.

TABLE 6.3

SUMMARY OF DETECTED SUB-SURFACE SOIL PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR 1*	*NCR 1*	*NCR 2*	*NCR 2*	*NCR 3M*	*NCR 3M*	*NCR 4*	*NCR 4*	*NCR 5*	*NCR 5*	*NCR 6*
SAMPLE DEPTH:	*1.0'-3.0'*	*44.0'-46.0'*	*2.0'-3.0'*	*24.0'-24.7'*	*4.0'-6.0'*	*24.0'-26.0'*	*1.0'-3.0'*	*55.0'-57.0'*	*5.4'-7.0'*	*44.0'-47.0'*	*2.0'-6.0'*
SAMPLE DATE:	*8/29/90*	*8/29/90*	*7/26/90*	*7/26/90*	*7/31/90*	*7/31/90*	*8/23/90*	*8/22/90*	*8/3/90*	*8/7/90*	*8/15/90*
CLP VOLATILES, ug/kg											
Acetone	ND11 UJ	ND11 UJ	ND11 UJ	ND11	ND12	ND11	ND11	50 J	ND12	ND12	ND11
1,2-Dichloroethene (total)	ND5.6 UJ	ND5.5 UJ	ND5.4 UJ	ND5.4	ND6.2	ND5.7	ND5.7	ND5.4 UJ	ND5.8	390 JQ	160 J
Ethylbenzene	ND5.6 UJ	ND5.5 UJ	ND5.4 UJ	ND5.4	ND6.2	ND5.7	ND5.7	ND5.4	ND5.8	65 Q	ND5.6
Methylene chloride	ND5.6 UJ	ND5.5 UJ	3.5 J	49	ND6.2	ND5.7	ND5.7 UJ	20	ND5.8	ND5.8	5.7 J
Styrene	ND5.6 UJ	ND5.5 UJ	ND5.4 UJ	ND5.4	ND6.2	ND5.7	ND5.7	ND5.4	ND5.8	39 JQ	ND5.6
Toluene	ND5.6 UJ	ND5.5 UJ	ND5.4 UJ	ND5.4	ND6.2	ND5.7	ND5.7	ND5.4	ND5.8	3.6 JQ	ND5.6
Total xylenes	ND5.6 UJ	ND5.5 UJ	ND5.4 UJ	ND5.4	ND6.2	ND5.7	ND5.7	ND5.4	ND5.8	ND5.8	ND5.6
1,1,1-Trichloroethane	ND5.6 UJ	ND5.5 UJ	ND5.4 UJ	ND5.4	ND6.2	ND5.7	ND5.7	ND5.4	ND5.8	ND5.8	5.6
Trichloroethene	ND5.6 UJ	ND5.5 UJ	ND5.4 UJ	24	ND6.2	ND5.7	ND5.7 UJ	ND5.4	ND5.8	ND5.8	15 J
Vinyl chloride	ND11 UJ	ND11 UJ	ND11 UJ	ND11	ND12	ND11	ND11	ND11	ND12	190 Q	ND11
CLP SEMI-VOLATILES, ug/kg											
Benzoic acid	ND1800	ND1800	ND1700	ND1700	ND2100	ND1800	ND1900 R	ND1800UJ	ND1900	ND1900 UJ	ND1800
Butylbenzylphthalate	ND370	ND370	ND350	ND340	ND420	ND370	ND380 UJ	1200	ND380	ND380	ND370
bis(2-Ethylhexyl)phthalate	ND370UJ	ND370UJ	ND350	ND340	ND420	ND370	ND380 UJ	1400 N	ND380	ND380	ND370
Phenol	ND370	ND370	ND350	ND340	ND420	ND370	ND380 UJ	ND360	ND380	ND380	ND370
PESTICIDES/PCB's, ug/kg											
Aroclor-1254	ND230	ND230	ND230	ND220	ND260	ND240 UJ	ND240	ND230	ND240	ND250UJ	ND240
alpha-BHC	ND12	ND12	ND11	ND11	ND13	ND12 UJ	ND12	ND12	ND12	ND12UJ	ND12
Heptachlor epoxide	ND12	ND12	ND11	ND11	ND13	ND12 UJ	ND12	ND12	0.58 J	ND12UJ	ND12

NOTES:

ND - None detected at provided sample quantitation limits.

J - The associated numerical number is an estimated quantity.

UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.

U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

R - Unusable data.

N - Presumptive evidence of presence of material.

Q - Data considered suspect, resampling and reanalyses of samples from NCR-13 did not confirm the presence of these compounds.

< - Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.3

SUMMARY OF DETECTED SUB-SURFACE SOIL PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR 1*	*NCR 1*	*NCR 2*	*NCR 2*	*NCR 3M*	*NCR 3M*	*NCR 4*	*NCR 4*	*NCR 5*	*NCR 5*	*NCR 6*
INTERVAL:	*1.0'-3.0'*	*44.0'-46.0'*	*2.0'-3.0'*	*24.0'-24.7'*	*4.0'-6.0'*	*24.0'-26.0'*	*1.0'-3.0'*	*55.0'-57.0'*	*5.4'-7.0'*	*44.0'-47.0'*	*2.0'-6.0'*
SAMPLE DATE:	*8/29/90*	*8/29/90*	*7/26/90*	*7/26/90*	*7/31/90*	*7/31/90*	*8/23/90*	*8/22/90*	*8/3/90*	*8/7/90*	*8/15/90*
METALS, mg/kg											
Aluminum	10000	4200	13000	7200	25000	11000	9500	3800	6600	2300	2600 R
Antimony	ND6.8	13	ND7.8	14	ND9.5	ND5.5	ND10	ND7.9 UJ	13	ND6.5	ND7.2
Barium	45	280	48	55	160	77	42	55 J	52	36	12 J
Beryllium	0.38	ND.16	ND.16	0.24	0.96	0.39	0.34	ND.16	0.24	ND.13	ND.14
Cadmium	ND.34	ND.41	ND.39	ND.34	ND.48	ND.28	ND.52	ND.40	ND.34	ND.32	ND.36
Calcium	3800 J	97000 J	10000	92000	90000	52000	17000 J	54000 J	89000	65000	27000
Chromium	13	5.9	16	8.4	30	13	13	6	8.9	3.5	4
Cobalt	5.1 J	2.6	6.6	3.6	15	6.1	5.9 J	2.3 J	3.4	1.5	2.1
Copper	< 8.8	< 8.3	8.8	16	21	14	< 8.6	< 8.1	12	4.7	4
Iron	11000	6800	15000	10000	31000	16000	16000	7200 J	9600	5200	4500 R
Magnesium	3200 J	48000 J	4800	40000	13000	18000	6100	16000	39000	28000	12000 R
Manganese	63	370 J	190	530	1300	510	240 J	460 J	520	290	160 R
Nickel	12	5.9	14 J	8.3	30	14	13	7.8	8	3.5	2.6
Potassium	800	1300	1500	2300	6000	3100	840	980 J	2100	660	470
Sodium	< 89	< 220	240	320	< 920	330	190	250	300	250	< 120
Vanadium	19	8.1	24	14	36	17	18 J	8.3	13	7.4	6.3
Zinc	40	39	43 J	120	68	52	36 J	30 J	96	36	25 J
Arsenic	2.7	1.8	14	13	26	11	11 J	5.3 J	7.8	4.2	6
Lead	< 22	< 4.9	8.7	12	11	14	8.6	7.2	13	6.4	6.3
Moisture (%)	8.7	8.1	16	9.7	20	7.9	13	6	9	12	12

NOTES:

ND - None detected at provided sample quantitation limits.
J - The associated numerical number is an estimated quantity.
UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
< - Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.3

SUMMARY OF DETECTED SUB-SURFACE SOIL PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR 6*	*NCR 7*	*NCR 7*	*NCR 8*	*NCR 8*	*NCR 9M*	*NCR 10*	*NCR10-DUP*	*NCR 10*	*NCR 10*	*NCR 11*
SAMPLE DEPTH:	*38.0'-40.0'*	*0-2.0'*	*44.0'-46.0'*	*0-2.0'*	*3.0'-5.0'*	*2.0'-6.0'*	*2.0'-4.0'*	*2.0'-4.0'*	*26.0'-28.0'*	*44.0'-46.0'*	*0-3.2'*
SAMPLE DATE:	*8/17/90*	*8/3/90*	*8/6/90*	*8/15/90*	*8/15/90*	*8/8/90*	*8/10/90*	*8/10/90*	*8/10/90*	*8/14/90*	*9/6/90*
CLP VOLATILES, ug/kg											
Acetone	ND11 UJ	ND10	ND12	ND12	ND12	ND11	ND12	ND13	ND12	ND12	ND13
1,2-Dichloroethene (total)	ND5.5 UJ	ND5.2	ND5.9	ND6.0UJ	ND6.0 UJ	320J	ND6.1 UJ	ND6.4 UJ	ND5.8 UJ	ND5.8 UJ	ND6.4
Ethylbenzene	ND5.5	ND5.2	ND5.9	ND6.0	ND6.0	ND5.6	ND6.1	ND6.4	ND5.8	ND5.8	ND6.4
Methylene chloride	ND5.5UJ	ND5.2	ND5.9	ND6.0	ND6.0	ND5.6	8.2	ND6.4	ND5.8	ND5.8	ND6.4
Styrene	ND5.5 UJ	ND5.2	ND5.9	ND6.0	ND6.0	ND5.6	ND6.1	ND6.4	ND5.8	ND5.8	ND6.4
Toluene	ND5.5	ND5.2	ND5.9	ND6.0	ND6.0	ND5.6	ND6.1	ND6.4	ND5.8	ND5.8	ND6.4
Total xylenes	ND5.5	ND5.2	ND5.9	ND6.0	ND6.0	ND5.6	ND6.1	ND6.4	ND5.8	ND5.8	ND6.4
1,1,1-Trichloroethane	ND5.5	ND5.2	ND5.9	6.1	6.1	ND5.6	5.7 J	ND6.4	ND5.8	ND5.8	ND6.4
Trichloroethene	ND5.5 UJ	ND5.2	ND5.9	20 J	ND6.0	15J	14 J	14 J	14 J	ND5.8	ND6.4
Vinyl chloride	ND11	ND10	ND12	ND12	ND12	ND11	ND12	ND13	ND12	ND12	ND13
CLP SEMI-VOLATILES, ug/kg											
Benzoic acid	ND1800	ND1700	ND1900	ND2000	ND1800	ND1900 R	ND2000	ND2100	ND1900	ND1900 R	ND2100
Butylbenzylphthalate	1200	ND340	ND370	ND390	ND370	ND370 R	ND400	ND420	ND380	ND380 R	ND420
bis(2-Ethylhexyl)phthalate	ND360	ND340	ND370	ND390	ND370	ND370 R	ND400	ND420	1500	ND380 R	ND420
Phenol	ND360	ND340	ND370	ND390	ND370	ND370 R	ND400	ND420	ND380	ND380 R	ND420
PESTICIDES/PCB's, ug/kg											
Aroclor-1254	ND230 UJ	ND200	ND200	ND210	ND240	ND230 R	ND260	ND260	ND240	ND240	ND270
alpha-BHC	ND12 UJ	ND10	ND9.8	ND11	ND12	0.26 J	ND13	ND13	ND12	ND12	ND14
Heptachlor epoxide	ND12 UJ	ND10	ND9.8	ND11	ND12	ND12 R	ND13	ND13	ND12	ND12	ND14

NOTES:

ND - None detected at provided sample quantitation limits.
J - The associated numerical number is an estimated quantity.
UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
< - Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.3

SUMMARY OF DETECTED SUB-SURFACE SOIL PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR 6*	*NCR 7*	*NCR 7*	*NCR 8*	*NCR 8*	*NCR 9M*	*NCR 10*	*NCR10-DUP*	*NCR 10*	*NCR 10*	*NCR 11*
INTERVAL:	*38.0'-40.0'*	*0-2.0'*	*44.0'-46.0'*	*0-2.0'*	*3.0'-5.0'*	*2.0'-6.0'*	*2.0'-4.0'*	*2.0'-4.0'*	*26.0'-28.0'*	*44.0'-46.0'*	*0-3.2'*
SAMPLE DATE:	*8/17/90*	*8/3/90*	*8/6/90*	*8/15/90*	*8/15/90*	*8/8/90*	*8/10/90*	*8/10/90*	*8/10/90*	*8/14/90*	*9/6/90*
METALS, mg/kg											
Aluminum	6000	12000	6400	26000	5000	8900	23000	15000	9500	8700	14000
Antimony	ND6.8 UJ	ND9.5	20	ND11	ND5.9	ND8.3 UJ	8.6	ND10	ND6.0	ND8.2	ND10
Barium	59 J	55	33	130	34	70	100	93	70	84	100
Beryllium	0.26	0.52	0.22	1.1	0.2	0.23	0.87	0.59	0.35	0.4	0.68
Cadmium	ND.34	ND.48	ND.32	ND.54	ND.30	ND.42	ND.34	ND.51	ND.30	ND.41	ND.52
Calcium	67000	25000	150000	40000	51000	82000	25000	30000	75000	68000	3500 J
Chromium	7.2 J	14	5.7	31	6.3	9.7	27	20	11	12	19
Cobalt	4.4 J	7.1	2	14	3.6	3.5	11	8.7	5.4	5.7	6.9
Copper	7.2	8	4.3	16	8.9	11	18	17	11	11	19
Iron	9200	15000	6700	31000	8700	11000	25000	22000	13000	12000	17000
Magnesium	28000	10000	93000	14000	37000	27000	12000	8300	29000	28000	3200J
Manganese	420	330	220	360	590	490	580	1100	480	410	100
Nickel	7 J	16	5.6	26	6.6	8.2	26	23	11	10	20
Potassium	1900	1700	3600	6300	1400	2500	5500	3000	2900	2800	1300
Sodium	< 210	690	350	< 160	< 210	360	350	320	360	< 240	ND100
Vanadium	12	22	9.4	37	10	16	34	25	16	17	17 J
Zinc	96 R	42	5.4	72	88	61	60	56	72	60	100 J
Arsenic	6.9	14	8.8	23	9.3	13 J	20	13	10	8.8	28
Lead	11	9.4	10	14	14	12	14	9.2	8.5	7.9	130 J
Moisture (%)	8.1	11	16	19	7.5	12	21	21	11	14	20

NOTES:

ND - None detected at provided sample quantitation limits.
J - The associated numerical number is an estimated quantity.
UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
< - Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.3

SUMMARY OF DETECTED SUB-SURFACE SOIL PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	***NCR 11***	***NCR11-DUP***	***NCR 12***	***NCR 12***	***NCR12-DUP***	***NCR 13***	***NCR 13***
SAMPLE DEPTH:	***0-3.2'***	***0-3.2'***	***22.0'-26.0'***	***44.0'-46.0'***	***44.0'-46.0'***	***0-0.8'***	***2.5'-3.5'***
SAMPLE DATE:	***9/12/90***	***9/12/90***	***8/22/90***	***8/23/90***	***8/23/90***	***8/8/90***	***8/8/90***
CLP VOLATILES, ug/kg							
Acetone	ND13	ND13	98 J	ND11 UJ	ND11 UJ	18 JQ	ND12[ND11]
1,2-Dichloroethene (total)	ND6.6 UJ	ND6.4 UJ	ND5.4 UJ	ND5.4 UJ	ND5.4 UJ	440 JQ[ND19]	ND6.0[ND6.0]
Ethylbenzene	ND6.6	ND6.4	5 J	ND5.4 UJ	ND5.4 UJ	ND6.2[ND6.0]	ND6.0[ND6.0]
Methylene chloride	ND6.6 UJ	ND6.4 UJ	ND5.4 UJ	ND5.4 UJ	ND5.4 UJ	6.5 Q[ND19]	17 Q[ND24]
Styrene	ND6.6	ND6.4	4.9 J	ND5.4 UJ	ND5.4 UJ	1.4 JQ[ND6.0]	ND6.0[ND6.0]
Toluene	ND6.6	ND6.4	51	15 J	ND5.4 UJ	ND6.2[ND6.0]	ND6.0[ND6.0]
Total xylenes	ND6.6	ND6.4	26	ND5.4 UJ	ND5.4 UJ	ND6.2[ND6.0]	ND6.0[ND6.0]
1,1,1-Trichloroethane	ND6.6	ND6.4	ND5.4 UJ	ND5.4 UJ	ND5.4 UJ	ND6.2[ND6.0]	ND6.0[ND6.0]
Trichloroethene	ND6.6	ND6.4	ND5.4 UJ	ND5.4 UJ	ND5.4 UJ	32 Q	6.8 Q
Vinyl chloride	ND13	ND13	ND11 UJ	ND11 UJ	ND11 UJ	240 Q[ND11]	210[ND11]
CLP SEMI-VOLATILES, ug/kg							
Benzoic acid	ND2100	ND2100	3500 J	ND1800 R	ND1800 R	ND2000 UJ	ND2000
Butylbenzylphthalate	ND430	ND410	2800	ND360	ND360 R	ND400	ND390
bis(2-Ethylhexyl)phthalate	ND430	ND410	2900 N	ND360	ND360 R	ND400	ND390
Phenol	ND430	ND410	4300	ND360	ND360 R	ND400	ND390
PESTICIDES/PCB's, ug/kg							
Aroclor-1254	ND280 UJ	ND260	47 J	ND230	ND230	ND260UJ	ND250
alpha-BHC	ND14 UJ	ND13	ND12	ND12	ND11	ND13UJ	ND13
Heptachlor epoxide	ND14 UJ	ND13	ND12	ND12	ND11	ND13UJ	ND13

NOTES:

ND - None detected at provided sample quantitation limits.
J - The associated numerical number is an estimated quantity.
UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
Q - Data considered suspect, resampling and reanalysis did not confirm the presence of these compounds.
< - Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
[ ] - Recollected and reanalyzed samples for TCL VOCs.

TABLE 6.3

SUMMARY OF DETECTED SUB-SURFACE SOIL PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR 11*	*NCR11-DUP*	*NCR 12*	*NCR 12*	*NCR12-DUP*	*NCR 13*	*NCR 13*
INTERVAL:	*0-3.2'*	*0-3.2'*	*22.0'-26.0'*	*44.0'-46.0'*	*44.0'-46.0'*	*0-0.8'*	*2.5'-3.5'*
SAMPLE DATE:	*9/12/90*	*9/12/90*	*8/22/90*	*8/23/90*	*8/23/90*	*8/8/90*	*8/8/90*
METALS, mg/kg							
Aluminum	18000	23000	5800	7900	7900	13000	8900
Antimony	ND9.2 UJ	ND10	ND9.0	ND9.3	ND10	ND10	ND11
Barium	140	130	72	69	72	65	ND1.1
Beryllium	0.89	1	0.2	0.3	0.27	0.46	0.34
Cadmium	ND.46	ND.52	2	ND.46	ND.52	ND.50	ND.53
Calcium	9000 J	5700	53000 J	60000 J	57000 J	13000	2600
Chromium	24	28	10	11	11	16	13
Cobalt	8.2	9.4 J	3.9	5.6 J	5 J	5.5	5.8
Copper	< 25	< 29	< 14	< 14	< 13	32	12
Iron	24000	25000 J	11000	13000	13000	16000	15000
Magnesium	5000 J	4600 J	17000	19000	18000	4600	2200
Manganese	200 J	230 J	410 J	510 J	450 J	250	200
Nickel	24	28 J	8.9	13	12	20	14
Potassium	2100	3300	1600	2100	2200	1700	1400
Sodium	< 290	< 150	390	320	350	320	260
Vanadium	31 J	38	13	14 J	14 J	21	19
Zinc	100 J	110 J	54 J	45 J	38 J	59	44
Arsenic	24	20	5.8	10 J	9.5 J	17	13
Lead	250 J	100 J	13	8.4	11	32	8.3
Moisture (%)	21	21	9	7.9	8.2	17	16

NOTES:

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U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
< - Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.4

SUMMARY OF DETECTED SEDIMENT PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*SED1-R*	*SED2-R*	*SED3-R*	*SED4-R*	*SED5-R*	*SED6-R*	*SED7-R*	*SED7-R DUP*	*SED8-R*	*SED9-R*
SAMPLE DATE:	*11/27/90*	*11/27/90*	*11/27/90*	*11/27/90*	*11/27/90*	*11/27/90*	*11/27/90*	*11/27/90*	*11/27/90*	*11/27/90*
VOLATILE ORGANICS, µg/kg										
1 1 1-Trichloroethane	ND(9.0)	ND(9.0)	ND(7.0)	ND(9.0)	ND(9.0)	2 J	3 J	ND(9.0)	ND(9.0)	ND(7.0)
1 1-Dichloroethane	ND(9.0)	ND(9.0)	ND(7.0)	ND(9.0)	ND(9.0)	ND(7.0)	ND(9.0)	ND(9.0)	ND(9.0)	ND(7.0)
Acetone	ND(19)	26	ND(15)	13 J	18	ND(15)	ND(18)	ND(18)	18	12 J
Benzene	ND(9.0)	ND(9.0)	ND(7.0)	ND(9.0)	ND(9.0)	ND(7.0)	ND(9.0)	ND(9.0)	ND(9.0)	ND(7.0)
Methylene chloride	ND(9.0)	ND(9.0)	ND(7.0)	ND(9.0)	ND(9.0)	ND(7.0)	ND(9.0)	22	ND(9.0)	20
SEMI-VOLATILE ORGANICS, µg/kg										
Benzo(a)anthracene	ND(1800)	140 J	ND(1400)	82 J	ND(1700)	ND(1500) UJ	ND(1700) UJ	ND(1700)	210 J	ND(1400)
Benzo(a)pyrene	ND(1800)	140 J	ND(1400)	ND(1800)	ND(1700)	ND(1500) UJ	ND(1700) UJ	ND(1700)	250 J	ND(1400)
Benzo(b)fluoranthene	ND(1800)	130 J	ND(1400)	250 J	ND(1700)	ND(1500) UJ	ND(1700) UJ	ND(1700)	320 J	ND(1400)
Benzo(g h i)perylene	ND(5500)	ND(5400)	ND(4300)	ND(5600)	ND(5200)	ND(1500) UJ	ND(5200) UJ	ND(5100)	230 J	ND(4300)
Benzo(k)fluoranthene	ND(1800)	160 J	ND(1400)	ND(1800)	ND(1700)	ND(1500) UJ	ND(1700)	ND(1700)	250 J	ND(1400)
Chrysene	ND(1800)	150 J	ND(1400)	150 J	ND(1700)	120 J	ND(1700) UJ	ND(1700)	270 J	ND(1400)
Di-n-butylphthalate	ND(1800)	ND(1800)	ND(1400)	ND(1800)	ND(1700)	ND(1500) UJ	ND(1700) UJ	ND(1700)	ND(1700)	ND(1400)
Di-n-octylphthalate	ND(1800)	ND(1800)	ND(1400)	ND(1800)	ND(1700)	ND(1500) UJ	ND(1700) UJ	ND(1700)	ND(1700)	ND(1400)
Fluoranthene	62 J	230 J	ND(1400)	150 J	ND(1700)	150 J	ND(1700) UJ	ND(1700)	320 J	ND(1400)
Phenanthrene	40 J	98 J	ND(1400)	62 J	ND(1700)	83 J	ND(1700) UJ	ND(1700)	150 J	ND(1400)
Pyrene	50 J	190 J	ND(1400)	140 J	ND(1700)	170 J	ND(1700) UJ	ND(1700)	280 J	ND(1400)
bis(2-Ethylhexyl)phthalate	290 J	ND(1800)	ND(1400)	440 J	170 J	ND(1500) UJ	ND(1700) UJ	690 J	110 J	580 J

NOTES:

ND	None detected at provided sample quantitation limits.
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U	The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	Unusable data.
N	Presumptive evidence of presence of material.
<	Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.4

SUMMARY OF DETECTED SEDIMENT PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*SED1-R* *11/27/90*	*SED2-R* *11/27/90*	*SED3-R* *11/27/90*	*SED4-R* *11/27/90*	*SED5-R* *11/27/90*	*SED6-R* *11/27/90*	*SED7-R* *11/27/90*	*SED7-R DUP* *11/27/90*	*SED8-R* *11/27/90*	*SED9-R* *11/27/90*
PESTICIDES/PCBs, µg/kg										
4-4'-DDD	ND(3.7)	ND(19)	ND(3.1)	ND(3.7)	ND(3.5)	ND(2.8)	ND(3.5)	ND(1.6)	ND(8.7)	ND(1.5)
4-4'-DDE	ND(3.7)	ND(19)	ND(3.1)	ND(3.7)	ND(3.5)	ND(2.8)	ND(3.5)	1.3 J	ND(8.7)	1.1 J
4-4'-DDT	ND(7.4)	77	ND(6.3)	15	ND(6.9)	ND(5.5)	ND(7.0)	ND(3.3)	ND(17)	6.9
Aldrin	ND(3.7)	ND(19)	ND(3.1)	ND(3.7)	ND(3.5)	ND(2.8)	ND(3.5)	ND(1.6)	ND(8.7)	ND(1.5)
Dieldrin	ND(3.7)	ND(19)	ND(3.1)	ND(3.7)	ND(3.5)	ND(2.8)	1.9 J	ND(1.6)	ND(8.7)	2.1
Endosulfan II	ND(11)	ND(56)	ND(9.4)	7.8 J	ND(10)	ND(8.3)	3.2 J	5.3	ND(26)	2.7 J
Endrin	ND(3.7)	ND(19)	ND(3.1)	ND(3.7)	ND(3.5)	ND(2.8)	ND(3.5)	ND(1.6)	ND(8.7)	ND(1.5)
Heptachlor epoxide	ND(3.7)	ND(19)	ND(3.1)	ND(3.7)	ND(3.5)	ND(2.8)	ND(3.5)	ND(1.6)	ND(8.7)	0.93 J
Methoxychlor	ND(19)	ND(93)	ND(16)	ND(18)	ND(17)	ND(14)	ND(18)	16	ND(44)	ND(7.3)
delta-BHC	ND(3.7)	ND(19)	ND(3.1)	5.4	ND(3.5)	ND(2.8)	3.7	ND(1.6)	ND(8.7)	1.7
gamma-BHC	ND(3.7)	ND(19)	ND(3.1)	ND(3.7)	ND(3.5)	ND(2.8)	ND(3.5)	ND(1.6)	ND(8.7)	0.92 J
METALS, mg/kg										
Aluminum	19200	24900	18300	21800	13800	19500	16900	16000	19800	16400
Arsenic	22	27	19	24	11	18	16	15.8	20J	20.1
Barium	111	148	91.1	113	72.3	98.5	75.5	79.3	102	218
Beryllium	1	1.1	0.74	0.91	0.63	0.84	0.73	0.65	0.89	0.79
Cadmium	ND(0.64)	ND(0.62)	ND(0.49)	ND(0.64)	ND(0.58)	ND(0.56)	ND(0.58)	ND(0.62)	ND(0.62)	1.4
Calcium	47200	8790	37100	48200	35600	39400	27100	31000	92300	33900
Chromium	26.7	30.8	23.9	28	17.4	25	20.4	19.4	28.7	21.6
Cobalt	12.7	10.3	8	11.1	7.4	8.1	7.2	6.6	7.9	14.9
Copper	35.5	24.4	17.2	31.9	12.5	15.5	29.2	34.4	19.6	14.6

NOTES:

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U	The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	Unusable data.
N	Presumptive evidence of presence of material.
<	Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.4

SUMMARY OF DETECTED SEDIMENT PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*SED1-R* *11/27/90*	*SED2-R* *11/27/90*	*SED3-R* *11/27/90*	*SED4-R* *11/27/90*	*SED5-R* *11/27/90*	*SED6-R* *11/27/90*	*SED7-R* *11/27/90*	*SED7-R DUP* *11/27/90*	*SED8-R* *11/27/90*	*SED9-R* *11/27/90*
METALS - continued, mg/kg										
Iron	30100	22500	20800	27300	18600	21200	18900	18500	21900	69000
Lead	49	35	30	54	21	44	30	28.4	100	41.6
Magnesium	16000	6140	10200	15400	11500	16200	7740	7940	39200	9790
Manganese	551	187	399	645	313	430	324	376	695	424
Mercury	0.56	ND(0.082)	0.32	1.1	ND(0.075)	0.18	0.12	0.16	0.13	0.18
Nickel	30	30.9	20	27.6	13.7	21.8	21.7	28.5	20.4	21.4
Potassium	4080	2360	3240	5980	3060	3740	3930	3440	4730	2950
Sodium	574	361	265	669	371	325	739	764	606	392
Vanadium	33.2	40.5	33.1	39.1	27.4	34.2	30.4	27.4	34.4	22.2
Zinc	133	99.5	71.2	124	66.8	101	145	198	148	139

NOTES:

ND None detected at provided sample quantitation limits.
J The associated numerical number is an estimated quantity.
UJ The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R Unusable data.
N Presumptive evidence of presence of material.
< Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.4

SUMMARY OF DETECTED SEDIMENT PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*SED10-R* *11/27/90*	*SED11-R* *11/27/90*	*SED11-R DUP* *11/27/90*	*SED12-R* *11/27/90*	*SED13-R* *11/27/90*	*SED14-R* *11/27/90*	*SED15-R* *11/27/90*	*SED16-R* *11/27/90*	*SED17-R* *11/28/90*
VOLATILE ORGANICS, µg/kg									
1 1 1-Trichloroethane	ND(11)	ND(10)	ND(11)	ND(9.0)	ND(11)	ND(9.0)	ND(9.0)	ND(9.0)	ND(8.0)
1 1-Dichloroethane	ND(11)	ND(10)	ND(11)	ND(9.0)	ND(11)	19	ND(9.0)	ND(9.0)	ND(8.0)
Acetone	30	100	78 J	69	31 J	84	ND(17)	ND(18)	ND(17)
Benzene	ND(11)	ND(10)	ND(11)	ND(9.0)	ND(11)	3 J	ND(9.0)	ND(9.0)	ND(8.0)
Methylene chloride	29	27	39	46	73	32	15	16	71
SEMI-VOLATILE ORGANICS, µg/kg									
Benzo(a)anthracene	210 J	ND(2000)	ND(2100)	ND(1800)	ND(2100)	ND(1800)	ND(1700)	ND(1800)	ND(1700)
Benzo(a)pyrene	ND(2100)	ND(2000)	ND(2100)	ND(1800)	ND(2100)	ND(1800)	ND(1700)	ND(1800)	ND(1700)
Benzo(b)fluoranthene	270 J	ND(2000)	ND(2100)	ND(1800)	ND(2100)	ND(1800)	ND(1700)	ND(1800)	ND(1700)
Benzo(g h i)perylene	ND(6300)	ND(6100)	ND(6400)	ND(5600)	ND(2100)	ND(5300)	ND(5100)	ND(5400)	ND(5000)
Benzo(k)fluoranthene	220 J	ND(2000)	ND(2100)	ND(1800)	ND(2100)	ND(1800)	ND(1700)	ND(1800)	ND(1700)
Chrysene	240 J	ND(2000)	ND(2100)	ND(1800)	ND(2100)	ND(1800)	ND(1700)	ND(1800)	ND(1700)
Di-n-butylphthalate	ND(2100)	ND(2000)	ND(2100)	140 J	ND(2100)	ND(1800)	ND(1700)	ND(1800)	ND(1700)
Di-n-octylphthalate	ND(2100)	ND(2000)	ND(2100)	ND(1800)	ND(2100)	ND(1800)	290 J	ND(1800)	ND(1700)
Fluoranthene	330 J	ND(2000)	ND(2100)	ND(1800)	ND(2100)	ND(1800)	ND(1700)	ND(1800)	ND(1700)
Phenanthrene	180 J	ND(2000)	ND(2100)	ND(1800)	ND(2100)	ND(1800)	ND(1700)	ND(1800)	ND(1700)
Pyrene	310 J	ND(2000)	ND(2100)	ND(1800)	ND(2100)	ND(1800)	ND(1700)	ND(1800)	ND(1700)
bis(2-Ethylhexyl)phthalate	ND(2100)	470 J	970 J	550 J	ND(2100)	ND(1800)	540 J	290 J	ND(1700)

NOTES:

ND None detected at provided sample quantitation limits.
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U The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R Unusable data.
N Presumptive evidence of presence of material.
< Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.4

