FINAL REPORT

VOLUME I

■ ■ ■ ■ ■ ■

FEASIBILITY STUDY NIAGARA TRANSFORMER CORPORATION DALE ROAD FACILITY BUFFALO, NEW YORK

Prepared for:
Niagara Transformer Corporation
1747 Dale Road
Buffalo, New York 14225
September 20, 1993

Woodward-Clyde

Woodward-Clyde Consultants
3571 Niagara Falls Boulevard
North Tonawanda, New York 14120
Project Number 90C2139-1

00-17-1 (5/76)
Formerly GA-4

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

TRANSMITTAL SLIP

TO M D.Pietro DHWR Albany Room 222

FROM D Locey DHWR Region 9

DATE 9.24.93

RE: Attached is the revised, two volume, FS report for the Niagara Transformer site. If you have any comments, please call me before Oct 4

FOR ACTION AS INDICATED:

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Woodward-Clyde Consultants

September 20, 1993
90C2139-1

Mr. Fred Darby
Niagara Transformer Corporation
1747 Dale Road
Buffalo, New York 14225

Re: Feasibility Study
Niagara Transformer Corporation
Dale Road Facility
Order on Consent Index Number B9-0334-90-05

Dear Mr. Darby:

Woodward-Clyde Consultants (WCC) is pleased to submit this Feasibility Study Report for remediation of polychlorinated biphenyl (PCB) contamination associated with the Niagara Transformer Dale Road Facility. Volume II of this report is the Human Health Evaluation for the site. If you have any questions or comments on this submittal, please contact the undersigned.

Sincerely,

Kelly R M

Kelly R. McIntosh, P.E.
Associate

for James F. Roetzer, Ph.D.
Senior Associate

KRM/JFR:jee

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cc: R. Fishlock

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VOLUME II

1.0
INTRODUCTION

1.1 OBJECTIVES

An Order on Consent (Index Number B-9-0334-90-05) was entered into between the New York State Department of Environmental Conservation (NYSDEC) and the Niagara Transformer Corporation (NTC) which required NTC to conduct a Remedial Investigation/Feasibility Study (RI/FS) for its plant located on Dale Road in Cheektowaga, New York. NTC retained Woodward-Clyde Consultants (WCC) to conduct the RI/FS.

The Draft RI Report (WCC, October 1992) presents an assessment of the nature and extent of contamination and makes some preliminary recommendations concerning remediation requirements. The objectives of the current report, the Feasibility Study (FS) are to:

1. Identify remedial action objectives
2. Identify and screen remedial technologies
3. Develop remedial alternatives for detailed evaluation
4. Evaluate and compare remedial alternatives
5. Recommend the most feasible remedial alternative

The remainder of Section 1.0 presents the project background and a summary of the RI results. Section 2.0 discusses applicable or relevant and appropriate requirements (ARARs). Section 3.0 presents the remedial action objectives for the site. Alternative technologies are identified and screened in Section 4.0. Based on the technology review and screening, remedial alternatives are developed in Section 5.0. Section 6.0 presents the detailed evaluation of remedial alternatives. The recommended remedial alternative as presented in Section 7.0. Limitations of the study are identified in Section 8.0 and references are listed in Section 9.0.

1.2 BACKGROUND

1.2.1 Site History and Local Land-Use

The Niagara Transformer Corporation (NTC) began manufacturing transformers at the site in 1959. Their business has consisted primarily of manufacturing new transformers (both dry and liquid-filled). On occasion, NTC will repair or recondition transformers for customers. PCB containing oils (Askarels), used as dielectric fluid in some of the liquid-filled transformers, were used on-site from approximately 1958 to the mid 1970s. Small quantities of PCB-containing oils continued to be stored at the facility until 1980. At this time remaining PCB oils were incinerated at an off-site facility. Currently, NTC uses either mineral oil, silicone, or RTemp™ in manufacturing liquid-filled transformers. None of these fluids contain PCBs. There are no records of industrial use of the property prior to NTC's ownership.

The NTC Dale Road facility is a 3.6 acre site located in an industrial community in Cheektowaga, New York. The site is bounded on the north by Dale Road, on the west by a large cemetery, on the south by a Conrail rail yard, and on the east by a 5-acre undeveloped property owned by NTC.

The closest downgradient residential community to the site is located about 1,000 feet to the southwest. The neighborhood of residences on Wallace Avenue, Lemoine Avenue and Kennedy Road, is bounded by Broadway to the north and Gruner Road to the south. There are approximately 130 residences in this neighborhood, and the residential area is completely surrounded by industrial and commercial properties. No other residences were found in the downgradient direction within the Study Area.

1.2.2 Site Setting

The Site Location Plan is shown on Figure 1-1. Site structures and drainage are shown on Figure 1-2. Site drainage is to a ditch bordering NTC property to the south which carries flow east to west (east-west ditch) and discharges to a pipe which carries water south beneath a railroad yard owned and operated by Conrail. As shown on Figure 1-3, this pipe emerges to a drainage ditch where flow is southerly for approximately 700 feet, then westerly through an industrial area for about 3,000 feet. At Harlem Road (the west end of the industrial area, the ditch discharges to the Sloan Storm Sewer, which eventually discharges to the Buffalo River.

Based on the RI, it is believed that at some time flow in the east-west ditch continued westerly beyond the pipe under the railroad tracks. Whether this was a previous drainage pattern or a periodic high flow condition has not been determined. This western section of the east-west ditch discharges to the retention pond south of the Thruway Mall as shown on Figure 1-2. The sections of the east-west ditch on both sides of the pipe beneath the railroad are referred to in this report as the upper ditch. The continuation of the drainage ditch south of the pipe beneath the railroad tracks is referred to in this report as the lower ditch. Neither the upper or lower ditches traverse, or are congruent to, any residential property.

Site geology and groundwater flow are described in detail in the RI Report. Examination and description of split-spoon samples collected during the monitoring well installations and soil borings performed as part of the RI were used to generally characterize the site overburden stratigraphy, in descending order from ground surface, as follows: 1) 0-3.5 feet of fill material, 2) 30-35 feet of a silt/clay till, 3) 9 to 17 feet of a massive lacustrine clay, and 4) 2-3 feet of a sand/gravel regolith overlying bedrock.

Fill materials were observed in areas which had been modified by paving and grading activities on-site. Fill deposits varied from bituminous asphalt and associated subgrade materials, in paved areas of the site and cemetery (NTC-2S, 3S, 9S, 9D), to miscellaneous shotrock fill behind the tank farm (NTC-4S), to a mottled silty clay fill placed in front of the main plant building for on-site final grading (NTC-1D). See Figure 1-12 for monitoring well and boring locations.

The silt/clay till typically consists of a firm, brown/tan silty clay with a very small sand component, and occasionally with rounded to subrounded fine to medium gravel sized rock clasts. However, sections of the till with thin interbedded moist to saturated fine silt and sand layers, and thicker, dominantly fine to medium sand layers with occasional thin silty clay seams, were encountered.

1.2.3 Geology and Hydrogeology

The lacustrine clay generally consists of a mottled, soft to very soft but cohesive red/brown/tan clay. A gradational contact from the till to the lacustrine clay was observed throughout the deep soil boring program. The lacustrine clay occasionally contained small rounded rock clasts and had a limited sand component indicating the silt/clay till and the clay are genetically closely linked.

A thin but continuous sand/gravel regolith was observed above rock in all the deep soil borings. The regolith consisted of a hard, very compact, gray sand and gravel mixture. The rock clasts contained in the regolith were typically very angular as opposed to the clasts observed in the till.

Soils in the vicinity are designated as urban land -- indicating 80 percent 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 permeability of these soils is very low.

Groundwater flow in the overburden and upper bedrock is discussed in the RI Report. Two water-bearing units were investigated at the site -- a perched zone above the clay and till layers, and the upper few feet of bedrock underlying the clay.

There are no known users of overburden groundwater in the vicinity. Groundwater flow in the perched zone is from the north toward the south, across the site. The east-west ditch bordering the south side of the site intercepts some of this flow during wet periods (the ditch is often dry during dry periods). Groundwater flow in the upper bedrock is also from the north to south across the site.

1.2.4 Nature and Extent of Contamination

The RI and preliminary investigations included soil sampling, sediment sampling, surface water sampling, and groundwater monitoring well installation and sampling. The numbers of samples obtained for chemical analyses were as follows:

RI Task	Number of Locations Sampled
On-site surficial soils	25
Upper ditch sediment	27
Lower ditch sediment	10
Flood-prone areas	13
Retention pond samples	12
Subsurface soil (drilling)	115
Cemetery soil	32
Residential soils (composite samples)	14
Groundwater	20
Surface water(1)	6
Depth specific soil	7

(1) One location in the upper ditch, just downgradient of the NTC property, was sampled routinely during 1992.

The RI found that polychlorinated biphenyl compounds (PCBs) were the major contaminants of concern related to the site. For soil, sediment and surface water, PCBs are the major contaminants detected and will drive any remedial actions. In groundwater, dichlorobenzene and trichlorobenzene compounds were detected at a maximum concentration of 335 ug/L. Thus, chlorobenzene compounds will have to be considered in any groundwater remediation.

The extent of contamination was described in detail in the RI Report and is summarized as follows. PCB contamination was found in soil, ditch sediment, retention pond sediment, groundwater and surface water in the RI study area. Lower concentrations of PCBs in soil were also detected in the St. Adalberts Cemetery property within 10 feet of the NTC property boundary.

Surficial Soils: Figure 1-4 summarizes PCB concentrations in on-site surface soil. Figure 1-5 shows areas of the site shaded according to the range of surficial soil PCB concentrations. Concentrations greater than 500 ppm were detected in the northern portion of the area behind the main building. Surficial soil PCB concentrations decreased rapidly to the south and east of this area.

Flood-Prone Soils: PCB concentrations in flood-prone soils along the fenceline of the cemetery bordering the east-west ditch ranged from 1.0 to 160 ppm (Figure 1.6). These levels appear to be a result of past ditch dredging and piling of excavated materials along the banks rather than flooding. PCB concentrations in flood-prone soils (Figure 1-7) adjacent the lower ditch were only slightly elevated (2.78 ppm to 11.8 ppm).

Ditch Sediment: Figures 1-8 and 1-9 show the PCB concentrations in surficial sediment in the upper and lower ditches, respectively. Levels greater than 100 ppm occur in the ditch between the site and the pipe passing beneath the railroad tracks and in two samples in the upper portion of the lower ditch (below the outfall of the aforementioned pipe). Other PCB results for the lower ditch were less than 33 ppm and most samples contained less than 10 ppm. Sediments within the pipe appear to be coarse, which is consistent with the higher velocities which would occur within the pipe. Based on flow conditions, substantial deposition of sediment eroded from the upper ditch is unlikely to occur within the pipe. However, due to the location of the pipe, it was assumed that it will require cleaning as part of any site remediation program.

In the highly contaminated section of the ditches in the immediate vicinity of the site, PCB contamination was generally present throughout the top foot of sediment. More distant from the site, PCB contamination was limited primarily to the upper 6-inches of sediment.

Retention Pond: Figure 1-10 presents the results of PCB analyses of sediment samples collected from the retention pond located west of the site. Total PCB concentrations ranged from 1.1 to 31 ppm in surficial sediment. In subsurface sediment samples (deeper than 4 inches) all total PCB concentrations were approximately 1 ppm or less except for one: a sample from 5 to 10 inches depth taken from the east end of the pond (concentration of 3.4 ppm).

Residential Soils: The results of the residential soil sampling are shown on Figure 1-11.

Fourteen composite samples were collected from fourteen residences. PCBs were not detected in 11 of the residential soil samples. The concentration was high enough to quantify in only one of three samples where detection occurred. The concentration of the single quantified positive result was 0.38 ppm, below EPA recommended action levels for residential soils and probably representative of typical concentrations expected near industrial areas.

Aqueous Groundwater Contamination: Sixteen groundwater monitoring wells were sampled for PCB and total petroleum hydrocarbon (TPH) analyses. Monitoring well locations are shown on Figure 1-12. Results of groundwater TPH analyses are presented on Figure 1-13. Results of groundwater PCB analyses are presented on Figure 1-14. PCBs were not detected in the cemetery wells (NTC-9S, NTC-9D and NTC-10S) or in the upgradient well (NTC-1D). Where detected, PCB concentrations were reported exclusively as PCB-1260. PCB-1260 concentrations were in the 1 to 10 ug/l range in samples from NTC-3S, NTC-4S, NTC-5S, NTC-6S, NTC-7S and NTC-8S. In the samples from NTC-2S (15,400 ug/l) and NTC-11S (22,000 ug/l), the PCB-1260 concentrations were far in excess of the solubility limit (2.7 ug/l). This is probably due to entrainment of non-aqueous phase liquid (NAPL) in the samples. PCBs were not detected in the three downgradient wells (NTC-12S, NTC-13S, and NTC-14S) located south of the property.

PCBs were detected in only one bedrock monitoring well (6.7 ug/l in monitoring well NTC-8D). The PCB detection in NTC-8D was not expected since PCBs were not detected in any previous bedrock groundwater samples. During sampling of NTC-8D, the water was visibly turbid, suggesting that the well still contained some soil brought down during the drilling and well installation. The well was resampled in September 1992, and the sample was filtered in the field. PCBs were not detected in this sample at detection limits of 0.05 ug/L. The results of this resampling verify that significant levels of dissolved PCBs have not migrated to the upper bedrock zone. Chlorobenzene compounds were not detected in NTC-8D.

TPH concentrations in groundwater ranged from approximately 1 to 25 mg/l. The highest levels were present in wells NTC-2S, NTC-5S and NTC-6S.

The groundwater sampled from NTC-7S was analyzed for the Target Compound List (TCL). The following five chemicals were measured above detection limits:

Chemical	**Concentration**
1,4-dichlorobenzene	230 ug/l
1,2,4-trichlorobenzene	335 ug/l
1,3-dichlorobenzene	17 ug/l
1,2-dichlorobenzene	182 ug/l
bis(2-ethylhexyl)phthalate	11.9 ug/l
PCB-1260	4.6 ug/l

Chlorinated benzene compounds are commonly present in Askarel.

Non-Aqueous Phase Liquid (NAPL) Contamination: NAPL was not observed as a discrete fluid phase in any of the soil samples obtained during the project. NAPL was observed in water at the following locations: NTC-2S; NTC-11S; in the seepage to the ditch at the southwest corner of the site; and in two test pits excavated on-site adjacent to this seepage.

At NTC-2S, a sheen was observed on the surface of water samples obtained from the top of the water column. This suggests that a NAPL with a lighter density than water (LNAPL) may be present in groundwater at this location. The LNAPL was observed only as a surface film and did not have an appreciable thickness. This LNAPL is probably residual mineral oil which was applied or spilled at the site.

During purging of NTC-2S, the peristaltic pump intake was placed at the bottom of the well. Approximately 0.25 liters of a denser than water NAPL (DNAPL) was evacuated from the well. The DNAPL probably consists primarily of Askarel, which contains a high percentage of PCBs. Similar conditions were observed during purging of NTC-11S.

NAPL was observed during the RI at seeps into the ditch near the southwest corner of the site. As in wells NTC-2S and NTC-11S, both LNAPL and DNAPL were observed. LNAPL in seepage was observed at two locations spaced a few feet apart. A sample of seepage water containing some LNAPL was analyzed for PCBs and total petroleum hydrocarbons (TPH) and was found to contain 230 mg/l PCB-1260, well above the aqueous solubility limit. The total TPH concentration in the sample was 7,200 mg/l.

Containment structures were built and maintained around the seeps as part of the Interim Remedial Measures program (IRM). Each containment structure consists of two steel barriers driven into the banks and bottom of the ditch. The inner barrier and the gap between the barriers is packed with oil absorbent material, which is regularly inspected and changed as necessary.

DNAPL was found to accumulate in the bottom of the ditch. The first observation of this material was in March 1991. The DNAPL appeared to have a very high surface tension, tending to form beads on the sediment. After the first observation, NTC undertook a program of regular DNAPL removal from the ditch. When found, it was present between the groundwater seep area and the nearest siphon dam downstream.

A sample of the DNAPL was collected for PCB analysis. Analytical results showed it contained 140,000 mg/kg (14 percent) PCB-1260.

In July 1991, the ditch dried up, apparently due to a lowering of the perched water table. From July through September, 1991 the ditch remained dry except for direct precipitation runoff. During this period, NAPL was not observed in the ditch.

The Draft RI concluded that NAPL was unlikely to have migrated from the probable source areas to the seepage points (a distance of more than 250 feet) through the low-permeability soils encountered and characterized during the subsurface investigation. This suggested that a preferential pathway existed between the source and the seepage points. The Draft RI recommended that test pits be excavated adjacent to the seeps and within the rail bedding traversing the site to investigate preferential migration of NAPL. Three test pits and two soil borings were advanced.

The two soil borings and one of the test pits were located in the railroad bedding. No evidence of NAPL presence or migration was found at these locations. The other two test pits were excavated on-site, adjacent to the seep areas. A subsurface tile drain was found in each of the test pits. These drains run from north to south and have caused the preferential migration of NAPL to the seep areas. Adjacent to the eastern seep, the tile drain is approximately 2 feet below ground surface. Adjacent to the west seep, the tile drain is approximately 3 feet below ground surface. As an Interim Remedial Measure (IRM), oil/water separation boxes were installed around the tile drains to prevent further seepage to the ditch.

Based on the lack of NAPL in monitoring wells NTC-7S and NTC-4S, it is likely that the NAPL presence is limited to the immediate vicinity of the drain pipes, between the source area and seepage points. Based on the lack of NAPL and very low PCB concentrations in NTC-12S, NTC-13S, and NTC-14S, off-site NAPL appears to be limited to the immediate vicinity of well NTC-11S.

2.0

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

This section identifies the applicable or relevant and appropriate requirements (ARARs) and guidance documents to be considered (TBCs) that may affect site remediation.

2.1 DEFINITION OF ARARs

A requirement may be "applicable" or "relevant and appropriate" but not both. USEPA defines "applicable requirements" as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA site."

If a regulation is not "applicable" it may still be "relevant and appropriate". "Relevant and appropriate requirements" are those standards, requirements, criteria or limitations promulgated under federal or state environmental or facility siting laws that "while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site."

2.2 TYPES OF ARARs

The ARARs are divided into three major categories: chemical-specific requirements, location-specific requirements, and action-specific requirements.

- Chemical-specific ARARs are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.

- Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in a particular location.
- Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes.

2.3 CHEMICAL-SPECIFIC ARARs

Neither New York nor federal regulations have established a standard for PCBs in soils or sediment. Chemical-specific regulations potentially applicable or relevant and appropriate to protection of air, surface water and groundwater are summarized in Table 2-1. The New York State groundwater standards are applicable to groundwater remediation at the site.

2.4 LOCATION-SPECIFIC ARARs

No location-specific ARARs have been identified for the site. Potential location-specific ARARs that were considered, and an explanation of why they were not considered applicable or relevant and appropriate, are summarized in Tables 2-2 and 2-3 for federal and state laws, respectively.

2.5 ACTION-SPECIFIC ARARs

Potential federal and state action-specific ARARs are summarized in Tables 2-4 and 2-5, respectively.

Selected New York Hazardous Waste Regulations and TSCA PCB Disposal Regulations that are identified as important potential ARARs for remedial alternatives are discussed below.

2.5.1 New York Hazardous Waste Regulations 6 NYCRR 370-376

The most important action-specific New York State ARARs are the following New York hazardous waste facility standards (6 NYCRR 373) and the New York land disposal restrictions (6 NYCRR 376). New York regulates wastes containing ≥ 50 ppm PCBs as hazardous wastes, although these wastes are not hazardous under RCRA regulations.

2.5.1.1 Incinerator Requirements

6 NYCRR Section 373-1.9 and 373-2.15 establish requirements for incinerators that treat hazardous waste. The substantive requirements of these regulations may be applicable for remedial alternatives that involve the use of an incinerator to treat soils with PCB concentrations ≥ 50 ppm. Section 373-1.9 presents the trial burn plan requirements for hazardous waste incinerators. Section 373-2.15 describes the operating and management requirements that may be applicable, or relevant and appropriate, to a mobile on-site incinerator used during site remediation.

2.5.1.2 Land Burial

6 NYCRR 373-2.14 provides regulations concerning land burial of hazardous wastes. It is New York State's position that on-site movement and consolidation of soils containing ≥ 50 ppm PCBs constitutes placement subject to Part 373 regulations and disposal under TSCA Subpart D regulations. Requirements of 6 NYCRR 373-2.14 thus may be applicable to remedial alternatives that involve placement or consolidation of materials containing PCBs ≥ 50 ppm. These requirements include:

- a liner (or double liner) and leachate collection system
- run-on/run-off control
- control of wind dispersal of particulates
- final cover
- monitoring and inspection requirements
- closure and post-closure requirements

Additional provisions for ignitable, reactive and incompatible wastes do not apply to the site.

2.5.1.3 Land Disposal Restrictions

New York State regulations governing the land disposal of hazardous wastes are found at 6 NYCRR Part 376. These regulations prohibit the land disposal of liquid hazardous wastes containing PCBs at concentrations greater than or equal to 50 ppm, or hazardous waste containing halogenated organic compounds, including PCBs, in concentration $\geq$1000 ppm, that are identified as hazardous by a property that does not involve halogenated organic compounds, unless the treatment standard is met or a variance is obtained (6 NYCRR 376.3(b)(1)). EPA has retained primary authority for any land disposal restriction rule variances or case-by-case extensions.

All other PCB wastes may be disposed of in accordance with the provisions of 40 CFR Part 761, except that oil and other liquids containing between 50 and 500 ppm PCBs, from any source other than a spill, may not be stabilized or mixed with any substance to conform with any provision of 40 CFR Part 761 regarding land disposal (6 NYCRR 376.4(f)). Treatment standards are also established for other hazardous wastes.

Substantive requirements of New York land disposal restrictions may be applicable to remedial alternatives that involve the placement of soil or sediments or backfilling of treatment residues at the site.

2.5.1.4 Thermal Treatment

Standards for thermal treatment units for hazardous waste are given in 6 NYCRR 373. These standards are potentially applicable to on-site thermal desorption of materials containing 50 ppm PCBs or more.

2.5.1.5 Closure and Post-Closure Care

The substantive requirements of Section 373-2.7 and Section 373-2.14(b) relating to closure and post-closure care may be relevant and appropriate to those remedial alternatives that leave in place any soil with PCB concentrations at or above 50 ppm. Those potentially relevant and appropriate requirements are:

- run-on/run-off control
- control of wind dispersal of particulates
- final cover
- monitoring
- maintenance

2.5.2 New York Solid Waste Regulations 6 NYCRR 360

6 NYCRR Part 360 regulates the land disposal of solid waste. Soils or sediments containing PCBs below 50 ppm may be subject to solid waste regulations if disposed. The substantive requirements of these regulations may be applicable to the backfilling of treated soil on the site unless a waiver is obtained from NYSDEC in the Record of Decision for the site on the grounds that this treated soil will present no risk to human health and the environment. The Part 360 regulations may be relevant and appropriate to alternatives involving on-site consolidation and containment of soils or sediments containing PCBs.

2.5.3 Toxic Substances Control Act (TSCA)

TSCA regulations apply to storage, disposal, marking and manifesting of materials containing PCBs at concentrations of 50 ppm or greater, and to materials with less than 50 ppm if that concentration was the result of dilution. Dilution is not considered if it occurred prior to the PCBs becoming regulated. TSCA regulations do not apply to PCBs in place. The USEPA has provided guidance that this cutoff applies to materials "as found" at Superfund sites, rather than potential source materials (USEPA, 1990). For disposal of non-liquid materials containing PCBs ≥ 50 ppm, TSCA regulations allow incineration, alternate equivalent treatment, or disposal in a chemical waste landfill.

The requirements for storage, disposal, marking, and manifesting of PCB materials and wastes presented in 40 CFR 761 Subpart C, D and K may be applicable to remedial alternatives proposed for the site.

Subpart C specifies the marking and labeling of PCB wastes. Subpart K addresses disposal record keeping, including manifests. Subpart D (storage and disposal) contains the primary regulations of importance with respect to site remediation, since it regulates treatment, storage and disposal of PCB containing materials. The TSCA Subpart D regulations identified as ARARs for the site are discussed below.

2.5.3.1 TSCA Incinerator Requirements

If liquids containing PCBs ≥ 50 ppm are incinerated, requirements of 40 CFR 761.70 (a), (c), and (d) apply. These requirements could apply to incineration of liquid PCB wastes generated as a by-product of remediation.

If contaminated soils or other non-liquid materials are incinerated, the incinerator requirements specified in 40 CFR 761.70 (b), (c) and (d) may apply.

2.5.3.2 TSCA Alternative Treatment Requirements

Under 40 CFR 761.60 (e), a person may treat PCBs by a method other than incineration if the treatment achieves a level of performance equivalent to incineration. For non-liquid PCB materials, treatment is considered equivalent to incineration if it achieves a PCB concentration of 2 ppm or less in the treatment residual. The requirements of this regulation may be applicable to the alternative treatment methods evaluated in this study. A TSCA permit may be required for the on-site alternative treatment methods (e.g., soil washing, solvent extraction, or thermal extraction) under consideration as remedial alternatives. Additional time would likely be required to implement on-site treatment methods if a TSCA permit or waiver is required.

If an alternative disposal method is to be used, pursuant to 40 CFR 761.60(e) the process must be approved by EPA. Research and development for such a process also requires an approval from EPA pursuant to 40 CFR 761.60(e) and (i).

2.5.3.3 TSCA Chemical Waste Landfill Requirements

The TSCA chemical waste landfill requirements specified in 40 CFR 761.75 are potentially applicable to off-site disposal of PCB waste. The TSCA chemical waste landfill requirements specified in 40 CFR 761.75 are applicable to off-site disposal of any PCB waste allowed to be landfilled. If consolidation is considered TSCA disposal, it would be subject to TSCA chemical waste landfill requirements unless a TSCA waiver is granted.

2.5.3.4 TSCA Storage Requirements

TSCA regulates the storage of PCB wastes (40 CFR 761.65). The regulations specify requirements for PCB containers and storage areas. Substantive requirements may be applicable to the storage of PCB soils at or above 50 ppm that are excavated and stored prior to treatment or off-site disposal. Under these regulations, some PCB materials, including non-liquid PCB soil and debris in containers, can be temporarily stored for up to 30 days, without meeting the requirements for permanent PCB storage areas. Storage of PCB contaminated soil longer than 30 days must be in an area which provides adequate containment and protection from precipitation.

2.6 TO-BE-CONSIDERED MATERIALS

To-be-considered (TBC) materials are non-promulgated advisories or guidance issued by Federal or State agencies. They are not legally binding, and do not have the status of potential ARARs, but were considered in selecting and implementing remedial alternatives for the site. Key guidance considered as TBCs for the site are guidance documents concerning the cleanup of PCB-contaminated sites under Superfund and the TSCA PCB Spill Policy.

Table 2-6 presents additional TBC guidance which may be appropriate to consider in specific situations for the site.

2.6.1 USEPA PCB Guidance

USEPA's "Guidance on Remedial Actions for Superfund Sites with PCB Contamination" (USEPA, 1990) provides a framework for evaluating remedial alternatives for the site. This document provides guidance with respect to the following items:

- Identification of "principal threats"
- Containment of waste that poses a low long-term threat, or where treatment is impractical
- Use of institutional controls to mitigate short term impacts and to supplement engineering controls
- Development of remedies that combine treatment of principal threats and containment and institutional controls for treatment residuals and untreated wastes
- Consideration of innovative technologies

Principal threats are generally defined as soils containing >100 ppm PCBs in residential areas, and >500 ppm PCBs in industrial/remote areas. Containment is generally considered an appropriate remedy for contaminated soils which are not principal threats. Treatment, where practical, is considered the preferred alternative for soils considered principal threats.

The guidance document defines industrial/remote sites as those which are more than 0.1 km from residential/commercial areas, or where access is limited by natural or man-made barriers, such as cliffs or fences.

The guidance document provides the result of a generic risk assessment for PCB sites that assumes an analytical starting point of 1 ppm for sites with unrestricted future use, and 10-25 ppm for industrial/remote sites, but states that 10-25 ppm also would be protective for unrestricted sites.

The guidance provides conceptual designs of potential containment systems appropriate for contaminated soils of various PCB concentrations. The potential containment systems incorporate a cap design and long-term management controls. For soils containing PCBs below 500 ppm, recommended long-term management (containment) systems include a cover system, restricted access (e.g., fences), a deed notice, and groundwater and surface water monitoring where appropriate.

2.6.2 TSCA Spill Policy

The TSCA Spill Policy applies to recent spills, i.e., those occurring after the effective date of regulation (May 4, 1987). The Spill Policy defines "high concentration PCBs" as materials which contain 500 ppm PCB or greater. "Low concentration PCBs" are defined as those materials which contain less than 500 ppm PCBs. For non-restricted access areas, the Spill Policy requires cleanup of soil to 10 ppm PCBs with a 10-inch clean soil cover. For industrial areas, cleanup of soils to 25 ppm is required by the Spill Policy.

3.0
REMEDIAL ACTION OBJECTIVES

The remedial action objectives (RAO) for this site are the protection of human health and the environment and satisfaction of the requirements of applicable law.

3.1 SOILS AND SEDIMENT

There are no chemical-specific ARARs for PCB contamination in soils or sediment. Therefore, the remedial action objective for soil and sediment contamination is protection of human health and the environment. This can be accomplished by:

1. Prevention of direct contact with contaminated soils and sediment.

2. Reduction/elimination of transport of contamination from the site to off-site surface water, groundwater, soil, and sediment.

The baseline risk assessment for the site (Volume 2 of this report) was performed in accordance with USEPA guidance under CERCLA and considered risks under average or typical conditions, as well as conservative Reasonable Maximum Exposure (RME) assumptions. The results of the risk assessment indicate that risks associated with average or typical exposures for the site and surrounding impacted areas are within the risk range of 10^{-6} to 10^{-4} cancer risk. Potential cancer risks were at or below $1x10^{-4}$ for the NTC site and below $1x10^{-5}$ for all off-site areas for average exposures. No unacceptable non-carcinogenic hazards were identified for either average or RME assumptions.

USEPA guidance (OSWER directive 9355.0-30) indicates that remediation is generally not warranted when the cancer risk is below 10^{-4} under RME assumptions. Estimated cancer risks using RME assumptions for the retention pond were well below this criterion, suggesting that remediation of the pond sediments is not warranted. For all other areas considered, the RME cancer risks exceeded 10^{-4} indicating that remediation may be warranted. These areas include:

- Site surface soils
- Site subsurface soils
- Cemetery soils
- Upper ditch area soils and sediments
- Lower ditch area soils and sediments

Potential remedial action levels were also evaluated. On-site remedial action levels in the range of 10 to 25 ppm PCBs, and off-site action levels in the range of 1 to 10 ppm were determined to be associated with residual risks well within, or below, the acceptable risk range, and thus are considered protective of human health.

The NYSDEC has established that the off-site soil/sediment remedial action objective be 1 ppm PCBs and the on-site soil/sediment remedial action objective (RAO) be 10 ppm PCBs. Therefore, the analysis of alternatives will evaluate remedial alternatives using two sets of remedial action objectives:

	Risk Assessment Based on Remedial Action Objectives	**NYSDEC Remedial Action Objectives**
On-Site Soil/Sediment	25 ppm	10 ppm
Off-Site Soil/Sediment	10 ppm	1 ppm

3.2 GROUNDWATER

For groundwater, the ARAR is 0.1 ug/L for class GA groundwater (potential drinking water supply). As described in the RI Report the shallow perched water at the NTC site cannot be considered a potential drinking water source. The uppermost water-bearing zone potentially capable of yielding sufficient water for public or private use is the upper bedrock zone. To maximize the possibility of attaining this standard in the upper bedrock, the remedial action objective for all on-site groundwater is 0.1 ug/L. Such a condition could be met through:

1. Groundwater treatment
2. Dewatering
3. Excavation of contaminated soil in the perched zone

3.3 SURFACE WATER

For surface water, the NYS surface water quality standard for PCBs is 0.01 ug/L for protection of human health, and 0.001 ug/L for protection of aquatic life. There are no regulated surface water bodies in the study area. However, the NYSDEC has required that the remedial action objective for water within the ditches and retention pond will be the NYS Class D surface water quality standard (6NYCRR Part 703.5) of 0.001 ug/l PCBs. This objective could potentially be attained by preventing or minimizing the contact of surface runoff and drainage flow with soil or groundwater contamination associated with the site, and by reducing off-site sediment PCB concentrations.

4.0
IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

A streamlined, or "focused" process was used for evaluating remedial alternatives consistent with EPA guidance (USEPA, 1990). The first step in the process of evaluating remedial alternatives was the identification and screening of available technologies which may be applicable to site remediation.

Three general categories of remedial alternatives (removal, treatment, and containment) applicable to PCB-contaminated soils were evaluated. The technologies considered were those reported as applicable to PCB contaminated soils in the "Guidance on Remedial Actions for Superfund Sites with PCB Contamination" (USEPA, 1990). The technologies that were considered and the results of the screening process are summarized in the following sections.

4.1 SOIL/SEDIMENT REMEDIATION

4.1.1 Screening Criteria

Technologies were initially screened for their suitability on the basis of effectiveness and implementability, considering site-specific conditions, in order to select a reasonable number of alternatives for detailed evaluation.

Effectiveness considers the extent to which a technology:

- Reduces the toxicity, mobility, or volume of contamination through treatment, or otherwise
- Minimizes residual risks and provides long term protection
- Complies with Applicable or Relevant and Appropriate Requirements (ARARs) (see Section 2)

- Minimizes short-term impacts

- Provides protection quickly

Technologies which were not initially considered effective were eliminated from further consideration.

Implementability considers the technical feasibility and availability of technologies, as well as the administrative feasibility of implementation at a given site. Technologies which were technically or administratively infeasible were eliminated from further consideration.

4.1.2 Removal Technologies

Removal of PCB-contaminated soils can be achieved by excavating the contaminated soils and disposing of them in an off-site facility. Materials containing less than 50 ppm of PCBs will be considered non-hazardous waste according to New York State Hazardous Waste Regulations and can be disposed of in an appropriately licensed landfill. In accordance with New York State Hazardous Waste Regulations and TSCA Regulations, materials containing PCBs at or above 50 ppm, if excavated and removed from the site, are subject to regulation as both hazardous waste and TSCA waste. This material can be incinerated, treated by an alternate method that can achieve a level of performance equivalent to incineration, or disposed of in an appropriately licensed landfill. Based on the established remedial action objectives and the RI soil sampling, soils with PCB concentrations above and below 50 ppm could be subject to removal.

Excavation and off-site disposal of soils in a landfill is a demonstrated technology, which would be effective in remediating contaminated soil. This technology would minimize residual risks and afford long-term protection by removing PCBs from contaminated areas, would comply with ARARs, and could be accomplished quickly. Some short-term impacts, including disturbance of the site, and possible fugitive dust emissions would occur during implementation. This technology is available, and could be readily implemented at the site. This technology was retained for further analysis.

4.1.3 Containment Technologies

Containment of impacted soils can be achieved by capping contaminated materials in place or by consolidation and capping. Containment is a demonstrated technology, which would be effective in remediating soil contamination on the site. This technology would minimize residual risks and afford long-term protection by eliminating or minimizing PCB mobility and exposure, would comply with ARARs, and could be accomplished quickly. Some short-term impacts, including disturbance of the site and possible fugitive dust emissions would occur during implementation. This technology is available, and could be readily implemented at the site. Long-term maintenance of a cap or containment system would be required.

Capping in place can be accomplished by various media caps. Because portions of the site contain PCBs in excess of 50 ppm, a composite cap consisting of a 12-inch soil base layer, an impermeable synthetic geomembrane and a 24-inch soil top layer was evaluated. Capping was retained for detailed analysis.

Because of the perched groundwater zone present at the site, a subsurface barrier would be useful for preventing off-site groundwater flow and for minimizing groundwater withdrawal and treatment which may be required. Subsurface barriers can be effective in minimizing leaching of contaminants from soil by containing or redirecting groundwater flow. Subsurface barriers can be used to isolate contaminated areas and vastly reduce contaminant migration.

For sites with contaminated soil, slurry walls are the most commonly used subsurface barriers because they are a proven and easily constructed means to minimize groundwater flow in the unconsolidated zone. When the soil is saturated, slurry walls are generally used in conjunction with groundwater withdrawal and treatment. Slurry walls are generally constructed in vertical trenches. Slurry walls that extend into a low permeability zone such as clay layer are referred to as keyed. At the NTC site, slurry walls would be keyed into the clay layer present from approximately 0 to 14 feet below ground surface. There are three types of slurry wall configurations that are generally considered for remediation of contaminated soils: upgradient barriers, downgradient barriers, and circumferential barriers. Upgradient slurry walls are used to divert uncontaminated groundwater around the contaminated area. Downgradient slurry walls are used to prevent off-site migration. However, in saturated zones, neither configuration is entirely effective without some groundwater withdrawal. The circumferential slurry wall is much more effective and requires less groundwater withdrawal. Although the circumferential wall would be more expensive to construct, the minimization of groundwater withdrawal makes this configuration the preferred barrier configuration at the site.

