Work Plan

Remedial Investigation Work Plan
Niagara Transformer Corporation
Cheektowaga, New York
November 15, 1990

[illegible] Road
Niagara Falls
New York 14304 3093

716 297 8771
FAX 716 297 8772

Woodward-Clyde Consultants

November 15, 1990
90C2139-1

Niagara Transformer Corporation
P.O. Box L33
Buffalo, New York 14225

Attention: Fred W. Darby

REMEDIAL INVESTIGATION WORK PLAN
NIAGARA TRANSFORMER CORPORATION

Dear Mr. Darby:

Woodward-Clyde Consultants (WCC) is pleased to submit this Work Plan for performance of a Remedial Investigation (RI) at the Dale Road Facility. If you have any questions or comments on this submittal, please contact the undersigned. We appreciate the opportunity to provide this service to your company.

Sincerely,

WOODWARD-CLYDE CONSULTANTS

Rebecca Walsh

Rebecca Y. Walsh
QA/QC Officer

Kelly R. McIntosh

Kelly R. McIntosh
Project Manager

Frank S. Waller JEY

Frank S. Waller, P.E.
Senior Managing Principal

KRM/FSW/jet/NF-M2

cc: Robert Fishlock

REMEDIAL INVESTIGATION
WORK PLAN
NIAGARA TRANSFORMER CORPORATION

Submitted to:

NIAGARA TRANSFORMER CORPORATION
Cheektowaga, New York

Prepared by:

WOODWARD-CLYDE CONSULTANTS
Niagara Falls, New York

November 1990

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

Woodward-Clyde Consultants (WCC) has been contracted by Niagara Transformer Corporation (NTC) to prepare a Remedial Investigation (RI) Work Plan for NTC's Dale Road Facility (Site) in Cheektowaga, New York (Figure 1). On April 10, 1990, Town of Cheektowaga employees observed an oily substance in a drainage ditch running in an east-west direction (parallel to the south perimeter of the Site) on Conrail property. The New York State Department of Environmental Conservation (NYSDEC) was contacted and subsequent testing indicated that the sediments within the east-west drainage ditch were contaminated with polychlorinated biphenyl compounds (PCBs). Further testing showed elevated PCB-levels in sediments within a drainage ditch running north to south across Niagara Transformer property, intersecting the east-west ditch near the southeast corner of the Site. Based on the distribution of contaminated sediments, visible seepage to the ditch, and documented use of PCB compounds at the Site, the source of contamination was determined to be on the NTC property.

Site structures and drainage are shown on Figure 2. The contaminated section of the drainage ditches has been designated an Operable Unit (Operable Unit 1) by NYSDEC. An Interim Remedial Measure (IRM) Work Plan for Operable Unit 1 was prepared by WCC and submitted to NYSDEC on November 1, 1990. The objective of the IRM will be to minimize the migration of contamination from the ditches during the investigatory process.

This RI Work Plan is organized into twelve Sections as follows:

Section 2.0 Site Background and Physical Setting
Section 3.0 Previous Data Collection
Section 4.0 Conceptual Contaminant Transport Model
Section 5.0 RI Scope of Work
Section 6.0 RI Field Investigation
Section 7.0 RI Report
Section 8.0 Quality Assurance
Section 9.0 Project Organization
Section 10.0 Community Relations
Section 11.0 Health and Safety

Section 12.0 Schedule

2.0 SITE BACKGROUND AND PHYSICAL SETTING

This section presents a brief description of the Site history and setting based on available information. As described in Section 5.0, the RI will involve further investigation of operating history, chemical handling and disposal, and physical setting.

2.1 OPERATING HISTORY

The Niagara Transformer Corporation (NTC) began manufacturing transformers at the Site in 1958. Their business has consisted primarily of manufacturing new transformers (both dry and liquid). On occasion, NTC will repair or recondition transformers for customers. PCB containing oils were used or stored on-site from approximately 1958 to 1980. Currently, NTC uses either mineral oil, silicone, or RTemp™ in manufacturing liquid-containing transformers.

A variety of chemicals have been used by NTC at the Site. Table 1, which is not yet complete and will be submitted at a later date, lists the substances used. However, based on available information, on-site spillage appears to have been limited primarily to mineral oil and transformer fluid. Prior to 1980, transformer fluid could have contained PCBs and chlorinated benzenes in addition to the petroleum hydrocarbons.

Precise locations of spills and the extent of the area impacted by the releases are not known. Based on discussions with NTC employees, such determinations may not be possible based only on Site records and employee interviews. Therefore, the RI cannot be focussed only on areas of known contamination or spillage. However, based on plant operations and available data, there are some areas of the Site which do require particular attention in the RI. These include:

- The tank farm area
- The back parking lot between the tank farm and the main building
- The vicinity of head of the north-south ditch
- The vicinity of the seep area in the east-west ditch

- The area between the tank farm and the seep

Conversely, the north side of the main building is probably upgradient of the releases. However, the area will be investigated to verify this conjecture.

Note that the front parking lot was paved in November 1967 and the rear and side lots were paved in September 1985. Subsequent to the paving, the only direct release to these soils would have been from leakage of the underground pipe between the tank farm and the main building.

2.2 SITE TOPOGRAPHY AND DRAINAGE

Topography on Site varies from approximately 657 feet above sea level near Dale Road in the north to approximately 645 feet above sea level near the southern property line (Figure 1). A drainage ditch runs north to south, along the eastern side of the property and discharges into a drainage ditch which runs east to west along the Conrail railroad easement. The north-south drainage ditch begins at a point just south of the end of a topographically low driveway which extends from the northern parking area, east along the Niagara Transformer facility. This drainage ditch directly receives discharges from a number of sources on the property including 1) surface runoff from the northern parking lot, 2) rainwater from roof drains, and 3) water discharged from a drainage system beneath the southern parking lot. In addition, the north-south drainage ditch most likely receives some surface runoff from the property just east of Niagara Transformer because of the low-lying nature of the east driveway and the drainage ditch. The southwest corner of the property has standing water throughout wet periods.

2.3 SITE GEOLOGY AND HYDROGEOLOGY

The Site is located within the Erie-Ontario Lowlands Physiographic Province of New York, which is characterized by a thick, gently dipping (southward at a rate of 20 to 50 feet per mile) sequence of rock formations ranging from sandstones and shales to dolomites and limestones from the Silurian and Devonian Periods. The Site is underlain by limestone of the Onondaga Formation. The Onondaga is Early Devonian in age (375 million years before present) and, in general, consists of light gray to gray, course textured, fossiliferous limestone with abundant blue/black chert nodules. Depth to the bedrock interface approximately 2500 feet north of the Site is 30 feet. Groundwater flow in bedrock aquifers of Erie County is primarily through secondary openings such as fractures and solution cavities. The Onondaga Limestone is one of the four principal sources for groundwater withdrawal in Erie County with a median well yield of 180 gpm. However, based upon available records, there are no municipal or private water supply wells within three miles of the Site. Groundwater flow in the Onondaga is probably northwesterly toward Lake Erie.

The surficial geology of Western New York has been largely controlled by the effects of Pleistocene glaciation. A majority of the moraines and tills of Erie County have been assigned to the Port Huron Glacial Substage (late Wisconsin), being deposited during the last 12,000 years. The Site is located within a lake silt, sand, and clay unit indicative of deposition within ancestral glacial lakes. Material within this unit typically consists of bedded massive silt, fine to medium sand, and clay with moderate bedding plane permeability. A roughly east-west trending end moraine unit running adjacent to Scajaquada Creek exists approximately 3000 feet north of the Site. There are no known users of overburden groundwater in the vicinity.

A previous study of the Ernst Steel Company Site (NYSDEC Inactive Hazardous Waste Site # 915022), located approximately 2500 feet north of the Niagara Transformer Site, characterized the overburden stratigraphy, in descending order from ground surface, as follows: 1) 0-3 feet of fill material, 2) a thin (0.5 to 1 foot), discontinuous native silt layer, 3) 5 to 20 feet of glaciolacustrine clay, and 5) 6 to 27 feet of a silt/clay till. It is believed that the overburden stratigraphy at the Niagara Transformer Site will be similar to that observed at Ernst Steel. However, since Niagara Transformer is further south of the aforementioned end moraine unit, and therefore in a dominantly lacustrine depositional environment at the time of moraine emplacement, an increased thickness in the glaciolacustrine clay unit and decreased till thickness may be realized. Additionally, based on available information, no appreciable fill thickness is expected to be encountered at NTC. Overburden thickness is expected to be between 20 and 30 feet.

The following units could be water-bearing zones based upon the overburden stratigraphy discussed above: 1) surface deposits/silt alluvium above the glaciolacustrine clay, and 2) clay/silt till above bedrock. Poor recovery rates for three wells installed at the Ernst Steel Site indicate that the till has a low hydraulic conductivity and is not a major water-bearing zone. Additionally, no perched water table was observed at the fill/clay or silt/clay interface during the Ernst Steel Site investigation. However, a perched water table is expected to be encountered at NTC as evidenced by the presence of a groundwater seep at the southern drainage ditch. Flow in both overburden zones is expected to be toward the southwest, in the topographically downgradient direction.

Soils in the vicinity are designated as urban land -- indicating 80% or more of the soil surface is covered by asphalt, concrete, buildings, or other impervious structures -- and soils of the Odessa Series. Odessa soils have a high clay content, being formed in gravel and stone-free lake deposited sediments, are poorly drained, and typically display a seasonally high water table perched in the upper part of the subsoil during wet periods. The soil permeability is very low.

3.0 PREVIOUS DATA COLLECTION

For the sampling programs discussed below, analytical services were provided by RECRA Environmental, Inc. of Amherst, New York. Samples obtained during the April 1990 program were grab samples from the ditch sediment. At most locations, an additional grab sample was obtained and provided to NYSDEC.

The May and September sampling programs were conducted in accordance with the site-specific Health and Safety Plan prepared by WCC for this phase of the project. Sediment samples were obtained from a transect across the ditch, using disposable tools, and composited in a disposable aluminum pan. The composite samples were split with the NYSDEC. Between sample locations, a dry decontamination procedure was followed which consisted of removing and disposing of all Personal protective equipment (Saran coated Tyvek suit, inner and outer gloves, and boot covers). Sampling tools were also disposed of between locations. Water samples were obtained directly from the pipes. Seep samples were obtained directly from the seepage face.

3.1 APRIL 1990 SAMPLING

After the initial discovery of elevated levels of PCBs in ditch sediment, Niagara Transformer and NYSDEC conducted a sampling program to provide an initial indication of the extent of sediment contamination. Surficial sediment samples were obtained on two dates (April 13 and 23, 1990) at a total of 18 locations. On April 13, a sample was also obtained of a floating non-aqueous phase found near a groundwater seep into the ditch near the southwest corner of the property. In addition, three surface water samples were obtained on April 13, 1990. Sample locations are shown on Figure 3. All samples were analyzed for PCBs. Split samples were provided to NYSDEC. Table 2 presents the results of the sediment analyses. The PCBs present above detection limits were reported exclusively as PCB-1260.

PCB concentrations in sediment were highest within the sections of the ditches adjacent to the east (north-south ditch) and south (east-west ditch) perimeters of the Niagara Transformer Property (280 ug/g to 3200 ug/g). The highest concentration (3200 ug/g) was present where the east-west drainage ditch discharges to a culvert which passes south, beneath railroad tracks (90 degree turn). This pipe discharges to a drainage ditch approximately 500 feet south of the railroad tracks. Approximately 500 feet upgradient in the east-west drainage ditch (before it reaches the Niagara Transformer Property and the confluence with the north-south ditch), PCB levels were less than 1 ug/g.

A floating non-aqueous phase was observed near the groundwater seep from the side of the north-south ditch. Analytical results indicate that this material contained approximately 5.7 percent PCBs.

3.2 MAY 1990 SAMPLING

3.2.1 EAST-WEST DITCH

On May 17, 1990, WCC obtained sediment samples from the east-west drainage ditch, east (upgradient) of the Site, at approximately the midpoint of the previous sample locations 041390-2 (44 ug/g) and 042390-4 (.1 ug/g). Sediment samples were also obtained west of the culvert crossing beneath the railroad tracks, one approximately 15 feet west of the east cemetery pump house, and another approximately 20 feet west of the west cemetery pump house. The latter two samples were located to be indicative of whether the drainage divide has prevented contaminant migration past the immediate vicinity of the culvert beneath the railroad tracks. The sample locations are shown on Figure 4. The sediment samples were analyzed for PCBs in accordance with Method 8080, SW-846, Third Edition. Results are summarized below and in Table 3.

PCBs, when detected, were reported exclusively as PCB-1260. The upgradient sediment sample from the east-west ditch (IRM-4) was found to contain 0.65 ug/g, indicating that conditions within the ditch upgradient of this location are acceptable for city maintenance. The downgradient sediment samples beyond the drainage divide (IRM-5 and IRM-6) contained 500 ug/g and 17 ug/g, respectively.

As described earlier, an area of groundwater seepage into the east-west ditch was located near the southwest corner of the Site. This is the approximate location of the original observation of a non-aqueous phase. The seep was directly sampled (IRM-2) using a sheet metal device which was driven into the soil to direct water from the seep to a narrow stream which was collected directly in the sample bottles. A non-aqueous phase liquid (NAPL) was observed in the flowing water from the seep. The NAPL was less dense than water and appeared to be emulsified with water. A second sample (IRM-1) was obtained from a second (upper) seep at the same location. Sample IRM-2 was analyzed for PCBs (Method 8080, SW-846, Third Edition) and Total Petroleum Hydrocarbons (TPH) (Method 418.1, EPA-600/4-79-020). A portion of sample IRM-1 was lost due to a laboratory accident, thus only the TPH analysis was performed. Results of the analyses were:

	Concentration (mg/L)	
Sample Number	PCB-1260	TPH
IRM-1	NA	BDL
IRM-2	230	7200

This indicates that groundwater seepage in the vicinity of the southwest corner of the Site is a significant contaminant discharge pathway. No other groundwater seeps into the ditch were observed; however, groundwater seepage would generally not be visible below the water level in the ditch.

3.2.2 NORTH-SOUTH DITCH

A field reconnaissance was performed to locate potential discharges of contamination to the north-south ditch along the east perimeter of the Site. No groundwater seeps were observed. However, at the head of this ditch, two buried sheet metal boxes were found. These appear to have been designed to act as an oil separation structure, with the first (upgradient) box being a collector and the second an oil separator with a discharge pipe to the ditch. Interviews with the maintenance supervisor suggest that the boxes are connected to a drain underlying the back parking lot. The roof drains may be connected to this system. Water was observed entering the collector box from two pipes coming in from the parking lot side. Sediment within the boxes was visibly oily and was sampled for PCB analyses (IRM-13). A semisolid material, approximately 2 inches in diameter, was observed floating in the oil separation box and was sampled for PCB analysis (IRM-12). Sediment was also sampled for PCB analyses from a transect crossing the ditch approximately 10 feet downstream of the discharge pipe from the box (IRM-3). The discharge pipe from the box was flowing, and water samples were collected for PCB and TPH analyses during dry conditions (IRM-14 on May 15, 1990) and wet conditions (IRM-15 on May 17, 1990). Results of these analyses are summarized briefly below.

As with all earlier samples, the PCB compounds present were reported as PCB-1260. The semisolid material (IRM-12) was found to contain approximately 5.8 percent PCB-1260. Sediment from the collector box (IRM-13) contained 4300 ug/g PCB-1260. The sediment transect composite sample (IRM-7) was reported to contain 940 ug/g of PCB 1260.

The water sample from the collector box (IRM-3) was found to contain 6.5 mg/L of PCB-1260 and 440 mg/L of TPH. Results of analysis of water discharge from the exit pipe of the oil/water separation box were as follows:

Sample ID	PCB-1260	TPH
IRM-14 (dry conditions)	0.0072 mg/L	NA
IRM-15 (wet conditions)	0.0023 mg/L	BDL

3.2.3 SAMPLING OF THE CEMETERY DRAIN SYSTEMS

To provide an indication of contaminant migration in groundwater from the Site towards the west, the drain systems underlying the cemetery bordering the Site were sampled. Samples were obtained directly from the discharge pipes of the two pumphouses. IRM-10, obtained from the pumphouse nearer to the Site, was found to contain 0.0021 mg/L PCB-1260. Results were below detection limits for the water sample (IRM-11) obtained from the more distant (westerly) pumphouse.

3.3 SEPTEMBER 1990 SAMPLING

Additional sampling was conducted on September 19, 1990 as follows:

Media/Location	Sample ID	Analyses
Sediment/100 Feet W of IRM 6	DS-1	PCB
Sediment/Between IRM 5 and IRM 6	DS-2	PCB
Sediment/Resample Location IRM 5	DS-3	PCB
Sediment/Retention Pond (east end)	PS-1	PCB
Blind Duplicate of PS-1	PS-2	PCB
Water/West Pumphouse	S-1	PCB
Water/East Pumphouse	S-2	PCB
Blind Duplicate of S-2	SS-1	HSL and 2,3,7,8-TCDD
Blind Duplicate of SS-1	SS-2	HSL

A QA review of the results of these analyses will be performed as part of the RI. Based on the preliminary results, the following compounds were detected:

Sample ID	Compound Detected	Concentration (mg/Kg or mg/L)
DS-1	PCB-1254	23J (estimated)
DS-2	PCB-1254	53C (GC/MS confirmed)
DS-3	PCB-1254	280J (estimated)
PS-1	PCB-1254	10J (estimated)
PS-2	PCB-1254	15
S-1	none detected	
S-2	none detected	
S-3	none detected	
SS-1	PCB-1254	2500 C (GC/MS confirmed)
	Acetone	0.061B (detected in blank)
	Chlorobenzene	0.27
	toluene	0.001 BJ (detected in blank)
	1,4-Dichlorobenzene	1.5 J (estimated)
	1,2,4-Trichlorobenzene	1.1 J (estimated)
	Phenanthrene	1.2 J (estimated)
	fluoranthene	2.6 J (estimated)
	Pyrene	3.4 J (estimated)
	Benzo(b)Fluoranthene	2.2 J (estimated)
SS-2	PCB-1254	3300C (GC/MS confirmed)
	Acetone	0.095B (detected in blank)
	Toluene	0.006 BJ (detected in blank)
	chlorobenzene	1.1
	1,3-dichlorobenzene	3.2 J (estimated)
	1,4-dichlorobenzene	4.1 J (estimated)
	1,2,4-trichlorobenzene	2.8 J (estimated)
	chrysene	0.002 J (estimated)
	Benzo(b)fluoranthene	3.0 J (estimated)
	Benzo(a)pyrene	1.7 J (estimated)

Results from the laboratory subcontracted to perform the 2,3,7,8-

tetrachlorodibenzodioxin analyses, indicate that 2,3,7,8-TCDD was not detected.