SUMMARY OF DETECTED SEDIMENT PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*SED10-R* *11/27/90*	*SED11-R* *11/27/90*	*SED11-R DUP* *11/27/90*	*SED12-R* *11/27/90*	*SED13-R* *11/27/90*	*SED14-R* *11/27/90*	*SED15-R* *11/27/90*	*SED16-R* *11/27/90*	*SED17-R* *11/28/90*	*SED18-R* *11/28/90*
PESTICIDES/PCBs, µg/kg										
4-4'-DDD	ND(2.1)	ND(2.1)	ND(2.1)	ND(1.7)	4.7	ND(36)	ND(31) UJ	ND(8.4)	ND(1.6)	ND(2.5)
4-4'-DDE	ND(2.1)	ND(2.1)	ND(2.1)	ND(1.7)	ND(4.1)	ND(36)	ND(31) UJ	ND(8.4)	28	ND(2.5)
4-4'-DDT	ND(4.1)	ND(4.1)	ND(4.2)	ND(3.5)	ND(8.3)	ND(71)	ND(63) UJ	ND(17)	11	11
Aldrin	2.0 J	1.1 J	ND(2.1)	ND(1.7)	ND(4.1)	ND(36)	ND(31) UJ	ND(8.4)	ND(1.6)	ND(2.5)
Dieldrin	ND(2.1)	2.4	2.1	ND(1.7)	ND(4.1)	ND(36)	ND(31) UJ	ND(8.4)	ND(1.6)	ND(2.5)
Endosulfan II	ND(6.2)	ND(6.2)	ND(6.3)	ND(5.2)	ND(12)	ND(110)	ND(94) UJ	ND(25)	ND(4.7)	ND(7.5)
Endrin	18	7.6	ND(2.1)	ND(1.7)	ND(4.1)	ND(36)	ND(31) UJ	ND(8.4)	ND(1.6)	ND(2.5)
Heptachlor epoxide	0.30 J	ND(2.1)	ND(2.1)	ND(1.7)	ND(4.1)	ND(36)	ND(31) UJ	ND(8.4)	3.1	ND(2.5)
Methoxychlor	ND(10)	ND(10)	ND(11)	ND(8.7)	ND(21)	ND(180)	ND(160) UJ	ND(42)	ND(7.9)	ND(13)
delta-BHC	4.4	2.6	ND(2.1)	2	ND(4.1)	ND(36)	ND(31) UJ	ND(8.4)	2	ND(2.5)
gamma-BHC	ND(2.1)	ND(2.1)	ND(2.1)	ND(1.7)	ND(4.1)	ND(36)	ND(31) UJ	ND(8.4)	1.5 J	ND(2.5)
METALS, mg/kg										
Aluminum	22400	21700	18700	18900	11600	13000	23100	27800	17000	6480
Arsenic	27.6	24.2	20.4	17.5	15	16.1	26.8	24.4	21	7.2
Barium	123	124	113	99.7	64.5	87	118	156	122	114
Beryllium	1	0.98	0.79	0.67	0.65	0.54	0.97	1.3	0.8	0.48
Cadmium	ND(0.74)	0.8	0.88	ND(0.49)	ND(0.58)	ND(0.72)	0.82	ND(0.65)	ND(0.48)	2.1
Calcium	54500	33100	29200	5170	9400	41800	61400	28400	38500	115000
Chromium	28	28.1	24.4	19.8	16.3	17.3	29.2	34.8	21.3	14.1
Cobalt	10.6	9.8	8.1	4.8	6.8	7.2	13.1	11.8	9	17.7
Copper	22.2	19.4	18.6	10.4	15.6	18.6	22.4	27.8	36.7	11.9

NOTES:

ND	None detected at provided sample quantitation limits.
J	The associated numerical number is an estimated quantity.
UJ	The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may inaccurate or imprecise.
U	The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	Unusable data.
N	Presumptive evidence of presence of material.
<	Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.4

SUMMARY OF DETECTED SEDIMENT PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*SED10-R* *11/27/90*	*SED11-R* *11/27/90*	*SED11-R DUP* *11/27/90*	*SED12-R* *11/27/90*	*SED13-R* *11/27/90*	*SED14-R* *11/27/90*	*SED15-R* *11/27/90*	*SED16-R* *11/27/90*	*SED17-R* *11/28/90*	*SED18-R* *11/28/90*
METALS - continued, mg/kg										
Iron	28200	28400	25400	15100	16300	17700	28500	32000	22100	8590
Lead	68	92.8	101	27.1	28	31.4	45.6	40.2	50	59
Magnesium	21900	11500	10100	4210	5230	11600	17600	12500	7710	48700
Manganese	511	373	330	126	196	344	511	402	515	451
Mercury	0.31	ND(0.10)	ND(0.10)	ND(0.082)	0.1	0.44	0.082	0.28	ND(0.064)	ND(0.10)
Nickel	27.1	28.5	26.2	16.5	15.2	20.9	27.9	35.4	23.6	7.4
Potassium	4750	4290	3460	2390	1520	3520	5960	6340	2730	1320
Sodium	328	1660	1630	1450	308	694	790	240	279	528
Vanadium	38.4	36.7	30	29.3	22.2	24.4	40.9	49	29.3	12
Zinc	146	280	306	88.5	246	76.6	97.7	120	142	78

NOTES:

ND	None detected at provided sample quantitation limits.
J	The associated numerical number is an estimated quantity.
UJ	The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U	The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	Unusable data.
N	Presumptive evidence of presence of material.
<	Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.5

SUMMARY OF DETECTED SURFACE WATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*SW1-R* *11/28/90*	*SW2-R* *11/29/90*	*SW4-R* *11/28/90*	*SW5-R* *11/28/90*	*SW7-R* *11/29/90*	*SW8-R* *11/29/90*	*SW10-R* *11/29/90*	*SW11-R* *11/28/90*	*SW11-RDUP* *11/28/90*	*SW-13 R* *11/28/90*	*SW18-R* *11/28/90*	*NYS Water Limits*
VOLATILE ORGANICS, µg												
1,1,1-Trichloroethane	ND(5.0)	ND(5.0)	2 J	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	5G
4-Methyl-2-pentanone(MIBK	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	2 J	ND(10)	ND(10)	ND(10)	--
Carbon disulfide	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	0.7 J	0.6 J	1 J	8	--
Ethyl benzene	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	1 J	ND(5.0)	5G
Tetrachloroethene	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	4 J	0.7G
Toluene	ND(5.0)	ND(5.0)	2 J	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	2 J	2 J	ND(5.0)	ND(5.0)	5G
Xylenes	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	6	5	ND(5.0)	ND(5.0)	5G
SEMI-VOLATILE ORGANI												
2,4-Dimethylphenol	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(9.0)	ND(10)	7 J	6 J	ND(10)	ND(10)	1
Benzoic acid	ND(48)	ND(48)	ND(48)	ND(50)	ND(48)	ND(47)	ND(49)	ND(48)	ND(48)	5 J	ND(48)	--
Di-n-butylphthalate	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(9.0)	ND(10)	0.4 J	ND(10)	ND(10)	0.3 J	50G
Diethylphthalate	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(9.0)	ND(10)	0.5 J	0.6 J	ND(10)	ND(10)	50G
Phenol	ND(10)	ND(10)	11	ND(10)	ND(10)	ND(9.0)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	1
bis(2-Ethylhexyl)phthalate	10	ND(10)	ND(10)	3 J	2 J	80	ND(10)	80	4 J	8 J	1000	4G
PESTICIDES/PCBs, µg/L												
4 4'-DDT	ND(0.019)	ND(0.019)	0.04	ND(0.020) UJ	ND(0.019)	ND(0.019)	ND(0.020)	ND(0.094)	ND(0.094)	ND(0.019)	ND(0.094)	0.01
Heptachlor epoxide	ND(0.0094)	ND(0.0095)	ND(0.0094)	ND(0.0098) UJ	ND(0.0095)	0.014	ND(0.0098)	ND(0.047)	ND(0.047)	ND(0.0094)	ND(0.047)	0.009
delta-BHC	ND(0.0094)	ND(0.0095)	0.021	ND(0.0098) UJ	ND(0.0095)	ND(0.0095)	ND(0.0098)	ND(0.047)	ND(0.047)	0.014	ND(0.047)	0.02G
gamma-BHC	ND(0.0094)	0.0051J	ND(0.0094)	ND(0.0098) UJ	ND(0.0095)	ND(0.0095)	ND(0.0098)	ND(0.047)	ND(0.047)	ND(0.0094)	ND(0.047)	0.02G

NOTES:

NYS Water Limits - New York State Ambient Water Quality Standards.
G - Guidance value.
ND - None detected at provided sample quantitation limits.
J - The associated numerical number is an estimated quantity.
UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
< - Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.5

SUMMARY OF DETECTED SURFACE WATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*SW1-R* *11/28/90*	*SW2-R* *11/29/90*	*SW4-R* *11/28/90*	*SW5-R* *11/28/90*	*SW7-R* *11/29/90*	*SW8-R* *11/29/90*	*SW10-R* *11/29/90*	*SW11-R* *11/28/90*	*SW11-RDUP* *11/28/90*	*SW-13 R* *11/28/90*	*SW18-R* *11/28/90*	*NYS Water Limits*
METALS, µg/L												
Aluminum	589	2570	861	666	426	21500	665	535	457	25200	734	--
Arsenic	ND(4.0)	4.7	ND(4.0)	ND(4.0)	ND(4.0)	24.6	ND(4.0)	ND(4.0)	ND(4.0)	30.6	ND(4.0)	50
Barium	89	147	96	66	103	347	68	167	164	456	55	1000
Beryllium	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.1	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	3G
Cadmium	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	5.7	ND(5.0)	10
Calcium	134000	262000	94600	81800	133000	285000	103000	75600	75400	286000	71100	--
Chromium	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	38	ND(10)	ND(10)	ND(10)	27	ND(10)	50
Cobalt	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	18	ND(10)	ND(10)	ND(10)	25	ND(10)	--
Copper	ND(20)	ND(20)	ND(20)	ND(20)	27	61	ND(20)	ND(20)	ND(20)	94	ND(20)	200
Cyanide	ND(10)	ND(10)	ND(10)	19.3	40.6	ND(10)	ND(10)	24.6	30.6	ND(10)	ND(10)	100
Iron	752	3400	1550	488	663	31300	1390	3690	3460	38000	1030	300
Lead	6.1	20	9.9	8.8	6.8	352	12.9	29.7	30.6	176	6.3	50
Magnesium	36900	64300	50100	34300	76600	113000	30400	90000	89400	56000	28500	35,000
Manganese	79	783	48	27	30	1690	130	48	46	1460	41	300
Nickel	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	63	ND(20)	29	25	57	ND(20)	--
Potassium	9290	5850	29100	12700 J	63200	33400	13600	68000	67500	7380	7760	--
Sodium	59400	60700	150000	47700	265000	171000	51400	395000	392000	29800	46400	--
Vanadium	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	42	ND(20)	ND(20)	ND(20)	61	ND(20)	--
Zinc	ND(20)	76	ND(20)	ND(20)	24	307	ND(20)	71	73	2360	ND(20)	300

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R - Unusable data.
N - Presumptive evidence of presence of material.
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TABLE 6.6

SUMMARY OF DETECTED LEACHATE PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*SEEP 5-R* *11/26/90*	*SEEP 5-RDUP* *11/26/90*	*SEEP 7-R* *11/26/90*	*SEEP 10-R* *11/27/90*	*SEEP 13-R* *11/26/90*	*SEEP 14-R* *11/26/90*	*SEEP 16-R* *11/26/90*	*SEEP 21-R* *11/26/90*	*SEEP 1-R* *11/26/90*	*SEEP 3-R* *11/26/90*	*NYS Water Limits*
									Soil Matrix *µg/kg*	*Soil Matrix* *µg/kg*	
VOLATILE ORGANICS, µg/L											
2-Butanone	72J	120J	120	ND(10)	1400	620	ND(50)	ND(20)	ND(12)	ND(14)	–
2-Hexanone	ND(10)	ND(10)	ND(10)	11J	ND(200)	ND(50)	ND(50)	ND(20)	ND(12)	ND(14)	50G
4-Methyl-2-pentanone(MIBK)	2J	5J	3J	ND(10)	ND(200)	21J	ND(50)	ND(20)	ND(12)	ND(14)	–
Acetone	29U	34U	37U	ND(10)	2200	490	32U	28U	10U	10U	–
Benzene	ND(5.0)	ND(5.0)	ND(5.0)	5U	36J	5U	50	48	6U	7U	0.7G
Chlorobenzene	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	26J	ND(25)	56	45	ND(6.0)	ND(7.0)	20
Ethyl benzene	1J	3J	2J	ND(5.0)	26J	ND(25)	680	87	ND(6.0)	ND(7.0)	5G
Methylene chloride	5U	5U	5U	5U	470	ND(25)	25U	27U	67	15U	5G
Toluene	2J	4J	ND(5.0)	ND(5.0)	190	11J	350	8J	ND(6.0)	ND(7.0)	5G
Xylenes	8	16	ND(5.0)	ND(5.0)	120	ND(25)	1300	250	ND(6.0)	ND(7.0)	5G
SEMI-VOLATILE ORGANICS, µg/L									*µg/kg*	*µg/kg*	
1,2-Dichlorobenzene	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	16	ND(11)	ND(1200)	ND(1300)	–
1,3-Dichlorobenzene	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	6J	ND(11)	ND(1200)	ND(1300)	20
1,4-Dichlorobenzene	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(11)	ND(1200)	1200J	30
2,4-Dimethylphenol	130	94	120	ND(10)	47	18	980	74	ND(1200)	ND(1300)	1
2,6-Dinitrotoluene	ND(10)	ND(10)	51	ND(10)	ND(10)	ND(10)	ND(10)	ND(11)	ND(1200)	ND(1300)	0.07G

NOTES:

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U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
< - Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.6

SUMMARY OF DETECTED LEACHATE PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*SEEP 5-R* *11/26/90*	*SEEP 5-RDUP* *11/26/90*	*SEEP 7-R* *11/26/90*	*SEEP 10-R* *11/27/90*	*SEEP 13-R* *11/26/90*	*SEEP 14-R* *11/26/90*	*SEEP 16-R* *11/26/90*	*SEEP 21-R* *11/26/90*	*SEEP 1-R* *11/26/90*	*SEEP 3-R* *11/26/90*	*NYS Water Limits*
									Soil Matrix µg/kg	*Soil Matrix µg/kg*	
SEMI-VOLATILE ORGANICS - continued, µg/L											
2-Methylnaphthalene	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	5J	ND(1200)	120J	–
2-Methylphenol	600	660	960	ND(10)	570	160	320	12	ND(1200)	ND(1300)	1
4-Methylphenol	4100	3400	2100	ND(10)	1200	400	750	ND(11)	ND(1200)	440J	1
Acenaphthene	1J	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	0.8J	1J	ND(1200)	100J	20
Anthracene	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(11)	ND(1200)	190J	50G
Benzo(a)anthracene	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(11)	ND(1200)	210J	0.002G
Benzoic acid	ND(50)	ND(48)	12000	ND(51)	ND(48)	4300	ND(51)	ND(57)	ND(5700)	ND(6300)	–
Butylbenzylphthalate	4J	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	0.9J	ND(11)	ND(1200)	1200J	50G
Di-n-butylphthalate	ND(10)	0.4J	ND(10)	ND(10)	1J	ND(10)	4J	ND(11)	81J	350J	50G
Diethylphthalate	18	14	55	ND(10)	53	1J	27	8J	ND(1200)	ND(1300)	50G
Fluoranthene	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(11)	ND(1200)	480J	50G
Fluorene	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	0.6J	1J	ND(1200)	ND(1300)	50G
N-Nitrosodiphenylamine	ND(10)	ND(10)	ND(10)	ND(10)	2J	ND(10)	7J	ND(11)	ND(1200)	ND(1300)	50G
Naphthalene	200	ND(10)	ND(10)	ND(10)	9J	0.6J	26	ND(11)	ND(1200)	240J	10
Phenanthrene	1J	1J	ND(10)	ND(10)	ND(10)	ND(10)	2J	2J	ND(1200)	470J	50G
Phenol	1000	1300	1800	ND(10)	130	990	45	ND(11)	ND(1200)	ND(1300)	1
Pyrene	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	ND(11)	ND(1200)	840J	50
bis(2-Ethylhexyl)phthalate	5J	15	3J	3J	1J	4J	0.7J	4J	ND(1200)	750J	4G

NOTES:

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U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
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N - Presumptive evidence of presence of material.
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TABLE 6.6

SUMMARY OF DETECTED LEACHATE PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*SEEP 5-R* *11/26/90*	*SEEP 5-RDUP* *11/26/90*	*SEEP 7-R* *11/26/90*	*SEEP 10-R* *11/27/90*	*SEEP 13-R* *11/26/90*	*SEEP 14-R* *11/26/90*	*SEEP 16-R* *11/26/90*	*SEEP 21-R* *11/26/90*	*SEEP 1-R* *11/26/90*	*SEEP 3-R* *11/26/90*	*NYS Water Limits*
PESTICIDES/PCBs, µg/L									*Soil Matrix mg/kg*	*Soil Matrix mg/kg*	
4,4'-DDD	ND(0.97)UJ	ND(0.10)UJ	ND(0.097)UJ	ND(0.010)	0.015J	ND(0.0094)UJ	ND(0.10)	ND(0.0094)	ND(1.2)	ND(13)	0.01
4,4'-DDE	ND(0.97)UJ	ND(0.10)UJ	ND(0.097)UJ	ND(0.010)	ND(0.0096)UJ	ND(0.0094)UJ	ND(0.10)	ND(0.0094)	0.69J	ND(13)	0.01
4,4'-DDT	ND(1.9)UJ	ND(0.20)UJ	ND(0.19)UJ	0.11	0.059J	0.044J	ND(0.20)	ND(0.019)	ND(2.4)	ND(26)	0.01
Aldrin	ND(0.97)UJ	ND(0.10)UJ	ND(0.097)UJ	ND(0.010)	ND(0.0096)UJ	ND(0.0094)UJ	0.082J	ND(0.0094)	2.1	ND(13)	–
Dieldrin	ND(0.97)UJ	ND(0.10)UJ	ND(0.097)UJ	ND(0.010)	ND(0.0096)UJ	ND(0.0094)UJ	ND(0.10)	ND(0.0094)	3.2	ND(13)	–
Heptachlor	1.1J	ND(0.10)UJ	ND(0.097)UJ	ND(0.010)	ND(0.0096)UJ	ND(0.0094)UJ	0.091J	ND(0.0094)	ND(1.2)	ND(13)	0.009
delta-BHC	ND(0.97)UJ	0.18J	ND(0.097)UJ	ND(0.010)	0.067J	ND(0.0094)UJ	ND(0.10)	0.019	2.1	ND(13)	0.02G
gamma-BHC	ND(0.97)UJ	ND(0.10)UJ	ND(0.097)UJ	ND(0.010)	ND(0.0096)UJ	0.052J	ND(0.10)	ND(0.0094)	ND(1.2)	ND(13)	0.02G
METALS, µg/L									*mg/kg*	*mg/kg*	
Aluminum	2330J	7270J	1710	15200	1140	325000	8720	4240	7810	11700	–
Arsenic	21.3	29.2	11.6	58.6	9.5	30.8	21.8J	13.8	7	12	50
Barium	310	437	294	7610	147	1200	1340J	949	110	110	1,000
Beryllium	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.2	ND(2.0)	ND(2.0)	0.29	0.6	3.0G
Cadmium	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	9J	6.1	ND(0.42)	0.71	10
Calcium	77900	115000	132000	272000	103000	396000	165000	139000	81400	78600	–
Chromium	52	69	45	26	27	51	114J	42	18.1	17.5	50
Cobalt	10	15	ND(10)	ND(10)	ND(10)	35	28J	93	4.7	6.8	–

NOTES:

NYS Water Limits - New York State Ambient Water Quality Standards.
G - Guidance value.
ND - None detected at provided sample quantitation limits.
J - The associated numerical number is an estimated quantity.
UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
< - Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.6

SUMMARY OF DETECTED LEACHATE PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*SEEP 5-R*	*SEEP 5-RDUP*	*SEEP 7-R*	*SEEP 10-R*	*SEEP 13-R*	*SEEP 14-R*	*SEEP 16-R*	*SEEP 21-R*	*SEEP 1-R*	*SEEP 3-R*	*NYS Water Limits*
SAMPLE DATE:	*11/26/90*	*11/26/90*	*11/26/90*	*11/27/90*	*11/26/90*	*11/26/90*	*11/26/90*	*11/26/90*	*11/26/90*	*11/26/90*	
METALS - continued, µg/L									*Soil Matrix mg/kg*	*Soil Matrix mg/kg*	
Copper	ND(20)	39	ND(20)	51	ND(20)	85	99J	28	29.4	47.8	200
Iron	7910J	17200J	13300	390000	14500	236000	77600	40500	23400	25700	300
Lead	< 36.1	50.8	< 17.4	< 39.5	100	185	1010	734	110	40	50
Magnesium	286000	324000	419000	145000	310000	107000	257000	291000	31300	29700	35,000
Manganese	106J	341J	124	2590	76	2960	450J	346	441	511	300
Mercury	ND(0.20)	ND(0.20)	ND(0.2)	ND(0.20)	ND(0.20)	ND(0.20)	0.5J	0.5	0.39	1.2	2
Nickel	102	120	93	34	78	101	92J	115	16.1	18.7	–
Potassium	263000	303000	275000	88800	310000	26200	254000	445000	1390	2890	–
Sodium	1010000	1090000	649000	664000	882000	84800	1290000	1660000	394	365	–
Vanadium	ND(20)	33	ND(20)	ND(20)	ND(20)	24	29J	23	16.3	23.1	–
Zinc	395	581	1410	293	204	376	939J	707	102	119	300

NOTES:

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U - The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
< - Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.7

SUMMARY OF DETECTED HAND AUGER SOIL PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*HA-3* *12/3/90*	*HA-8* *12/3/90*	*HA-9* *12/3/90*	*HA-9DUP* *12/3/90*	*HA-13* *12/3/90*	*HA-14* *12/3/90*
VOLATILE ORGANICS, µg/kg						
1,1,1-Trichloroethane	3J	ND(6.0)	ND(6.0)	ND(6.0)	ND(6.0)	ND(6.0)
Acetone	17J	ND(12)	9J	4 J	13	14J
Methylene chloride	22	22	18	15	11	15
SEMI-VOLATILE ORGANICS, µg/kg						
bis(2-Ethylhexyl)phthalate	ND(1200)	ND(1200)	850J	1200	ND(1100)	700J
PESTICIDES/PCBs, µg/kg						
delta-BHC	ND(1.2)	1.4	ND(1.2)	ND(1.2)	ND(1.2)	ND(1.1)
METALS, mg/kg						
Aluminum	8570	10900	7420	6250	4650	5960
Arsenic	6.1	9.8	7.5	6.9	5.3	8.6J
Barium	18.6	74.9	39.5	25.2	25.8	21.2
Beryllium	0.31	0.47	0.27	0.25	ND(0.18)	0.28
Calcium	10500	3140	34100	46700	48500	68900
Chromium	17.1	14.7	9.9	8.2	6.4	7.9
Cobalt	3.5	6.1	4.3	3.5	3	3.7
Copper	7.4	14.5	9.2	9.3	10.2	14
Iron	11500	15400	11200	9590	10900	10900
Lead	6.3	7.5	5.4	5.3	4.9	5.4R
Magnesium	6830	2850	9630	12000	17600	25500
Manganese	344	575	444J	271J	389	356J
Nickel	11.2	15.8	12.2	9.4	9	11.5
Potassium	1140	1130	1050	1290	727	1250J
Sodium	211	134	429	475	392	199
Vanadium	15.9	25.1	14.9	13.7	13.1	15.1
Zinc	41	36.5	33.2	28.2	35.5	40.8

Notes:

ND	None detected at provided sample quantitation limits.
J	The associated numerical number is an estimated quantity.
UJ	The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U	The material was analyzed for but was not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	Unusable data.
N	Presumptive evidence of presence of material.
<	Less than value. The sample quantitation limit has been adjusted to reflect potential contamination attributable to laboratory or field conditions.

TABLE 6.8

SUMMARY OF DETECTED TEST PIT SOIL PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

Sample Location:	*Test Pit 3*
Sample Date:	*04/30/91*
TCL Semi-Volatiles (µg/kg)	
bis (2-Ethylhexyl) phthalate	160J
4-methylphenol	68J
Benzoic Acid	220J
Naphthalene	43J
Diethylphthalate	82J
Phenanthrene	60J
Pyrene	67J
Chrysene	46J
TAL Metals (mg/kg)	
Aluminum	15000
Arsenic	3.9
Barium	89.0
Beryllium	0.62B
Calcium	37600
Chromium	20.6
Cobalt	9.3
Copper	39.2
Iron	21500
Lead	20.5
Magnesium	10700
Manganese	403
Mercury	0.23
Nickel	22.7
Potassium	3070
Selenium	0.82
Sodium	302B
Vanadium	32.3
Zinc	135

Notes:

J - The associated numerical value is an estimated quantity.
B - Detected below CRDL, but above instrument detection limit.

TABLE 6.9

SUMMARY OF DETECTED ROUND I GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*NCR-1M-I* *3/20/91*	*NCR-2S-I* *3/14/91*	*NCR-2I-I* *3/14/91*	*NCR-2M-I* *3/14/91*	*NCR-2D-I* *3/14/91*	*NCR-3S-I* *3/18/91*	*NCR-3M-I* *3/18/91*	*NCR-4S-I* *3/22/91*	*NCR-4M-I* *3/25/91*	*NCR-5S-I* *3/18/91*	*NCR-5M-I* *3/15/91*	*MCL*
TCL VOLATILES (µg/L)												
Methylene Chloride	4UR	3UR	3UR	20UR	3UR	2UR	2UR	4UR	3UR	3UR	3UR	5
Acetone	ND5	ND5	ND5	12U	ND5	ND5	ND5	27U	ND5	8U	ND5	5
Benzene	ND1	ND1	ND1	1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND
Toluene	ND1	ND1	ND1	5	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
Ethylbenzene	ND1	ND1	ND1	1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
Styrene	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
Xylenes (Total)	ND1	ND1	ND1	8	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
TCL SEMI-VOLATILES (µg/L)												
Phenol	2 J	ND5	ND5	ND5	ND5	ND5	ND5	4 J	2 J	ND5	ND5	1
2-Methylphenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
4-Methylphenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
2,4-Dimethylphenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
Pentachlorophenol	ND20	ND20	ND20	ND20	ND20	ND20	ND20	ND20	ND20	ND20	ND20	1
Di-n-Butylphthalate	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1J	ND5	ND5	50
Butylbenzylphthalate	ND5	5U	6U	ND5	5U	ND5	ND5	ND5	ND5	3 J	4 J	50
Chrysene	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	50
bis(2-Ethylhexyl)phthalate	ND5	6U	ND5	5U	ND5	ND5	ND5	5U	10	23	1JN	50

Notes:

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N	Presumptive evidence of presence of material.
P	Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E	Exceeded linear calibration range of instrument, requires dilution.
D	Sample was diluted and reanalyzed.
B	Detected below CRDL, but above instrument detection limit.

TABLE 6.9

SUMMARY OF DETECTED ROUND I GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-1M-I*	*NCR-2S-I*	*NCR-2I-I*	*NCR-2M-I*	*NCR-2D-I*	*NCR-3S-I*	*NCR-3M-I*	*NCR-4S-I*	*NCR-4M-I*	*NCR-5S-I*	*NCR-5M-I*	
SAMPLE DATE:	*3/20/91*	*3/14/91*	*3/14/91*	*3/14/91*	*3/14/91*	*3/18/91*	*3/18/91*	*3/22/91*	*3/25/91*	*3/18/91*	*3/15/91*	*MCL*
TCL PESTICIDES/PCB (µg/L)												
alpha-BHC	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	0.00065JP	ND0.010UJ	ND0.010	0.00054JP	ND0.010UJ	ND
beta-BHC	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010	0.049 P	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010UJ	ND
delta-BHC	ND0.010	0.0012 J	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010UJ	ND
gamma-BHC (Lindane)	ND0.010	ND0.010UJ	0.00099JP	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010	0.0011JP	0.0011 JP	ND
Heptachlor	0.0015 JP	ND0.010UJ	0.0020JP	0.0017JP	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	0.00070 JP	ND
Aldrin	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010UJ	ND
Heptachlor epoxide	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010UJ	ND
Dieldrin	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020UJ	ND
4,4'-DDE	ND0.020	ND0.020UJ	0.0018JP	ND0.020UJ	ND0.020	0.0010 JP	ND0.020UJ	0.0012JP	0.02U	ND0.020UJ	ND0.020UJ	ND
Endosulfan sulfate	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020UJ	50
Methoxyclor	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	0.0078JP	ND0.010	ND0.010UJ	ND0.010UJ	35
Endrin aldehyde	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	0.02U	ND0.020UJ	0.0031 J	0.02U	ND0.020UJ	5
alpha-Chlordane	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010	0.0015 JP	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010UJ	0.1
gamma-Chlordane	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	0.01U	ND0.010UJ	ND0.010	0.01U	ND0.010UJ	0.1

Notes:

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TABLE 6.9

SUMMARY OF DETECTED ROUND I GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*NCR-5D-I* *3/15/91*	*NCR-6M-I* *3/21/91*	*NCR-6D-I* *3/22/91*	*NCR-7M-I* *3/19/91*	*NCR-7M-I Dup* *3/19/91*	*NCR-8M-I* *3/20/91*	*NCR-8D-I* *3/20/91*	*NCR-9M-I* *3/19/91*	*NCR-10M-I* *3/19/91*	*NCR-11M-I* *3/22/91*	*NCR-11D-I* *3/22/91*	*MCL*
TCL VOLATILES (µg/L)												
Methylene Chloride	2UR	4UR	3UR	2UR	3UR	2UR	2UR	2UR	2UR	2UR	4UR	5
Acetone	ND5	ND5	ND5	ND5	ND5	5U	ND5	ND5	11U	ND5	6J	5
Benzene	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND
Toluene	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
Ethylbenzene	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
Styrene	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
Xylenes (Total)	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
TCL SEMI-VOLATILES (µg/L)												
Phenol	1 J	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
2-Methylphenol	ND5UJ	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
4-Methylphenol	ND5UJ	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
2,4-Dimethylphenol	ND5UJ	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
Pentachlorophenol	ND20UJ	ND20	ND20	ND20	ND20	ND20	ND20	ND20	ND20	ND20	ND20	1
Di-n-Butylphthalate	ND5UJ	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	50
Butylbenzylphthalate	ND5UJ	ND5	ND5	2J	ND5	ND5	ND5	ND5	ND5	ND5	ND5	50
Chrysene	ND5UJ	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	50
bis(2-Ethylhexyl)phthalate	3 J	ND5	ND5	5U	5U	5	ND5	5U	5U	ND5	ND5	50

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TABLE 6.9

SUMMARY OF DETECTED ROUND I GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-5D-I*	*NCR-6M-I*	*NCR-6D-I*	*NCR-7M-I*	*NCR-7M-I Dup*	*NCR-8M-I*	*NCR-8D-I*	*NCR-9M-I*	*NCR-10M-I*	*NCR-11M-I*	*NCR-11D-I*	*MCL*
SAMPLE DATE:	*3/15/91*	*3/21/91*	*3/22/91*	*3/19/91*	*3/19/91*	*3/20/91*	*3/20/91*	*3/19/91*	*3/19/91*	*3/22/91*	*3/22/91*	
TCL PESTICIDES/PCB (µg/L)												
alpha-BHC	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND
beta-BHC	0.00086JP	ND0.010	ND0.010UJ	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND
delta-BHC	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	0.00051JP	ND0.010UJ	ND
gamma-BHC (Lindane)	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND
Heptachlor	ND0.010UJ	0.0018 JP	ND0.010UJ	ND0.010	ND0.010	0.0034 JP	ND0.010	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND
Aldrin	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010	ND0.010	ND0.010	ND0.010	0.00089 JP	ND0.010	ND0.010UJ	ND0.010UJ	ND
Heptachlor epoxide	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010UJ	0.00086JP	ND
Dieldrin	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020	ND0.020	ND0.020	ND0.020	ND0.020	0.00058 J	ND0.020UJ	ND0.020UJ	ND
4,4'-DDE	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020	ND0.020	ND0.020	ND0.020	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND
Endosulfan sulfate	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020	0.00094JP	ND0.020	ND0.020	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	50
Methoxyclor	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	35
Endrin aldehyde	ND0.020UJ	ND0.020	ND0.020UJ	0.02U	0.02U	ND0.020	0.02U	ND0.020	0.02U	ND0.020UJ	ND0.020UJ	5
alpha-Chlordane	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	0.1
gamma-Chlordane	ND0.010UJ	ND0.010	ND0.010UJ	0.01U	ND0.01	ND0.010	0.01U	ND0.010	0.01U	ND0.010UJ	ND0.010UJ	0.1

Notes:

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ND - None detected at provided sample quantitation limits.
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TABLE 6.9

SUMMARY OF DETECTED ROUND I GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-11D-I Dup*	*NCR-12D-I*	*NCR-12D-I Diluted*	*NCR-12D-I Dup*	*NCR-12D-I Dup/Diluted*	*NCR-13S-I*	*MCL*
SAMPLE DATE:	*3/22/91*	*3/25/91*	*3/25/91*	*3/25/91*	*3/24/91*	*3/20/91*	
TCL VOLATILES (µg/L)							
Methylene Chloride	2U	3UR	6UR	3UR	7UR	3UR	5
Acetone	5J	43 EJ	42DJ	46EJ	50DJ	12U	5
Benzene	ND1	0.7 J	ND2	0.7 J	ND2	ND1	ND
Toluene	ND1	3	3	3	3	ND1	5
Ethylbenzene	ND1	ND1	ND2	ND1	ND2	ND1	5
Styrene	ND1	3	3	3	3	ND1	5
Xylenes (Total)	ND1	2	2J	2	2J	ND1	5
TCL SEMI-VOLATILES (µg/L)							
Phenol	ND5	1500E	1200D	1200 E	1200D	ND5	1
2-Methylphenol	ND5	46	32DJ	34	ND300	ND5	1
4-Methylphenol	ND5	49J	42DJ	37J	34DJ	ND5	1
2,4-Dimethylphenol	ND5	4	ND120	3 J	ND300	ND5	1
Pentachlorophenol	ND20	ND40	ND500	ND20	ND1200	3 J	1
Di-n-Butylphthalate	ND5	2 J	ND120	ND5	ND300	ND5	50
Butylbenzylphthalate	ND5	ND10	ND120	ND5	ND300	ND5	50
Chrysene	ND5	ND10	ND120	ND5	ND300	ND5	50
bis(2-Ethylhexyl)phthalate	ND5	4 JN	ND120	3 J	ND300	8	50