Slurry walls can be constructed of soil-bentonite (SB), cement-bentonite (CB) or reinforced concrete sections (referred to as diaphragms). SB walls generally have the lowest permeability and are compatible with a wide range of contaminants. CB and diaphragm walls are generally more expensive, and more permeable than SB type walls. Since the site topography and geology is suitable for installation of the SB slurry wall, this subsurface barrier will be retained for evaluation of alternatives employing the containment technology.

4.1.4 Treatment Technologies

4.1.4.1 Incineration

Excavation followed by incineration is a demonstrated treatment technology for PCB contaminated soils. Incineration is considered an effective technology, capable of achieving a 99.9999 percent reduction of PCB concentrations in soil. Incineration would minimize residual risk and afford long-term protection by destroying PCBs and would comply with ARARs. Due to the limited availability of off-site incinerators, this technology may not be implemented quickly for large volumes of soil. This technology is implementable for low volumes of soil. Short-term impacts, including disturbance of the site, and possible fugitive dust emissions would occur during implementation. Currently, due to limited capacity, waiting periods for commercial off-site incinerators can be quite long -- on the order of several years.

On-site incineration is a demonstrated reliable technology for treatment of PCB-containing materials. Due to the high costs of mobilization, this technology is only appropriate for large volumes of soil (typically on the order of 10,000 cubic yards or greater). Extensive testing, permitting, and mobilization/construction at the site would be required prior to implementation.

On-site incineration requires extensive areas for staging soils and process equipment, and results in extensive disturbance of the site. Considering land use in the site vicinity (residential areas, cemetery), and difficulties in obtaining appropriate permits and community acceptance, it is unlikely that on-site incineration can be implemented at the site. This technology was not retained for further evaluation.

4.1.4.2 On-Site Thermal Treatment

On-site thermal treatment is a demonstrated technology for PCB-contaminated soils. On-site thermal treatment includes high-temperature methods which completely destroy PCBs and low-temperature methods which remove PCBs from soils and concentrate PCBs in an oil phase for subsequent treatment or disposal. Most available thermal treatment technologies require excavation of soils for subsequent treatment in an above-ground reactor.

Thermal treatment technologies are considered effective, since they would minimize residual risks and afford long-term protection by removing or destroying PCBs from soil, and would comply with ARARs. Short-term effects include disturbance of the site, potential fugitive dust emissions, and air emissions during implementation. These technologies are considered implementable, although permitting requirements and mobilization/construction may delay implementation.

On-site thermal treatment technologies were retained for further evaluation. However, a major limitation of thermal desorption is that the treated soil loses its structure and load-bearing capability. Since this greatly restricts its use, the treated material may have to be disposed of in a sanitary landfill or stabilized prior to use as backfill. Another disadvantage of on-site thermal treatment is that only a few operational units exist. Waiting periods for obtaining an on-site thermal treatment unit could be several years.

4.1.4.3 Biodegradation

Although biodegradation of PCBs is still in the developmental stage, pilot studies performed to date have shown that enhanced natural degradation of PCBs can reduce the concentrations of PCBs in soil and sediments. Enhanced natural degradation was retained as a potential remedial technology for low level contamination off the NTC property.

4.1.4.4 Dechlorination

Chemical dechlorination of PCBs utilizing dehalogenation methods, such as Potassium Polyethylene Glycolate (KPEG) and Alkali Metal Polyethylene Glycolate (APEG) are technologies being developed for treatment of soils containing PCBs. Field studies have been performed utilizing these technologies with the EPA in Guam and Soiltech in Wide Beach, NY. These methods use nucleophilic substitution with an alkali metal hydroxide polyethylene glycol solvent to dehalogenate the PCB-containing soil. Although field studies have been promising, this technology has not been fully demonstrated.

At Wide Beach, APEG was used in conjunction with low temperature thermal treatment. Based upon conversations with Soiltech Inc., the contractor implementing the remediation at Wide Beach, low temperature thermal treatment without APEG can achieve cleanup to a level of 2 ppm or less of PCBs in soil. APEG was incorporated into the treatment system primarily to comply with the ROD for Wide Beach. The APEG process did not significantly enhance the low temperature thermal treatment used at that site to meet remedial objectives.

Chemical dechlorination alone may not be effective in meeting remedial objectives at this site. EPA guidance (USEPA, 1990) states that dechlorination methods can reduce PCB concentrations in soil, but may not be able to reach site-specific action levels. In addition, the residual of the dechlorination agent may be left in the soils. Thus it is uncertain whether this technology can reduce PCB concentrations sufficiently to comply with ARARs. Implementation of this technology would require additional research and development including possible treatability studies.

Short-term impacts during implementation would include disturbance of the site, possible fugitive dust emissions, air emissions, and waste residues from the treatment process.

This technology was not retained for further consideration because it is not demonstrated, may not be effective and may not meet ARARs.

4.1.4.5 Solvent Extraction

Solvent extraction is under development by several remediation firms as a potential method for treating PCB-containing soils. This technology uses a closed loop process to strip PCBs from soil with a solvent (triethylamine or TEA) and concentrate them into an oil phase. Previous studies by Resource Conservation Corporation (RCC) have shown that this technology can treat PCBs in soil with single pass PCB removal efficiencies ranging from 85 to 99 percent. Repeated applications may be required to reduce the concentration of PCBs in the soil below the required action levels.

This technology would be implementable; however, implementation would be delayed by additional development (likely including treatability studies), permitting, mobilization, and installation of waste control systems. Short-term impacts during implementation of this technology would include disturbance of the site, possible fugitive dust emissions, possible air emissions, wastewater discharges, and process waste residues. The potential impact of TEA residues in soil after implementation have not been evaluated. Because of the additional development required for implementation of the technology, it was dropped from further consideration.

4.1.4.6 Vitrification

Vitrification has been suggested as a method to treat soil containing up to 10,000 ppm PCBs. Vitrification uses electrical current to destroy organics and immobilize inorganics in-situ. Vitrification is designed to remediate subsurface contamination (up to 10-15 ft in depth). At this time, vitrification has not been used on sufficient PCB contaminated sites to be demonstrated as a feasible alternative for remediation of the NTC site. It is therefore dropped from further consideration.

4.1.4.7 Stabilization/Solidification

Stabilization/solidification is a treatment process that involves the mixing of PCB-contaminated soil with specific ratios of water, binder material and other additives to modify the chemical and physical properties in such a manner to cause the contaminants to remain physically bonded to or encapsulated within the solid matrix. Stabilization/solidification can be performed in-situ, or on excavated material which is subsequently backfilled. The stabilization/solidification technology was retained for use in the development of remedial alternatives, both for stabilization prior to off-site land disposal and for on-site treatment. Application of specific stabilization/solidification technology would require bench-scale testing prior to detailed remedial design.

4.1.4.8 Soil Washing

Aqueous soil washing can be conducted on-site using commercially available surfactants in a water solution. The surfactant is sprayed on the impacted soil as it moves across a horizontal belt. The number of soil wash passes required is dependent on the initial PCB concentration in the soil and the final PCB concentration desired. Research and development work on this technology has shown that fine soils require more wash cycles than coarse soils. The practical lower limit for treatment of soils containing PCBs is approximately 10 ppm, based upon preliminary research conducted to date.

This technology would be effective by reducing the PCB soil concentrations. Short-term impacts, including disturbance of the site, and possible fugitive dust emissions would occur during implementation. It is not likely that all ARARs could be met by this technology. This technology has not been commercialized and demonstrated on a full scale basis to date. It therefore was not considered appropriate for the NTC site and was not retained for further consideration.

4.2 GROUNDWATER REMEDIATION

The most demonstrated, reliable, and effective method for treatment of PCB-containing groundwater is carbon absorption using granular activated carbon preceded by solids removal as necessary. This technology was retained for alternatives requiring groundwater treatment.

4.3 SUMMARY

The technologies retained for further evaluations described above will be considered (in combination as appropriate) in the following section to develop a list of alternatives for site remediation. These technologies are:

- Containment of PCB-containing soils with a composite cap and circumferential slurry wall
- Excavation of soils and sediment and off-site land disposal in a TSCA landfill
- Excavation and off-site incineration of PCB soils and sediment
- Excavation and on-site thermal extraction of PCB soils and sediment
- Stabilization/solidification of PCB-containing soils and sediment
- Bioremediation of PCB-containing sediments
- Carbon absorption (groundwater)

5.0
DEVELOPMENT OF REMEDIAL ALTERNATIVES

5.1 APPROACH

In this section, the potentially feasible technologies evaluated and retained in Section 4.0 are incorporated into remedial alternatives which will be evaluated in detail in the final Feasibility Study. The technologies selected in Section 4.0 as being potentially appropriate for remediation of some or all portions of the study area were as follows:

- Containment of PCB containing soils with a composite cap and circumferential slurry wall
- Excavation of soils and sediment and off-site land disposal in a TSCA landfill
- Excavation and off-site incineration of PCB soils and sediment
- Excavation and on-site thermal extraction of PCB soils and sediment
- Stabilization/solidification of PCB-containing soils and sediment
- Bioremediation of PCB-containing sediment
- Carbon absorption (groundwater)

The no-action alternative is not considered for the site because it is not protective of human health or the environment.

The alternatives developed utilize the selected technologies which are most appropriate based on:

1. Location of the area to be remediated
2. Media impacted
3. PCB concentration

The location of the area to be remediated is important in terms of accessibility and availability of land for implementation of remedial technologies, as well as for community acceptance. The media impacted and PCB concentrations determine the applicability, implementability, and cost-effectiveness of potential remedial technologies. For use in developing alternatives, the study area was divided into seven areas.

Area 1	NTC property
Area 2	Upper ditch and adjacent flood-prone areas
Area 3	Retention pond
Area 4	Lower ditch, east of Kennedy Road, and adjacent flood-prone areas
Area 5	Lower ditch, west of Kennedy Road, and adjacent flood-prone areas
Area 6	Storm water pipe beneath railroad between upper and lower ditch
Area 7	Eastern portion of the St. Adalbert's Cemetery, bordering NTC property

The upper and lower ditch areas include the flood-prone soils adjacent to them. In developing the remedial alternatives, each potentially feasible technology was evaluated with respect to locations within the study area where it could be successfully applied as well as those areas where the technology is inappropriate for use in remediation. Appropriate applications of each retained technology are described below.

5.2 EVALUATION OF RETAINED TECHNOLOGIES

5.2.1 Composite Cap and Slurry Wall

Use of this containment technology in conjunction with dewatering and groundwater treatment will provide a barrier to migration of the contamination and prevent exposure. However, routine maintenance and control of access to the remediated area would be required. It therefore is considered an effective and appropriate technology for use on-site, on property owned and controlled by NTC.

5.2.2 Excavation and Land Disposal

Excavation and off-site land disposal in appropriately permitted landfill is a viable remedial action for PCB-containing soils and sediment. It could be applied throughout the study area. However, soil containing residual NAPL may have to be stabilized or treated prior to landfilling.

5.2.3 Excavation and Off-Site Incineration

Excavation and off-site incineration could be successfully applied to all soils targeted for remediation. However, the very high cost and limited availability of this alternative essentially rules out its use for soils containing less than 50 ppm PCBs. Furthermore, it is not a cost-effective alternative for soils containing 50 to 500 ppm PCBs. However, for the development of alternatives it is considered potentially applicable to all soils with PCB concentrations greater than 50 ppm. As noted in Section 4.0, due to limited capacity, waiting periods for off-site incineration could be several years.

5.2.4 Excavation and On-Site Thermal Extraction

This technology could be feasible for treatment of all PCB-containing soils and sediments in the study area.

5.2.5 Stabilization/Solidification

Stabilization/solidification is feasible for treatment of all PCB-containing soils and sediments in the study area. It is appropriate for use in pretreatment of wet or NAPL-containing materials prior to off-site land disposal. It is also appropriate for use in treatment of soil and sediment prior to use as backfill on NTC property. This treatment could be performed in-situ or on excavated material.

5.2.6 Bioremediation

Enhanced natural degradation could reduce PCB concentrations in surficial soil or sediment. Because this is a slow process, with PCB half-lives expected to be in the range of several years, this method is not appropriate for soil with PCB concentrations over 50 ppm because ARARs could not be met in a reasonable period of time. Furthermore, this technology is not appropriate for use in areas easily accessible to the public where direct contact could commonly occur. The areas suitable for treatment with enhanced natural degradation are the retention pond, where elevated PCB levels were found to be limited to the upper 5 inches of sediment and concentrations ranged from approximately 1 ppm to 31 ppm, and portions of the lower ditch with concentrations less than 10 ppm. Bioremediation was retained for consideration for remediation of these areas.

5.3 REMEDIAL ALTERNATIVES FOR DETAILED ANALYSIS

Based on the technology assessment presented above, the remedial alternatives presented in this section were developed. These alternatives rely on combinations of technologies assembled to address the variety of locations, media, and PCB concentrations observed at the site.

Each combination of technologies is applied to three remedial alternatives which are different only in the remedial action objectives for soil and sediment. Alternatives designated with an "a" suffix are based on the remedial action objectives developed to reduce risks to acceptable levels based upon risks identified in the risk assessment (Volume II):

	Remedial Action Objective
On-site soils/sediment	25 ppm PCBs
Off-site soils/sediment	10 ppm PCBs

Alternatives designated with a "b" suffix are based on the NYSDEC preliminary remedial action objectives for soils and sediment:

	Remedial Action Objective
On-site soils/sediment	10 ppm
Off-site soils/sediment	1 ppm

Alternatives designated with a "c" suffix are based on the NYSDEC preliminary remedial action objectives for on-site and off-site soils and sediment except within the retention pond, where the risk-based levels would apply:

	Remedial Action Objectives
On-site soils/sediment	10 ppm
Off-site soils/sediment, except retention pond	1 ppm
Retention pond sediment	10 ppm

5.3.1 Alternatives 1a, 1b, and 1c: Excavation, Incineration and Land Disposal

Alternatives 1a, 1b, and 1c include excavation of soil and sediment above remedial action objectives for incineration or land disposal. Alternative 1a would entail excavating on-site soil and sediment above 25 ppm PCBs and off-site soil and sediment above 10 ppm PCBs. For Alternative 1b, on-site soils above 10 ppm PCBs and off-site soils above 1 ppm PCBs would be excavated. Alternative 1c is identical to Alternative 1b except that the action level in the retention pond would be 10 ppm PCBs.

Soil and sediment with PCB concentrations above 50 ppm would be incinerated, and soil and sediment with PCB concentrations below 50 ppm would be disposed of in an off-site landfill. In summary, Alternatives 1a, 1b, and 1c include the following:

Remedial Area	**Remediation Method**
Area 1 (NTC property)	Excavation, incineration and land disposal
Area 2 (Upper ditch)	Excavation, incineration and land disposal
Area 3 (Retention pond)	Excavation and land disposal
Area 4 (Lower ditch-east)	Excavation, incineration and land disposal
Area 5 (Lower ditch-west)	Excavation and land disposal
Area 6 (Pipe beneath railroad)	Cleaning and incineration or land disposal of solids
Area 7 (Cemetery-east)	Excavation, incineration, and land disposal

It is anticipated that in Areas 1, 2, 4, 6, and 7 soil with concentrations above and below 50 ppm would be removed. Only sediments below 50 ppm are expected in areas 3 and 5.

For Alternatives 1a, 1b, and 1c, surface water and groundwater remedial action objectives are expected to be attained through excavation of contaminated soil and sediment and dewatering during excavations. This should effectively remove the primary sources of water-borne contamination. A substantial volume of water is expected to be generated during the on-site excavations due to the expected depth. Operation of a temporary treatment facility will be necessary for this alternative. Table 5-1 lists the operations included in these alternatives.

5.3.2 Alternatives 2a, 2b, and 2c: Excavation and Land Disposal

Alternatives 2a, 2b, and 2c include excavation of soil and sediment above remedial action objectives for land disposal. For Alternative 2a, on-site soil and sediment above 25 ppm PCBs and off-site soil and sediment above 10 ppm PCBs would be excavated. For Alternative 2b, on-site soil and sediment above 10 ppm PCBs and off-site soil and sediment above 1 ppm PCBs would be excavated. Alternative 2c is identical to Alternative 2b except the retention pond action level would be 10 ppm PCBs.

The soil/sediment would be transported for off-site land disposal in an appropriately permitted landfill. NAPL-contaminated soil would require some stabilization or treatment prior to disposal. In summary, Alternatives 2a, 2b, and 2c include the following:

Remedial Area	Remediation Method
Area 1 (NTC property)	Excavation, land disposal
Area 2 (Upper ditch)	Excavation, land disposal
Area 3 (Retention pond)	Excavation, land disposal
Area 4 (Lower ditch-east)	Excavation, land disposal
Area 5 (Lower ditch-west)	Excavation, land disposal
Area 6 (Pipe beneath railroad)	Cleaning, land disposal
Area 7 (Cemetery-east)	Excavation, land disposal

Alternatives 2a, 2b, and 2c are expected to attain surface water and groundwater remedial action objectives through excavation and off-site disposal of contaminated soil and sediment and dewatering during excavations. This should effectively remove the primary sources of waterborne contamination. A substantial volume of water is expected to be generated during the on-site excavations due to the expected depth. Operation of a temporary treatment facility will be necessary for this alternative. Table 5-2 lists the operations included in these alternatives.

5.3.3 Alternatives 3a, 3b, and 3c: Excavation and On-Site Thermal Desorption

Alternatives 3a, 3b, and 3c are similar to Alternatives 2a, 2b, and 2c except that rather than off-site land disposal, thermal desorption would be used to treat soils and sediment. Soil and sediment action levels for Alternative 3a would be 25 ppm PCBs on-site and 10 ppm PCBs off-site. For Alternative 3b these levels would be 10 ppm (on-site) and 1 ppm (off-site). Alternative 3c is identical to Alternative 3b except that the action level for the retention pond would be 10 ppm. In summary, Alternatives 3a, 3b, and 3c include the following:

Remedial Area	Remediation Method
Area 1 (NTC property)	Excavation, thermal desorption
Area 2 (Upper ditch)	Excavation, thermal desorption
Area 3 (Retention pond)	Excavation, thermal desorption
Area 4 (Lower ditch-east)	Excavation, thermal desorption
Area 5 (Lower ditch-west)	Excavation, thermal desorption
Area 6 (Pipe beneath railroad)	Cleaning and thermal desorption
Area 7 (Cemetery-east)	Excavation, thermal desorption

Alternatives 3a, 3b, and 3c are expected to attain surface water and groundwater remedial action objectives through excavation and treatment of contaminated soil and sediment and dewatering during excavations. This should effectively remove the primary sources of waterborne contamination. A substantial volume of water is expected to be generated during the on-site excavations due to the expected depth. Operation of a temporary treatment facility will be necessary for this alternative. Table 5-3 lists the operations included in these alternatives.

5.3.4 Alternatives 4a and 4b: Excavation, Land Disposal and Bioremediation

Some recent studies (Harkness, et. al., 1993) provide indications that PCBs slowly biodegrade in sediments. Alternatives 4a and 4b would employ this natural degradation to reduce sediment concentrations in the retention pond. This reduction is expected to occur slowly over a period of years, and long-term monitoring of PCB concentrations will be required. Under Alternative 4a, off-site soil and sediment above 10 ppm PCBs would be excavated and land disposed, except from the retention pond. On-site soil and sediment above 25 ppm would be excavated and land disposed. NAPL-contaminated soil would require some stabilization or treatment prior to disposal. Alternative 4b is identical to Alternative 4a except that soil and sediment action levels would be 10 ppm PCBs on-site and 1 ppm off-site.

Alternatives 4a and 4b are summarized as follows:

Remedial Area	**Remediation Method**
Area 1 (NTC property)	Excavation, land disposal
Area 2 (Upper ditch)	Excavation, land disposal
Area 3 (Retention pond)	Bioremediation
Area 4 (Lower ditch-east)	Excavation, land disposal
Area 5 (Lower ditch-west)	Excavation, land disposal
Area 6 (Pipe beneath railroad)	Cleaning, land disposal
Area 7 (Cemetery-east)	Excavation, land disposal

Alternatives 4a and 4b are expected to attain surface water and groundwater remedial action objectives through excavation and off-site disposal of contaminated soil and sediment and dewatering during excavations. This should effectively remove the primary sources of waterborne contamination. A substantial volume of water is expected to be generated during the on-site excavations due to the expected depth. Operation of a temporary treatment facility will be necessary for this alternative. Table 5-4 lists the operations included in these alternatives.

5.3.5 Alternatives 5a and 5b: On-Site Containment, Excavation and Land Disposal of Off-Site Sediment and Soil, and Bioremediation of Retention Pond Sediment

Alternatives 5a and 5b would incorporate a site cap, slurry wall and groundwater recovery system to prevent contaminant migration from the site. The slurry wall would be keyed into the underlying clay layer, and capped with a composite cap which covers the entire area surrounded by the slurry wall. Thus, the contaminated soil would be contained by the composite cap on top, by the slurry wall on the sides and by the natural clay base underlying the site below. In addition, a groundwater recovery system, consisting of a trench drain and on-site treatment plant will be installed to collect any leachate from the contaminated soil, maintaining dewatered conditions in the containment area. This system is expected to provide performance similar to that of a regulated hazardous waste landfill.

For Alternative 5a, off-site soils and sediment contaminated with greater than 10 ppm

PCBs would be excavated except for the retention pond. In the retention pond, natural degradation would be expected to reduce concentrations to the remedial action objective over time.

Alternative 5a would entail the following:

- Excavation, off-site stabilization (or treatment) and disposal of NAPL-contaminated soil.
- Installation of a composite cap and circumferential slurry wall encompassing the area bounded by the south side of the main building, the west property line, the south property line and the eastern edge of the north-south ditch (the north-south ditch would lie within the containment area). Storm drainage formerly carried by the north-south ditch would be piped or redirected.
- Long-term groundwater withdrawal within the slurry wall and treatment using carbon absorption (as needed to maintain an inward hydraulic gradient).
- Excavation and land disposal of upper and lower ditch soil/sediment with PCB concentrations greater than 10 ppm. Excavated soil or sediments with PCB concentrations below 50 ppm would be used on-site as fill below the composite cap.
- Bioremediation of retention pond sediments.

In summary, Alternative 5a would consist of the following:

Remedial Area	Remediation Method
Area 1 (NTC property)	Excavation of NAPL-containing soil, composite cap, slurry wall, groundwater treatment
Area 2 (Upper ditch)	Excavation, land disposal
Area 3 (Retention pond)	Bioremediation
Area 4 (Lower ditch-east)	Excavation, land disposal (>50 ppm), on-site fill (10 to 50 ppm).
Area 5 (Lower ditch-west)	Excavation, land disposal (>50 ppm), on-site fill (10 to 50 ppm).
Area 6 (Pipe beneath railroad)	Cleaning, land disposal
Area 7 (Cemetery-east)	Excavation, land disposal (>50 ppm), on-site fill (10 to 50 ppm).

Alternative 5b would be identical to Alternative 5a except that the action level in the upper and lower ditches would be 1 ppm. Table 5-5 lists the operations included in these alternatives.

5.3.6 Alternatives 6a, 6b, and 6c: On-Site Containment, Excavation and Land Disposal of Off-Site Sediment and Soils

Alternatives 6a, 6b. and 6c would utilize the same site cap, slurry wall, and groundwater recovery system as Alternatives 5a and 5b. As described in Section 5.3.5, the slurry wall keyed into the clay base and composite cap, in conjunction with the groundwater recovery system, will provide a degree of containment similar to that of a regulated hazardous waste landfill.

For Alternative 6a, off-site soils and sediments above 10 ppm would be excavated and disposed of in an off-site landfill (>50 ppm), or used as fill beneath the cap on-site (10 to 50) ppm. For Alternative 6b, the off-site soil and sediment clean-up level would be the NYSDEC preliminary remedial action objective of 1 ppm. Alternative 6c is identical to Alternative 6b except that the risk based action level of 10 ppm is used for the retention pond. In summary, Alternatives 6a, 6b, and 6c include the following:

Remedial Area	Remediation Method
Area 1 (NTC property)	Excavation of NAPL-containing soil, composite cap, slurry wall, groundwater treatment
Area 2 (Upper ditch)	Excavation, land disposal
Area 3 (Retention pond)	Excavation, land disposal
Area 4 (Lower ditch-east)	Excavation, land disposal (>50 ppm), on-site fill (5 to 50 ppm)
Area 5 (Lower ditch-west)	Excavation, land disposal (>50 ppm), on-site fill (5 to 50 ppm)
Area 6 (Pipe beneath railroad)	Cleaning, land disposal
Area 7 (Cemetery-east)	Excavation, land disposal (>50 ppm), on-site fill (10 to 50 ppm).

Table 5-6 lists the operations included in these alternatives.

5.3.7 Alternatives 7a, 7b, and 7c: Stabilization/Solidification

Alternatives 7a, 7b, and 7c use stabilization/solidification to treat PCB-containing soils and sediments. NAPL-containing soils would be disposed off-site following stabilization. All other soil and sediment treated would be consolidated on-site and covered with clean soil. For Alternative 7a, soils on NTC property above 25 ppm would be treated using stabilization/solidification. Off-site soils and sediments above 10 ppm PCB content would be excavated, transported to the NTC property, treated using stabilization/solidification and subsequently used as on-site fill. The site would then be covered using an asphalt or a composite cap. Alternative 7b utilizes the same actions, with action levels of 10 ppm PCBs on-site and 1 ppm off-site. Alternative 7c utilizes the same actions, with action levels of 10 ppm PCBs on-site and in the retention pond, and 1 ppm in off-site ditches. Table 5-7 lists the operations included in these alternatives.

5.4 SUMMARY

In this section, potentially feasible remedial alternatives were developed for detailed analysis. Table 5-8 summarizes all alternatives. These alternatives are based on demonstrated technologies. Therefore, no treatability studies were necessary for this Feasibility Study. Bench-scale treatability testing may be required for the detailed design of the remedial program.

6.0
DETAILED EVALUATION OF REMEDIAL ALTERNATIVES

The technologies retained for detailed evaluation were combined into 19 remedial alternatives tailored to site-specific requirements. This section presents the detailed evaluation of these remedial alternatives.

The seven primary evaluation criteria used to assess each remedial alternative are:

- Compliance with ARARs
- Protection of human health and environment
- Short-term effectiveness
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Implementability
- Cost

These evaluation criteria are described in greater detail in subsection 6.1, which also describes the two remaining criteria to be considered prior to remedy selection, community and state acceptance.

Each remedial alternative is presented separately in subsection 6.3. Within the presentation of each alternative there is a description of key processes and components, a review of ARARs for that alternative, and a detailed analysis based on the seven primary evaluation criteria listed above.

6.1 CRITERIA FOR EVALUATING REMEDIAL ALTERNATIVES

6.1.1 Compliance With ARARs

Each remedial alternative was evaluated to determine whether it complies with applicable or relevant and appropriate federal and state environmental laws (ARARs), or provides grounds to invoke a waiver.

6.1.2 Protection of Human Health and the Environment

Each remedial alternative was evaluated to determine whether it can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks posed by hazardous substances present at the site by eliminating, reducing, or controlling exposures above the action level.

6.1.3 Short-Term Effectiveness

Each remedial alternative was evaluated considering the following:

- Potential short-term risks to the community during remedial activities
- Potential impacts on workers, and the effectiveness and reliability of protective measures
- Potential environmental impacts of the remedial activities, and the effectiveness and reliability of mitigative measures used during implementation
- Time until protection is achieved

6.1.4 Long-Term Effectiveness and Permanence

Each remedial alternative was evaluated for the long-term effectiveness and permanence it provides, along with the degree of certainty that the remedial alternative will prove successful. The following factors were addressed:

- Magnitude of residual risk from untreated soils or treatment residuals remaining on-site at the conclusion of remedial activities
- Adequacy and reliability of controls necessary to manage treatment residuals and untreated material

6.1.5 Reduction of Toxicity, Mobility, or Volume

Each remedial alternative was evaluated for its ability to permanently and significantly reduce toxicity, mobility, or volume, including an evaluation of how impacted materials are addressed. The following factors were considered:

- The remedial processes employed
- The amount of hazardous materials destroyed, treated, contained, or recycled
- The degree of expected reduction in toxicity, mobility, or volume
- The degree to which the remedial alternative is irreversible
- The characteristics of residuals that will remain following remediation
- The degree to which the remedial alternative reduces the inherent hazards at the site

6.1.6 Implementability

Each remedial alternative was evaluated for the ease or difficulty of implementation, considering the following factors:

- Technical feasibility, including technical difficulties and unknowns associated with construction and operation
- Reliability of the technology
- Ease in undertaking additional remedial activities
- Ability to monitor the effectiveness of the remedial alternative

- Administrative feasibility, including the ability and time required to obtain necessary approvals

- Availability of services and materials, including off-site treatment, storage and disposal services, equipment and specialists, additional resources, services, and materials which may be necessary to complete the remediation using a given technology

6.1.7 Cost

Each remedial alternative was evaluated to assess the following types of costs:

- Capital costs, including direct and indirect costs

- Annual operation and maintenance (O&M) costs

- Net present value of capital and O&M costs

6.1.8 Community Acceptance

A brief discussion of community issues associated with remedial alternatives for the site is presented in Section 7 of this report. The State, in association with NTC, will solicit public comment on the recommended remedy prior to implementation of any remedial alternative, as specified in the Consent Order.

6.1.9 State Acceptance

State agencies will be responsible for review of this FS and selection of the remedial alternative for the site. This process will ensure that the remedial program will address the State's concerns.

6.2 ESTIMATION OF SOIL VOLUMES

Soil and sediment volumes to be excavated were estimated for each alternative based on the sampling and analytical data collected for the RI. On-site, excavation volumes were estimated for action levels of 25 ppm and 10 ppm PCBs. In addition, an estimate of on-site (and adjacent) soils potentially containing NAPL was developed for use in the containment alternatives.

For the sediment and soil off of NTC property, volumes were estimated for action levels of 10 ppm and 1 ppm PCBs.

6.2.1 Soil Volumes: Area 1 (NTC Property)

Area 1 includes the NTC property south of the main building and the soil on Conrail property in the vicinity of the two seepage areas along the east-west ditch. Figure 6-1 shows where PCB concentrations in soil exceeded 25 ppm in Area 1. This area was divided into several zones, within which an average excavation depth was assumed based on sampling and analytical data. The zones, average excavation depths, depth-specific analytical data, and estimated soil volumes are shown on Figure 6-1. The total volume of soil in Area 1 exceeding a PCB content of 25 ppm is estimated to be 12,420 cubic yards.

Figure 6-2 illustrates the assumptions and volume calculations for soil in Area 1 exceeding a PCB content of 10 ppm. This volume is estimated to be 15,100 cubic yards.

The containment alternatives will require excavation of soil which contains non-aqueous phase liquid (NAPL). This volume is estimated to be 375 cubic yards based on the assumption that the NAPL is primarily located in and adjacent to the parallel underground drains and that the total volume would be equivalent to a 460 feet long by 3 feet wide by 3 feet deep volume multiplied by two. This yields an estimate of approximately 300 cubic yards. To this number, 75 cubic yards were added for potentially NAPL-contaminated soil on Conrail property near the two seeps and monitoring well NTC-11S. The total estimated value for NAPL-contaminated soil is 375 cubic yards. Table 6-1 summarizes the soil volume estimates.

6.2.2 Soil Volumes: Area 2 (Upper Ditch and Flood-Prone Soils)

The action levels considered for the off-site soils and sediments were 10 and 1 ppm PCB content. For the upper ditch itself (not including adjacent flood-prone soils), the soil volumes to be remediated were based on measurements of the ditch and analytical results for sediment samples. It was estimated that the total volume exceeding 10 ppm PCB content would be equivalent to a volume of 1,570 feet long by 10 feet wide by an average 1.5 feet deep plus a volume of 1,570 feet long by 4 feet wide by 0.5 feet deep. This estimate is 990 cubic yards. Adjacent flood-prone soils exceeding 10 ppm PCBs were estimated as illustrated in Figure 6-3 to be 700 cubic yards. Therefore, the total volume of material exceeding 10 ppm PCBs in the upper ditch and adjacent flood-prone areas is estimated to be 1,690 cubic yards.

The total volume within the upper ditch exceeding 1 ppm PCB content was estimated to be equivalent to a volume of 1,570 feet long by 10 feet wide by an average of 1.5 feet deep plus a volume of 1,570 feet long by 4 feet wide by 1.0 foot deep. This estimate is 1,100 cubic yards. The adjacent flood-prone soils exceeding 1 ppm content were estimated as illustrated in Figure 6-4 to be 1,045 cubic yards. Therefore, the total volume of material exceeding 1 ppm PCB content in the upper ditch and flood-prone areas is estimated to be 2,145 cubic yards. Table 6-1 summarizes the soil volume estimates.

6.2.3 Soil Volumes: Area 3 (Retention Pond)

Figure 6-5 illustrates the assumptions and volume calculations for retention pond sediment to be remediated for the 10 ppm action level. Note that the one sample exceeding 10 ppm in the western section of the pond was assumed to be either anomalous or an isolated occurrence and was not included in the areas to be remediated under an action level of 10 ppm PCB content. The estimated volume of sediment to be excavated for an action level of 10 ppm PCB content is 200 cubic yards.

Figure 6-6 illustrates the assumptions and volume calculations for sediment exceeding 1 ppm PCB content. This volume is estimated to be approximately 2,500 cubic yards. Table 6-1 summarizes the soil/sediment volume estimates.

6.2.4 Soil Volumes: Area 4 (Lower Ditch East and Adjacent Flood-Prone Soils)

Sediment and soil volumes were estimated separately for the portion of the lower ditch east of Kennedy Road (Area 4) and that west of Kennedy Road (Area 5). Based on ditch measurements and analytical results from sampling, the volume of material exceeding 10 ppm was estimated to be equivalent to a volume 700 feet long by 7 feet wide by 1 foot deep (upstream of the bend) plus a volume 700 feet long by 13 feet wide by 0.5 feet deep (downstream of the bend). This estimated volume is 350 cubic yards.

Based on ditch measurements and analytical results from sampling, the volume of material exceeding 1 ppm was estimated to be equivalent to a volume 700 feet long by 8.5 feet wide by 1.5 feet deep (upstream of the bend) plus a volume of 700 feet long by 15 feet wide by 0.75 feet deep (downstream of the bend). This volume is approximately 650 cubic yards. This includes excavation in adjacent flood-prone soil. Soil and sediment volume estimates are summarized in Table 6-1.

6.2.5 Soil Volumes: Area 5 (Lower Ditch-West and Adjacent Flood-Prone Soils)

Sediment and adjacent flood-prone soil in the lower ditch west of Kennedy Road (Area 5) was estimated based on ditch measurements and sampling and analytical data. The volume of material exceeding 10 ppm was estimated to be equivalent to a volume of 2,000 feet long by 10 feet wide by 0.5 feet deep. This estimated volume is 370 cubic yards.

The volume of material exceeding 1 ppm was estimated to be equivalent to a volume of 2,500 feet long by 15 feet wide by 0.6 feet deep. This estimated volume is 830 cubic yards. Table 6-1 summarizes the soil and sediment volume estimates.

6.2.6 Soil Volumes: Area 6 (Stormwater Pipe)

The sediment volume within the stormwater pipe connecting the upper ditch to the lower ditch (Area 6) was estimated to be 80 cubic yards for both the 10 ppm and 1 ppm action levels. There is no analytical data or depth measurements for sediments within the pipe. Therefore, the volume estimates had to be based entirely on assumptions regarding the presence and PCB content of sediment. It was assumed that the pipe contains 0.66 cubic feet of soil per foot of its length. Furthermore it was assumed that the PCB content of this material is between 10 and 50 ppm. The resultant volume estimate for both action levels is 80 cubic yards. Table 6-1 summarizes the soil and sediment volume estimates.

6.2.7 Soil Volumes: Area 7 (Eastern Cemetery Soils)

Soil present along the eastern side of the St. Adalbert's Cemetery adjacent to the NTC property are designated as Area 7 soils. Figure 6-7 illustrates the assumptions and volume estimates for the 10 ppm action level. The estimated volume exceeding 10 ppm is approximately 80 cubic yards.

Figure 6-8 illustrates the assumptions and volume estimates for the 1 ppm action level. The estimated volume exceeding 1 ppm is approximately 260 cubic yards. Table 6-1 summarizes the soil and sediment volume estimates.

6.2.8 Limitations of Volume Estimates

All volume estimates presented in this section are based on the sampling and analytical data available and assumptions concerning the contaminant distribution where data are limited. These volume estimates are approximate and could be different from the actual volumes if unexpected conditions are encountered during the remedial activities.

6.3 ANALYSIS OF INDIVIDUAL REMEDIAL ALTERNATIVES

The following subsections present the detailed evaluation of each of the remedial alternatives developed for analysis. Analysis of each remedial alternative is presented separately.

6.3.1 Remedial Alternatives 1a, 1b, and 1c

6.3.1.1 Description of Remedial Alternatives 1a, 1b, and 1c

Remedial Alternatives 1a, 1b, and 1c were described in Section 5.3.1. These alternatives would entail excavation of PCB-contaminated soil and sediment. Excavated soil and sediment containing 50 ppm PCBs or more would be incinerated at an off-site facility. Excavated soil and sediment below 50 ppm PCBs would be disposed of in an off-site landfill.