4.0 CONCEPTUAL MODEL OF CONTAMINANT TRANSPORT

In this Section, available information regarding local geological and hydrogeological conditions (Section 2.3) were considered with the available Site contaminant distribution data (Section 3.0) to develop a conceptual model of contaminant migration from the Site.

PCBs apparently have been released onto surface soils at the Site. Subsurface release could also have occurred through underground piping. To date, no evidence of subsurface landfilling of PCB materials has been discovered. At this stage in the RI scoping process, WCC must assume that application of PCB-containing oil could have occurred at any place on NTC property between the south wall of the main building and the south property line. Spillage onto soil could also have occurred on the narrow strip of land on the west side of the main building. It is unlikely that any contaminated material was spilled on the Front Parking Lot, the East Roadway or the front lawn areas. However, these areas will be investigated.

As described in Section 2.3, geologic data from investigations conducted in the vicinity of NTC suggest that the surficial soil and limited alluvium at the Site is underlain by a glaciolacustrine clay of low hydraulic conductivity. The clay unit is expected to be encountered within a depth of approximately 5 feet below ground surface. Based on the Ernst Steel data (Section 2.3), the clay could range from 5 to 20 feet in thickness. The clay unit will likely be underlain by a glacial till, also of relatively low hydraulic conductivity, which is expected to be encountered between 20 and 30 feet below ground surface.

The glaciolacustrine clay will retard the downward percolation of precipitation, probably resulting in perched groundwater (i.e., a zone of saturation overlying an unsaturated section of the low hydraulic conductivity clay). If an oil is applied directly to the soil, it will spread and infiltrate. If excess oil, beyond the infiltration capacity of the soil, was applied, some direct runoff of oil into the drainage ditch would occur.

Infiltrating oil will likely percolate vertically through the topsoil and any coarse fill material, leaving behind a residual component, held in the soil pore spaces due to surface tension. The degree to which this occurs depends on the soil pore sizes and the wetting and fluid properties of the oil. The residual oil will resist further flow as a separate phase, but will remain a source of aqueous contamination, through desorption, for quite some time. When the infiltrating (i.e., in excess of residual) oil reaches the water table, further transport depends to a large extent on its density.

Denser than water oils will tend to sink until the hydraulic head of the oil (related to how much oil remains present in the non-residual phase) can no longer overcome the viscous and capillary forces retarding flow in the porous media. Below the water table, soil will still hold a residual of the oil. The denser than water oil will tend to spread horizontally when it reaches a low hydraulic conductivity unit, taking the path of least resistance. At some point after the source is discontinued, the oil migrates to the extent that nearly all is present as residual--non-mobile as a discreet fluid, but a continuing source of contaminant desorption to the aqueous phase. Dense oil can also accumulate in troughs or low areas at the interface with the low hydraulic conductivity unit.

Lighter than water oils tend to migrate along the surface of the water table. As with the denser oils, the hydraulic head of the oil must be sufficient to overcome the capillary and viscous forces resisting flow for migration to occur as a discreet phase. The lighter oils tend to spread in the downgradient direction. After the source is discontinued, the oil will eventually migrate to the point where it is almost entirely held in the soil as a residual component. As such, it will no longer flow as a discreet separate phase, but will slowly desorb and become aqueous contamination.

The oil which has been discharged to the east-west ditch is observed to be lighter than water. It is thought to be composed primarily of mineral oil. It is possible that some oils applied at the Site were denser than water. For purposes of RI scoping, WCC will not rule out the possibility of application of denser than water oils.

Figure 5 illustrates WCC's conceptual model of contaminant transport at the Site. Potential contaminant transport media include groundwater, surface water, and air. It appears likely, based on Site topography and observed seepage, that groundwater flow in the perched zone (or shallow groundwater) is southward toward the east-west ditch. If the alluvium/clay interface dips in the same direction as the local ground surface, dense oils (if present) would also tend to migrate southerly until residual conditions were attained. Discharge locations for the perched or shallow groundwater migrating from the Site are the east-west drainage ditch, the north-south drainage ditch (via the parking lot underdrain) and the drainage system underlying the cemetery (bordering the property on the west).

Contaminant transport from the Site in surface water obviously occurs subsequent to the groundwater discharges identified above. In addition, contaminants could be transported in surface runoff in unpaved areas of the Site through desorption from, or particulate transport of, surficial soils. Surficial soils could also be transported from the Site by wind.

The Remedial Investigation has been designed to investigate these transport routes. The Scope-of-Work for the RI is presented in detail in the following section.

5.0 REMEDIAL INVESTIGATION SCOPE-OF-WORK

The contaminant transport assessment presented in Section 4.0 suggests that the major environmental concerns at the Site are contaminated perched or shallow groundwater (aqueous and non-aqueous) and contaminated surficial soils and sediments. These will therefore be the primary focus of the RI. The RI will also include a geophysical investigation to evaluate the possibility of on-site landfilling. Each specific task of the RI is identified below along with its objectives.

Task 1: Investigation of Operating History

Employee interviews and records review will be conducted to attempt to document past releases (and clean-up measures) at the Site to the extent possible. The RI Report will include a detailed section on operating history, including as much information on past releases as can be derived.

Task 2: Investigation of Site Drainage

Drainage from the Site will be investigated to ascertain potential surface water migration pathways from the Site. This investigation will consist of field inspection, examination of town utility drawings and dye studies.

Task 3: Geophysical Investigation

A terrain conductivity survey will be conducted to evaluate the presence of buried metallic materials even though there is no documentation or evidence of landfilling at the Site.

Task 4: Surficial Soil Sampling

Surficial soil samples (0-6 inch composite samples) will be obtained on a grid pattern from unpaved areas south of the main plant building. Surficial soil samples will also be obtained from the west side of the main building and from areas along the drainage ditches thought to be flood prone. The purpose of these samples will be to provide data for use in assessing the potential for contamination of surface drainage and airborne contaminant transport.

Task 5: Shallow Monitoring Well Installation, Monitoring, and Sampling

Overburden monitoring wells will be installed to monitor the uppermost water-bearing zone beneath the Site. These wells will be installed through any fill and alluvium, and 1-2 feet into the glaciolacustrine clay. The monitoring network should provide sufficient data to evaluate the shallow or perched groundwater flow regime. Analysis of groundwater samples from these wells should be sufficient to ascertain the groundwater contaminant distribution.

Task 6: Deeper Soil Borings and Monitoring Well Installation

At several locations throughout the Site (and one off-site location), soil borings will be advanced to bedrock. Split-spoon samples will be collected and analyzed. These borings will be installed to document the overburden stratigraphy and to determine if PCB contamination has penetrated the low hydraulic conductivity glaciolacustrine clay. Three of the deep soil borings will be converted to monitoring wells for evaluation of groundwater quality near the soil/bedrock interface.

Task 7: Supplemental Sediment Sampling

Sediment samples will be obtained from the ditches to determine the extent of contamination in the drainage system.

Task 8: Exposure Pathway Analysis and Receptor Identification

The RI will include an analysis of potential exposure routes from the sites and identify potential human and environmental receptors. This task will form the basis for concluding whether more rigorous risk assessment or habitat-based assessment is required.

Task 9: Remedial Investigation Report

The RI Report will evaluate the results generated from Tasks 1 through 8 above. It will also evaluate the impact of the IRM and assess the need for further remediation and/or treatability study.

Each investigative task is described in detail in the following section. Preparation of the RI Report is discussed in Section 7.0.

6.0 RI INVESTIGATIONS

6.1 INVESTIGATION OF OPERATING HISTORY

Additional employee interviewing and records review will be conducted to document past releases and clean-up measures to the extent practical. The information will be presented in the RI Report in the form of a map depicting areas of suspected contaminant releases. The RI Report will describe how the Site became contaminated and the nature of the released material to the extent that it can be ascertained.

6.2 INVESTIGATION OF SITE DRAINAGE

The following will be conducted to investigate surface water drainage from the Site:

1. Field inspection of the ditches (both on-site and off-site) during periods of rainfall or snow melt.

2. Examination of town utility drawings and maps to determine the eventual discharge location for site drainage

3. Dye studies to determine the drainage from the roof drains and to verify that the flow entering the railroad culvert (east-west ditch) discharges to the open ditch further south.

6.3 GEOPHYSICAL INVESTIGATION

The terrain conductivity survey will be conducted in areas south of the parking area behind the NTC main building. The general principle of terrain conductivity is based upon the induction of eddy currents in the ground by an alternating magnetic field. These currents induce a secondary magnetic field in the subsurface whose quadrature component is directly related to the conductivity of subsurface materials. Conductivity can be associated with specific subsurface parameters (i.e., material type, permeability, porosity, water content, and electrolyte concentration). The instrument to be used during this field investigation would be an EM-31 Terrain Conductivity Meter manufactured by Geonics Ltd. of Mississauga, Ontario, Canada. Prior to conducting the terrain conductivity survey, underground utilities in the area will be identified and located.

The purpose of the terrain conductivity survey will be to determine if buried metal is present on-site. The findings will be correlated with subsurface stratigraphy to the extent possible. However, the primary means of investigating subsurface stratigraphy will be through soil borings.

6.4 SURFICIAL SOIL SAMPLING

Surficial soil samples will be obtained on a grid pattern from unpaved areas south and west of the main plant building. The spacing of soil samples will be approximately 50 feet. If visible signs of oil contamination are observed in any soil sample, additional surface soil samples will be obtained on a smaller grid spacing to further delineate contaminated areas. Sampling on a smaller grid spacing will be at the discretion of the WCC Field Geologist. Additionally, three samples will be obtained from the cemetery to the west of the Site (if permission from the landowner is received). These surficial soil sampling locations are illustrated on Figure 6.

As part of Task 2, flood-prone areas along the drainage ditches will be identified. Flood-prone areas are thought to occur near the southern perimeter of the cemetery. Up to four surficial soil samples will be obtained from this area. In addition, up to four surficial soil samples will be collected from areas determined to be most susceptible to flooding along the Gruner Road ditch. The actual locations of these samples will be a field determination by NTC and NYSDEC representatives.

Surficial soil samples will be collected using either a stainless steel bucket auger or a stainless steel hand trowel. The top 6 inches of soil will be composited in a stainless steel mixing bowl. Organic matter which has been integrated into the soil will be kept in the sample, while undecomposed organic material will be discarded. All sampling equipment will be decontaminated in accordance with the procedures outlined in Section 8.0. All soil samples will be analyzed for PCBs, except as noted in Section 6.9.

6.5 GROUNDWATER INVESTIGATION

The groundwater investigation will involve monitoring well installation, hydraulic testing, hydraulic head measurement, and groundwater sampling. Each of these components is detailed below.

6.5.1 MONITORING WELL INSTALLATION

Thirteen groundwater monitoring wells will be installed to investigate groundwater flow and chemical contamination in the vicinity of the Site. Ten of the wells will be designed to monitor the overburden above the presumed clay layer (shallow monitoring wells). Three of the wells will be designed to monitor the interface between the clay layer and the top of bedrock. Approximate monitoring well locations are shown on Figure 7. Installation procedures are presented below.

6.5.1.1 SHALLOW MONITORING WELLS

All shallow monitoring wells will monitor the shallow or perched groundwater and will be installed through any fill or alluvium and 1 to 2 feet into the glaciolacustrine clay. An attempt will be made to screen the water table. However, if the depth to groundwater is less than about 1.5 feet this may not be practical.

One shallow well will be installed in the presumed upgradient area where disposal is not thought to have occurred. One shallow well will be located adjacent to the seep area. One shallow well will be located at the tank farm, and another near the underground pipe between the tank farm and the main building. Shallow wells will also be located near the head of the north-south ditch, near the halfway point of the north-south ditch, and at the end of the north-south ditch. One shallow well will be located near the center of the Site south of the storage building. One well will be located off-site, south of the east-west ditch on Conrail (or Town) property. An additional off-site well will be located on cemetery property, about 200 feet west of the Site, near the east-west ditch. An easement from the landowners will be required prior to installing these wells. Well locations are shown approximately on Figure 7. These wells will give adequate coverage for delineating groundwater flow and groundwater contamination in the upper water-bearing zone.

All borings in which wells will be constructed will be advanced using hollow-stem auger drilling techniques. Continuous 2-foot split-spoon samples will be obtained ahead of the auger flights during drilling and retained for PCB analysis in accordance with Section 6.9. All drill cuttings will be drummed for proper disposal. Wells will be constructed of stainless-steel well screen and riser, with a sand-pack and overlying bentonite seal. Backfill above the bentonite seal will be cement. Locking protective casings will be installed at all wells.

Well construction details are shown on Figure 8, but may vary based on field conditions. An attempt will be made to span the water table with the well screen. Therefore, the quantity of sandpack above the screen and the thickness of the bentonite seal will depend to an extent on the thickness of the unsaturated zone. The actual depth of the well bottoms will depend on the elevation of the alluvium/clay interface.

Upon completion, each well will be developed in accordance with Section 6.5.1.3 to remove fines from around the screened interval. The wells will be developed by either over-pumping or surging. All water collected during development will be containerized and stored on-site prior to treatment. After development, each well will be allowed to stabilize for at least two weeks prior to sampling. Each monitoring well casing will be surveyed for elevation and location.

6.5.1.2 DEEP MONITORING WELLS

Deep monitoring wells will be installed at the three locations shown on Figure 7. Each of these locations is also the location of a shallow monitoring well. The shallow well at each location will be installed first. Deep soil borings which will not be converted to monitoring wells (see Section 6.6) will also be advanced prior to the deep well installations so that the wells can be installed with a better knowledge of the subsurface stratigraphy. Soil sampling during deep well installation will be in accordance with Section 6.6.

Well construction details are shown on Figure 9. The boreholes will be advanced using rotary drilling techniques. To prevent cross-contamination, outer casing will be set approximately 5 to 10 feet into the clay (depending on the results of the deep soil borings). The well will be screened over a 5-foot interval spanning the overburden bedrock interface. Wells will be constructed of stainless steel well screen and riser, with a sandpack and overlying bentonite seal. Backfill above the bentonite seal will be cement. Locking protective casings will be installed at all wells.

6.5.1.3 MONITORING WELL DEVELOPMENT

Monitoring well development serves to remove fines from the sandpack and ensure turbid-free groundwater samples. Wells will be developed using either a peristaltic or centrifugal pump.

Monitoring well development will be in accordance with the following:

1. Perform well development no later than seven days after well completion.

2. Lower the pump suction line to the bottom of the monitoring well. All downhole equipment will be decontaminated prior to usage.

3. Purge the well of at least five well volumes and monitor discharged water, each one-half to one well volume, for pH, conductivity, and turbidity (record these data).

4. Periodically surge the monitoring well with a bailer several times during development to suspend fine-grained sediment.

5. Continue purging until the turbidity measurement is 50 NTU or less.

6. Pump all development fluids to a designated tanker or container and document the estimated volume of fluid removed.

It is anticipated that a portable water treatment unit (activated carbon) will be used on-site to treat the drilling water and decontamination water. NTC will attempt to arrange for disposal of this water with the local sewer authority. NYSDEC will be kept informed of progress in this area.

6.5.2 SINGLE WELL PERMEABILITY TESTING

Single well permeability tests (falling and/or rising head slug tests) will be performed on all wells installed for the RI. The purpose of these tests is to estimate the hydraulic conductivity in the immediate vicinity of the monitoring well. Slug tests enable rapid collection of hydraulic data without pumping potentially contaminated water or introducing water into the wells. All down-hole equipment will be decontaminated between wells as described in Section 8.2.

6.5.3 HYDRAULIC HEAD MEASUREMENT

Hydraulic head (groundwater elevation) measurements will be obtained monthly for a period of six months. The hydraulic head data will be plotted on base maps and interpreted with respect to groundwater flow conditions.

6.5.4 GROUNDWATER SAMPLING

Groundwater will be sampled once from each monitoring well and analyzed for PCBs and TPH. Sampling methods will be in accordance with Section 8.1.3. Groundwater analysis will be in accordance with Section 6.5. Prior to purging, samples will be obtained from the top and bottom of the water column and examined for non-aqueous phase liquid.

6.6 DEEPER SOIL BORINGS

At two additional locations, soil borings will be advanced to the top-of-bedrock. The purpose of these borings will be to verify the overburden stratigraphy and obtain deep soil samples for chemical analysis (Figure 7).

The soil borings will be advanced using hollow-stem auger drilling techniques. Beginning at the depth of the adjacent monitoring well, continuous split-spoon samples will be collected, examined and logged by the WCC project geologist. At intervals of 6-feet (every third spoon), the split-spoon contents will be composited and submitted for PCB analysis. In addition, if any oil staining or other evidence of contamination is observed, a sample will be obtained for analysis. If strata containing coarser materials (i.e., saturated sand or gravel layers) are observed, a representative sample of this unit will also be obtained for PCB analysis. The need for additional samples will be determined by WCC and NYSDEC field representatives. All deep soil borings will be tremie grouted to the surface upon completion to avoid any cross-contamination.

Decontamination of the drilling rig and all sampling equipment will be performed in accordance with Section 8.2. Water management will be in accordance with Section 6.5.1.3.

6.7 SUPPLEMENTAL SEDIMENT SAMPLING

A number of sediment samples will be obtained to supplement the data presented in Section 3.0. Within the ditches, in the vicinity of the Site, paired samples will be obtained at ten locations as shown on Figure 10. The paired samples will be obtained from the center of the ditch at two depth intervals: 0 to 0.5 foot and 0.5 to 1.0 foot. Note that one of these locations is located upgradient in the east-west ditch. Except where noted in Section 6.9, all analyses will be for PCBs. The samples will be obtained using a hand auger. Sampling equipment decontamination will be as described in Section 8.2.