Notes:

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TABLE 6.9

SUMMARY OF DETECTED ROUND I GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*NCR-11D-I Dup* *3/22/91*	*NCR-12D-I* *3/25/91*	*NCR-12D-I Diluted* *3/25/91*	*NCR-12D-I Dup* *3/25/91*	*NCR-12D-I Dup/Diluted* *3/24/91*	*NCR-13S-I* *3/20/91*	*MCL*
TCL PESTICIDES/PCB (μg/L)							
alpha-BHC	ND0.010UJ	ND0.05UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND
beta-BHC	ND0.010UJ	ND0.05UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND
delta-BHC	0.0011JP	ND0.05UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND
gamma-BHC (Lindane)	ND0.010UJ	ND0.05UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND
Heptachlor	0.0017JP	0.01U	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND
Aldrin	ND0.010UJ	ND0.05UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND
Heptachlor epoxide	ND0.010UJ	ND0.05UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND
Dieldrin	ND0.020UJ	ND0.1 UJ	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020UJ	ND
4,4'-DDE	ND0.020UJ	ND0.01UJ	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020UJ	ND
Endosulfan sulfate	ND0.020UJ	ND0.01UJ	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020UJ	50
Methoxyclor	ND0.010UJ	ND0.5UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	35
Endrin aldehyde	0.02U	ND0.01UJ	ND0.020UJ	ND0.020UJ	ND0.020	0.02U	5
alpha-Chlordane	ND0.010UJ	ND0.05UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	0.1
gamma-Chlordane	ND0.010UJ	ND0.05UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	0.1

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TABLE 6.9

SUMMARY OF DETECTED ROUND I GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-1M-I*		*NCR-2S-I*		*NCR-2I-I*		*NCR-2M-I*		*NCR-2D-I*		
SAMPLE DATE:	*3/14/91*		*3/14/91*		*3/14/91*		*3/14/91*		*3/14/91*		
	Total	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***MCL***
TAL METALS (µg/L)											
Aluminum	181B	93.4B	1110	130B	80800	301R	1460	140B	200U	139B	–
Antimony	ND28.0	ND22.0UJ	ND28.0	ND22.0UJ	ND28.0	ND22.0UJ	ND28.0	ND22.0UJ	ND28.0	ND22.0UJ	3G
Arsenic	16.3	12.8	ND3.0	ND3.0	14.6	5.2B	5.4B	6.3B	4.2B	ND3.0	25
Barium	55.8B	46.5B	31.7B	28.0B	431	37.7B	59.6B	38.4B	7.6B	5.7B	1,000
Beryllium	ND1.0	ND1.0	ND1.0	ND1.0	3.1B	ND1.0	1.0B	ND1.0	ND1.0	ND1.0	3G
Cadmium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	10
Calcium	48500	43700	80100	87000	511000	43000	50200	46000	468000	492000	–
Chromium	ND5.0	ND5.0	25.2	ND5.0	105J	ND5.0	9.0B	ND5.0	ND5.0	ND5.0	50
Cobalt	ND7.0	ND5.0	ND7.0	ND5.0	43.9B	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	–
Copper	3.1B	ND4.0	14.2B	ND4.0	109	ND4.0	36.3	5.5B	ND3.0	ND4.0	200
Iron	434	ND42.0	1440	ND42.0	108000J	235J	1820	ND42.0	284U	204	300
Lead	ND3.0	ND2.0UJ	ND3.0	ND2.0UJ	77.9	ND2.0UJ	ND3.0	ND20.0UJ	ND30.0R	ND20.0UJ	25
Magnesium	72900	71300	43300J	54000J	217000	97100	71000	78200	119000	124000	35,000G
Manganese	91.6	52.3	190J	415J	3740	133	106	40.9	33.7U	22.7	300
Mercury	ND0.20	ND0.15UJ	ND0.20	ND0.15UJ	1.8	ND0.15UJ	ND0.20	ND0.15UJ	ND0.20	0.15J	2
Nickel	ND11.0	ND7.0	19.0B	14.2B	133J	10.1B	ND11.0	ND7.0	ND11.0	ND7.0	–
Potassium	5040	3720B	1370B	ND1240	24300	3460B	4930B	5710	4090B	5000	–
Silver	ND4.0	ND5.0R	ND4.0	ND5.0UJ	ND4.0UJ	ND5.0UJ	ND4.0	ND5.0UJ	ND4.0	ND5.0UJ	50
Sodium	45100	43500	27100R	59600R	81000	82800	66900J	76200J	74900	77100	20,000
Vanadium	ND4.0	ND4.0	ND4.0	ND4.0	150	ND4.0	5.1B	ND4.0	ND4.0	ND4.0	–
Zinc	24.4J	2.6B	88.8	4.4B	469	2.4B	76.1	ND2.0	20U	2.4B	300

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SUMMARY OF DETECTED ROUND I GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-3S-I*		*NCR-3M-I*		*NCR-4S-I*		*NCR-4M-I*		*NCR-5S-I*		
SAMPLE DATE:	*3/18/91*		*3/18/91*		*3/26/91*		*3/25/91*		*3/18/91*		
	Total	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*MCL*
TAL METALS (µg/L)											
Aluminum	27300	73.9B	1180	124B	2440	55.6B	215U	51.1B	2200	113B	–
Antimony	ND28.0	ND22.0UJ	ND28.0	ND22.0UJ	ND28.0	ND22.0	ND28.0	ND22.0	ND28.0	ND22.0UJ	3G
Arsenic	6.1B	4.3B	3.0B	ND3.0	ND3.0	ND3.0	3.3B	ND3.0	ND3.0	ND3.0	25
Barium	364	191B	35.0B	24.0B	47.7B	15.6B	39.0B	31.7B	80.4B	56.5B	1,000
Beryllium	1.7B	ND1.0	1.5B	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	3G
Cadmium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	199R	ND4.0	ND4.0	ND4.0	ND4.0	10
Calcium	317000	288000	35600	28000	71100	73100	163000	163000	83300	79500	–
Chromium	134	ND5.0	14.6	ND5.0	91.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	50
Cobalt	19.6B	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	–
Copper	62.6	ND4.0	11.5B	ND4.0	20.4B	ND4.0	ND3.0	ND4.0	13.5B	9.8B	200
Iron	43600	1410	1200	ND42.0	7220	ND42.0	287U	ND42.0	2750	ND42.0	300
Lead	22.4	ND2.0UJ	ND3.0	ND2.0UJ	5.6J	ND20.0	ND3.0UJ	ND20.0	4.2	ND2.0UJ	25
Magnesium	100000	92300	33500	31700	28500	24400	62600	63000	64900	64500	35,000G
Manganese	3840	3340	128	60.2	1440	912	38.5	19.6	531	434	300
Mercury	ND0.20	ND0.15UJ	ND0.20	ND0.15UJ	ND0.20	ND0.20	ND0.20	ND0.20	ND0.20	ND0.15UJ	2
Nickel	155	87.6	12.0B	ND7.0	149	74.3	ND11.0	ND7.0	28.0B	35.3	–
Potassium	7410	2340B	3310B	2220B	1900B	ND1240	20800	17400	2900B	ND1240	–
Silver	ND4.0	ND5.0R	5.0B	ND5.0UJ	ND4.0UJ	ND5.0	ND4.0UJ	ND5.0	ND4.0	ND5.0UJ	50
Sodium	807000	825000	79100	81200	63000	60900	112000	110000	70800	68500	20,000
Vanadium	55.9	ND4.0	ND4.0	ND4.0	6.1B	ND4.0	ND4.0	ND4.0	4.7B	ND4.0	–
Zinc	149	7.2B	27.2J	ND2.0	96.8U	9.4B	20U	ND2.0	50.6J	5.0B	300

Notes:

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TABLE 6.9

SUMMARY OF DETECTED ROUND I GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-5M-I*		*NCR-5D-I*		*NCR-6M-I*		*NCR-6D-I*		*NCR-7M-I*		
SAMPLE DATE:	*3/15/91*		*3/15/91*		*3/21/91*		*3/22/91*		*3/19/91*		
	Total	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***MCL***
<u>TAL METALS (µg/L)</u>											
Aluminum	101B	86.0B	73.8B	42.0B	205J	97.3B	130B	ND35.0	200U	203	–
Antimony	ND28.0	ND22.0UJ	ND28.0	ND22.0UJ	ND28.0	ND22.0	ND28.0	ND22.0	ND28.0	26.9BJ	3G
Arsenic	7.1B	8.7B	ND3.0	ND3.0	5.9BJ	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	25
Barium	54.7B	46.5B	6.3B	6.1B	21.2B	21.7BJ	7.2B	7.8B	12.7B	14.0B	1,000
Beryllium	ND1.0	ND1.0	ND1.0	ND1.0	21.2B	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	3G
Cadmium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	10
Calcium	62100	61000	525000	538000	484000	499000J	553000	561000	532000J	631000J	–
Chromium	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	50
Cobalt	ND7.0	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	–
Copper	ND3.0	ND4.0	ND3.0	ND4.0	ND3.0	ND4.0	ND3.0	8.7B	ND3.0	ND4.0	200
Iron	722	573	101	43.1B	398	49.2B	291	276	1550	1710	300
Lead	ND3.0	ND2.0	ND15.0	ND20.0	ND15.0UJ	ND20.0R	ND27.0	ND20.0	ND3.0	ND20.0UJ	25
Magnesium	71600	71200	125000	128000	88700	91900J	148000	151000	95800J	113000J	35,000G
Manganese	39.4	24.3	38.7	23.1	42.9J	33.9J	19.7	18.0	103	103	300
Mercury	1.2	ND0.15UJ	ND0.20	ND0.15UJ	ND0.20R	ND0.20UJ	ND0.20	ND0.20UJ	ND0.20	ND0.15UJ	2
Nickel	ND11.0	ND7.0	ND11.0	ND7.0	ND11.0	ND7.0	ND11.0	ND7.0	ND11.0	8.9B	–
Potassium	2350B	2700B	6010	5960	11100	12700J	17900J	21100J	6310J	7510J	–
Silver	ND4.0	ND5.0UJ	ND4.0	ND5.0UJ	ND4.0UJ	ND5.0UJ	ND4.0UJ	ND5.0	ND4.0	8.2BJ	50
Sodium	15100	15600	123000	125000	92400	96000J	420000	433000	58400	66000	20,000
Vanadium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	9.6B	ND4.0	4.4B	–
Zinc	6.8B	ND2.0	3.7B	ND2.0	7.2B	ND2.0	7.4B	ND2.0	20U	ND2.0	300

<u>Notes:</u>

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WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-7M-I Dup*		*NCR-8M-I*		*NCR-8D-I*		*NCR-9M-I*		*NCR-10M-I*		
SAMPLE DATE:	*3/19/91*		*3/20/91*		*3/20/91*		*3/19/91*		*3/19/91*		
	Total	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	*MCL*
TAL METALS (µg/L)											
Aluminum	200U	138B	176B	86.4B	392	101B	200U	80.0B	211U	120B	–
Antimony	ND28.0	ND22.0UJ	ND28.0	ND22.0UJ	ND28.0	ND22.0UJ	ND28.0	ND22.0UJ	ND28.0	ND22.0UJ	3G
Arsenic	ND3.0	ND3.0	3.5B	4.6B	ND3.0	ND3.0	ND3.0	ND3.0	3.4B	ND3.0	25
Barium	13.2B	13.2B	30.7B	24.3B	7.5B	4.1B	9.2B	9.4B	23.2B	13.8B	1,000
Beryllium	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	3G
Cadmium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	10
Calcium	548000	587000	59800	58200	526000	557000	425000	448000	466000	481000	–
Chromium	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	50
Cobalt	ND7.0	5.9B	ND7.0	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	–
Copper	ND3.0	18.3B	N D3.0	ND4.0	ND3.0	ND4.0	ND3.0	ND4.0	ND3.0	ND4.0	200
Iron	1580	1600	318	72.4B	520	ND42.0	1660	1650	1180	988	300
Lead	ND3.0	ND20.0UJ	ND3.0	ND2.0UJ	ND15.0UJ	ND20.0UJ	ND3.0	ND20.0UJ	ND3.0	ND20.0UJ	25
Magnesium	98800	106000	33400	32400	123000	130000	81300	85300	74300	75400	35,000G
Manganese	105	96.3	42.4	21.9	44.1	21.4	57.7U	46.6	76.7	55.6	300
Mercury	ND0.20	ND0.15UJ	ND0.20	ND0.15UJ	ND0.20	ND0.15UJ	ND0.20	ND0.15UJ	ND0.20	ND0.15UJ	2
Nickel	ND11.0	ND7.0	ND11.0	ND7.0	ND11.0	ND7.0	ND11.0	ND7.0	ND11.0	ND7.0	–
Potassium	5570R	12000R	7210	6260	6270	6560	6300J	7970J	5570	6000	–
Silver	ND4.0	ND5.0UJ	ND4.0	ND5.0R	ND4.0	ND5.0R	ND4.0	ND5.0UJ	ND4.0	ND5.0R	50
Sodium	60100	63200	56700	54500	127000	131000	64900	67500	37000	36700	20,000
Vanadium	ND4.0	16.5B	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	–
Zinc	20U	4.1B	8.8B	ND2.0	13.9B	ND2.0	20U	ND2.0	20U	ND2.0	300

Notes:

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B	Detected below CRDL, but above instrument detection limit.

TABLE 6.9

SUMMARY OF DETECTED ROUND I GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-11M-I*		*NCR-11D-I*		*NCR-11D-I Dup*		*NCR-12D-I*		*NCR-12D-I Dup*		*NCR-13S-I*		
SAMPLE DATE:	*3/22/91*		*3/22/91*		*3/22/91*		*3/25/91*		*3/25/91*		*3/20/91*		
	Total	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*MCL*
<u>TAL METALS (µg/L)</u>													
Aluminum	22500	81.3B	119B	298J	89.1B	ND35.0UJ	200U	ND35.0UJ	200U	117BJ	265	96.5	–
Antimony	ND28.0	ND22.0UJ	ND28.0	58.4BJ	ND28.0	ND22.0UJ	ND28.0	ND22.0	ND28.0	39.1B	ND28.0	ND22.0UJ	3G
Arsenic	13.5	4.1B	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	25
Barium	260	23.6B	13.9B	9.2B	13.3B	4.4B	12.4B	12.6B	12.5B	11.0B	44.6B	41.2B	1,000
Beryllium	1.2B	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	3G
Cadmium	5.0B	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0UJ	ND4.0	ND4.0	ND4.0	ND4.0	10
Calcium	453000	116000	519000	547000	534000	568000	497000	528000	500000	512000	202000	195000	–
Chromium	42.8	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	50
Cobalt	15.1B	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	ND7.0	ND5.0	–
Copper	42.5	ND4.0	ND3.0	ND4.0	ND3.0	ND4.0	ND3.0	ND4.0UJ	ND3.0	19.9BJ	12.6B	ND4.0	200
Iron	41100	1390	88.4B	ND42.0	66.3B	ND42.0	630	601	645	579	6960	335	300
Lead	25.7J	ND2.0UJ	ND27.0UJ	ND20.0UJ	ND27.0	ND2.0UJ	ND27.0UJ	ND20.0	ND3.0UJ	ND20.0	ND3.0	ND20.0UJ	25
Magnesium	340000	235000	104000	109000	107000	116000	96900	103000	97400	101000	67400	64600	35,000G
Manganese	2670	455	17.2	19.3	17.3	16.6	24.1	24.4	23.8	24.9	3780	3660	300
Mercury	ND0.20	ND0.15UJ	ND0.20	ND0.15UJ	ND0.20	ND0.15UJ	ND0.20	ND0.20	ND0.20	ND0.20	ND0.20	ND0.15UJ	2
Nickel	57.9	ND7.0	ND11.0	ND7.0	ND11.0	ND7.0	ND11.0	ND7.0	ND11.0	ND7.0	128	111	–
Potassium	10300	5300	8140	8040J	7650	1910BJ	14600	14500	15200J	19200J	11200	9640	–
Silver	ND4.0UJ	ND5.0R	ND4.0UJ	15.1J	ND4.0	ND5.0J	ND4.0UJ	ND5.0	ND4.0UJ	6.6B	ND4.0	ND5.0R	50
Sodium	86500	87700	178000	177000	184000	200000	69600	72200	70100	66100	116000	107000	20,000
Vanadium	47.2B	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0UJ	ND4.0	19.4BJ	ND4.0	ND4.0	–
Zinc	269	11.6B	6.6B	ND2.0	6.8B	ND2.0	20U	ND2.0	20U	ND2.0	33.9	10.2B	300

<u>Notes:</u>

MCL	New York State Groundwater Maximum Contaminant Level
G	Guidance Value
ND	None detected at provided sample quantitation limits.
J	The associated numerical number is an estimated quantity.
UJ	The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U	The material was analyzed for but not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	Unusable data.
N	Presumptive evidence of presence of material.
P	Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E	Exceeded linear calibration range of instrument, requires dilution.
D	Sample was diluted and reanalyzed.
B	Detected below CRDL, but above instrument detection limit.

TABLE 6.10

SUMMARY OF DETECTED ROUND II GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*NCR-1M-II* *4/29/91*	*NCR-2S-II* *4/23/91*	*NCR-2I-II* *4/23/91*	*NCR-2M-II* *4/23/91*	*NCR-2D-II* *4/23/91*	*NCR-3S-II* *4/23/91*	*NCR-3M-II* *4/23/91*	*NCR-4S-II* *4/29/91*	*NCR-4M-II* *4/29/91*	*MCL*
TCL VOLATILES (µg/L)										
Methylene Chloride	3 U	3 U	4 J	3 U	2 U	3U	3 U	3 U	4 U	5
Acetone	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	5
Carbon Disulfide	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	50
2-Butanone	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	50
Toluene	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
Styrene	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
Xylenes (Total)	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
TCL SEMI-VOLATILES (µg/L)										
Phenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
2-Methylphenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
4-Methylphenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
2,4-Dimethylphenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
Diethyl Phthalate	ND5	ND5	1J	ND5	ND5	ND5	ND5	ND5	ND5	50G
bis(2-Ethylhexyl)phthalate	ND5	ND5	0.8J	ND5	ND5	ND5	2J	5U	ND5	50

Notes:

MCL - New York State Groundwater Maximum Contaminant Levels.
G - Guidance Value
ND - None detected at provided sample quantitation limits.
J - The associated numerical number is an estimated quantity.
UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U - The material was analyzed for but not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
P - Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E - Exceeded linear calibration range of instrument, requires dilution.
D - Sample was diluted and reanalyzed.
B - Detected below CRDL, but above instrument detection limit.

TABLE 6.10

SUMMARY OF DETECTED ROUND II GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-1M-II*	*NCR-2S-II*	*NCR-2I-II*	*NCR-2M-II*	*NCR-2D-II*	*NCR-3S-II*	*NCR-3M-II*	*NCR-4S-II*	*NCR-4M-II*	
SAMPLE DATE:	*4/29/91*	*4/23/91*	*4/23/91*	*4/23/91*	*4/23/91*	*4/23/91*	*4/23/91*	*4/29/91*	*4/29/91*	*MCL*
TCL PESTICIDES/PCB (µg/L)										
beta-BHC	ND0.0100	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	ND0.010	0.048UJ	ND0.0100UJ	ND0.0100	ND
gamma-BHC (Lindane)	ND0.0100	ND0.010UJ	0.00085 JP	ND0.010	ND0.010	ND0.010	ND0.010UJ	0.0016JP	ND0.0100	ND
Heptachlor	ND0.0100	ND0.010UJ	0.0033 JP	0.0037JP	ND0.010	0.00092JP	0.0019JP	ND0.0100UJ	ND0.0100	ND
4,4'-DDE	ND0.020	0.0011J	0.0012 JP	0.0012JP	0.00081J	ND0.020	0.00092JP	ND0.020UJ	ND0.020	ND
4,4'-DDD	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND
Endosulfan sulfate	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020	0.00089JP	ND0.020UJ	ND0.020	50
4,4'-DDT	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND
Methoxyclor	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	ND0.10	ND0.010UJ	0.10U	ND0.10	35
Endrin Ketone	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	5
Endrin aldehyde	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	5
alpha-Chlordane	ND0.0100	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	ND0.010	0.00098JP	0.0022JP	ND0.0100	0.1
gamma-Chlordane	ND0.0100	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	ND0.010	ND0.010UJ	0.0018JP	ND0.0100	0.1

Notes:

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D - Sample was diluted and reanalyzed.
B - Detected below CRDL, but above instrument detection limit.

TABLE 6.10

SUMMARY OF DETECTED ROUND II GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*NCR-5S-II* *4/23/91*	*NCR-5M-II* *4/23/91*	*NCR-5D-II* *4/23/91*	*NCR-6M-II* *4/26/91*	*NCR-6D-II* *4/26/91*	*NCR-7M-II* *4/24/91*	*NCR-7M-II Dup* *4/24/91*	*NCR-8M-II* *4/25/91*	*NCR-8M-II Dup* *4/25/91*	*NCR-8D-II* *4/26/91*	*MCL*
TCL VOLATILES (µg/L)											
Methylene Chloride	3 U	4 U	4 U	2 U	2 U	2 U	3 U	6 U	4 U	2 U	5
Acetone	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	5
Carbon Disulfide	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	50
2-Butanone	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	50
Toluene	ND1	3	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
Styrene	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
Xylenes (Total)	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
TCL SEMI-VOLATILES (µg/L)											
Phenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
2-Methylphenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
4-Methylphenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
2,4-Dimethylphenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
Diethyl Phthalate	ND5	ND5	5 U	ND5	ND5	5 U	ND5	ND5	ND5	ND5	50G
bis(2-Ethylhexyl)phthalate	5 U	ND5	5 U	3J	ND5	5 U	5 U	5 U	ND5	5	50

Notes:

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ND - None detected at provided sample quantitation limits.
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TABLE 6.10

SUMMARY OF DETECTED ROUND II GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-5S-II*	*NCR-5M-II*	*NCR-5D-II*	*NCR-6M-II*	*NCR-6D-II*	*NCR-7M-II*	*NCR-7M-II Dup*	*NCR-8M-II*	*NCR-8M-II Dup*	*NCR-8D-II*	
SAMPLE DATE:	*4/23/91*	*4/23/91*	*4/23/91*	*4/26/91*	*4/26/91*	*4/24/91*	*4/24/91*	*4/25/91*	*4/25/91*	*4/26/91*	*MCL*
<u>TCL PESTICIDES/PCB (µg/L)</u>											
beta-BHC	ND0.0100UJ	ND0.010	ND0.0100	ND0.0020UJ	ND0.010UJ	ND0.0100	ND0.0100	ND0.0100	ND0.0100	ND0.0020	ND
gamma-BHC (Lindane)	ND0.0100UJ	ND0.010	ND0.0100	ND0.0020UJ	ND0.010UJ	ND0.0100	ND0.0100	ND0.0100	ND0.0100	ND0.0020	ND
Heptachlor	0.013U	0.0011JP	0.01U	0.0035J	ND0.010UJ	0.01U	0.01U	0.00095J	0.00083JP	0.0015JP	ND
4,4'-DDE	ND0.020UJ	0.00098JP	ND0.020	ND0.0040UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020	ND0.020	ND0.0040	ND
4,4'-DDD	ND0.020UJ	ND0.020	ND0.020	ND0.0040UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020	ND0.020	ND0.0040	ND
Endosulfan sulfate	ND0.020UJ	ND0.020	ND0.020	ND0.0040UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020	ND0.020	ND0.0040	50
4,4'-DDT	ND0.020UJ	ND0.020	ND0.020	ND0.0040UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020	ND0.020	ND0.0040	ND
Methoxyclor	ND0.10UJ	ND0.10	ND0.10	ND0.020UJ	ND0.10UJ	ND0.10	ND0.010	ND0.010	ND0.010	ND0.020	35
Endrin Ketone	ND0.020UJ	ND0.020	ND0.020	ND0.0040UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020	0.0024JP	ND0.0040	5
Endrin aldehyde	ND0.020UJ	ND0.020	ND0.020	ND0.0040UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020	ND0.020	ND0.0040	5
alpha-Chlordane	ND0.0100UJ	ND0.010	ND0.010	ND0.0020UJ	ND0.010UJ	ND0.0100	ND0.0100	ND0.0100	ND0.0100	ND0.0020	0.1
gamma-Chlordane	ND0.0100UJ	ND0.010	ND0.010	ND0.0020UJ	ND0.010UJ	ND0.0100	ND0.0100	ND0.0100	ND0.0100	ND0.0020	0.1

<u>Notes:</u>

MCL - New York State Groundwater Maximum Contaminant Levels.
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ND - None detected at provided sample quantitation limits.
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P - Indicates greater than 25% difference between the concentration calculated from the two GC columns.
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D - Sample was diluted and reanalyzed.

TABLE 6.10

SUMMARY OF DETECTED ROUND II GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*NCR-9M-II* *4/25/91*	*NCR-10M-II* *4/25/91*	*NCR-11M-II* *4/30/91*	*NCR-11D-II* *5/1/91*	*NCR-12D-II* *4/30/91*	*NCR-12D-II Diluted* *4/30/91*	*NCR-12D-II Dup* *4/30/91*	*NCR-12D-II Dup/Dil* *4/30/91*	*NCR-13S-II* *4/24/91*	*MCL*
TCL VOLATILES (µg/L)										
Methylene Chloride	3 U	5U	3U	2 U	4 U	–	4 U	–	5 U	5
Acetone	ND5 UJ	ND5 UJ	ND5 UJ	ND5 UJ	19 U	–	24 U	–	ND5 UJ	5
Carbon Disulfide	ND1	ND1	ND1	ND1	ND1	–	1	–	ND1	50
2-Butanone	ND5	ND5	ND5	ND5	ND7	–	15	–	ND5	50
Toluene	ND1	ND1	ND1	ND1	1J	–	1	–	ND1	5
Styrene	ND1	ND1	ND1	ND1	2	–	2	–	ND1	5
Xylenes (Total)	ND1	ND1	ND1	ND1	1J	–	0.9J	–	ND1	5
TCL SEMI-VOLATILES (µg/L)										
Phenol	ND5	ND5	ND5	ND5	480E	740D	500E	810D	ND5	1
2-Methylphenol	ND5	ND5	ND5	ND5	480E	740D	500E	810D	ND5	1
4-Methylphenol	ND5	ND5	ND5	ND5	21	23DJ	22	22DJ	ND5	1
2,4-Dimethylphenol	ND5	ND5	ND5	ND5	2J	ND50	2J	ND75	ND5	1
Diethyl Phthalate	2J	ND5	ND5	ND5	ND5	ND50	ND5	ND75	ND5	50G
bis(2-Ethylhexyl)phthalate	ND5 5	ND5	ND5	5U	ND5	ND50	ND5	ND74	5U	50

Notes:

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SUMMARY OF DETECTED ROUND II GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*NCR-9M-II* *4/25/91*	*NCR-10M-II* *4/25/91*	*NCR-11M-II* *4/30/91*	*NCR-11D-II* *5/1/91*	*NCR-12D-II* *4/30/91*	*NCR-12D-II Diluted* *4/30/91*	*NCR-12D-II Dup* *4/30/91*	*NCR-12D-II Dup/Dil* *4/30/91*	*NCR-13S-II* *4/24/91*	*MCL*
<u>TCL PESTICIDES/PCB (µg/L)</u>										
beta-BHC	ND0.0100	ND0.0100	ND0.0050UJ	ND0.050	ND0.0050UJ	–	ND0.0050UJ	–	ND0.0020	ND
gamma-BHC (Lindane)	ND0.0100	ND0.0100	ND0.0050UJ	0.0030JP	0.00041JP	–	ND0.0050UJ	–	ND0.0020	ND
Heptachlor	0.016P	0.00099JP	ND0.0050UJ	ND0.050	ND0.0050UJ	–	0.00059JP	–	0.090	ND
4,4'-DDE	ND0.020	0.002U	ND0.0100UJ	0.57P	ND0.0100UJ	–	ND0.0050UJ	–	0.02U	ND
4,4'-DDD	0.002U	ND0.020	ND0.0100UJ	0.24P	ND0.0100UJ	–	ND0.0050UJ	–	ND0.0040	ND
Endosulfan sulfate	ND0.020	ND0.020	ND0.0100UJ	0.056JP	0.00069JP	–	ND0.0100UJ	–	ND0.0040	50
4,4'-DDT	0.14	ND0.020	ND0.0100UJ	0.67P	ND0.0100UJ	–	ND0.0100UJ	–	ND0.0040	ND
Methoxyclor	0.0025JP	ND0.10	0.10U	ND0.050	0.10U	–	ND0.0050UJ	–	ND0.020	35
Endrin Ketone	ND0.020	ND0.020	ND0.0100UJ	0.022JP	ND0.0100UJ	–	ND0.0050UJ	–	ND0.0040	5
Endrin aldehyde	ND0.020	ND0.020	ND0.0100UJ	0.0076JP	ND0.0100UJ	–	ND0.0050UJ	–	0.0025J	5
alpha-Chlordane	ND0.0100	ND0.0100	ND0.0050UJ	ND0.050	ND0.0050UJ	–	ND0.0050UJ	–	0.00062JP	0.1
gamma-Chlordane	ND0.0100	ND0.0100	ND0.0050UJ	0.015J	ND0.0050UJ	–	ND0.0050UJ	–	ND0.0020	0.1

<u>Notes:</u>

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TABLE 6.10

SUMMARY OF DETECTED ROUND II GROUNDWATER PARAMETGERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-1M-II*		*NCR-2S-II*		*NCR-2I-II*		*NCR-2M-II*		*NCR-2D-II*		*NCR-3S-II*		*NCR-3M-II*		
SAMPLE DATE:	*4/29/91*		*4/24/91*		*4/23/91*		*4/23/91*		*4/23/91*		*4/23/91*		*4/23/91*		
	Total	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*MCL*
TAL METALS (µg/L)															
Aluminum	200U	117B	15400	68.2B	55600	ND35.0	1960	77.3B	80.5B	ND35.0	9370	38.2B	3040	85.5B	–
Antimony	ND22.0	ND22.0	ND22.0UJ	ND22.0	26.4BJ	ND22.0	ND22.0UJ	ND22.0	ND22.0UJ	ND22.0	ND22.0UJ	ND22.0	ND22.0UJ	ND22.0	3G
Arsenic	16.4	13.4	4.2B	ND3.0	15.4	6.5B	6.9B	6.2B	ND3.0	ND3.0	4.9B	ND3.0	ND3.0	ND3.0	25
Barium	59.9B	56.0B	153B	76.5B	413	77.1B	60.6B	56.4B	5.9B	4.0B	294	242J	48.6BJ	72.2BJ	1,000
Beryllium	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	2.6B	ND1.0UJ	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	3G
Cadmium	ND4.0	ND4.0UJ	4.6BJ	4.1BJ	5.7R	28.5R	ND4.0UJ	ND4.0UJ	ND4.0UJ	ND4.0UJ	ND4.0UJ	ND4.0UJ	ND4.0UJ	5.0BJ	10
Calcium	47400	47000	101000	88200	577000	38100	55800	43300	500000	506000	293000	275000	36000	28100	–
Chromium	ND5.0	ND5.0UJ	128J	ND5.0UJ	101J	ND5.0UJ	8.3BJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	77.2J	ND5.0UJ	119J	ND5.0UJ	50
Cobalt	ND5.0	ND5.0UJ	9.0B	ND5.0UJ	33.7B	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0	ND5.0UJ	9.1B	ND5.0UJ	ND5.0	ND5.0UJ	–
Copper	ND4.0	ND4.0UJ	39.5	ND4.0UJ	127	ND4.0UJ	8.8B	ND4.0UJ	ND4.0	ND4.0UJ	25.0	ND4.0UJ	11.2B	ND4.0UJ	200
Iron	500	ND42.0	17800	ND42.0	76700	ND42.0	2630	ND42.0	237	189	12600	2270J	3900	ND42.0	300
Lead	ND20.0	ND2.0	7.6	ND2.0	61.6	ND2.0	2.6B	ND2.0	ND10.0UJ	ND20.0	5.5	ND20.0	2.9B	ND2.0UJ	25
Magnesium	74500J	83200J	59200	51100	251000	99000	77200	72800	124000	130000	90600	87100	33500	31100	35,000G
Manganese	46.2	43.5	580	175	3930	168	115	34.8	23.3	19.3	3550	3360J	140	35.7	300
Nickel	ND7.0	ND7.0	93.7	10.1B	107	ND7.0	9.5B	ND7.0	ND7.0	ND7.0	99.4	34.8B	66.5	ND7.0	–
Potassium	4550B	4040B	5730	ND1240	19200	2430B	4780B	3020B	4690B	2110B	6300	1970B	3230B	1820B	–
Silver	ND5.0	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	50
Sodium	42300J	48500J	64700	38100	83200	73100	76600	70500	77600J	92100J	3610000	1080000	80200	76800	20,000
Vanadium	ND4.0	ND4.0	28.8B	ND4.0	105	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	18.4B	ND4.0	6.3B	ND4.0	–
Zinc	26.5U	6.7B	121	29.2	508	24.6	71.5	13.2B	15.3BJ	ND2.0	133	35.7	47.3	13.1B	300

Notes:

MCL	New York State Groundwater Maximum Contaminant Levels.
G	Guidance Value
ND	None detected at provided sample quantitation limits.
J	The associated numerical number is an estimated quantity.
UJ	The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U	The material was analyzed for but not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	Unusable data.
N	Presumptive evidence of presence of material.
P	Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E	Exceeded linear calibration range of instrument, requires dilution.
D	Sample was diluted and reanalyzed.
B	Detected below CRDL, but above instrument detection limit.