As described in Section 5.3.1, Alternatives 1a, 1b, and 1c differ only in the action levels used. The soil and sediment action levels for Alternative 1a are 25 ppm on-site and 10 ppm off-site. The soil and sediment action levels for Alternative 1b are 10 ppm on-site and 1 ppm off-site. The soil and sediment action levels for Alternative 1c are 10 ppm on-site, 10 ppm in the retention pond and 1 ppm in off-site ditches and flood-prone areas.

The key components of Remedial Alternatives 1a, 1b, and 1c include:

- Institutional controls, such as deed notices, future land use restrictions and access restrictions for the NTC property.
- Clearing vegetation from approximately 1.4 acres in the southern portion of the NTC property and the ditches and retention pond.
- Removing and disposing asphalt from the NTC rear parking lot.
- Evaluation of and control potential fugitive dust emissions during soil and sediment excavations.
- Excavation of on-site soils above the on-site action level. Incineration of excavated soil containing 50 ppm PCBs or more at an off-site facility. Disposal of soil containing less than 50 ppm PCBs at an off-site landfill. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet soils will be stabilized as necessary using flyash, cement, or equivalent.
- Excavation of cemetery and flood-prone soils above the action level. Incineration of excavated soils containing 50 ppm PCBs or more at an off-

site facility. Disposal of soil containing less than 50 ppm PCBs at an off-site landfill. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. It was assumed in this evaluation that excavation will not occur beneath the buildings or beneath the tank farm foundation. However, if during the design or implementation of the selected remedy, NAPL is found in these areas remedial measures will be taken. Wet soils will be stabilized as necessary using flyash, cement, or equivalent.

- Excavation of sediments above the action level from the upper and lower ditches. Sediment containing 50 ppm PCBs or more will be incinerated at an off-site facility. Excavated sediment containing less than 50 ppm PCBs will be disposed at an off-site landfill. The excavated areas will be dewatered in sections using diversion structures, pumps, and temporary piping. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet sediments will be stabilized as necessary using flyash, cement, or equivalent.

- Excavation of sediments containing greater than the action level from the retention pond. Sediment containing 50 ppm or more (if found) would be incinerated at an off-site facility. Excavated sediment containing less than 50 ppm PCBs would be disposed at an off-site landfill. The section of the retention pond to be excavated will be dewatered using diversion structures, pumps, and temporary piping. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet sediments will be stabilized as necessary using flyash, cement, or equivalent.

- Hydraulic cleaning of the pipe passing beneath the railroad tracks which connects the upper and lower ditches, and collection of flushed sediment. In order to access the entire pipe, the pipe will have to be broken at several locations along its run.

- Use of a temporary water treatment facility to treat potentially contaminated water generated during the excavations.

- Testing of excavated areas to confirm concentrations of PCBs remaining do not exceed action levels.

- Transportation of excavated soils and sediment to the off-site facility (incinerator or landfill, depending on PCB content).

- Backfilling and compacting of excavated areas with clean fill using conventional earthmoving equipment.

- Restoring the excavated areas on-site and in flood-prone areas.

- Establishing and implementing a post remediation monitoring program, including groundwater and sediment sampling.

The components of Alternative 1a are summarized on Table 5-1. The total volume of soil and sediment to be excavated was estimated as described in Section 6.2 to be approximately 15,190 cubic yards. An estimated 10,515 cubic yards of this total would be incinerated and the remaining 4,675 cubic yards would be disposed at an off-site landfill.

The components of Alternative 1b are summarized on Table 5-1. The total volume of soil and sediment to be excavated was estimated as described in Section 6.2 to be approximately 21,565 cubic yards. An estimated 10,515 cubic yards of this total would be incinerated and the remaining 11,050 cubic yards would be disposed at an off-site landfill.

The components of Alternative 1c are summarized on Table 5-1. The total volume of soil and sediment to be excavated was estimated as described in Section 6.2 to be approximately 19,265 cubic yards. As estimated 10,515 cubic yards of this total would be incinerated and the remaining 8,750 cubic yards would be disposed at an off-site landfill.

This soil will be excavated and placed in bins (i.e., roll-off boxes) for off-site transport in accordance with NYS and TSCA regulations. The containers will be lined with an impermeable liner that is chemically resistant to PCBs. The bins will be covered with a waterproof tarp to prevent entry of rainfall and to reduce the potential for fugitive emissions during transport to the off-site incinerator or landfill. Pads for stabilization activities may be constructed if needed, depending on the volume of wet soil to be handled. The excavated areas will be tested to confirm that soils containing PCB concentrations greater than the action levels have been removed.

Backfilling of the excavated areas with clean fill will occur following confirmatory testing. Prior to backfilling on-site, the area will be regraded as necessary to allow placement of at least 1 foot of clean soil throughout. The final cover will be either pavement or grass on-site. Off-site flood-prone soils and cemetery soils will be backfilled and reseeded to grass. The ditches will be backfilled with crushed stone as necessary.

6.3.1.2 Analysis of Remedial Alternatives 1a, 1b, and 1c

Compliance with ARARs

These alternatives are anticipated to comply with applicable chemical-, location-, and action-specific regulations, as listed in Table 6-2. These remedial alternatives are consistent with USEPA guidance for Superfund sites.

Both TSCA disposal regulations and New York Hazardous Waste regulations would be applicable to materials excavated with PCB concentrations above 50 ppm. These ARARs will be met by conventional methods and through the use of appropriately licensed haulers and disposal facilities.

Temporary staging of materials may require a waiver from TSCA storage requirements. There are adequate grounds for a waiver under CERCLA, because material staging is an interim measure necessary to facilitate remediation of the site. Relevant and appropriate performance standards of the NYS Hazardous Waste Pile regulations will be incorporated into design and operation of any soil staging piles used during remediation.

Due to the limited availability of off-site incinerators, this alternative could not be implemented quickly. Long-term interim storage would likely be required until an incinerator becomes available. This storage would have to occur at a permitted storage facility. If the interim storage were to be on-site, permits (including TSCA and NYS Part 373) would be required unless a waiver is granted.

Compliance with SPDES regulations may be required for discharges occurring during implementation of, or resulting from, this remedial alternative.

Conventional dust control methods will be used during implementation of the remedial alternative to achieve compliance with applicable air quality standards.

Compliance with requirements of transportation regulations, OSHA regulations, and TSCA marking, recordkeeping and reporting requirements will be achieved through conventional methods.

It is expected that the groundwater and surface water quality standards will be attained through removal of contaminated soil and dewatering of the perched zone at the site during excavation. Groundwater monitoring will be required to confirm this. If one of these alternatives is selected, a monitoring program will be developed using relevant and appropriate provisions of NYS regulations as guidance.

Protection of Human Health and the Environment

Excavation and off-site incineration (50 ppm PCBs or more) or disposal (less than 50 ppm PCBs) of contaminated material will provide protection of human health and the environment. This alternative mitigates future migration of PCBs at the site by removing them from the site, thereby providing long-term protection of human health and the environment. The clean backfill and reseeding provides an additional measure of protectiveness for the remediated areas. The risk assessment (Volume 2) shows that residual levels pose no significant risk to human health.

After implementation, usage of the site would be restricted to industrial use through means of a deed restriction. Off-site land use restrictions would not be required.

Short-Term Effectiveness

The remedial measures required by these alternatives could have potential short-term impacts, including exposure to workers and the nearby community resulting from dust generated during the excavation and transport of impacted material. Measures will be taken to minimize dust generation during these activities and an evaluation of potential emissions will be conducted to confirm that no unacceptable off-site exposures will occur. Potential exposure of the remediation workers to the soils will be controlled by the use of personnel protective equipment and proper decontamination procedures as specified by the Health and Safety Plan for the site. The Health and Safety Plan will be implemented and maintained by an on-site Health & Safety Officer, who will be present during the remediation.

During excavation of the drainage ditches and retention pond, dewatering will be required. This will be accomplished through diversion structures and pumping. If a rainfall event occurs which exceeds the ability to divert flow, some particulates may be released downstream. This potential problem of recontamination of sediments will be mitigated by remediating upstream first and proceeding downstream.

Long-Term Effectiveness and Permanence

These remedial alternatives use off-site incineration or disposal at regulated facilities for soils with PCB concentrations greater than the action levels. These alternatives provide reliable method for mitigating the future potential impacts to the environment and human health near or at the site by removing the PCB material from the area. These alternatives are expected to provide protection to human health and environment. Long-term monitoring of surface water and groundwater will be required to assess effectiveness in remediation of these media.

Reduction of Toxicity, Mobility, or Volume

Placement of excavated materials in an off-site regulated landfill will greatly limit mobility of the PCBs. Incinerated PCBs would be irreversibly destroyed by this alternative. Materials above the action levels would be removed from the impacted areas.

Implementability

This remedial alternative can be easily implemented using readily available construction, containment, and disposal technologies. However, due to limited availability of off-site incinerators, this alternative could not be implemented quickly. Long-term interim storage would likely be required until an incinerator becomes available. If this storage were to be on NTC property, permits (including TSCA and NYS Part 373) would be required unless waivers are granted. These permit requirements could cause delays. Several landfills are available for disposal of PCB soils. The work tasks required for completion of this remedial alternative can be provided by multiple vendors so that competitive bids can be obtained. The technology is reliable and fully demonstrated.

Cost

The cost for remedial Alternative 1a is estimated at $49.8 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-3. The cost for remedial Alternative 1b is estimated at $53.2 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-4. The cost for remedial Alternative 1c is estimated at $52.0 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-5. These cost estimates are extremely sensitive to the assumed volume of impacted soil and sediment, which is not known with high precision.

6.3.2 Remedial Alternatives 2a, 2b, and 2c

6.3.2.1 Description of Remedial Alternatives 2a, 2b, and 2c

Remedial Alternatives 2a, 2b, and 2c were described in Section 5.3.2. These alternatives would entail excavation of PCB-contaminated soil and sediment above action levels. Excavated soil and sediment would be disposed of in an off-site TSCA regulated landfill.

As described in Section 5.3.2, Alternatives 2a, 2b, and 2c differ only in the action levels used. The soil and sediment action levels for Alternative 2a are 25 ppm PCBs for on-site remediation and 10 ppm PCBs for off-site remediation. The soil and sediment action levels for Alternative 2b are 10 ppm PCBs on-site and 1 ppm PCBs off-site. The soil and sediment action levels for Alternative 2c are 10 ppm PCBs on-site, 10 ppm PCBs in the retention pond and 1 ppm PCBs in off-site ditches and flood-prone areas.

The key components of Remedial Alternatives 2a, 2b, and 2c include:

- Institutional controls, such as deed notices, future land use restrictions and access restrictions for the NTC property.

- Clearing vegetation from approximately 1.4 acres in the southern portion of the NTC property and the ditches and retention pond.

- Removing and disposing asphalt from the NTC rear parking lot.

- Evaluation and control of potential fugitive dust emissions during soil and sediment excavations.

- Excavation of on-site soils above the action level for land disposal at an off-site TSCA regulated landfill. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. It was assumed in this evaluation that excavation will not occur beneath the buildings or beneath the tank farm foundation. However, if during the design or implementation of the selected remedy, NAPL is found in these areas remedial measures will be taken. Wet soils will be stabilized as necessary using flyash, cement, or equivalent.

- Excavation of cemetery and flood-prone soils above the action level for land disposal at an off-site TSCA regulated landfill. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet soils will be stabilized as necessary using flyash, cement, or equivalent.

- Excavation of sediments above the action level from the upper and lower ditches. Excavated sediment would be disposed at an off-site TSCA regulated landfill. The excavated areas will be dewatered in sections using diversion structures, pumps, and temporary piping. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet sediments will be stabilized as necessary using flyash, cement, or equivalent.

- Excavation of sediments above the action level from the retention pond. Excavated sediment would be disposed at an off-site TSCA regulated landfill. The section of the retention pond to be excavated will be dewatered using diversion structures, pumps, and temporary piping. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet sediments will be stabilized as necessary using flyash, cement, or equivalent.

- Hydraulic cleaning of the pipe passing beneath the railroad tracks which connects the upper and lower ditches, and collection of flushed sediment. In order to access the entire pipe, the pipe will have to be broken at several locations along its run.

- Use of a temporary water treatment facility to treat potentially contaminated water generated during the excavations.

- Testing of excavated areas to confirm concentrations of PCBs remaining do not exceed action levels.

- Transportation of excavated soils and sediment to the off-site TSCA regulated landfill.

- Backfilling and compacting of excavated areas with clean fill using conventional earthmoving equipment.

- Restoring the excavated areas on-site and in flood-prone areas.

- Establishing and implementing a post remediation monitoring program, including groundwater and sediment sampling.

The components of Alternatives 2a, 2b, and 2c are summarized on Table 5-2. The total volume of soil and sediment to be excavated for Alternative 2a was estimated as described in Section 6.2 to be approximately 15,190 cubic yards. The total volume of soil and sediment to be excavated for Alternative 2b was estimated as described in Section 6.2 to be approximately 21,565 cubic yards. The total volume of soil and sediment to be excavated for Alternative 2c was estimated as described in Section 6.2 to be approximately 19,265 cubic yards.

The excavated soil will be placed in bins (i.e., roll-off boxes) for off-site transport in accordance with NYS and TSCA regulations. The containers will be lined with an impermeable liner that is chemically resistant to PCBs. The bins will be covered with a waterproof tarp to prevent entry of rainfall and to reduce the potential for fugitive emissions during transport to the off-site TSCA regulated landfill. Pads for stabilization activities may be constructed if needed, depending on the volume of wet soil to be handled. The excavated areas will be tested to confirm that soils containing PCB concentrations greater than the action levels have been removed.

Backfilling of the excavated areas with clean fill will occur following confirmatory testing. Prior to backfilling on-site, the area will be regraded as necessary to allow placement of at least 1 foot of clean soil throughout. The final cover will be either pavement or grass on-site. Off-site flood-prone soils and cemetery soils will be backfilled and reseeded to grass. The ditches will be backfilled with crushed stone as necessary.

6.3.2.2 Analysis of Remedial Alternatives 2a, 2b and 2c

Compliance with ARARs

These alternatives are anticipated to comply with applicable chemical-, location-, and action-specific regulations, as listed in Tables 6-6. These remedial alternatives are consistent with USEPA guidance for Superfund sites.

Both TSCA disposal regulations and New York Hazardous Waste regulations would be applicable to materials excavated with PCB concentrations above 50 ppm. These ARARs will be met by conventional methods and through the use of appropriately licensed haulers and disposal facilities.

Temporary staging of materials may require a waiver from TSCA storage requirements. There are adequate grounds for a waiver under CERCLA, because material staging is an interim measure necessary to facilitate remediation of the site. Relevant and appropriate performance standards of the NYS Hazardous Waste Pile regulations will be incorporated into design and operation of any soil staging piles used during remediation.

Compliance with SPDES regulations may be required for discharges occurring during implementation of, or resulting from, this remedial alternative.

Conventional dust control methods will be used during implementation of the remedial alternative to achieve compliance with applicable air quality standards.

Compliance with requirements of transportation regulations, OSHA regulations, and TSCA marking, recordkeeping and reporting requirements will be achieved through conventional methods.

It is expected that the groundwater and surface water quality standards will be attained through removal of contaminated soil and dewatering of the perched zone at the site during excavation. Groundwater monitoring will be required to confirm this. If one of these alternatives is selected, a monitoring program will be developed using relevant and appropriate provisions of NYS regulations as guidance.

Protection of Human Health and the Environment

Excavation and disposal of contaminated material in an off-site TSCA regulated landfill will provide protection of human health and the environment. This alternative mitigates future migration of PCBs at the site by removing them from the site, thereby providing long-term protection of human health and the environment. The clean backfill and reseeding provides an additional measure of protectiveness for the remediated areas. The risk assessment (Volume 2) shows that residual levels pose no significant risk to human health.

After implementation, usage of the site would be required to be restricted to industrial use through means of a deed restriction. Off-site land use restrictions would not be required.

Short-Term Effectiveness

The remedial measures required by these alternatives could have potential short-term impacts, including exposure to workers and the nearby community resulting from dust generated during the excavation and transport of impacted material. Measures will be taken to minimize dust generation during these activities and an evaluation of potential emissions will be conducted to confirm that no unacceptable off-site exposures will occur. Potential exposure of the remediation workers to the soils will be controlled by the use of personnel protective equipment and proper decontamination procedures as specified by the Health and Safety Plan for the site. The Health and Safety Plan will be implemented and maintained by an on-site Health & Safety Officer, who will be present during the remediation.

During excavation of the drainage ditches and retention pond, dewatering will be required. This will be accomplished through diversion structures and pumping. If a rainfall event occurs which exceeds the ability to divert flow, some particulates may be released downstream. This potential problem of recontamination of sediments will be mitigated by remediating upstream first and proceeding downstream.

Long-Term Effectiveness and Permanence

These remedial alternatives use off-site disposal in a TSCA regulated landfill for soils with PCB concentrations greater than the action level. This alternative is a reliable method for mitigating the future potential impacts to the environment and human health near or at the site by removing the PCB material from the area. These remedial alternatives are expected to provide protection to human health and environment for the design life of the TSCA regulated landfill. Long-term monitoring of surface water and groundwater will be required to assess effectiveness in remediation of these media.

Reduction of Toxicity, Mobility, or Volume

Placement of excavated materials in a TSCA regulated landfill will greatly limit mobility of the PCBs. No materials would be treated or irreversibly destroyed by these alternatives. Materials above the action levels would be removed from the impacted areas.

Implementability

These remedial alternatives can be implemented using readily available construction technologies. Administrative coordination with regulators during this remedial alternative should be normal. One TSCA landfill in New York State and several out-of-state TSCA landfills are available for disposal of PCB soils. The work tasks required for completion of these remedial alternatives can be provided by multiple vendors so that competitive bids can be obtained. Costing for these alternatives assumed out-of-state disposal. The technology is reliable and fully demonstrated.

Cost

The cost for remedial Alternative 2a is estimated at $9.0 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-7. The cost for remedial Alternative 2b is estimated at $12.2 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-8. The cost for remedial Alternative 2c is estimated at $11.1 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-9. These cost estimates are extremely sensitive to the assumed volume of impacted soil and sediment, which is not known with high precision. These costs were based on disposal at Chemical Waste Management's (CWM's) Model City TSCA facility. CWM has indicated that a disposal price of approximately $190 per ton (including transportation) could be obtained presently for large volume disposal. If circumstances dictate that an off-site TSCA landfill is to be used, costs of implementing these alternatives could be higher by 50 percent or more.

6.3.3 Remedial Alternatives 3a, 3b, and 3c

6.3.3.1 Description of Remedial Alternatives 3a, 3b, and 3c

Remedial Alternatives 3a, 3b, and 3c include treatment of soil with PCB concentrations above the action levels using an on-site thermal desorption unit. Soil will be excavated in a step-wise manner until the action levels are achieved. Treated soil will be backfilled on-site following verification that the action levels are achieved.

As described in Section 5.3.3, Alternatives 3a, 3b, and 3c differ only in the action levels used. The soil and sediment action levels for Alternative 3a are 25 ppm PCBs for on-site remediation and 10 ppm PCBs for off-site remediation. The soil and sediment action levels for Alternative 3b are 10 ppm PCBs on-site and 1 ppm PCBs off-site. The soil and sediment action levels for Alternative 3c are 10 ppm PCBs on-site, 10 ppm PCBs in the retention pond and 1 ppm PCBs in off-site ditches and flood-prone areas.

The key components of these alternatives include:

- Institutional controls, such as deed notices, future land use restrictions and access restrictions as appropriate for the NTC property.

- Clearing of approximately 1.4 acres of land in the southern portion of the NTC property and the ditches and retention pond.

- Removing and disposing asphalt from the NTC rear parking lot.

- Evaluating potential fugitive dust emissions during soil excavation.

- Conducting bench-scale testing with site-specific soil to determine operational process parameters.

- Conducting bench-scale testing with site-specific soil to evaluate the characteristics of treated material and determine whether it can be used for on-site fill after stabilization. Evaluation of off-site disposal options for treated soil (including required delisting petitions), if necessary.

- Meeting air emission standards for the on-site thermal desorption unit.

- Establishing a temporary staging area.

- Preparing site for installation of the thermal desorption unit.

- Mobilization, transportation, installation and shakedown of the mobile thermal desorption unit.

- Conducting on-site trials to refine and set operational process parameters.

- Excavating soil above action levels using conventional excavation and earth moving equipment and procedures, including dust control. Excavations and water diversions will be as described in Section 6.3.1. It was assumed in this evaluation that excavation will not occur beneath the buildings or beneath the tank farm foundation. However, if during the design or implementation of the selected remedy, NAPL is found in these areas remedial measures will be taken. Water treatment will be in accordance with Section 6.3.1, if needed.

- Testing and additional excavation of soil and sediment to achieve the action level.

- Coordination of ongoing excavation and backfilling activities, confirmatory testing of excavated areas and treated soil, and the thermal desorption of impacted soils and sediment.

- Profiling and disposal of thermal desorption unit waste streams.

- Breakdown, clean-up, and removal of the thermal desorption unit.

- Conducting closure activities for area used for the thermal desorption process.

- Restoring the site.

The key operations for Alternatives 3a, 3b, and 3c are summarized in Table 5-3. The total volume of soil and sediment to be treated for Alternative 3a was estimated to be 15,190 cubic yards. The total volume of soil and sediment to be treated for Alternative 3b was estimated to be 21,565 cubic yards. The total volume of soil and sediment to be treated for Alternative 3c was estimated to be 19,265 cubic yards.

The site will be cleared as previously described. Potential fugitive dust emissions will be evaluated, and appropriate control measures will be identified. Bench scale treatability studies will be conducted using site-specific soil in order to establish full-scale operating parameters and estimate potential air emissions and waste streams.

An area of approximately 150 by 150 feet will be cleared and compacted prior to the construction of the thermal desorption unit pad and support foundations. Utilities hook-ups will be established for the unit. A temporary staging area will be prepared for staging soil prior to on-site thermal desorption. It is anticipated that the unit will be located on the undeveloped property owned by NTC bordering the site on the east.

The following discussion of on-site thermal desorption is based on a representative system which removes PCBs from impacted soils. Other units with different operations able to provide similar degrees of treatment could be selected during final design/procurement if one of these alternatives are selected.

PCB materials will be screened or crushed to a design maximum size, and placed into a feed bin with an attached belt conveyor. The belt conveyor is designed to transport solids to the feed auger which discharges through an annular zone to the desorption zone of the unit. The annular zone forms an air seal through which solids enter the desorption zone which operates at approximately 1100 to 1300°F, removing PCBs (and other hydrocarbons) by volatilization. The hot treated materials exit the desorption zone through a second annular zone onto a cooling conveyor. PCBs extracted as a vapor are either catalytically oxidized on-site, or condensed and concentrated as an oil phase for subsequent treatment in an off-site TSCA incinerator.

Treated soil will be deposited in a clean soil staging area, tested and eventually returned to the area previously excavated. Although the soils to be treated may contain in excess of 50 ppm PCBs, PCB concentrations following treatment will be significantly <50 ppm; therefore the treated soils residues will not be considered to contain a hazardous waste. As described below (see Implementability) there may be difficulty in using the treated soil for on-site backfill.

Upon completion of site preparation, the thermal desorption unit will be installed and undergo a mechanical and electrical shake down. The unit will process clean soil to further test the system. This will be followed by a process trial involving PCB soil for a minimum of 2 days of continuous operation. Normal operating conditions will be established at which time sampling of stack gases will be conducted. Once the process trial is completed and approvals are issued by the State, full-scale excavation of impacted soil at the site will begin.

Soil will be excavated in a step-wise manner, with confirmatory testing, to minimize the amount of soil to be treated by the thermal desorption unit. PCB soil and associated vegetation will be pre-screened to remove large materials. Pre-screened materials will either be crushed to pass the screen, or stored for subsequent off-site disposal in a TSCA landfill if determined to be contaminated.

Excavated soil from off-site will be transported to treatment unit using bins as described in Section 6.3.1.

Once all material above the action level has been treated, the unit will be run for a day with clean soil, and allowed to cool down. The unit will be disassembled and cleaned prior to removal from the site.

Waste steams created by the operation or demobilization of the process will be profiled and arrangements for treatment/disposal will be made.

The pad and equipment foundations remaining at the site after removal of the thermal desorption unit will be cleaned, tested, and disposed in an appropriate landfill.

Finally, the site will be restored by placing clean soil cover and seeding as necessary.

6.3.3.2 Analysis of Remedial Alternatives 3a, 3b and 3c

Compliance with ARARs

These alternatives are anticipated to comply with applicable chemical-, location-, and action-specific ARARs as listed in Tables 6-10. These remedial alternatives are consistent with the USEPA guidance for Superfund sites.

The most important ARARs for this alternative are those which apply to the treatment unit. These include NYS Hazardous Waste regulations and TSCA requirements for treatment alternatives to incineration. Design and operation of the treatment unit would be consistent with the applicable NYS regulations for thermal treatment units. New York land disposal restrictions will be met with compliance with TSCA disposal regulations. In order to be considered an alternate treatment in compliance with TSCA regulations, the thermal desorption would have to achieve a treatment level of 2 ppm residual PCBs in the treated soil. Available data supplied by vendors of the technology indicate that this level is achievable. A waiver by EPA of TSCA chemical waste landfill requirements would be necessary for on-site backfilling of treated materials containing greater than 2 ppm PCBs. If treated materials are considered solid wastes, a waiver of NYS Solid Waste Regulations will be required to allow on-site backfilling. There are adequate grounds for both waivers because the treated materials pose no significant risks to human health or the environment.

Temporary staging of materials may require a waiver from TSCA storage requirements. There are adequate grounds for a waiver under CERCLA, because material staging is an interim measure necessary to facilitate remediation of the site. Relevant and appropriate performance standards of the NYS Hazardous Waste Pile regulations will be incorporated into design and operation of any soil staging piles used during remediation.

Compliance with SPDES regulations may be required for discharges occurring during implementation of, or resulting from, this remedial alternative. No permit is required for on-site discharges, however, substantive requirements of all applicable regulations must be met. A permit may be required for off-site discharges.

Treatment unit air emissions would be consistent with air emission standards pursuant to NYS Air Quality Standards and Air Quality Emission Limit regulations. Conventional dust control methods would be used during construction activities to achieve compliance with applicable air quality standards.

Compliance with requirements of OSHA regulations and TSCA marking, recordkeeping and reporting requirements will be achieved through conventional methods.

It is expected that the groundwater and surface water quality standards will be attained through excavation and treatment of contaminated soil and dewatering of the perched zone at the site during excavation. Groundwater monitoring will be required to confirm this. If one of these alternatives is selected, a monitoring program will be developed using relevant and appropriate provisions of NYS regulations as guidance.

Protection of Human Health and the Environment

Excavation and the thermal desorption of PCBs from soils with subsequent destruction of desorbed PCBs, will provide permanent protection to human health and the environment by reducing PCBs in soils to the action level. Waste streams created by air scrubbers and water treatment will be removed from the site and disposed of in accordance with appropriate federal and state regulations.

Short-Term Effectiveness

These remedial alternatives may present potential short-term impacts to the community and the environment. Potential short-term impacts may result from exposure to workers and the nearby community caused by dust generated by excavation, storage, and transport of PCB soil and sediment. Measures will be taken to minimize dust generation during these activities and evaluation of emissions and appropriate control measures will be conducted so that adverse off-site impacts will not occur. Exposure of the remediation workers to the soils will be controlled by the use of personnel protective equipment and decontamination procedures as specified by the Health and Safety Plan for the Site. The Health and Safety Plan will be implemented and maintained by an on-site Health & Safety Officer, who will be present during all phases of the remediation. Additional short-term impacts to human and environmental receptors may result from potential air emissions and wastewater discharges. Flue gas will be scrubbed to minimize potential impacts from air emissions. Wastewater generated by the process will be treated, stored and tested prior to reuse for dust control such that potential impacts are minimized. Any PCB wastes generated by the treatment process will be handled and stored using appropriate hazardous waste management practices to prevent potential impacts to human health and the environment.

Long-Term Effectiveness and Permanence

These remedial alternatives use on-site treatment to remove PCBs from the soils, and subsequent destruction of the desorbed PCBs. This alternative minimizes future potential impacts to human health and the environment. This remedial alternative is expected to provide protection to human health and the environment for the design life of the TSCA regulated landfill for residual PCB materials that cannot be thermally treated.

Reduction of Toxicity, Mobility, or Volume

Thermal desorption can achieve irreversible removal of PCBs from impacted soil such that treated material will contain PCB levels at or below the action levels. PCBs desorbed from the soil will be destroyed. This process will permanently destroy PCBs removed from the soils, resulting in elimination of toxicity and mobility. The waste streams created by this process, such as air scrubber residues or water treatment wastes, will be treated in an appropriate facility. This alternative will achieve reduction of toxicity and mobility through treatment of impacted soils and sediments.

Implementability

Thermal desorption of PCB soils has been demonstrated full-scale, and the reliability of this system has been established. However, there may be difficulty in using the soil treated using thermal desorption for on-site backfill without addition of stabilizing agents. Because of the limited full-scale experiences with this technology, the suitability of the treated soil for use as on-site fill, even after stabilization, is not certain. If the treated soil has to be disposed of in an off-site landfill due to its physical characteristics, delisting will be required, and additional costs will be incurred. These problems may cause delays in implementing the remedial action. Furthermore, availability of thermal desorption equipment is limited, as only one vendor can provide this system at this time. Other vendors are developing thermal desorption units which should achieve similar results. Implementation could be limited by availability of existing equipment, or by time for construction of new equipment. Because the system has been operated full-scale on PCB soils, most technical difficulties and potential uncertainties associated with treatment of PCB soils have been identified. These alternatives are implementable using available technologies, and effectiveness can be readily monitored. Extensive coordination with regulators and approval requirements are expected prior to implementation. With the exception of the treatment unit, the alternative can be implemented using standard construction equipment and methods available from numerous vendors. These alternatives may require use of off-site incineration for low volume waste PCB oils. Off-site incineration services are available at several locations; however, availability can be limited.

Project delays related to use of the treated soil as on-site backfill (or off-site land disposal and delisting) and delays caused by limited availability of the treatment unit could postpone the start of the remediation project.

Administrative coordination with regulators should be normal. One TSCA landfill in New York State and several out-of-state TSCA landfills are available for disposal of residual PCB materials that cannot be thermally treated.

Cost

The costs for the on-site thermal desorption alternatives were estimated assuming that the treated soil could be used as on-site backfill with minimal stabilization effort. If this proves not to be the case, costs would increase due to the need for on-site disposal of treated soil. Due to this and other implementability concerns, a contingency factor of 50 percent was applied in the cost analysis. The cost for remedial Alternative 3a is estimated at $13.4 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-11. The cost for remedial Alternative 3b is estimated at $17.3 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-12. The cost for remedial Alternative 3c is estimated at $15.9 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-13. The costs for these alternatives are extremely sensitive to the assumed volume of impacted soil and sediment, which is not known with high precision, as well as the actual contracted cost of disposal.

6.3.4 Remedial Alternatives 4a and 4b

6.3.4.1 Description of Remedial Alternatives 4a and 4b

Remedial Alternatives 4a and 4b were described in Section 5.3.4. They would entail excavation of soil and sediment above action levels on-site and from the ditches and flood-prone areas. Excavated soil and sediment would be disposed of in an off-site TSCA regulated landfill. For this alternative, the retention pond would be treated using natural biodegradation.

As described in Section 5.3.4, Alternatives 4a and 4b differ only in the action levels used. The soil and sediment action levels for Alternative 4a are 25 ppm PCBs for on-site remediation and 10 ppm PCBs for off-site remediation. The soil and sediment action levels for Alternative 4b are 10 ppm PCBs on-site and 1 ppm PCBs off-site.

The key components of Remedial Alternatives 4a and 4b include:

- Institutional controls, such as deed notices, future land use restrictions and access restrictions for the NTC property.

- Clearing vegetation from approximately 1.4 acres in the southern portion of the NTC property and the ditches and retention pond.

- Removing and disposing asphalt from the NTC rear parking lot.

- Evaluation and control of potential fugitive dust emissions during soil and sediment excavations.

- Excavation of on-site soils above the action levels and subsequent land disposal at an off-site TSCA regulated landfill. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. It was assumed in this evaluation that excavation will not occur beneath the buildings or beneath the tank farm foundation. However, if during the design or implementation of the selected remedy, NAPL is found in these areas remedial measures will be taken. Wet soils will be stabilized as necessary using flyash, cement, or equivalent.

- Excavation of cemetery and flood-prone soils above action levels and subsequent land disposal at an off-site TSCA regulated landfill. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet soils will be stabilized as necessary using flyash, cement, or equivalent.

- Excavation of sediments above action levels from the upper and lower ditches. Excavated sediment would be disposed at an off-site TSCA regulated landfill. The excavated areas will be dewatered in sections using diversion structures, pumps, and temporary piping. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet sediments will be stabilized as necessary using flyash, cement, or equivalent.

- Bioremediation of sediments within the retention pond. This will entail annual core sampling and analyses of sediments within the pond for a period of 3 years. After 3 years of data have been collected, the natural degradation rate will be evaluated to assess whether PCBs will degrade to levels below action levels and the route of degradation. If degradation is determined to be occurring too slowly to attain the remedial action objectives within a reasonable period of time, a work plan to enhance the biodegradation rate through means such as nutrient and cosubstrate addition will be prepared and submitted to NYSDEC.

- Hydraulic cleaning of the pipe passing beneath the railroad tracks which connects the upper and lower ditches, and collection of flushed sediment. In order to access the entire pipe, the pipe will have to be broken at several locations along its run.
- Use of a temporary water treatment facility to treat potentially contaminated water generated during the excavations.
- Testing of excavated areas to confirm concentrations of PCBs remaining do not exceed action levels on-site or in off-site ditches.
- Transportation of excavated soils and sediment to the off-site TSCA regulated landfill.
- Backfilling and compacting of excavated areas with clean fill using conventional earthmoving equipment.
- Restoring the excavated areas on-site and in flood-prone areas.
- Establishing and implementing a post remediation monitoring program, including groundwater and sediment sampling.

The components of Alternatives 4a and 4b are summarized on Table 5-4. The total volume of soil and sediment to be excavated for Alternative 4a was estimated as described in Section 6.2 to be approximately 14,990 cubic yards. The total volume of soil and sediment to be excavated for alternative 4b was estimated as described in Section 6.2 to be approximately 19,065 cubic yards. This soil will be excavated and placed in bins (i.e., roll-off boxes) for off-site transport in accordance with NYS and TSCA regulations. The containers will be lined with an impermeable liner that is chemically resistant to PCBs. The bins will be covered with a waterproof tarp to prevent entry of rainfall and to reduce the potential for fugitive emissions during transport to the off-site TSCA regulated landfill. Pads for stabilization activities may be constructed if needed, depending on the volume of wet soil to be handled. The excavated areas will be tested to confirm that soils containing greater than the action levels have been removed on-site and from the off-site ditches.

Backfilling of the excavated areas with clean fill will occur following confirmatory testing. Prior to backfilling on-site, the area will be regraded as necessary to allow placement of at least 1 foot of clean soil throughout. The final cover will be either pavement or grass on-site. Cemetery soils will be backfilled and reseeded to grass. The ditches will be backfilled with crushed stone as necessary.

6.3.4.2 Analysis of Remedial Alternatives 4a and 4b

Compliance with ARARs

These alternatives are anticipated to comply with applicable chemical-, location-, and action-specific regulations, as listed in Table 6-14. This remedial alternative is consistent with USEPA guidance for Superfund sites.

Both TSCA disposal regulations and New York Hazardous Waste regulations would be applicable to materials excavated with PCB concentrations above 50 ppm. These ARARs will be met by conventional methods and through the use of appropriately licensed haulers and disposal facilities.

Temporary staging of materials may require a waiver from TSCA storage requirements. There are adequate grounds for a waiver under CERCLA, because material staging is an interim measure necessary to facilitate remediation of the site. Relevant and appropriate performance standards of the NYS Hazardous Waste Pile regulations will be incorporated into design and operation of any soil staging piles used during remediation.

Compliance with SPDES regulations may be required for discharges occurring during implementation of, or resulting from, these remedial alternatives.

Conventional dust control methods will be used during implementation of the remedial alternative to achieve compliance with applicable air quality standards.

Compliance with requirements of transportation regulations, OSHA regulations, and TSCA marking, recordkeeping and reporting requirements will be achieved through conventional methods.

It is expected that the groundwater and surface water quality standards will be attained through removal of contaminated soil and dewatering of the perched zone at the site during excavation. Groundwater monitoring will be required to confirm this. If one of these alternatives is selected, a monitoring program will be developed using relevant and appropriate provisions of NYS regulations as guidance.

Protection of Human Health and the Environment

Excavation and disposal of contaminated material in an off-site TSCA regulated landfill will provide protection of human health and the environment. This alternative mitigates future migration of PCBs at the site by removing them from the site, thereby providing long-term protection of human health and the environment. The clean backfill and reseeding provides an additional measure of protectiveness for the remediated areas. The risk assessment (Volume 2) shows that residual levels, including those within the retention ponds, pose no significant risk to human health.