Sediment samples will also be obtained at several locations more distant from the Site. Two samples will be collected from the ditch into which the pipe passing beneath the railroad tracks discharges (approximately 1500 feet south of the Site). At points approximately 20 feet and 200 feet south of the pipe discharge, composite sediment samples will be obtained from 0 to 0.5 foot and from 0.5 to 1.0 foot. The approximate locations of these samples are shown on Figure 11. Sampling methods will be as described above.

Further off-site, two surficial sediment samples will be obtained, using the composition method described in Section 3.0. One of the samples will be collected from the ditch just upgradient of the Harlem Road culvert. A second surficial sample will be obtained approximately 1000 feet upgradient of this location. The approximate locations of these samples are shown on Figure 11.

6.8 SURFACE WATER SAMPLING

To assess surface water as a contaminant pathway, samples will be obtained from the retention pond west of the Site, and from the east-west drainage ditch (between the Site and the culvert passing beneath the railroad tracks). The ditch into which this culvert discharges will also be sampled; 20 feet south of the discharge and downstream of the Dinaire plant near Gruner Road and Wallace Avenue. Analyses will be for PCBs, except as noted in Section 6.9.

6.9 ANALYTICAL PROGRAM AND METHODS

With the exceptions noted below, surficial soil, sediment, groundwater, and split-spoon samples obtained for chemical analysis will be analyzed for PCBs using Method 8080, SW-846, Third Edition. All groundwater samples obtained during the RI will also be analyzed for Total Petroleum Hydrocarbons (TPH) using Method 418.1, EPA-600/4-79-020.

To supplement these analyses, and to provide additional data on the types of contaminants present, select samples will be analyzed for the EPA Target Compound List (TCL) using NYSDEC ASP protocols. The TCL analyses will be performed on the following samples:

Sediment:

1. Sediment from the seep area within the east-west ditch (This analyses was already performed (in duplicate), see Section 3.0).

2. Surficial sediment from a location approximately midway between locations IRM-5 and DS-2

3. Surficial sediment from the ditch near the location of IRM-6.

4. Surficial sediment from a location approximately 50 feet upgradient of IRM-4 (upgradient sample)

Surficial Soil:

1. A surficial soil sample collected near the center of the grid shown on Figure 6.

Groundwater:

1. A groundwater sample from the most downgradient shallow monitoring well (based on water level measurements).

Surface Water:

1. The surface water sample collected between the Site and the culvert passing beneath the railroad tracks will be analyzed for the TCL.

The number of samples to be collected for each matrix and the required analyses are summarized in Table 4.

7.0 RI REPORT

The RI Report presenting the results and conclusions of the tasks described in Section 6.0 will be prepared by WCC. The RI Report will likely include the following major components:

1) Detailed presentation of Site history and chemical usage

2) Presentation of data generated by the RI Investigations

3) Assessment of PCB distribution and transport from the Site

4) Assessment of the importance of contaminants other than PCBs

5) Assessment of IRM effectiveness (preliminary)

6) Contaminant transport analysis and receptor identification

7) Recommendations regarding the need for additional work

8) Presentation of general remedial objectives for the Site

9) Review of potentially applicable remedial technologies and recommendations for treatability studies (if appropriate).

8.0 QUALITY ASSURANCE

The primary objective of the Quality Assurance (QA) Program is to provide a description of the procedures to control and evaluate the quality of data acquired throughout this Remedial Investigation at the Niagara Transformer Facility. Definition of Quality Assurance (QA) procedures is necessary for the control of field and analytical methods to assure data validity and representativeness.

8.1 DATA QUALITY OBJECTIVES

The data quality objective (DQO) for this project is to obtain data of sufficient quality to enable confident assessment of whether contaminants of concern are present in sediment, soil, groundwater and surface water at levels exceeding ARARs (to be provided by NYSDEC). The standard analytical methods specified in Section 6.9 will be used to attempt to achieve the DQO. The DQO may not be entirely attainable if ARARs are set by NYSDEC at levels below readily quantifiable levels using standard analytical methods. Contaminants of concern include PCB compounds and petroleum hydrocarbons. Other contaminants of concern might be identified based on the Target Compound List analyses to be performed.

8.2 SAMPLING PROCEDURES

8.2.1 PRELIMINARY ACTIVITIES

The following preliminary activities should be performed prior to the initiation of any field activities to ensure proper preparation of the field team:

1. Close coordination between sampling and laboratory personnel will be maintained so that the laboratory can prepare the appropriate type and quantity of sample containers (based upon the number of samples to be obtained and field Quality Assurance/Quality Control (QA/QC) requirements) and prepare for the receipt of

the sample shipment and initiation of analysis.

2. All equipment to be used during the sampling event will be inspected and decontaminated prior to use.

3. Field meters will be checked to ensure proper calibration and precision response.

4. All appropriate field forms will be assembled.

8.2.2 SURFACE SOIL SAMPLING

All surface soil samples will be collected using a stainless steel, hand operated bucket auger or a stainless steel hand trowel, depending on the types of surface materials present.

All soil samples will be placed in a stainless steel bowl and homogenized before being transferred to the laboratory-supplied glassware. After sampling, all containers will be placed in the provided sample shuttles and preserved according to EPA protocols.

During sample collection, descriptions of all samples, based on visual observation, will be recorded. Additionally, other pertinent data related to the collection of each sample, including sample acquisition methods and the number and type of sample containers filled, will be recorded. Upon completion of sampling, the hole will be backfilled with remaining material removed from the excavation. All equipment used during the acquisition of a particular sample will be thoroughly decontaminated prior to use at another location according to the procedures outlined in Section 8.2. After the sampling equipment has dried, it will be wrapped in aluminum foil (shiny side out) until it is ready to be used again.

8.2.3 GROUNDWATER SAMPLING

Groundwater sampling techniques will be performed in accordance with WCC's Standard Operating Procedures, which conform to the RCRA Groundwater Monitoring Technical Enforcement Document (TEGD). These procedures will be followed to ensure sample representativeness and validity as well as to minimize sample contamination from outside sources. The following procedures will be followed in the collection of groundwater samples:

1. The current condition of the well to be sampled shall be examined, particularly with respect to the possibility of security breaches, tampering or well damage, and reported on the WCC Field Sampling Sheet. Personal protective equipment (PPE) will be in accordance with the Site Health and Safety Plan.

2. Measure the depth to water (DTW) and total well depth. Record data on field sampling sheet and calculate the well volume. Decontaminate measuring devices per Section 8.2.

3. Purge the well of a minimum of three and a maximum of five well volumes using either a peristaltic pump, or hand bailing. All purge water will be containerized for proper disposal. During purging, water quality parameters (pH, specific conductance and temperature) will be monitored between each half to one well volume, depending upon the volume of water in a particular well. Sufficient purging will be indicated by a stabilization of $\pm$10% for each parameter. All readings taken will be recorded in a field log book. The stabilized values and purged amounts will be recorded on the field sampling sheet.

4. Wells will be sampled using either a stainless steel or Teflon bottom loading bailer. The bailer will be lowered smoothly into the well to the middle of the screened or open hole interval. The number of bails used to fill sample bottles should be minimized.

5. The number and types of sample containers filled for each sample as well as any identification codes will be recorded in the field log book and on the field sampling sheet. Add appropriate preservatives, as necessary, according to CLP protocols and place samples in shuttles.

All non-dedicated purging and sampling equipment will be decontaminated according to the procedures in Section 8.2 subsequent to the sampling of each well.

8.3 DECONTAMINATION PROCEDURES

All equipment used to collect surface soil samples and all non-dedicated equipment used during well purging and sampling activities will be thoroughly decontaminated prior to each use according to the following procedures:

1. Brush all foreign material off of equipment and wash with non-phosphate detergent/potable water solution

2. Tap water rinse

3. Deionized water rinse

4. Rinse with pesticide grade hexane

5. Deionized water rinse

6. Air dry

Sampling equipment (bailers, bucket-auger, etc.) will be wrapped in aluminum foil (shiny side out) until ready for use. Other equipment (submersible pump, electrical line for pump, etc.) will be stored in plastic bags to avoid contamination.

Any equipment not involved with sample acquisition efforts (i.e., equipment for hydraulic head monitoring or single well permeability tests) will be decontaminated with a non-phosphate detergent solution wash and deionized water rinse.

All large field equipment (drilling rigs, excavation equipment; groundwater purge equipment) will be thoroughly steam cleaned and scrubbed with Alconox and water upon initial arrival to the Site and after each well installation or excavation.

All fluids generated during decontamination will be containerized and stored on-site prior to treatment.

8.4 QUALITY ASSURANCE (QA) SAMPLES

As part of the Quality Assurance (QA) program for this investigation, QA samples will be collected during the sampling events to provide control over the collection of environmental measurements and the subsequent review, interpretation and validation of generated analytical data. A number of field-related QA samples provide verification as to whether sample collection and handling procedures have affected the overall quality of the acquired samples. Two types of QA samples will be prepared/collected throughout the surface soil and groundwater sampling programs: 1) equipment or rinsate blanks, and 2) duplicate samples.

RINSATE OR EQUIPMENT BLANKS - Equipment blanks will be collected and analyzed to document proper decontamination of sampling equipment. In collection of an equipment blank, laboratory demonstrated analyte-free water is poured over and collected off of a specific piece of decontaminated field equipment. The piece of field equipment to be used for collection of an equipment blank will be dependent upon the matrix of samples to which the blank applies (i.e., use of a bailer or submersible pump for groundwater sampling, and use of the bucket-auger or hand scoop for soil). During groundwater and surface soil sampling, equipment blanks will be collected at a rate of one for each 10 samples taken.

Equipment blanks will be handled, transported and analyzed in the same manner as the samples acquired during that particular sampling event. Equipment blanks will also be analyzed for the same parameters that the samples collected during that event are analyzed for. The procedures used to collect each equipment blank (i.e., what piece of equipment was rinsed for the blank) and the number and type of sample containers filled will be recorded in the field log book.

DUPLICATE SAMPLES - Blind field duplicate samples will be collected for 10 percent of all samples acquired for this investigation. Duplicate samples will be collected in the same manner as the actual sample and will be analyzed for the same parameters. Collection of duplicate samples provide for the evaluation of the laboratory's performance and field homogenization techniques by comparing analytical results for two samples from the same location.

Duplicates of groundwater samples will be obtained by evenly distributing the contents of each bailer among the sample containers for both samples until all bottles are filled. For duplicate soil samples, it is important that the duplicate be split from one homogenized sample rather than two separate samples from the same location. The original sample identification to which the duplicate sample applies, and the type and number of sample containers filled will be recorded.

All QA samples will be preserved and stored according to CLP protocols.

8.5 SAMPLE CUSTODY

Sample chain-of-custody procedures are integral to the legal defensibility of analytical data, as they provide a mechanism for tracing the possession and handling of individual samples from the time of sample shuttle preparation to field collection and through laboratory analysis. A field chain-of-custody form will accompany all sample shipments to track each individual sample, from preparation at the laboratory to sample collection and preservation in the field, and subsequent return to the laboratory.

The laboratory will be notified of any upcoming field sampling activities by WCC so that the proper bottle order can be assembled. All sample bottle labels will include the following information:

- Site name/job number
- Name of collector
- Date and time of collection
- Type of sample
- Analysis required
- Preservative
- Sample-specific identification number

The chain-of-custody form will be completed and signed before sealing the coolers again for transport to the laboratory.

8.6 DATA VALIDATION

Data validation will consist of reviewing all data and backup generated by the laboratory to determine if QA/QC performance criteria have been attained with respect to the following (as appropriate):

- Methodology
- Holding times
- Surrogate spikes
- Matrix spikes
- Method detection limits
- Field duplicates
- Equipment blanks
- Trip blanks
- Laboratory replicates
- Laboratory blanks
- EPA check samples
- Chain-of-custody
- Application of data qualifiers

WCC's data validator for this project will be Ms. Rebecca Y. Walsh. Ms. Walsh has performed a similar role on WCC's project for DuPont in New York State. Her resume is included in Appendix A. Ms. Walsh will be available to meet with the NYSDEC chemist and WCC can provide a recent validation report for NYSDEC's review, if necessary.

9.0 PROJECT ORGANIZATION

Figure 12 illustrates the project organization for the Niagara Transformer Remedial Investigation. Mr. Fred Darby, President of Niagara Transformer Corporation, has the overall responsibility for the project completion in accordance with this Work Plan. Mr. Darby, or his designate, will be responsible for formal communication with NYSDEC on issues related to the RI. Woodward-Clyde Consultants will conduct the RI and prepare the RI Report.

For this project, the WCC Project Manager is the lead technical person and is responsible for directing the technical staff. In accordance with the WCC Quality of Practice Program, the WCC Project Manager is responsible for assuring that all technical work is adequately reviewed. This includes a detailed technical review by a senior specialist in the firm (Peer Reviewer). In addition, major submittals must be reviewed by the Responsible Professional, a senior engineer, geologist or scientist with significant consulting experience in private practice. The Responsible Professional is responsible for monitoring the quality of the technical and managerial aspects of the project. The Responsible Professional may conduct peer reviews on his/her projects provided he/she is independent of the work product to be reviewed.

The following WCC personnel are, or may be, assigned to the Remedial Investigation:

Project Manager:	Kelly R. McIntosh
Responsible Professional:	Frank S. Waller, PE
Project Geologist:	Paul F. Mazierski
Staff Geologist:	Frank R. Garbe
Project QA/QC:	Rebecca Y. Walsh
Engineer:	W. Scott McIntyre
Peer Review:	Robert G. Gibson and James F. Roetzer, Ph.D.

Resumes for each of these WCC personnel are included in Appendix A. Other key personnel will be involved, as necessary, when specialized project needs arise.

10.0 COMMUNITY RELATIONS

Niagara Transformer Corporation will establish a document repository through which project plans, reports and data will be made available to members of the community. The location of the repository will be the Reinstein Branch of the Cheektowaga Public

Libraries, at 2580 Harlem Road. When a project submittal is approved by NYSDEC, NTC, in conjunction with NYSDEC, will make a public announcement.

NTC will arrange and participate in public meetings at the start and completion of the RI. The meetings will be described in public notices as joint DEC/NTC sessions. NTC will also assist NYSDEC in the preparation and distribution of fact sheets as directed.

11.0 HEALTH AND SAFETY

Woodward-Clyde Consultants requires that projects involving potential for contact with hazardous substances be conducted in accordance with OSHA Regulation 29CFR1910.120. Compliance with this regulation generally requires the following:

- Personnel Training
- Medical Surveillance
- Hazard Communication
- Project-Specific Safety Plan

Appendix B presents the Health and Safety Plan for this project. The Health and Safety Plan documents WCC compliance with the OSHA training and medical monitoring requirements, contains a hazard assessment, and meets the requirements of a Project-Specific Safety Plan.

12.0 SCHEDULE

The following schedule for conducting the Remedial Investigation is proposed:

Task	Completion Time[1]
Geophysical Investigation	5
Surficial Soil Sampling	10

Sediment Sampling	10
Groundwater Investigation	
Monitoring Well Installation/Development	12
Slug Testing	14
Groundwater Sampling	16
Hydraulic Head Measurements	40
Deep Soil Borings	14
Draft RI Report	45

(1) Weeks after NYSDEC approval of the RI and IRM Work Plans

The critical path items on this schedule are the monitoring well installations, sample analysis, hydraulic head monitoring, and report preparation.

Tables

TABLE 1
LIST OF SUBSTANCES USED AT THE NIAGARA TRANSFORMER DALE ROAD FACILITY

To Be Provided Under Separate Cover

TABLE 2
PRELIMINARY DATA ACQUISITION: SEDIMENT/SOIL SAMPLES
NIAGARA TRANSFORMER CORPORATION
CHEEKTOWAGA, NEW YORK

SAMPLE NUMBER	DATE SAMPLED	PCB CONCENTRATION (ug/g)
041390-1	4/13/90	700
041390-2	4/13/90	44
041390-3	4/13/90	880
041390-4	4/13/90	280
041390-5	4/13/90	3200
041390-6	4/13/90	30
041390-7	4/13/90	22
041390-8	4/13/90	11
042390-1	4/23/90	0.19
042390-2	4/23/90	0.08
042390-3	4/23/90	2.8
042390-4	4/23/90	0.1
042390-5	4/23/90	0.11
042390-6	4/23/90	140
042390-7	4/23/90	2.9
042390-8	4/23/90	9.5
042390-9	4/23/90	0.64
042390-10	4/23/90	4.4

TABLE 3
PRELIMINARY IRM INVESTIGATION RESULTS
NIAGARA TRANSFORMER CORPORATION
CHEEKTOWAGA, NEW YORK

SAMPLE NUMBER	MEDIA	PCB CONCENTRATION[1]	TPH CONCENTRATION
IRM-1	Water	NA[2]	BDL[3]
IRM-2	Water	230 mg/L	7200 mg/L
IRM-3	Water	6.5 mg/L	440 mg/L
IRM-4	Sediment	0.65 ug/g	NA
IRM-5	Sediment	500 ug/g	NA
IRM-6	Sediment	17 ug/g	NA
IRM-7	Sediment	940 ug/g	NA
IRM-10	Water	.0021 mg/L	BDL
IRM-11	Water	BDL	BDL
IRM-12	Emulsion	58,000 ug/g	NA
IRM-13	Sediment	4,300 ug/g	NA
IRM-14	Water	.0072 mg/L	NA
IRM-15	Water	.0023 mg/L	BDL