TABLE 6.10

SUMMARY OF DETECTED ROUND II GROUNDWATER PARAMETGERS
NCR SITE
WHEATFIELD, NEW YORK

	NCR-4S-II		*NCR-4M-II*		*NCR-5S-II*		*NCR-5M-II*		*NCR-5D-II*		*NCR-6M-II*		*NCR-6D-II*		
	4/30/91		*4/29/91*		*4/24/91*		*4/23/91*		*4/24/91*		*4/26/91*		*4/26/91*		
	Total	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*MCL*
<u>TAL METALS (µg/L)</u>															
Aluminum	1420	45.3B	1270	99.4B	6460	49.5B	132B	97.7B	200U	ND35.0	116BR	750R	121B	96.8B	–
Antimony	ND22.0	ND36.0UJ	ND22.0	ND36.0UJ	ND22.0UJ	ND22.0	ND22.0UJ	ND22.0	ND22.0UJ	ND22.0	ND22.0R	153R	ND22.0R	374R	3G
Arsenic	ND3.0	ND3.0UJ	5.1B	ND30.0UJ	ND3.0	ND3.0	8.2B	8.1B	ND3.0	ND3.0	ND3.0R	483R	ND3.0	ND3.0	25
Barium	26.9B	28.2B	37.6B	29.3B	130B	159B	56.6B	50.9B	200U	35.1B	11.4B	21.4B	7.4B	30.0B	1,000
Beryllium	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	3G
Cadmium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0UJ	9.5J	ND4.0UJ	ND4.0UJ	ND4.0UJ	ND4.0	ND4.0R	35.3R	ND4.0UJ	ND4.0UJ	10
Calcium	70300R	183000R	171000	182000	130000	83900	61400	62600	520000J	589000J	483000J	604000J	549000J	629000J	–
Chromium	47.0	ND5.0	ND5.0	ND5.0	24.5J	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0	ND5.0UJ	ND5.0UJ	ND5.0UJ	50
Cobalt	ND5.0	ND5.0	ND5.0	ND5.0	6.6B	ND5.0UJ	ND5.0	ND5.0UJ	ND5.0UJ	6.4BJ	ND5.0	ND5.0UJ	ND5.0	ND5.0UJ	–
Copper	7.4B	ND9.0	5.2B	ND9.0	31.2	ND4.0UJ	ND4.0	ND4.0UJ	ND4.0UJ	ND4.0UJ	ND4.0	ND4.0UJ	4.5B	ND4.0UJ	200
Iron	1560	67.8B	1070	28.5B	8660	ND42.0	807	719	104	86.6BJ	483	437	386	275	300
Lead	ND20.0	ND20.0UJ	ND20.0	ND20.0R	13.2	ND2.0	ND2.0	ND2.0	ND10.0	ND20.0UJ	ND20.0R	ND20.0UJ	ND2.0	ND20.0UJ	25
Magnesium	23400R	68200R	66000	69800	77100	66200	73700	73600	122000J	138000J	86800J	105000J	144000J	175000J	35,000G
Manganese	687	24.8U	68.9	24.6	651	245	35.4	29.9	24.5	28.0	44.0J	53.9J	23.4J	33.1J	300
Nickel	52.1	ND35.0UJ	ND7.0	ND35.0UJ	26.8B	12.0B	ND7.0	ND7.0	ND7.0	ND7.0	ND7.0R	47.6R	ND7.0	ND7.0	–
Potassium	1960BR	12400R	13900	14400	4200B	1950B	6450	4210B	7460	5390	9040	6980	17100	17400	–
Silver	ND5.0	ND5.0UJ	ND5.0	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0R	25.0R	ND5.0R	77.9R	50
Sodium	59200R	112000R	104000	115000	60200	62000	19900	17600	120000	129000	87600	94600	407000	461000	20,000
Vanadium	ND4.0	ND6.0	ND4.0	ND6.0	13.7B	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	–
Zinc	34.7U	ND2.0	36.2U	ND2.0	160	42.9	16.7B	ND2.0	20U	3.4B	23.2J	ND2.0	9.2B	24.5	300

Notes:

MCL	New York State Groundwater Maximum Contaminant Levels.
G	Guidance Value
ND	None detected at provided sample quantitation limits.
J	The associated numerical number is an estimated quantity.
UJ	The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U	The material was analyzed for but not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	Unusable data.
N	Presumptive evidence of presence of material.
P	Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E	Exceeded linear calibration range of instrument, requires dilution.
D	Sample was diluted and reanalyzed.
B	Detected below CRDL, but above instrument detection limit.

TABLE 6.10

SUMMARY OF DETECTED ROUND II GROUNDWATER PARAMETGERS
NCR SITE
WHEATFIELD, NEW YORK

	NCR-7M-II *4/24/91*		*NCR-7M-II* *Dup* *4/24/91*		*NCR-8M-II* *4/25/91*		*NCR-8M-II* *Dup* *4/25/91*		*NCR-8D-II* *4/26/91*		*NCR-9M-II* *4/25/91*		*NCR-10M-II* *4/25/91*		
	Total	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*MCL*
TAL METALS (µg/L)															
Aluminum	334J	291	829J	120B	200U	90.8B	200U	85.2B	ND35.0	ND35.0	200U	120B	200U	ND35.0	–
Antimony	ND22.0UJ	151J	ND22.0R	219R	ND22.0UJ	ND22.0	ND22.0UJ	ND22.0	ND22.0R	135R	ND22.0R	160R	ND22.0UJ	ND22.0	3G
Arsenic	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	3.6B	ND3.0	4.2B	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	3.0B	25
Barium	15.8B	16.6B	23.6B	47.9B	25.1B	26.9B	25.5B	26.5B	3.4B	5.6B	11.0B	43.7B	17.1B	39.9B	1,000
Beryllium	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	ND1.0	ND1.0UJ	3G
Cadmium	ND4.0UJ	8.9	ND4.0UJ	ND4.0UJ	ND4.0UJ	ND4.0UJ	ND4.0UJ	ND4.0UJ	ND4.0UJ	10.6J	ND4.0UJ	5.5J	ND4.0UJ	ND4.0UJ	10
Calcium	534000J	607000J	529000J	623000J	62600J	70300J	63900J	70300J	513000J	603000J	424000	484000	463000	499000	–
Chromium	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	50
Cobalt	ND5.0	ND5.0UJ	ND5.0	ND5.0UJ	ND5.0	ND5.0UJ	ND5.0	ND5.0UJ	ND5.0	ND5.0UJ	ND5.0	9.8BJ	ND5.0	ND5.0UJ	–
Copper	ND4.0	ND5.0UJ	10.7B	ND4.0UJ	ND4.0	ND4.0UJ	ND4.0	ND4.0UJ	ND4.0	ND4.0UJ	ND4.0	16.4BJ	ND4.0	ND4.0UJ	200
Iron	1630	991J	1710	368J	182	ND42.0	188	ND42.0	ND42.0	ND42.0	1580	686	972	844	300
Lead	ND10.0	ND20.0UJ	ND10.0	ND20.0UJ	ND2.0	ND2.0	ND2.0	ND2.0	ND10.0	ND20.0UJ	ND2.0	ND2.0UJ	ND2.0	ND20.0UJ	25
Magnesium	94400J	106000J	94200J	110000J	31900J	36300J	32300J	36300J	118000J	137000J	80000J	90200J	72300	79200	35,000G
Manganese	93.2	102	109	117	18.7	20.5	19.1	20.4	19.5J	26.5J	55.7	66.0	55.8J	63.6J	300
Nickel	ND7.0	11.6B	ND7.0	ND7.0	ND7.0	ND7.0	ND7.0	ND7.0	ND7.0	ND7.0	ND7.0	14.6B	ND7.0	ND7.0	–
Potassium	6500	3970	7320	7390	3910B	4440B	4670B	4100B	5020	4640B	15400J	23800J	3780B	ND1240	–
Silver	ND5.0UJ	30.1J	ND5.0UJ	42.2J	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	27.6J	ND5.0R	34.9R	ND5.0UJ	ND5.0UJ	50
Sodium	57900	63200	58700	62900	53600J	61600J	53800J	61800J	126000	134000	71900	76600	35500J	41300J	20,000
Vanadium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	15.0B	ND4.0	ND4.0	–
Zinc	8.5BJ	5.2BJ	44.0J	49.1J	20U	3.9B	20U	2.3B	4.2B	ND2.0	20U	29.4J	20U	21.4	300

Notes:

MCL	New York State Groundwater Maximum Contaminant Levels.
G	Guidance Value
ND	None detected at provided sample quantitation limits.
J	The associated numerical number is an estimated quantity.
UJ	The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U	The material was analyzed for but not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	Unusable data.
N	Presumptive evidence of presence of material.
P	Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E	Exceeded linear calibration range of instrument, requires dilution.
D	Sample was diluted and reanalyzed.
B	Detected below CRDL, but above instrument detection limit.

TABLE 6.10

SUMMARY OF DETECTED ROUND II GROUNDWATER PARAMETGERS
NCR SITE
WHEATFIELD, NEW YORK

	NCR-11M-II 4/30/91		*NCR-11D-II 5/1/91*		*NCR-12D-II 4/30/91*		*NCR-12D-II Dup 4/30/91*		*NCR-13S-II 4/25/91*		
	Total	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***MCL***
TAL METALS (µg/L)											
Aluminum	29200	84.5B	124B	ND35.0	132B	141B	66.4B	118B	228U	87.5B	–
Antimony	29.6B	ND36.0UJ	23.1B	108	26.6B	ND36.0UJ	ND22.0	200U	ND22.0UJ	ND22.0	3G
Arsenic	12.9	ND3.0UJ	ND3.0	ND3.0UJ	ND3.0	ND30.0UJ	ND3.0	ND30.0UJ	ND3.0	ND3.0	25
Barium	274	55.2B	18.9B	17.0B	9.9B	10.6B	9.0B	10.2B	46.3B	107B	1,000
Beryllium	1.1B	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0UJ	3G
Cadmium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0UJ	ND4.0UJ	10
Calcium	281000	114000	540000	586000	523000	561000	499000J	575000J	184000J	221000J	–
Chromium	84.9	ND5.0	ND5.0	10U	ND5.0	ND5.0	ND5.0	ND5.0	7.5BJ	ND5.0UJ	50
Cobalt	14.0B	ND5.0	ND5.0	6.7B	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0UJ	–
Copper	54.4	ND9.0	ND4.0	ND9.0	ND4.0	ND9.0	ND4.0	ND9.0	ND4.0	ND4.0UJ	200
Iron	40500	1820	59.5B	ND7.0	675	623	588J	666J	8650	ND42.0	300
Lead	ND20.0	ND20.0	ND20.0	ND20.0	ND20.0	ND20.0UJ	ND20.0	ND20.0UJ	ND2.0UJ	ND2.0UJ	25
Magnesium	308000	293000	106000J	124000J	98600J	110000J	94000J	117000J	64900	67300	35,000G
Manganese	1610	458	18.8	22.5U	25.1	27.5U	23.4	28.3U	1810	1460	300
Nickel	65.6	ND35.0UJ	ND7.0	ND35.0UJ	ND7.0	ND35.0UJ	ND7.0	ND35.0UJ	42.7	35.8B	–
Potassium	14700	5010	13100J	19700J	10400	6980	9580	10200	7790J	14600J	–
Silver	ND5.0	ND5.0UJ	ND5.0	21.8U	ND5.0	ND5.0UJ	ND5.0	ND5.0UJ	ND5.0UJ	ND5.0UJ	50
Sodium	89700J	110000J	187000	216000	67900	74800	64200J	78700J	95800J	138000J	20,000
Vanadium	58.9	ND6.0	ND4.0	ND6.0	ND4.0	ND6.0	ND4.0	ND6.0	ND4.0	ND4.0	–
Zinc	268	30.7U	12.3B	ND2.0	21.2J	ND2.0	10.2B	ND2.0	20UR	46.2R	300

Notes:

MCL	New York State Groundwater Maximum Contaminant Levels.
G	Guidance Value
ND	None detected at provided sample quantitation limits.
J	The associated numerical number is an estimated quantity.
UJ	The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise.
U	The material was analyzed for but not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	Unusable data.
N	Presumptive evidence of presence of material.
P	Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E	Exceeded linear calibration range of instrument, requires dilution.
D	Sample was diluted and reanalyzed.
B	Detected below CRDL, but above instrument detection limit.

TABLE 6.11

SUMMARY OF DETECTED SHALLOW OVERBURDEN GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-2S-I*	*NCR-2S-II*	*NCR-3S-I*	*NCR-3S-II*	*NCR-4S-I*	*NCR-4S-II*	*NCR-5S-I*	*NCR-5S-II*	*NCR-13S-I*	*NCR-13S-II*	
SAMPLE DATE:	*3/14/91*	*4/23/91*	*3/18/91*	*4/23/91*	*3/22/91*	*4/29/91*	*3/18/91*	*4/23/91*	*3/20/91*	*4/24/91*	*MCL*
TCL SEMI-VOLATILES (µg/L)											
Phenol	ND5	ND5	ND5	ND6	4 J	ND6	ND5	ND5	ND5	ND5	1
Pentachlorophenol	ND20	ND20	ND20	ND20	ND20	ND20	ND20	ND20	3 J	ND20	1
Butylbenzylphthalate	5U	ND5	ND5	ND5	ND6	ND5	3 J	ND5	ND5	ND5	50
bis(2-Ethylhexyl)phthalate	6U	ND5	ND5	ND6	5U	5U	23	5 U	8	5U	50
TCL PESTICIDES/PCB (µg/L)											
alpha-BHC	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	ND0.0100UJ	0.00054JP	ND0.0100UJ	ND0.010UJ	ND0.0020	ND
beta-BHC	ND0.010UJ	ND0.010UJ	0.049 P	ND0.010	ND0.010UJ	ND0.0100UJ	ND0.010UJ	ND0.0100UJ	ND0.010UJ	ND0.0020	ND
delta-BHC	0.0012 J	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND
gamma-BHC (Lindane)	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	0.0016JP	0.0011JP	ND0.0100UJ	ND0.010UJ	ND0.0020	ND
Heptachlor	ND0.010UJ	ND0.010UJ	ND0.010	0.00092JP	ND0.010UJ	ND0.0100UJ	ND0.010UJ	0.013U	ND0.010UJ	0.090	ND
4,4'-DDE	ND0.020UJ	0.0011J	0.0010 JP	ND0.020	0.0012JP	ND0.020UJ	ND0.020UJ	ND0.020UJ	ND0.020UJ	0.02U	ND
Methoxyclor	ND0.010UJ	ND0.010UJ	ND0.010	ND0.10	0.0078JP	0.10U	ND0.010UJ	ND0.10UJ	ND0.010UJ	ND0.020	35
Endrin aldehyde	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	0.02U	ND0.020UJ	0.02U	0.0025J	5
alpha-Chlordane	ND0.010UJ	ND0.010UJ	0.0015 JP	ND0.010	ND0.010UJ	0.0022JP	ND0.010UJ	ND0.0100UJ	ND0.010UJ	0.00062JP	0.1
gamma-Chlordane	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	0.0018JP	0.01U	ND0.0100UJ	ND0.010UJ	ND0.0020	0.1

Notes:

MCL - New York State Groundwater Maximum Contaminant Level.
G - Guidance value.
ND - None detected at provided sample quantitation limits.
J - The associated numerical number is an estimated quantity.
UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise
U - The material was analyzed for but not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
P - Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E - Exceeded linear calibration range of instrument, requires dilution.
D - Sample was diluted and reanalyzed.
B - Detected below CRDL, but above instrument detection limit.

TABLE 6.11

SUMMARY OF DETECTED SHALLOW OVERBURDEN GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-2S-I*		*NCR-2S-II*		*NCR-3S-I*		*NCR-3S-II*		*NCR-4S-I*		
SAMPLE DATE:	*3/14/91*		*4/24/91*		*3/18/91*		*4/23/91*		*3/26/91*		
	Total	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*MCL*
<u>TAL METALS (µg/L)</u>											
Aluminum	1110	130B	15400	68.2B	27300	73.9B	9370	38.2B	2440	55.6B	--
Arsenic	ND3.0	ND3.0	4.2B	ND3.0	6.1B	4.3B	4.9B	ND3.0	ND3.0	ND3.0	75
Barium	31.7B	28.0B	153B	76.5B	364	191B	294	242J	47.7B	15.6B	1,000
Beryllium	ND1.0	ND1.0	ND1.0	ND1.0UJ	1.7B	ND1.0	ND1.0	ND1.0UJ	ND1.0	ND1.0	3G
Cadmium	ND4.0	ND4.0	4.6BJ	4.1BJ	ND4.0	ND4.0	ND4.0UJ	ND4.0UJ	ND4.0	199R	10
Calcium	80100	87000	101000	88200	317000	288000	293000	275000	71100	73100	--
Chromium	25.2	ND5.0	128J	ND5.0UJ	134	ND5.0	77.2J	ND5.0UJ	91.0	ND5.0	50
Cobalt	ND7.0	ND5.0	9.0B	ND5.0UJ	19.6B	ND5.0	9.1B	ND5.0UJ	ND7.0	ND5.0	--
Copper	14.2B	ND4.0	39.5	ND4.0UJ	62.6	ND4.0	25.0	ND4.0UJ	20.4B	ND4.0	200
Iron	1440	ND42.0	17800	ND42.0	43600	1410	12600	2270J	7220	ND42.0	300
Lead	ND3.0	ND2.0UJ	7.6	ND2.0	22.4	ND2.0UJ	5.5	ND20.0	5.6J	ND20.0	25
Magnesium	43300J	54000J	59200	51100	100000	92300	90600	87100	28500	24400	35,000G
Manganese	190J	415J	580	175	3840	3340	3550	3360J	1440	912	300
Nickel	19.0B	14.2B	93.7	10.1B	155	87.6	99.4	34.8B	149	74.3	--
Potassium	1370B	ND1240	5730	ND1240	7410	2340B	6300	1970B	1900B	ND1240	--
Sodium	27100R	59600R	64700	38100	807000	825000	3610000	1080000	63000	60900	20,000
Vanadium	ND4.0	ND4.0	28.8B	ND4.0	55.9	ND4.0	18.4B	ND4.0	6.1B	ND4.0	--
Zinc	88.8	4.4B	121	29.2	149	7.2B	133	35.7	96.8U	9.4B	300

<u>Notes:</u>

MCL - New York State Groundwater Maximum Contaminant Level.
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ND - None detected at provided sample quantitation limits.
J - The associated numerical number is an estimated quantity.
UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise
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R - Unusable data.
N - Presumptive evidence of presence of material.
P - Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E - Exceeded linear calibration range of instrument, requires dilution.
D - Sample was diluted and reanalyzed.
B - Detected below CRDL, but above instrument detection limit.

TABLE 6.11

SUMMARY OF DETECTED SHALLOW OVERBURDEN GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-4S-II*		*NCR-5S-I*		*NCR-5S-II*		*NCR-13S-I*		*NCR-13S-II*		
SAMPLE DATE:	*4/30/91*		*3/18/91*		*4/24/91*		*3/20/91*		*4/25/91*		
	Total	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*MCL*
<u>TAL METALS (µg/L)</u>											
Aluminum	1420	45.3B	2200	113B	6460	49.5B	265	96.5	228U	87.5B	–
Arsenic	ND3.0	ND3.0UJ	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	75
Barium	26.9B	28.2B	80.4B	56.5B	130B	159B	44.6B	41.2B	46.3B	107B	1,000
Beryllium	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0UJ	ND1.0	ND1.0	ND1.0	ND1.0UJ	3G
Cadmium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0UJ	9.5J	ND4.0	ND4.0	ND4.0UJ	ND4.0UJ	10
Calcium	70300R	183000R	83300	79500	130000	83900	202000	195000	184000J	221000J	–
Chromium	47.0	ND5.0	ND5.0	ND5.0	24.5J	ND5.0UJ	ND5.0	ND5.0	7.5BJ	ND5.0UJ	50
Cobalt	ND5.0	ND5.0	ND7.0	ND5.0	6.6B	ND5.0UJ	ND7.0	ND5.0	ND5.0	ND5.0UJ	–
Copper	7.4B	ND9.0	13.5B	9.8B	31.2	ND4.0UJ	12.6B	ND4.0	ND4.0	ND4.0UJ	200
Iron	1560	67.8B	2750	ND42.0	8660	ND42.0	6960	335	8650	ND42.0	300
Lead	ND20.0	ND20.0UJ	4.2	ND2.0UJ	13.2	ND2.0	ND3.0	ND20.0UJ	ND2.0UJ	ND2.0UJ	25
Magnesium	23400R	68200R	64900	64500	77100	66200	67400	64600	64900	67300	35,000G
Manganese	687	24.8U	531	434	651	245	3780	3660	1810	1460	300
Nickel	52.1	ND35.0UJ	28.0B	35.3	26.8B	12.0B	128	111	42.7	35.8B	–
Potassium	1960BR	12400R	2900B	ND1240	4200B	1950B	11200	9640	7790J	14600J	–
Sodium	59200R	112000R	70800	68500	60200	62000	116000	107000	95800J	138000J	20,000
Vanadium	ND4.0	ND6.0	4.7B	ND4.0	13.7B	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	–
Zinc	34.7U	ND2.0	50.6J	5.0B	160	42.9	33.9	10.2B	20UR	46.2R	300

<u>Notes:</u>

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TABLE

SUMMARY OF DETECTED DEEP OVERBURDEN (CLAY/UPPER AND LOWER TILL UNITS) GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*NCR-1M-I* *3/20/91*	*NCR-1M-II* *4/29/91*	*NCR-2I-I* *3/14/91*	*NCR-2I-II* *4/23/91*	*NCR-2M-I* *3/14/91*	*NCR-2M-II* *4/23/91*	*NCR-3M-I* *3/18/91*	*NCR-3M-II* *4/23/91*	*NCR-4M-I* *3/25/91*	*NCR-4M-II* *4/29/91*	*MCL*
<u>TCL VOLATILES (µg/L)</u>											
Methylene Chloride	4UR	3 U	3UR	4 J	20UR	3 U	2UR	3 U	3UR	4 U	5
Benzene	ND1	ND1	ND1	ND1	1	ND1	ND1	ND1	ND1	ND1	ND
Toluene	ND1	ND1	ND1	ND1	5	ND1	ND1	ND1	ND1	ND1	5
Ethylbenzene	ND1	ND1	ND1	ND1	1	ND1	ND1	ND1	ND1	ND1	5
Xylenes (Total)	ND1	ND1	ND1	ND1	8	ND1	ND1	ND1	ND1	ND1	5
<u>TCL SEMI-VOLATILES (µg/L)</u>											
Phenol	2 J	ND5	ND5	ND5	ND5	ND5	ND5	ND5	2 J	ND5	1
Diethyl Phthalate	ND5	ND5	ND5	1J	ND5	ND5	ND5	ND5	ND5	ND5	50 G
Di-n-Butylphthalate	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1J	ND5	50
Butylbenzylphthalate	ND5	ND5	6U	ND5	ND5	ND5	ND5	ND5	ND5	ND5	50
bis(2-Ethylhexyl)phthalate	ND5	ND5	ND5	0.8J	5U	ND5	ND5	2J	10	ND5	50
<u>TCL PESTICIDES/PCB (µg/L)</u>											
alpha-BHC	ND0.010	ND0.0100	ND0.010UJ	ND0.0100UJ	ND0.010UJ	ND0.010	0.00065JP	ND0.010UJ	ND0.010	ND0.0100	ND
delta-BHC	ND0.010	ND0.0100	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010	ND0.0100	ND
gamma-BHC (Lindane)	ND0.010	ND0.0100	0.00099JP	0.00085 JP	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010	ND0.0100	ND
Heptachlor	0.0015 JP	ND0.0100	0.0020JP	0.0033 JP	0.0017JP	0.0037JP	ND0.010UJ	0.0019JP	ND0.010	ND0.0100	ND
Aldrin	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND0.0100UJ	ND0.010	ND0.0100	ND
Dieldrin	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	ND
4,4'-DDE	ND0.020	ND0.020	0.0018JP	0.0012 JP	ND0.020UJ	0.0012JP	ND0.020UJ	0.00092JP	0.02U	ND0.020	ND
Endosulfan sulfate	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020UJ	0.00089JP	ND0.020	ND0.020	50
4-4'DDT	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	ND
Methoxyclor	ND0.010	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010	ND0.10	35
Endrin Ketone	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.020	5
Endrin aldehyde	ND0.020	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020UJ	ND0.020	0.02U	ND0.020UJ	0.0031 J	ND0.020	5
alpha-Chlordane	ND0.010	ND0.0100	ND0.010UJ	ND0.010UJ	ND0.010UJ	ND0.010	ND0.010UJ	0.00098JP	ND0.010	ND0.0100	0.1

<u>Notes:</u>

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B - Detected below CRDL, but above instrument detection limit.

TABLE

SUMMARY OF DETECTED DEEP OVERBURDEN
(CLAY/UPPER AND LOWER TILL UNITS) GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION: *SAMPLE DATE:*	*NCR-5M-I* *3/15/91*	*NCR-5M-II* *4/23/91*	*NCR-6M-I* *3/21/91*	*NCR-6M-II* *4/26/91*	*NCR-10M-I* *3/19/91*	*NCR-10M-II* *4/25/91*	*NCR-11M-I* *3/22/91*	*NCR-11M-II* *4/30/91*	*MCL*
TCL VOLATILES (µg/L)									
Methylene Chloride	3UR	4 U	4UR	2 U	2UR	5U	2UR	3U	5
Benzene	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND
Toluene	ND1	3	ND1	ND1	ND1	ND1	ND1	ND1	5
Ethylbenzene	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
Xylenes (Total)	ND1	ND1	ND1	ND1	ND1	ND1	ND1	ND1	5
TCL SEMI-VOLATILES (µg/L)									
Phenol	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
Diethyl Phthalate	ND5	ND5	8U	ND5	ND5	ND5	ND5	ND5	50 G
Di-n-Butylphthalate	ND5	ND5	ND5	ND5	ND20	ND20	ND20	ND20	50
Butylbenzylphthalate	4 J	ND5	ND5	ND5	ND5	ND5	ND5	ND5	50
bis(2-Ethylhexyl)phthalate	1JN	ND5	ND5	3J	ND5	ND5	ND5	ND5	50
TCL PESTICIDES/PCB (µg/L)									
alpha-BHC	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	ND0.010	ND0.0100	ND0.010UJ	ND0.0050UJ	ND
delta-BHC	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	ND0.010	ND0.0100	0.00051JP	ND0.0050UJ	ND
gamma-BHC (Lindane)	0.0011 JP	ND0.010	ND0.010	ND0.0020UJ	ND0.010	ND0.0100	ND0.010UJ	ND0.0050UJ	ND
Heptachlor	0.00070 JP	0.0011JP	0.0018 JP	0.0035J	ND0.010	0.00099JP	ND0.010UJ	ND0.0050UJ	ND
Aldrin	ND0.010UJ	ND0.010	ND0.010	ND0.010UJ	ND0.010	ND0.0100	ND0.010UJ	ND0.0050UJ	ND
Dieldrin	ND0.020UJ	ND0.020	ND0.020	ND0.020	0.00058 J	ND0.020	ND0.020UJ	ND0.0100UJ	ND
4,4'-DDE	ND0.020UJ	0.00098JP	ND0.020	ND0.0040UJ	ND0.020	0.002U	ND0.020UJ	ND0.0100UJ	ND
Endosulfan sulfate	ND0.020UJ	ND0.020	ND0.020	ND0.0040UJ	ND0.020	ND0.020	ND0.020UJ	ND0.0100UJ	50
4-4'DDT	ND0.020UJ	ND0.020	ND0.020	ND0.0040UJ	ND0.020	ND0.020	ND0.020UJ	ND0.0100UJ	ND
Methoxyclor	ND0.010UJ	ND0.10	ND0.010	ND0.020UJ	ND0.010	ND0.10	ND0.010UJ	0.10U	35
Endrin Ketone	ND0.020UJ	ND0.020	ND0.020	ND0.0040UJ	ND0.020	ND0.020	ND0.020	ND0.0100UJ	5
Endrin aldehyde	ND0.020UJ	ND0.020	ND0.020	ND0.0040UJ	0.02U	ND0.020	ND0.020UJ	ND0.0100UJ	5
alpha-Chlordane	ND0.010UJ	ND0.010	ND0.010	ND0.0020UJ	ND0.010	ND0.0100	ND0.010UJ	ND0.0050UJ	0.1

Notes:

MCL - New York State Groundwater Maximum Contaminant Level.
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R - Unusable data.
N - Presumptive evidence of presence of material.
P - Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E - Exceeded linear calibration range of instrument, requires dilution.
B - Detected below CRDL, but above instrument detection limit.

TABLE 6.12

SUMMARY OF DETECTED DEEP OVERBURDEN
(CLAY/UPPER AND LOWER TILL UNITS) GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-1M-I*		*NCR-1M-II*		*NCR-2I-I*		*NCR-2I-II*		*NCR-2M-I*		*NCR-2M-II*		*NCR-3M-I*		
SAMPLE DATE:	*3/14/91*		*4/29/91*		*3/14/91*		*4/23/91*		*3/14/91*		*4/23/91*		*3/18/91*		
	Total	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*MCL*
TAL METALS (µg/L)															
Aluminum	181B	93.4B	200U	117B	80800	301R	55600	ND35.0	1460	140B	1960	77.3B	1180	124B	–
Antimony	ND28.0	ND22.0UJ	ND22.0	ND22.0	ND28.0	ND22.0UJ	26.4BJ	ND22.0	ND28.0	ND22.0UJ	ND22.0UJ	ND22.0	ND28.0	ND22.0UJ	3G
Arsenic	16.3	12.8	16.4	13.4	14.6	5.2B	15.4	6.5B	5.4B	6.3B	6.9B	6.2B	3.0B	ND3.0	25
Barium	55.8B	46.5B	59.9B	56.0B	431	37.7B	413	77.1B	59.6B	38.4B	60.6B	56.4B	35.0B	24.0B	1,000
Beryllium	ND1.0	ND1.0	ND1.0	ND1.0UJ	3.1B	ND1.0	2.6B	ND1.0UJ	1.0B	ND1.0	ND1.0	ND1.0UJ	1.5B	ND1.0	3G
Cadmium	ND4.0	ND4.0	ND4.0	ND4.0UJ	ND4.0	ND4.0	5.7R	28.5R	ND4.0	ND4.0	ND4.0UJ	ND4.0UJ	ND4.0	ND4.0	10
Calcium	48500	43700	47400	47000	511000	43000	577000	38100	50200	46000	55800	43300	35600	28000	–
Chromium	ND5.0	ND5.0	ND5.0	ND5.0UJ	105J	ND5.0	101J	ND5.0UJ	9.0B	ND5.0	8.3BJ	ND5.0UJ	14.6	ND5.0	50
Cobalt	ND7.0	ND5.0	ND5.0	ND5.0UJ	43.9B	ND5.0	33.7B	ND5.0UJ	ND7.0	ND5.0	ND5.0UJ	ND5.0UJ	ND7.0	ND5.0	–
Copper	3.1B	ND4.0	ND4.0	ND4.0UJ	109	ND4.0	127	ND4.0UJ	36.3	5.5B	8.8B	ND4.0UJ	11.5B	ND4.0	200
Iron	434	ND42.0	500	ND42.0	108000J	235J	76700	ND42.0	1820	ND42.0	2630	ND42.0	1200	ND42.0	300
Lead	ND3.0	ND2.0UJ	ND20.0	ND2.0	77.9	ND2.0UJ	61.6	ND2.0	ND3.0	ND20.0UJ	2.6B	ND2.0	ND3.0	ND2.0UJ	25
Magnesium	72900	71300	74500J	83200J	217000	97100	251000	99000	71000	78200	77200	72800	33500	31700	35,000G
Manganese	91.6	52.3	46.2	43.5	3740	133	3930	168	106	40.9	115	34.8	128	60.2	300
Mercury	ND0.20	ND0.15UJ	ND0.20	ND0.20UJ	1.8	ND0.15UJ	ND0.20	ND0.20UJ	ND0.20	ND0.15UJ	ND0.20	ND0.20UJ	ND0.20	ND0.15UJ	2
Nickel	ND11.0	ND7.0	ND7.0	ND7.0	133J	10.1B	107	ND7.0	ND11.0	ND7.0	9.5B	ND7.0	12.0B	ND7.0	–
Potassium	5040	3720B	4550B	4040B	24300	3460B	19200	2430B	4930B	5710	4780B	3020B	3310B	2220B	–
Silver	ND4.0	ND5.0R	ND5.0	ND5.0UJ	ND4.0UJ	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND4.0	ND5.0UJ	ND5.0UJ	ND5.0UJ	5.0B	ND5.0UJ	50
Sodium	45100	43500	42300J	48500J	81000	82800	83200	73100	66900J	76200J	76600	70500	79100	81200	20,000
Vanadium	ND4.0	ND4.0	ND4.0	ND4.0	150	ND4.0	105	ND4.0	5.1B	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	–
Zinc	24.4J	2.6B	26.5U	6.7B	469	2.4B	508	24.6	76.1	ND2.0	71.5	13.2B	27.2J	ND2.0	300

Notes:

MCL - New York State Groundwater Maximum Contaminant Level.
G - Guidance value.
ND - None detected at provided sample quantitation limits.
J - The associated numerical number is an estimated quantity.
UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise
U - The material was analyzed for but not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R - Unusable data.
N - Presumptive evidence of presence of material.
P - Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E - Exceeded linear calibration range of instrument, requires dilution.
D - Sample was diluted and reanalyzed.
B - Detected below CRDL, but above instrument detection limit.