After implementation, usage of the site would be required to be restricted to industrial use through means of a deed restriction. Off-site land use restrictions would not be required. Some restrictions on the cleaning of the retention pond would be required during the bioremediation monitoring program.

Short-Term Effectiveness

The remedial measures required by these alternatives could have potential short-term impacts, including exposure to workers and the nearby community resulting from dust generated during the excavation and transport of impacted material. Measures will be taken to minimize dust generation during these activities and an evaluation of potential emissions will be conducted to confirm that no unacceptable off-site exposures will occur. Potential exposure of the remediation workers to the soils will be controlled by the use of personnel protective equipment and proper decontamination procedures as specified by the Health and Safety Plan for the site. The Health and Safety Plan will be implemented and maintained by an on-site Health & Safety Officer, who will be present during the remediation.

During excavation of the drainage ditches, dewatering will be required. This will be accomplished through diversion structures and pumping. If a rainfall event occurs which exceeds the ability to divert flow, some particulates may be released downstream. This potential problem will be mitigated by remediating upstream first and proceeding downstream.

Long-Term Effectiveness and Permanence

These remedial alternatives use off-site disposal in a TSCA regulated landfill for soils with PCB concentrations greater than the action level. This alternative is a reliable method for mitigating the future potential impacts to the environment and human health near or at the site by removing the PCB material from the area. This remedial alternative is expected to provide protection to human health and environment for the design life of the TSCA regulated landfill. Long-term monitoring of surface water and groundwater will be required to assess effectiveness in remediation of these media.

Reduction of Toxicity, Mobility, or Volume

Placement of excavated materials in a TSCA regulated landfill will greatly limit mobility of the PCBs. Biological degradation is expected to irreversibly destroy some PCBs within the retention pond.

Implementability

These remedial alternatives can be implemented using readily available construction technologies. Administrative coordination with regulators during this remedial alternative should be normal. One TSCA landfill in New York State and several out-of-state TSCA landfills are available for disposal of PCB soils. The work tasks required for completion of this remedial alternative can be provided by multiple vendors so that competitive bids can be obtained. Costing for these alternatives assumed out-of-state disposal. The technology is reliable and fully demonstrated.

Cost

Disposal at CWM's Model City facility was assumed in the cost analysis. The cost for remedial Alternative 4a is estimated at $9.1 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-15. The cost for remedial Alternative 4b is estimated at $11.4 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-16. These cost estimates are extremely sensitive to the assumed volume of impacted soil, which is not known with high precision.

6.3.5 Remedial Alternatives 5a and 5b

6.3.5.1 Description of Remedial Alternatives 5a and 5b

Remedial Alternatives 5a and 5b would include excavation of the most highly contaminated on-site soil (NAPL-containing) and subsequent construction of a slurry wall circumscribing the contaminated area and a site cap. A groundwater collection system (trench drain) and treatment plant would also be constructed and operated. Off-site soils and sediment within the upper and lower ditches (and adjacent flood-prone areas) above action levels would be excavated and consolidated beneath the on-site cap (if below 50 ppm). In the retention pond, natural biodegradation would be expected to reduce sediment PCB concentrations to the remedial action objective over time.

As described in Section 5.3.5, Alternatives 5a and 5b differ only in the action levels used.

The soil and sediment action levels for Alternative 5a are 10 ppm PCBs for off-site remediation. The soil and sediment action levels for Alternative 5b are 1 ppm PCBs on-site for off-site remediation.

The key components of Remedial Alternatives 5a and 5b include:

- Institutional controls, such as deed notices, future land use restrictions and access restrictions for the NTC property.
- Clearing vegetation from approximately 1.4 acres in the southern portion of the NTC property and the ditches and retention pond.
- Evaluation and control of potential fugitive dust emissions during soil and sediment excavations.
- Excavation of NAPL-containing soil from the NTC property and adjacent areas near the seeps. This soil would be stabilized and disposed of at an off-site TSCA regulated landfill. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. It was assumed in this evaluation that excavation will not occur beneath the buildings or beneath the tank farm foundation. However, if during the design or implementation of the selected remedy, NAPL is found in these areas remedial measures will be taken.
- Excavation of cemetery and flood-prone soils above action levels and subsequent land disposal at an off-site TSCA regulated landfill or consolidation on-site if less than 50 ppm PCB content. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet soils will be stabilized as necessary using flyash, cement, or equivalent.
- Excavation of sediments above action levels from the upper and lower ditches. Excavated sediment would be disposed at an off-site TSCA regulated landfill or consolidated on-site if less than 50 ppm PCB content.

The excavated areas will be dewatered in sections using diversion structures, pumps, and temporary piping. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet sediments will be stabilized as necessary using flyash, cement, or equivalent.

- Bioremediation of sediments within the retention pond. This will entail annual core sampling and analyses of sediments within the pond for a period of 3 years. After 3 years of data have been collected, the natural degradation rate will be evaluated to assess whether PCBs will degrade to levels below action levels, and the rate of degradation. If degradation is determined to be occurring too slowly to attain the remedial action objectives within a reasonable period of time, a work plan to enhance the biodegradation rate through means such as nutrient and cosubstrate addition will be prepared and submitted to NYSDEC.

- Hydraulic cleaning of the pipe passing beneath the railroad tracks which connects the upper and lower ditches, and collection of flushed sediment. In order to access the entire pipe, the pipe will have to be broken at several locations along its run. Sediment removed will either be consolidated on-site or disposed at an off-site TSCA regulated landfill.

- Use of a temporary water treatment facility to treat potentially contaminated water generated during the excavations.

- Testing of excavated off-site areas to confirm concentrations of PCBs remaining do not exceed action levels.

- Transportation of excavated soils and sediment to the off-site TSCA regulated landfill.

- Backfilling and compacting of excavated areas with clean fill using conventional earthmoving equipment.

- Construction of a fully circumscribing slurry wall containing the area bordered by the southern and western NTC property lines, the south side of the main building (north boundary of slurry wall). The base of the slurry wall would be keyed into the underlying clay.

- Construction of a composite cap over the area contained by the slurry wall. The cap will consist of a soil cover and flexible membrane liner (FML).
- Construction and operation of a groundwater recovery and treatment system which would include a trench drain for collection and a clarifier and granular activated carbon (GAC) system for treatment.
- Restoring the excavated areas on-site and in flood-prone areas.
- Establishing and implementing a post remediation monitoring program, including groundwater and sediment sampling.

The components of Alternatives 5a and 5b are summarized on Table 5-5. Soil volumes were estimated as described in Section 6.2. For Alternative 5a, NAPL-contaminated soil was estimated to constitute approximately 375 cubic yards. Off-site excavated soil below 50 ppm, suitable for use as on-site fill beneath the site cap, was estimated to be 1,475 cubic yards. The volume of off-site excavated soil above 50 ppm, to be disposed at a TSCA regulated landfill was estimated to be 1,095 cubic yards.

For Alternative 5b, NAPL-contaminated soil was estimated to constitute approximately 375 cubic yards. Off-site excavated soil below 50 ppm, suitable for use as on-site fill beneath the site cap, was estimated to be 2,870 cubic yards. The volume of off-site excavated soil above 50 ppm, to be disposed at a TSCA-regulated landfill was estimated to be 1,095 cubic yards.

Soil will be excavated and placed in bins (i.e., roll-off boxes) for off-site transport in accordance with NYS and TSCA regulations. The containers will be lined with an impermeable liner that is chemically resistant to PCBs. The bins will be covered with a waterproof tarp to prevent entry of rainfall and to reduce the potential for fugitive emissions during transport to the off-site TSCA regulated landfill. Pads for stabilization activities may be constructed if needed, depending on the volume of wet soil to be handled. The excavated areas will be tested to confirm that soils containing greater than the action levels have been removed.

The final cover will be either pavement or grass on-site. Cemetery soils will be backfilled and reseeded to grass. The ditches will be backfilled with crushed stone as necessary.

6.3.5.2 Analysis of Remedial Alternatives 5a and 5b

Compliance with ARARs

This alternative is anticipated to comply with applicable chemical-, location-, and action-specific regulations, as listed in Tables 6-17. This remedial alternative is consistent with USEPA guidance for Superfund sites.

Both TSCA disposal regulations and New York Hazardous Waste regulations would be applicable to materials excavated with PCB concentrations above 50 ppm. These ARARs will be met by conventional methods and through the use of appropriately licensed haulers and disposal facilities. On-site consolidation of soil and sediment containing less than 50 ppm PCBs will not require a waiver from TSCA regulations but would require a waiver of NYS solid waste regulations. There are grounds for this waiver because the materials to be consolidated on-site would not pose a significant risk to health or the environment, and because the proposed containment system provides performance equivalent to a solid waste landfill.

Temporary staging of materials may require a waiver from TSCA storage requirements. There are adequate grounds for a waiver under CERCLA, because material staging is an interim measure necessary to facilitate remediation of the site. Relevant and appropriate performance standards of the NYS Hazardous Waste Pile regulations will be incorporated into design and operation of any soil staging piles used during remediation.

On January 15, 1993, USEPA issued a final rule concerning RCRA Corrective Action

Management Units (CAMUs). In essence, this rule allows designation of contaminated areas as CAMUs, which permit management of hazardous wastes on sites without triggering the land disposal or minimum technology requirements of RCRA. CAMUs may include areas of a site that are not contiguous to existing management units. The CAMU rule will be a federal ARAR, applicable at federal Superfund sites. Adoption of the CAMU rule by NYSDEC would allow on-site consolidation of materials without triggering land disposal restrictions or solid/hazardous land burial regulations. TSCA land burial regulations could still be applicable to disposal of materials containing 50 ppm PCBs or more, and a waiver could be required for on-site placement of these materials.

Compliance with SPDES regulations may be required for discharges occurring during implementation of, or resulting from, this remedial alternative.

Conventional dust control methods will be used during implementation of the remedial alternative to achieve compliance with applicable air quality standards.

Compliance with requirements of transportation regulations, OSHA regulations, and TSCA marking, recordkeeping and reporting requirements will be achieved through conventional methods.

Groundwater and surface water remedial action objectives will be attained through physical barriers (cap and slurry wall) between the source and receptor and through groundwater collection and treatment. An SPDES permit or permit to discharge to the Buffalo Sewer Authority (BSA) will be required for the treatment plant effluent. Long-term groundwater and surface water monitoring will be required to confirm the effectiveness of this alternative. If one of these alternatives is selected, a monitoring program will be developed using relevant and appropriate provisions of NYS regulations as guidance.

Protection of Human Health and the Environment

These alternatives will isolate contaminants on-site within the slurry wall and cap. Groundwater recovery will maintain an inward gradient which will provide hydraulic isolation of on-site contaminants, and the treatment plant will remove contaminants from the groundwater. Off-site soils will be isolated on-site (if less than 50 ppm PCB content) or disposed in a TSCA regulated landfill, providing protection of human health and the environment.

The risk assessment (Volume 2) shows that residual levels, including those within the retention ponds, pose no significant risk to human health.

After implementation, usage of the site would be required to be restricted to industrial use through means of a deed restriction. Off-site land use restrictions would not be required. Some restrictions on the cleaning of the retention pond would be required during the bioremediation monitoring program.

Short-Term Effectiveness

The remedial measures required by these alternatives could have potential short-term impacts, including exposure to workers and the nearby community resulting from dust generated during the cap and slurry wall construction and excavation and transport of impacted material. Measures will be taken to minimize dust generation during these activities and an evaluation of potential emissions will be conducted to confirm that no unacceptable off-site exposures will occur. Potential exposure of the remediation workers to the soils will be controlled by the use of personnel protective equipment and proper decontamination procedures as specified by the Health and Safety Plan for the site. The Health and Safety Plan will be implemented and maintained by an on-site Health & Safety Officer, who will be present during the remediation.

During excavation of the drainage ditches dewatering will be required. This will be accomplished through diversion structures and pumping. If a rainfall event occurs which exceeds the ability to divert flow, some particulates may be released downstream. This potential problem will be mitigated by remediating upstream first and proceeding downstream.

Long-Term Effectiveness and Permanence

Alternatives 5a and 5b would incorporate a site cap, slurry wall and groundwater recovery system to prevent contaminant migration from the site. The slurry wall would be keyed into the underlying clay layer, and capped with a composite cap which covers the entire area surrounded by the slurry wall. Thus, the contaminated soil would be contained by the composite cap on top, by the slurry wall on the sides, and by the natural clay base underlying the site below. In addition, a groundwater recovery system, consisting of a trench drain and on-site treatment plant will be installed to collect any leachate from the contaminated soil, maintaining dewatered conditions in the containment area. This system is expected to provide performance similar to that of a regulated hazardous waste landfill.

These remedial alternatives use on-site containment and off-site disposal in a TSCA regulated landfill for soils with PCB concentrations greater than the action levels. These are reliable methods for mitigating the future potential impacts to the environment and human health near or at the site by physically and hydraulically isolating contaminated soils and by removing PCB materials from off-site areas. These remedial alternatives are expected to provide protection to human health and environment for the design life of the site containment structures and the TSCA regulated landfill. Long-term monitoring of surface water and groundwater will be required to assess the effectiveness of remediation of these media.

Reduction of Toxicity, Mobility, or Volume

Placement of excavated materials in the on-site containment area or in the TSCA regulated landfill will greatly limit mobility of the PCBs. Biological degradation is expected to irreversibly destroy some PCBs within the retention pond.

Implementability

These remedial alternatives can be implemented using readily available construction technologies. Administrative coordination with regulators during this remedial alternative should be normal. One TSCA landfill in New York State and several out-of-state TSCA landfills are available for disposal of PCB soils. The work tasks required for completion of these remedial alternatives can be provided by multiple vendors so that competitive bids can be obtained. Costing for this alternative assumed out-of-state disposal. The technology is reliable and fully demonstrated.

Cost

The cost for remedial Alternative 5a is estimated at $5.3 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-18. The cost for remedial Alternative 5b is estimated at $5.6 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-19. These cost estimates are extremely sensitive to the assumed volume of impacted soil, which is not known with high precision.

6.3.6 Remedial Alternatives 6a, 6b, and 6c

6.3.6.1 Description of Remedial Alternatives 6a, 6b, and 6c

Remedial Alternatives 6a, 6b, and 6c would include excavation of the most highly contaminated on-site soil (NAPL-containing) and subsequent construction of a slurry wall circumscribing the contaminated area and a site cap. A groundwater collection system (trench drain) and treatment plant would also be constructed and operated. Off-site soils and sediment exceeding action levels within the upper and lower ditches (and adjacent flood-prone areas) and in the retention pond would be excavated and consolidated beneath the on-site cap (if below 50 ppm).

As described in Section 5.3.6, Alternatives 6a, 6b, and 6c differ only in the action levels used for off-site soils and sediments. The off-site soil and sediment action level for Alternative 6a is 10 ppm PCBs. The off-site soil and sediment action level for Alternative 6b is 1 ppm PCBs. The off-site soil and sediment action level for Alternative 6c is 10 ppm PCBs in the retention pond and 1 ppm PCBs in off-site ditches and flood-prone areas.

The key components of Remedial Alternatives 6a, 6b, and 6c include:

- Institutional controls, such as deed notices, future land use restrictions and access restrictions for the NTC property.

- Clearing vegetation from approximately 1.4 acres in the southern portion of the NTC property and the ditches and retention pond.

- Evaluation and control of potential fugitive dust emissions during soil and sediment excavations.

- Excavation of NAPL-containing soil from the NTC property and adjacent areas near the seeps. This soil would be stabilized and disposed at an off-site TSCA regulated landfill. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. It was assumed in this evaluation that excavation will not occur beneath the buildings or beneath the tank farm foundation. However, if during the design or implementation of the selected remedy, NAPL is found in these areas remedial measures will be taken.

- Excavation of cemetery and flood-prone soils above the action level for land disposal at an off-site TSCA regulated landfill or consolidation on-site if less than 50 ppm PCB content. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet soils will be stabilized as necessary using flyash, cement, or equivalent.

- Excavation of sediments containing more than the action level from the upper and lower ditches. Excavated sediment would be disposed at an off-site TSCA regulated landfill or consolidated on-site if less than 50 ppm PCB content. The excavated areas will be dewatered in sections using diversion structures, pumps, and temporary piping. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet sediments will be stabilized as necessary using flyash, cement, or equivalent.

- Excavation of sediments containing greater than the action level from the retention pond. Excavated sediment would be consolidated on-site. The section of the retention pond to be excavated will be dewatered using diversion structures, pumps, and temporary piping. Conventional excavation and earthmoving equipment and procedures, including dust control, will be utilized. Wet sediments will be stabilized as necessary using flyash, cement, or equivalent.

- Hydraulic cleaning of the pipe passing beneath the railroad tracks which connects the upper and lower ditches, and collection of flushed sediment. In order to access the entire pipe, the pipe will have to be broken at several locations along its run. Sediment removed will either be consolidated on-site or disposed at an off-site TSCA regulated landfill.

- Use of a temporary water treatment facility to treat potentially contaminated water generated during the excavations.

- Testing of excavated off-site areas to confirm concentrations of PCBs remaining do not exceed action levels.

- Transportation of excavated soils and sediment to the off-site TSCA regulated landfill.

- Backfilling and compacting of excavated areas with clean fill using conventional earthmoving equipment.

- Construction of a fully circumscribing slurry wall containing the area bordered by the southern and western NTC property lines, the south side of the main building (north boundary of slurry wall). The base of the slurry wall would be keyed into the underlying clay.

- Construction of a composite cap over the area contained by the slurry wall. The cap will consist of a soil cover and flexible membrane liner (FML).

- Construction and operation of a groundwater recovery and treatment system which would include a trench drain for collection and a clarifier and granular activated carbon (GAC) system for treatment.

- Restoring the excavated areas on-site and in flood-prone areas.
- Establishing and implementing a post remediation monitoring program, including groundwater and sediment sampling.

The components of Alternatives 6a, 6b, and 6c are summarized on Table 5-6. Soil volumes were estimated as described in Section 6.2. For Alternative 6a, NAPL-contaminated soil was estimated to constitute approximately 375 cubic yards. Off-site excavated soil below 50 ppm, suitable for use as on-site fill beneath the site cap, was estimated to be 1,675 cubic yards. The volume of off-site excavated soil above 50 ppm, to be disposed at a TSCA regulated landfill was estimated to be 1,095 cubic yards.

For Alternative 6a, NAPL-contaminated soil was estimated to constitute approximately 375 cubic yards. Off-site excavated soil below 50 ppm, suitable for use as on-site fill beneath the site cap, was estimated to be 5,370 cubic yards. The volume of off-site excavated soil above 50 ppm, to be disposed at a TSCA regulated landfill was estimated to be 1,095 cubic yards.

For Alternative 6c, NAPL-contaminated soil was estimated to constitute approximately 375 cubic yards. Off-site excavated soil below 50 ppm, suitable for use as on-site fill beneath the site cap, was estimated to be 3,070 cubic yards. The volume of off-site excavated soil above 50 ppm, to be disposed at a TSCA regulated landfill was estimated to be 1,095 cubic yards.

This soil will be excavated and placed in bins (i.e., roll-off boxes) for off-site transport in accordance with NYS and TSCA regulations. The containers will be lined with an impermeable liner that is chemically resistant to PCBs. The bins will be covered with a waterproof tarp to prevent entry of rainfall and to reduce the potential for fugitive emissions during transport to the off-site TSCA regulated landfill. Pads for stabilization activities may be constructed if needed, depending on the volume of wet soil to be handled. The excavated areas will be tested to confirm that off-site soils containing PCB concentrations greater than the action levels have been removed.

The final cover will be either pavement or grass on-site. Cemetery soils will be backfilled and reseeded to grass. The ditches will be backfilled with crushed stone as necessary.

6.3.6.2 Analysis of Remedial Alternatives 6a, 6b, and 6c

Compliance with ARARs

This alternative is anticipated to comply with applicable chemical-, location-, and action-specific regulations, as listed in Tables 6-20. This remedial alternative is consistent with USEPA guidance for Superfund sites.

Both TSCA disposal regulations and New York Hazardous Waste regulations would be applicable to materials excavated with PCB concentrations above 50 ppm. These ARARs will be met by conventional methods and through the use of appropriately licensed haulers and disposal facilities. On-site consolidation of soil and sediment containing less than 50 ppm PCBs will not require a waiver from TSCA regulations.

Temporary staging of materials may require a waiver from TSCA storage requirements. There are adequate grounds for a waiver under CERCLA, because material staging is an interim measure necessary to facilitate remediation of the site. Relevant and appropriate performance standards of the NYS Hazardous Waste Pile regulations will be incorporated into design and operation of any soil staging piles used during remediation.

On January 15, 1993, USEPA issued a final rule concerning RCRA Corrective Action Management Units (CAMUs). This rule will be effective April, 1993. In essence, this rule allows designation of contaminated areas as CAMUs, which permit management of hazardous wastes on sites without triggering the land disposal or minimum technology requirements of RCRA. CAMUs may include areas of a site that are not contiguous to existing management units. The CAMU rule will be a federal ARAR, applicable at federal Superfund sites. Adoption of the CAMU rule by NYSDEC would allow on-site consolidation of materials without triggering land disposal restrictions or solid/hazardous land burial regulations. TSCA land burial regulations could still be applicable to disposal of materials containing 50 ppm PCBs or more, and a waiver could be required for on-site placement of these materials.

Compliance with SPDES regulations may be required for discharges occurring during implementation of, or resulting from, this remedial alternative.

Conventional dust control methods will be used during implementation of the remedial alternative to achieve compliance with applicable air quality standards.

Compliance with requirements of transportation regulations, OSHA regulations, and TSCA marking, recordkeeping and reporting requirements will be achieved through conventional methods.

Groundwater and surface water remedial action objectives will be attained through physical barriers (cap and slurry wall) between the source and receptor and through groundwater collection and treatment. An SPDES permit or permit to discharge to the Buffalo Sewer Authority (BSA) will be required for the treatment plant effluent. Long-term groundwater and surface water monitoring will be required to confirm the effectiveness of this alternative. If one of these remedial alternatives is selected, a monitoring program will be developed using relevant and appropriate provisions of NYS regulations as guidance.

Protection of Human Health and the Environment

These alternatives will isolate contaminants on-site within the slurry wall and cap. Groundwater recovery will maintain an inward gradient which will provide hydraulic isolation of on-site contaminants, and the treatment plant will remove contaminants from the groundwater. Off-site soils will be isolated on-site (if less than 50 ppm PCB content) or disposed in a TSCA regulated landfill, providing protection of human health and the environment.

The risk assessment (Volume 2) shows that residual levels, including those within the retention ponds, pose no significant risk to human health.

After implementation, usage of the site would be required to be restricted to industrial use through means of a deed restriction. Off-site land use restrictions would not be required. Some restrictions on the cleaning of the retention pond would be required during the bioremediation monitoring program.

Short-Term Effectiveness

The remedial measures required by these alternatives could have potential short-term impacts, including exposure to workers and the nearby community resulting from dust generated during the cap and slurry wall construction and excavation and transport of impacted material. Measures will be taken to minimize dust generation during these activities and an evaluation of potential emissions will be conducted to confirm that no unacceptable off-site exposures will occur. Potential exposure of the remediation workers to the soils will be controlled by the use of personnel protective equipment and proper decontamination procedures as specified by the Health and Safety Plan for the site. The Health and Safety Plan will be implemented and maintained by an on-site Health & Safety Officer, who will be present during the remediation.

During excavation of the drainage ditches, dewatering will be required. This will be accomplished through diversion structures and pumping. If a rainfall event occurs which exceeds the ability to divert flow, some particulates may be released downstream. This potential problem will be mitigated by remediating upstream first and proceeding downstream.

Long-Term Effectiveness and Permanence

Alternatives 6a, 6b, and 6c would incorporate a site cap, slurry wall and groundwater recovery system to prevent contaminant migration from the site. The slurry wall would be keyed into the underlying clay layer, and capped with a composite cap which covers the entire area surrounded by the slurry wall. Thus, the contaminated soil would be contained by the composite cap on top, by the slurry wall on the sides and by the natural clay base underlying the site below. In addition, a groundwater recovery system, consisting of a trench drain and on-site treatment plant will be installed to collect any leachate from the contaminated soil, maintaining dewatered conditions in the containment area. This system is expected to provide performance similar to that of a regulated hazardous waste landfill.

These remedial alternatives use on-site containment and off-site disposal in a TSCA regulated landfill for soils with PCB concentrations greater than the action levels. These are reliable methods for mitigating the future potential impacts to the environment and human health near or at the site by physically and hydraulically isolating contaminated soils and by removing PCB materials from off-site areas. These remedial alternatives are expected to provide protection to human health and environment for the design life of the site containment structures and the TSCA regulated landfill. Long-term monitoring of surface water and groundwater will be required to assess the effectiveness of remediation of these media.

Reduction of Toxicity, Mobility, or Volume

Placement of excavated materials in the on-site containment area or in the TSCA regulated landfill will greatly limit mobility of the PCBs. Groundwater contamination would be treated by this alternative.

Implementability

These remedial alternatives can be easily implemented using readily available construction technologies. Administrative coordination with regulators during this remedial alternative should be normal. One TSCA landfill in New York State and several out-of-state TSCA landfills are available for disposal of PCB soils. The work tasks required for completion of these remedial alternatives can be provided by multiple vendors so that competitive bids can be obtained. Costing for these alternatives assumed out-of-state disposal. The technology is reliable and fully demonstrated.

Cost

The cost for remedial Alternative 6a is estimated at $5.2 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-21. The cost for remedial Alternative 6b is estimated at $5.3 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-22. The cost for remedial Alternative 6c is estimated at $5.2 million. The cost breakdown for the activities which comprise this alternative is presented in Table 6-23. These cost estimates are extremely sensitive to the assumed volume of impacted soil, which is not known with high precision.

6.3.7 Remedial Alternatives 7a, 7b, and 7c

6.3.7.1 Description of Remedial Alternatives 7a, 7b, and 7c

Remedial Alternatives 7a, 7b, and 7c include treatment of soil with PCB concentrations above the action levels using stabilization/solidification. On-site soils will either be treated in place, or excavated and treated. Off-site soil and sediment will be excavated in a step-wise manner until the action levels are achieved. Stabilized soil will be backfilled on-site, and covered with a composite or asphalt cap.

Alternatives 7a, 7b, and 7c differ only in the action levels used. For Alternative 7a, the action levels are 25 ppm PCBs on-site and 10 ppm PCBs off-site. For Alternative 7b, the action levels are 10 ppm on-site and 1 ppm off-site. For Alternative 7c, the action levels are 10 ppm on-site, 10 ppm in the retention pond, and 1 ppm in off-site ditches and flood-prone soils.

The key components of these alternatives include:

- Institutional controls, such as deed notices, future land use restrictions and access restrictions as appropriate.

- Clearing of approximately 1.4 acres of land in the southern portion of the NTC property and the ditches and retention pond.

- Removing and disposing asphalt from the NTC rear parking lot.

- Evaluating potential fugitive dust emissions during soil excavation and/or stabilization operations.

- Conducting bench-scale testing with site-specific soil to determine operational process parameters.

- Establishing a temporary staging area.

- Preparing the site for installation and use of the stabilization equipment.

- Mobilization, transportation, and shake down of the stabilization/solidification equipment.

- Excavation and stabilization of NAPL-contaminated soil and subsequent disposal in an off-site TSCA-regulated landfill.

- Stabilization/solidification of contaminated soil (using either in-situ or excavation methods on-site and excavation methods off-site). It was assumed in this evaluation that stabilization/solidification will not occur beneath the buildings or beneath the tank farm foundation. However, if during the design or implementation of the selected remedy, NAPL is found in these areas remedial measures will be taken.

- Construct asphalt or composite cap over the area.

The specific stabilization/solidification processes to be used will be determined during the remedial program design. For cost estimation, a system which stabilizes excavated material (as opposed to in-situ) was assumed. This type of system would consist of a variety of feeders, conveyors, silos, and a pugmill mixer integrated into a system for the continuous mixing of wastes and reagents. The soil mix will be fed to a live bottom feeder and then by conveyor into the pugmill for blending with the stabilization additive. As the untreated material enters the pugmill, it passes over a weigh belt unit to record the tonnage of the material treated. The weigh belt provides a continuous record of the performance of the stabilization system. The stabilization additive material will be introduced from the silo feeder which attaches to the pugmill. The silo feed rate is correlated with the weigh belt reading to ensure the appropriate ratio of stabilization additive is delivered to the pugmill in a consistent manner. The treated material is conveyed to a storage area for testing. The material would subsequently be used as fill on-site and capped with asphalt or a composite cap.

6.3.7.2 Analysis of Remedial Alternatives 7a, 7b, and 7c (On-Site Stabilization)

Compliance with ARARs

These alternatives are anticipated to comply with applicable chemical-, location-, and action-specific regulations as listed in Tables 6-24. These alternatives are consistent with USEPA guidance for remediation of Superfund sites.

Materials containing PCBs in concentrations above 50 ppm will be stabilized on-site within the impacted area. Therefore substantive requirements of New York land burial, closure/post-closure, solid waste regulations, and TSCA chemical waste landfill regulations, may be applicable to the on-site consolidation of treated soils.

The selected composite cap design is consistent with USEPA guidance (USEPA, 1990) for soils containing an average of 100 ppm PCBs, and meets the performance standards for final cover of hazardous waste land burial units defined in 6 NYCRR 373-2.14 (g). In order to be protective over the long-term, institutional controls on land use and access controls for the containment area would be required.

Consistent with USEPA guidance (USEPA, 1990) full compliance with New York land burial, closure/post-closure care and groundwater monitoring and TSCA chemical landfill requirements is not necessary as long as the alternative is protective of human health and the environment. This remedial alternative will comply with New York land burial regulations, closure/post-closure care and solid waste regulations through a waiver by DEC of those requirements not necessary to protect human health and the environment. Relevant and appropriate provisions of New York groundwater monitoring regulations will be adopted.

The remedial alternatives will comply with the New York land disposal restrictions through compliance with TSCA. The remedial alternative will comply with TSCA through a waiver by EPA of those chemical waste landfill design requirements that are not necessary to protect human health and the environment.

On January 15, 1993, USEPA issued a final rule concerning RCRA Corrective Action Management Units (CAMUs). This rule will be effective April, 1993. In essence, this rule allows designation of contaminated areas as CAMUs, which permit management of hazardous wastes on sites without triggering the land disposal or minimum technology requirements of RCRA. CAMUs may include areas of a site that are not contiguous to existing management units. The CAMU rule will be a federal ARAR, applicable at federal Superfund sites. Adoption of the CAMU rule by NYSDEC would allow on-site consolidation of materials without triggering land disposal restrictions or solid/hazardous land burial regulations. TSCA land burial regulations could still be applicable to disposal of materials containing 50 ppm PCBs or more, and a waiver could be required for on-site placement of these materials.

Compliance with SPDES regulations may be required for wastewater discharges occurring during implementation of, or resulting from, this remedial alternative. No permit is required for on-site discharges; a permit may be required for off-site discharges.

Conventional dust control procedures will be used during construction activities to achieve compliance with applicable air quality standards.

For materials transported off-site, containers will be lined with an impermeable liner that is chemically resistant to PCBs, and covered with a waterproof tarp to prevent entry of rainfall and to reduce the potential for fugitive emissions.

Temporary staging of materials may require a waiver from TSCA storage requirements. There are adequate grounds for a waiver under CERCLA because material staging is an interim measure necessary to facilitate remediation of the site.

Compliance with requirements of transportation regulations, OSHA, and TSCA marking and recordkeeping and reporting requirements will be achieved through conventional methods.

In order to be protective over the long term institutional controls on land use and access controls may be required.

Protection of Human Health and the Environment

These alternatives will isolate PCB contamination above action levels within the solid matrix formed by the stabilization/solidification process.

The risk assessment (Volume 2) shows that residual levels, including those within the retention ponds, pose no significant risk to human health.

After implementation, usage of the site would be required to be restricted to industrial use through means of a deed restriction. Off-site land use restrictions would not be required.

Short-Term Effectiveness

The remedial measures required by these alternatives could have potential short-term impacts, including exposure to workers and the nearby community resulting from dust generated during the excavation, transport, or stabilization of impacted material. Measures will be taken to minimize dust generation during these activities and an evaluation of potential emissions will be conducted to confirm that no unacceptable off-site exposures will occur. Potential exposure of the remediation workers to the soils will be controlled by the use of personnel protective equipment and proper decontamination procedures as specified by the Health and Safety Plan for the site. The Health and Safety Plan will be implemented and maintained by an on-site Health & Safety Officer, who will be present during the remediation.

During excavation of the drainage ditches dewatering will be required. This will be accomplished through diversion structures and pumping. If a rainfall event occurs which exceeds the ability to divert flow, some particulates may be released downstream. This potential problem will be mitigated by remediating upstream first and proceeding downstream.

Long-Term Effectiveness and Permanence

These remedial alternatives use stabilization/solidification to treat PCB-contaminated soil. This alternative is a reliable method for mitigating the future potential impacts to the environment and human health near or at the site by immobilizing the contaminants and by removing PCB materials from off-site areas. This remedial alternative is expected to provide protection to human health and environment. Long-term monitoring of groundwater will be required to assess effectiveness of remediation.

Reduction of Toxicity, Mobility, or Volume

Treatment of PCB-containing materials using stabilization/solidification will greatly limit mobility of the PCBs. No PCBs are irreversibly destroyed by these alternatives.

Implementability

These remedial alternatives can be implemented using readily available technologies. Administrative coordination with regulators during this remedial alternative should be normal. One TSCA landfill in New York State and several out-of-state TSCA landfills are available for disposal of NAPL-containing soils. The work tasks required for completion of this remedial alternative can be provided by multiple vendors so that competitive bids can be obtained.

Cost

The estimated cost of Alternative 7a is $5.8 million (Table 6-25). The estimated cost of Alternative 7b is $7.2 million (Table 6-26). The estimated cost of Alternative 7c is $6.6 million (Table 6-27).

7.0
RECOMMENDED REMEDIAL ALTERNATIVE

7.1 COMPARATIVE ANALYSIS OF ALTERNATIVES

As presented in Section 6, all 19 remedial alternatives evaluated in this Feasibility Study meet the threshold National Contingency Plan (NCP) criteria of protectiveness of human health and the environment and compliance with ARARs. These alternatives are compared below for the purpose of selecting the most appropriate remedial alternative(s) for the site. The alternatives were also scored following the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) on Selection of Remedial Actions at Inactive Hazardous Waste Sites (HWR-90-4030). The TAGM scoring is presented in Appendix B.

7.1.1 Balancing Criteria

The 19 remedial alternatives have been evaluated on the basis of the five primary NCP balancing criteria: short-term effectiveness; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume of hazardous substances; implementability; and cost.

The following discussion summarizes the comparative analysis of alternatives. To simplify this comparison, the remedial alternatives are grouped according to the primary technology employed as follows:

Off-site treatment or disposal (Alternatives 1a, 1b, 1c, 2a, 2b, 2c, 4a, and 4b)
On-site treatment (Alternatives 3a, 3b, and 3c)
On-site containment or stabilization/solidification (Alternatives 5a, 5b, 6a, 6b, 6c, 7a, 7b, and 7c)

Off-Site Treatment or Disposal

Off-site treatment or disposal alternatives considered include off-site incineration

(Alternatives 1a, 1b, and 1c) and disposal in an off-site TSCA-regulated landfill (Alternatives 2a, 2b, 2c, 4a, and 4b). These alternatives are equivalent with respect to remediation of the site, although they differ in that incineration offers permanent destruction of PCBs, while PCBs would not be destroyed for the land disposal alternatives. In spite of this benefit, off-site incineration has the disadvantage of being extremely costly for a similar degree of protection of human health and the environment. Furthermore, off-site PCB incineration capacity is extremely limited and a waiting period of several years would be required prior to treatment of NTC soils. On this basis, off-site incineration is dropped from further consideration.

Alternatives 4a and 4b include natural biodegradation of the retention pond sediments. This natural biodegradation has not yet been proven to effectively reduce concentrations of highly chlorinated PCBs such as Aroclor-1260. Therefore, with respect to the retention pond, removal of sediments above 10 ppm (Alternative 2c) would attain the action level more quickly. However, WCC recommends that bioremediation should be considered as a treatment alternative to more extensive excavation of the retention pond. On this basis, Alternatives 2a, 2b, and 2c are the off-site treatment or disposal alternatives retained for further analysis. Alternative 4b should be reconsidered if the State selects an action level lower than 10 ppm for the retention pond.

On-Site Treatment (Alternatives 3a, 3b, and 3c)

Thermal desorption was the on-site treatment alternative considered. It is protective of human health and the environment, and provides permanent destruction of PCBs. There are some implementability concerns, specifically the scarcity of treatment units. It is expected that a waiting period of 2 years will be required prior to unit availability for the NTC project. However, Alternatives 3a, 3b, and 3c were retained because they represent a permanent remedy at total costs similar to the off-site land disposal alternatives.

On-Site Containment or Stabilization/Solidification

On-site containment alternatives evaluated were Alternatives 5a, 5b, 6a, 6b, and 6c. All are protective of human health and the environment, but none irreversibly treat or destroy PCBs. These alternatives are the most cost effective and are equivalent to the off-site disposal alternatives with respect to protection of human health and the environment. Alternatives 5a and 5b present the same concerns as 4a and 4b with respect to the feasibility of bioremediation of the retention pond sediments. Therefore the containment alternatives retained for further analysis are 6a, 6b, and 6c. Alternative 5b should be reconsidered if the State selects an action level lower than 10 ppm.