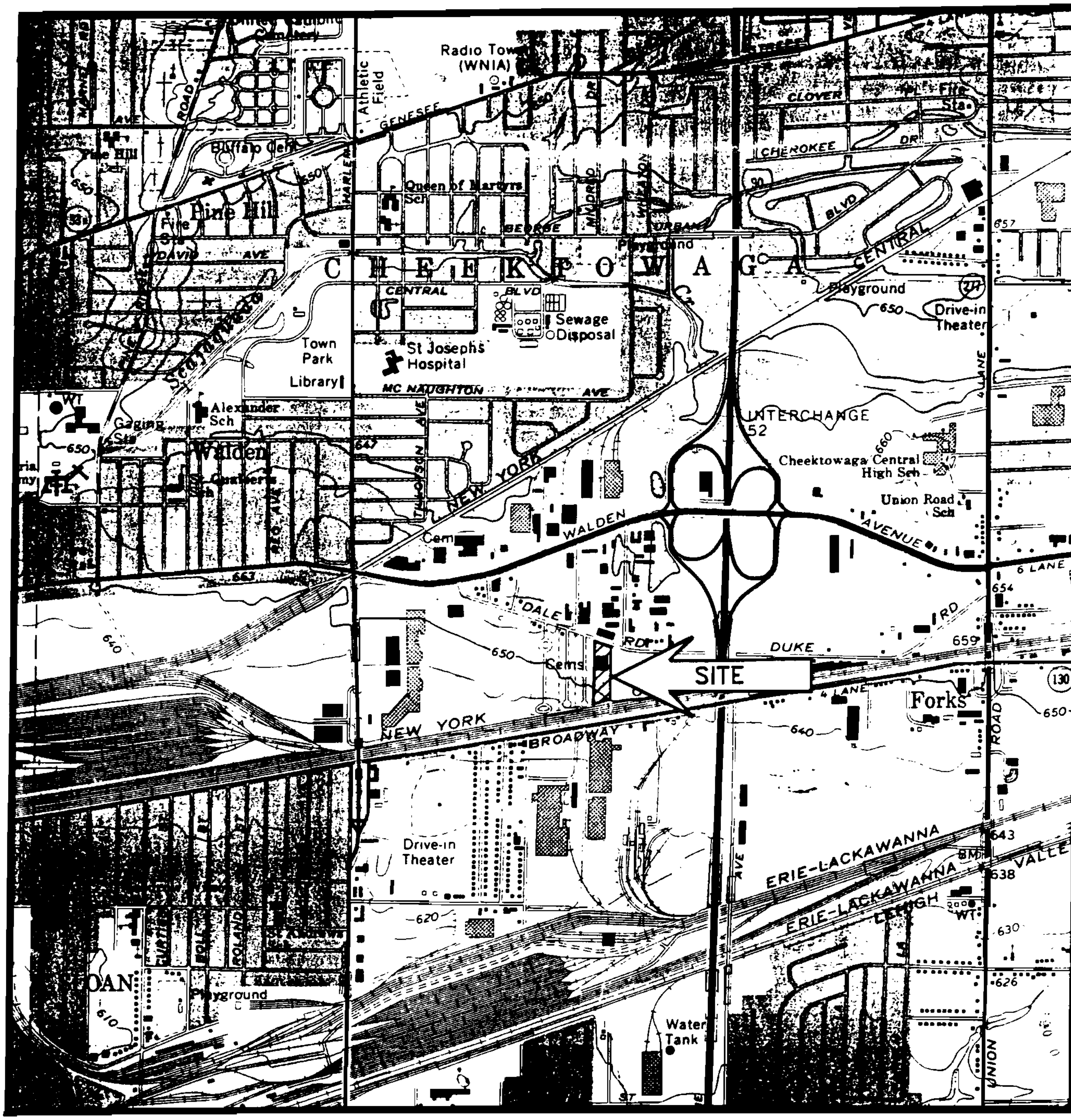
(1) PCB concentrations reported exclusively as PCB-1260
(2) Not analyzed
(3) Below method detection limits

TABLE 4
SUMMARY OF RI REQUIRED ANALYSES

MEDIA SAMPLED	TYPE OF ANALYSES	NUMBER ANALYZED
Surficial Soil	TCL(1)	1
	PCB(2)	33
Subsurface Soil	PCB	75(3)
Groundwater	TCL	1
	PCB	12
	TPH(4)	13
Sediment	TCL	4
	PCB	26
Surface Water	TCL	1
	PCB	3

(1) EPA Target Compound List using NYSDEC ASP Protocols
(2) PCBs using Method 8080, SW-846 Third Edition
(3) Quantity Estimated
(4) Total Petroleum Hydrocarbons using Method 418.1, EPA-600/4-79-020

Figures

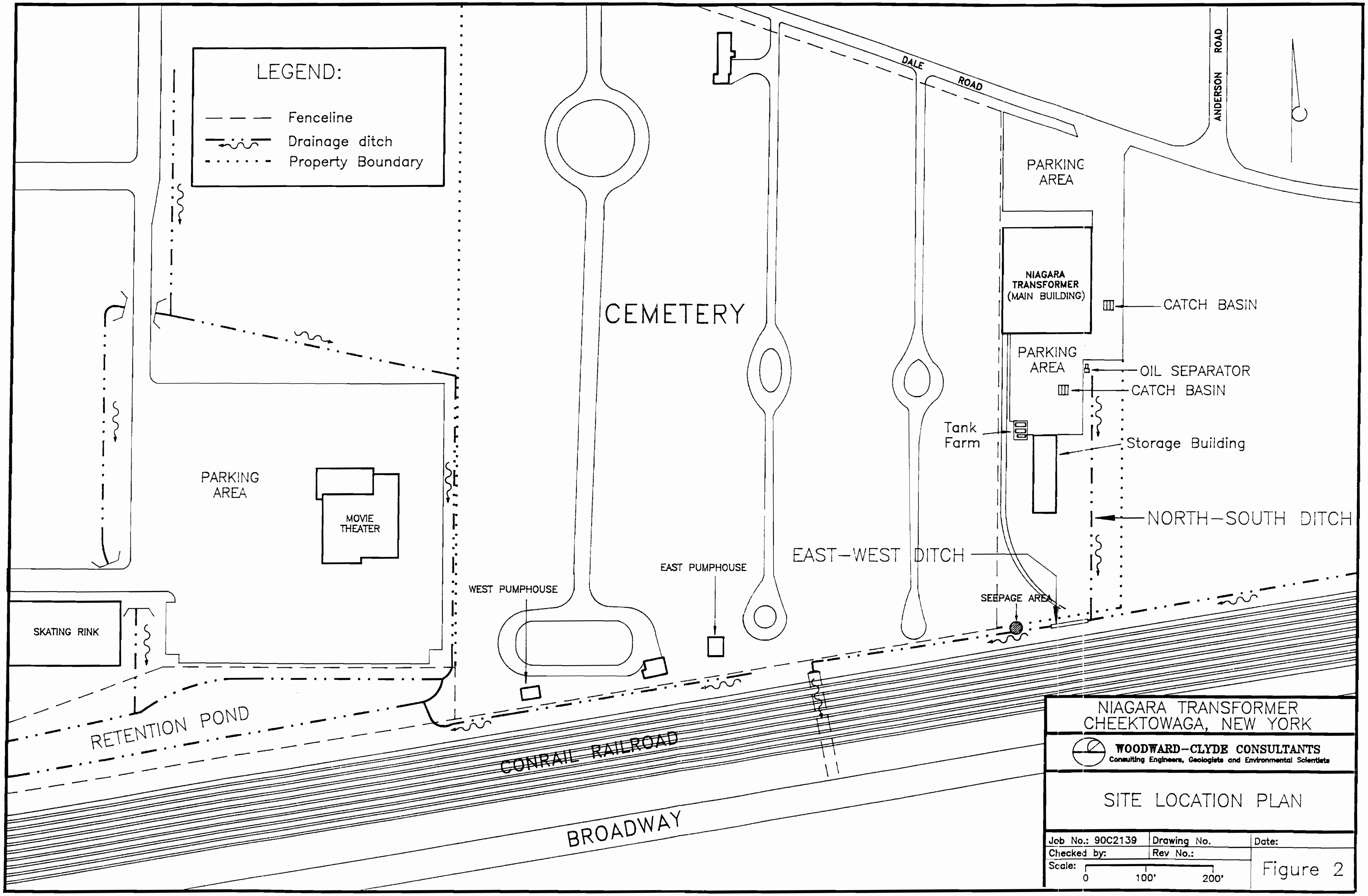


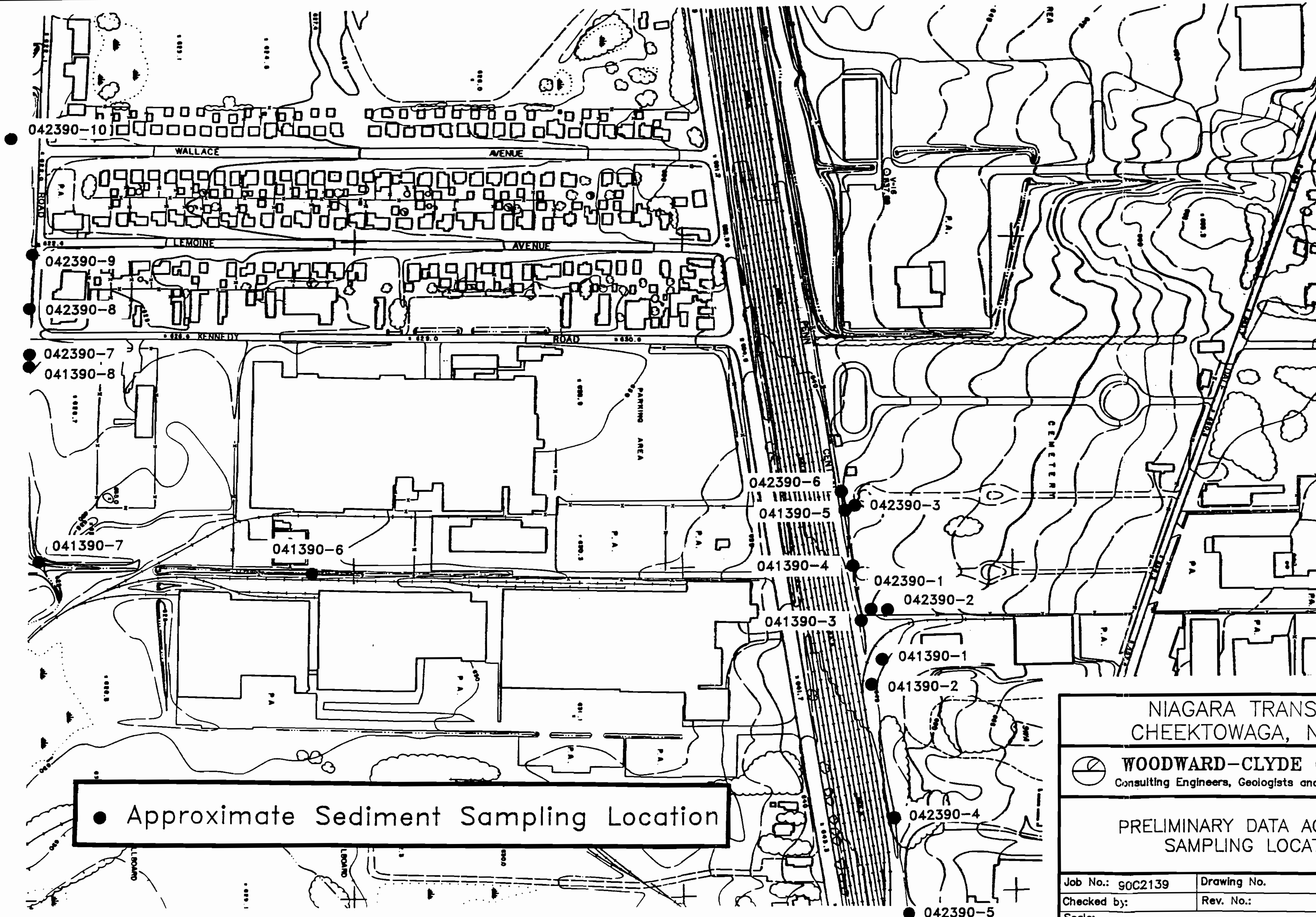
NIAGARA TRANSFORMER
CHEEKTOWAGA, NEW YORK

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

REGIONAL LOCATION MAP

Job No.: 90C2139	Drawing No.	Date:
Checked by:	Rev. No.:	
Scale:		Figure 1


LEGEND:
Fenceline
Drainage ditch
Property Boundary
DALE ROAD
ANDERSON ROAD
PARKING AREA
NIAGARA TRANSFORMER (MAIN BUILDING)
CATCH BASIN
PARKING AREA
OIL SEPARATOR
CATCH BASIN
Tank Farm
Storage Building
NORTH-SOUTH DITCH
CEMETERY
EAST-WEST DITCH
SEEPAGE AREA
EAST PUMPHOUSE
WEST PUMPHOUSE
PARKING AREA
MOVIE THEATER
SKATING RINK
RETENTION POND
CONRAIL RAILROAD
BROADWAY
NIAGARA TRANSFORMER
CHEEKTOWAGA, NEW YORK
WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists
SITE LOCATION PLAN
Job No.: 90C2139
Drawing No.
Date:
Checked by:
Rev No.:
Scale:
0
100'
200'
Figure 2

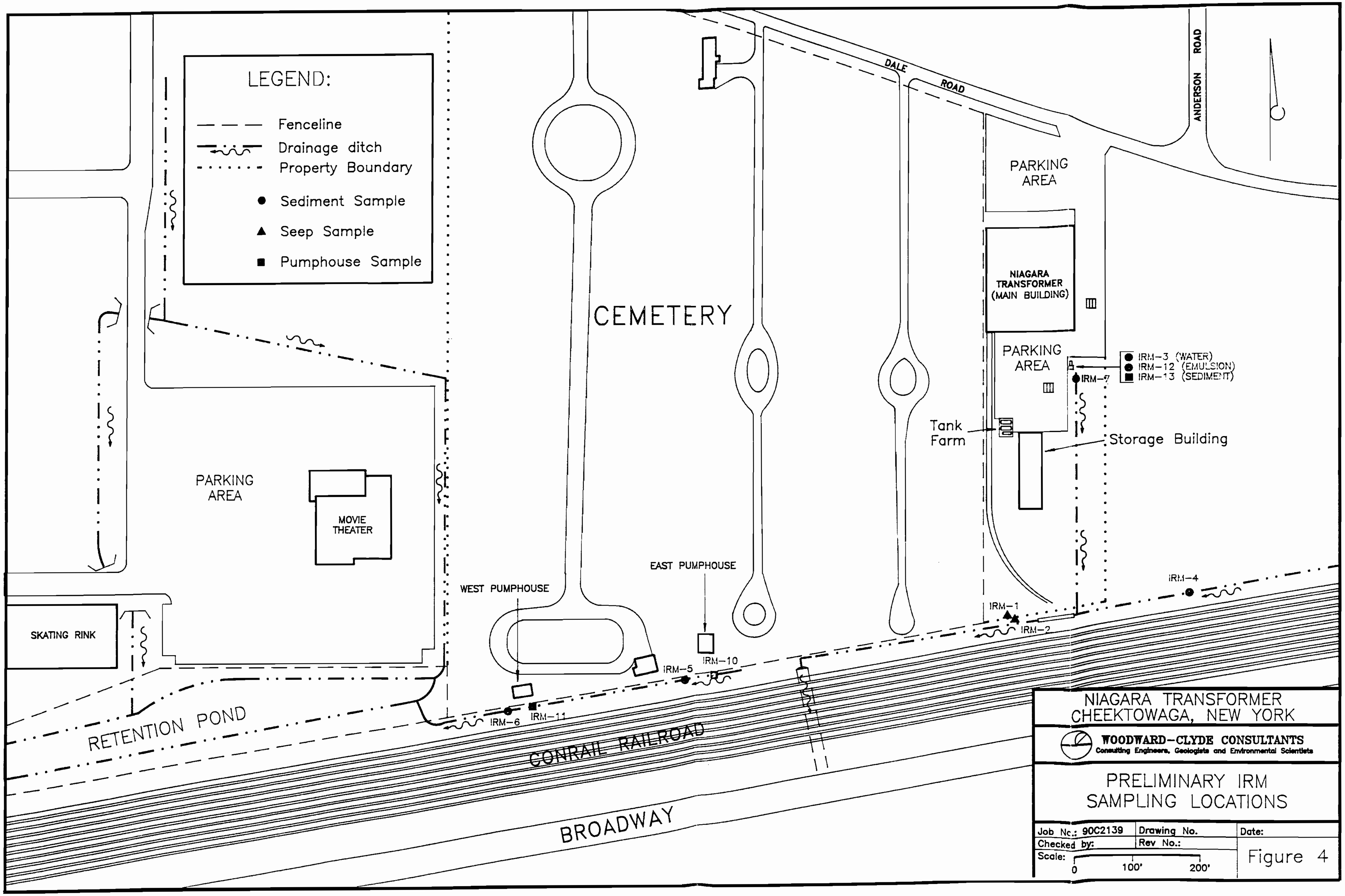


NIAGARA TRANSFORMER
CHEEKTOWAGA, NEW YORK

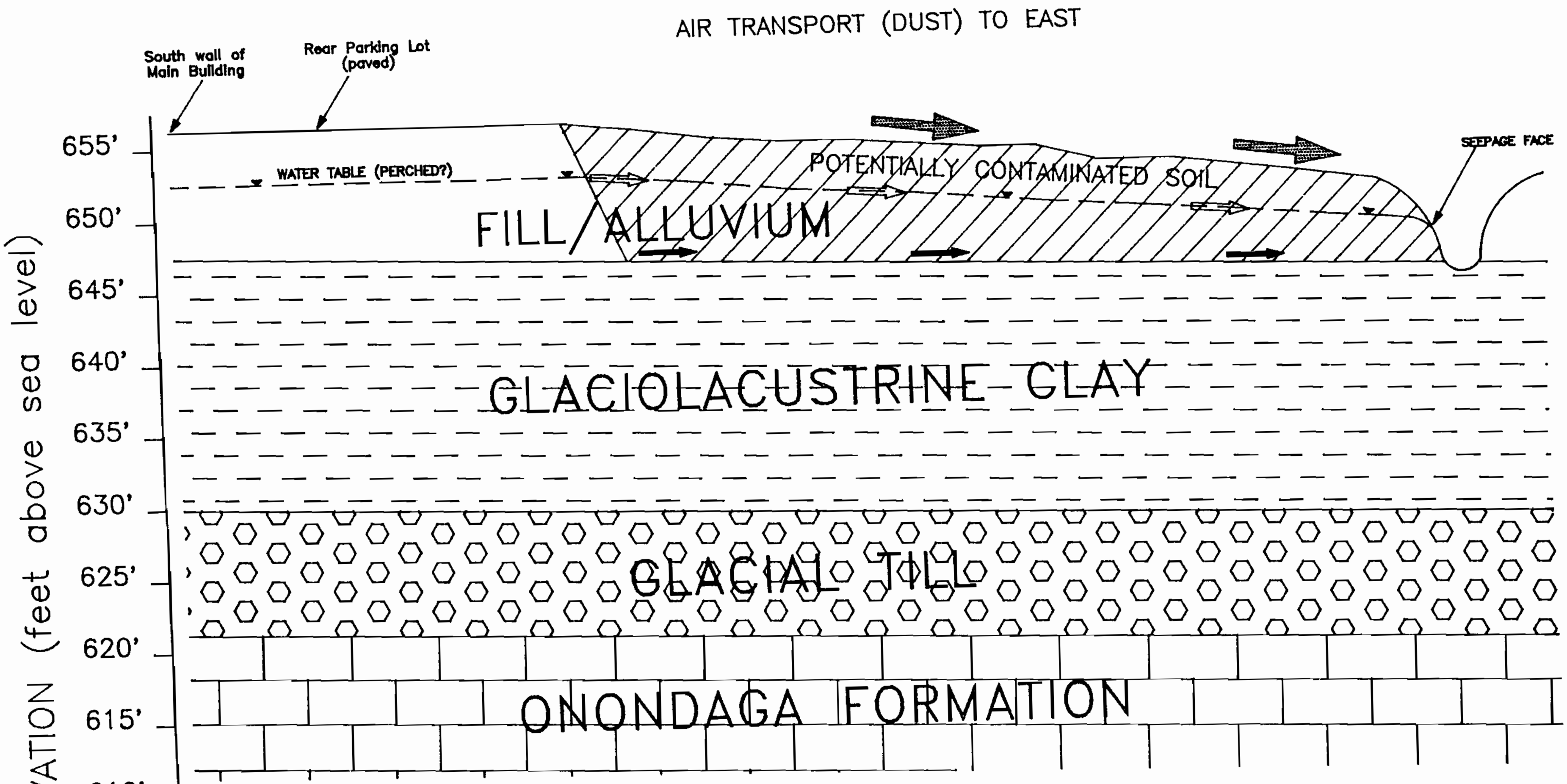
WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