TABLE 6.12

SUMMARY OF DETECTED DEEP OVERBURDEN
(CLAY/UPPER AND LOWER TILL UNITS) GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	***NCR-3M-II***		***NCR-4M-I***			***NCR-4M-II***		***NCR-5M-I***		***NCR-5M-II***		***NCR-6M-I***		
SAMPLE DATE:	***4/23/91***		***3/25/91***		***MCL***	***4/29/91***		***3/15/91***		***4/23/91***		***3/21/91***		
	Total	***Filtered***	***Total***	***Filtered***		***Total***	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***Total***	***Filtered***	***MCL***
<u>**TAL METALS (µg/L)**</u>														
Aluminum	3040	85.5B	215U	51.1B	--	1270	99.4B	101B	86.0B	132B	97.7B	205J	97.3B	–
Antimony	ND22.0UJ	ND22.0	ND28.0	ND22.0	3G	ND22.0	ND36.0UJ	ND28.0	ND22.0UJ	ND22.0UJ	ND22.0	ND28.0	ND22.0	3G
Arsenic	ND3.0	ND3.0	3.3B	ND3.0	25	5.1B	ND30.0UJ	7.1B	8.7B	8.2B	8.1B	5.9BJ	ND3.0	25
Barium	48.6BJ	72.2BJ	39.0B	31.7B	1,000	37.6B	29.3B	54.7B	46.5B	56.6B	50.9B	21.2B	21.7BJ	1,000
Beryllium	ND1.0	ND1.0UJ	ND1.0	ND1.0	3G	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0	ND1.0UJ	ND1.0	ND1.0	3G
Cadmium	ND4.0UJ	5.0BJ	ND4.0	ND4.0	10	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0UJ	ND4.0UJ	ND4.0	ND4.0	10
Calcium	36000	28100	163000	163000	--	171000	182000	62100	61000	61400	62600	484000	499000J	–
Chromium	119J	ND5.0UJ	ND5.0	ND5.0	50	ND5.0	ND5.0	ND5.0	ND5.0	ND5.0UJ	ND5.0UJ	ND5.0	ND5.0	50
Cobalt	ND5.0	ND5.0UJ	ND7.0	ND5.0	--	ND5.0	ND5.0	ND7.0	ND5.0	ND5.0	ND5.0UJ	ND7.0	ND5.0	–
Copper	11.2B	ND4.0UJ	ND3.0	ND4.0	200	5.2B	ND9.0	ND3.0	ND4.0	ND4.0	ND4.0UJ	ND3.0	ND4.0	200
Iron	3900	ND42.0	287U	ND42.0	300	1070	28.5B	722	573	807	719	398	49.2B	300
Lead	2.9B	ND2.0UJ	ND3.0UJ	ND20.0	25	ND20.0	ND20.0R	ND3.0	ND2.0	ND2.0	ND2.0	ND15.0UJ	ND20.0R	25
Magnesium	33500	31100	62600	63000	35,000G	66000	69800	71600	71200	73700	73600	88700	91900J	35,000G
Manganese	140	35.7	38.5	19.6	300	68.9	24.6	39.4	24.3	35.4	29.9	42.9J	33.9J	300
Mercury	ND0.20	ND0.20UJ	ND0.20	ND0.20	2	ND0.20	ND0.20UJ	1.2	ND0.15UJ	ND0.20	ND0.20UJ	ND0.20R	ND0.20UJ	2
Nickel	66.5	ND7.0	ND11.0	ND7.0	--	ND7.0	ND35.0UJ	ND11.0	ND7.0	ND7.0	ND7.0	ND11.0	ND7.0	–
Potassium	3230B	1820B	20800	17400	--	13900	14400	2350B	2700B	6450	4210B	11100	12700J	–
Silver	ND5.0UJ	ND5.0UJ	ND4.0UJ	ND5.0	50	ND5.0	ND5.0UJ	ND4.0	ND5.0UJ	ND5.0UJ	ND5.0	ND4.0UJ	ND5.0UJ	50
Sodium	80200	76800	112000	110000	20,000	104000	115000	15100	15600	19900	17600	92400	96000J	20,000
Vanadium	6.3B	ND4.0	ND4.0	ND4.0	--	ND4.0	ND6.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	–
Zinc	47.3	13.1B	20U	ND2.0	300	36.2U	ND2.0	6.8B	ND2.0	16.7B	ND2.0	7.2B	ND2.0	300

<u>Notes:</u>

MCL	- New York State Groundwater Maximum Contaminant Level.
G	- Guidance value.
ND	- None detected at provided sample quantitation limits.
J	- The associated numerical number is an estimated quantity.
UJ	- The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise
U	- The material was analyzed for but not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	- Unusable data.
N	- Presumptive evidence of presence of material.
P	- Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E	- Exceeded linear calibration range of instrument, requires dilution.
D	- Sample was diluted and reanalyzed.
B	- Detected below CRDL, but above instrument detection limit.

TABLE 6.12

SUMMARY OF DETECTED DEEP OVERBURDEN (CLAY/UPPER AND LOWER TILL UNITS) GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-6M-II*		*NCR-10M-I*		*NCR-10M-II*		*NCR-11M-I*		*NCR-11M-II*		
SAMPLE DATE:	4/26/91		3/19/91		4/25/91		3/22/91		4/30/91		
	Total	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*MCL*
<u>**TAL METALS (μg/L)**</u>											
Aluminum	116BR	750R	211U	120B	200U	ND35.0	22500	81.3B	29200	84.5B	–
Antimony	ND22.0R	153R	ND28.0	ND22.0UJ	ND22.0UJ	ND22.0	ND28.0	ND22.0UJ	29.6B	ND36.0UJ	3G
Arsenic	ND3.0R	483R	3.4B	ND3.0	ND3.0	3.0B	13.5	4.1B	12.9	ND3.0UJ	25
Barium	11.4B	21.4B	23.2B	13.8B	17.1B	39.9B	260	23.6B	274	55.2B	1,000
Beryllium	ND1.0	ND1.0UJ	ND1.0	ND1.0	ND1.0	ND1.0UJ	1.2B	ND1.0	1.1B	ND1.0	3G
Cadmium	ND4.0R	35.3R	ND4.0	ND4.0	ND4.0UJ	ND4.0UJ	5.0B	ND4.0	ND4.0	ND4.0	10
Calcium	483000J	604000J	466000	481000	463000	499000	453000	116000	281000	114000	–
Chromium	ND5.0	ND5.0UJ	ND5.0	ND5.0	ND5.0UJ	ND5.0UJ	42.8	ND5.0	84.9	ND5.0	50
Cobalt	ND5.0	ND5.0UJ	ND7.0	ND5.0	ND5.0	ND5.0UJ	15.1B	ND5.0	14.0B	ND5.0	–
Copper	ND4.0	ND4.0UJ	ND3.0	ND4.0	ND4.0	ND4.0UJ	42.5	ND4.0	54.4	ND9.0	200
Iron	483	437	1180	988	972	844	41100	1390	40500	1820	300
Lead	ND20.0R	ND20.0UJ	ND3.0	ND20.0UJ	ND2.0	ND20.0UJ	25.7J	ND2.0UJ	ND20.0	ND20.0	25
Magnesium	86800J	105000J	74300	75400	72300	79200	340000	235000	308000	293,000	35,000G
Manganese	44.0J	53.9J	76.7	55.6	55.8J	63.6J	2670	455	1,610	458	300
Mercury	ND0.20	ND0.20UJ	ND0.20	ND0.15UJ	ND0.20	ND0.20UJ	ND0.20	ND0.15UJ	ND0.20	ND0.20UJ	2
Nickel	ND7.0R	47.6R	ND11.0	ND7.0	ND7.0	ND7.0	57.9	ND7.0	65.6	ND35.0UJ	–
Potassium	9040	6980	5570	6,000	3780B	ND1240	10300	5300	14700	5010	–
Silver	ND5.0R	25.0R	ND4.0	ND5.0R	ND5.0UJ	ND5.0UJ	ND4.0UJ	ND5.0R	ND5.0	ND5.0UJ	50
Sodium	87600	94600	37000	36700	35500J	41300J	86500	87700	89700J	110,000J	20,000
Vanadium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	47.2B	ND4.0	58.9	ND6.0	–
Zinc	23.2J	ND2.0	20U	ND2.0	20U	21.4	269	11.6B	268	30.7U	300

<u>Notes:</u>

MCL	-	New York State Groundwater Maximum Contaminant Level.
G	-	Guidance value.
ND	-	None detected at provided sample quantitation limits.
J	-	The associated numerical number is an estimated quantity.
UJ	-	The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise
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N	-	Presumptive evidence of presence of material.
P	-	Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E	-	Exceeded linear calibration range of instrument, requires dilution.
B	-	Detected below CRDL, but above instrument detection limit.

TABLE 6.13

SUMMARY OF DETECTED BEDROCK GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-2D-I*	*NCR-2D-II*	*NCR-5D-I*	*NCR-5D-II*	*NCR-6D-I*	*NCR-6D-II*	*NCR-8D-I*	*NCR-8D-II*	*NCR-11D-I*	*NCR-11D-I Dup*	*NCR-11D-II*	*MCL*
SAMPLE DATE:	*3/14/91*	*4/23/91*	*3/15/91*	*4/23/91*	*3/22/91*	*4/26/91*	*3/20/91*	*4/26/91*	*3/22/91*	*3/22/91*	*5/1/91*	
TCL VOLATILES (µg/L)												
Acetone	ND5	ND5 UJ	ND5	ND5 UJ	ND5	ND5 UJ	ND5	ND5 UJ	6J	5J	ND5 UJ	5
TCL SEMI-VOLATILES (µg/L)												
Phenol	ND5	ND5	1 J	ND5	ND5	ND5	ND5	ND5	ND5	ND5	ND5	1
bis(2-Ethylhexyl)phthalate	ND5	ND5	3 J	5 U	ND5	ND5	ND5	5	ND5	ND5	5U	50
TCL PESTICIDES/PCB (µg/L)												
beta-BHC	ND0.010	ND0.010	0.00086JP	ND0.0100	ND0.010UJ	ND0.010UJ	ND0.010	ND0.0020	ND0.010UJ	ND0.010UJ	ND0.050	ND
delta-BHC	ND0.010	ND0.010	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010	ND0.0020	ND0.010UJ	0.0011JP	ND0.050	ND
gamma-BHC (Lindane)	ND0.010	ND0.010	ND0.010UJ	ND0.0100	ND0.010UJ	ND0.010UJ	ND0.010	ND0.0020	ND0.010UJ	ND0.010UJ	0.0030JP	ND
Heptachlor	ND0.010	ND0.010	ND0.010UJ	0.01U	ND0.010UJ	ND0.010UJ	ND0.010	0.0015JP	ND0.010UJ	0.0017JP	ND0.050	ND
Heptachlor epoxide	ND0.010	ND0.010	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010UJ	ND0.010	ND0.0020	0.00086JP	ND0.010UJ	ND0.050	ND
4,4'-DDE	ND0.020	0.00081J	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.0040	ND0.020UJ	ND0.020UJ	0.57P	ND
4,4'-DDD	ND0.020	ND0.020	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.0040	ND0.020UJ	ND0.020UJ	0.24P	ND
Endosulfan sulfate	ND0.020	ND0.020	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.0040	ND0.020UJ	ND0.020UJ	0.056JP	50
4-4'DDT	ND0.020	ND0.020	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.0040	ND0.020UJ	ND0.020UJ	0.67P	ND
Endrin Ketone	ND0.020	ND0.020	ND0.010UJ	ND0.020	ND0.020UJ	ND0.020UJ	ND0.020	ND0.0040	ND0.020UJ	ND0.020UJ	0.022JP	5
Endrin aldehyde	ND0.020	ND0.020	ND0.020UJ	ND0.020	ND0.020UJ	ND0.020UJ	0.02U	ND0.0040	ND0.020UJ	0.02U	0.0076JP	5
gamma-Chlordane	ND0.010	ND0.010	ND0.010UJ	ND0.010	ND0.010UJ	ND0.010UJ	0.01U	ND0.0020	ND0.010UJ	ND0.010UJ	0.015J	0.1

Notes:

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P	- Indicates greater than 25% difference between the concentration calculated from the two GC columns.
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B	- Detected below CRDL, but above instrument detection limit.

TABLE 6.13

SUMMARY OF DETECTED BEDROCK GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-2D-I*		*NCR-2D-II*		*NCR-5D-I*		*NCR-5D-II*		*NCR-6D-I*		*NCR-6D-II*		
SAMPLE DATE:	*3/14/91*		*4/23/91*		*3/15/91*		*4/24/91*		*3/22/91*		*4/26/91*		
	Total	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*MCL*
TAL METALS (µg/L)													
Aluminum	200U	139B	80.5B	ND35.0	73.8B	42.0B	200U	ND35.0	130B	ND35.0	121B	96.8B	--
Antimony	ND28.0	ND22.0UJ	ND22.0UJ	ND22.0	ND28.0	ND22.0UJ	ND22.0UJ	ND22.0	ND28.0	ND22.0	ND22.0R	374R	3G
Arsenic	4.2B	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	25
Barium	7.6B	5.7B	5.9B	4.0B	6.3B	6.1B	200U	35.1B	7.2B	7.8B	7.4B	30.0B	1,000
Cadmium	ND4.0	ND4.0	ND4.0UJ	ND4.0UJ	ND4.0	ND4.0	ND4.0UJ	ND4.0	ND4.0	ND4.0	ND4.0UJ	ND4.0UJ	10
Calcium	468000	492000	500000	506000	525000	538000	520000J	589000J	553000	561000	549000J	629000J	--
Cobalt	ND7.0	ND5.0	ND5.0	ND5.0UJ	ND7.0	ND5.0	ND5.0UJ	6.4BJ	ND7.0	ND5.0	ND5.0	ND5.0UJ	--
Copper	ND3.0	ND4.0	ND4.0	ND4.0UJ	ND3.0	ND4.0	ND4.0UJ	ND4.0UJ	ND3.0	8.7B	4.5B	ND4.0UJ	200
Iron	284U	204	237	189	101	43.1B	104	86.6BJ	291	276	386	275	300
Magnesium	119000	124000	124000	130000	125000	128000	122000J	138000J	148000	151000	144000J	175000J	35,000G
Manganese	33.7U	22.7	23.3	19.3	38.7	23.1	24.5	28.0	19.7	18.0	23.4J	33.1J	300
Mercury	ND0.20	0.15J	ND0.20	ND0.20UJ	ND0.20	ND0.15UJ	ND0.20	ND0.20R	ND0.20	ND0.20UJ	ND0.20	ND0.20UJ	2
Potassium	4090B	5000	4690B	2110B	6010	5960	7460	5390	17900J	21100J	17100	17400	--
Silver	ND4.0	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND4.0	ND5.0UJ	ND5.0UJ	ND5.0UJ	ND4.0UJ	ND5.0	ND5.0R	77.9R	50
Sodium	74900	77100	77600J	92100J	123000	125000	120000	129000	420000	433000	407000	461000	20,000
Vanadium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	9.6B	ND4.0	ND4.0	--
Zinc	20U	2.4B	15.3BJ	ND2.0	3.7B	ND2.0	20U	3.4B	7.4B	ND2.0	9.2B	24.5	300

Notes:

MCL - New York State Groundwater Maximum Contaminant Level.
G - Guidance value.
ND - None detected at provided sample quantitation limits.
J - The associated numerical number is an estimated quantity.
UJ - The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise
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E - Exceeded linear calibration range of instrument, requires dilution.
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B - Detected below CRDL, but above instrument detection limit.

TABLE 6.13

SUMMARY OF DETECTED BEDROCK GROUNDWATER PARAMETERS
NCR SITE
WHEATFIELD, NEW YORK

SAMPLE LOCATION:	*NCR-8D-I*		*NCR-8D-II*		*NCR-11D-I*		*NCR-11D-I Dup*		*NCR-11D-II*		
SAMPLE DATE:	*3/20/91*		*4/26/91*		*3/22/91*		*3/22/91*		*5/1/91*		
	Total	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*MCL*
TAL METALS (µg/L)											
Aluminum	392	101B	ND35.0	ND35.0	119B	298J	89.1B	ND35.0UJ	124B	ND35.0	–
Antimony	ND28.0	ND22.0UJ	ND22.0R	135R	ND28.0	58.4BJ	ND28.0	ND22.0UJ	23.1B	108U	3G
Arsenic	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0	ND3.0UJ	25
Barium	7.5B	4.1B	3.4B	5.6B	13.9B	9.2B	13.3B	4.4B	18.9B	17.0B	1,000
Cadmium	ND4.0	ND4.0	ND4.0UJ	10.6J	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	10
Calcium	526000	557000	513000J	603000J	519000	547000	534000	568000	540000	580000	–
Cobalt	ND7.0	ND5.0	ND5.0	ND5.0UJ	ND7.0	ND5.0	ND7.0	ND5.0	ND5.0	6.7B	–
Copper	ND3.0	ND4.0	ND4.0	ND4.0UJ	ND3.0	ND4.0	ND3.0	ND4.0	ND4.0	ND9.0	200
Iron	520	ND42.0	ND42.0	ND42.0	88.4B	ND42.0	66.3B	ND42.0	59.5B	ND7.0	300
Magnesium	123000	130000	118000J	137000J	104000	109000	107000	116000	106000J	124000J	35,000G
Manganese	44.1	21.4	19.5J	26.5J	17.2	19.3	17.3	16.6	18.8	22.5U	300
Mercury	ND0.20	ND0.15UJ	ND0.20	ND0.20UJ	ND0.20	ND0.15UJ	ND0.20	ND0.15UJ	ND0.20	ND0.20UJ	2
Potassium	6270	6560	5020	4640B	8140	8040J	7650	1910BJ	13100J	19700J	–
Silver	ND4.0	ND5.0R	ND5.0UJ	27.6J	ND4.0UJ	15.1J	ND4.0	ND5.0J	ND5.0	21.8U	50
Sodium	127000	131000	126000	134000	178000	177000	184000	200000	187000	216000	20,000
Vanadium	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND4.0	ND6.0	–
Zinc	13.9B	ND2.0	4.2B	ND2.0	6.6B	ND2.0	6.8B	ND2.0	12.3B	ND2.0	300

Notes:

MCL	- New York State Groundwater Maximum Contaminant Level.
G	- Guidance value.
ND	- None detected at provided sample quantitation limits.
J	- The associated numerical number is an estimated quantity.
UJ	- The material was analyzed for but not detected. The sample quantitation limit is an estimated quantity and may be inaccurate or imprecise
U	- The material was analyzed for but not detected. The associated numerical value is the sample quantitation limit and has been adjusted to reflect potential contamination attributable to laboratory or field conditions.
R	- Unusable data.
N	- Presumptive evidence of presence of material.
P	- Indicates greater than 25% difference between the concentration calculated from the two GC columns.
E	- Exceeded linear calibration range of instrument, requires dilution.
D	- Sample was diluted and reanalyzed.
B	- Detected below CRDL, but above instrument detection limit.

TABLE 7.1

POTENTIAL PARAMETERS OF CONCERN - SUBSURFACE SOILS(1)
NCR SITE
WHEATFIELD, NEW YORK

	Subsurface Soil Concentration (2)					
Parameter	*Frequency of Detection*	*Range of Detected Concentrations(4)*	*Mean Concentration (3)(4)*	*Maximum Detected Concentration(4)*	*95% UCL Concentration(4)*	*Parameter of Potential Concern*
TCL VOCs (µg/kg)						
Acetone	5/30	4J - 50J	8.0	50J	11	X
1,2-Dichloroethene (total)	2/30	160J - 320J	19	320J	42	X
Methylene Chloride	10/30	3.5J - 49	10	49	14	X
1,1,1-Trichloroethane	5/30	3J - 6.1	3.1	6.1	3.3	X
Trichloroethene	6/30	14J - 24	5.8	24	8.0	X
TCL SVOCs (µg/kg)						
Butylbenzylphthalate	2/28	1200	335	1200	447	X
bis (2-Ethylhexyl) phthalate	4/28	700J - 1500	369	1500	513	X
TCL PESTICIDES/PCB (µg/kg)						
alpha-BHC	1/30	0.26J	4.7	0.26J	5.6	
Heptachlor epoxide	1/29	0.58J	4.7	0.58J	5.6	
delta-BHC	1/29	1.4	4.9	1.4	5.8	

Notes:

(1) Does not include data from NCR-12D (landfill borehole) or initial VOC borehole data from NCR-5 (44.0' - 47.0' BGS) or NCR-13 (0 - 0.8' and 2.5' to 3.5' BGS).
(2) Includes borehole and hand auger samples.
(3) For duplicate samples, the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.
(4) All data, except those data qualified as unusable (R), used to calculate concentrations.
J - Associated value is an estimated concentration.

TABLE 7.1

POTENTIAL PARAMETERS OF CONCERN - SUBSURFACE SOILS(1)
NCR SITE
WHEATFIELD, NEW YORK

	Subsurface Soil Concentration (2)					
Parameter	*Frequency of Detection*	*Range of Detected Concentrations(4)*	*Mean Concentration (3)(4)*	*Maximum Detected Concentration(4)*	*95% UCL Concentration(4)*	*Parameter of Potential Concern*
TAL METALS (mg/kg)						
Aluminium	29/29	2300 - 26000	10428	26000	12699	
Antimony	5/30	6.8 - 20	5.8	20	7.3	
Arsenic	30/30	1.8 - 28	11	28	14	
Barium	29/30	12J - 280	69	280	89	
Beryllium	24/30	0.2 - 1.1	0.38	1.1	0.48	
Calcium	30/30	2600 - 150000	47260	150000	60761	
Chromium	30/30	3.5- 31	13	31	16	
Cobalt	30/30	1.5 - 15	5.5	15	6.8	
Copper	30/30	4 - 39.2	13	39.2	16700	
Iron	29/29	5200 - 31000	14172	31000	35	
Lead	29/29	<4.9 - 175J	21	175J	27317	
Magnesium	29/29	2200 - 93000	20046	93000	497	
Manganese	29/29	63 - 1300	407	1300	16	
Nickel	30/30	2.6 - 30	13	30	2641	
Potassium	30/30	470 - 6300	2100	6300	353	
Sodium	29/30	<89 - <920	289	<920	21	
Vanadium	30/30	6.3 - 37	18	37	69	
Zinc	29/29	5.4 - 135	58	135	110	

Notes:

(1) Does not include data from NCR-12D (landfill borehole) or initial VOC borehole data from NCR-5 (44.0' - 47.0' BGS) or NCR-13 (0 - 0.8' and 2.5' to 3.5' BGS).
(2) Includes borehole and hand auger samples.
(3) For duplicate samples, the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.
(4) All data, except those data qualified as unusable (R), used to calculate concentrations.
J - Associated value is an estimated concentration.

[illegible]ABLE 7.2

POTENTIAL PARAMETERS OF CONCERN - SEDIMENT SAMPLES
NCR SITE
WHEATFIELD, NEW YORK

Parameter	Frequency of Detection	*Sediment Concentration* Range of Detected Concentrations(2)	Mean Concentrations(1)(2)	Maximum Detected Concentrations(2)	95% UCL Concentrations(2)	Parameter of Potential Concern
TCL VOCs (μg/kg)						
1,1,1-Trichloroethane	2/18	2J - 3.8J	4.3	3.8J	4.3	X
1,1-Dichloroethane	1/18	19	5.2	19	6.9	
Acetone	11/18	12J - 89J	26	89J	38	X
Benzene	1/18	3J	4.3	3J	4.7	
Methylene Chloride	11/18	13.3 - 73	22	73	33	X
TCL SVOCs (μg/kg)						
Benzo (a) anthracene	4/18	82J - 210J	695	210J	844	X
Benzo (a) pyrene	2/18	140J - 250J	790	250J	906	X
Benzo (b) fluoranthene	4/18	130J - 320J	714	320J	847	X
Benzo (g,h,i) perylene	1/18	230J	2291	230J	2677	
Benzo (k) flouranthene	3/18	160J - 250J	745	250J	872	X
Chrysene	5/18	120J - 270J	670	270J	825	X
Di-n-butylphthalate	1/18	140J	823	140J	920	
Di-n-octylphthalate	1/18	290J	834	290J	918	
Fluoranthene	6/18	62J - 330J	637	330J	796	X
Phenanthrene	6/18	40J - 180J	602	180J	782	X
Pyrene	6/18	50J - 310J	631	310J	793	X
bis (2-Ethylhexyl) phthalate	11/18	110J - 3900	809	3900	1200	X

Note:

(1) For duplicate samples, the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.
(2) All data, except those data qualified as unusable (R), used to calculate concentrations.
J - Associated value is an estimated concentration.

[illegible]BLE 7.2

POTENTIAL PARAMETERS OF CONCERN - SEDIMENT SAMPLES
NCR SITE
WHEATFIELD, NEW YORK

	Sediment Concentration					
Parameter	***Frequency of Detection***	***Range of Detected Concentrations(2)***	***Mean Concentrations(1)(2)***	***Maximum Detected Concentrations(2)***	***95% UCL Concentrations(2)***	***Parameter of Potential Concern***
TCL CLP PEST/PCBs (µg/kg)						
4-4' DDD	1/18	4.7	4.1	4.7	6.5	
4-4' DDE	3/18	1.1J - 28	5.4	28	9.0	X
4-4' DDT	5/18	6.9 - 77	13	77	2.2	X
Aldrin	2/18	1.1J - 2.0J	3.9	2.0J	6.3	X
Dieldrin	3/18	1.4J - 2.3	4.0	2.3	6.4	X
Endolsulfan II	3/18	2.7J - 7.8J	12	7.8J	19	X
Endrin	2/18	4.3 - 18	5.0	18	7.8	X
Heptachlor epoxide	3/18	0.30J - 3.1	3.9	3.1	6.4	X
Methoxychlor	1/18	12.5	20	12.5	32	
delta-BHC	7/18	1.7 - 5.4	4.5	5.4	6.8	X
gamma-BHC	2/18	0.92J - 1.5J	3.9	1.5J	6.3	X
TAL METALS (mg/kg)						
Aluminium	18/18	6480 - 27800	18368	27800	20781	
Arsenic	18/18	11 - 27.6	20	27.6	22	
Barium	18/18	64.5 - 218	113	218	130	
Beryllium	18/18	0.48 - 1.3	0.83	1.3	0.92	
Cadmium	4/18	0.82 - 2.1	0.5	2.1	0.76	X
Calcium	18/18	5170 - 115000	42048	115000	55016	
Chromium	18/18	14.1 - 34.8	24	34.8	27	
Cobalt	18/18	4.8 - 17.7	9.8	17.7	11	
Copper	18/18	10.4 - 36.7	22	36.7	25	
Iron	18/18	8590 - 69000	24749	69000	30724	
Lead	18/18	21 - 100	47	100	58	
Magnesium	18/18	4210 - 48700	15140	48700	20645	
Manganese	18/18	126 - 695	411	695	483	
Mercury	12/18	0.1 - 1.1	0.226	1.1	0.35	X
Nickel	18/18	7.4 - 35.4	23	35.4	26	
Potassium	18/18	1320 - 6340	3679	6340	4370	
Sodium	18/18	240 - 1645	588	1645	775	
Vanadium	18/18	12 - 49	32	49	36	
Zinc	18/18	66.8 - 293	130	293	158	

Note:

(1) For duplicate samples, the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.

(2) All data, except those data qualified as unusable (R), used to calculate concentrations.

J - Associated value is an estimated concentration.

TABLE 7.3

POTENTIAL PARAMETERS OF CONCERN - LEACHATE
NCR SITE
WHEATFIELD, NEW YORK

	Leachate Concentration (1)								
Parameter	***Frequency of Detection***	***Range of Detected Concentrations(3)***	***Mean Concentration(2)(3)***	***Maximum Detected Concentration(3)***	***95% UCL Concentration(3)***	***Parameter of Potential Concern***	***Surface Water Limits NYS***	***MCL EPA***	***MCLG EPA***
TCL VOCs (ug/L)									
2-Butanone	4/7	96 - 1400	325	1400	397	X	–		
2-Hexanone	1/7	11J	26	11J	52		50G		
4-Methyl-2-pentanone (MIBK)	3/7	3J - 21J	24	21J	50		–		
Acetone	2/7	490 - 2200	394	2200	1017	X	–		
Benzene	3/7	36J - 50	21	50	38	X	0.7G	5	
Chlorobenzene	3/7	26 - 56	21	56	38	X	20	100	100
Ethylbenzene	5/7	2J - 680	116	680	308	X	5G	700	700
Methylene Chloride	1/9	470	74	470	207		5G	200	
Toluene	5/7	3J - 350	81	350	186		5G	1000	1000
Xylenes	4/7	12 - 1300	243	1300	606		5G	10000	10000
TCL SVOCs (ug/L)									
1,2-Dichlorobenzene	1/7	16	6.6	16	9.8		30	600	600
1,3-Dichlorobenzene	1/7	6J	5.2	6J	5.5		20	600	600
2,4-Dimethylphenol	6/7	18 - 980	194	980	461	X	1		
2,6-Dinitrotoluene	1/7	51	12	51	25		0.07G		
2-Methylnapthalene	1/7	5J	5	5J	5		–		
2-Methyphenol	6/7	12 - 960	380	960	458	X	1		
4-Methylphenol	5/7	400 - 3750	1173	3750	1977	X	1		
Acenaphthene	3/7	0.8J - 3J	3.5	3J	3.7		20		
Benzoic acid	2/7	4300 - 12000	2347	12000	3071	X	–		
Butylbenzylphthalate	2/7	0.9J - 4.5J	4.4	4.5J	4.4		50G		
Di-n-butylphthalate	3/7	1J - 5.2J	4.4	5.2J	4.4	X	50G		
Diethylphthalate	6/7	1J - 55	24	55	26		50G		
Fluorene	2/7	0.6J - 1J	3.8	1J	4.2		50G		
N-Nitrosodiphenylamine	2/7	2J - 7J	4.9	7J	5		50G		
Naphthalene	4/7	0.6J - 103J	22	103J	47	X	10		
Phenanthrene	3/7	1J - 2J	3.5	2J	4.4		50G		
Phenol	5/7	45 - 1800	589	1800	764	X	1		
bis (2-Ethylhexyl) phthalate	7/7	0.7J - 10J	3.7	10J	5.6	X	4G		

Notes:

(1) Does not include data for the two soil stained samples collected as part of the leachate sampling.
(2) For duplicate samples, the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.
(3) All data, except those data qualified as unusable (R), used to calculate concentrations.
J - Associated value is an estimated concentration.
NYS Water Limits - New York State Ambient Water Quality Standards.
G - Guidance Value.
MCL - EPA Maximum Contaminant Level
MCLG - EPA Maximum Contaminant Level Goal

TABLE 7.3

POTENTIAL PARAMETERS OF CONCERN - LEACHATE
NCR SITE
WHEATFIELD, NEW YORK

	Leachate Concentration (1)								
Parameter	*Frequency of Detection*	*Range of Detected Concentrations(3)*	*Mean Concentration(2)(3)*	*Maximum Detected Concentration(3)*	*95% UCL Concentration(3)*	*Parameter of Potential Concern*	*Surface Water Limits NYS*	*MCL EPA*	*MCLG EPA*
TCL PESTICIDES/PCB (µg/L)									
4,4'-DDD	1/7	0.015J	0.057	0.015J	0.12		0.01		
4,4'-DDT	3/7	0.044 - 0.11	0.135	0.11	0.26	X	0.01		
Aldrin	1/7	0.082J	0.06	0.082J	0.12		0.002G		
Heptachlor	2/7	0.091J - 0.575J	0.105	0.575J	0.25	X	0.009	0.4	
delta-BHC	3/7	0.019 - 0.333J	0.008	0.333J	0.16		0.02G		
gamma-BHC	1/7	0.052J	0.062	0.052J	0.13		0.02G	0.2	0.2
TAL METALS (µg/L)									
Aluminium	7/7	1140 - 325000	51544	325000	66121		–		
Arsenic	7/7	9.5 - 58.6	25	58.6	25		50		
Barium	7/7	147 - 7610	1702	7610	2116	X	1000		
Beryllium	1/7	2.2	1.2	2.2	1.2		3.0G		
Cadmium	2/7	6.1 - 9J	3.9	9J	4.4		10	5	5
Calcium	7/7	96450 - 396000	186207	396000	214198		–		
Chromium	7/7	26 - 114J	52	114J	55	X	50	100	100
Cobalt	7/7	12.5 - 93	46	93	31	X	–		
Copper	5/7	24.5 - 99J	44	99J	50		200		
Iron	7/7	12555J - 390000	112065	390000	143097		300	300	
Lead	7/7	<17.4 - 1010	304	1010	386	X	50		
Magnesium	7/7	145000 - 419000	262000	419000	275409	X	35,000		
Manganese	7/7	76 - 2960	967	2960	1199	X	300		
Mercury	2/7	0.5	0.21	0.5	0.25		2	2	2
Nickel	7/7	34 -115	89	115	96	X	–		
Potassium	7/7	26200 - 445000	240286	445000	253606		–		
Sodium	7/7	84800 - 1660000	897114	1660000	944791		–		
Vanadium	4/7	21.5J - 29J	18	29J	19	X	–		
Zinc	7/7	204 - 1410	631	1410	676	X	300	5000	

Notes:

(1) Does not include data for the two soil stained samples collected as part of the leachate sampling.