On-site stabilization/solidification alternatives evaluated were Alternatives 7a, 7b, and 7c. These alternatives are protective of human health and the environment but do not irreversibly destroy PCBs. These alternatives are less costly than off-site land disposal and offer equivalent protection of human health and the environment. They are therefore retained for further consideration.

7.1.2 Modifying Criteria

State and community acceptance are NCP modifying criteria to be considered following evaluation of remedial alternatives using the balancing criteria. State acceptance will be assured since NYSDEC will select the remedial alternative for the site. Community acceptance of the various remedial alternatives is not known at this time. However, based on experience at other sites, and public input during the public meetings held during the NTC project, community acceptance would probably be greatest for the off-site land disposal alternatives and on-site thermal desorption alternatives, as they remove PCBs from the site vicinity. All alternatives will involve some disturbance to the community during implementation because all involve excavation of sediments from the off-site ditches.

The risk assessment (see Volume II) showed that off-site concentrations of 10 ppm are protective of human health. Therefore, the remaining alternatives designated with the "a" suffix (which provide action levels of 25 ppm on-site and 10 ppm off-site) were retained. Community acceptance considerations may indicate a lower clean-up level in the lower ditch and flood-prone areas. However, the lower level is not justified for the retention pond. Therefore, alternatives designated with the "c" suffix (which provide action levels of 10 ppm on-site and in the retention pond and 1 ppm for off-site ditches and flood-prone soils) are preferred over the alternatives designated with the "b" suffix (which provide action levels of 10 ppm on-site and 1 ppm for all off-site soils and sediment, including the retention pond). Based on the modifying criteria, alternatives designated with the "b" suffix were dropped from further consideration.

7.2 RECOMMENDED REMEDIAL ALTERNATIVE

Based upon the discussion above, the following list of alternatives are retained as candidate remedial alternatives:

Alternatives 2a and 2c:	Off-site disposal in a TSCA landfill
Alternatives 3a and 3c:	On-site thermal desorption
Alternatives 6a and 6c:	On-site containment
Alternatives 7a and 7c:	On-site stabilization/solidification

Alternatives 6a or 6c and 7a or 7c are the preferred alternatives because they offer the most cost effective site remediation and provide equivalent protection of human health and the environment at substantially lower cost than Alternatives 2a or 2c and 3a or 3c. WCC recommends that a flexible Record of Decision (ROD) be issued which allows NTC to select either Alternative 6 (a or c) or 7 (a and c) depending on the detailed design considerations.

8.0
LIMITATIONS

WCC's work is in accordance with our understanding of professional practice and environmental standards existing at the time the work was performed. Professional judgements presented are based on our evaluation of technical information gathered and on our understanding of site conditions and site history. Our analyses, interpretations, and judgements rendered are consistent with professional standards of care and skill ordinarily exercised by the consulting community and reflect the degree of conservatism WCC deems proper for this project at this time. Methods are constantly changing and it is recognized that standards may subsequently change because of improvements in the state of the practice.

Information used to prepare this report includes results from soil, surface water, and groundwater analyses collected by WCC. It is assumed that the reported results are representative of the general site conditions.

Information used to prepare this report includes a site-specific risk assessment. There is a high degree of uncertainty associated with evaluation of human health risks, since in many cases, data concerning the effects of chemicals on humans are limited. In keeping with general agency guidance, we have attempted to use conservative approaches in evaluating risks due to this uncertainty. In general, it is more likely that potential risks will be overstated than understated. However, it should be recognized that our understanding of human health risk is likely to improve over time, and that this assessment was based upon data available at the time the report was prepared.

Costs were estimated based on information provided by vendors and from standard construction cost literature. These estimates reflect costs at the time the report was prepared. Cost estimates were based on calculated soil volumes based upon data collected during the Remedial Investigation. These volumes are not known with high precision. Therefore, there is some uncertainty associated with the cost estimates presented in this report.

9.0
REFERENCES

Harkness, M.R., et. al. 1993. In-Situ Stimulation of Aerobic PCB Biodegradation in Hudson River Sediments. Science, Vol. 259, pp. 503-507. January 22, 1993.

New York State Department of Environmental Conservation (NYSDEC). Revised May 15, 1990. Technical and Administrative Guidance Memorandum on Selection of Remedial Actions at Hazardous Waste Sites (HWR-90-4030).

United States Environmental Protection Agency (USEPA). 1990. Guidance on remedial actions for Superfund sites with PCB contamination. EPA/540/G-90/007. August 1990.

United States Environmental Protection Agency (USEPA). 1991. Memorandum: "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions". OSWER Directive 9355.0-30, April 22, 1991.

Woodward-Clyde Consultants (WCC). 1992. Draft Remedial Investigation - Niagara Transformer Corporation. October 23, 1992.

Tables

TABLE 2-1
SUMMARY OF POTENTIAL CHEMICAL - SPECIFIC ARARs

Requirement	Applicable	Relevant and Appropriate	Comments
Safe Drinking Water Act 40CFR 141	No	No	A maximum contaminant level of 0.5 ppb (ug/l) for PCBs in water that is used as a public drinking water supply.
New York Groundwater Quality Standards 6 NYCRR Part 703.5	Yes	No	A standard for PCBs in class GA waters has been established at 0.1 μg/l. Groundwater Quality Standards are applicable to protection of bedrock groundwater.
New York Surface Water Quality Standards 6 NYCRR Part 701.19	No	Yes	A health-based standard exists for class AA and A fresh surface waters of 0.02 μg/l. A standard of 0.001 μg/l has been established for all classes of surface water for protection of aquatic life. No regulated surface water bodies are located on or adjacent to the Site.
New York Air Quality Standards 6 NYCRR Part 257	No	No	No air quality standard has been promulgated for PCBs; Air Quality Standards for other constituents may be applicable to specific remedial actions (see Table 2-5).

By: DCW
Checked By: JFR

TABLE 2-2
SUMMARY OF POTENTIAL LOCATION - SPECIFIC FEDERAL ARARs

Requirement	Applicable	Relevant and Appropriate	Comments
Protection of Floodplains E.O. 11988 40 CFR 6 App A	No	No	Remedial activities will not be conducted within a 100 year floodplain.
Protection of Wetlands E.O. 11990 40 CFR 6 App A 40 CFR 230	No	No	No lands meeting Federal Wetland criteria have been identified at the site.
Clean Water Act Section 404	No	No	No waters of the U.S. to be dredged or filled during remediation of the Site.
Rivers & Harbors Act 33 CFR 320-330	No	No	The Site is not within an area designated by this act.
Marine Protection, Research & Sanctuaries Act 33 CFR 324	No	No	The Site is not within an area designated by this act.
Farmland Protection Policy Act 7 CFR 658	No	No	No farmland exists on the Site, nor are proposed remedial alternatives anticipated to affect farmlands in the area.
Endangered Species Act 50 CFR 17/81/200/225/402	No	No	No endangered species or critical habitats exist on the Site and none are anticipated to be adversely impacted by remedial activities at the Site.
Wilderness Act 50 CFR 35	No	No	Site is not within a federally-owned wilderness area or an area designated as part of the National Wildlife Refuge System.
Coastal Zone Management Act 15 CFR 923/930 40 CFR 6.302(d)	No	No	The Site is not within an area designated by this act.
National Historic Preservation Act 33 CFR 60/63/65	No	No	The Site has no historic, architectural, archaeological, or cultural value, and is not listed on or eligible for listing on the National Register of Historic Places or the National Registry of Natural Landmarks.
Fish & Wildlife Coordination Act 30 CFR 320/330 40 CFR 6	No	No	The design of the remedial alternatives for the Site will prevent any negative impact to rivers or streams in the area.
Outer Continental Shelflands Act 33 CFR 322	No	No	The Site is not within an area designated by this act.
Ports & Waterways Safety Act	No	No	The Site is not within an area designated by this act.
Wild & Scenic Rivers Act 40 CFR 6.302(e)	No	No	The Site is not within an area designated by this act.
Archaeological and Historic Preservation Act 40 CFR 6.301(a)	No	No	No scientific, prehistoric, historic, or archaeological data exist at the Site.

TABLE 2-2 (Continued)
SUMMARY OF POTENTIAL LOCATION - SPECIFIC FEDERAL ARARs

	Applicable	Relevant and Appropriate	Comments
National Wildlife Refuge System 50 CFR 27	No	No	The Site is not within an area designated as a part of the National Wildlife Refuge System.

By: DCW
Checked By: JFR

TABLE 2-3
SUMMARY OF POTENTIAL LOCATION-SPECIFIC STATE ARARs

Requirement	Applicable	Relevant and Appropriate	Comments
Endangered and Threatened Species of Fish and Wildlife 6 NYCRR 182	No	No	Remedial alternatives are not anticipated to impact state designated areas.
Use and Protection of Waters 6 NYCRR 608	No	No	The design of the remedial alternatives for the Site will prevent any negative impacts to waters covered by this regulation.
Tidal Wetlands 6 NYCRR 660, 661	No	No	The Site is not within an area designated by this regulation.
Freshwater Wetlands 6 NYCRR 662 to 665	No	No	Remedial alternatives are not anticipated to impact state designated freshwater wetlands.
Historic Preservation 9 NYCRR 426	No	No	The Site has no historic, architectural, archaeological, or cultural value, and is not listed on either the National or State Registers.
Wild, Scenic, and Recreational Rivers System Act 6 NYCRR 666	No	No	No portion of the Site is designated as a wild, scenic or recreational river.
Floodplain Management Regulations Development Permits 6 NYCRR 500	No	No	The Site does not lie within a 100 year floodplain.
Coastal Erosion Management 6 NYCRR 505	No	No	The Site does not lie in a coastal erosion hazard area.

By: DCW
Checked By: JFR

TABLE 2-4
SUMMARY OF POTENTIAL ACTION-SPECIFIC FEDERAL ARARs

Requirement	Applicable	Relevant and Appropriate	Comments
Resource Conservation and Recovery Act (RCRA) 40 CFR 260-268	No	No	Establishes criteria and standards for solid and hazardous waste storage, treatment, and disposal. New York State has the authority to administer those RCRA requirements that may be applicable or relevant and appropriate to the site, and thus NYS Hazardous Waste Regulations will be considered.
Hazardous Materials Transportation Regulations 49 CFR 171-177	Yes	No	Regulates transportation of hazardous materials. Substantive requirements of these regulations would be applicable to any remedial alternative that involves the off-site transportation of hazardous materials.
Clean Water Act National Pollutant Discharge Elimination System 40 CFR Part 122	No	Yes	Requires permits for the discharge of any pollutants from any point source into waters of the United States. The substantive requirements of these regulations would be applicable to actions involving disturbance of greater than 5 acres, including capping, which result in off-site stormwater discharges.
Toxic Substances Control Act			
Incinerator Requirements 40 CFR 761.70	Yes	No	Applies to incineration of liquids containing PCBs ≥ 50 ppm, and may apply to PCB containing soils or other non-liquids
Alternative Treatment 40 CFR 761.60	Yes	No	Specifies level of performance for PCB treatment methods other than incineration
Chemical Waste Landfill 40 CFR 761.75	Yes	No	Applies to disposal of soils containing PCBs ≥ 50 ppm in or on the land.
Storage 40 CFR 761.65	Yes	No	TSCA storage requirements may be applicable to storage of PCB materials on site during remediation.
Marking 40 CFR 761.40	Yes	No	Regulates marking of containers containing PCB materials.
Waste Disposal Records and Reports 40 CFR 761.202-218	Yes	No	Requires manifesting for transportation of PCB wastes and reporting of PCB disposal.

By: DCW
Checked By: JFR

TABLE 2-5
SUMMARY OF POTENTIAL ACTION-SPECIFIC STATE ARARs

Requirement	Applicable	Relevant and Appropriate	Comments
Identification and Listing of Hazardous Wastes 6 NYCRR 371	Yes	No	Regulations identifying and listing materials that are considered hazardous waste under State law. Under State law, PCBs ≥ 50 ppm are considered hazardous waste when discarded.
Hazardous Waste Manifest System Regulations 6 NYCRR 372	Yes	No	Establishes standards for generators and transporters of hazardous wastes and TSD facilities relating to use of the manifest system. Substantive requirements of these regulations would be applicable to any remedial alternative that involves the off-site transportation of hazardous waste.
Hazardous Waste Container Standards 6 NYCRR 373-2.9	Yes	No	Establishes standards for container storage of hazardous wastes. Substantive requirements of these regulations would be applicable to any remedial alternative that involves container storage of hazardous waste.
Waste Piles 6 NYCRR 373-2.12	No	Yes	Requires prevention of migration of hazardous constituents to soil or groundwater. May be relevant to alternatives involving storage of soils in piles.
Land Burial 6 NYCRR 373-2.14	Yes	No	Applicable to disposal of soils containing ≥ 50 ppm of PCBs.
Groundwater Monitoring 6 NYCRR 373-2.6	No	Yes	Relevant as guidance for any alternative involving ground water monitoring.
Land Disposal Restrictions 6 NYCRR 376	Yes	No	Applicable to any alternative involving disposal of PCBs ≥ 50 ppm in New York State.
Closure/Post-Closure Case 6 NYCRR 373-2.7 and 2.14(b)	No	Yes	Closure/Post-closure provision may be relevant for alternatives leaving soil ≥ 50 ppm PCB in place.
Inactive Hazardous Waste Sites 6 NYCRR 375	Yes	No	Site is listed as an inactive waste site. This regulation allows the State to waive state permits for remedial alternatives conducted at the Site.
Solid Waste Regulations 6 NYCRR 360	No	Yes	May be relevant to on-site backfilling of treated soil, unless a waiver is obtained. May be relevant and appropriate to containment of soils containing low concentration PCBs.
New York Air Quality Standards 6 NYCRR Part 257	Yes	No	Remedial activities must comply with substantive requirements of these regulations.

TABLE 2-5 (continued)
SUMMARY OF POTENTIAL ACTION-SPECIFIC STATE ARARs

Requirement	Applicable	Relevant and Appropriate	Comments
New York Air Quality Emission Limits 6 NYCRR Part 212	Yes	No	Defines percent removal required of air pollution control devices based on the environmental rating assigned for each contaminant emitted. Remedial activities must comply with the substantial requirements of these regulations.
New York Groundwater Quality Standards 6 NYCRR Part 703.5	Yes	No	May be applicable to any alternative requiring monitoring of groundwater.
State Pollution Discharge Elimination System 6 NYCRR 750-758	Yes	No	Applicable to alternatives requiring discharge of treated water to waters of the State.
New York Thermal Treatment 6 NYCRR 373-3.16	Yes	No	Operating, waste analysis, monitoring, inspection and closure requirements of this subpart will be applicable to remedial alternatives that include thermal desorption.
New York Wastewater Treatment Units 6 NYCRR 373-1.1(d)(1)(xii)	No	Yes	May be relevant to remedial alternatives that use long-term pump and treat for impacted groundwater.

By: DCW
Checked By: JFR

TABLE 2-6
SUMMARY OF MISCELLANEOUS TBCs

Guidance Document	Description	Comments
Guidance on Remedial Actions for Superfund sites with PCB contamination (EPA/540/G-90/007).	Identifies "principal threats: as soils containing > 100 ppm in residential areas and > 500 ppm in industrial areas.	Containment is generally considered appropriate remedy for soils which are not principal threats.
	Generic risk assessment indicates initial action level of 1 ppm PCBs for non-restricted sites and 10-25 ppm for industrial/remote sites; states that 10-25 ppm would be protective for unrestricted sites.	Guidance recognizes that generic risk assessment is conservative for many site, and higher action levels may be protective.
	Provides conceptual designs for PCB containment systems, including cap designs.	Potentially relevant to design of on-site capping/consolidation alternatives.
	Defines industrial/remote sites as those more than 0.1 km from residential/commercial areas, or where access is limited by natural or man-made barriers (e.g., cliffs or fences).	Potentially relevant to on-site containment alternatives.
PCB Spill Policy	Provides guidance for cleanup of PCB spills occurring after May 4, 1987. Identifies industrial/remote sites as those more than 0.1 km from residential/commercial areas, and where access is limited by natural or man-made barriers (e.g., cliffs of fences).	Cleanup levels may be relevant as guidance.
Draft Guidelines for Permit Applications and Demonstrations - Test Plans for PCB Disposal by Non-Thermal Alternative Treatment Methods (USEPA, Aug. 21, 1986)	Guidelines for acceptable alternative treatment for PCBs	This guidance would be relevant to a remedial alternative that treats PCBs by an alternative treatment method.
Verification of PCB Spill Cleanup by Sampling and Analysis (EPA-56015-85-026)	Guidance for PCB sampling and analysis	This guidance would be relevant for remedial alternatives that excavate impacted soil for treatment or disposal.
New York State Air Guide-1 (Draft 1991 Edition)	Guidance for the establishment of ambient guideline concentrations and short-term ambient guideline concentrations at receptor locations	This guidance would be relevant for remedial alternatives that treat PCBs by a process that generates air emissions.
NYSDEC Technical Administrative Guidance Memorandum (TAGM) #446 - Determination of Soil Cleanup Objectives and Cleanup Levels	Provides guidance for determination of soil cleanup levels	Cleanup levels may be relevant as guidance
NYSDEC Cleanup Criteria for Aquatic Sediments	Provides guidance for cleanup criteria for aquatic sediments	Cleanup levels may be relevant as guidance.

TABLE 5-1

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 1a, 1b, and 1c NIAGARA TRANSFORMER FEASIBILITY STUDY

SOIL AND SEDIMENT REMEDIATION

Area 1 (NTC Property):

- Excavation of soil above the action level will entail excavation depths of up to 8 feet (depending on the RAO applied), with limited hot spot excavations up to 16 feet adjacent to the east-west ditch near the southwest corner of the site. Soil and sediment above 50 ppm PCB content will be incinerated at an off-site facility. Soil and sediment below 50 ppm PCB content will be disposed of at an off-site landfill.

- Dewatering and groundwater treatment during excavations.

- Backfilling, grading, and reseeding excavated areas.

- Implementation of new drainage plan for the site to eliminate underground drains in the rear parking lot.

- Estimated soil volumes from Area 1:

Alternative 1a:	9,500 cubic yards for incineration 2,920 cubic yards for land disposal
Alternative 1b:	9,500 cubic yards for incineration 5,600 cubic yards for land disposal
Alternative 1c:	Same as Alternative 1b

Area 2 (Upper Ditch and Adjacent Flood-Prone Soils)

- Excavation of soil above the action level will likely entail excavation depths up to 3 feet at the more highly contaminated areas. Soil and sediment above 50 ppm PCB content will be incinerated at an off-site facility. Excavated soil and sediment below 50 ppm PCB content will be disposed of at an off-site landfill.

TABLE 5-1 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 1a, 1b, and 1c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Backfill grading and seeding as needed.

- Estimated soil volumes from Area 2:

  Alternative 1a: 950 cubic yards for incineration
  740 cubic yards for land disposal
  Alternative 1b: 950 cubic yards for incineration
  1,195 cubic yards for land disposal
  Alternative 1c: Same as Alternative 1b

Area 3 (Retention Pond)

- Excavation of sediment above the action level will likely entail excavation of up to approximately 1.5 feet in the most contaminated area. All excavated sediment is expected to be less than 50 ppm and would be disposed of at an off-site landfill.

- The pond will need to be drained and the sediments may require stabilization prior to shipment.

- Estimated sediment volumes from Area 3:

  Alternative 1a: 200 cubic yards for land disposal
  Alternative 1b: 2,500 cubic yards for land disposal
  Alternative 1c: 200 cubic yards for land disposal

TABLE 5-1 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 1a, 1b, and 1c NIAGARA TRANSFORMER FEASIBILITY STUDY

Areas 4 (Lower Ditch - East of Kennedy Road)

- Excavation of sediment above the action level will likely entail excavation of up to 2 feet in the most contaminated area. Soil and sediment above 50 ppm PCB content will be incinerated at an off-site facility. Excavated soil below 50 ppm PCB content will be disposed at an off-site landfill.

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Some sediment stabilization may be required prior to shipment.

- Estimated soil volumes from Area 4:

Alternative 1a:	25 cubic yards for incineration 325 cubic yards for land disposal
Alternative 1b:	25 cubic yards for incineration 625 cubic yards for land disposal
Alternative 1c:	Same as Alternative 1b

Area 5 (Lower Ditch - West of Kennedy Road)

- Excavation of soil and sediment above the action level will likely entail excavation of up to approximately 0.5 feet of soil. All excavated sediment is expected to contain less than 50 ppm PCBs and would be disposed of at an off-site landfill.

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Some sediment stabilization may be required prior to shipment.

TABLE 5-1 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 1a, 1b, and 1c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Estimated soil volumes from Area 5:

  Alternative 1a: 370 cubic yards for land disposal
  Alternative 1b: 830 cubic yards for land disposal
  Alternative 1c: Same as Alternative 1b

Area 6 (Pipe Beneath Railroad)

- The pipe will be flushed of sediment, which will be collected. It was assumed for the FS that sediment removed from the pipe will contain less than 50 ppm PCBs and would be land disposed.
- Water generated during the cleaning would be collected and treated.
- Some sediment stabilization may be required prior to shipment.
- The pipe will likely have to be broken at one or more locations along its run due to lack of access for cleaning equipment.
- Estimated soil volumes from Area 6:

  Alternative 1a: 80 cubic yards for land disposal
  Alternative 1b: 80 cubic yards for land disposal
  Alternative 1c: Same as Alternative 1b

Area 7 (Eastern Portion of St. Adalbert's Cemetery)

- Cemetery soils bordering the NTC property will be excavated to a depth of approximately 0.5 to 1 foot. Soil above 50 ppm PCB content will be incinerated at an off-site facility. Excavated soil below 50 ppm PCB content will be disposed of at an off-site landfill.

TABLE 5-1 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 1a, 1b, and 1c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Estimated soil volumes from Area 7:

Alternative 1a:	40 cubic yards for incineration 40 cubic yards for land disposal
Alternative 1b:	40 cubic yards for incineration 220 cubic yards for land disposal
Alternative 1c:	Same as Alternative 1b

Total Soil Volumes

Alternative 1a

Incineration:	10,515 cubic yards
Land Disposal:	4,675 cubic yards

Alternative 1b

Incinerator:	10,515 cubic yards
Land Disposal:	11,050 cubic yards

Alternative 1c

Incineration:	10,515 cubic yards
Land Disposal:	8,750 cubic yards

GROUNDWATER REMEDIATION

- Groundwater RAO to be achieved by excavating contaminated soil, and dewatering and groundwater treatment during the on-site excavations.

- Temporary treatment system will require a system to remove solids followed by granular activated carbon units in series.

TABLE 5-2

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 2a, 2b, and 2c NIAGARA TRANSFORMER FEASIBILITY STUDY

SOIL AND SEDIMENT REMEDIATION

Area 1 (NTC Property):

- Excavation of soil above the action level will entail excavation depths of up to 8 feet (depending on the RAO applied), with limited hot spot excavations up to 16 feet adjacent to the east-west ditch near the southwest corner of the site. Excavated soil and sediment will be disposed of at an off-site landfill. NAPL-contaminated soil will be stabilized or treated (off-site) prior to disposal.

- Dewatering and groundwater treatment during excavations.

- Backfilling, grading, and reseeding excavated areas.

- Implementation of new drainage plan for the site to eliminate underground drains in the rear parking lot.

- Estimated soil volumes from Area 1:

Alternative 2a:	12,420 cubic yards for land disposal
Alternative 2b:	15,100 cubic yards for land disposal
Alternative 2c:	Same as Alternative 2b

Area 2 (Upper Ditch and Adjacent Flood-Prone Soils)

- Excavation of soil above the action level will likely entail excavation depths up to 3 feet at the more highly contaminated areas. Excavated soil and sediment will be disposed of at an off-site landfill.

TABLE 5-2 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 2a, 2b, and 2c
NIAGARA TRANSFORMER FEASIBILITY STUDY

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Backfilling, grading and seeding as needed.

- Estimated soil volumes from Area 2:

  Alternative 2a: 1,690 cubic yards for land disposal
  Alternative 2b: 2,145 cubic yards for land disposal
  Alternative 2c: Same as Alternative 2b

Area 3 (Retention Pond)

- Excavation of sediment above the action level will likely entail excavation of up to approximately 1.5 feet in the most contaminated area. All excavated sediment would be disposed of at an off-site landfill.

- The pond will need to be drained and the sediments may require stabilization prior to shipment.

- Estimated sediment volumes from Area 3:

  Alternative 2a: 200 cubic yards for land disposal
  Alternative 2b: 2,500 cubic yards for land disposal
  Alternative 2c: 200 cubic yards for land disposal

TABLE 5-2 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 2a, 2b, and 2c
NIAGARA TRANSFORMER FEASIBILITY STUDY

Areas 4 (Lower Ditch - East of Kennedy Road)

- Excavation of sediment above the action level will likely entail excavation of up to 2 feet in the most contaminated area. Excavated soil and sediment will be disposed at an off-site landfill.
- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.
- Some sediment stabilization may be required prior to shipment.
- Estimated soil volumes from Area 4:

Alternative 2a:	350 cubic yards for land disposal
Alternative 2b:	650 cubic yards for land disposal
Alternative 2c:	Same as Alternative 2b

Area 5 (Lower Ditch - West of Kennedy Road)

- Excavation of soil and sediment above the action level will likely entail excavation of up to approximately 0.5 feet of soil. All excavated soil and sediment would be disposed of at an off-site landfill.
- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.
- Some sediment stabilization may be required prior to shipment.

TABLE 5-2 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 2a, 2b, and 2c
NIAGARA TRANSFORMER FEASIBILITY STUDY

- Estimated soil volumes from Area 5:

  Alternative 2a: 370 cubic yards for land disposal
  Alternative 2b: 830 cubic yards for land disposal
  Alternative 2c: Same as Alternative 2b

Area 6 (Pipe Beneath Railroad)

- The pipe will be flushed of sediment, which will be collected. Sediment removed from the pipe would be land disposed.
- Water generated during the cleaning would be collected and treated.
- Some sediment stabilization may be required prior to shipment.
- The pipe will likely have to be broken at one or more locations along its run due to lack of access for cleaning equipment.
- Estimated soil volumes from Area 6:

  Alternative 2a: 80 cubic yards for land disposal
  Alternative 2b: 80 cubic yards for land disposal
  Alternative 2c: Same as Alternative 2b

Area 7 (Eastern Portion of St. Adalbert's Cemetery)

- Cemetery soils bordering the NTC property will be excavated to a depth of approximately 0.5 to 1 foot. Excavated soil will be disposed of at an off-site landfill.

TABLE 5-2 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 2a, 2b, and 2c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Estimated soil volumes from Area 7:

  Alternative 2a: 80 cubic yards for land disposal
  Alternative 2b: 260 cubic yards for land disposal
  Alternative 2c: Same as Alternative 2b

Total Soil Volumes

Alternative 2a

Land Disposal: 15,190 cubic yards

Alternative 2b

Land Disposal: 21,565 cubic yards

Alternative 2c

Land Disposal: 19,265 cubic yards

GROUNDWATER REMEDIATION

- Groundwater RAO to be achieved by excavating contaminated soil, and dewatering and groundwater treatment during the on-site excavations.
- Temporary treatment system will require a system to remove solids followed by granular activated carbon units in series.

TABLE 5-3

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 3a, 3b, and 3c NIAGARA TRANSFORMER FEASIBILITY STUDY

SOIL AND SEDIMENT REMEDIATION

Area 1 (NTC Property):

- Excavation of soil above the action level will entail excavation depths of up to 8 feet (depending on the RAO applied), with limited hot spot excavations up to 16 feet adjacent to the east-west ditch near the southwest corner of the site. Soil and sediment content will be excavated, treated by thermal desorption, and left on site.
- Dewatering and groundwater treatment during excavations.
- Backfilling, grading, and reseeding excavated areas.
- Implementation of new drainage plan for the site to eliminate underground drains in the rear parking lot.
- Estimated soil volumes from Area 1:

Alternative 3a:	12,420 cubic yards for thermal desorption
Alternative 3b:	15,100 cubic yards for thermal desorption
Alternative 3c:	Same as Alternative 3b

Area 2 (Upper Ditch and Adjacent Flood-Prone Soils)

- Excavation of soil above the action level will likely entail excavation depths up to 3 feet at the more highly contaminated areas. Excavated soil and sediment will be treated by thermal desorption, and left on-site.

TABLE 5-3 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 3a, 3b, and 3c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.
- Backfilling, grading and seeding as needed.
- Estimated soil volumes from Area 2:

Alternative 3a:	1,690 cubic yards for thermal desorption
Alternative 3b:	2,145 cubic yards for thermal desorption
Alternative 3c:	Same as Alternative 3b

<u>Area 3 (Retention Pond)</u>

- Excavation of sediment above the action level will likely entail excavation of up to approximately 1.5 feet in the most contaminated area. All excavated sediment would be treated by thermal desorption, and left on-site.
- The pond will need to be drained.
- Estimated sediment volumes from Area 3:

Alternative 3a:	200 cubic yards for thermal desorption
Alternative 3b:	2,500 cubic yards for thermal desorption
Alternative 3c:	200 cubic yards for thermal desorption

TABLE 5-3 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 3a, 3b, and 3c NIAGARA TRANSFORMER FEASIBILITY STUDY

Areas 4 (Lower Ditch - East of Kennedy Road)

- Excavation of sediment above the action level will likely entail excavation of up to 2 feet in the most contaminated area. Excavated soil and sediment will be treated by thermal desorption.

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Estimated soil volumes from Area 4:

Alternative 3a:	350 cubic yards for thermal desorption
Alternative 3b:	650 cubic yards for thermal desorption
Alternative 3c:	Same as Alternative 3b

Area 5 (Lower Ditch - West of Kennedy Road)

- Excavation of soil and sediment above the action level will likely entail excavation of up to approximately 0.5 feet of soil. All excavated sediment would be treated by thermal desorption.

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

TABLE 5-3 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 3a, 3b, and 3c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Estimated soil volumes from Area 5:

Alternative 3a:	370 cubic yards for thermal desorption
Alternative 3b:	830 cubic yards for thermal desorption
Alternative 3c:	Same as Alternative 3b

Area 6 (Pipe Beneath Railroad)

- The pipe will be flushed of sediment, which will be collected. Sediment removed from the pipe would be treated by thermal desorption.

- Water generated during the cleaning would be collected and treated.

- The pipe will likely have to be broken at one or more locations along its run due to lack of access for cleaning equipment.

- Estimated soil volumes from Area 6:

Alternative 3a:	80 cubic yards for thermal desorption
Alternative 3b:	80 cubic yards for thermal desorption
Alternative 3c:	Same as Alternative 3b

Area 7 (Eastern Portion of St. Adalbert's Cemetery)

- Cemetery soils bordering the NTC property will be excavated to a depth of approximately 0.5 to 1 foot. Excavated soil will be treated by thermal desorption.

TABLE 5-3 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 3a, 3b, and 3c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Estimated soil volumes from Area 7:

  Alternative 3a: 80 cubic yards for thermal desorption
  Alternative 3b: 260 cubic yards for thermal desorption
  Alternative 3c: Same as Alternative 3b

Total Soil Volumes

Alternative 3a

Thermal Desorption: 15,190 cubic yards

Alternative 3b

Thermal Desorption: 21,565 cubic yards

Alternative 3c

Thermal Desorption: 19,265 cubic yards

GROUNDWATER REMEDIATION

- Groundwater RAO to be achieved by excavating contaminated soil, and dewatering and groundwater treatment during the on-site excavations.

- Temporary treatment system will require a system to remove solids followed by granular activated carbon units in series.

TABLE 5-4

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 4a and 4b NIAGARA TRANSFORMER FEASIBILITY STUDY

SOIL AND SEDIMENT REMEDIATION

Area 1 (NTC Property):

- Excavation of soil above the action level will entail excavation depths of up to 8 feet (depending on the RAO applied), with limited hot spot excavations up to 16 feet adjacent to the east-west ditch near the southwest corner of the site. Soil and sediment will be disposed of at an off-site landfill. NAPL-contaminated soil will be stabilized or treated (off-site) prior to disposal.

- Dewatering and groundwater treatment during excavations.

- Backfilling, grading, and reseeding excavated areas.

- Implementation of new drainage plan for the site to eliminate underground drains in the rear parking lot.

- Estimated soil volumes from Area 1:

Alternative 4a:	12,420 cubic yards for land disposal
Alternative 4b:	15,100 cubic yards for land disposal

Area 2 (Upper Ditch and Adjacent Flood-Prone Soils)

- Excavation of soil above the action level will likely entail excavation depths up to 3 feet at the more highly contaminated areas. Excavated soil and sediment will be disposed of at an off-site landfill.

TABLE 5-4 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 4a and 4b NIAGARA TRANSFORMER FEASIBILITY STUDY

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Backfilling, grading, and reseeding as needed.

- Estimated soil volumes from Area 2:

  Alternative 4a: 1,690 cubic yards for land disposal
  Alternative 4b: 2,145 cubic yards for land disposal

Area 3 (Retention Pond)

- Sediments will be left in place and bioremediated.

- Estimated sediment volumes in Area 3:

  Alternative 4a: 200 cubic yards for bioremediation
  Alternative 4b: 2,500 cubic yards for bioremediation

Areas 4 (Lower Ditch - East of Kennedy Road)

- Excavation of sediment above the action level will likely entail excavation of up to 2 feet in the most contaminated area. Excavated soil and sediment will be disposed of at an off-site landfill.

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Some sediment stabilization may be required prior to shipment.

- Estimated soil volumes from Area 4:

  Alternative 4a: 350 cubic yards for land disposal
  Alternative 4b: 650 cubic yards for land disposal

TABLE 5-4 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 4a and 4b NIAGARA TRANSFORMER FEASIBILITY STUDY

Area 5 (Lower Ditch - West of Kennedy Road)

- Excavation of soil and sediment above the action level will likely entail excavation of up to approximately 0.5 feet of soil. All excavated sediment would be disposed of at an off-site landfill.

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Some sediment stabilization may be required prior to shipment.

- Estimated soil volumes from Area 5:

Alternative 4a:	370 cubic yards for land disposal
Alternative 4b:	830 cubic yards for land disposal

Area 6 (Pipe Beneath Railroad)

- The pipe will be flushed of sediment, which will be collected. Sediment removed from the pipe would be land disposed.

- Water generated during the cleaning would be collected and treated.

- Some sediment stabilization may be required prior to shipment.

- The pipe will likely have to be broken at one or more locations along its run due to lack of access for cleaning equipment.

- Estimated soil volumes from Area 6:

Alternative 4a:	80 cubic yards for land disposal
Alternative 4b:	80 cubic yards for land disposal

TABLE 5-4 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 4a and 4b NIAGARA TRANSFORMER FEASIBILITY STUDY

Area 7 (Eastern Portion of St. Adalbert's Cemetery)

- Cemetery soils bordering the NTC property will be excavated to a depth of approximately 0.5 to 1 foot. Excavated soil will be disposed of at an off-site landfill.

- Estimated soil volumes from Area 7:

  Alternative 4a: 80 cubic yards for land disposal
  Alternative 4b: 260 cubic yards for land disposal

Total Soil Volumes

Alternative 4a

Bioremediation: 200 cubic yards
Land Disposal: 14,990 cubic yards

Alternative 4b

Bioremediation: 2,500 cubic yards
Land Disposal: 19,065 cubic yards

GROUNDWATER REMEDIATION

- Groundwater RAO to be achieved by excavating contaminated soil, and dewatering and groundwater treatment during the on-site excavations.

- Temporary treatment system will require a system to remove solids followed by granular activated carbon units in series.

TABLE 5-5

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 5a and 5b
NIAGARA TRANSFORMER FEASIBILITY STUDY

SOIL AND SEDIMENT REMEDIATION

Area 1 (NTC Property):

- Excavation of NAPL-contaminated soil will entail excavation depths of up to 16 feet. NAPL-contaminated soils will be stabilized or treated prior to disposal.
- Installation of composite cap and circumferential slurry wall.
- Long-term dewatering and groundwater treatment inside slurry wall.
- Dewatering and groundwater treatment during excavations.
- Implementation of new drainage plan for the site to eliminate or redirect drainage in the north-south ditch.
- Estimated soil volumes from Area 1:

Alternative 5a:	375 cubic yards for off-site land disposal
Alternative 5b:	375 cubic yards for off-site land disposal

Area 2 (Upper Ditch and Adjacent Flood-Prone Soils)

- Excavation of soil above the action level will likely entail excavation depths up to 3 feet at the more highly contaminated areas. Soil and sediment above 50 ppm PCB content will be disposed of at an off-site facility. Excavated soil and sediment below 50 ppm PCB content will be disposed of under the on-site composite cap.