PRELIMINARY DATA ACQUISITION
SAMPLING LOCATIONS

Job No.: 90C2139	Drawing No.	Date:
Checked by:	Rev. No.:	Figure 3
Scale:		



LEGEND:
Fenceline
Drainage ditch
Property Boundary
Sediment Sample
Seep Sample
Pumphouse Sample
CEMETERY
DALE ROAD
ANDERSON ROAD
PARKING AREA
NIAGARA TRANSFORMER (MAIN BUILDING)
PARKING AREA
IRM-3 (WATER)
IRM-12 (EMULSION)
IRM-13 (SEDIMENT)
IRM-7
Tank Farm
Storage Building
PARKING AREA
MOVIE THEATER
SKATING RINK
WEST PUMPHOUSE
EAST PUMPHOUSE
IRM-1
IRM-2
IRM-4
IRM-5
IRM-10
IRM-6
IRM-11
RETENTION POND
CONRAIL RAILROAD
BROADWAY
NIAGARA TRANSFORMER
CHEEKTOWAGA, NEW YORK
WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists
PRELIMINARY IRM
SAMPLING LOCATIONS
Job No.: 90C2139
Drawing No.
Date:
Checked by:
Rev No.:
Scale:
0
100'
200'
Figure 4



LEGEND:

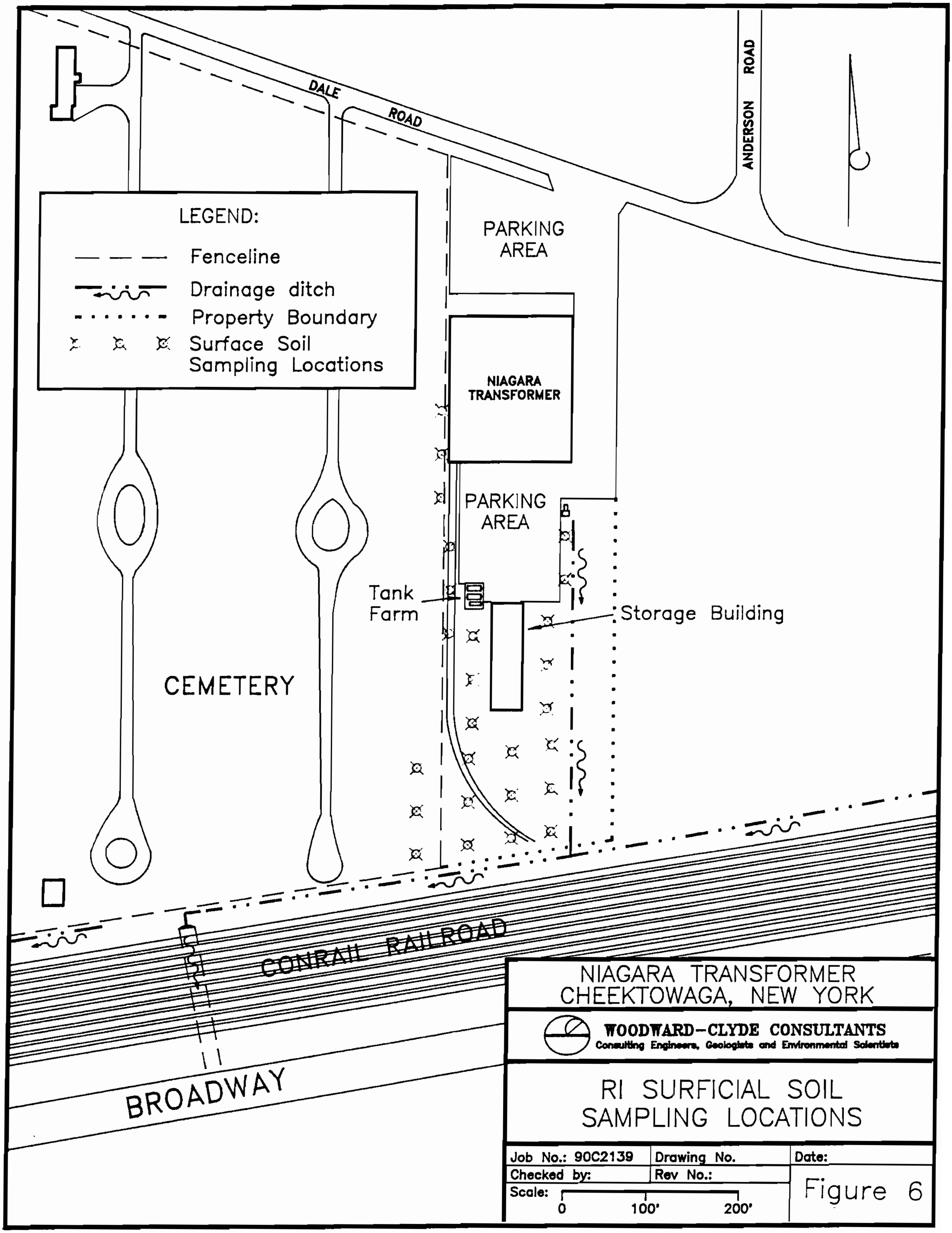
- [shaded arrow] SURFACE RUNOFF DIRECTION
- [open arrow] LIGHT OIL MIGRATION DIRECTION
- [solid arrow] HEAVY OIL MIGRATION DIRECTION

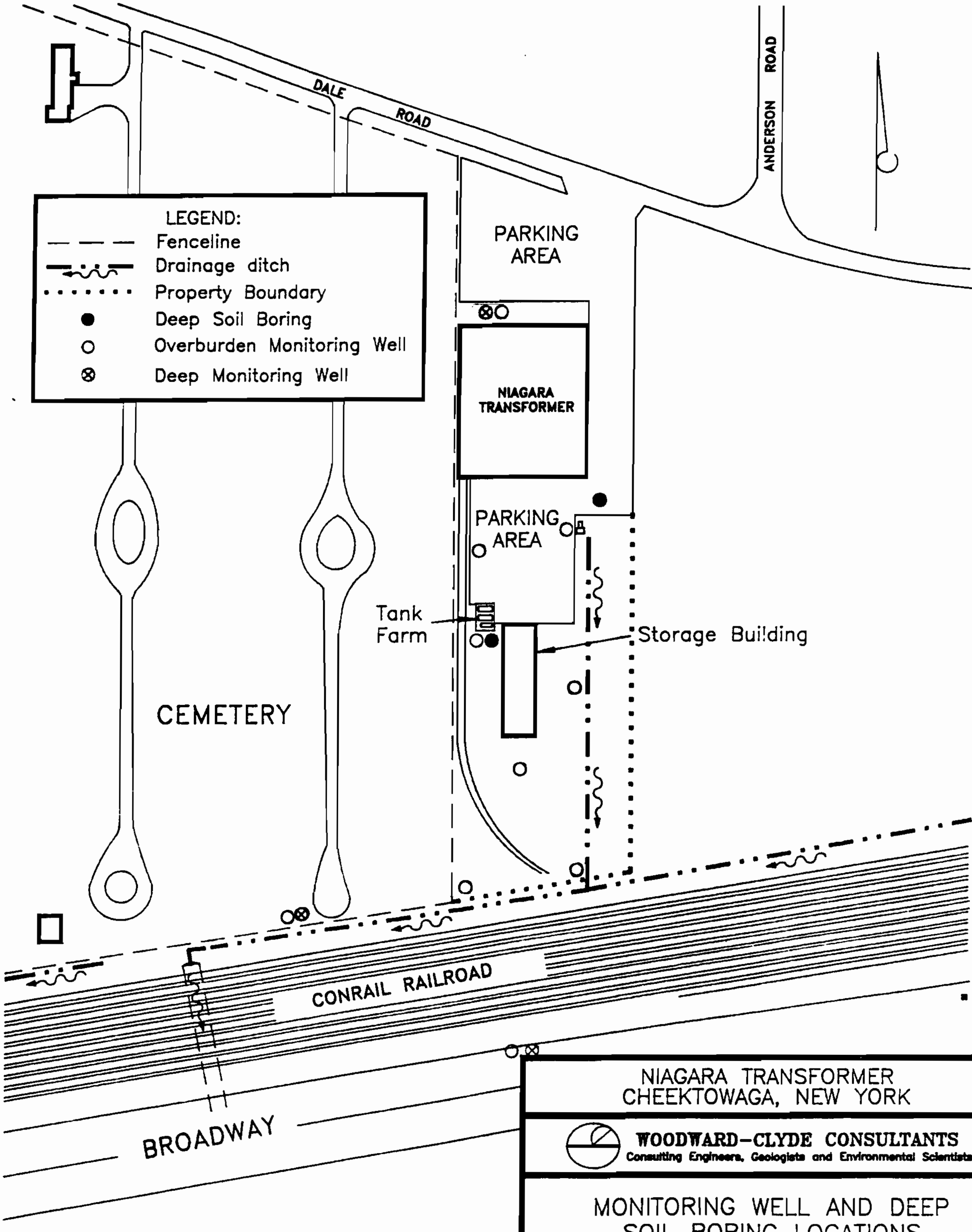
NIAGARA TRANSFORMER
CHEEKTOWAGA, NEW YORK

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

CONCEPTUAL MODEL OF
CONTAMINANT TRANSPORT AT NTC

Job No.: 90C2139	Drawing No.	Date:
Checked by:	Rev. No.:	Figure 5
Scale: not to scale		


DALE ROAD
ANDERSON ROAD
LEGEND:
Fenceline
Drainage ditch
Property Boundary
Surface Soil Sampling Locations
PARKING AREA
NIAGARA TRANSFORMER
PARKING AREA
Tank Farm
Storage Building
CEMETERY
CONRAIL RAILROAD
BROADWAY
NIAGARA TRANSFORMER
CHEEKTOWAGA, NEW YORK
WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists
RI SURFICIAL SOIL SAMPLING LOCATIONS
Job No.: 90C2139
Drawing No.
Date:
Checked by:
Rev No.:
Scale:
0
100'
200'
Figure 6



NIAGARA TRANSFORMER
CHEEKTOWAGA, NEW YORK

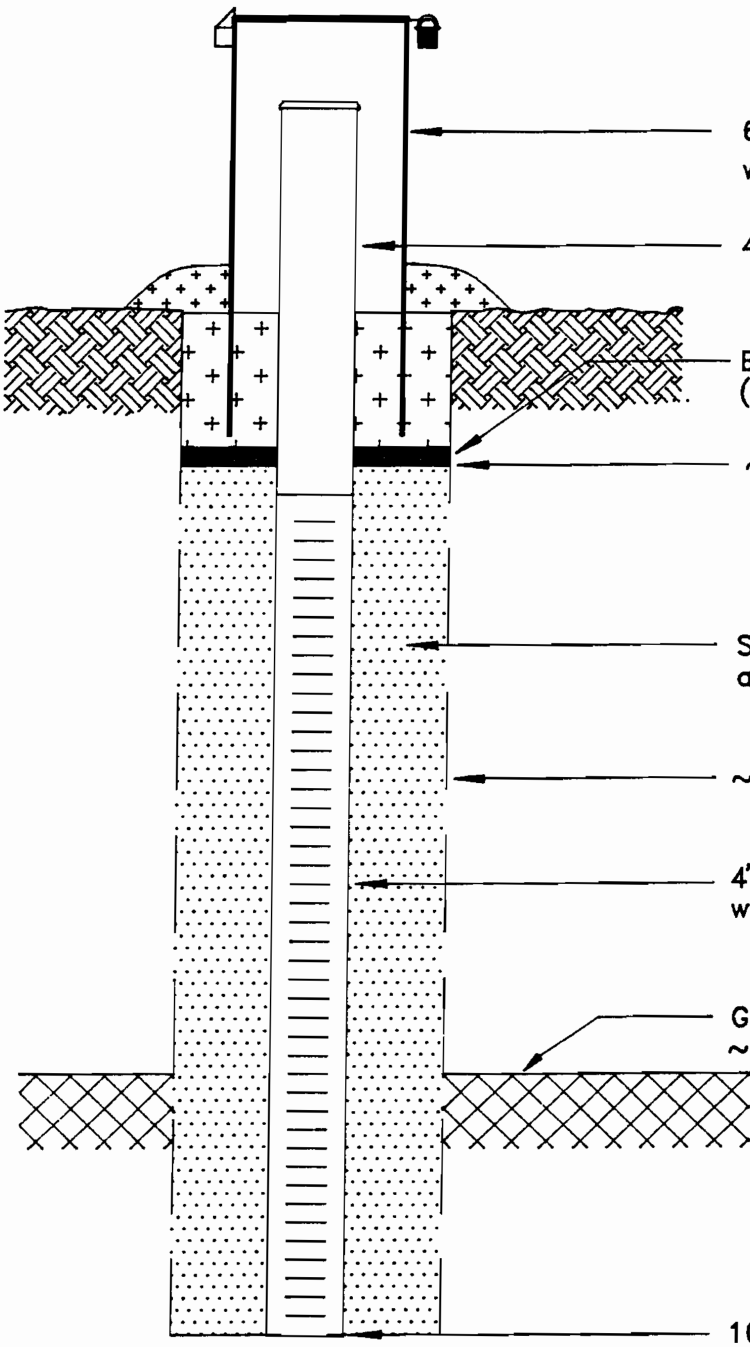
WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

MONITORING WELL AND DEEP SOIL BORING LOCATIONS

Job No.: 90C2139	Drawing No. NTALWELL	Date: 11/13/90
Checked by:	Rev No.:	FIGURE 7
Scale: 0 100' 200'		

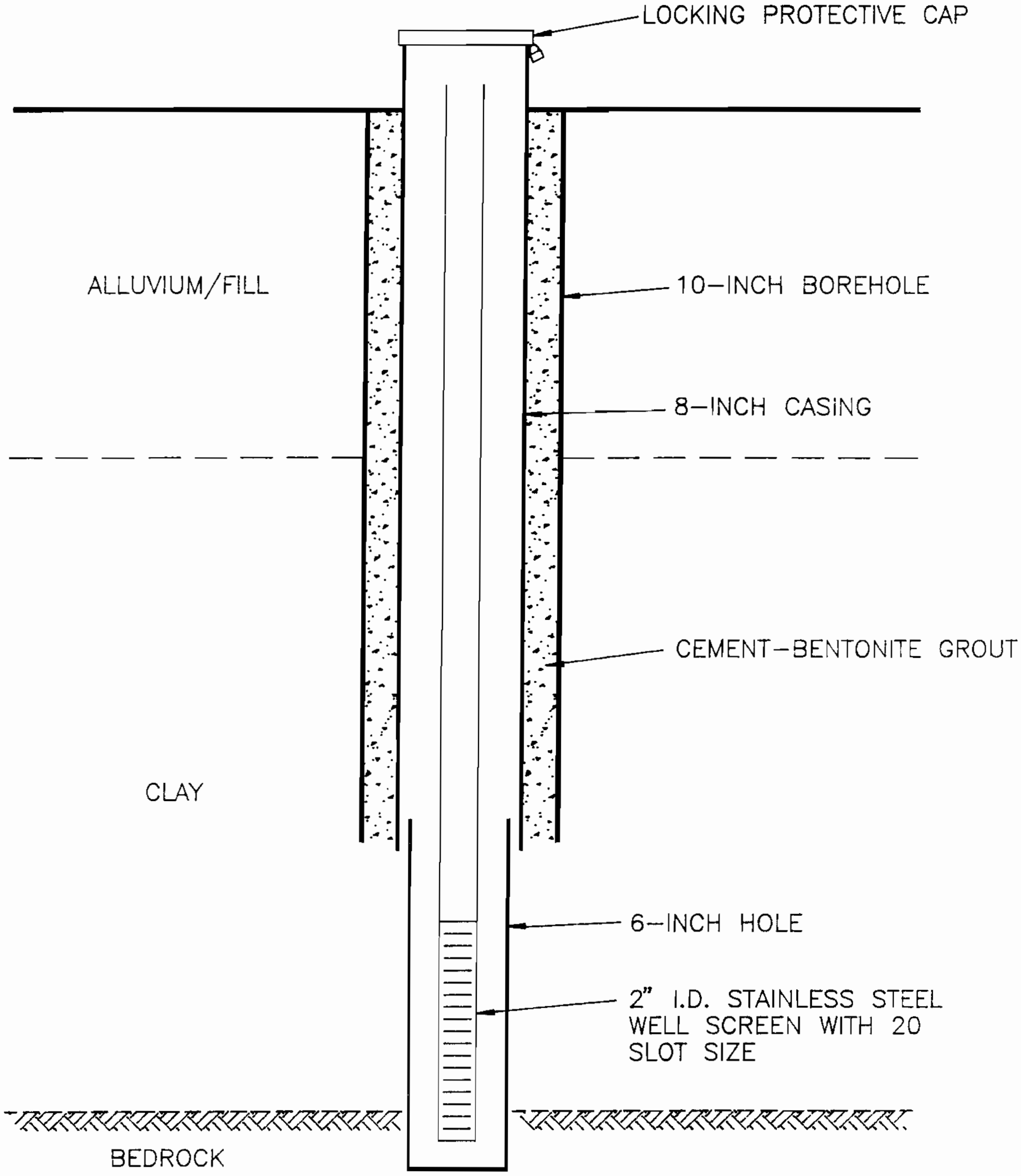
NIAGARA TRANSFORMER
Remedial Investigation