(2) For duplicate samples, the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.

(3) All data, except those data qualified as unusable (R), used to calculate concentrations.

J - Associated value is an estimated concentration.

NYS Water Limits - New York State Ambient Water Quality Standards.

G - Guidance Value.

MCL - EPA Maximum Contaminant Level.

MCLG - EPA Maximum Contaminant Level Goal.

TABLE 7.4

POTENTIAL PARAMTERS OF CONCERN - SURFACE WATER
NCR SITE
WHEATFIELD, NEW YORK

	Surface Water Concentration								
Parameter	*Frequency of Detection*	*Range of Detected Concentrations(2)*	*Mean Concentration(1)(2)*	*Maximum Detected Concentration(2)*	*95% UCL Concentration(2)*	*Parameter of Potential Concern*	*Surface Water Limits NYS*	*MCL EPA*	*MCLG EPA*
TCL VOCs (µg/L)									
1,1,1-Trichloroethane	1/10	2J	2.5	2J	2.5		5G	200	200
4-Methyl-2-pentanone (MIBK)	1/10	3.5J	4.9	3.5J	5.2		-		
Carbon Disulfide	3/10	0.65J - 8	2.7	8	4.0	X	-		
Ethyl Benzene	1/10	1J	2.4	1J	2.7		5G	700	700
Tetrachloroethene	1/10	4J	2.7	4J	3.0		0.7G	5	
Toluene	2/10	2J	2.4	2J*	2.5		5G	1000	1000
Xylenes	1/10	5.5	2.8	5.5	3.4		5G	10000	10000
TCL SVOCs (µg/L)									
2,4-Dimethylphenol	1/10	6.5J	5.1	6.5J	5.4		1		
Benzoic acid	1/10	5J	22	5J	2.6		-		
Di-n-butylphathalate	2/10	0.3J - 2.7J	4.3	2.7J	5.2		50G		
Diethylphthalate	1/10	0.55J	4.5	0.55J	5.4		50G		
Phenol	1/10	11	5.6	11	6.8		1		
bis (2-Ethylhexyl) phthalate	6/10	2J - 1000	116	1000	3.5	X	4G		
TCL PESTICIDES (µg/L)									
4-4' DDT	1/10	0.04	0.024	0.04	0.035		0.01		
Heptachlor epoxide	1/10	0.014	0.009	0.014	0.01		0.009	0.2	0.0
delta-BHC	2/10	0.014 - 0.021	0.011	0.021*	0.017		0.02G		
gamma-BHC	1/10	0.0051J	0.009	0.0051J	0.014		0.02G	0.2	0.2

Notes:

(1) For duplicate samples, the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.
(2) All data, except those data qualified as unusable (R), used to calculate concentrations.
J - Associated value is an estimated concentration.
NYS Water Limits - New York State Ambient Water Quality Standards.
G - Guidance Value.
MCL - EPA Maximum Contaminant Level.
MCLG - Maximum Contaminant Level Goal.
* Maximum detected at or value below NYS Ambient Water Quality Standards and Guidance Values.

TABLE 7.4

POTENTIAL PARAMTERS OF CONCERN - SURFACE WATER
NCR SITE
WHEATFIELD, NEW YORK

	Surface Water Concentration								
Parameter	***Frequency of Detection***	***Range of Detected Concentrations(2)***	***Mean Concentration(1)(2)***	***Maximum Detected Concentration(2)***	***95% UCL Concentration(2)***	***Parameter of Potential Concern***	***Surface Water Limits NYS***	***MCL EPA***	***MCLG EPA***
TAL METALS (ug/L)									
Aluminium	10/10	426 - 25200	5371	25200	6389		-		
Arsenic	3/10	4.7- 30.6	7.4	30.6*	14		50		
Barium	10/10	55 - 456	159	456*	245		1000		
Beryllium	1/10	2.1	1.1	2.1	1.3		3G		
Cadmium	1/10	5.7	2.8	5.7	3.5		10	5	5
Calcium	10/10	71100 - 286000	152600	286000	209543		-		
Chromium	2/10	27 - 38	10.5	38*	18		50	100	100
Cobalt	2/10	18 - 25	8.3	25	13	X	-		
Copper	3/10	27- 94	25	94	44	X	200		
Cyanide	3/10	19.3 - 40.6	12	40.6	20	X	100		
Iron	10/10	488 - 38000	8215	38000	17202	X	300	300	
Lead	10/10	6.1 - 352	63	352	136	X	50		
Magnesium	10/10	28500 - 113000	57980	113000	75957	X	35000		
Manganese	10/10	27 - 1690	434	1690	846	X	300		
Nickel	3/10	27 - 63	22	63	35	X	-		
Potassium	10/10	5850 - 67750	25003	67750	39880		-		
Sodium	10/10	29800 - 393500	127490	393500	204135		-		
Vanadium	2/10	42 - 61	18	61	30	X	-		
Zinc	5/10	24 - 2360	289	2360	758	X	300	5000	

Notes:

(1) For duplicate samples, the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.
(2) All data, except those data qualified as unusable (R), used to calculate concentrations.
J - Associated value is an estimated concentration.
NYS Water Limits - New York State Ambient Water Quality Standards.
G - Guidance Value.
MCL - EPA Maximum Contaminant Level
MCLG - EPA Maximum Contaminant Level Goal.
* Maximum detected at or value below NYS Ambient Water Quality Standards and Guidance Values.

TABLE 7.5

POTENTIAL PARAMETERS OF CONCERN
SHALLOW OVERBURDEN GROUNDWATER
NCR SITE
WHEATFIELD, NEW YORK

	Groundwater Concentration (1)							
Parameter	*Frequency of Detection*	*Range of Detected Concentrations (3)*	*Mean Concentration (2) (3)*	*Maximum Detected Concentration (3)*	*95% UCL Concentration (3)*	*Parameter of Potential Concern*	*MCL NYS*	*MCL EPA*
TCL VOC (µg/L)	None							
TCL SVOC (µg/L)								
Phenol	1/5	4J	2.7	4J	2.7		1	
Pentachlorophenol	1/5	3J	9.3	3J	9.6		1	1
Butylbenzylphthalate	1/5	3J	2.6	3J	2.6		50	
bis (2-Ethylhexyl) phthalate	2/5	8-23	5.4	23	6.6		50	
TCL PESTICIDES/PCB (µg/L)								
alpha-BHC	1/5	0.00054J	0.004	0.0054J	0.005		ND	
beta-BHC	1/5	0.049	0.009	0.049	0.01		ND	
delta-BHC	1/5	0.0012J	0.004	0.0012J	0.005		ND	
gamma-BHC (Lindane)	2/5	0.0011J-0.0016J	0.004	0.0016J	0.004		ND	0.2
Heptachlor	2/5	0.00092J-0.090	0.01	0.09	0.02		ND	0.4
4,4'-DDE	3/5	0.0011J-0.0012J	0.007	0.0012J	0.008		ND	
Methoxyclor	1/5	0.0078J	0.02	0.0078J	0.03		35	40
Endrin aldehyde	1/5	0.0025J	0.01	0.0025J	0.01		5	
alpha-Chlordane*	3/5	0.00062J-0.0022J	0.004	0.0022J	0.004		0.1	2
gamma-Chlordane*	1/5	0.0018J	0.004	0.0018J	0.005		0.1	2

Notes:

(1) Data for on-site well NCR-12D not included.
(2) For duplicate samples the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.
(3) All data, except those data qualified as unusable (R), used to calculate concentrations.
MCL Groundwater Maximum Contaminant Levels for New York State (NYS) and Environmental Protection Agency (EPA).
G New York State Guidance Value
* MCL for chlordane.

TABLE 7.5

POTENTIAL PARAMETERS OF CONCERN
SHALLOW OVERBURDEN GROUNDWATER
NCR SITE
WHEATFIELD, NEW YORK

	Groundwater Concentration (1)												
	Frequency of Detection		*Range of Detected Concentrations (3)*		*Mean Concentration (2) (3)*		*Maximum Detected Concentration (3)*		*95% UCL Concentration (3)*		*Parameter of Potential Concern*	*MCL*	
Parameter	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*		*NYS*	*EPA*
TAL METALS (µg/L)													
Aluminium	5/5	5/5	265-27,300	38.2-130	6,608	76	27,300	130	7,352	86		–	
Arsenic	2/5	1/5	4.2-6.1	4.3	2.3	1.8	6.1	4.3	2.7	19		25	
Barium	5/5	5/5	26.9-364	15.6-242J	122	95	364	242J	135	114		1,000	
Beryllium	1/5	0/5	1.7	–	0.6	0.5	1.7	–	0.7	0.5		3G	
Cadmium	1/5	2/5	4.6J	4.1J-9.5J	2.3	3.0	4.6J	9.5J	2.7	3.0		10	5
Calcium	5/5	5/5	71,100-317,000	7,310-288,000	153,260	146,380	317,000	288,000	181,599	172,943		–	
Chromium	5/5	0/5	7.5J-134	–	54	2.5	134	–	64	2.5		50	100
Cobalt	3/5	0/5	6.6-19.6	–	6.4	2.5	19.6	–	6.4	2.5		–	
Copper	5/5	1/5	7.4-62.6	9.8	23	3.0	62.6	9.8	25	3.5		200	
Iron	5/5	3/5	1,440-43,600	67.8-2,270J	11,124	421	43,600	2,270J	11,804	602		300	300
Lead	4/5	0/5	4.2-22.4	–	7.3	4.6	22.4	–	8.5	6.2		25	
Magnesium	5/5	5/5	28,500-100,000	24,400-92,300	62,440	59,590	100,000	92,300	67,497	62,771		35,000 G	
Manganese	5/5	5/5	190J-3,840	175-3,660	1,706	8,273	3,840	3,660	2,303	11,879		300	
Nickel	5/5	5/5	19.0-155	10.1-111	79.4	43	155	111	89.8	57		–	
Potassium	5/5	3/5	1,370-11,200	1,950-14,600J	5,070	3,360	11,200	14,600J	5,757	4,598		–	
Sodium	5/5	5/5	60,200-3,610,000	38,100-1,080,000	501,520	247,850	3,610,000	1,080,000	698,923	342,638		20,000	
Vanadium	4/5	0/5	4.7-55.9	–	14	2.1	55.9	–	14	2.1		–	
Zinc	4/5	5/5	33.9-160	4.4-42.9	84	16	160	42.9	93	16		300	5000

Notes:

(1) Data for on-site well NCR-12D not included.
(2) For duplicate samples the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.
(3) All data, except those data qualified as unusable (R), used to calculate concentrations.
MCL Groundwater Maximum Contaminant Levels for New York State (NYS) and Environmental Protection Agency (EPA).
G New York State Guidance Value

TABLE 7

POTENTIAL PARAMETERS OF CONCERN
DEEP OVERBURDEN (CLAY/UPPER AND LOWER TILL UNITS) GROUNDWATER
NCR SITE
WHEATFIELD, NEW YORK

	Groundwater Concentration							
Parameter	***Frequency of Detection***	***Range of Detected Concentrations (1)***	***Mean Concentration (1) (2)***	***Maximum Detected Concentration (1)***	***95% UCL Concentration (1)***	***Parameter of Potential Concern***	***MCL NYS***	***MCL EPA***
TCL VOC (µg/L)								
Benzene	1/9	1	0.5	1	0.6		ND	5
Toluene	2/9	3-5	0.9	5	1.4		5	1000
Ethylbenzene	1/9	1	0.5	1	0.6		5	700
Xylenes	1/9	8	0.9	8	1.8		5	10000
Methylene Chloride	1/9	4J	1.9	4J	2.5		5	
TCL SVOCs (µg/L)								
Phenol	2/9	2J	2.4	2J	2.5		1	
Di-n-Butylphthalate	1/9	1J	4.1	1J	3.4		50	
Butylbenzylphthalate	1/9	4J	2.6	4J	2.8		50	
bis (2-Ethylhexyl) phthalate	5/9	0.8J-10	2.7	10	3.7		50	
Diethylphthalate	1/9	1J	2.5	1J	2.8		50 G	
TCL PESTICIDES/PCB (µg/L)								
alpha-BHC	1/9	0.00065J	0.005	0.00065J	0.005		ND	
delta-BHC	1/9	0.00051J	0.005	0.00051J	0.005		ND	
gamma-BHC (Lindane)	2/9	0.00085JP-0.0011J	0.004	0.0011J	0.005		ND	0.2
Heptachlor	7/9	0.00070JP-0.0037JP	0.004	0.0037JP	0.004		ND	0.4
Dieldrin	1/9	0.00058J	0.008	0.00058J	0.009		ND	
4,4'-DDE	4/9	0.00092J-0.0012J	0.007	0.0012J	0.007		ND	
Endosulfan sulfate	1/9	0.00089JP	0.008	0.00089JP	0.008		50	
Endrin aldehyde	1/9	0.0031J	0.008	0.0031J	0.008		5	
alpha-Chlordane*	1/9	0.00098J	0.005	0.00098J	0.005		0.1	2

Notes:

(1) All data, except those data qualified as unusable (R), used to calculate concentrations.

(2) For duplicate samples the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.

MCL Groundwater Maximum Contaminant Levels for New York State (NYS) and Environmental Protection Agency (EPA).

G New York State Guidance Value

* MCL for Chlordane.

TAB

POTENTIAL PARAMETERS OF CONCERN
DEEP OVERBURDEN (CLAY/UPPER AND LOWER TILL UNITS) GROUNDWATER
NCR SITE
WHEATFIELD, NEW YORK

Parameter	*Groundwater Concentration*										*Parameter of Potential Concern*	*MCL*	
	Frequency of Detection		*Range of Detected Concentrations (1)*		*Mean Concentration (1) (2)*		*Maximum Detected Concentration (1)*		*95% UCL Concentration (1)*				
Parameter	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*		*NYS*	*EPA*
TAL METALS (μg/L)													
Aluminium	8/9	8/9	101-80,800	51.1-140	11,014	84	80,800	140	13,604	89		–	
Antimony	2/9	0/9	26.4J-29.6	–	15	12	29.6	–	15	12		3G	
Arsenic	9/9	6/9	3.0-16.4	3.0-13.4	8.2	5.6	16.4	13.4	10	7.4		25	
Barium	9/9	9/9	11.4-431	13.8-77.1	109	41	431	77.1	121	44		1,000	
Beryllium	4/9	0/9	1.0-3.1	--	2.1	0.5	3.1	–	2.6	0.5		3 G	
Cadmium	1/9	1/9	5.0	5.0J	2.0	2.2	5.0	5.0J	2.0	2.2		10	5
Calcium	9/9	9/9	35,600-577,000	28,000-604,000J	247,222	172,156	577,000	604,000J	294,684	202,358		–	
Chromium	4/9	0/9	8.3J-119J	–	28	2.5	119J	–	34	2.5		50	100
Cobalt	2/9	0/9	14.0-43.9	–	8.3	2.5	43.9	–	9.5	2.5		–	
Copper	7/9	1/9	3.1-127	5.5	24	2.5	127	5.5	29	2.6		200	
Iron	9/9	7/9	398-108,000J	28.5-1,820	15,698	403	108,000J	1,820	19,326	494		300	300
Lead	4/9	0/9	2.6-77.9	–	13	5	77.9	–	14	6		25	
Magnesium	9/9	9/9	33,500-340,000	31,100-293,000	79,292	95,156	340,000	293,000	80,623	100,456		35,000 G	
Manganese	9/9	9/9	35.4-3,930	19.6-458	721	99	3,930	458	876	112		300	
Mercury	2/9	0/9	1.2-1.8	--	0.3	0.1	1.8	--	0.3	0.1		2	2
Nickel	4/9	1/9	9.5-133J	10.1	28	5.4	133J	10.1	34	5.9		–	
Potassium	9/9	9/9	2,350-24,300	1,820-17,400	9,296	5,652	24,300	17,400	10,368	6,074		–	
Silver	1/9	0/9	5.0	--	2.4	2.5	5.0	–	2.4	2.5		50	
Sodium	9/9	9/9	15,100-112,000	15,600-115,000	68,561	169,839	112,000	115,000	74,482	199,344		20,000	
Vanadium	4/9	0/9	5.1-150	--	22	2.1	150	--	27	2.1		–	
Zinc	7/9	6/9	6.8-508	2.4-24.6	104	6.7	508	24.6	125	7.1		300	5000

Notes:

(1) All data, except those data qualified as unusable (R), used to calculate concentrations.

(2) For duplicate samples the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.

MCL Groundwater Maximum Contaminant Levels for New York State (NYS) and Environmental Protection Agency (EPA).

G New York State Guidance Value

TABLE 7.7

POTENTIAL PARAMETERS OF CONCERN
BEDROCK GROUNDWATER
NCR SITE
WHEATFIELD, NEW YORK

	Groundwater Concentration (1)						*MCL*	
Parameter	*Frequency of Detection*	*Range of Detected Concentrations (3)*	*Mean Concentration (2) (3)*	*Maximum Detected Concentration (3)*	*95% UCL Concentration (3)*	*Parameter of Potential Concern*	*NYS*	*EPA*
TCL VOC (μg/L)								
Acetone	1/5	5J-6J	2.8	6J	2.9			
TCL SVOCs (μg/L)								
Phenol	1/5	1J	2.4	1J	2.4		1	
bis (2-Ethylhexyl) phthalate	1/5	3J	2.8	3J	2.9		50	
TCL PESTICIDES/PCB (μg/L)								
beta-BHC	1/5	0.00086J	0.006	0.00086J	0.007		ND	
delta-BHC	1/5	0.0011J	0.006	0.0011J	0.007		ND	
gamma-BHC (Lindane)	1/5	0.0030J	0.004	0.0030J	0.005		ND	0.2
Heptachlor	1/5	0.0015J-0.0017J	0.006	0.0017J	0.007		ND	0.4
Heptachlor epoxide	1/5	0.00086J	0.006	0.00086J	0.007		ND	0.2
4,4'-DDE	2/5	0.00081J-0.57	0.006	0.57	0.009		ND	0.2
Endosulfan sulfate	1/5	0.056J	0.01	0.056J	0.02		50	
Endrin aldehyde	1/5	0.0076J	0.009	0.0076J	0.009		5	
gamma-Chlordane*	1/5	0.015J	0.007	0.015J	0.008		0.1	2
4-4'-DDD	1/5	0.24	0.03	0.24	0.04		ND	
4-4'-DDT	1/5	0.67	0.08	0.67	0.1		ND	
Endrin ketone	1/5	0.022J	0.01	0.022J	0.01		5	

Notes:

(1) Data for on-site well NCR-12D not included.
(2) For duplicate samples the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.
(3) All data, except those data qualified as unusable (R), used to calculate concentrations.
MCL Groundwater Maximum Contaminant Levels for New York State (NYS) and Environmental Protection Agency (EPA).
G New York State Guidance Value
* MCL for Chlordane.

TABLE 7.7

POTENTIAL PARAMETERS OF CONCERN
BEDROCK GROUNDWATER
NCR SITE
WHEATFIELD, NEW YORK

	Groundwater Concentration (1)												
	Frequency of Detection		*Range of Detected Concentrations (3)*		*Mean Concentration (2) (3)*		*Maximum Detected Concentration (3)*		*95% UCL Concentration (3)*		*Parameter of Potential Concern*	*MCL*	
Parameter	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*	*Total*	*Filtered*		*NYS*	*EPA*
TAL METALS (µg/L)													
Aluminium	5/5	5/5	73.8-392	42.0-298J	124	62	392	298J	140	70		--	
Antimony	1/5	1/5	23.1	58.4J	13	23	23.1	58.4J	15	29		3 G	
Arsenic	1/5	0/5	4.2	--	1.8	1.5	4.2	--	2.3	1.5		25	
Barium	5/5	5/5	3.4-18.9	4.0-35.1	18	12	18.9	35.1	23	16		1,000	
Cadmium	0/5	1/5	--	10.6J	2	2.9	--	10.6J	2.0	3.2		10	5
Calcium	5/5	5/5	468,000-553,000	492,000-629,000J	522,050	561,850	553,000	629,000J	539,245	590,253		--	
Cobalt	0/5	2/5	--	6.4J-6.7	3.0	3.3	--	6.7	3.0	3.7		--	
Copper	1/5	1/5	4.5	8.7	2.1	2.9	4.5	8.7	2.3	3.3		200	
Iron	5/5	3/5	59.5-520	43.1-276	194	114	520	276	196	151		300	300
Magnesium	5/5	5/5	104,000-148,000	109,000-175,000J	123,450	134,950	148,000	175,000J	124,331	138,543		35,000 G	
Manganese	5/5	5/5	17.2-44.1	16.6-33.1J	25	22	44.1	33.1J	27	23		300	
Mercury	0/5	1/5	--	0.15J	0.1	0.1	--	0.15J	0.1	0.1		2	2
Potassium	5/5	5/5	4,090-17,900J	1,910J-21,100J	8,954	9,284	17,900J	21,100J	11,016	11,872		--	
Silver	0/5	2/5	--	15.17-27.6J	2.2	9.1	--	27.6	2.2	12		50	
Sodium	5/5	5/5	74,900-420,000	77,100-461,000	184,350	198,670	420,000	461,000	233,201	250,219		20,000	
Vanadium	0/5	1/5	--	9.6	2	2.9	--	9.6	2.0	3.2		--	
Zinc	5/5	3/5	3.7-15.3J	2.4-24.5	9.3	3.7	15.3J	24.5	11	4.7		300	5,000

<u>Notes:</u>

(1) Data for on-site well NCR-12D not included.
(2) For duplicate samples the mean of the two samples was used to calculate mean concentration. Non-detect values were assumed equal to one half of detection limit to calculate mean concentration.
(3) All data, except those data qualified as unusable (R), used to calculate concentrations.
MCL Groundwater Maximum Contaminant Levels for New York State (NYS) and Environmental Protection Agency (EPA).
G New York State Guidance Value

TABLE 7.8

SUMMARY OF PARAMETERS OF POTENTIAL CONCERN(1)
NCR SITE
WHEATFIELD, NEW YORK

Parameter	*Subsurface Soil*	*Sediment*	*Leachate*	*Surface Water*
TCL VOLATILES				
Acetone	X	X	X	
1,2-Dichloroethene (total)	X			
Ethylbenzene			X	
Methylene chloride	X	X		
1,1,1-Trichloroethane	X	X		
Trichloroethene	X			
2-Butanone			X	
4-Methyl-2-pentanone (MIBK)				
Benzene			X	
Chlorobenzene			X	
Carbon disulfide				X
TCL SEMI-VOLATILE ORGANICS				
Benzo(a)anthracene		X		
Benzo(a)pyrene		X		
Benzo(b)fluoranthene		X		
Benzo(k)fluoranthene		X		
Chrysene		X		
Di-n-butylphthalate			X	
Flouranthene		X		
Phenanthrene		X		
Pyrene		X		
bis (2-Ethylhexyl) phthalate	X	X	X	X
2,4-Dimethylphenol			X	
Benzoic acid			X	
Phenol			X	
Butylbenzylphthalate	X			
2-Methylphenol			X	
4-Methylphenol			X	
Naphthalene			X	

TABLE 7.8

SUMMARY OF PARAMETERS OF POTENTIAL CONCERN(1)
NCR SITE
WHEATFIELD, NEW YORK

Parameter	*Subsurface Soil*	*Sediment*	*Leachate*	*Surface Water*
TCL PESTICIDES				
4,4'-DDE		X		
4,4'-DDT		X	X	
Aldrin		X		
Dieldrin		X		
Endosulfan II		X		
Endrin		X		
Heptachlor epoxide		X		
delta-BHC		X		
gamma-BHC (Lindane)		X		
Heptachlor			X	
TAL METALS				
Barium			X	
Cadmium		X		
Chromium			X	
Cobalt			X	X
Copper				X
Iron				X
Lead			X	X
Magnesium			X	X
Manganese			X	X
Mercury		X		
Nickel			X	X
Vanadium			X	X
Zinc			X	X
Cyanide				X

Note:

(1) From Tables 7.1 through 7.4.

TABLE 7.9

TYPICAL BACKGROUND METAL SOIL CONCENTRATION RANGE
NCR SITE
WHEATFIELD, NEW YORK

Metal	*Eastern United States Observed Range(1) (mg/kg)*
Aluminum	7,000 - 100,000
Antimony	<1-8.8
Arsenic	<0.1-73
Barium	10 - 1500
Beryllium	<1.0-7
Cadmium	0.01 - 7(2)
Calcium	100 - 28,000(3)
Chromium	1 - 1,000
Cobalt	<0.3 - 70
Copper	<1 - 700
Iron	100 - 100,000
Lead	<10 - 300
Magnesium	50 - 50,000(3)
Manganese	<2-7,000
Mercury	0.01 - 3.4
Nickel	<5 - 700
Potassium	50 - 37,000(3)
Sodium	500 - 50,000(3)
Vanadium	<7 - 300
Zinc	<5 - 2,900

Notes:

(1) Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States. Arthor: H.T. Shacklette and J.G. Boerngan, U.S. Geological Survey, Professional Paper 1270, pg. 6, 1984.
(2) The Soil Chemistry of Hazardous Materials. Author: Dragon, James, Hazardous Materials Control Research Institute, 1988.
(3) Common Soil Element.

TABLE 7.10

CHEMICAL CONSTANTS AND FACTORS
NCR SITE
WHEATFIELD, NEW YORK

CHEMICAL (1)	*TOXICITY CONSTANTS (2)*				
	CSF (3) ORAL 1/(mg/kg/d)	*CSF (3) INHAL. 1/(mg/kg/d)*	*RfD (4) ORAL mg/kg/d*	*RfD (4) INHAL. mg/kg/d*	*TOXICITY CLASSIFICATION*
ACENAPHTHENE	NC	NC	6.00E-02		
ACENAPHTHALENE	NC	NC	NA		
ACETONE	NC	NC	1.00E-01	3.00E+00	D
ALDRIN	1.70E+01	1.70E+01	3.00E-05	NA	D
ARSENIC	1.75E+00	5.00E+01	NA	NA	A
BARIUM	NC	NC	5.00E-02	1.40E-04	
BENZENE	2.90E-02	2.90E-02	NA	NA	A
BERYLIUM	4.30E+00	8.40E+00	5.00E-03	NA	B2
delta-BHC	NA	NA	NA	NA	D
gama-BHC	1.33E+00	NA	3.00E-04	NA	B2
[illegible]NZOIC ACID	NC	NC	4.00E+00	NA	D
BENZ(a)ANTHRACENE	1.67E+00	NA	NA	NA	B2
BENZO(a)PYRENE	1.15E+01	6.10E+00	NA	NA	B2
BENZO(b)FLUORANTHENE	1.61E+00	NA	NA	NA	B2
BENZO(k)FLUORANTHENE	7.59E-01				B2
BENZO(g,h,i)PERYLENE			NA		B2
bis(2-ETHYLHEXYL)PHTHALATE	1.40E-02	NA	2.00E-02	NA	B2
BUTYLBENZYLPHTHALATE	NC	NC	2.00E-01	NA	C
2-BUTANONE	NC	NC	5.00E-02	9.00E-02	D
CADMIUM	NC	6.30E+00	1.00E-03	NA	B1 INHAL
CARBON DISULFIDE	NC	NC	1.00E-01	NA	
CHROMIUM VI	NC	4.20E+01	5.00E-03	NA	A INHAL
CHLOROBENZENE	NC	NC	2.00E-02	NA	D
CHRYSENE	5.06E-02	NA	NA	NA	B2
COBALT	NA	NA	NA	NA	
COPPER	NC	NC	3.70E-02	1.00E-02	D
CYANIDE	NC	NC	2.00E-02	NA	D
4,4'-DDE	2.40E-01	NA	NA	NA	B2
4,4'-DDT	3.40E-01	3.40E-01	5.00E-04	NA	B2
1,2-DICHLOROETHENE (TOTAL)	NC	NC	2.00E-02	NA	D
DIELDRIN	1.60E+01	1.60E+01	5.00E-05	NA	B2
DIETHYLPHTHALATE	NC	NC	8.00E-01	NA	D
2,4-DIMETHYLPHENOL	NC	NC	NA	NA	
[illegible]n-BUTYLPHTHALATE	NC	NC	1.00E-02	NA	D

TABLE 7.10

CHEMICAL CONSTANTS AND FACTORS
NCR SITE
WHEATFIELD, NEW YORK

CHEMICAL (1)	*TOXICITY CONSTANTS (2)*				
	CSF (3) ORAL 1/(mg/kg/d)	*CSF (3) INHAL. 1/(mg/kg/d)*	*RfD (4) ORAL mg/kg/d*	*RfD (4) INHAL. mg/kg/d*	*TOXICITY CLASSIFICATION*
DIETHYLPHTHALATE	NC	NC	8.00E-01	NA	D
ENDOSULFAN II (ENDOSULFAN)	NC	NC	5.00E-05	NA	D
ENDRIN	NC	NC	3.00E-04	NA	D
ETHYLBENZENE	NC	NC	1.00E-01	2.86E-01	D
FLUORANTHENE	NC	NC	4.00E-02	NA	D
FLUORENE	NC	NC	4.00E-02	NA	D
HEPTACHLOR EPOXIDE	9.10E+00	9.10E+00	1.30E-05	NA	B2
HEPTACHLOR	4.50E+00	4.60E+00	5.00E-04	NA	B2
IRON	NA	NA	NA	NA	
LEAD	NA	NA	NA	NA	B2
[illegible]GNESIUM	NA	NA	NA	NA	
MANGANESE	NC	NC	1.00E-01	3.00E-04	D
MERCURY	NC	NC	NA	NA	D
METHYLENE CHLORIDE	7.50E-03	1.65E-03	6.00E-02	8.57E-01	B2
2-METHYLNAPTHALENE	NC	NC	NA	NA	
4-METHYL-2-PENTANONE(MIBK)	NC	NC	NA	NA	
2-METHYLPHENOL	NA	NA	5.00E-02	NA	C
4-METHYLPHENOL	NA	NA	5.00E-02	NA	C
NAPHTHALENE	NC	NC	4.00E-03	NA	D
NICKEL	NC	8.40E-01	2.00E-02	NA	A INHAL
N-NITROSODIPHENLYAMINE	4.90E-03	NA	NA	NA	B2
PHENANTHRENE	NC	NC	NA	NA	D
PHENOL	NC	NC	6.00E-01	NA	D
PYRENE	NC	NC	3.00E-02	NA	D
STYRENE	NC	NC	2.00E-01	NA	
TOLUENE	NC	NC	2.00E-01	5.70E-01	D
1,1,1-TRICHLOROETHANE	NC	NC	9.00E-02	3.00E-01	D
TRICHLOROETHENE	1.10E-02	1.70E-02	NA	NA	B2
VANADIUM	NC	NC	7.00E-03	NA	
VINYL CHLORIDE	2.30E+00	2.95E-01	NA	NA	A
XYLENE (TOTAL)	NC	NC	2.00E+00	8.60E-02	D
ZINC	NC	NC	2.00E-01	1.00E-02	D

TABLE 7.10

CHEMICAL CONSTANTS AND FACTORS
NCR SITE
WHEATFIELD, NEW YORK

NOTES FOR TABLE 7.10:

NC - NOT A CARCINOGEN
NA - NOT AVAILABLE

(1) INCLUDES THOSE CHEMICALS DETERMINED TO BE CHEMICALS OF CONCERN IN ONE OR MORE MEDIA SAMPLED AND ANALYZED AT THE SITE.

(2) REFERENCES USED IN ORDER OF PREFERENCE WERE:
 * IRIS (INTEGRATEDED RISK INFORMATION SYSTEM)
 * HEAST (HEALTH ASSESSMENT SUMMARY TABLES)
 * SPHEM (SUPERFUND PUBLIC HEALTH EVALUATION MANUAL)

(3) CSF = CANCER SLOPE FACTOR: THIS FACTOR REPRESENTS THE ESTIMATED POTENCY OF A A SUSPECT CARCINOGEN.

(4) RfD = REFERENCE DOSE: THE LONG TERM DOSE THAT IS UNLIKELY TO CAUSE ADVERSE EFFECTS.