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 5a and 5b NIAGARA TRANSFORMER FEASIBILITY STUDY

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.
- Backfilling, grading, and reseeding as needed.
- Estimated soil volumes from Area 2:

Alternative 5a:	950 cubic yards for off-site land disposal 740 cubic yards for on-site containment
Alternative 5b:	950 cubic yards for off-site land disposal 1,195 cubic yards for on-site containment

Area 3 (Retention Pond)

- All contaminated sediment would be bioremediated and left in place.
- Estimated sediment volumes in Area 3:

Alternative 5a:	200 cubic yards for bioremediation
Alternative 5b:	2,500 cubic yards for bioremediation

Areas 4 (Lower Ditch - East of Kennedy Road)

- Excavation of sediment above the action level will likely entail excavation of up to 2 feet in the most contaminated area. Soil and sediment above 50 ppm PCB content will be disposed of at an off-site landfill. Excavated soil below 50 ppm PCB content will be disposed of under the on-site composite cap.
- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

TABLE 5-5 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 5a and 5b NIAGARA TRANSFORMER FEASIBILITY STUDY

- Some sediment stabilization may be required prior to shipment.

- Estimated soil volumes from Area 4:

Alternative 5a:	25 cubic yards for off-site land disposal 325 cubic yards for on-site containment
Alternative 5b:	25 cubic yards for off-site land disposal 625 cubic yards for on-site containment

Area 5 (Lower Ditch - West of Kennedy Road)

- Excavation of soil and sediment above the action level will likely entail excavation of up to approximately 0.5 feet of soil. All excavated sediment is expected to be less than 50 ppm and would be disposed of under the on-site composite cap.

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Some sediment stabilization may be required prior to shipment.

- Estimated soil volumes from Area 5:

Alternative 5a:	370 cubic yards for on-site fill
Alternative 5b:	830 cubic yards for on-site fill

TABLE 5-5 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 5a and 5b NIAGARA TRANSFORMER FEASIBILITY STUDY

Area 6 (Pipe Beneath Railroad)

- The pipe will be flushed of sediment, which will be collected. Sediment removed from the pipe would be land disposed off-site.
- Water generated during the cleaning would be collected and treated.
- Some sediment stabilization may be required prior to shipment.
- The pipe will likely have to be broken at one or more locations along its run due to lack of access for cleaning equipment.
- Estimated soil volumes from Area 6:

Alternative 5a: 80 cubic yards for off-site land disposal
Alternative 5b: 80 cubic yards for off-site land disposal

Area 7 (Eastern Portion of St. Adalbert's Cemetery)

- Cemetery soils bordering the NTC property will be excavated to a depth of approximately 0.5 to 1 foot. Soil above 50 ppm PCB content will be disposed of at an off-site landfill. Excavated soil below 50 ppm PCB content will be disposed of under the on-site composite cap.
- Estimated soil volumes from Area 7:

Alternative 5a: 40 cubic yards for off-site land disposal
40 cubic yards for on-site containment
Alternative 5b: 40 cubic yards for off-site land disposal
220 cubic yards for on-site containment

TABLE 5-5 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 5a and 5b NIAGARA TRANSFORMER FEASIBILITY STUDY

Total Soil Volumes

Alternative 5a

Off-Site Landfill:	1,470 cubic yards
On-Site Containment (From Off-Site):	1,475 cubic yards
Bioremediation:	200 cubic yards

Alternative 5b

Off-Site Landfill:	1,470 cubic yards
On-Site Containment (From Off-Site):	2,870 cubic yards
Bioremediation:	2,500 cubic yards

GROUNDWATER REMEDIATION

- Groundwater RAO to be achieved by excavating contaminated off-site sediments, soil, and long-term dewatering inside the on-site slurry wall with on-site groundwater treatment.

TABLE 5-6

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 6a, 6b, and 6c NIAGARA TRANSFORMER FEASIBILITY STUDY

SOIL AND SEDIMENT REMEDIATION

Area 1 (NTC Property):

- Excavation of NAPL-contaminated soil above the action level will entail excavation depths of up to 16 feet. NAPL-contaminated soils will be stabilized or treated prior to disposal.

- Installation of composite cap and circumferential slurry wall.

- Long-term dewatering and groundwater treatment inside slurry wall.

- Dewatering and groundwater treatment during excavations.

- Implementation of new drainage plan for the site to eliminate or redirect drainage in the north-south ditch.

- Estimated soil volumes from Area 1 to be disposed off-site:

Alternative 6a:	375 cubic yards for off-site land disposal.
Alternative 6b:	375 cubic yards for off-site land disposal.
Alternative 6c:	375 cubic yards for off-site land disposal.

Area 2 (Upper Ditch and Adjacent Flood-Prone Soils)

- Excavation of soil above the action level will likely entail excavation depths up to 3 feet at the more highly contaminated areas. Soil and sediment above 50 ppm PCB content will be disposed of at an off-site landfill. Excavated soil and sediment below 50 ppm PCB content will be disposed of under the on-site composite cap.

TABLE 5-6 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 6a, 6b, and 6c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Backfilling, grading, and reseeding as needed.

- Estimated soil volumes from Area 2:

Alternative 6a:	950 cubic yards for off-site land disposal 740 cubic yards for on-site containment
Alternative 6b:	950 cubic yards for off-site land disposal 1,195 cubic yards for on-site containment
Alternative 6c:	Same as Alternative 6b

Area 3 (Retention Pond)

- Excavation of sediment above the action level will likely entail excavation of up to approximately 1.5 feet in the most contaminated area. All excavated sediment would be disposed of at an off-site landfill.

- The pond will need to be drained and the sediments may require stabilization prior to shipment.

- Estimated sediment volumes from Area 3:

Alternative 6a:	200 cubic yards for on-site containment
Alternative 6b:	2,500 cubic yards for on-site containment
Alternative 6c:	200 cubic yards for on-site containment

TABLE 5-6 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 6a, 6b, and 6c NIAGARA TRANSFORMER FEASIBILITY STUDY

Areas 4 (Lower Ditch - East of Kennedy Road)

- Excavation of sediment above the action level will likely entail excavation of up to 2 feet in the most contaminated area. Soil and sediment above 50 ppm PCB content will be disposed of at an off-site landfill. Excavated soil below 50 ppm PCB content will be disposed under the on-site composite cap.

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Some sediment stabilization may be required prior to shipment.

- Estimated soil volumes from Area 4:

Alternative 6a:	25 cubic yards for off-site land disposal 325 cubic yards for on-site containment
Alternative 6b:	25 cubic yards for off-site land disposal 625 cubic yards for on-site containment
Alternative 6c:	Same as Alternative 6b

Area 5 (Lower Ditch - West of Kennedy Road)

- Excavation of soil and sediment above the action level will likely entail excavation of up to approximately 0.5 feet of soil. All excavated sediment is expected to be less than 50 ppm and would be disposed of under the on-site composite cap.

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Some sediment stabilization may be required prior to shipment.

- Estimated soil volumes from Area 5:

Alternative 6a:	370 cubic yards for on-site containment
Alternative 6b:	830 cubic yards for on-site containment
Alternative 6c:	Same as Alternative 6b

Area 6 (Pipe Beneath Railroad)

- The pipe will be flushed of sediment, which will be collected. It was assumed for the FS that sediment removed from the pipe will contain less than 50 ppm PCBs and would be suitable for on-site containment.

- Water generated during the cleaning would be collected and treated.

- Some sediment stabilization may be required prior to shipment.

- The pipe will likely have to be broken at one or more locations along its run due to lack of access for cleaning equipment.

- Estimated soil volumes from Area 6:

Alternative 6a:	80 cubic yards for off-site land disposal
Alternative 6b:	80 cubic yards for off-site land disposal
Alternative 6c:	Same as Alternative 6b

Area 7 (Eastern Portion of St. Adalbert's Cemetery)

- Cemetery soils bordering the NTC property will be excavated to a depth of approximately 0.5 to 1 foot. Soil above 50 ppm PCB content will be disposed of at an off-site landfill. Excavated soil below 50 ppm PCB content will be disposed of under the on-site composite cap.

TABLE 5-6 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 6a, 6b, and 6c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Estimated soil volumes from Area 7:

  Alternative 6a: 40 cubic yards for off-site land disposal
  40 cubic yards for on-site containment
  Alternative 6b: 40 cubic yards for off-site land disposal
  220 cubic yards for on-site containment
  Alternative 6c: Same as Alternative 6b

<u>**Total Soil Volumes**</u>

Alternative 6a

Off-Site Land Disposal: 1,470 cubic yards
On-Site Containment (From Off-Site): 1,675 cubic yards

Alternative 6b

Off-Site Land Disposal: 1,470 cubic yards
On-Site Containment (From Off-Site): 5,370 cubic yards

Alternative 6c

Off-Site Land Disposal: 1,470 cubic yards
On-Site Containment (From Off-Site): 3,070 cubic yards

GROUNDWATER REMEDIATION

- Groundwater RAO to be achieved by excavating contaminated off-site sediments and soil, and long-term dewatering and groundwater treatment inside the on-site slurry wall.

TABLE 5-7

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 7a, 7b, and 7c NIAGARA TRANSFORMER FEASIBILITY STUDY

SOIL AND SEDIMENT REMEDIATION

Area 1 (NTC Property):

- Excavation of soil above the action level will entail excavation depths of up to 8 feet (depending on the RAO applied), with limited hot spot excavations up to 16 feet adjacent to the east-west ditch near the southwest corner of the site. NAPL-contaminated soil will be stabilized or treated prior to off-site disposal. The remaining soils (above the action level) will be stabilized/solidified, and disposed of on-site.

- Dewatering and groundwater treatment during excavations.

- Backfilling stabilized soil on-site, capping with asphalt or composite cap.

- Implementation of new drainage plan for the site to eliminate underground drains in the rear parking lot.

- Estimated soil volumes from Area 1:

Alternative 7a:	12,045 cubic yards for stabilization/solidification 375 cubic yards for off-site land disposal
Alternative 7b:	14,725 cubic yards for stabilization/solidification 375 cubic yards for off-site land disposal
Alternative 7c:	Same as Alternative 7b

Area 2 (Upper Ditch and Adjacent Flood-Prone Soils)

- Excavation of soil above the action level will likely entail excavation depths up to 3 feet at the more highly contaminated areas. Excavated soil and sediment will be stabilized/solidified, and disposed of under the on-site cap.

TABLE 5-7 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 7a, 7b, and 7c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Backfilling, grading, and reseeding as needed.

- Estimated soil volumes from Area 2:

  Alternative 7a: 1,690 cubic yards for stabilization/solidification
  Alternative 7b: 2,145 cubic yards for stabilization/solidification
  Alternative 7c: Same as Alternative 7b

Area 3 (Retention Pond)

- Excavation of sediment above the action level will likely entail excavation of up to approximately 1.5 feet in the most contaminated area. All excavated sediment would be stabilized/solidified, and disposed of under the on-site cap.

- The pond will need to be drained.

- Estimated sediment volumes from Area 3:

  Alternative 7a: 200 cubic yards for stabilization/solidification
  Alternative 7b: 2,500 cubic yards for stabilization/solidification
  Alternative 7c: 200 cubic yards for stabilization/solidification

TABLE 5-7 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 7a, 7b, and 7c
NIAGARA TRANSFORMER FEASIBILITY STUDY

Areas 4 (Lower Ditch - East of Kennedy Road)

- Excavation of sediment above the action level will likely entail excavation of up to 2 feet in the most contaminated area. Excavated soil and sediment will be stabilized/solidified, and disposed of under the on-site cap.

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

- Estimated soil volumes from Area 4:

Alternative 7a:	350 cubic yards for stabilization/solidification
Alternative 7b:	650 cubic yards for stabilization/solidification
Alternative 7c:	Same as Alternative 7b

Area 5 (Lower Ditch - West of Kennedy Road)

- Excavation of soil and sediment above the action level will likely entail excavation of up to approximately 0.5 feet of soil. All excavated soil and sediment would be stabilized/solidified, and disposed of under the on-site cap.

- Diversion of flow in the drainage ditch will be required during the excavation. Some limited dewatering and water treatment may be required.

TABLE 5-7 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 7a, 7b, and 7c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Estimated soil volumes from Area 5:

  Alternative 7a: 370 cubic yards for stabilization/solidification
  Alternative 7b: 830 cubic yards for stabilization/solidification
  Alternative 7c: Same as Alternative 7b

Area 6 (Pipe Beneath Railroad)

- The pipe will be flushed of sediment, which will be collected. Sediment removed from the pipe would be stabilized/solidified, and disposed of under the on-site cap.

- Water generated during the cleaning would be collected and treated.

- The pipe will likely have to be broken at one or more locations along its run due to lack of access for cleaning equipment.

- Estimated soil volumes from Area 6:

  Alternative 7a: 80 cubic yards for stabilization/solidification
  Alternative 7b: 80 cubic yards for stabilization/solidification
  Alternative 7c: Same as Alternative 7b

Area 7 (Eastern Portion of St. Adalbert's Cemetery)

- Cemetery soils bordering the NTC property will be excavated to a depth of approximately 0.5 to 1 foot. Excavated soil will be stabilized/solidified, and disposed of under the on-site cap.

TABLE 5-7 (continued)

OPERATIONS INCLUDED IN REMEDIAL ALTERNATIVES 7a, 7b, and 7c NIAGARA TRANSFORMER FEASIBILITY STUDY

- Estimated soil volumes from Area 7:

Alternative 7a:	80 cubic yards for stabilization/solidification
Alternative 7b:	260 cubic yards for stabilization/solidification
Alternative 7c:	Same as Alternative 7b

__Total Soil Volumes__

Alternative 7a

Off-Site Land Disposal:	375 cubic yards
Stabilization/Solidification:	14,815 cubic yards

Alternative 7b

Off-Site Land Disposal:	375 cubic yards
Stabilization/Solidification:	21,190 cubic yards

Alternative 7c

Off-Site Land Disposal:	375 cubic yards
Stabilization/Solidification:	18,890 cubic yards

GROUNDWATER REMEDIATION

- Groundwater RAO to be achieved by excavation or stabilization/solidification of contaminated soil, and dewatering and groundwater treatment during the on-site excavations.

- Temporary treatment system will require a system to remove solids followed by granular activated carbon units in series.

TABLE 5-8

SUMMARY OF ALTERNATIVES FOR DETAILED EVALUATION
NIAGARA TRANSFORMER CORPORATION FEASIBILITY STUDY

		REMEDIAL ALTERNATIVE					
Remediation Area		**Alt. 1a**	**Alt. 1b**	**Alt. 1c**	**Alt. 2a**	**Alt. 2b**	**Alt. 2c**
Area 1	Remedial Actions:	E, I, LD	E, I, LD	E, I, LD	E, LD	E, LD	E, LD
(NTC property)	Action Level:	25 ppm	10 ppm	10 ppm	25 ppm	10 ppm	10 ppm
Area 2	Remedial Actions:	E, I, LD	E, I, LD	E, I, LD	E, LD	E, LD	E, LD
(upper ditch)	Action Level:	10 ppm	1 ppm	1 ppm	10 ppm	1 ppm	1 ppm
Area 3	Remedial Actions:	E, LD	E, LD	E, LD	E, LD	E, LD	E, LD
(retention pond)	Action Level:	10 ppm	1 ppm	10 ppm	10 ppm	1 ppm	10 ppm
Area 4	Remedial Actions:	E, I, LD	E, I, LD	E, I, LD	E, LD	E, LD	E, LD
(lower ditch-east)	Action Level:	10 ppm	1 ppm	1 ppm	10 ppm	1 ppm	1 ppm
Area 5	Remedial Actions:	E, LD	E, LD	E, LD	E, LD	E, LD	E, LD
(lower ditch-west)	Action Level:	10 ppm	1 ppm	1 ppm	10 ppm	1 ppm	1 ppm
Area 6	Remedial Actions:	P, I, LD	P, I, LD	P, I, LD	P, LD	P, LD	P, LD
(pipe beneath railroad)	Action Level:	NA	NA	NA	NA	NA	NA
Area 7	Remedial Actions:	E, I, LD	E, I, LD	E, I, LD	E, LD	E, LD	E, LD
(cemetery-east)	Action Level:	10 ppm	1 ppm	1 ppm	10 ppm	1 ppm	1 ppm

Key to Remedial Action Abbreviations

E: Excavation of soil and sediment
I: Off-site incineration of excavated soil and sediment above 50 ppm PCBs
LD: Land disposal of excavated soil and sediment
TO: On-site thermal desorption
BR: Enhanced natural degradation (bioremediation)
C: Containment consisting of a site cap and circumferential slurry wall, includes limited excavation of NAPL-containing soil
G: Groundwater recovery and treatment
S: Stabilization/solidification
P: Flushing of sediment from the pipe
NA: Not applicable

TABLE 5-8 (continued)

SUMMARY OF ALTERNATIVES FOR DETAILED EVALUATION
NIAGARA TRANSFORMER CORPORATION FEASIBILITY STUDY

		REMEDIAL ALTERNATIVE				
Remediation Area		**Alt. 3a**	**Alt. 3b**	**Alt. 3c**	**Alt. 4a**	**Alt. 4b**
Area 1	Remedial Actions:	E, TO	E, TO	E, TO	E, LD	E, LD
(NTC property)	Action Level:	25 ppm	10 ppm	10 ppm	25 ppm	10 ppm
Area 2	Remedial Actions:	E, TX	E, TX	E, TX	E, LD	E, LD
(upper ditch)	Action Level:	10 ppm	1 ppm	1 ppm	10 ppm	1 ppm
Area 3	Remedial Actions:	E, TX	E, TX	E, TX	BR	BR
(retention pond)	Action Level:	10 ppm	1 ppm	10 ppm	10 ppm	1 ppm
Area 4	Remedial Actions:	E, TX	E, TX	E, TX	E, LD	E, LD
(lower ditch-east)	Action Level:	10 ppm	1 ppm	1 ppm	10 ppm	1 ppm
Area 5	Remedial Actions:	E, TX	E, TX	E, TX	E, LD	E, LD
(lower ditch-west)	Action Level:	10 ppm	1 ppm	1 ppm	10 ppm	1 ppm
Area 6	Remedial Actions:	P, TX	P, TX	P, TX	P, LD	P, LD
(pipe beneath railroad)	Action Level:	NA	NA	NA	NA	NA
Area 7	Remedial Actions:	E, TX	E, TX	E, TX	E, LD	E, LD
(cemetery-east)	Action Level:	10 ppm	1 ppm	1 ppm	10 ppm	1 ppm

Key to Remedial Action Abbreviations

E:	Excavation of soil and sediment
I:	Off-site incineration of excavated soil and sediment above 50 ppm PCBs
LD:	Land disposal of excavated soil and sediment
TO:	On-site thermal desorption
BR:	Enhanced natural degradation (bioremediation)
C:	Containment consisting of a site cap and circumferential slurry wall, includes limited excavation of NAPL-containing soil
G:	Groundwater recovery and treatment
S:	Stabilization/solidification
P:	Flushing of sediment from the pipe
NA:	Not applicable

TABLE 5-8 (continued)

SUMMARY OF ALTERNATIVES FOR DETAILED EVALUATION
NIAGARA TRANSFORMER CORPORATION FEASIBILITY STUDY

		REMEDIAL ALTERNATIVE				
Remediation Area		**Alt. 5a**	**Alt. 5b**	**Alt. 6a**	**Alt. 6b**	**Alt. 6c**
Area 1	Remedial Actions:	C, G	C, G	C, G	C, G	C, G
(NTC property)	Action Level:	NA	NA	NA	NA	NA
Area 2	Remedial Actions:	E, LD	E, LD	E, LD	E, LD	E, LD
(upper ditch)	Action Level:	10 ppm	1 ppm	10 ppm	1 ppm	1 ppm
Area 3	Remedial Actions:	BR	BR	E, LD	E, LD	E, LD
(retention pond)	Action Level:	10 ppm	1 ppm	10 ppm	1 ppm	10 ppm
Area 4	Remedial Actions:	E, LD	E, LD	E, LD	E, LD	E, LD
(lower ditch-east)	Action Level:	10 ppm	1 ppm	10 ppm	1 ppm	1 ppm
Area 5	Remedial Actions:	E, LD	E, LD	E, LD	E, LD	E, LD
(lower ditch-west)	Action Level:	10 ppm	1 ppm	10 ppm	1 ppm	1 ppm
Area 6	Remedial Actions:	P, LD	P, LD	P,LD	P, LD	P, LD
(pipe beneath railroad)	Action Level:	NA	NA	NA	NA	NA
Area 7	Remedial Actions:	E, LD	E, LD	E, LD	E, LD	E, LD
(cemetery-east)	Action Level:	10 ppm	1 ppm	10 ppm	1 ppm	1 ppm

Key to Remedial Action Abbreviations

E: Excavation of soil and sediment
I: Off-site incineration of excavated soil and sediment above 50 ppm PCBs
LD: Land disposal of excavated soil and sediment
TO: On-site thermal desorption
BR: Enhanced natural degradation (bioremediation)
C: Containment consisting of a site cap and circumferential slurry wall, includes limited excavation of NAPL-containing soil
G: Groundwater recovery and treatment
S: Stabilization/solidification
P: Flushing of sediment from the pipe
NA: Not applicable

TABLE 5-8 (continued)

SUMMARY OF ALTERNATIVES FOR DETAILED EVALUATION
NIAGARA TRANSFORMER CORPORATION FEASIBILITY STUDY

Remediation Area		**REMEDIAL ALTERNATIVE** **Alt. 7a**	**Alt. 7b**	**Alt. 7c**
Area 1	Remedial Actions:	S	S	S
(NTC property)	Action Level:	25 ppm	10 ppm	10 ppm
Area 2	Remedial Actions:	E, S	E, S	E, S
(upper ditch)	Action Level:	10 ppm	1 ppm	1 ppm
Area 3	Remedial Actions:	E, S	E, S	E, S
(retention pond)	Action Level:	10 ppm	1 ppm	10 ppm
Area 4	Remedial Actions:	E, S	E, S	E, S
(lower ditch-east)	Action Level:	10 ppm	1 ppm	1 ppm
Area 5	Remedial Actions:	E, S	E, S	E, S
(lower ditch-west)	Action Level:	10 ppm	1 ppm	1 ppm
Area 6	Remedial Actions:	P, S	P, S	P, S
(pipe beneath railroad)	Action Level:	NA	NA	NA
Area 7	Remedial Actions:	E, S	E, S	E, S
(cemetery-east)	Action Level:	10 ppm	1 ppm	1 ppm

Key to Remedial Action Abbreviations

E:	Excavation of soil and sediment
I:	Off-site incineration of excavated soil and sediment above 50 ppm PCBs
LD:	Land disposal of excavated soil and sediment
TO:	On-site thermal desorption
BR:	Enhanced natural degradation (bioremediation)
C:	Containment consisting of a site cap and circumferential slurry wall, includes limited excavation of NAPL-containing soil
G:	Groundwater recovery and treatment
S:	Stabilization/solidification
P:	Flushing of sediment from the pipe
NA:	Not applicable

TABLE 6-1

ESTIMATED SOIL AND SEDIMENT VOLUMES EXCEEDING ACTION LEVELS
NIAGARA TRANSFORMER CORPORATION FEASIBILITY STUDY

			Soil Volumes in Cubic Yards		
Area	**Description**	**Exceed 10 PPM**	**Exceed 25 PPM**	**50 PPM or more**	**NAPL Contaminated**
Area 1	NTC property(1)	15,100	12,420	9,500	375
		Exceed 1 PPM	**Exceed 10 PPM**	**50 PPM or more**	**NAPL Contaminated**
Area 2	Upper ditch and flood-prone soils	2,145	1,690	950	
Area 3	Retention pond	2,500	200	0	
Area 4	Lower ditch east	650	350	25	
Area 5	Lower ditch west	830	370	0	
Area 6	Stormwater pipe	80	80	0	
Area 7	East cemetery soils	260	80	40	
	Totals	**21,565**	**15,190**	**10,515**	**375**

(1) Includes adjacent soils near the seepage areas and monitoring well NTC-11S, located adjacent to the southeast corner of the NTC property.

TABLE 6-2

ARAR COMPLIANCE CHECKLIST
REMEDIAL ALTERNATIVES 1a, 1b, and 1c - EXCAVATION, OFF-SITE INCINERATION, AND OFF-SITE LAND DISPOSAL

ARARs	**Evaluation/Comments**
Chemical Specific	
• NYSGWQS	Applicable to groundwater remedial objectives.
Location Specific	No applicable location-specific ARARs identified.
Action Specific	
• NYAQS	Applicable during site remediation.
• NYAQEL	Not applicable (NA).
• NY Hazardous Waste Regulations/RCRA	
- Generator Requirements/Manifests	Applicable to off-site disposal.
- Containers	Applicable to storage/transportation of wastes for off-site disposal.
- Thermal Treatment	NA
- Waste Piles	NA
- Land Burial	NA
- Groundwater Monitoring	Potentially relevant and appropriate to groundwater monitoring.
- Land Disposal Restrictions	Applicable to off-site disposal.
- Closure/Post-Closure Care	NA
• NYS Solid Waste Regulations	NA
• TSCA Requirements	
- Incinerator	Applicable to off-site incinerator.
- Alternate Treatment	NA
- Chemical Waste Landfill	Applicable to off-site disposal.
- Storage	Potentially applicable to materials stored prior to off-site disposal.
- Marking/Reporting/Recordkeeping	Applicable to storage and transportation of materials for off-site disposal.
• SPDES/Stormwater	Potentially applicable to discharge of wastewater/runoff.
• Transportation Regulations	Applicable to off-site disposal and incineration.

Table 6-3

REMEDIAL ALTERNATIVE 1A COSTING

OFF-SITE INCINERATION OF >50 PPM PCB SOILS
OFF-SITE LAND DISPOSAL OF 25 to 50 PPM (On-site) & 10 to 50 PPM (Off-site)PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavation/Transport of Impacted Soils	15190	$15	CY	$228,000
Confirmatory Soil Testing	238	$200	PER SAMPLE	$48,000
Off-Site Transport & Incineration of Impacted Soils	15773	$1,750	TON	$27,603,000
Transport and Disposal at a TSCA Landfill	7013	$190	TON	$1,332,000
Backfill Excavated Area (Off-Site Soil)	15190	$16	CY	$243,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Annual GW & SW Monitoring/Reporting (10 yrs)			LUMP SUM	$97,000
Estimated Direct Cost				**$30,206,000**
INDIRECT COSTS				
Engineering (10%)				$3,021,000
Field Inspection/Technical Support (5%)				$1,510,000
Construction Management (5%)				$1,510,000
Contractor Profits and Overhead (15%)				$4,531,000
Contingency (30%)				$9,062,000
Estimated Indirect Costs				**$19,634,000**
ESTIMATED TOTAL COST FOR ALTERNATIVE 1A				**$49,840,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-4

REMEDIAL ALTERNATIVE 1B COSTING

OFF-SITE INCINERATION OF >50 PPM PCB SOILS
OFF-SITE LAND DISPOSAL OF 10 to 50 PPM(On-site) & 1 to 50 PPM (Off-site) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavation/Transport of Impacted Soils	21565	$15	CY	$323,000
Confirmatory Soil Testing	238	$200	PER SAMPLE	$48,000
Off-Site Transport & Incineration of Impacted Soils	15773	$1,750	TON	$27,603,000
Transport and Disposal at a TSCA Landfill	16575	$190	TON	$3,149,000
Backfill Excavated Area (Off-Site Soil)	21565	$16	CY	$345,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Annual GW & SW Monitoring/Reporting (10 yrs)			LUMP SUM	$97,000
Estimated Direct Cost				**$32,220,000**
INDIRECT COSTS				
Engineering (10%)				$3,222,000
Field Inspection/Technical Support (5%)				$1,611,000
Construction Management (5%)				$1,611,000
Contractor Profits and Overhead (15%)				$4,833,000
Contingency (30%)				$9,666,000
Estimated Indirect Costs				**$20,943,000**
ESTIMATED TOTAL COST FOR ALTERNATIVE 1B				**$53,163,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-5

REMEDIAL ALTERNATIVE 1C COSTING

OFF-SITE INCINERATION OF >50 PPM PCB SOILS
OFF-SITE LAND DISPOSAL OF 10 to 50 PPM (On-site), 1 to 50 PPM (Off-site), & >10 PPM (Retention Pond) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavation/Transport of Impacted Soils	19265	$15	CY	$289,000
Confirmatory Soil Testing	238	$200	PER SAMPLE	$48,000
Off-Site Transport & Incineration of Impacted Soils	15773	$1,750	TON	$27,603,000
Transport and Disposal at a TSCA Landfill	13125	$190	TON	$2,494,000
Backfill Excavated Area (Off-Site Soil)	19265	$16	CY	$308,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Annual GW & SW Monitoring/Reporting (10 yrs)			LUMP SUM	$97,000
Estimated Direct Cost				**$31,494,000**
INDIRECT COSTS				
Engineering (10%)				$3,149,000
Field Inspection/Technical Support (5%)				$1,575,000
Construction Management (5%)				$1,575,000
Contractor Profits and Overhead (15%)				$4,724,000
Contingency (30%)				$9,448,000
Estimated Indirect Costs				**$20,471,000**
ESTIMATED TOTAL COST FOR ALTERNATIVE 1C				**$51,965,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

TABLE 6-6

ARAR COMPLIANCE CHECKLIST
REMEDIAL ALTERNATIVES 2a, 2b, and 2c - EXCAVATION AND OFF-SITE LAND DISPOSAL

ARARs	**Evaluation/Comments**
Chemical Specific	
• NYSGWQS	Applicable to groundwater remedial objectives.
Location Specific	No applicable location-specific ARARs identified.
Action Specific	
• NYAQS	Applicable during site remediation.
• NYAQEL	Not applicable (NA).
• NY Hazardous Waste Regulations/RCRA	
- Generator Requirements/Manifests	Applicable to off-site disposal.
- Containers	Applicable to storage/transportation of wastes for off-site disposal.
- Thermal Treatment	NA
- Waste Piles	NA
- Land Burial	NA
- Groundwater Monitoring	Potentially relevant and appropriate to groundwater monitoring.
- Land Disposal Restrictions	Applicable to off-site disposal.
- Closure/Post-Closure Care	NA
• NYS Solid Waste Regulations	NA
• TSCA Requirements	
- Incinerator	NA
- Alternate Treatment	NA
- Chemical Waste Landfill	Applicable to off-site disposal.
- Storage	Potentially applicable to materials stored prior to off-site disposal.
- Marking/Reporting/Recordkeeping	Applicable to storage and transportation of materials for off-site disposal.
• SPDES/Stormwater	Potentially applicable to discharge of wastewater/runoff.
• Transportation Regulations	Applicable to off-site disposal.

Table 6-7

REMEDIAL ALTERNATIVE 2A COSTING

OFF-SITE DISPOSAL IN A TSCA LANDFILL OF >25 PPM (On-site) & >10 PPM (Off-site) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavation/Transport of Impacted Soils	14815	$15	CY	$222,000
Confirmatory Soil Testing	238	$200	PER SAMPLE	$48,000
Transport and Disposal at a TSCA Landfill	22785	$190	TON	$4,329,000
Backfill Excavated Area (Off-Site Soil)	15190	$16	CY	$243,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Annual GW & SW Monitoring/Reporting (10 yrs)			LUMP SUM	$97,000
Estimated Direct Cost				**$5,626,000**
INDIRECT COSTS				
Engineering (5%)				$281,000
Field Inspection/Technical Support (5%)				$281,000
Construction Management (5%)				$281,000
Contractor Profits and Overhead (15%)				$844,000
Contingency (30%)				$1,688,000
Estimated Indirect Cost				**$3,375,000**
ESTIMATED TOTAL COST FOR ALTERNATIVE 2A				**$9,001,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-8

REMEDIAL ALTERNATIVE 2B COSTING

OFF-SITE DISPOSAL IN A TSCA LANDFILL OF >10 PPM (On-site) & >1 PPM (Off-site) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavation/Transport of Impacted Soils	21190	$15	CY	$318,000
Confirmatory Soil Testing	238	$200	PER SAMPLE	$48,000
Transport and Disposal at a TSCA Landfill	32348	$190	TON	$6,146,000
Backfill Excavated Area (Off-Site Soil)	21565	$16	CY	$345,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Annual GW & SW Monitoring/Reporting (10 yrs)			LUMP SUM	$97,000
Estimated Direct cost				**$7,641,000**
INDIRECT COSTS				
Engineering (5%)				$382,000
Field Inspection/Technical Support (5%)				$382,000
Construction Management (5%)				$382,000
Contractor Profits and Overhead (15%)				$1,146,000
Contingency (30%)				$2,292,000
Estimated Indirect Cost				**$4,584,000**
ESTIMATED TOTAL COST FOR ALTERNATIVE 2B				**$12,225,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-9

REMEDIAL ALTERNATIVE 2C COSTING

OFF-SITE DISPOSAL IN A TSCA LANDFILL OF >10 PPM (On-site), >1 PPM (Off-site) & >10 PPM (Retention Pond) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavation/Transport of Impacted Soils	18890	$15	CY	$283,000
Confirmatory Soil Testing	238	$200	PER SAMPLE	$48,000
Transport and Disposal at a TSCA Landfill	28898	$190	TON	$5,491,000
Backfill Excavated Area (Off-Site Soil)	19265	$16	CY	$308,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Annual GW & SW Monitoring/Reporting (10 yrs)			LUMP SUM	$97,000
Estimated Direct Cost				**$6,914,000**
INDIRECT COSTS				
Engineering (5%)				$346,000
Field Inspection/Technical Support (5%)				$346,000
Construction Management (5%)				$346,000
Contractor Profits and Overhead (15%)				$1,037,000
Contingency (30%)				$2,074,000
Estimated Indirect Cost				**$4,149,000**
ESTIMATED TOTAL COST FOR ALTERNATIVE 2C				**$11,063,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

TABLE 6-10

ARAR COMPLIANCE CHECKLIST
REMEDIAL ALTERNATIVES 3a, 3b, and 3c - ON-SITE THERMAL DESORBTION

ARARs	**Evaluation/Comments**
Chemical Specific	
• NYSGWQS	Applicable to groundwater remedial objectives.
Location Specific	No applicable location-specific ARARs identified.
Action Specific	
• NYAQS	Applicable to construction activities/treatment unit emissions.
• NYAQEL	Applicable to treatment unit emissions.
• NY Hazardous Waste Regulations/RCRA	
- Generator Requirements/Manifests	NA; Materials treated on-site - no hazardous waste transported off-site.
- Containers	NA
- Thermal Treatment	Applicable to treatment unit design/operation.
- Waste Piles	Potentially relevant and appropriate to on-site staging of soils prior to treatment.
- Land Burial	NA
- Groundwater Monitoring	NA
- Land Disposal Restrictions	Applicable.
- Closure/Post-Closure Care	NA
• NYS Solid Waste Regulations	Treated soil should not be subject to solid waste regulations after PCBs are removed. If treated soils are considered solid wastes, on-site back-filling would require a waiver of these regulations.
• TSCA Requirements	
- Incinerator	Potentially applicable to off-site treatment of concentrated PCBs.
- Alternate Treatment	Applicable; Treatment to 2 ppm PCB residual considered equivalent to incineration.
- Chemical Waste Landfill	Potentially applicable; Waiver of TSCA requirements would be necessary for on-site backfilling of treated soils above 2 ppm PCBs.
- Storage	Potentially applicable to materials stored prior to treatment.
- Marking/Reporting/Recordkeeping	Potentially applicable to storage or off-site transportation of PCBs for disposal.
• SPDES/Stormwater	Potentially applicable to discharge of wastewater/runoff during implementation.
• Transportation Regulations	NA

Table 6-11

REMEDIAL ALTERNATIVE 3A COSTING

ON-SITE THERMAL DESORPTION OF >25 PPM (On-site) & >10 PPM (Off-site) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Bench Work			LUMP SUM	$20,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Air Permits for Mobile Thermal Desorption System			LUMP SUM	$30,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Site Prep for Thermal Desorption System			LUMP SUM	$150,000
Mobilization of Thermal Desorption System			LUMP SUM	$600,000
Process Unit Trial			LUMP SUM	$250,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavation of Impacted Soils	15190	$15	CY	$228,000
Confirmatory Soil Testing	238	$200	PER SAMPLE	$48,000
Thermally Desorb Impacted Soils	22785	$200	TON	$4,557,000
Confirmatory Testing on Treated Soils	509	$200	PER SAMPLE	$102,000
Backfill Excavated Area (Treated Soil)	15190	$10	CY	$152,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Disposal of Thermal Desorption Unit Waste Streams			LUMP SUM	$60,000
Demobilization of Thermal Desorption Unit			LUMP SUM	$300,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Annual GW & SW Monitoring/Reporting (10 yrs)			LUMP SUM	$97,000
Estimated Direct Cost				**$7,249,000**
INDIRECT COSTS				
Engineering (10%)				$725,000
Field Inspection/Technical Support (5%)				$362,000
Construction Management (5%)				$362,000
Contractor Profits and Overhead (15%)				$1,087,000
Contingency (50%)				$3,625,000
Estimated Indirect Cost				**$6,161,000**
ESTIMATED TOTAL COST FOR REMEDIAL ALTERNATIVE 3A				**$13,410,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-12

REMEDIAL ALTERNATIVE 3B COSTING

ON-SITE THERMAL DESORPTION OF >10 PPM (On-site) & >1 PPM (Off-site) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Bench Work			LUMP SUM	$20,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Air Permits for Mobile Thermal Desorption System			LUMP SUM	$30,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Site Prep for Thermal Desorption System			LUMP SUM	$150,000
Mobilization of Thermal Desorption System			LUMP SUM	$600,000
Process Unit Trial			LUMP SUM	$250,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavation of Impacted Soils	21565	$15	CY	$323,000
Confirmatory Soil Testing	238	$200	PER SAMPLE	$48,000
Thermally Desorb Impacted Soils	32348	$200	TON	$6,470,000
Confirmatory Testing on Treated Soils	722	$200	PER SAMPLE	$144,000
Backfill Excavated Area (Treated Soil)	21565	$10	CY	$216,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Disposal of Thermal Desorption Unit Waste Streams			LUMP SUM	$60,000
Demobilization of Thermal Desorption Unit			LUMP SUM	$300,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Annual GW & SW Monitoring/Reporting (10 yrs)			LUMP SUM	$97,000
Estimated Direct Cost				**$9,363,000**
INDIRECT COSTS				
Engineering (10%)				$936,000
Field Inspection/Technical Support (5%)				$468,000
Construction Management (5%)				$468,000
Contractor Profits and Overhead (15%)				$1,404,000
Contingency (50%)				$4,682,000
Estimated Indirect Cost				**$7,958,000**
ESTIMATED TOTAL COST FOR REMEDIAL ALTERNATIVE 3B				**$17,321,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-13

REMEDIAL ALTERNATIVE 3C COSTING

ON-SITE THERMAL DESORPTION OF >10 PPM (On-site), >1 PPM (Off-site) & >10 PPM (Retention Pond) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Bench Work			LUMP SUM	$20,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Air Permits for Mobile Thermal Desorption System			LUMP SUM	$30,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Site Prep for Thermal Desorption System			LUMP SUM	$150,000
Mobilization of Thermal Desorption System			LUMP SUM	$600,000
Process Unit Trial			LUMP SUM	$250,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavation of Impacted Soils	19265	$15	CY	$289,000
Confirmatory Soil Testing	238	$200	PER SAMPLE	$48,000
Thermally Desorb Impacted Soils	28898	$200	TON	$5,780,000
Confirmatory Testing on Treated Soils	645	$200	PER SAMPLE	$129,000
Backfill Excavated Area (Treated Soil)	19265	$10	CY	$193,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Disposal of Thermal Desorption Unit Waste Streams			LUMP SUM	$60,000
Demobilization of Thermal Desorption Unit			LUMP SUM	$300,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Annual GW & SW Monitoring/Reporting (10 yrs)			LUMP SUM	$97,000
Estimated Direct Cost				**$8,601,000**
INDIRECT COSTS				
Engineering (10%)				$860,000
Field Inspection/Technical Support (5%)				$430,000
Construction Management (5%)				$430,000
Contractor Profits and Overhead (15%)				$1,290,000
Contingency (50%)				$4,301,000
Estimated Indirect Cost				**$7,311,000**
ESTIMATED TOTAL COST FOR REMEDIAL ALTERNATIVE 3C				**$15,912,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

TABLE 6-14

ARAR COMPLIANCE CHECKLIST
REMEDIAL ALTERNATIVES 4a and 4b - EXCAVATION AND OFF-SITE LAND DISPOSAL

ARARs	**Evaluation/Comments**
Chemical Specific	
• NYSGWQS	Applicable to groundwater remedial objectives.
Location Specific	No applicable location-specific ARARs identified.
Action Specific	
• NYAQS	Applicable during site remediation.
• NYAQEL	Not applicable (NA).
• NY Hazardous Waste Regulations/RCRA	
- Generator Requirements/Manifests	Applicable to off-site disposal.
- Containers	Applicable to storage/transportation of wastes for off-site disposal.
- Thermal Treatment	NA
- Waste Piles	NA
- Land Burial	NA
- Groundwater Monitoring	Potentially relevant and appropriate to groundwater monitoring.
- Land Disposal Restrictions	Applicable to off-site disposal.
- Closure/Post-Closure Care	NA
• NYS Solid Waste Regulations	NA
• TSCA Requirements	
- Incinerator	NA
- Alternate Treatment	NA
- Chemical Waste Landfill	Applicable to off-site disposal.
- Storage	Potentially applicable to materials stored prior to off-site disposal.
- Marking/Reporting/Recordkeeping	Applicable to storage and transportation of materials for off-site disposal.
• SPDES/Stormwater	Potentially applicable to discharge of wastewater/runoff.
• Transportation Regulations	Applicable to off-site disposal.