WOODWARD–CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists



OVERBURDEN MONITORING WELL CONSTRUCTION SPECIFICS

Figure 8



NIAGARA TRANSFORMER
CHEEKTOWAGA, NEW YORK

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

DEEP MONITORING WELL

Job No.: 90C2139	Drawing No. NTALWE	Date: 11/14/90
Checked by:	Rev No.:	FIGURE 9
Scale: 0 100' 200'		

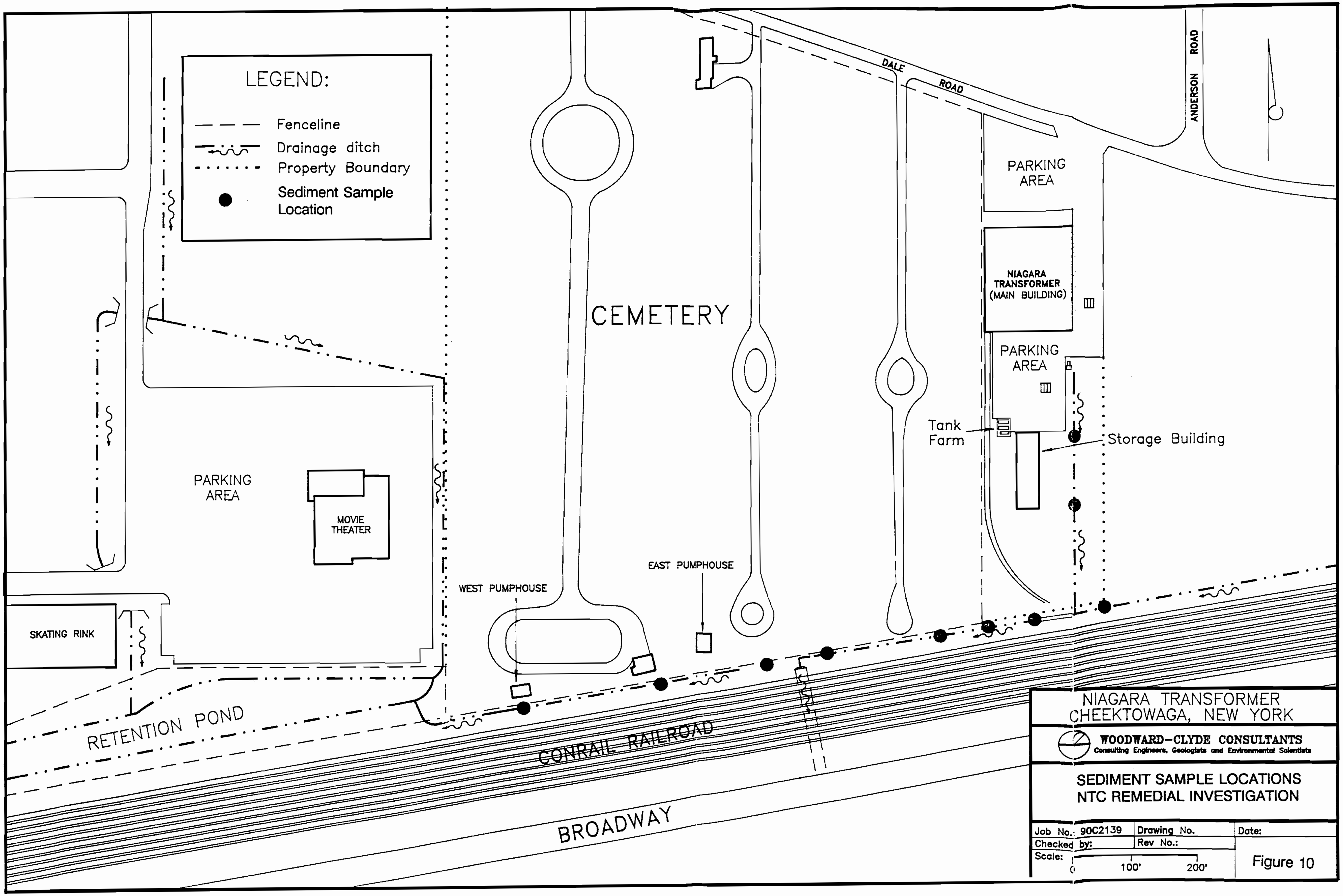
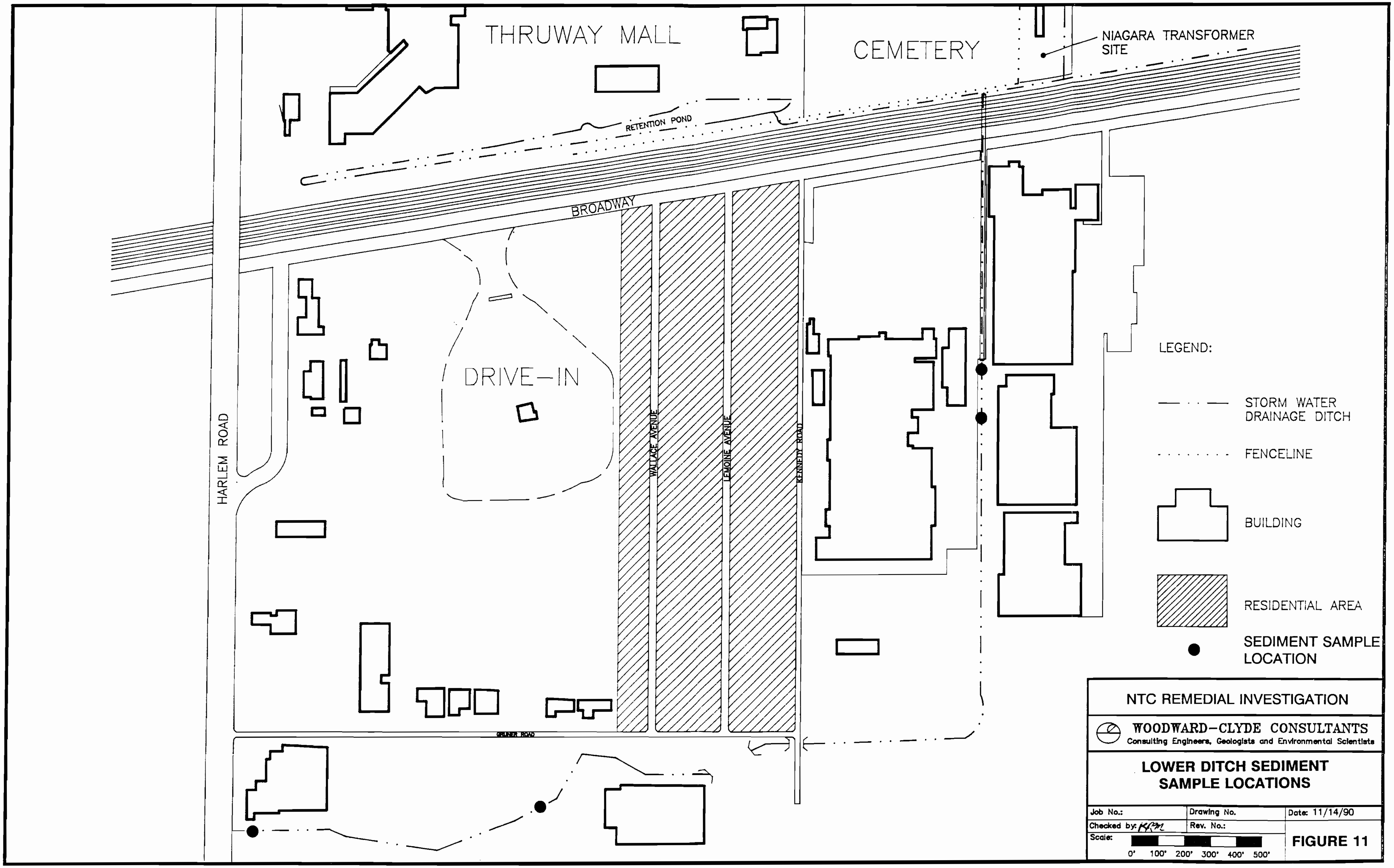

LEGEND:
Fenceline
Drainage ditch
Property Boundary
Sediment Sample Location
CEMETERY
DALE ROAD
ANDERSON ROAD
PARKING AREA
NIAGARA TRANSFORMER (MAIN BUILDING)
PARKING AREA
Tank Farm
Storage Building
PARKING AREA
MOVIE THEATER
SKATING RINK
WEST PUMPHOUSE
EAST PUMPHOUSE
RETENTION POND
CONRAIL RAILROAD
BROADWAY
NIAGARA TRANSFORMER
CHEEKTOWAGA, NEW YORK
WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists
SEDIMENT SAMPLE LOCATIONS
NTC REMEDIAL INVESTIGATION
Job No.: 90C2139
Drawing No.
Date:
Checked by:
Rev No.:
Scale:
0
100'
200'

Figure 10



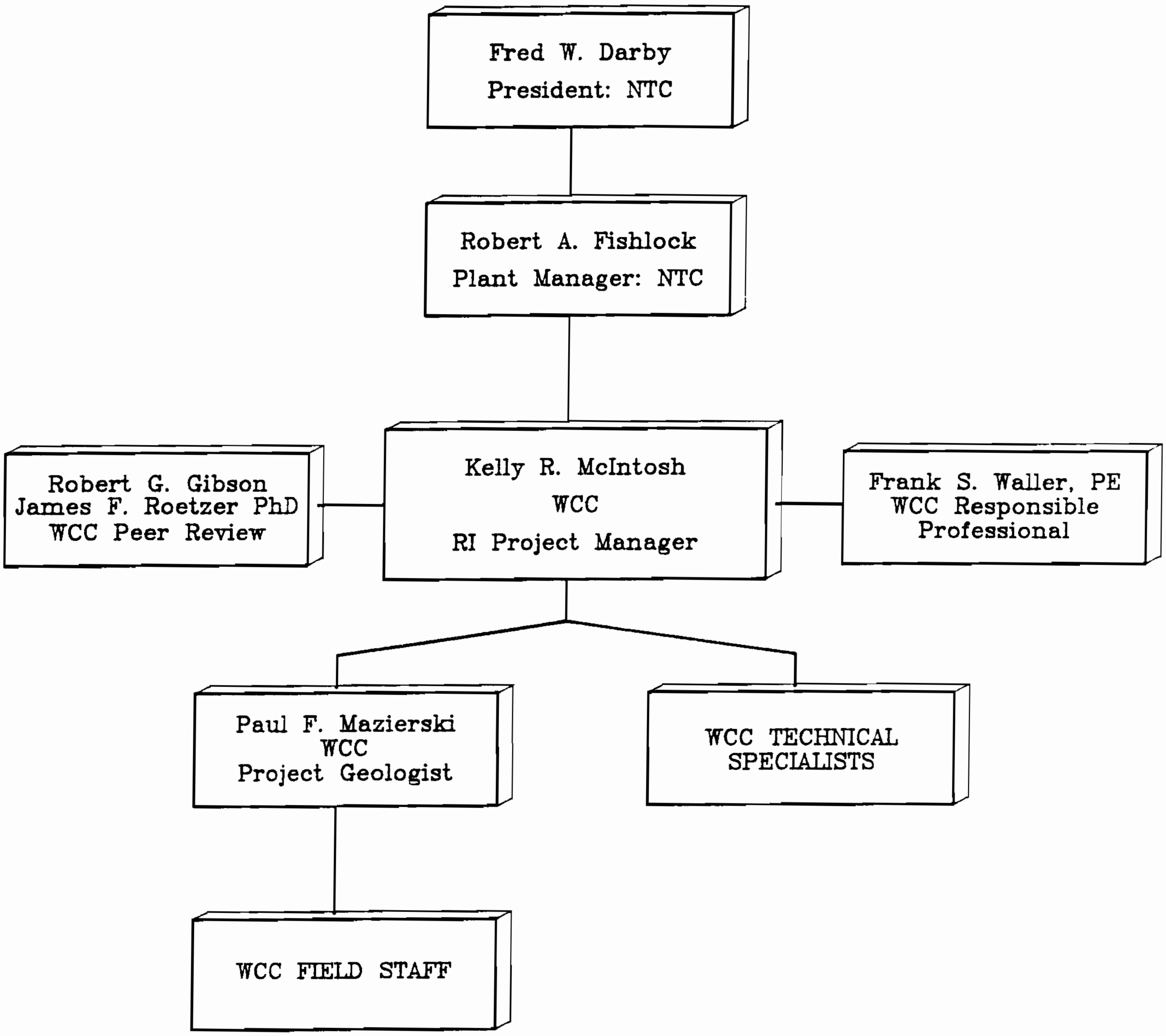
NTC REMEDIAL INVESTIGATION

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

LOWER DITCH SEDIMENT SAMPLE LOCATIONS

Job No.:	Drawing No.	Date: 11/14/90
Checked by:	Rev. No.:	

FIGURE 11



NIAGARA TRANSFORMER
CHEEKTOWAGA, NEW YORK

WOODWARD–CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

PROJECT ORGANIZATION CHART

Job No.: 90C2139	Drawing No.	Date:
Checked by:	Rev. No.:	Figure 12
Scale:		

Appendix A

FRANK R. GARBE

geology
hydrogeology
groundwater/soil
sampling techniques

EDUCATION

State University of New York at Brockport: B.S., Geology, 1985

PROFESSIONAL HISTORY

Woodward-Clyde Consultants, Staff Geologist, 1990-present
General Testing Corporation, Sampling Crew Leader, 1989-1990; Field Technician, 1988-1989

REPRESENTATIVE EXPERIENCE

Mr. Garbe's responsibilities with Woodward-Clyde Consultants include hydrological data acquisition and interpretation, groundwater monitoring, well drilling and installation inspection, and groundwater, surface water and soil/rock sampling. Mr. Garbe is also involved in data reduction and data analysis.

Prior to employment at Woodward-Clyde Consultants, Mr. Garbe was the sampling team leader for General Testing Corporation's Niagara Falls Field Office. He managed a three man groundwater monitoring and sampling crew responsible for all sampling programs conducted at a local chemical manufacturing plant and hazardous waste landfill. He was also involved with an ongoing hazardous waste landfill groundwater remediation project as well as monitoring/sampling at other hazardous and sanitary landfills and industrial facilities in Western New York.

Mr. Garbe has extensive experience with groundwater purging and sampling equipment including: submersible, centrifugal, peristaltic and bladder pumps and well-wizard™ purging/sampling systems. Additional experience includes standing water, open water, wetlands, soil and rock sampling techniques.

In his work in the Niagara Falls area, Mr. Garbe has extensive experience working in Levels C and B personal protective equipment. He has received the 40 hour Health & Safety and 8 hour supervisor's training courses required under OSHA. Additionally, Mr. Garbe is a New York State Certified Emergency Medical Technician.

ROBERT G. GIBSON

hydrogeology
containment transport
site assessment

EDUCATION

Lehigh University: M.S., Geology, 1985
Lehigh University: B.S., Geological Sciences, 1983

PROFESSIONAL HISTORY

Woodward-Clyde Consultants, Project Geologist, 1988-present; Staff, Senior Staff, Assistant Project Geologist, 1985-1988

REPRESENTATIVE EXPERIENCE

Mr. Gibson has conducted and managed numerous hydrogeologic and environmental investigations at industrial facilities and uncontrolled hazardous waste sites. Typical projects have involved the characterization of contaminant distribution and migration in soil and groundwater through the installation of groundwater monitoring networks, collection of field samples, and aquifer testing and evaluation. Following the site characterization phase, many projects have also involved risk characterization and evaluation of remedial alternatives for site clean-up. Mr. Gibson has been responsible for management of remedial investigations, feasibility studies, and risk assessments for industrial clients that include E. I. duPont de Nemours & Co., Olin Corporation, Allied Corporation, Rohm and Haas Company, and Rohm and Haas subsidiaries. Mr. Gibson has represented his clients at technical negotiations and presentations with state and federal regulatory agencies.

Mr. Gibson is project manager for an RI/FS at an active industrial site in New York State. The project involves delineation of PCBs, hexachlorobutadiene, and other chlorinated hydrocarbon contamination within stream sediment and surface water. Due to the hazardous nature of the chemicals anticipated, Mr. Gibson coordinated a team of seven key technical staff from three WCC offices trained to perform the sampling program in Level B health and safety protection. Innovative barge, and hydraulic crane-mounted vibracoring sampling techniques were employed during the investigation program. An environmental assessment and preliminary feasibility study have been performed to screen potentially feasible remedial alternatives.

Mr. Gibson is currently project manager for on-going consulting services at a Pennsylvania chemical manufacturing facility. A Remedial Investigation and Risk Assessment have been performed at the site. As part of the site characterization, complex hydrologic conditions including river/aquifer interactions and hydrologic effects of underground utilities was evaluated and modeled using a three-dimensional groundwater flow model. The groundwater model was used to evaluate the effectiveness of various remedial alternatives. WCC is currently working with the client to integrate groundwater remedial actions with a plant-wide infrastructure repair program involving renovation of the plant sewer and wastewater treatment system.