TABLE 7.11

SOIL CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
CONSTRUCTION WORKER - SUBSURFACE SOILS
FUTURE CONDITION
OFF-SITE
NCR
WHEATFIELD, NEW YORK

	MEDIA CONCENTRATION		*LIFETIME UPPERBOUND EXCESS CANCER RISK*		*HAZARD QUOTIENT CDI/RfD*	
CHEMICAL	*MEAN mg/kg*	*RME mg/kg*	*MEAN*	*RME*	*MEAN*	*RME*
TCL VOCs						
ACETONE	8.00E-03	1.10E-02	0.00E+00	0.00E+00	4.54E-08	1.25E-07
1,2-DICHLOROETHENE (TOTAL)	1.90E-02	4.20E-02	0.00E+00	0.00E+00	5.39E-07	2.38E-06
METHYLENE CHLORIDE	1.00E-02	1.40E-02	1.22E-12	6.81E-12	9.45E-08	2.65E-07
1,1,1-TRICHLOROETHANE	3.10E-03	3.30E-03	0.00E+00	0.00E+00	1.95E-08	4.16E-08
TRICHLOROETHENE	5.80E-03	8.00E-03	1.03E-12	5.70E-12	0.00E+00	0.00E+00
TCL SVOCs						
BUTYL BENZYLPHTHALATE	3.35E-01	4.47E-01	0.00E+00	0.00E+00	3.97E-07	1.06E-06
bis(2-ETHYLHEXYL)PHTHALATE	3.69E-01	5.13E-01	3.50E-11	1.95E-10	4.38E-06	1.22E-05
	TOTAL ADDED LIFETIME CANCER RISK:		3.73E-11	2.07E-10		
			HAZARD INDEX:		5.47E-06	1.60E-05

TABLE 7.12

SOIL CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
TRESPASSERS (HIKERS AND HUNTERS) - SEDIMENTS
PRESENT CONDITION
ON- AND OFF-SITE
NCR
WHEATFIELD, NEW YORK

CHEMICAL	*MEDIA CONCENTRATION*		*LIFETIME UPPER BOUND EXCESS CANCER RISK*		*HAZARD QUOTIENT CDI/RfD*	
	MEAN mg/kg	*RME mg/kg*	*MEAN*	*RME*	*MEAN*	*RME*
TCL VOCs						
ACETONE	2.60E-02	3.80E-02	0.00E+00	0.00E+00	8.60E-09	6.29E-08
METHYLENE CHLORIDE	2.20E-02	3.30E-02	5.35E-13	1.20E-11	1.21E-08	9.10E-08
1,1,1-TRICHLOROETHANE	4.30E-03	3.80E-03	0.00E+00	0.00E+00	1.58E-09	6.98E-09
TCL SVOCs						
BENZO(a)ANTHRACENE	6.95E-01	2.10E-01	1.57E-09	7.13E-09	0.00E+00	0.00E+00
BENZO(a)PYRENE	7.90E-01	2.50E-01	1.23E-08	5.84E-08	0.00E+00	0.00E+00
BENZO(b)FLUORANTHENE	7.14E-01	3.20E-01	1.56E-09	1.05E-08	0.00E+00	0.00E+00
BENZO(k)FLUORANTHENE	7.45E-01	2.50E-01	7.66E-10	3.86E-09	0.00E+00	0.00E+00
[illegible]RYSENE	6.70E-01	2.70E-01	4.59E-11	2.78E-10	0.00E+00	0.00E+00
bis(2-ETHYLHEXYL)PHTHALATE	8.09E-01	1.20E+00	1.53E-11	3.42E-10	5.60E-07	4.15E-06
FLUORANTHENE	6.37E-01	3.30E-01	0.00E+00	0.00E+00	2.20E-07	5.71E-07
PHENANTHRENE	6.02E-01	1.88E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PYRENE	6.31E-01	3.10E-01	0.00E+00	0.00E+00	2.91E-07	7.15E-07
TCL PESTICIDES						
4,4'-DDE	5.40E-03	9.00E-03	1.76E-12	4.39E-11	0.00E+00	0.00E+00
4,4'-DDT	1.30E-02	2.20E-03	5.99E-12	1.52E-11	0.00E+00	0.00E+00
ALDRIN	3.90E-03	2.00E-03	2.15E-10	1.65E-09	4.30E-06	1.10E-05
DIELDRIN	4.00E-03	2.30E-03	2.07E-10	1.79E-09	2.65E-06	7.61E-06
ENDOSULFAN II (1)	1.20E-02	7.80E-03	0.00E+00	0.00E+00	7.94E-06	2.58E-05
ENDRIN	5.00E-03	7.80E-03	0.00E+00	0.00E+00	5.51E-07	4.30E-06
HEPTACHLOR EPOXIDE	3.90E-03	3.10E-03	1.15E-10	1.37E-09	9.92E-06	3.94E-05
delta-BHC	4.50E-03	5.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
gamma-BHC	3.90E-03	1.50E-03	7.03E-12	4.06E-11	1.80E-07	3.46E-07
TAL METALS						
CADMIUM	5.00E-01	7.60E-01	0.00E+00	0.00E+00	3.72E-06	2.92E-05
MERCURY	2.26E-01	3.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00

[illegible]TOXICITY VALUES BASED ON ENDOSULFAN.

TOTAL ADDED LIFETIME CANCER RISK: 1.68E-08 8.55E-08

HAZARD INDEX: 3.04E-05 1.23E-04

TABLE 7.13

SOIL CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
TRESPASSERS (RECREATIONAL ACTIVITIES) - SEDIMENTS
FUTURE CONDITION
ON- AND OFF-SITE
NCR
WHEATFIELD, NEW YORK

	MEDIA CONCENTRATION		*LIFETIME UPPER BOUND EXCESS CANCER RISK*		*HAZARD QUOTIENT CDI/RfD*	
CHEMICAL	*MEAN mg/kg*	*RME mg/kg*	*MEAN*	*RME*	*MEAN*	*RME*
TCL VOCs						
ACETONE	2.60E-02	3.80E-02	0.00E+00	0.00E+00	1.72E-08	1.26E-07
METHYLENE CHLORIDE	2.20E-02	3.30E-02	1.56E-12	2.34E-11	2.43E-08	1.82E-07
1,1,1-TRICHLOROETHANE	4.30E-03	3.80E-03	0.00E+00	0.00E+00	3.16E-09	1.40E-08
TCL SVOCs						
BENZO(a)ANTHRACENE	6.95E-01	2.10E-01	4.59E-09	1.39E-08	0.00E+00	0.00E+00
BENZO(a)PYRENE	7.90E-01	2.50E-01	3.59E-08	1.14E-07	0.00E+00	0.00E+00
BENZO(b)FLUORANTHENE	7.14E-01	3.20E-01	4.54E-09	2.04E-08	0.00E+00	0.00E+00
[illegible]NZO(k)FLUORANTHENE	7.45E-01	2.50E-01	2.24E-09	7.50E-09	0.00E+00	0.00E+00
[illegible]RYSENE	6.70E-01	2.70E-01	1.34E-10	5.40E-10	0.00E+00	0.00E+00
bis(2-ETHYLHEXYL)PHTHALATE	8.09E-01	1.20E+00	4.48E-11	6.64E-10	1.12E-06	8.30E-06
FLUORANTHENE	6.37E-01	3.30E-01	0.00E+00	0.00E+00	4.41E-07	1.14E-06
PHENANTHRENE	6.02E-01	1.80E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PYRENE	6.31E-01	3.10E-01	0.00E+00	0.00E+00	5.82E-07	1.43E-06
TCL PESTICIDES						
4,4'-DDE	5.40E-03	9.00E-03	5.12E-12	8.54E-11	0.00E+00	0.00E+00
4,4'-DDT	1.30E-02	2.20E-03	1.75E-11	2.96E-11	0.00E+00	0.00E+00
ALDRIN	3.90E-03	2.00E-03	6.27E-10	3.21E-09	8.60E-06	2.21E-05
DIELDRIN	4.00E-03	2.30E-03	6.05E-10	3.48E-09	5.29E-06	1.52E-05
ENDOSULFAN II (1)	1.20E-02	7.80E-03	0.00E+00	0.00E+00	1.59E-05	5.16E-05
ENDRIN	5.00E-03	7.80E-03	0.00E+00	0.00E+00	1.10E-06	8.60E-06
HEPTACHLOR EPOXIDE	3.90E-03	3.10E-03	3.35E-10	2.67E-09	1.98E-05	7.89E-05
delta-BHC	4.50E-03	5.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
gamma-BHC	3.90E-03	1.50E-03	2.05E-11	7.89E-11	3.60E-07	6.92E-07
TAL METALS						
CADMIUM	5.00E-01	7.60E-01	0.00E+00	0.00E+00	7.45E-06	5.83E-05
MERCURY	2.26E-01	3.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		TOTAL ADDED LIFETIME CANCER RISK:	4.91E-08	1.66E-07		
				HAZARD INDEX:	6.07E-05	2.47E-04

TABLE 7.14

SOIL CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
RESIDENTIAL EXPOSURE - SEDIMENTS
FUTURE CONDITIONS
OFF-SITE
NCR
WHEATFIELD, NEW YORK

	MEDIA CONCENTRATION		*LIFETIME UPPER BOUND EXCESS CANCER RISK*		*HAZARD QUOTIENT CDI/RfD*	
CHEMICAL	*MEAN mg/kg*	*RME mg/kg*	*MEAN*	*RME*	*MEAN*	*RME*
TCL VOCs						
ACETONE	2.60E-02	3.80E-02	0.00E+00	0.00E+00	5.23E-07	1.91E-06
METHYLENE CHLORIDE	2.20E-02	3.30E-02	2.78E-11	1.66E-10	7.37E-07	2.76E-06
1,1,1-TRICHLOROETHANE	4.30E-03	3.80E-03	0.00E+00	0.00E+00	9.61E-08	2.12E-07
TCL SVOCs						
BENZO(a)ANTHRACENE	6.95E-01	2.10E-01	9.64E-08	1.09E-07	0.00E+00	0.00E+00
BENZO(a)PYRENE	7.90E-01	2.50E-01	7.54E-07	8.96E-07	0.00E+00	0.00E+00
BENZO(b)FLUORANTHENE	7.14E-01	3.20E-01	9.54E-08	1.61E-07	0.00E+00	0.00E+00
BENZO(k)FLUORANTHENE	7.45E-01	2.50E-01	4.69E-08	5.92E-08	0.00E+00	0.00E+00
CHRYSENE	6.70E-01	2.70E-01	2.81E-09	4.26E-09	0.00E+00	0.00E+00
bis(2-ETHYLHEXYL)PHTHALATE	8.09E-01	1.20E+00	9.40E-10	5.24E-09	4.11E-05	1.52E-04
FLUORANTHENE	6.37E-01	3.30E-01	0.00E+00	0.00E+00	1.62E-05	2.10E-05
PHENANTHRENE	6.02E-01	1.88E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PYRENE	6.31E-01	3.10E-01	0.00E+00	0.00E+00	2.14E-05	2.63E-05
TCL PESTICIDES						
4,4'-DDE	5.40E-03	9.00E-03	1.08E-10	6.74E-10	0.00E+00	0.00E+00
4,4'-DDT	1.30E-02	2.20E-03	3.67E-10	2.33E-10	0.00E+00	0.00E+00
ALDRIN	3.90E-03	2.00E-03	1.12E-08	2.28E-08	2.61E-04	3.35E-04
DIELDRIN	4.00E-03	2.30E-03	1.08E-08	2.47E-08	1.61E-04	2.31E-04
ENDOSULFAN II (1)	1.20E-02	7.80E-03	0.00E+00	0.00E+00	4.83E-04	7.84E-04
ENDRIN	5.00E-03	7.80E-03	0.00E+00	0.00E+00	3.35E-05	1.31E-04
HEPTACHLOR EPOXIDE	3.90E-03	3.10E-03	5.98E-09	1.89E-08	6.03E-04	1.20E-03
delta-BHC	4.50E-03	5.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
gamma-BHC	3.90E-03	1.50E-03	4.31E-10	6.22E-10	1.32E-05	1.27E-05
TAL METALS						
CADMIUM	5.00E-01	7.60E-01	0.00E+00	0.00E+00	3.43E-04	1.30E-03
MERCURY	2.26E-01	3.50E-01	0.00E+00	0.00E+00	7.75E-05	3.00E-04
	TOTAL ADDED LIFETIME CANCER RISKS:		1.03E-06	1.30E-06		
			HAZARD INDEX:		2.06E-03	4.50E-03

(1) TOXICITY VALUES BASED ON ENDOSULFAN.

TABLE 7.15

SOIL CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
WORKERS ON-SITE - SEDIMENTS
FUTURE CONDITION
ON- AND OFF-SITE
NCR
WHEATFIELD, NEW YORK

CHEMICAL	*MEDIA CONCENTRATION*		*LIFETIME UPPER BOUND EXCESS CANCER RISK*		*HAZARD QUOTIENT CDI/RfD*	
	MEAN mg/kg	*RME mg/kg*	*MEAN*	*RME*	*MEAN*	*RME*
TCL VOCs						
ACETONE	2.60E-02	3.80E-02	0.00E+00	0.00E+00	1.36E-08	3.68E-07
METHYLENE CHLORIDE	2.20E-02	3.30E-02	2.47E-13	1.37E-11	1.92E-08	5.33E-07
1,1,1-TRICHLOROETHANE	4.30E-03	3.80E-03	0.00E+00	0.00E+00	2.50E-09	4.09E-08
TCL SVOCs						
BENZO(a)ANTHRACENE	6.95E-01	2.10E-01	7.26E-10	1.33E-08	0.00E+00	0.00E+00
BENZO(a)PYRENE	7.90E-01	2.50E-01	5.68E-09	1.09E-07	0.00E+00	0.00E+00
BENZO(b)FLUORANTHENE	7.14E-01	3.20E-01	7.19E-10	1.96E-08	0.00E+00	0.00E+00
BENZO(k)FLUORANTHENE	7.45E-01	2.50E-01	3.54E-10	7.21E-09	0.00E+00	0.00E+00
[illegible]RYSENE	6.70E-01	2.70E-01	2.12E-11	5.19E-10	0.00E+00	0.00E+00
bis(2-ETHYLHEXYL)PHTHALATE	8.09E-01	1.20E+00	7.08E-12	6.39E-10	8.86E-07	3.99E-05
FLUORANTHENE	6.37E-01	3.30E-01	0.00E+00	0.00E+00	3.49E-07	5.49E-06
PHENANTHRENE	6.02E-01	1.80E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PYRENE	6.31E-01	3.10E-01	0.00E+00	0.00E+00	4.60E-07	6.87E-06
TCL PESTICIDES						
4,4'-DDE	5.40E-03	9.00E-03	8.11E-13	8.21E-11	0.00E+00	0.00E+00
4,4'-DDT	1.30E-02	2.20E-03	2.76E-12	2.84E-11	0.00E+00	0.00E+00
ALDRIN	3.90E-03	2.00E-03	9.92E-11	1.88E-09	6.81E-06	6.46E-05
DIELDRIN	4.00E-03	2.30E-03	9.57E-11	2.04E-09	4.19E-06	4.46E-05
ENDOSULFAN II (1)	1.20E-02	7.80E-03	0.00E+00	0.00E+00	1.26E-05	1.51E-04
ENDRIN	5.00E-03	7.80E-03	0.00E+00	0.00E+00	8.72E-07	2.52E-05
HEPTACHLOR EPOXIDE	3.90E-03	3.10E-03	5.31E-11	1.56E-09	1.57E-05	2.31E-04
delta-BHC	4.50E-03	5.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
gamma-BHC	3.90E-03	1.50E-03	3.24E-12	7.58E-11	2.85E-07	3.33E-06
TAL METALS						
CADMIUM	5.00E-01	7.60E-01	0.00E+00	0.00E+00	5.89E-06	4.31E-04
MERCURY	2.26E-01	3.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00

[illegible] TOXICITY VALUES BASED ON ENDOSULFAN.

TOTAL ADDED
LIFETIME CANCER RISK: 7.76E-09 1.56E-07

HAZARD INDEX: 4.80E-05 1.00E-03

TABLE 7.16

SOIL CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
PARKLAND VISITORS - SEDIMENTS
FUTURE CONDITION
NCR
WHEATFIELD, NEW YORK

CHEMICAL	*MEDIA CONCENTRATION* *MEAN* *mg/kg*	*RME* *mg/kg*	*LIFETIME UPPER BOUND EXCESS CANCER RISK* *MEAN*	*RME*	*HAZARD QUOTIENT CDI/RfD* *MEAN*	*RME*
TCL VOCs						
ACETONE	2.60E-02	3.80E-02	0.00E+00	0.00E+00	8.68E-09	1.27E-07
METHYLENE CHLORIDE	2.20E-02	3.30E-02	4.52E-13	1.14E-11	1.22E-08	1.84E-07
1,1,1-TRICHLOROETHANE	4.30E-03	3.80E-03	0.00E+00	0.00E+00	1.59E-09	1.41E-08
TCL SVOCs						
BENZO(a)ANTHRACENE	6.95E-01	2.10E-01	1.26E-09	6.05E-09	0.00E+00	0.00E+00
BENZO(a)PYRENE	7.90E-01	2.50E-01	9.86E-09	4.96E-08	0.00E+00	0.00E+00
BENZO(b)FLUORANTHENE	7.14E-01	3.20E-01	1.25E-09	8.89E-09	0.00E+00	0.00E+00
BENZO(k)FLUORANTHENE	7.45E-01	2.50E-01	6.13E-10	3.27E-09	0.00E+00	0.00E+00
CHRYSENE	6.70E-01	2.70E-01	3.68E-11	2.36E-10	0.00E+00	0.00E+00
[illegible](2-ETHYLHEXYL)PHTHALATE	8.09E-01	1.20E+00	1.23E-11	2.90E-10	5.45E-07	8.09E-06
FLUORANTHENE	6.37E-01	3.30E-01	0.00E+00	0.00E+00	2.15E-07	1.11E-06
PHENANTHRENE	6.02E-01	1.80E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PYRENE	6.31E-01	3.10E-01	0.00E+00	0.00E+00	2.83E-07	1.39E-06
TCL PESTICIDES						
4,4'-DDE	5.40E-03	9.00E-03	1.41E-12	3.73E-11	0.00E+00	0.00E+00
4,4'-DDT	1.30E-02	2.20E-03	4.79E-12	1.29E-11	0.00E+00	0.00E+00
ALDRIN	3.90E-03	2.00E-03	1.81E-10	1.56E-09	4.34E-06	2.22E-05
DIELDRIN	4.00E-03	2.30E-03	1.75E-10	1.69E-09	2.67E-06	1.53E-05
ENDOSULFAN II (1)	1.20E-02	7.80E-03	0.00E+00	0.00E+00	8.01E-06	5.21E-05
ENDRIN	5.00E-03	7.80E-03	0.00E+00	0.00E+00	5.56E-07	8.68E-06
HEPTACHLOR EPOXIDE	3.90E-03	3.10E-03	9.72E-11	1.30E-09	1.00E-05	7.96E-05
delta-BHC	4.50E-03	5.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
gamma-BHC	3.90E-03	1.50E-03	5.63E-12	3.44E-11	1.75E-07	6.74E-07
TAL METALS						
CADMIUM	5.00E-01	7.60E-01	0.00E+00	0.00E+00	3.44E-06	5.41E-05
MERCURY	2.26E-01	3.50E-01	0.00E+00	0.00E+00	7.77E-07	1.25E-05

(1) TOXICITY VALUES BASED ON ENDOSULFAN.

TOTAL ADDED LIFETIME CANCER RISK:	1.35E-08	7.30E-08
HAZARD INDEX:	3.10E-05	2.56E-04

TABLE 7.17

WATER CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
TRESPASSER - SEEP SURFACE WATER
PRESENT CONDITION
ON- AND OFF-SITE
NCR
WHEATFIELD, NEW YORK

	MEDIA CONCENTRATIONS		*LIFETIME UPPER BOUND EXCESS CANCER RISK*		*HAZARD QUOTIENTS*	
CHEMICAL	*MEAN mg/l*	*RME mg/l*	*MEAN*	*RME*	*MEAN*	*RME*
TLC VOCs						
ACETONE	3.94E-01	1.02E+00	0.00E+00	0.00E+00	7.91E-10	8.45E-07
BENZENE	2.10E-02	3.80E-02	1.22E-13	9.15E-11	0.00E+00	0.00E+00
2-BUTANONE	3.25E-01	3.97E-01	0.00E+00	0.00E+00	1.30E-09	6.59E-07
CHLOROBENZENE	2.10E-02	3.80E-02	0.00E+00	0.00E+00	2.11E-10	1.58E-07
ETHYLBENZENE	1.16E-01	3.08E-01	0.00E+00	0.00E+00	2.33E-10	2.56E-07
TCL SVOCs						
BENZOIC ACID	2.35E+00	3.07E+00	0.00E+00	0.00E+00	1.18E-10	6.38E-08
DI-n-BUTYLPHTHALATE	4.40E-03	4.40E-03	0.00E+00	0.00E+00	8.83E-11	3.65E-08
DIMETHYLPHENOL	1.94E-01	4.61E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
bis(2-ETHYLHEXYL)PHTHALATE	3.70E-03	5.60E-03	1.04E-14	6.51E-12	3.71E-11	2.33E-08
2-METHYLPHENOL	3.80E-01	4.58E-01	NONE	NONE	1.53E-09	7.61E-07
4-METHYLPHENOL	1.17E+00	1.98E+00	NONE	NONE	4.71E-09	3.28E-06
NAPHTHALENE	2.20E-02	4.70E-02	0.00E+00	0.00E+00	1.10E-09	9.76E-07
PHENOL	5.89E-01	7.64E-01	0.00E+00	0.00E+00	1.97E-10	1.06E-07
TCL PESTICIDES						
4,4'-DDT	1.35E-04	1.10E-04	9.22E-15	3.11E-12	5.42E-11	1.83E-08
HEPTACHLOR	1.05E-04	2.50E-04	9.49E-14	9.34E-11	4.22E-11	4.15E-08
TAL METALS						
BARIUM	1.70E+00	2.12E+00	0.00E+00	0.00E+00	6.83E-09	3.51E-06
CHROMIUM	5.20E-02	5.50E-02	0.00E+00	0.00E+00	2.09E-09	9.14E-07
COBALT	4.60E-02	3.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LEAD	3.04E-01	3.86E-01	NONE	NONE	0.00E+00	0.00E+00
MAGNESIUM	2.62E+02	2.75E+02	0.00E+00	0.00E+00	5.26E-07	2.29E-04
MANGANESE	9.67E-01	1.20E+00	0.00E+00	0.00E+00	9.71E-08	4.98E-05
NICKEL	8.90E-02	9.60E-02	0.00E+00	0.00E+00	8.93E-10	3.99E-07
VANADIUM	1.80E-02	1.90E-02	0.00E+00	0.00E+00	5.16E-10	2.25E-07
ZINC	6.31E-01	6.76E-01	0.00E+00	0.00E+00	6.33E-09	2.81E-06

TOTAL ADDED
LIFETIME CANCER RISK : 2.37E-13 1.95E-10

HAZARD INDEX: 6.50E-07 2.94E-04

TABLE 7.18

WATER CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
TRESPASSER - SEEP SURFACE WATER
FUTURE CONDITION
ON-SITE
NCR
WHEATFIELD, NEW YORK

	MEDIA CONCENTRATIONS		*LIFETIME UPPER BOUND EXCESS CANCER RISK*		*HAZARD QUOTIENTS*	
CHEMICAL	*MEAN mg/l*	*RME mg/l*	*MEAN*	*RME*	*MEAN*	*RME*
TCL VOCs						
ACETONE	3.94E-01	1.02E+00	0.00E+00	3.62E-08	3.62E-08	7.84E-06
BENZENE	2.10E-02	3.80E-02	5.60E-12	0.00E+00	0.00E+00	0.00E+00
2-BUTANONE	3.25E-01	3.97E-01	0.00E+00	5.97E-08	5.97E-08	6.12E-06
CHLOROBENZENE	2.10E-02	3.80E-02	0.00E+00	9.65E-09	9.65E-09	1.47E-06
ETHYLBENZENE	1.16E-01	3.08E-01	0.00E+00	1.07E-08	1.07E-08	2.38E-06
TCL SVOCs						
BENZOIC ACID	2.35E+00	3.07E+00	0.00E+00	4.94E-09	4.94E-09	5.71E-07
DI-n-BUTYLPHTHALATE	4.40E-03	4.40E-03	0.00E+00	3.70E-09	3.70E-09	3.27E-07
[illegible]DIMETHYLPHENOL	1.94E-01	4.61E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
[illegible](2-ETHYLHEXYL)PHTHALATE	3.70E-03	5.60E-03	4.36E-13	1.56E-09	1.56E-09	2.08E-07
2-METHYLPHENOL	3.80E-01	4.58E-01	NONE	6.39E-08	6.39E-08	6.81E-06
4-METHYLPHENOL	1.17E+00	1.98E+00	NONE	1.97E-07	1.97E-07	2.94E-05
NAPHTHALENE	2.20E-02	4.70E-02	0.00E+00	4.63E-08	4.63E-08	8.73E-06
PHENOL	5.89E-01	7.64E-01	0.00E+00	8.26E-09	8.26E-09	9.46E-07
TCL PESTICIDES						
4,4'-DDT	1.35E-04	1.10E-04	3.86E-13	2.27E-09	2.27E-09	1.64E-07
HEPTACHLOR	1.05E-04	2.50E-04	4.34E-12	1.93E-09	1.93E-09	3.86E-07
TAL METALS						
BARIUM	1.70E+00	2.12E+00	0.00E+00	2.77E-07	2.77E-07	3.11E-05
CHROMIUM	5.20E-02	5.50E-02	0.00E+00	8.48E-08	8.48E-08	8.08E-06
COBALT	4.60E-02	3.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LEAD	3.04E-01	3.86E-01	NONE	0.00E+00	0.00E+00	0.00E+00
MAGNESIUM	2.62E+02	2.75E+02	0.00E+00	2.14E-05	2.14E-05	2.02E-03
MANGANESE	9.67E-01	1.20E+00	0.00E+00	3.94E-06	3.94E-06	4.41E-04
NICKEL	8.90E-02	9.60E-02	0.00E+00	3.63E-08	3.63E-08	3.52E-06
VANADIUM	1.80E-02	1.90E-02	0.00E+00	2.10E-08	2.10E-08	1.99E-06
ZINC	6.31E-01	6.76E-01	0.00E+00	2.57E-07	2.57E-07	2.48E-05
TOTAL ADDED LIFETIME CANCER RISK :			6.03E-12	9.08E-10		
HAZARD INDEX:					4.42E-07	6.48E-05

TABLE 7.19

WATER CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
TRESPASSERS - SURFACE WATER
PRESENT CONDITION
ON- AND OFF-SITE
NCR
WHEATFIELD, NEW YORK

	MEDIA CONCENTRATIONS		*LIFETIME UPPER BOUND EXCESS CANCER RISK*		*HAZARD QUOTIENTS*	
CHEMICAL	*MEAN mg/l*	*RME mg/l*	*MEAN*	*RME*	*MEAN*	*RME*
TCL VOCs						
CARBON DISULFIDE	2.70E-03	4.00E-03	0.00E+00	8.64E-11	8.64E-11	2.51E-08
TCL SVOCs						
bis(2-ETHYLHEXYL)PHTHALATE	1.16E-01	3.50E-03	5.20E-12	1.86E-08	1.86E-08	5.48E-08
METALS						
COBALT	8.30E-03	1.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
COPPER	2.50E-02	4.40E-02	0.00E+00	2.16E-09	2.16E-09	2.52E-07
CYANIDE	1.20E-02	2.00E-02	0.00E+00	1.92E-09	1.92E-09	6.27E-07
IRON	8.21E+00	1.72E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LEAD	6.30E-02	3.52E-01	NONE	0.00E+00	0.00E+00	0.00E+00
MAGNESIUM	5.80E+01	7.60E+01	0.00E+00	1.86E-06	1.86E-06	1.61E-04
MANGANESE	4.34E-01	8.46E-01	0.00E+00	6.94E-07	6.94E-07	8.98E-05
NICKEL	2.20E-02	3.50E-02	0.00E+00	3.52E-09	3.52E-09	3.71E-07
VANADIUM	1.80E-02	3.00E-02	0.00E+00	8.23E-09	8.23E-09	9.10E-07
ZINC	2.89E-01	7.58E-01	0.00E+00	4.62E-08	4.62E-08	8.04E-06
	TOTAL ADDED LIFETIME CANCER RISK :		5.20E-12	1.53E-11		
			HAZARD INDEX:		2.63E-06	2.61E-04

NC - NOT A CARCINOGEN
NA = NOT AVAILABLE

TABLE 7.20

WATER CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
TRESPASSERS - SURFACE WATER
FUTURE CONDITION
ON- AND OFF-SITE
NCR
WHEATFIELD, NEW YORK

	MEDIA CONCENTRATIONS		*LIFETIME UPPER BOUND EXCESS CANCER RISK*		*HAZARD QUOTIENTS*	
CHEMICAL	*MEAN mg/l*	*RME mg/l*	*MEAN*	*RME*	*MEAN*	*RME*
TLC VOCs						
CARBON DISULFIDE	2.70E-03	4.00E-03	0.00E+00	8.37E-10	8.37E-10	1.25E-07
TCL SVOCs						
BIS(2-ETHYLHEXYL)PHTHALATE	1.16E-01	3.50E-03	5.03E-11	1.80E-07	1.80E-07	5.48E-07
TAL METALS						
COBALT	8.30E-03	1.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
COPPER	2.50E-02	4.40E-02	0.00E+00	2.09E-08	2.09E-08	3.72E-06
CYANIDE	1.20E-02	2.00E-02	0.00E+00	1.86E-08	1.86E-08	3.13E-06
IRON	8.21E+00	1.72E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LEAD	6.30E-02	3.52E-01	NONE	0.00E+00	0.00E+00	0.00E+00
MAGNESIUM	5.80E+01	7.60E+01	0.00E+00	1.80E-05	1.80E-05	2.38E-03
MANGANESE	4.34E-01	8.46E-01	0.00E+00	6.72E-06	6.72E-06	1.32E-03
NICKEL	2.20E-02	3.50E-02	0.00E+00	3.41E-08	3.41E-08	5.48E-06
VANADIUM	1.80E-02	3.00E-02	0.00E+00	7.97E-08	7.97E-08	1.34E-05
ZINC	2.89E-01	7.58E-01	0.00E+00	4.48E-07	4.48E-07	1.19E-04
NC - NOT A CARCINOGEN NA = NOT AVAILABLE	TOTAL LIFETIME ADDED CANCER RISKS :		5.03E-11	1.53E-10		
			HAZARD INDEX:		2.55E-05	3.85E-03

TABLE 7.21

WATER CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
RESIDENTIAL EXPOSURE - SURFACE WATER
FUTURE CONDITION
OFF-SITE
NCR
WHEATFIELD, NEW YORK

CHEMICAL	*MEDIA CONCENTRATIONS*		*LIFETIME UPPER BOUND EXCESS CANCER RISK*		*HAZARD QUOTIENTS*	
	MEAN mg/l	*RME mg/l*	*MEAN*	*RME*	*MEAN*	*RME*
TCL VOCs						
CARBON DISULFIDE	2.70E-03	4.00E-03	0.00E+00	5.83E-09	5.83E-09	1.11E-06
TCL SVOCs						
bis(2-ETHYLHEXYL)PHTHALATE	1.16E-01	3.50E-03	3.50E-10	1.25E-06	1.25E-06	4.84E-06
METALS						
COBALT	8.30E-03	1.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
COPPER	2.50E-02	4.40E-02	0.00E+00	1.46E-07	1.46E-07	3.29E-05
CYANIDE	1.20E-02	2.00E-02	0.00E+00	1.29E-07	1.29E-07	2.77E-05
IRON	8.21E+00	1.72E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LEAD	6.30E-02	3.52E-01	NONE	0.00E+00	0.00E+00	0.00E+00
MAGNESIUM	5.80E+01	7.60E+01	0.00E+00	1.25E-04	1.25E-04	2.10E-02
MANGANESE	4.34E-01	8.46E-01	0.00E+00	4.68E-05	4.68E-05	1.17E-02
NICKEL	2.20E-02	3.50E-02	0.00E+00	2.37E-07	2.37E-07	4.84E-05
VANADIUM	1.80E-02	3.00E-02	0.00E+00	5.55E-07	5.55E-07	1.19E-04
ZINC	2.89E-01	7.58E-01	0.00E+00	3.12E-06	3.12E-06	1.05E-03
TOTAL ADDED LIFETIME CANCER RISK :			3.50E-10	1.36E-09		
HAZARD INDEX:					1.77E-04	3.40E-02

NC - NOT A CARCINOGEN
NA = NOT AVAILABLE

TABLE 7.22

WATER CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
WORKER ON-SITE - SURFACE WATER
FUTURE CONDITION
ON- AND OFF-SITE
NCR
WHEATFIELD, NEW YORK

CHEMICAL	*MEDIA CONCENTRATIONS* *MEAN* *mg/l*	*RME* *mg/l*	*LIFETIME UPPER BOUND EXCESS CANCER RISK* *MEAN*	*RME*	*HAZARD QUOTIENTS* *MEAN*	*RME*
TCL VOCs						
CARBON DISULFIDE	2.70E-03	4.00E-03	0.00E+00	8.51E-11	8.51E-11	1.18E-08
TCL SVOCs						
bis(2-ETHYLHEXYL)PHTHALATE	1.16E-01	3.50E-03	5.12E-12	1.83E-08	1.83E-08	5.14E-08
TAL METALS						
COBALT	8.30E-03	1.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
COPPER	2.50E-02	4.40E-02	0.00E+00	2.13E-09	2.13E-09	3.49E-07
CYANIDE	1.20E-02	2.00E-02	0.00E+00	1.89E-09	1.89E-09	2.94E-07
IRON	8.21E+00	1.72E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LEAD	6.30E-02	3.52E-01	NONE	0.00E+00	0.00E+00	0.00E+00
MAGNESIUM	5.80E+01	7.60E+01	0.00E+00	1.83E-06	1.83E-06	2.23E-04
MANGANESE	4.34E-01	8.46E-01	0.00E+00	6.84E-07	6.84E-07	1.24E-04
NICKEL	2.20E-02	3.50E-02	0.00E+00	3.47E-09	3.47E-09	5.14E-07
VANADIUM	1.80E-02	3.00E-02	0.00E+00	8.10E-09	8.10E-09	1.26E-06
ZINC	2.89E-01	7.58E-01	0.00E+00	4.55E-08	4.55E-08	1.11E-05
NC - NOT A CARCINOGEN	TOTAL ADDED					
NA = NOT AVAILABLE	LIFETIME CANCER RISKS :		5.12E-12	1.44E-11		
			HAZARD INDEX:		2.59E-06	3.61E-04