Table 6-15

REMEDIAL ALTERNATIVE 4A COSTING

OFF-SITE DISPOSAL IN A TSCA LANDFILL OF >25 PPM (On-site) & >10 PPM (Off-site) PCB SOILS
BIOREMEDIATION IN RETENTION POND OF >10 PPM PCB SEDIMENTS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Stormwater Pipe cleaning	2000	$20	LF	$40,000
Excavation/Transport of Impacted Soils	14615	$15	CY	$219,000
Confirmatory Soil Testing	238	$200	PER SAMPLE	$48,000
Transport and Disposal at a TSCA Landfill	22485	$190	TON	$4,272,000
Backfill Excavated Area (Off-Site Soil)	14990	$16	CY	$240,000
Bioremediate Retention Pond Sediments	200	$50	CY	$10,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Annual GW & SW Monitoring/Reporting (10 yrs)			LUMP SUM	$97,000
Long Term Annual Retention Pond Monitoring/Reporting (30 yrs)			LUMP SUM	$95,000
Estimated Direct Cost				**$5,668,000**
INDIRECT COSTS				
Engineering (5%)				$283,000
Field Inspection/Technical Support (5%)				$283,000
Construction Management (5%)				$283,000
Contractor Profits and Overhead (15%)				$850,000
Contingency (30%)				$1,700,000
Estimated Indirect Cost				**$3,399,000**
ESTIMATED TOTAL COST FOR ALTERNATIVE 4A				**$9,067,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-16

REMEDIAL ALTERNATIVE 4B COSTING

OFF-SITE DISPOSAL IN A TSCA LANDFILL OF >10 PPM (On-site) & >1 PPM (Off-site) PCB SOILS
BIOREMEDIATION IN RETENTION POND OF >1 PPM PCB SEDIMENTS

DIRECT COSTS	**QUANTITY**	**UNIT COST**	**UNITS**	**ITEM COST**
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Stormwater Pipe cleaning	2000	$20	LF	$40,000
Excavation/Transport of Impacted Soils	18690	$15	CY	$280,000
Confirmatory Soil Testing	238	$200	PER SAMPLE	$48,000
Transport and Disposal at a TSCA Landfill	28598	$190	TON	$5,434,000
Backfill Excavated Area (Off-Site Soil)	19065	$16	CY	$305,000
Bioremediate Retention Pond Sediments	2500	$50	CY	$125,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Annual GW & SW Monitoring/Reporting (10 yrs)			LUMP SUM	$97,000
Long Term Annual Retention Pond Monitoring/Reporting (30 yrs)			LUMP SUM	$140,000
Estimated Direct cost				**$7,116,000**
INDIRECT COSTS				
Engineering (5%)				$356,000
Field Inspection/Technical Support (5%)				$356,000
Construction Management (5%)				$356,000
Contractor Profits and Overhead (15%)				$1,067,000
Contingency (30%)				$2,135,000
Estimated Indirect Cost				**$4,270,000**
ESTIMATED TOTAL COST FOR ALTERNATIVE 4B				**$11,386,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

TABLE 6-17

ARAR COMPLIANCE CHECKLIST
REMEDIAL ALTERNATIVES 5a and 5b - ON-SITE CONTAINMENT, OFF-SITE DISPOSAL, AND GROUNDWATER TREATMENT

ARARs	**Evaluation/Comments**
Chemical Specific	
• NYSGWQS	Applicable to groundwater remedial objectives.
Location Specific	No applicable location-specific ARARs identified.
Action Specific	
• NYAQS	Applicable during site remediation.
• NYAQEL	Not applicable (NA).
• NY Hazardous Waste Regulations/RCRA	
- Generator Requirements/Manifests	Applicable to off-site disposal.
- Containers	Applicable to storage/transportation of wastes for off-site disposal.
- Thermal Treatment	NA
- Waste Piles	NA
- Land Burial	NA
- Groundwater Monitoring	Potentially relevant and appropriate to groundwater monitoring.
- Land Disposal Restrictions	Applicable to off-site disposal.
- Closure/Post-Closure Care	Applicable
• NYS Solid Waste Regulations	Applicable; waiver may be required.
• TSCA Requirements	
- Incinerator	NA
- Alternate Treatment	NA
- Chemical Waste Landfill	NA
- Storage	Potentially applicable to materials stored prior to off-site disposal.
- Marking/Reporting/Recordkeeping	Applicable to storage and transportation of materials for off-site disposal.
• SPDES/Stormwater	Potentially applicable to discharge of wastewater/runoff.
• Transportation Regulations	Applicable to off-site disposal and incineration.

Table 6-18

REMEDIAL ALTERNATIVE 5A COSTING

OFF-SITE LAND DISPOSAL OF NAPL SOILS & >50 PPM (Off-site) PCB SOILS
ON-SITE CONSOLIDATION AND CAPPING OF ON-SITE & 10 to 50 PPM (Off-site) PCB SOILS
BIOREMEDIATION IN RETENTION POND OF >10 PPM PCB SEDIMENTS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$65,000
Temporary Water Treatment System			LUMP SUM	$300,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Excavation/Transport of >50 ppm PCB Off-Site Soils	1095	$15	CY	$16,000
Confirmatory Soil Testing of >50 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Transport NAPL & >50ppm PCB Soils to TSCA Landfill	2205	$170	TON	$375,000
TSCA Landfill Disposal of NAPL & >50ppm PCB Soils	2205	$140	TON	$309,000
Circumferential Slurry Wall	10080	$30	SF	$302,000
Leachate Collection System	200	$70	LF	$14,000
Excavation of >10 ppm PCB Off-Site Impacted Soils	1475	$10	CY	$15,000
Confirmatory Soil Testing of >10 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Backfill Excavated Off-Site Area (Off-Site Soil)	2570	$16	CY	$41,000
Fill and Grade for Cap Slope Drainage	3500	$16	CY	$56,000
Final Grading of Consolidation Area	2	$5,000	ACRE	$10,000
Cap Consolidation Area with Composite Cap	9400	$27	SQYD	$254,000
Bioremediate Retention Pond Sediments	200	$50	CY	$10,000
Fence for Consolidation Area	1380	$18	LF	$25,000
Surface Water Drainage System	1340	$55	LF	$74,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Groundwater Treatment System			LUMP SUM	$100,000
Long Term GW Treatment Operation (30 Years)			LUMP SUM	$310,000
Long Term GW & Surfacewater Monitoring (30 yrs)			LUMP SUM	$195,000
Long Term Annual Retention Pond Monitoring/Reporting (30 yrs)			LUMP SUM	$61,000
Long Term Maintenance (30 yrs)			LUMP SUM	$359,000
Estimated Direct Cost				**$3,204,000**
INDIRECT COSTS				
Engineering (10%)				$320,000
Field Inspection/Technical Support (5%)				$160,000
Construction Management (5%)				$160,000
Contractor Profits and Overhead (15%)				$481,000
Contingency (30%)				$961,000
Estimated Indirect Cost				**$2,082,000**
ESTIMATED TOTAL COST FOR REMEDIAL ALTERNATIVE 5A				**$5,286,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-19

REMEDIAL ALTERNATIVE 5B COSTING

OFF-SITE LAND DISPOSAL OF NAPL SOILS & >50 PPM (Off-site) PCB SOILS
ON-SITE CONSOLIDATION AND CAPPING OF ON-SITE & 1 to 50 PPM (Off-site) PCB SOILS
BIOREMEDIATION IN RETENTION POND OF >1 PPM PCB SEDIMENTS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$65,000
Temporary Water Treatment System			LUMP SUM	$300,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Excavation/Transport of >50 ppm PCB Off-Site Soils	1095	$15	CY	$16,000
Confirmatory Soil Testing of >50 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Transport NAPL & >50ppm PCB Soils to TSCA Landfill	2205	$170	TON	$375,000
TSCA Landfill Disposal of NAPL & >50ppm PCB Soils	2205	$140	TON	$309,000
Circumferential Slurry Wall	10080	$30	SF	$302,000
Leachate Collection System	200	$70	LF	$14,000
Excavation of >1 ppm PCB Off-Site Impacted Soils	2870	$10	CY	$29,000
Confirmatory Soil Testing of >1 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Backfill Excavated Off-Site Area (Off-Site Soil)	3965	$16	CY	$63,000
Fill and Grade for Cap Slope Drainage	3500	$16	CY	$56,000
Final Grading of Consolidation Area	2	$5,000	ACRE	$10,000
Cap Consolidation Area with Composite Cap	9400	$27	SQYD	$254,000
Bioremediate Retention Pond Sediments	2500	$50	CY	$125,000
Fence for Consolidation Area	1380	$18	LF	$25,000
Surface Water Drainage System	1340	$55	LF	$74,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Groundwater Treatment System			LUMP SUM	$100,000
Long Term GW Treatment Operation (30 Years)			LUMP SUM	$310,000
Long Term GW & Surfacewater Monitoring (30 yrs)			LUMP SUM	$195,000
Long Term Annual Retention Pond Monitoring/Reporting (30 yrs)			LUMP SUM	$129,000
Long Term Maintenance (30 yrs)			LUMP SUM	$359,000
Estimated Direct Cost				**$3,423,000**
INDIRECT COSTS				
Engineering (10%)				$342,000
Field Inspection/Technical Support (5%)				$171,000
Construction Management (5%)				$171,000
Contractor Profits and Overhead (15%)				$513,000
Contingency (30%)				$1,027,000
Estimated Indirect Cost				**$2,224,000**
ESTIMATED TOTAL COST FOR REMEDIAL ALTERNATIVE 5B				**$5,647,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

TABLE 6-20

ARAR COMPLIANCE CHECKLIST
REMEDIAL ALTERNATIVES 6a, 6b, and 6c - ON-SITE CONTAINMENT, OFF-SITE DISPOSAL, AND GROUNDWATER TREATMENT

ARARs	**Evaluation/Comments**
Chemical Specific	
• NYSGWQS	Applicable to groundwater remedial objectives.
Location Specific	No applicable location-specific ARARs identified.
Action Specific	
• NYAQS	Applicable during site remediation.
• NYAQEL	Not applicable (NA).
• NY Hazardous Waste Regulations/RCRA	
- Generator Requirements/Manifests	Applicable to off-site disposal.
- Containers	Applicable to storage/transportation of wastes for off-site disposal.
- Thermal Treatment	NA
- Waste Piles	NA
- Land Burial	NA
- Groundwater Monitoring	Potentially relevant and appropriate to groundwater monitoring.
- Land Disposal Restrictions	Applicable to off-site disposal.
- Closure/Post-Closure Care	Applicable
• NYS Solid Waste Regulations	Applicable; variance or waiver may be required.
• TSCA Requirements	
- Incinerator	NA
- Alternate Treatment	NA
- Chemical Waste Landfill	NA
- Storage	Potentially applicable to materials stored prior to off-site disposal.
- Marking/Reporting/Recordkeeping	Applicable to storage and transportation of materials for off-site disposal.
• SPDES/Stormwater	Potentially applicable to discharge of wastewater/runoff.
• Transportation Regulations	Applicable to off-site disposal and incineration.

Table 6-21

REMEDIAL ALTERNATIVE 6A COSTING

OFF-SITE LAND DISPOSAL OF NAPL SOILS & >50 PPM (Off-site) PCB SOILS
ON-SITE CONSOLIDATION AND CAPPING OF ON-SITE & 10 to 50 PPM (Off-site) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$65,000
Temporary Water Treatment System			LUMP SUM	$300,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Excavation/Transport of >50 ppm Off-Site PCB Soils	1095	$15	CY	$16,000
Confirmatory Soil Testing of >50 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Transport NAPL & >50ppm PCB soils to TSCA Landfill	2205	$170	TON	$375,000
TSCA Landfill Disposal of NAPL & >50ppm PCB Soils	2205	$140	TON	$309,000
Circumferential Slurry Wall	10080	$30	SF	$302,000
Leachate Collection System	200	$70	LF	$14,000
Excavation of >10 ppm PCB Off-Site Impacted Soils	1675	$10	CY	$17,000
Confirmatory Soil Testing of >10 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Backfill Excavated Off-Site Area (Off-Site Soil)	2770	$16	CY	$44,000
Fill and Grade for Cap Slope Drainage	3500	$16	CY	$56,000
Final Grading of Consolidation Area	2	$5,000	ACRE	$10,000
Cap Consolidation Area with Composite Cap	9400	$27	SQYD	$254,000
Fence for Consolidation Area	1380	$18	LF	$25,000
Surface Water Drainage System	1340	$55	LF	$74,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Groundwater Treatment System			LUMP SUM	$100,000
Long Term GW Treatment Operation (30 yrs)			LUMP SUM	$310,000
Long Term GW & Surfacewater Monitoring (30 yrs)			LUMP SUM	$195,000
Long Term Maintenance (30 yrs)			LUMP SUM	$359,000
Estimated Direct Cost				**$3,138,000**
INDIRECT COSTS				
Engineering (10%)				$314,000
Field Inspection/Technical Support (5%)				$157,000
Construction Management (5%)				$157,000
Contractor Profits and Overhead (15%)				$471,000
Contingency (30%)				$941,000
Estimated Indirect Cost				**$2,040,000**
ESTIMATED TOTAL COST FOR REMEDIAL ALTERNATIVE 6A				**$5,178,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-22

REMEDIAL ALTERNATIVE 6B COSTING

OFF-SITE LAND DISPOSAL OF NAPL SOILS & >50 PPM (Off-site) PCB SOILS
ON-SITE CONSOLIDATION AND CAPPING OF ON-SITE & 1 to 50 PPM (Off-site) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$65,000
Temporary Water Treatment System			LUMP SUM	$300,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Excavation/Transport of >50 ppm Off-Site PCB Soils	1095	$15	CY	$16,000
Confirmatory Soil Testing of >50 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Transport NAPL & >50ppm PCB soils to TSCA Landfill	2205	$170	TON	$375,000
TSCA Landfill Disposal of NAPL & >50ppm PCB Soils	2205	$140	TON	$309,000
Circumferential Slurry Wall	10080	$30	SF	$302,000
Leachate Collection System	200	$70	LF	$14,000
Excavation of >1 ppm PCB Off-Site Impacted Soils	5370	$10	CY	$54,000
Confirmatory Soil Testing of >1 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Backfill Excavated Off-Site Area (Off-Site Soil)	6465	$16	CY	$103,000
Fill and Grade for Cap Slope Drainage	3500	$16	CY	$56,000
Final Grading of Consolidation Area	2	$5,000	ACRE	$10,000
Cap Consolidation Area with Composite Cap	9400	$27	SQYD	$254,000
Fence for Consolidation Area	1380	$18	LF	$25,000
Surface Water Drainage System	1340	$55	LF	$74,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Groundwater Treatment System			LUMP SUM	$100,000
Long Term GW Treatment Operation (30 yrs)			LUMP SUM	$310,000
Long Term GW & Surfacewater Monitoring (30 yrs)			LUMP SUM	$195,000
Long Term Maintenance (30 yrs)			LUMP SUM	$359,000
Estimated Direct Cost				**$3,234,000**
INDIRECT COSTS				
Engineering (10%)				$323,000
Field Inspection/Technical Support (5%)				$162,000
Construction Management (5%)				$162,000
Contractor Profits and Overhead (15%)				$485,000
Contingency (30%)				$970,000
Estimated Indirect Cost				**$2,102,000**
ESTIMATED TOTAL COST FOR REMEDIAL ALTERNATIVE 6B				**$5,336,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-23

REMEDIAL ALTERNATIVE 6C COSTING

OFF-SITE LAND DISPOSAL OF NAPL SOILS & >50 PPM (Off-site) PCB SOILS
ON-SITE CONSOLIDATION AND CAPPING OF ON-SITE, 1 to 50 PPM (Off-site) & 10 to 50 PPM(Retention Pond) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$10,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$65,000
Temporary Water Treatment System			LUMP SUM	$300,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Excavation/Transport of >50 ppm Off-Site PCB Soils	1095	$15	CY	$16,000
Confirmatory Soil Testing of >50 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Transport NAPL & >50ppm PCB soils to TSCA Landfill	2205	$170	TON	$375,000
TSCA Landfill Disposal of NAPL & >50ppm PCB Soils	2205	$140	TON	$309,000
Circumferential Slurry Wall	10080	$30	SF	$302,000
Leachate Collection System	200	$70	LF	$14,000
Excavation of >1 ppm PCB Off-Site Impacted Soils	3070	$10	CY	$31,000
Confirmatory Soil Testing of >1 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Backfill Excavated Off-Site Area (Off-Site Soil)	4165	$16	CY	$67,000
Fill and Grade for Cap Slope Drainage	3500	$16	CY	$56,000
Final Grading of Consolidation Area	2	$5,000	ACRE	$10,000
Cap Consolidation Area with Composite Cap	9400	$27	SQYD	$254,000
Fence for Consolidation Area	1380	$18	LF	$25,000
Surface Water Drainage System	1340	$55	LF	$74,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term Groundwater Treatment System			LUMP SUM	$100,000
Long Term GW Treatment Operation (30 yrs)			LUMP SUM	$310,000
Long Term GW & Surfacewater Monitoring (30 yrs)			LUMP SUM	$195,000
Long Term Maintenance (30 yrs)			LUMP SUM	$359,000
Estimated Direct Cost				**$3,175,000**
INDIRECT COSTS				
Engineering (10%)				$318,000
Field Inspection/Technical Support (5%)				$159,000
Construction Management (5%)				$159,000
Contractor Profits and Overhead (15%)				$476,000
Contingency (30%)				$953,000
Estimated Indirect Cost				**$2,065,000**
ESTIMATED TOTAL COST FOR REMEDIAL ALTERNATIVE 6C				**$5,240,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

TABLE 6-24

ARAR COMPLIANCE CHECKLIST
REMEDIAL ALTERNATIVES 7a, 7b, and 7c - ON-SITE STABILIZATION

ARARs	**Evaluation/Comments**
Chemical Specific	
• NYSGWQS	Applicable to groundwater remedial objectives.
Location Specific	No applicable location-specific ARARs identified.
Action Specific	
• NYAQS	Applicable during site remediation.
• NYAQEL	Not applicable (NA).
• NY Hazardous Waste Regulations/RCRA	
- Generator Requirements/Manifests	Applicable to off-site disposal.
- Containers	Applicable to storage/transportation of wastes for off-site disposal.
- Thermal Treatment	NA
- Waste Piles	NA
- Land Burial	Applicable; waiver may be required for placement of stabilized off-site materials.
- Groundwater Monitoring	Potentially relevant and appropriate to groundwater monitoring.
- Land Disposal Restrictions	Applicable; waiver may be required for placement of stabilized off-site materials.
- Closure/Post-Closure Care	Applicable
• NYS Solid Waste Regulations	Potentially applicable; waiver may be required.
• TSCA Requirements	
- Incinerator	NA
- Alternate Treatment	NA
- Chemical Waste Landfill	Potentially applicable to placement of stabilized off-site materials; waiver may be required.
- Storage	Potentially applicable to materials stored prior to off-site disposal.
- Marking/Reporting/Recordkeeping	Applicable to storage and transportation of materials for off-site disposal.
• SPDES/Stormwater	Potentially applicable to discharge of wastewater/runoff.
• Transportation Regulations	Applicable to off-site disposal and incineration.

Table 6-25

REMEDIAL ALTERNATIVE 7A COSTING

OFF-SITE LAND DISPOSAL OF NAPL (On-site) SOILS
ON-SITE CONSOLIDATION AND STABILIZATION OF >25 PPM (On-site) & >10 PPM (Off-site) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Bench Work			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$5,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Transport NAPL Soils to TSCA Landfill	563	$170	TON	$96,000
TSCA Landfill Disposal of NAPL Soils	563	$140	TON	$79,000
Excavation of >10 ppm PCB Off-Site Impacted Soils	2770	$10	CY	$28,000
Confirmatory Soil Testing of >10 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Stabilization of Impacted Soils	22223	$80	TON	$1,778,000
Backfill Excavated Off-Site Area (Off-Site Soil)	2770	$16	CY	$44,000
Fill and Grade for Cap Slope Drainage	2000	$16	CY	$32,000
Final Grading of Consolidation Area	2	$5,000	ACRE	$10,000
Cap Consolidation Area with Composite Cap	9400	$27	SQYD	$254,000
Fence for Consolidation Area	1380	$18	LF	$25,000
Surface Water Drainage System	1340	$55	LF	$74,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term GW & Surfacewater Monitoring (30 yrs)			LUMP SUM	$195,000
Long Term Maintenance (30 yrs)			LUMP SUM	$167,000
Estimated Direct Cost				**$3,502,000**
INDIRECT COSTS				
Engineering (10%)				$350,000
Field Inspection/Technical Support (5%)				$175,000
Construction Management (5%)				$175,000
Contractor Profits and Overhead (15%)				$525,000
Contingency (30%)				$1,051,000
Estimated Indirect Cost				**$2,276,000**
ESTIMATED TOTAL COST FOR REMEDIAL ALTERNATIVE 7A				**$5,778,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-26

REMEDIAL ALTERNATIVE 7B COSTING

OFF-SITE LAND DISPOSAL OF NAPL (On-site) SOILS
ON-SITE CONSOLIDATION AND STABILIZATION OF >10 PPM (On-site) & >1 PPM (Off-site) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Bench Work			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$5,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Transport NAPL Soils to TSCA Landfill	563	$170	TON	$96,000
TSCA Landfill Disposal of NAPL Soils	563	$140	TON	$79,000
Excavation of >1 ppm PCB Off-Site Impacted Soils	6465	$10	CY	$65,000
Confirmatory Soil Testing of >1 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Stabilization of Impacted Soils	31785	$80	TON	$2,543,000
Backfill Excavated Off-Site Area (Off-Site Soil)	6465	$16	CY	$103,000
Fill and Grade for Slope for Cap Drainage	2000	$16	CY	$32,000
Final Grading of Consolidation Area	2	$5,000	ACRE	$10,000
Cap Consolidation Area with Composite Cap	9400	$27	SQYD	$254,000
Fence for Consolidation Area	1380	$18	LF	$25,000
Surface Water Drainage System	1340	$55	LF	$74,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term GW & Surfacewater Monitoring (30 yrs)			LUMP SUM	$195,000
Long Term Maintenance (30 yrs)			LUMP SUM	$167,000
Estimated Direct Cost				**$4,363,000**
INDIRECT COSTS				
Engineering (10%)				$436,000
Field Inspection/Technical Support (5%)				$218,000
Construction Management (5%)				$218,000
Contractor Profits and Overhead (15%)				$654,000
Contingency (30%)				$1,309,000
Estimated Indirect Cost				**$2,835,000**
ESTIMATED TOTAL COST FOR REMEDIAL ALTERNATIVE 7B				**$7,198,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Table 6-27

REMEDIAL ALTERNATIVE 7C COSTING

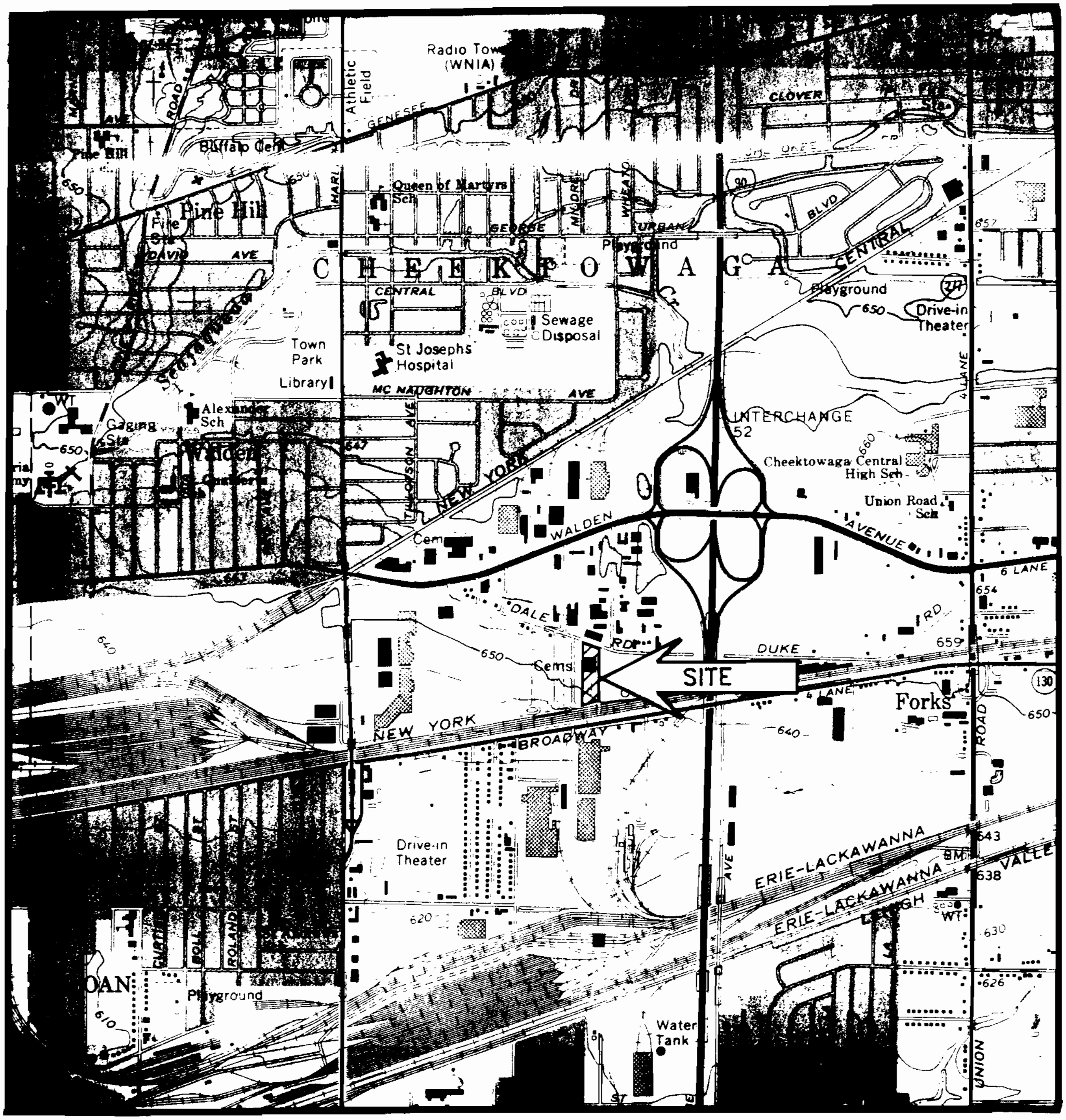
OFF-SITE LAND DISPOSAL OF NAPL (On-site) SOILS
ON-SITE CONSOLIDATION AND STABILIZATION OF >10 PPM (On-site), >1 PPM (Off-site), & >10 PPM (Retention Pond) PCB SOILS

DIRECT COSTS	QUANTITY	UNIT COST	UNITS	ITEM COST
Health & Safety Plan			LUMP SUM	$25,000
Bench Work			LUMP SUM	$25,000
Mob/Demob - Earthmoving Equipment			LUMP SUM	$40,000
Clear and Grub Site	2	$4,000	ACRE	$8,000
Waste Profile Forms and Tests			LUMP SUM	$5,000
Air Emission Modeling for Excavation Activities			LUMP SUM	$50,000
Temporary Staging Area for Excavated Soils			LUMP SUM	$100,000
Temporary Water Treatment System			LUMP SUM	$300,000
Stormwater Pipe Cleaning	2000	$20	LF	$40,000
Excavate NAPL Contaminated Soils	375	$25	CY	$9,000
Stabilize NAPL Contaminated Soils	563	$40	TON	$23,000
Transport NAPL Soils to TSCA Landfill	563	$170	TON	$96,000
TSCA Landfill Disposal of NAPL Soils	563	$140	TON	$79,000
Excavation of >1 ppm PCB Off-Site Impacted Soils	4165	$10	CY	$42,000
Confirmatory Soil Testing of >1 ppm PCB Off-Site Soils	63	$200	PER SAMPLE	$13,000
Stabilization of Impacted Soils	28335	$80	TON	$2,267,000
Backfill Excavated Off-Site Area (Off-Site Soil)	4165	$16	CY	$67,000
Fill and Grade for Slope for Cap Drainage	2000	$16	CY	$32,000
Final Grading of Consolidation Area	2	$5,000	ACRE	$10,000
Cap Consolidation Area with Composite Cap	9400	$27	SQYD	$254,000
Fence for Consolidation Area	1380	$18	LF	$25,000
Surface Water Drainage System	1340	$55	LF	$74,000
Work Site Closure			LUMP SUM	$40,000
Plug and Abandon Existing Wells	8	$2,000	PER WELL	$16,000
Site Restoration - 4" Top Soil, Hydroseed and Fertilize	2	$13,000	ACRE	$26,000
Long Term GW & Surfacewater Monitoring (30 yrs)			LUMP SUM	$195,000
Long Term Maintenance (30 yrs)			LUMP SUM	$167,000
Estimated Direct Cost				**$4,028,000**
INDIRECT COSTS				
Engineering (10%)				$403,000
Field Inspection/Technical Support (5%)				$201,000
Construction Management (5%)				$201,000
Contractor Profits and Overhead (15%)				$604,000
Contingency (30%)				$1,208,000
Estimated Indirect Cost				**$2,617,000**
ESTIMATED TOTAL COST FOR REMEDIAL ALTERNATIVE 7C				**$6,645,000**

Note: All costs are based on present worth calculations.