Mr. Gibson has served as project geologist for a hydrogeologic and soils investigation of a coal gasification plant in southeastern Pennsylvania. The study encompassed the implementation of a RCRA compliance groundwater monitoring program and performance of a study to delineate the extent of coal tar contamination in soil as part of RCRA's corrective action program. As part of the soil contamination study, Mr. Gibson helped design and implement a sampling program utilizing on-site fluorometric methods to get "real time" characterization of coal tar contamination in soil.

Mr. Gibson has managed several site assessments for industrial property transfers in Pennsylvania and New York. His responsibilities have included proposal preparation, coordination of field activities, historic records searches, and report preparation.

Mr. Gibson participated in a site feasibility study for hydrologic containment of an industrial landfill in upstate New York; a three-dimensional groundwater flow model was used to evaluate hydrologic effectiveness of proposed remedial alternatives. He was involved in a geotechnical investigation of a retired flyash basin in central Pennsylvania; site groundwater conditions were modeled to evaluate the hydrologic effectiveness of a slurry trench cutoff wall to retard groundwater and leachate flow from the retired flyash basin.

AFFILIATIONS

Geological Society of America
American Geophysical Union
Sigma Xi
National Water Well Association

PAUL F. MAZIERSKI

geology
hydrogeology
environmental analytical chemistry
analytical QA/QC

EDUCATION

State University of New York at Buffalo: M.A., Geology, 1988
State University of New York at Buffalo: B.A., Geology, 1984

PROFESSIONAL HISTORY

Woodward-Clyde Consultants, Senior Staff Geologist, 1990-present; Staff Geologist, 1989-1990
SMC Martin Inc., Project Geologist/QA/QC Officer, 1988
Ecology & Environment, Inc., Analytical Chemist, 1986-1988

REPRESENTATIVE EXPERIENCE

Mr. Mazierski has extensive experience in several geotechnical disciplines pertaining to groundwater studies and hazardous waste assessment, including soil, surface water, and groundwater sampling techniques, monitoring well drilling and installation, soil gas and geophysical surveying methods, QA/QC validation of analytical data, work plan preparation, and technical report writing. Additionally, Mr. Mazierski has training and experience in many aspects of environmental sample analysis, including airborne and bulk asbestos analysis, sample preparation, and inorganic analysis using atomic absorption and emission techniques.

With Woodward-Clyde Consultants Niagara Falls office, Mr. Mazierski is responsible for many aspects of several CERCLA/RCRA type remedial investigations at local chemical manufacturing facilities and hazardous waste landfills. Responsibilities include work plan/quality assurance plan (QAP) preparation and implementation, chemical data validation, hydrologic data acquisition and interpretation, and technical report writing, as well as some project managerial duties. Additionally, he has been involved with several smaller scale jobs including underground storage tank removal work and environmental assessments for property transfers.

Mr. Mazierski was the project geologist for a remedial investigation of a precious metal reclamation facility. Responsibilities included performing soil borings, installation and sampling of a number of groundwater monitoring wells and performing extensive down-hole and terrain electromagnetic conductivity surveys for the identification of potentially recoverable precious metals in nearby sediments.

Mr. Mazierski has also been the field geologist for an environmental evaluation of a light-duty metals fabrication plant suspected of contributing to a contaminant plume located downgradient of the facility. Responsibilities included evaluation of existing data and conducting a soil gas survey to delineate possible contaminant sources and transport pathways.

Mr. Mazierski was the field geologist for hydrogeologic investigation and remediation of a contaminated aquifer in the vicinity of a manufacturing plant. Responsibilities included monthly sampling of on-site and residential wells, analysis of analytical data, and technical report writing.

Mr. Mazierski was site manager for a remedial investigation of a scrap metal reclamation plant. He was responsible for all aspects of the field investigation, including drilling, construction, and sampling of a network of overburden and bedrock monitoring wells, and implementation of an extensive surface soil and creek sediment sampling program. He also prepared an on-site laboratory for the analysis of samples obtained during the investigation according to CLP methodologies.

As QA/QC officer at SMC Martin, Inc. Mr. Mazierski was responsible for the validation of all chemical data for volatile and semivolatile organic compounds, pesticides, PCB's, and inorganic parameters using EPA and NJDEP guidelines.

Mr. Mazierski has received the Health and Safety Training required under OSHA 1910 and has significant experience performing field exercises in protection levels B and C. He has also served as Site Health and Safety Officer during several projects and is familiar with a variety of air monitoring equipment (i.e. HNu, OVA, MVA).

AFFILIATIONS

National Water Well Association
Buffalo Association of Professional Geologists

KELLY R. MCINTOSH

hydrology
hydrogeologic modeling
water quality/contaminant transport
environmental assessments

EDUCATION

University of Delaware: Graduate Study Toward Ph.D. in Water Resources Engineering, (Degree Expected 1990)
University of New Hampshire: M.S., Hydrology, 1984
Drexel University: Graduate Study, Environmental Engineering and Science, 1981, 1982
Pennsylvania State University: B.S., Biology (Environmental Science), 1979

PROFESSIONAL HISTORY

Woodward-Clyde Consultants, Senior Project Hydrologist, 1989-present; Project Hydrologist, 1987-present; Assistant Project Hydrologist 1986-1987; Senior Staff Hydrologist, 1984-1985
United Engineers and Constructors, Philadelphia, PA, Engineer, 1983
Johnson Matthey, Inc., Wayne, Pennsylvania, Research Chemist, 1980-1982; Process Engineering Technician, 1979-1980

REPRESENTATIVE EXPERIENCE

Mr. McIntosh is an experienced surface and groundwater hydrologist. His contributions to projects at Woodward-Clyde Consultants have included: groundwater flow and contaminant transport modeling; surface water quality modeling; endangerment/risk assessment studies; and water quality investigations. In early 1989 Mr. McIntosh took a lead role in the expansion of Woodward-Clyde Consultants' services by opening the Western New York office. He is currently manager of this office.

Mr. McIntosh is the manager of a remediation project at an inactive landfill in western New York. This project involves installation of a bedrock grout curtain and groundwater recovery system. Woodward-Clyde Consultants has been responsible for design of the system and construction supervision.

Mr. McIntosh has recently conducted a risk assessment for contaminated groundwater at a large manufacturing facility on the Delaware River. His methods in this study included: characterization of site and vicinity; identification of exposure pathways; quantification of off-site contaminant transport rates based on three-dimensional modeling of groundwater flow; analytical modeling of dispersion of non-point discharge of groundwater contaminants to the Delaware estuary; estimation of contaminant concentrations at exposure points; and assessment of risk to human health and the environment associated with these exposure levels. He has contributed to several endangerment/risk assessments performed by other offices of Woodward-Clyde Consultants as a specialist in contaminant transport in the hydrologic environment.

Mr. McIntosh has applied the USGS Three-Dimensional Modular Groundwater Flow Model to several problems including a fractured Dolomite flow regime in Niagara Falls, New York. Contaminant transport rates were estimated using known chemical concentration and computer generated flow rates. Other modeling projects include the simulation of transport of radioisotopes from several types of disposal facilities using the Illinois State Water Survey Random-Walk Solute Transport Model. He is also experienced in application of analytical solutions to water quality simulation.

With United Engineers and Constructors, Mr. McIntosh worked as a field engineer at a nuclear generating station during construction. He was responsible for assessing the progress of installation of piping and pipe supports. At Johnson Matthey, a large chemical manufacturer, Mr. McIntosh worked in Production (Process Engineering) and Research (Diesel Emission Control).

His education included several graduate courses in environmental engineering, toxicology and environmental toxicology which supplement his degree programs in the biological sciences (B.S. Biology) and Earth Sciences (M.S. Hydrology). As a graduate student in hydrology at the University of New Hampshire, Mr. McIntosh's curriculum included courses in hydrology, groundwater hydrology, engineering, modeling techniques, water chemistry and wastewater treatment. He was awarded an academic scholarship for the second year of his program. His master's research involved an investigation of nitrogen transport from an abandoned municipal landfill. Presently Mr. McIntosh is working toward a Ph.D. in Water Resources Engineering at the University of Delaware.

AFFILIATION

National Water Well Association

AWARDS AND HONORS

1986 Woodward Prize for Best Paper at PDC Central Symposium
1989 Young Professional Award

PUBLICATIONS

McIntosh, K.R., Lennon, G.P., and Rumbaugh, D.B., (1986). "Groundwater Modeling: Selection of Computing Systems," Proceedings of the Fourth Conference on Computing in Civil Engineering, ASCE.

Gallagher, M.N., Leitzinger, A.H., and McIntosh, K.R., (1986). "Installation of multi-level monitoring wells in a fractured rock media." Proceedings of the Sixth National Symposium on Aquifer Restoration and Groundwater Monitoring, NWWA.

KRM 2/90 3of3

W. SCOTT MCINTYRE

petroleum engineering
construction engineering

EDUCATION

Marietta College: B.S., Petroleum Engineering, 1985

PROFESSIONAL HISTORY

Woodward-Clyde Consultants, Senior Staff Engineer, 1990-present; Staff Engineer, 1988-1990
United States Pipe and Foundry Co, Sales Representative, 1986-1988
Continental Laboratories, Analyst, 1986

REPRESENTATIVE EXPERIENCE

Since joining Woodward-Clyde Consultants, Mr. McIntyre has been involved with the construction of a subsurface grout curtain barrier at a hazardous waste landfill in Niagara Falls, New York. His duties included full-time monitoring of the drilling and grouting operations for the construction of the vertical grout curtain, as well as documentation of the daily operations, quantities, and events. Later in the project, he assumed the position of Lead Field Engineer. Mr. McIntyre also served as the Site Safety Officer for the project.

Mr. McIntyre served as site Health and Safety Officer at a complex hazardous waste landfill remediation project in Lake Charles, Louisiana. All activities involved with the remediation of the landfill were performed using level B personal protective equipment. Mr. McIntyre was responsible for enforcing the Health and Safety Plan, calibration of monitoring instruments, auditing of numerous Health and Safety and environmental activities, and area and personal monitoring. He has received advanced Health and Safety training including waste site supervisor training.

Mr. McIntyre has also provided engineering inspection services on a number of projects. One of the more prominent was construction of an asphalt cap over a contaminated soil site in western New York.

Prior to joining Woodward-Clyde Consultants, Mr. McIntyre worked for United States Pipe and Foundry Company as a sales representative. He obtained experience in trouble-shooting material defects, assisting in the design of water/waste water systems, and client relations.

As an analyst with Continental Laboratories, Mr. McIntyre received analytical training. His experience included collecting and analyzing drilling fluid samples and interpretation of data to reveal possible oil and gas bearing zones.

AFFILIATIONS

Society of Petroleum Engineers
American Water Works Association

FRANK S. WALLER

project management
geotechnical engineering
waste management
regulatory testimony/negotiations
earth dams
administration

EDUCATION

University of Maryland: M.S., Civil Engineering, 1962
University of Delaware: B.S., Civil Engineering, 1958
Harvard University: Certificate of Completion, Special Soil Mechanics Program for Professors and Practicing Engineers, 1965

REGISTRATION

Professional Engineer: Pennsylvania, Delaware, Maryland, and District of Columbia

PROFESSIONAL HISTORY

Woodward-Clyde Consultants, Member of Board of Directors, 1986-present; Principal, 1970-present; Associate, Project and Staff Engineer, 1962-1970
J.E. Greiner Company, Soils Engineer, 1958-1962

REPRESENTATIVE EXPERIENCE

Mr. Waller has more than 30 years of experience in geotechnical engineering and applied earth sciences. He has served as the Principal-in-Charge (or project manager) for a broad range of projects, including power plants, industrial/commercial facilities, high-rise buildings, transportation systems, earth dams, site development studies, offshore pipelines, and waste disposal/landfill facilities. Brief descriptions of representative projects in each of these areas are presented below.

Presently, Mr. Waller is serving as Principal-in-Charge of the following types of waste management projects:

- o Remedial Investigations/Feasibility Studies
- o Site Assessment Studies
- o Risk Assessment Studies
- o Remedial Designs and Cost Estimates
- o Groundwater Remediation
- o Computer Modeling of Groundwater Flow and Solute Transport
- o Impoundment/Landfill Closures
- o Regulatory Compliance/Negotiations

In the last several years, Mr. Waller has developed expertise in applied earth science applications to solid and hazardous waste facilities and various types of sites having subsurface contamination. Projects have included the development of a municipal garbage dump into a major regional shipping center; designing waste disposal basins for storage of hazardous chemical wastes; hydrogeologic studies of hazardous waste sites in Delaware, Maryland, New Jersey, New York, Pennsylvania, and Ohio; flyash disposal systems in Delaware and Michigan; and special laboratory investigations for characterization of physical and engineering properties of various chemical wastes. Mr. Waller has directed geotechnical, hydrogeological, and hazardous waste site closure studies for several sites at the Savannah River Plant (Aiken, SC), which is operated for the Department of Energy by the DuPont Company. Some of these sites include radioactive wastes.

Mr. Waller has served as the Principal-In-Charge or project manager for geotechnical studies on major foreign projects, such as the DuPont Textile Fibers Plant in Isfahan, Iran; the Saline Water Conversion Corporation's Desalination/Power Plant in Al Jubail, Saudi Arabia; and the Shuichang Open Pit Mine, Beneficiation and Pelletization Plant for the People's Republic of China (through Bethlehem International Engineering Corporation).

In addition to providing expert testimony before several public NRC and ACRS hearings on nuclear plant projects, Mr. Waller has given expert testimony at arbitration and court trials on construction claims. Mr. Waller also has extensive experience in regulatory negotiations on behalf of industrial clients with such agencies as the U.S. EPA, NY DEC, PA DER, DE DNR, and NJ DEP. He has also served many clients as an independent consultant in his areas of expertise.

Mr. Waller has been in charge of several geotechnical projects including the design and construction engineering associated with the Service Water Pond Dams (Category I structures) for the V.C. Summer Nuclear Station, owned by South Carolina Electric and Gas Company; geotechnical investigation, foundation design criteria, and construction engineering for the Cleveland Electric Illuminating Company's Perry Nuclear Power Plant, near Painesville, Ohio; geology, seismology, and foundation studies (Chapter 2.5 of the PSAR) for Ohio Edison Company's Erie Nuclear Plant (project cancelled) near Sandusky, Ohio; and offshore geotechnical and oceanographic investigations for a deepwater cooling water system for the Consumers Power Company's Palisades Nuclear Power Plant, near South Haven, Michigan. Mr. Waller has directed geotechnical studies and construction engineering for fossil plants including the Consumers Power Company's Dan E. Karn Plant, Units 5 and 6, Essexville, Michigan, and James H. Campbell Plant, Unit 3, West Olive, Michigan. The Dan E. Karn Plant foundation system included drilled-in-caissons constructed by the underwater tremie concrete placement method. The James H. Campbell plant included offshore geotechnical and environmental studies for a deepwater cooling system as well as conventional onshore geotechnical studies. Typical industrial facilities for which Mr. Waller has directed the geotechnical studies have included a complete new DuPont plant near Charleston, South Carolina, and numerous DuPont plant expansions throughout the east and southeastern United States. He has directed the foundation studies for many commercial facilities, including several department stores for John Wanamaker, Strawbridge and Clothier, Gimbels, Sears, J.C. Penney, and Macy's. He has directed foundation studies for several high-rise buildings in Philadelphia, Pennsylvania; Wilmington, Delaware; along the New Jersey coast; and many other locations. Mr. Waller has been the project manager for a substructure evaluation of the timber piles and deck (60 years old) of Piers 3 and 5 in Philadelphia, Pennsylvania, for support of three-story residential condominiums.

Mr. Waller has had extensive experience in transportation facilities, having directed the geotechnical investigations for more than 100 miles of interstate highways in Pennsylvania; numerous highway bridges; the Betsy Ross Bridge across the Delaware River (Philadelphia); and tunnels in Philadelphia, Pennsylvania; Washington, D.C.; Buffalo, New York; and Cleveland, Ohio.

Mr. Waller has served as the project engineer or project manager for the design and construction of earth dams and retention dikes throughout the eastern United States and the People's Republic of China. He has also directed dam safety studies for several dams in the Philadelphia area for the Philadelphia Suburban Water Company.

Mr. Waller's administrative functions include managing the 90-person staff of the Plymouth Meeting, Pennsylvania, office and participating in local technical and semi-technical activities. Mr. Waller was instrumental in opening Woodward-Clyde's new (Spring 1989) Niagara Falls, New York, office and is the Responsible Principal for this new office. Mr. Waller is a member of Woodward-Clyde Group, Inc.'s Board of Directors and serves on several Corporate committees.

HONORS

Austin B. Mason Award for Outstanding Work in the Field of Soil Mechanics, Harvard University.

AFFILIATIONS

American Society of Civil Engineers
Pennsylvania Society of Professional Engineers
Consulting Engineers Council
The Association of Engineering Firms Practicing in the Geosciences (ASFE)
Hazardous Waste Action Coalition (HWAC)
Air and Waste Management Association
American Water Works Association

PUBLICATIONS

Geotechnics of Lagoon Closures, (with J.C. Evans). Proceedings of the Third Annual Hazardous Materials Management Conference, Philadelphia, Pennsylvania, 1985.

Hazardous Waste Remediation. Proceedings of New Technology in Geotechnical Engineering Conference, Hershey, Pennsylvania, 1987.

REBECCA Y. WALSH

analytical QA/QC
sedimentology
low-temperature geochemistry

EDUCATION

Bowling Green State University: M.S., Geology, 1984
Earlham College: B.A., Geology, 1981

PROFESSIONAL HISTORY

Woodward-Clyde Consultants, Assistant Project Geologist, 1988-present; Senior Staff Geologist, 1986-1988; Staff Geologist, 1985-1986
Graduate Assistant Coordinator, Geology Department, Bowling Green State University, 1983-1984
Geology Field Camp Graduate Assistant, Bowling Green State University, Summer 1984
Teaching Assistantship, Geology Department, Bowling Green State University, 1982-1983

REPRESENTATIVE EXPERIENCE

Ms. Walsh works with the Geosciences Division of Woodward-Clyde Consultants in Niagara Falls, New York. Ms. Walsh has participated in a variety of Site Assessments, RI/FS, RCRA Facilities Investigations and other environmental projects. In recent years, Ms. Walsh has performed an active role in WCC's Corporate Quality Assurance Program. Her field experience includes installation of groundwater monitoring wells and angle drilling using mud rotary and hollow-stem augering techniques. She has logged rock core, collected soil samples, and taken groundwater permeability measurements. In addition to experience with sediment handling, Ms. Walsh has supervised and participated in sampling of both groundwater and surface water for analytical testing. Ms. Walsh has organized and participated in aquifer tests in New York and Pennsylvania using electronic data loggers. Her responsibilities have included data collection, reduction, and interpretation.