TABLE 7.23

WATER CONCENTRATIONS, ESTIMATED CANCER RISKS AND HAZARD
PARKLAND VISITORS - SURFACE WATER
FUTURE CONDITION
OFF-SITE
NCR
WHEATFIELD, NEW YORK

	MEDIA CONCENTRATIONS		*LIFETIME UPPER BOUND EXCESS CANCER RISK*		*HAZARD QUOTIENTS*	
CHEMICAL	*MEAN mg/l*	*RME mg/l*	*MEAN*	*RME*	*MEAN*	*RME*
TCL VOCs						
CARBON DISULFIDE	2.70E-03	4.00E-03	0.00E+00	1.66E-09	1.66E-09	3.41E-07
TCL SVOCs						
bis(2-ETHYLHEXYL)PHTHALATE	1.16E-01	3.50E-03	1.00E-10	3.58E-07	3.58E-07	1.49E-06
METALS						
COBALT	8.30E-03	1.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
COPPER	2.50E-02	4.40E-02	0.00E+00	4.17E-08	4.17E-08	1.01E-05
CYANIDE	1.20E-02	2.00E-02	0.00E+00	3.70E-08	3.70E-08	8.51E-06
IRON	8.21E+00	1.72E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LEAD	6.30E-02	3.52E-01	NONE	0.00E+00	0.00E+00	0.00E+00
MAGNESIUM	5.80E+01	7.60E+01	0.00E+00	3.57E-05	3.57E-05	6.47E-03
MANGANESE	4.34E-01	8.46E-01	0.00E+00	1.34E-05	1.34E-05	3.60E-03
NICKEL	2.20E-02	3.50E-02	0.00E+00	6.78E-08	6.78E-08	1.49E-05
VANADIUM	1.80E-02	3.00E-02	0.00E+00	1.59E-07	1.59E-07	3.65E-05
ZINC	2.89E-01	7.58E-01	0.00E+00	8.91E-07	8.91E-07	3.23E-04

NC - NOT A CARCINOGEN
NA = NOT AVAILABLE

TOTAL ADDED LIFETIME CANCER RISK : 1.00E-10 4.17E-10

HAZARD INDEX: 5.07E-05 1.05E-02

TABLE 7.24

SUMMATION OF LIFETIME CANCER RISKS AND HAZARDS FOR TRESPASSERS (PRESENT CONDITIONS) NCR SITE WHEATFIELD, NEW YORK

	Upperbound Excess Lifetime Cancer Risks	
	Level 1	*Level 2*
Exposure: dermal contact and inadvertent ingestion		
(i) Sediments	2E-08	9E-08
(ii) Leachate Seeps	2E-13	2E-10
(iii) Surface Water	5E-12	2E-11
Total	2E-08	9E-08

	Hazard Index	
	Level 1	*Level 2*
Exposure: dermal contact and inadvertent ingestion		
(i) Sediments	3E-05	1E-04
(ii) Leachate Seeps	7E-07	3E-04
(iii) Surface Water	3E-06	3E-04
Total	3E-05	7E-04

TABLE 7.25

SUMMATION OF LIFETIME CANCER RISKS AND HAZARDS FOR TRESPASSERS (FUTURE CONDITIONS)
NCR SITE
WHEATFIELD, NEW YORK

	Upperbound Excess Lifetime Cancer Risks	
	Level 1	*Level 2*
Exposure: dermal contact and inadvertent ingestion		
(i) Sediments	5E-08	2E-07
(ii) Leachate Seeps	6E-12	9E-10
(iii) Surface Water	5E-11	2E-10
Total	5E-08	2E-07

	Hazard Index	
	Level 1	*Level 2*
Exposure: dermal contact and inadvertent ingestion		
(i) Sediments	6E-05	2E-04
(ii) Leachate Seeps	4E-07	6E-05
(iii) Surface Water	3E-05	4E-03
Total	9E-05	4E-03

TABLE 7.26

SUMMATION OF LIFETIME CANCER RISKS AND HAZARDS FOR RESIDENTS (FUTURE CONDITIONS)
NCR SITE
WHEATFIELD, NEW YORK

	Upperbound Excess Lifetime Cancer Risks	
	Level 1	*Level 2*
Exposure: dermal contact and inadvertent ingestion		
(i) Sediments	1E-06	1E-06
(ii) Surface Water	4E-10	1E-09
Total	1E-06	1E-06

	Hazard Index	
	Level 1	*Level 2*
Exposure: dermal contact and inadvertent ingestion		
(i) Sediments	2E-03	5E-03
(ii) Surface Water	2E-04	3E-02
Total	2E-03	4E-02

TABLE 7.27

SUMMATION OF LIFETIME CANCER RISKS AND HAZARDS FOR WORKERS (FUTURE CONDITIONS)
NCR SITE
WHEATFIELD, NEW YORK

	Upperbound Excess Lifetime Cancer Risks	
	Level 1	*Level 2*
Exposure: dermal contact and inadvertent ingestion		
(i) Sediments	8E-09	2E-07
(ii) Surface Water	5E-12	1E-11
(iii) Subsurface Soils	4E-11	2E-10
Total	9E-09	2E-07

	Hazard Index	
	Level 1	*Level 2*
Exposure: dermal contact and inadvertent ingestion		
(i) Sediments	5E-05	1E-03
(ii) Surface Water	3E-06	4E-04
(iii) Subsurface Soils	6E-06	2E-05
Total	6E-05	1E-03

TABLE 7.28

SUMMATION OF LIFETIME CANCER RISKS AND HAZARDS FOR PARKLAND VISITORS (FUTURE CONDITIONS)
NCR SITE
WHEATFIELD, NEW YORK

	Upperbound Excess Lifetime Cancer Risks	
	Level 1	*Level 2*
Exposure: dermal contact and inadvertent ingestion		
(i) Sediments	1E-08	7E-08
(ii) Surface Water	1E-10	4E-10
Total	1E-08	7E-08

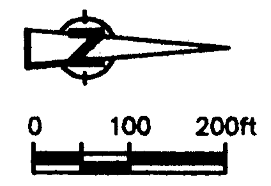
	Hazard Index	
	Level 1	*Level 2*
Exposure: dermal contact and inadvertent ingestion		
(i) Sediments	3E-05	3E-04
(ii) Surface Water	5E-05	1E-02
Total	8E-05	1E-02

NOTES CONCERNING SITE GRID

THE GRID SYSTEM IS BASED ON AN ASSUMED COORDINATE OF 10000N / 10000E ON AN EXISTING RR SPIKE IN THE APPROX. CENTERLINE OF WARNER RD. AT ITS INTERSECTION WITH THE APPROX. CENTERLINE OF BOSTON AVENUE.

THE DIRECTION OF THE FIRST GRID LINE WAS ESTABLISHED HOLDING AN EXISTING RR SPIKE IN THE APPROX. CENTERLINE INTERSECTION OF WARNER & WITMER RD.

ALL GRID LINES ARE REFERENCED PARALLEL OR PERPENDICULAR TO THE ABOVE DESCRIBED LINE.



SOURCE:

ABRAMS AERIAL SURVEY CORP.
124 NORTH LARCH, LANSING, MI 48933
A.A.S.C. #22886

LEGEND

● 10 LEACHATE SEEP

Nº	Revision	Date	Initial

Approved

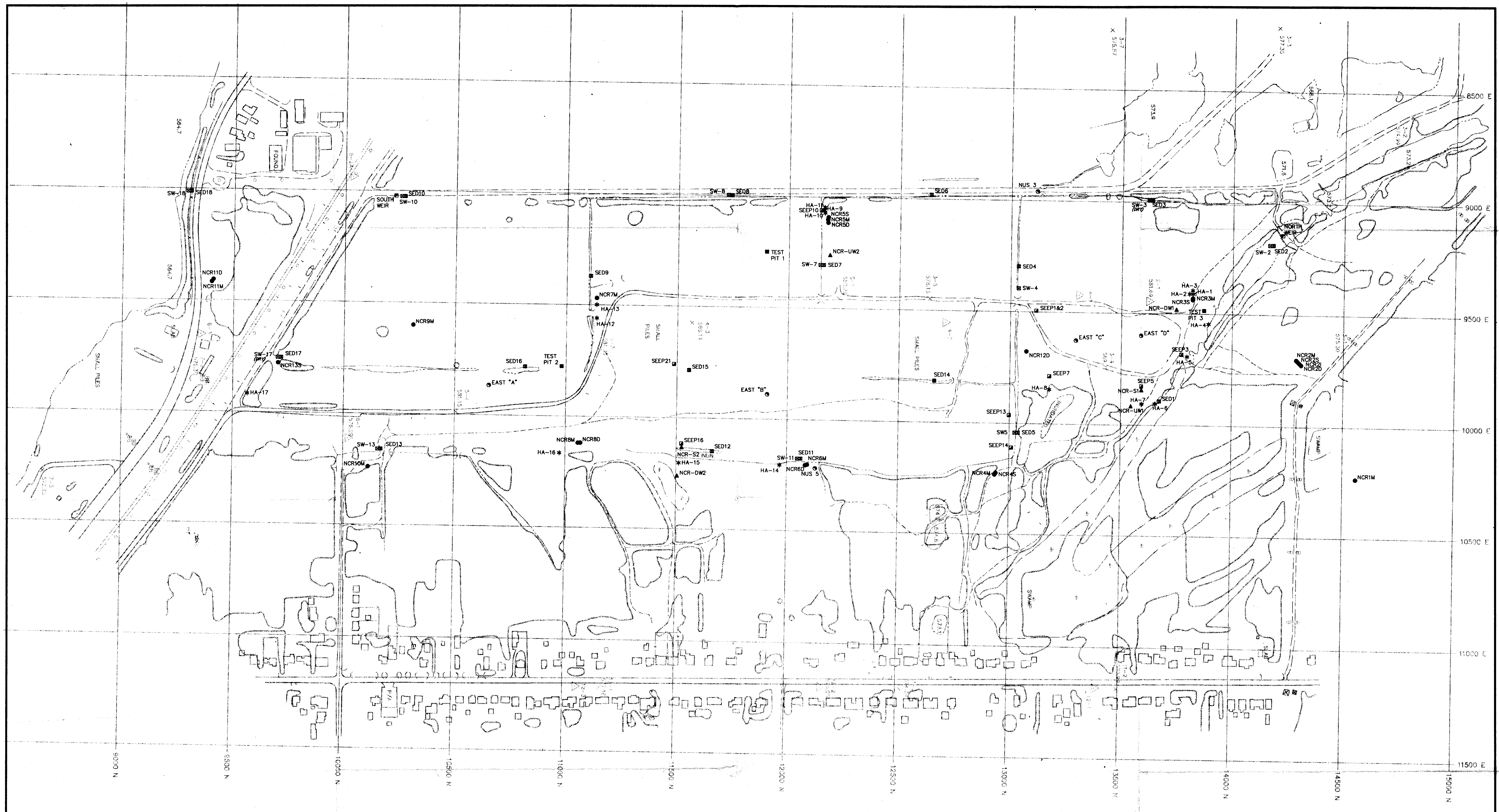
NIAGARA COUNTY REFUSE SITE
WHEATFIELD, NEW YORK

RI REPORT

LEACHATE SEEPS

CRA
CONESTOGA-ROVERS & ASSOCIATES

Drawn by: R.B.B./L.D.M.	Scale: 1"=200'	Date: AUGUST 1991	File Nº: 15 (P-18)	Rev.Nº: –
Designed by: E.R.	Field book:	Project Nº: 2677	Drawing Nº: 2	
Checked by: E.R.				



NOTES CONCERNING SITE GRID

THE GRID SYSTEM IS BASED ON AN ASSUMED COORDINATE OF 10000N / 10000E ON AN EXISTING RR SPIKE IN THE APPROX. CENTERLINE OF WARNER RD. AT ITS INTERSECTION WITH THE APPROX. CENTERLINE OF BOSTON AVENUE.

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ALL GRID LINES ARE REFERENCED PARALLEL OR PERPENDICULAR TO THE ABOVE DESCRIBED LINE.

0 100 200ft

SOURCE:

ABRAMS AERIAL SURVEY CORP.
124 NORTH LARCH, LANSING, MI 48933
A.A.S.C. #22886

LEGEND

◒	EXISTING MONITORING WELL
●	CRA RI MONITORING WELL
■	TEST PIT
⊠	SEDIMENT SAMPLE
◪	LEACHATE SEEP SAMPLE
◩	WEIR
⊠	SURFACE WATER SAMPLE
▲	AIR SAMPLE
*	HAND AUGER SAMPLE

Nº	Revision	Date	Initial

Approved

NIAGARA COUNTY REFUSE SITE
WHEATFIELD, NEW YORK

RI REPORT

SAMPLING LOCATIONS

CRA
CONESTOGA-ROVERS & ASSOCIATES

Drawn by: R.B.B.	Scale: 1"=200'	Date: NOVEMBER 1990	File Nº: 8 (P-06)	Rev.Nº: –
Designed by: J.B.				
Checked by: E.R.	Field book:	Project Nº: 2677	Drawing Nº: 2	

SOURCE:
ABRAMS AERIAL SURVEY CORP.
124 NORTH LARCH, LANSING, MI 48933
A.A.S.C. # 22886

Nº	Revision	Date	Initial

Approved

NIAGARA COUNTY REFUSE SITE
WHEATFIELD, NEW YORK

RI REPORT

TOPOGRAPHIC SITE PLAN

CRA Consulting Engineers
CONESTOGA-ROVERS & ASSOCIATES
651 Colby Drive, Waterloo, Ontario Canada N2V 1C2

Drawn by: RBB	Scale: 1"=200'	Date: OCTOBER 1989	File Nº: S	Rev.Nº: –
Designed by:				
Checked by: E.R.	Field book:	Project Nº: 2677	Drawing Nº: 0 1 (B-1) PLAN 1	

NOTES CONCERNING SITE GRID

THE GRID SYSTEM IS BASED ON AN ASSUMED COORDINATE OF 10000N / 10000E ON AN EXISTING RR SPIKE IN THE APPROX. CENTERLINE OF WARNER RD. AT ITS INTERSECTION WITH THE APPROX. CENTERLINE OF BOSTON AVENUE.

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ALL GRID LINES ARE REFERENCED PARALLEL OR PERPENDICULAR TO THE ABOVE DESCRIBED LINE.

0 100 200ft

SOURCE:

ABRAMS AERIAL SURVEY CORP.
124 NORTH LARCH, LANSING, MI 48933
A.A.S.C. #22886

LEGEND
- ◉ EXISTING MONITORING WELLS
- ● CRA RI MONITORING WELLS
- ⊔ CROSS-SECTION LOCATIONS

Nº	Revision	Date	Initial

Approved

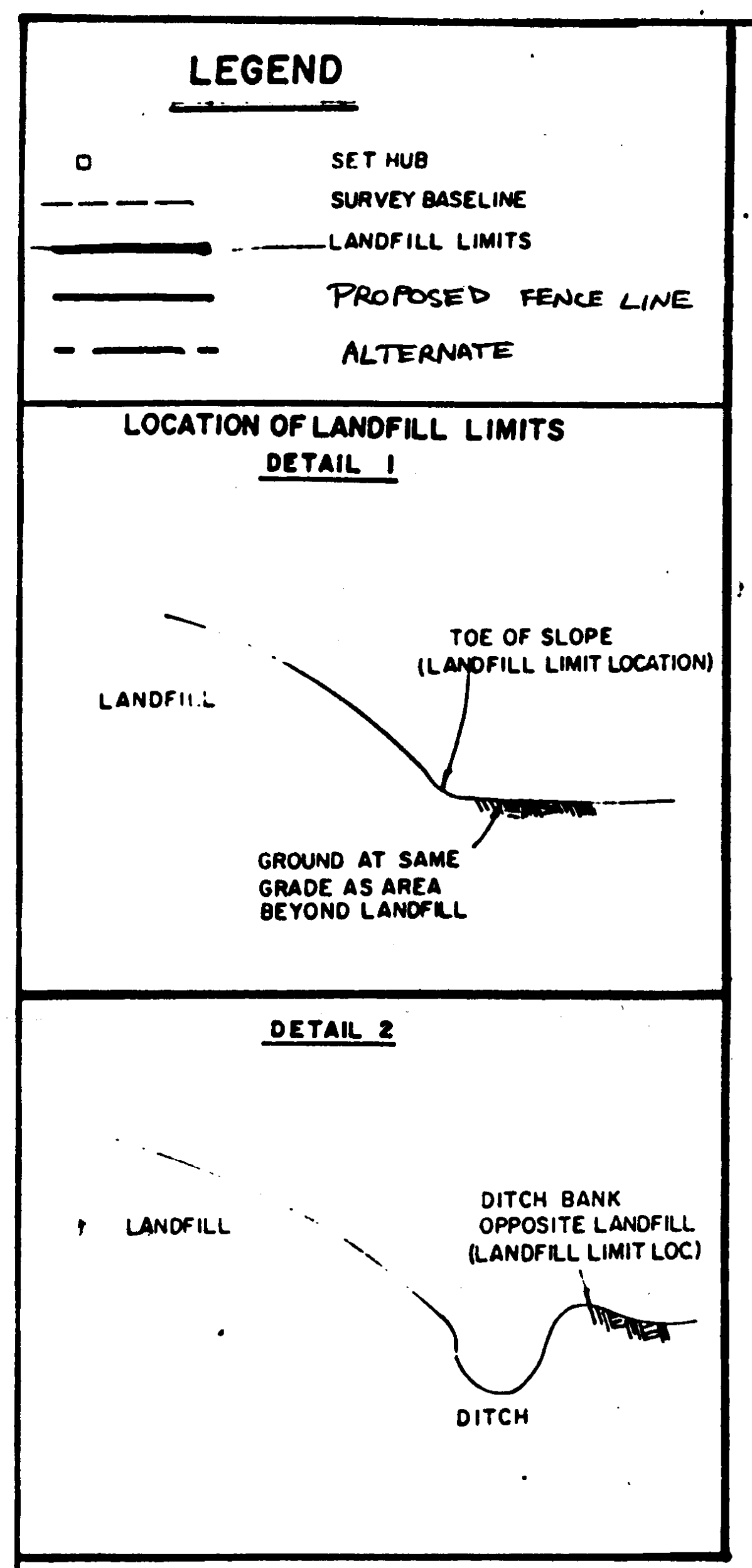
NIAGARA COUNTY REFUSE SITE
WHEATFIELD, NEW YORK

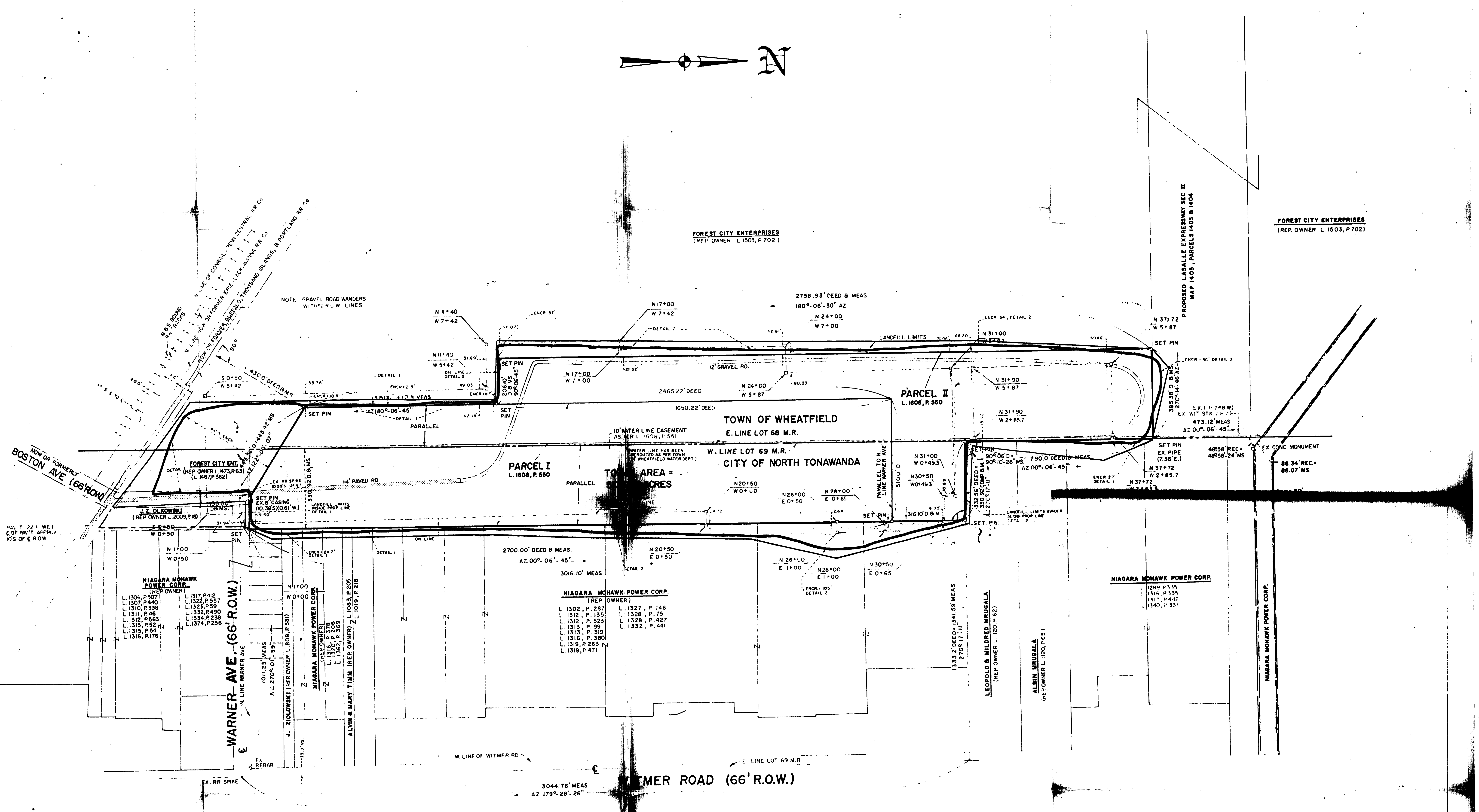
RI REPORT

MONITORING WELL LOCATIONS

CRA
CONESTOGA-ROVERS & ASSOCIATES

Drawn by: R.B.B.	Scale: 1"=200'	Date: NOVEMBER 1990	File Nº: 7 (P-05)	Rev.Nº: -
Designed by: J.B.				
Checked by: E.R.	Field book:	Project Nº: 2677	Drawing Nº: PLAN 4	





NOTE:
PROPERTY IS SUBJECT
TO EASEMENT AS DESCRIBED
IN L. 1508, P. 119

NOTES:

1) Azimuths (directions) shown along property lines are referenced to an assumed north.

2) The survey baseline shown on this map was established for CRA Engineers. The purpose was to provide sufficient ground control for scientific measurements prior to determination of the property lines.

3) Refer to sketch 1 & 2 for landfill limit locations. The limit as shown is the most outward extent of the man-made "improvements" created during construction of said landfill. Limits are measured at right angles to the property line.

MAP
SHOWING SURVEY
OF
PROPERTY OWNED BY

THE TOWN OF WHEATFIELD

(FORMERLY NIAGARA COUNTY REFUSE DISPOSAL DISTRICT)

PREPARED FOR:

C.R.A. ENGINEERS, NIAGARA FALLS, N.Y.

RI REPORT SITE PROPERTY MAP PLAN 3

NIAGARA BOUNDARY
AND MAPPING SERVICES, L.S.P.C.
FORMERLY FRANK T. TRIPI & ASSOCIATES P.C.
765 CAYUGA STREET LEWISTON, NEW YORK 14092 TEL (716) 754-8330

RESURVEYED	DATE

REFERENCE:

"ONLY COPIES FROM THE ORIGINAL OF THIS SURVEY MARKED WITH AN ORIGINAL OF THE LAND SURVEYOR'S EMBOSSED SEAL SHALL BE CONSIDERED TO BE VALID TRUE COPIES."

BARRY H NICHOLS Lic No 49890

LOT 68 M.R. & 69 M.R.	SEC.	TWP.	RNG.

CITY/TOWN	N TONAWANDA/WHEATFIEL
COUNTY	NIAGARA
STATE	NEW YORK
DATE	6/4/90
SCALE	1" = 200'
JOB NO.	3833-90

NOTE:
UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY MAP IS A VIOLATION OF SECTION 7209 PROVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

NOTE:
THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF AN ABSTRACT OF TITLE AND IS SUBJECT TO ANY STATE OF FACTS THAT MAY BE REVEALED BY AN EXAMINATION OF SUCH.

2677 #2

0 100 200ft

NOTES CONCERNING SITE GRID

THE GRID SYSTEM IS BASED ON AN ASSUMED COORDINATE OF 10000N / 10000E ON AN EXISTING RR SPIKE IN THE APPROX. CENTERLINE OF WARNER RD. AT ITS INTERSECTION WITH THE APPROX. CENTERLINE OF BOSTON AVENUE.

THE DIRECTION OF THE FIRST GRID LINE WAS ESTABLISHED HOLDING AN EXISTING RR SPIKE IN THE APPROX. CENTERLINE INTERSECTION OF WARNER & WITMER RD.

ALL GRID LINES ARE REFERENCED PARALLEL OR PERPENDICULAR TO THE ABOVE DESCRIBED LINE.

SOURCE:

ABRAMS AERIAL SURVEY CORP.
124 NORTH LARCH, LANSING, MI 48933
A.A.S.C. #22886

LEGEND

◔	EXISTING MONITORING WELL
●	CRA RI MONITORING WELL
■	TEST PIT
▣	SEDIMENT SAMPLE
◪	LEACHATE SEEP SAMPLE
◩	WEIR
▦	SURFACE WATER SAMPLE
▲	AIR SAMPLE
*	HAND AUGER SAMPLE

Nº	Revision	Date	Initial

Approved

NIAGARA COUNTY REFUSE SITE
WHEATFIELD, NEW YORK

RI REPORT

SAMPLING LOCATIONS

CRA
CONESTOGA-ROVERS & ASSOCIATES

Drawn by:	Scale:	Date:	File Nº:	Rev.Nº:
DCR	1"=200'	JULY 1991	14 (R-12)	–
Designed by: J.B.	Field book:	Project Nº:	Drawing Nº:	
Checked by: E.R.		2677	PLAN 5	

NOTES CONCERNING SITE GRID

THE GRID SYSTEM IS BASED ON AN ASSUMED COORDINATE OF 10000N / 10000E ON AN EXISTING RR SPIKE IN THE APPROX. CENTERLINE OF WARNER RD. AT ITS INTERSECTION WITH THE APPROX. CENTERLINE OF BOSTON AVENUE.

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ALL GRID LINES ARE REFERENCED PARALLEL OR PERPENDICULAR TO THE ABOVE DESCRIBED LINE.

SOURCE:

ABRAMS AERIAL SURVEY CORP.
124 NORTH LARCH, LANSING, MI 48933
A.A.S.C. #22886

LEGEND

- ◐ EXISTING MONITORING WELLS
- ● CRA RI MONITORING WELLS
- (573.2) TOP OF CLAY/UPPER TILL ELEVATIONS (ft.AMSL)
- —— 569 TOP OF CLAY/UPPER TILL CONTOUR (ft. AMSL)

Nº	Revision	Date	Initial
1	PLAN NUMBER IS CHANGED FROM PLAN 7 TO PLAN 6	APRIL 20/92	J.I.

Approved

NIAGARA COUNTY REFUSE SITE
WHEATFIELD, NEW YORK

RI REPORT

TOP OF CLAY/UPPER TILL CONTOURS

CRA
CONESTOGA-ROVERS & ASSOCIATES

Drawn by: R.B.B/K.S.W.
Designed by: J.B.
Checked by: E.R.
Scale: 1"=200'
Date: NOVEMBER 1990
File Nº: 13 (P-10)
Rev.Nº: 1
Field book:
Project Nº: 2677
Drawing Nº: PLAN 6

NOTES CONCERNING SITE GRID

THE GRID SYSTEM IS BASED ON AN ASSUMED COORDINATE OF 10000N / 10000E ON AN EXISTING RR SPIKE IN THE APPROX. CENTERLINE OF WARNER RD. AT ITS INTERSECTION WITH THE APPROX. CENTERLINE OF BOSTON AVENUE.

THE DIRECTION OF THE FIRST GRID LINE WAS ESTABLISHED HOLDING AN EXISTING RR SPIKE IN THE APPROX. CENTERLINE INTERSECTION OF WARNER & WITMER RD.

ALL GRID LINES ARE REFERENCED PARALLEL OR PERPENDICULAR TO THE ABOVE DESCRIBED LINE.

SOURCE:

ABRAMS AERIAL SURVEY CORP.
124 NORTH LARCH, LANSING, MI 48933
A.A.S.C. #22886

LEGEND

●	EXISTING MONITORING WELLS
●	CRA RI MONITORING WELLS
(573.2)	TOP OF CLAY/TILL ELEVATIONS (ft. AMSL)
━ 569	TOP OF CLAY TILL CONTOUR (ft. AMSL)

Nº	Revision	Date	Initial

Approved

NIAGARA COUNTY REFUSE SITE
WHEATFIELD, NEW YORK

RI REPORT

TOP OF CLAY/TILL CONTOURS

CRA
CONESTOGA-ROVERS & ASSOCIATES

Drawn by: R.B.B/K.S.W.	Scale: 1"=200'	Date: NOVEMBER 1990	File Nº: 13 (P-10)	Rev.Nº: –
Designed by: J.B.				
Checked by: E.R.	Field book:	Project Nº: 2677	Drawing Nº: PLAN 7	

NOTES CONCERNING SITE GRID

THE GRID SYSTEM IS BASED ON AN ASSUMED COORDINATE OF 10000N / 10000E ON AN EXISTING RR SPIKE IN THE APPROX. CENTERLINE OF WARNER RD. AT ITS INTERSECTION WITH THE APPROX. CENTERLINE OF BOSTON AVENUE.

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ALL GRID LINES ARE REFERENCED PARALLEL OR PERPENDICULAR TO THE ABOVE DESCRIBED LINE.

0 100 200ft

SOURCE:

ABRAMS AERIAL SURVEY CORP.
124 NORTH LARCH, LANSING, MI 48933
A.A.S.C. #22886

LEGEND

◐ EXISTING MONITORING WELLS
● CRA RI MONITORING WELLS
(564.71) GROUNDWATER ELEVATION TAKEN ON 04/19/91 (ft. AMSL)
→ DIRECTION OF GROUNDWATER FLOW

Nº	Revision	Date	Initial

Approved

NIAGARA COUNTY REFUSE SITE
WHEATFIELD, NEW YORK

RI REPORT

LOWER TILL GROUNDWATER
CONTOURS (04/19/91)

CRA
CONESTOGA-ROVERS & ASSOCIATES

Drawn by: R.B.B./K.S.W.
Designed by: J.B.
Checked by: E.R.
Scale: 1"=200'
Date: NOVEMBER 1990
File Nº: 10 (P-21)
Rev.Nº: –
Field book:
Project Nº: 2677
Drawing Nº: PLAN 8

NOTES CONCERNING SITE GRID

THE GRID SYSTEM IS BASED ON AN ASSUMED COORDINATE OF 10000N / 10000E ON AN EXISTING RR SPIKE IN THE APPROX. CENTERLINE OF WARNER RD. AT ITS INTERSECTION WITH THE APPROX. CENTERLINE OF BOSTON AVENUE.

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SOURCE:

ABRAMS AERIAL SURVEY CORP.
124 NORTH LARCH, LANSING, MI 48933
A.A.S.C. #22886

LEGEND

◉	EXISTING MONITORING WELLS
●	CRA RI MONITORING WELLS
(564.79)	LEACHATE ELEVATION (10/30/90) —FILL MATERIAL (ft. AMSL)
574	LEACHATE CONTOUR (10/30/90) —FILL MATERIAL
[571.43]	WATER LEVEL ELEVATION (10/30/90) —SHALLOW SILTY SAND UNIT

Nº	Revision	Date	Initial

Approved

NIAGARA COUNTY REFUSE SITE
WHEATFIELD, NEW YORK

RI REPORT

LEACHATE ELEVATION (10/30/90)
FILL MATERIAL

CRA
CONESTOGA-ROVERS & ASSOCIATES

Drawn by: R.B.B./K.S.W.	Scale: 1"=200'	Date: NOVEMBER 1990	File Nº: 11 (P-08)	Rev.Nº: –
Designed by: J.B.				
Checked by: E.R.	Field book:	Project Nº: 2677	Drawing Nº: PLAN 9	