Ms. Walsh has organized and implements a Quality Assurance/Quality Control (QA/QC) program for ongoing environmental sampling programs conducted by DuPont in Niagara Falls. The elements of the program carried out by Ms. Walsh include:

- o Review of analytical documentation and data validation in accordance with NYSDEC and EPA guidance
- o Annual audits of sample collection, handling, and decontamination procedures (sampling performed by another DuPont contractor)
- o Annual audit of the contracted laboratory facility

This program has been in effect since 1987. Attached to this resume is a list of Ms. Walsh's chemistry course work.

Ms. Walsh has developed hydrologic and contaminant loading assessments for several industrial sites. She has used field and laboratory data to interpret various geological and hydrological conditions which were incorporated in major site assessment reports. Her organizational skills and writing abilities have enabled Ms. Walsh to become involved in researching, organizing, and writing reports for a number of different clients. While at Woodward-Clyde, Ms. Walsh has been selected to attend several Professional Development Seminars.

Prior to employment, Ms. Walsh attended Bowling Green State University as a Master's candidate in geology. She received a Teaching Assistantship in her first year of study and was selected by the faculty as the Lab Coordinator for the second year. Ms. Walsh's M.S. thesis research involved experimental and theoretical estimation of clay compositions from shales collected in New York and Pennsylvania. She used x-ray diffraction, atomic absorption spectroscopy, and electron dispersion spectroscopy to determine sample mineralogy and chemistry. Graduate courses in clastic and carbonate petrology, low-temperature geochemistry, and igneous and metamorphic petrology contributed to Ms. Walsh's broad geological education received at Earlham College.

In April 1985, Ms. Walsh presented her thesis at the North-Central Regional Meeting of the Geological Society of America. She is a member of the Bowling Green State University Chapter of Sigma Gamma Epsilon and was selected as a finalist in the 1985 Sigma Gamma Epsilon graduate research speech competition.

AFFILIATIONS

National Water Well Association
Buffalo Association of Professional Geologists

ATTACHMENT 1

UNDERGRADUATE AND GRADUATE CHEMISTRY COURSE WORK

Course Title	Semester Hours
Chemistry I (undergraduate)	3.33
Chemistry II (undergraduate)	3.33
Covalent Bonds (undergraduate)	3.33
Introduction to Geochemistry (graduate)	3
Geochemistry of Sediments (graduate)	3
Mineralogy (undergraduate)	3.33
Advanced Igneous and Metamorphic Petrology (graduate)	5
Total	24.32

Appendix B

6928 Williams Road
Niagara Falls
New York 14304-3093

716-297-8771
FAX 716-297-8772

Woodward-Clyde Consultants

HEALTH AND SAFETY PLAN

PROJECT NUMBER: 90C2139

PROJECT NAME: Niagara Transformer Corporation
Remedial Investigation
Niagara Falls, New York

PROJECT MANAGER: Kelly R. McIntosh

1.0 INTRODUCTION

This Safety Plan establishes guidelines and requirements for worker safety during implementation of the Niagara Transformer Corporation Remedial Investigation (RI). Employees of Woodward-Clyde Consultants (WCC) and its subcontractors are required to read the Plan and sign the Compliance Agreement attached to the Plan.

1.1 SITE DESCRIPTION

The Niagara Transformer Corporation builds and reconditions transformers at its facility at 1747 Dale Road in Cheektowaga, New York. Past spillage of PCB-containing transformer oil has apparently resulted in soil contamination in a shallow drainage ditch along the southeast and south perimeter of the site.

1.2 WORK DESCRIPTION

The field investigation covered by this Safety Plan is designed to determine the extent of PCB contamination in soil and groundwater at the Site. The field work will include the following:

1. Surficial soil and sediment sampling
2. Soil borings and split-spoon sampling
3. Monitoring well installation

4. Non-intrusive geophysical survey

The numbers and locations of samples, borings and monitoring wells is detailed in the Remedial Investigation Work Plan for the project.

2.0 HAZARD ASSESSMENT

The potential chemical hazards are primarily due to potential direct contact of anticipated contaminated sediments or water during their collection and handling. Initial sampling and analytical efforts conducted by Niagara Transformer and the New York State Department of Environmental Conservation (NYSDEC) have detected PCB concentrations of less than 10 ppm to approximately 3200 ppm in the sediment. One sample of an emulsified oil/water mixture contained approximately 5% PCB compounds. Elevated levels of PCBs are expected to be the primary hazard at the Site.

PCBs (Polychlorinated biphenyls) are a group of compounds varying in chlorine content. PCB exposure can occur via direct skin contact, ingestion, or inhalation of vapors or fumes. Their primary hazard is skin absorption; the threshold limit value (TLV) recommended by the American Conference of Governmental Industrial Hygienists (0.5 mg/m^3)includes a skin notation. They cause skin and eye irritation and are suspect human carcinogens. PCBs are sometimes associated with a mild hydrocarbon odor, however, this is due to a frequent co-contaminant (petroleum products). They are not volatile and therefore cannot be detected with an organic vapor analyzer.

3.0 GENERAL HEALTH AND SAFETY REQUIREMENTS

3.1 MEDICAL SURVEILLANCE

Before commencing field work, all WCC personnel must take a WCC-approved medical examination as part of WCC's medical surveillance program. This requirement is waived for individuals who have taken the examination during the past 12 months. Subcontractor personnel must participate in a similar medical program.

3.2 HEALTH AND SAFETY TRAINING

All WCC personnel involved in field work receive training in chemical hazards, safe operating procedures, and the use of protective clothing and equipment. They are required to participate in a WCC sponsored or approved 40-hour Health and Safety Training Course (or annual refresher course) in compliance with OSHA regulation 1910.120 prior to site work. Subcontractor field personnel must participate in a Health and Safety Course that meets requirements of 1910.134. All said training must be documented.

3.3 COMPLIANCE AGREEMENT

The Project Manager (PM) and/or Operating Unit Health and Safety Officer (HSO) shall hold a meeting with all field personnel before work commences. During the meeting, all personnel shall be provided with a copy of the Safety Plan. The plan shall be reviewed and discussed and questions answered. Signed Compliance Agreement Forms shall be collected by the PM and filed. Individuals refusing to sign the form will not be allowed to work on the site. A copy of this form is included as an attachment to this document.

3.4 SAFETY EQUIPMENT

The personnel protective equipment specified in this plan will be provided to all WCC field personnel. Subcontractors must provide equivalent equipment to their field personnel.

3.5 PROJECT MANAGER NOTIFICATION

All field personnel must inform the PM or his/her designated representative (e.g., Site Safety Officer - SSO) before entering work areas. At least two members of the field crew must be in visual contact with each other on-site whenever work is to be performed.

3.6 DOCUMENTATION

A daily log will be maintained to record the following information:

- o Date and time of WCC and subcontractor personnel entries and exits.
- o Accidents, injuries, and illness.
- o Incidents of safety infractions by field personnel.
- o Personal protective equipment worn.
- o Weather conditions.

Safety completion reports are to be prepared by the PM and/or SSO upon completion of the activities. This report shall address, at a minimum, the following:

- o Degree of compliance by WCC employees.
- o Incident occurrence(s), if any.
- o Corrective action response to incident(s).
- o Proposed modifications to future Health and Safety Plans to improve safe working conditions at the site.

Personnel responsible for implementing the Health and Safety Plan are the PM and the SSO. Their specific responsibilities and authority are described in WCC's Hazardous Waste Management Practice Health and Safety Manual, June 1987.

3.7 PROHIBITIONS

Smoking, eating, drinking, and open fires shall not be permitted on the work site. Good personnel hygiene should be practices by field personnel to avoid ingestion of contaminants or spread of contaminated materials.

3.8 OSHA INFORMATION POSTER

In compliance with the Occupational Safety and Health Act of 1970, the OSHA Employee Information Poster is attached to this Health and Safety Plan. A copy of this poster (11 x 17 inch) must be posted in the work area.

4.0 PERSONAL PROTECTIVE EQUIPMENT

Potential hazards posted by contaminants may be minimized by protecting against exposures to toxic materials by utilizing appropriate personal protective equipment (PPE).

Personal protective equipment required for this phase of the Niagara Transformer Project are as described below. This equipment must be worn by the sampling personnel when inside the exclusion zone. The exclusion zone is the ditch itself which has already been marked. The required PPE will be:

- Hard hat
- Side shielded safety glasses
- Heavy duty outer nitrite gloves
- Inner latex gloves
- Disposable chemical-resistant boot coverings
- Chemically-resistant steel toe boots
- Saranex coveralls (non-hooded) taped at the boots and gloves

In addition, dust respirators will be on-hand if dusty conditions are encountered. The SSO will make this determination in the field.

A safety station containing at least one First Aid Kit and eye wash station (or emergency eye wash package) shall be available at all times in the contaminant reduction zone. WCC field personnel will be briefed on the location of the nearest telephones prior to commencement of field work.

5.0 WORK ZONES

The work area will be delineated into three distinct zones; exclusion (contaminated) zone, contamination reduction zone, and the support (non-contaminated) zone.

- o Exclusion Zone

  This area is considered contaminated, and prescribed levels of protection must be worn by all entering personnel.

- o Contamination Reduction Zone

  This zone will be designated areas adjacent to the exclusion zone. All decontamination will be performed within this zone. All personnel exiting this zone toward the non-contaminated zone will be required to remove all contaminated protective equipment and all equipment suspected of being contaminated.

- o Support Zone

  The support zone consists of all areas outside of the Contamination Reduction Zone. This zone is considered non-contaminated, and normal street clothes are appropriate within these areas.

6.0 DECONTAMINATION

For surficial soil and sediment sampling protective clothing (including boots and gloves) will be removed each time personnel exit the exclusion zone which may include several sample locations. Used personal protective equipment will place in plastic bags and disposed of at the end of each day. Disposal sampling tools will be discarded after each sample is taken. This will be a dry decontamination procedure, however, all field personnel are required to wash hands and face prior to leaving the site. If the exclusion zone contains more than one sample location, outer gloves will be changed or decontaminated between samples.

During the proposed drilling operations, additional equipment and personnel decontamination will be required. A personal decontamination zone and a small equipment decontamination zone will be established prior to commencement of work. No contaminated equipment will be carried off-site. Used personal protective equipment will be placed in plastic bags and disposed of at the end of each day. No disposable item will be reused. Ultimate disposal of these materials are the responsibility of the Niagara Transformer. All non-disposable items will be thoroughly washed with Alconox and water and a hexane rinse. Used water will be containerized and stored on-site prior to treatment at the IRM treatment facility. Equipment decontamination will be performed at a level of protection equal to or greater than that used during sediment sampling.

The specific steps for personal decontamination are as follows:

- o Deposit equipment (tools, sampling devices, clipboards, etc.) that need to be decontaminated on plastic drop cloths.
- o Discard outer latex boots.
- o Wash steel-toe boots and gloves with long handled brushes (in a tub or other available water holding device) using an Alconox solution and water.
- o Rinse boots and gloves in another tub or container using plain water or a sprayer.
- o Decontaminate small pieces of equipment using Alconox and water followed by a hexane rinse and a water rinse.
- o Discard outer gloves and Saranex coveralls.
- o Remove inner gloves and place in disposal drum or container.
- o Wash hands and face.

A decontamination zone for larger pieces of equipment will be set up as necessary. As with the personal decontamination zone, all liquids generated during cleanup will be containerized and stored on-site prior to treatment at the IRM treatment plant. Large equipment decontamination will be performed in a level of personal protection equal to that used during sampling.

Equipment decontamination will proceed as described below:

- o Alconox and potable water wash.
- o Potable water rinse.
- o Hexane rinse.
- o Final potable water rinse.

For reusable equipment used directly for sampling, the water rinses will utilize distilled water.

7.0 AIR QUALITY

The potential airborne hazard for this phase of the project would be dust generation. If dusty conditions are encountered, the SSO will require the use of dust respirators.

After the scope-of-work for the Remedial Investigation is finalized, the need for air quality monitoring will be evaluated by the Business Unit Health and Safety Officer. An addendum to this plan will be issued if needed.

8.0 PERSONNEL ASSIGNMENTS

8.1 PROJECT PERSONNEL

Project Manager	Kelly R. McIntosh
Site Safety Officer	Paul Mazierski
Plymouth Meeting Health and Safety Officer	David M. Carl
Corporate Health and Safety Administrator	Philip L. Jones

9.0 EMERGENCIES

In the event of a major accident or life-threatening situation, the WCC SSO shall contact emergency response crews immediately. Personnel not required to assist must move to a safe area. The SSO must notify the Plymouth Meeting Health and Safety Officer (David M. Carl), and Corporate Health and Safety Administrator (Phillip Jones).

Illnesses and minor injuries occurring on-site must be reported to the PM and client and attended to immediately. Any accident, illness, or minor injury requires completion of a WCC Incident/Accident Report Form which must be forwarded to the HSO within the first 24 hours. A copy of this form is included as an attachment of this document.

All personnel will become knowledgeable of the location of the emergency eye wash station and nearest emergency telephone. Emergency telephone numbers are:

Police - 911
Ambulance - 911
Fire Department - 911

The nearest hospital to the project site is:

St. Joseph Hospital
2605 Harlem Road
Cheektowaga, New York
(716) 891-2450 (Emergencies)

The shortest route to the hospital is shown on Figure 1.

10.0 SAFETY PLAN APPROVALS

_______________________________ _______________

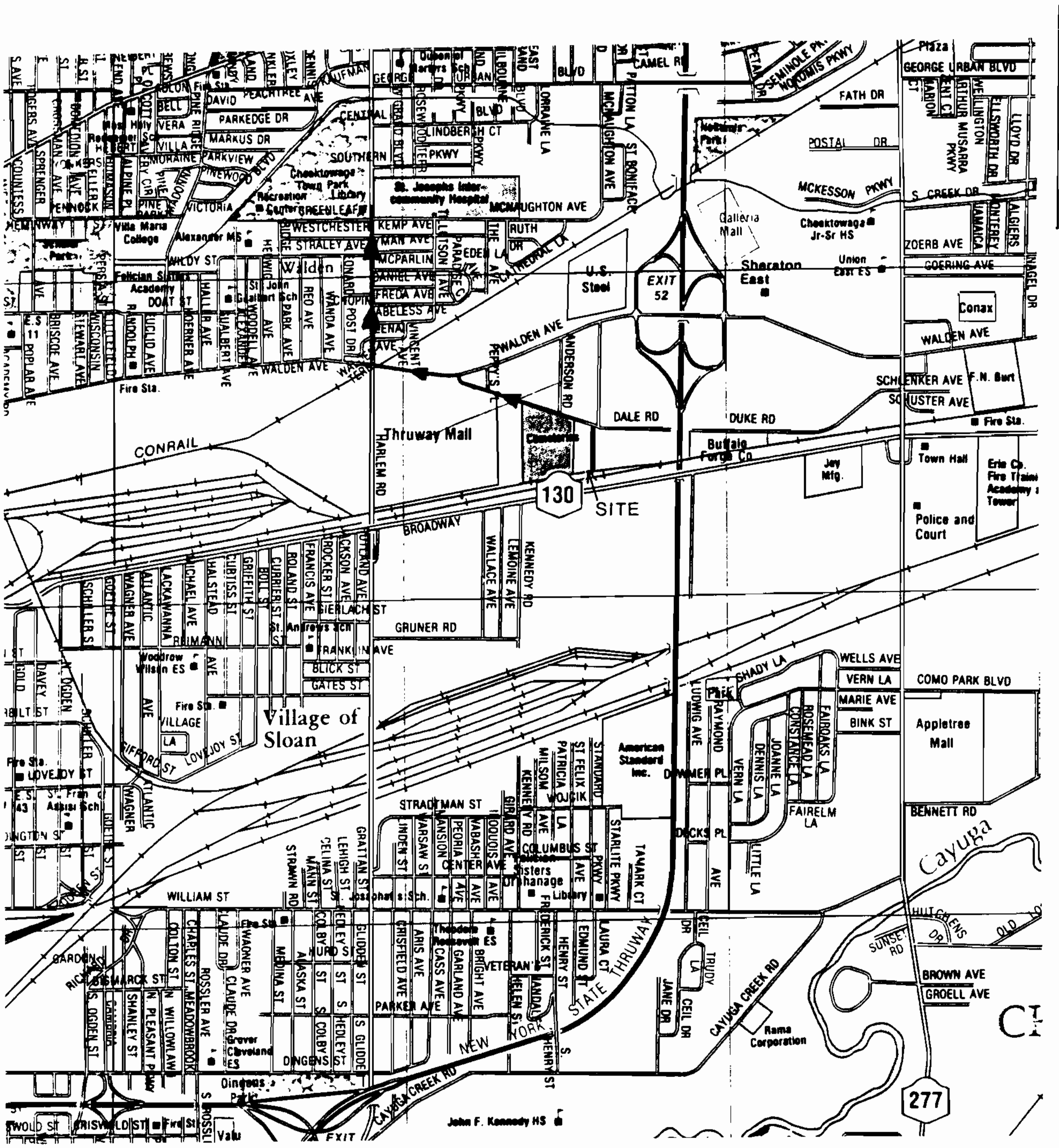
Phillip L. Jones — Date
Corporate Health and Safety Administrator

_______________________________ _______________

David M. Carl — Date
Plymouth Meeting Health and Safety Officer

_______________________________ _______________

Kelly R. McIntosh — Date
Project Manager



NIAGARA TRANSFORMER
CHEEKTOWAGA, NEW YORK

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

EMERGENCY ROUTE
TO HOSPITAL

Job No.: 90C2139	Drawing No.	Date:
Checked by:	Rev No.:	Figure 1
Scale:		