BY: DCW
CHK: MSL

Figures



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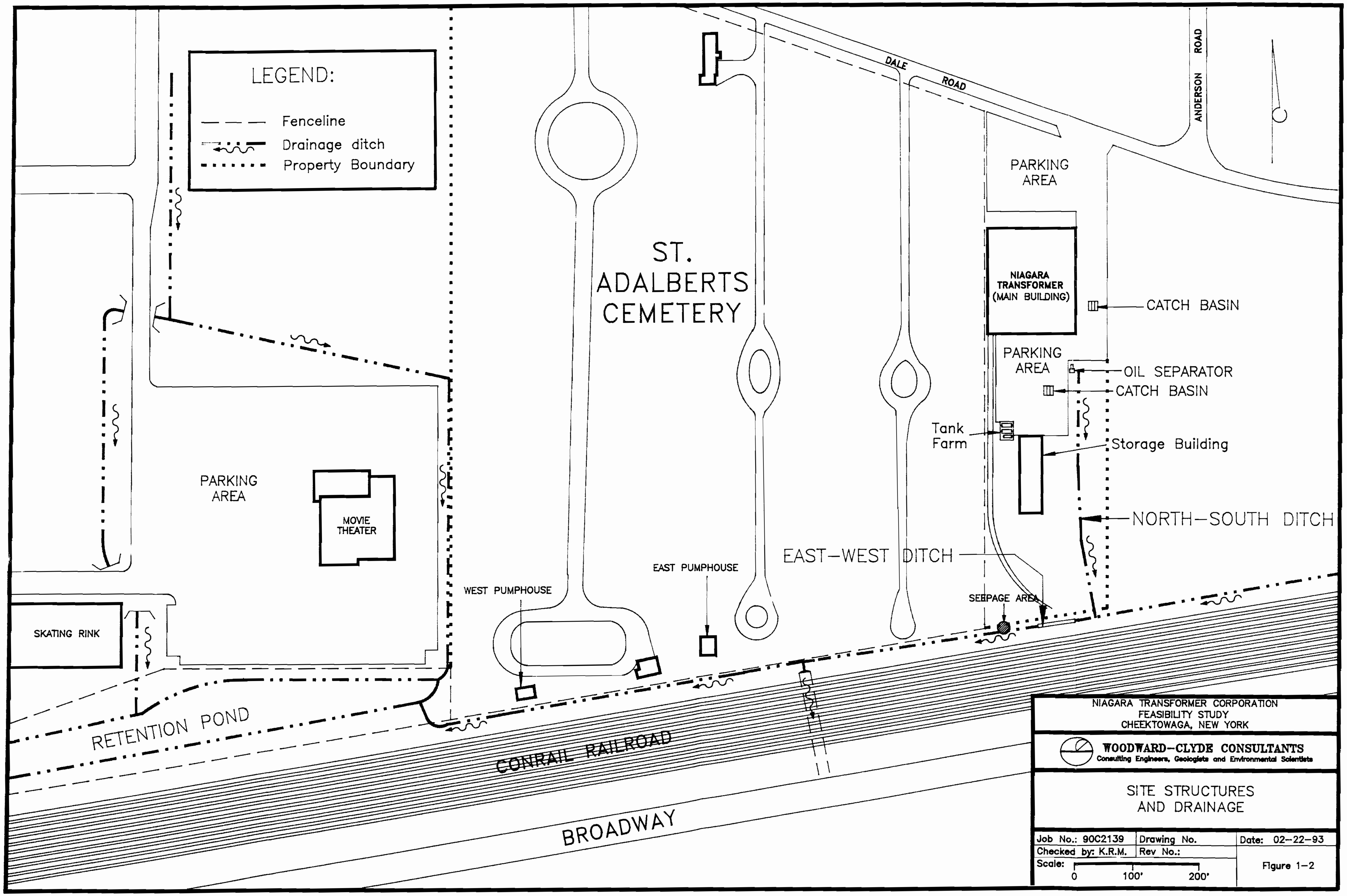
SITE LOCATION MAP

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



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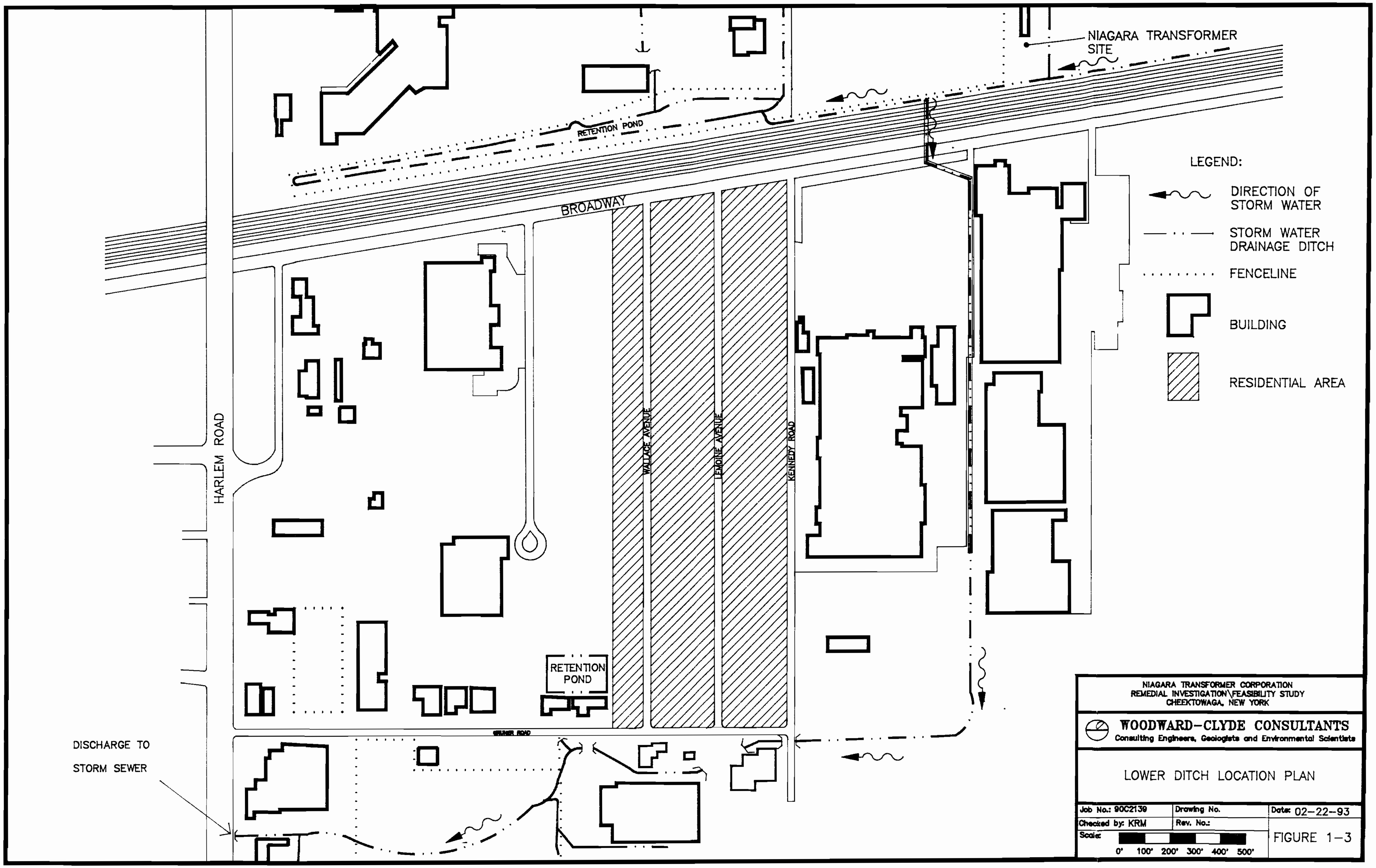
SITE STRUCTURES
AND DRAINAGE

Job No.: 90C2139
Checked by: K.R.M.
Scale: 0 100' 200'
Drawing No.
Rev No.:
Date: 02-22-93
Figure 1-2



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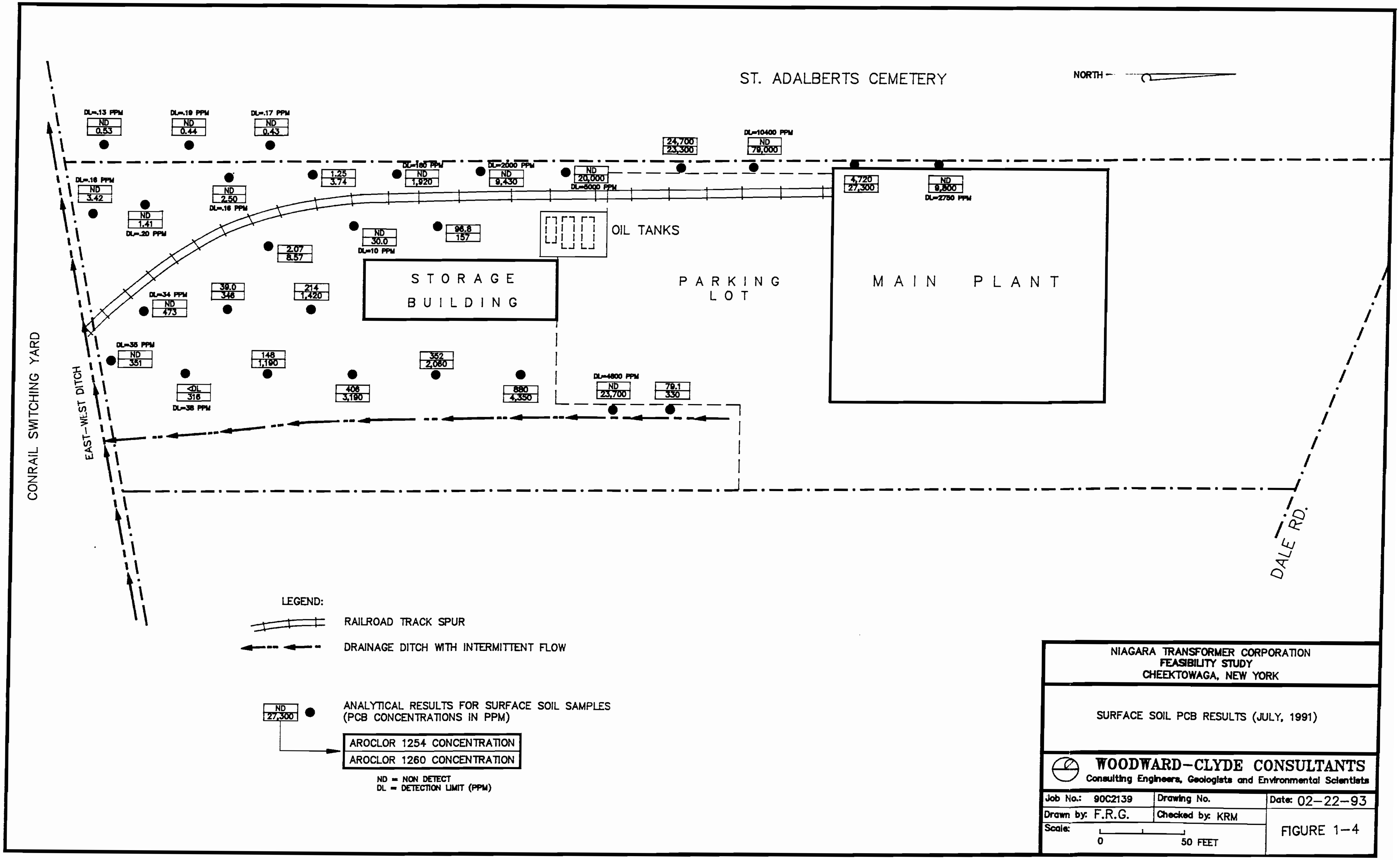
LOWER DITCH LOCATION PLAN

Job No.: 90C2139
Drawing No.
Date: 02-22-93
Checked by: KRM
Rev. No.:
Scale: 0' 100' 200' 300' 400' 500'

FIGURE 1-3



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SURFACE SOIL PCB RESULTS (JULY, 1991)

WOODWARD-CLYDE CONSULTANTS
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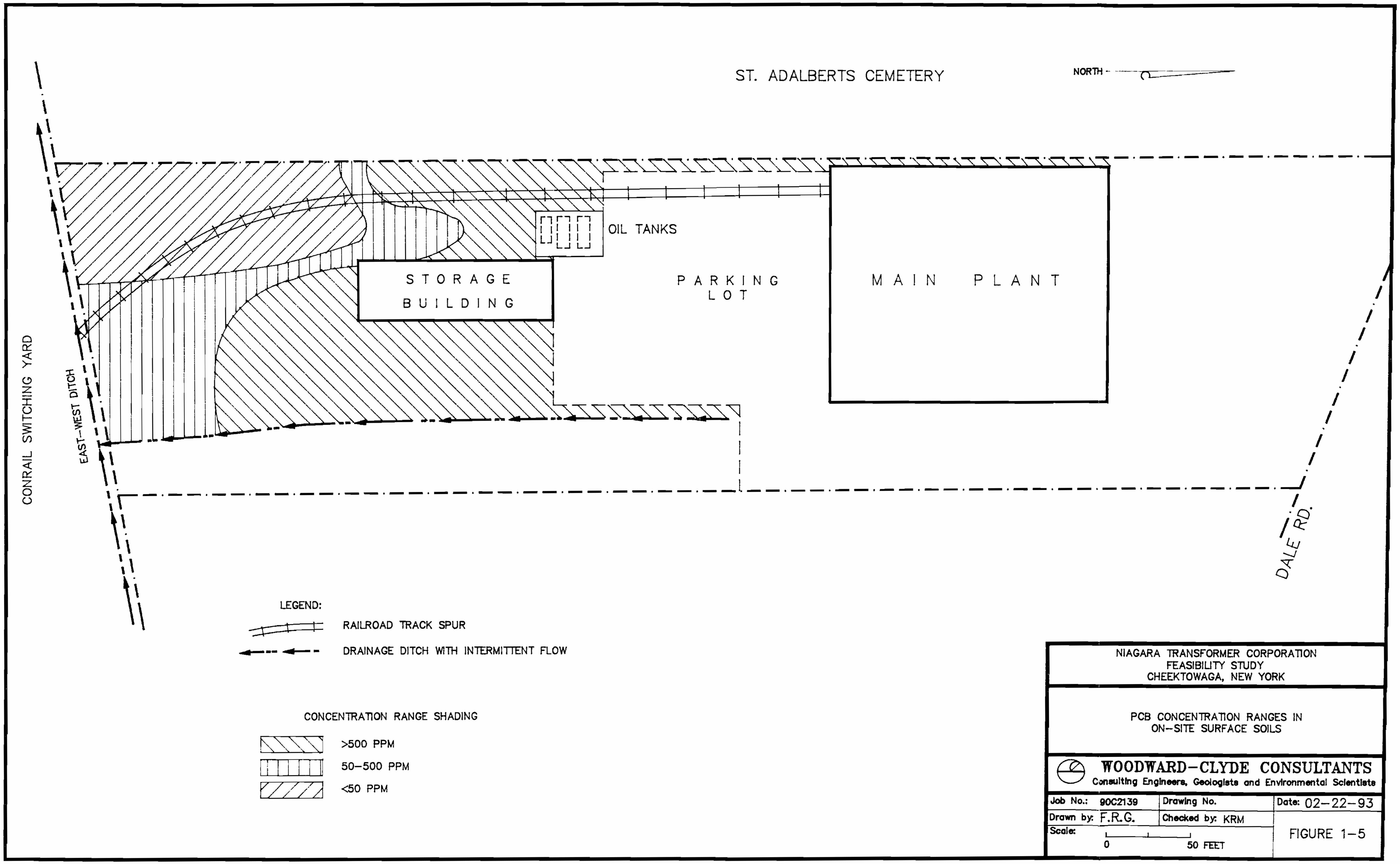
Job No.: 90C2139	Drawing No.	Date: 02-22-93
Drawn by: F.R.G.	Checked by: KRM	FIGURE 1-4
Scale: 0 50 FEET		



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PCB CONCENTRATION RANGES IN
ON-SITE SURFACE SOILS

WOODWARD-CLYDE CONSULTANTS
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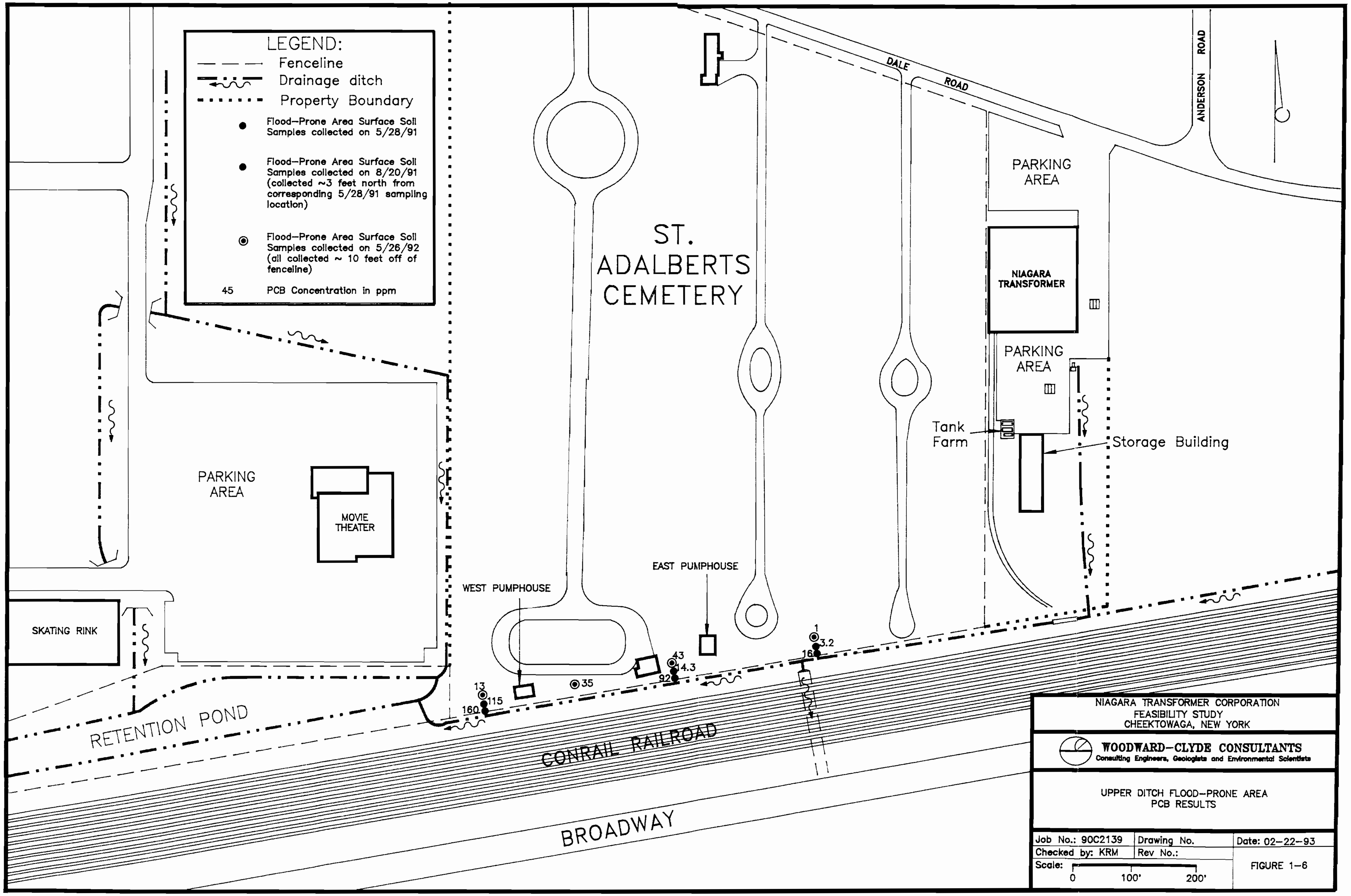
Job No.: 90C2139	Drawing No.	Date: 02-22-93
Drawn by: F.R.G.	Checked by: KRM	FIGURE 1-5
Scale: 0 50 FEET		



LEGEND:

— — — Fenceline

Drainage ditch

• • • • • • • Property Boundary

● Flood–Prone Area Surface Soil Samples collected on 5/28/91

● Flood–Prone Area Surface Soil Samples collected on 8/20/91 (collected ~3 feet north from corresponding 5/28/91 sampling location)

◉ Flood–Prone Area Surface Soil Samples collected on 5/26/92 (all collected ~ 10 feet off of fenceline)

45 PCB Concentration in ppm

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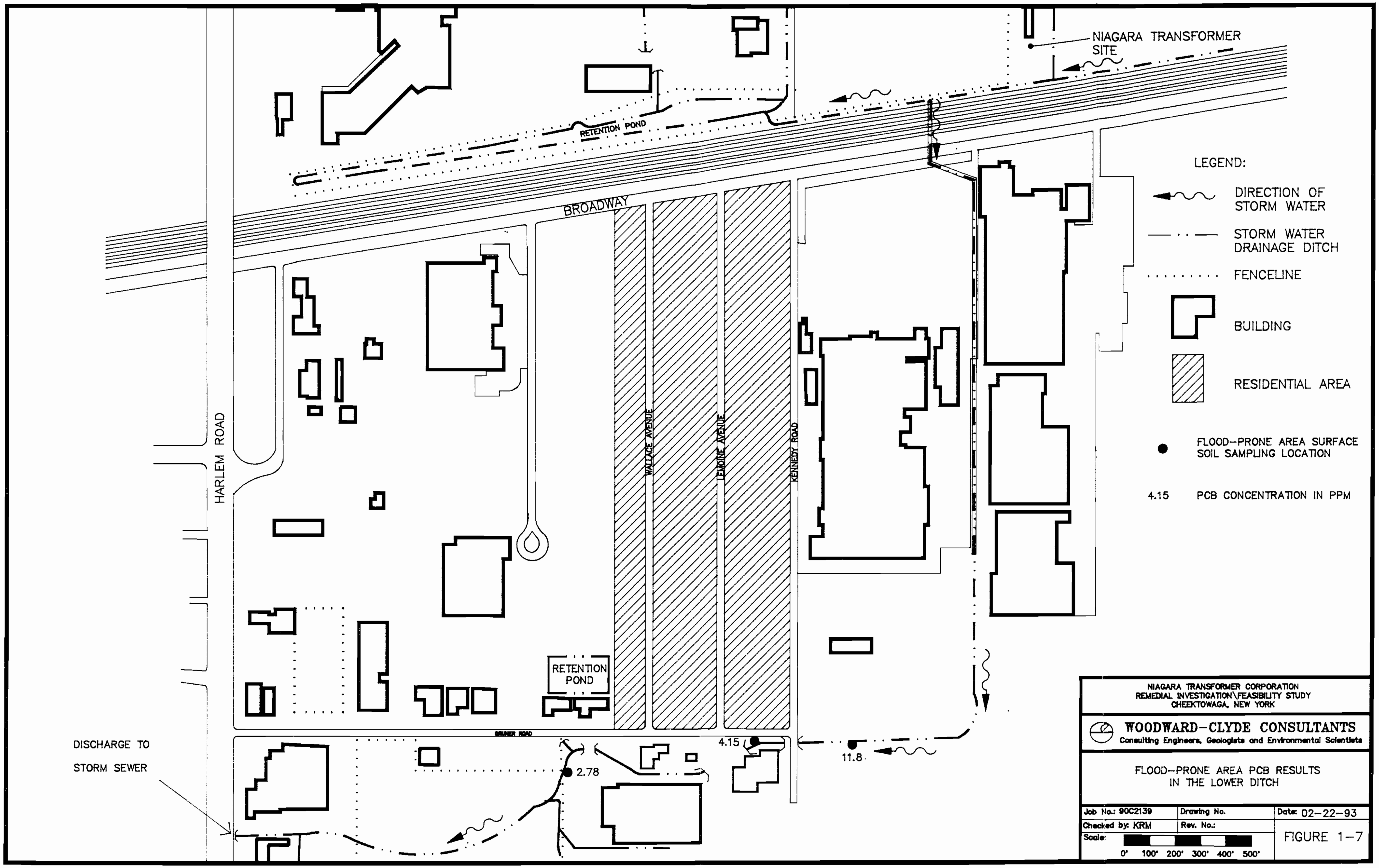
UPPER DITCH FLOOD–PRONE AREA
PCB RESULTS

Job No.: 90C2139	Drawing No.	Date: 02–22–93
Checked by: KRM	Rev No.:	FIGURE 1–6
Scale: 0 100' 200'		



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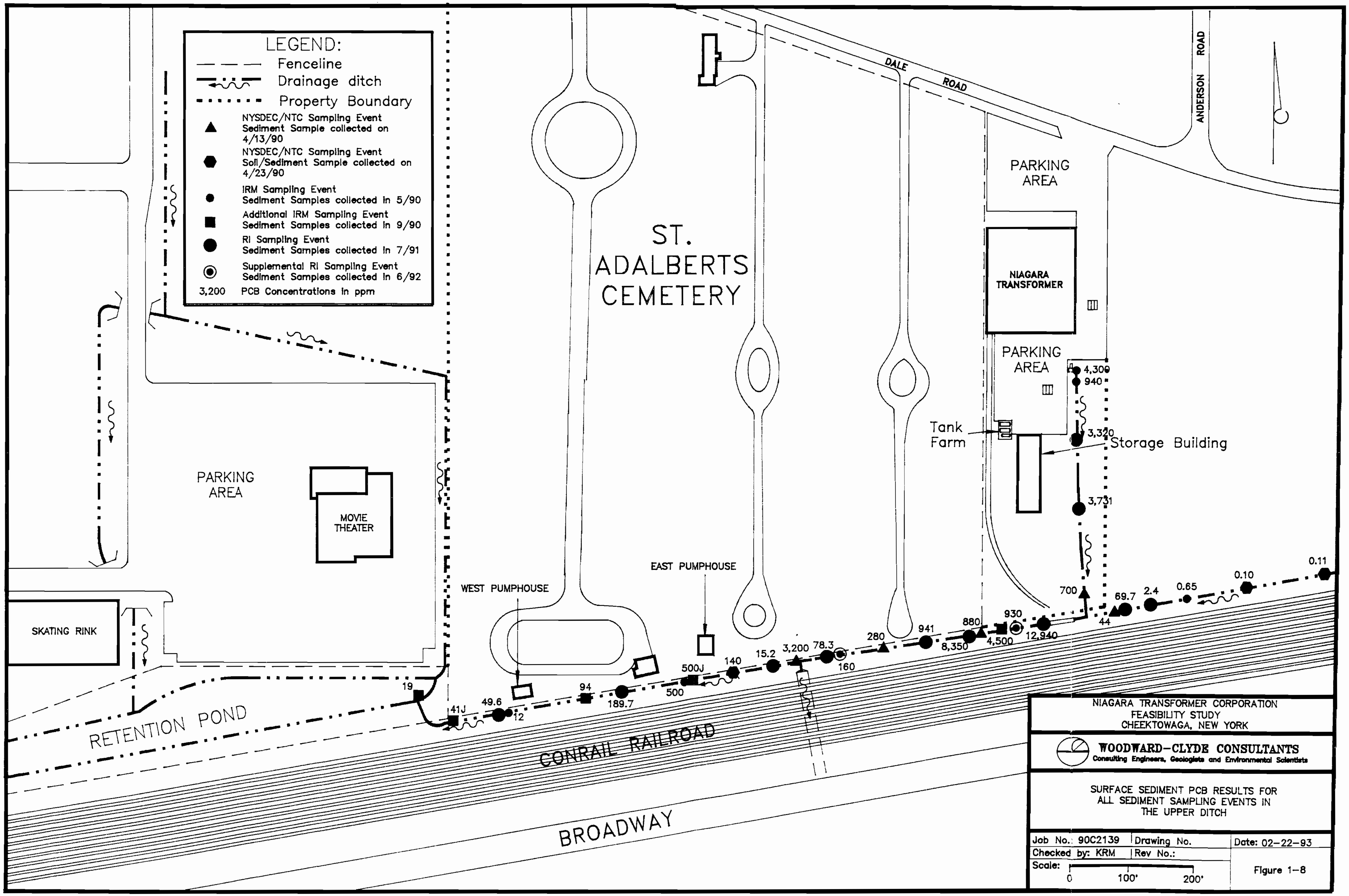
FLOOD-PRONE AREA PCB RESULTS
IN THE LOWER DITCH

Job No.: 90C2139
Drawing No.
Date: 02-22-93
Checked by: KRM
Rev. No.:
Scale: 0' 100' 200' 300' 400' 500'
FIGURE 1-7



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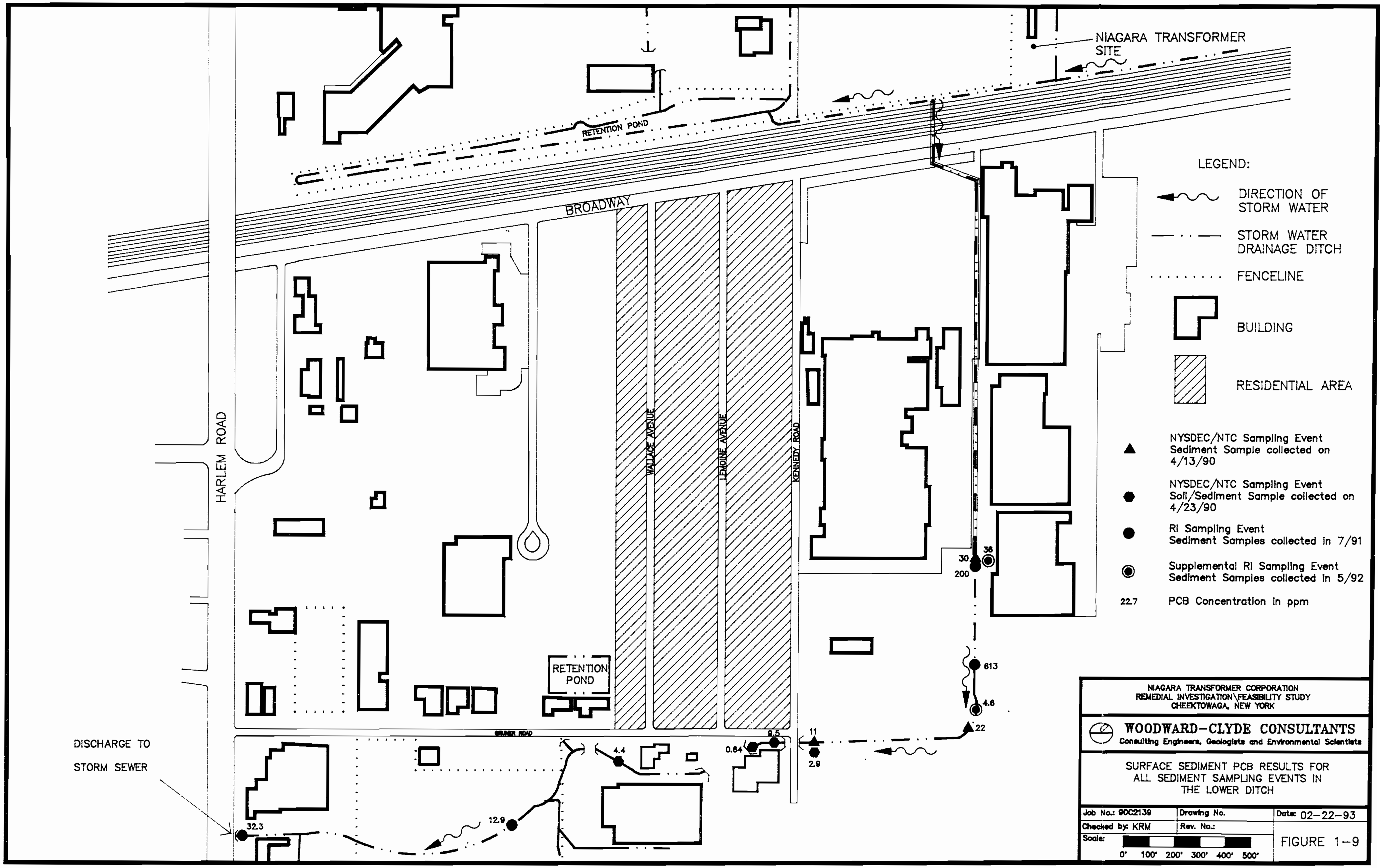
SURFACE SEDIMENT PCB RESULTS FOR
ALL SEDIMENT SAMPLING EVENTS IN
THE UPPER DITCH

Job No.: 90C2139	Drawing No.	Date: 02-22-93
Checked by: KRM	Rev No.:	Figure 1-8
Scale: 0 100' 200'		



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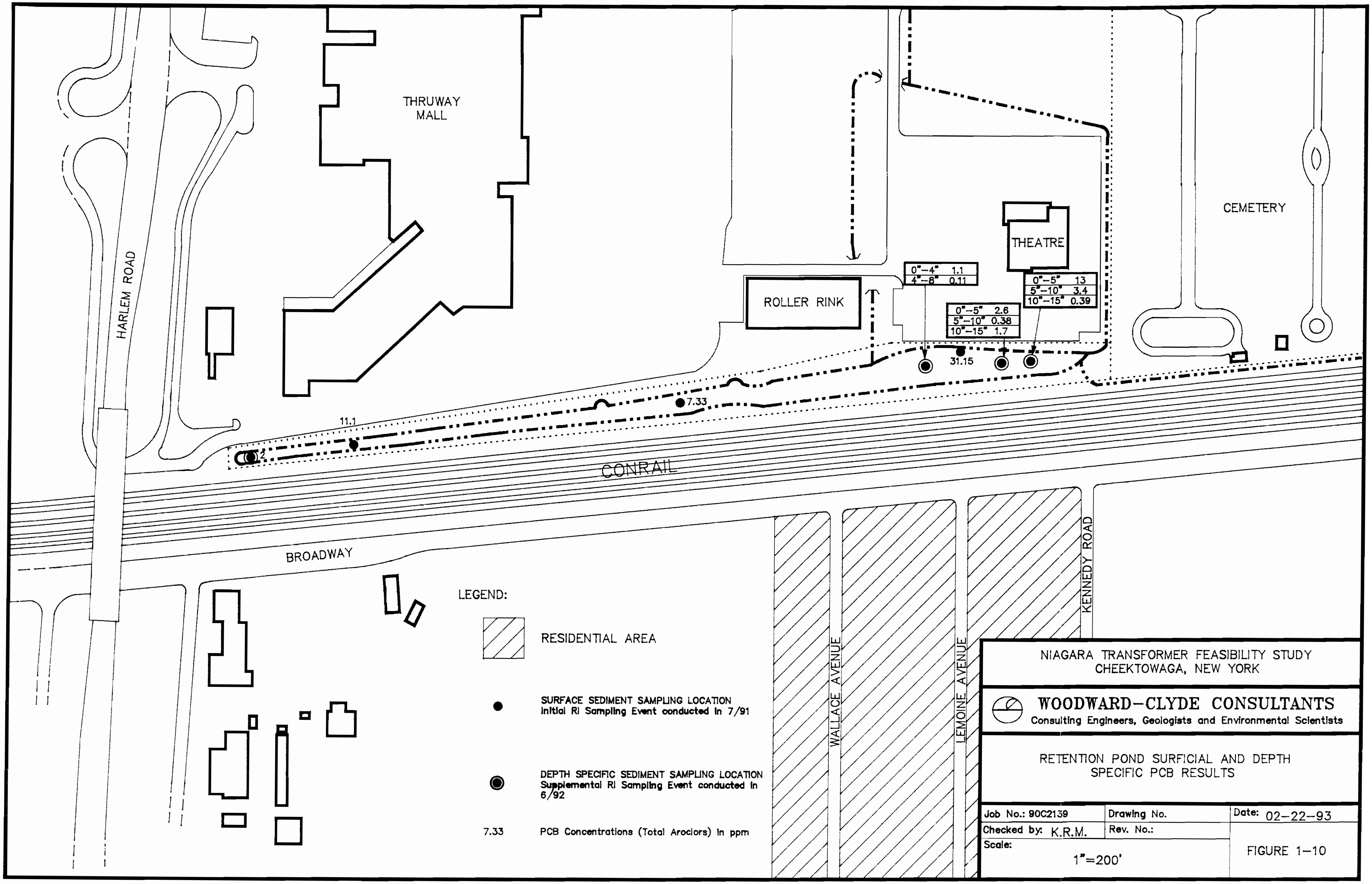
SURFACE SEDIMENT PCB RESULTS FOR
ALL SEDIMENT SAMPLING EVENTS IN
THE LOWER DITCH

Job No.: 90C2139
Drawing No.
Date: 02-22-93
Checked by: KRM
Rev. No.:

FIGURE 1-9



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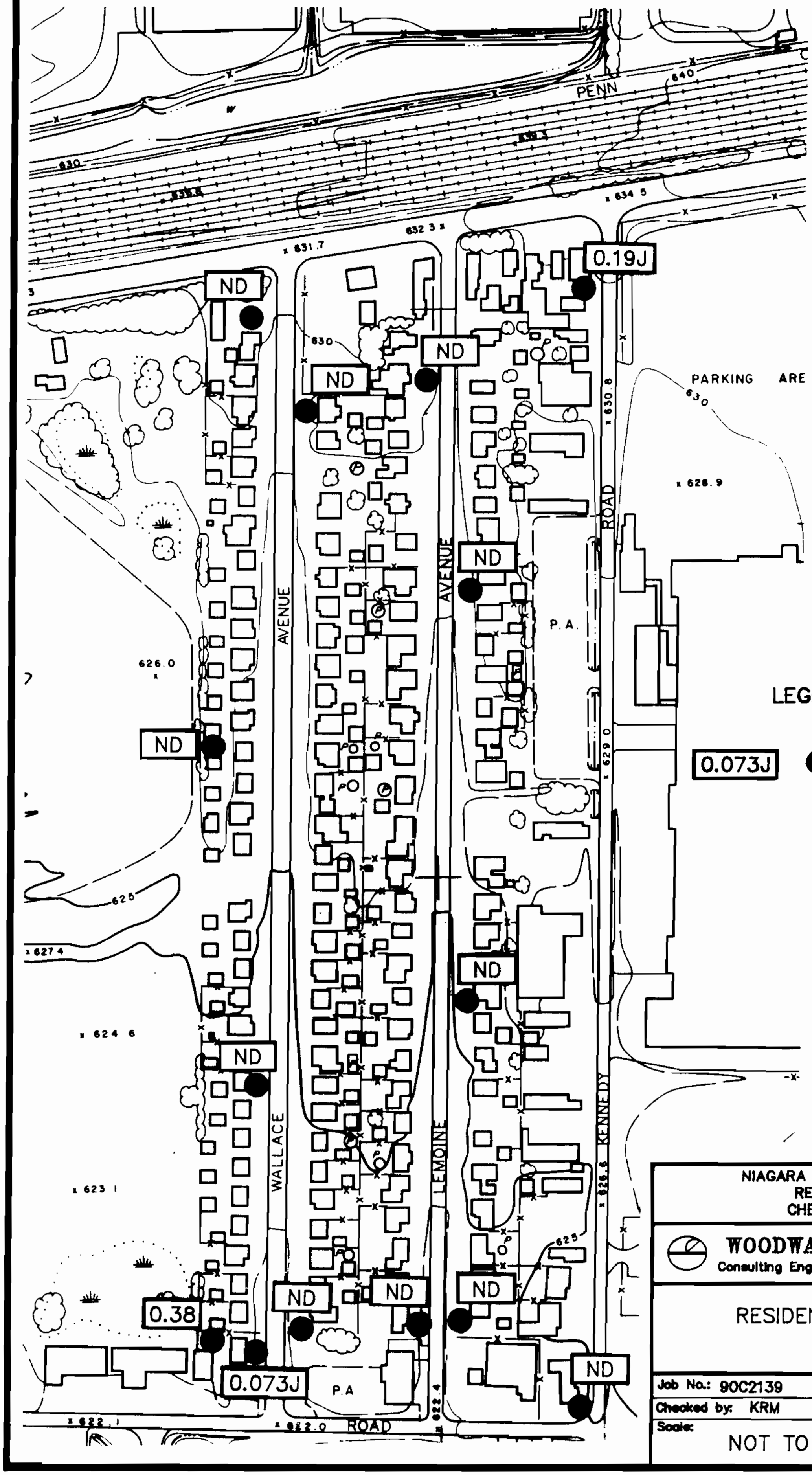
RETENTION POND SURFICIAL AND DEPTH
SPECIFIC PCB RESULTS

Job No.: 90C2139
Drawing No.
Date: 02–22–93
Checked by: K.R.M.
Rev. No.:
Scale: 1"=200'
FIGURE 1–10



LEGEND:

0.073J ● PCB RESULT IN PPM

Detection Limits ranged from .22 to .30 ppm.

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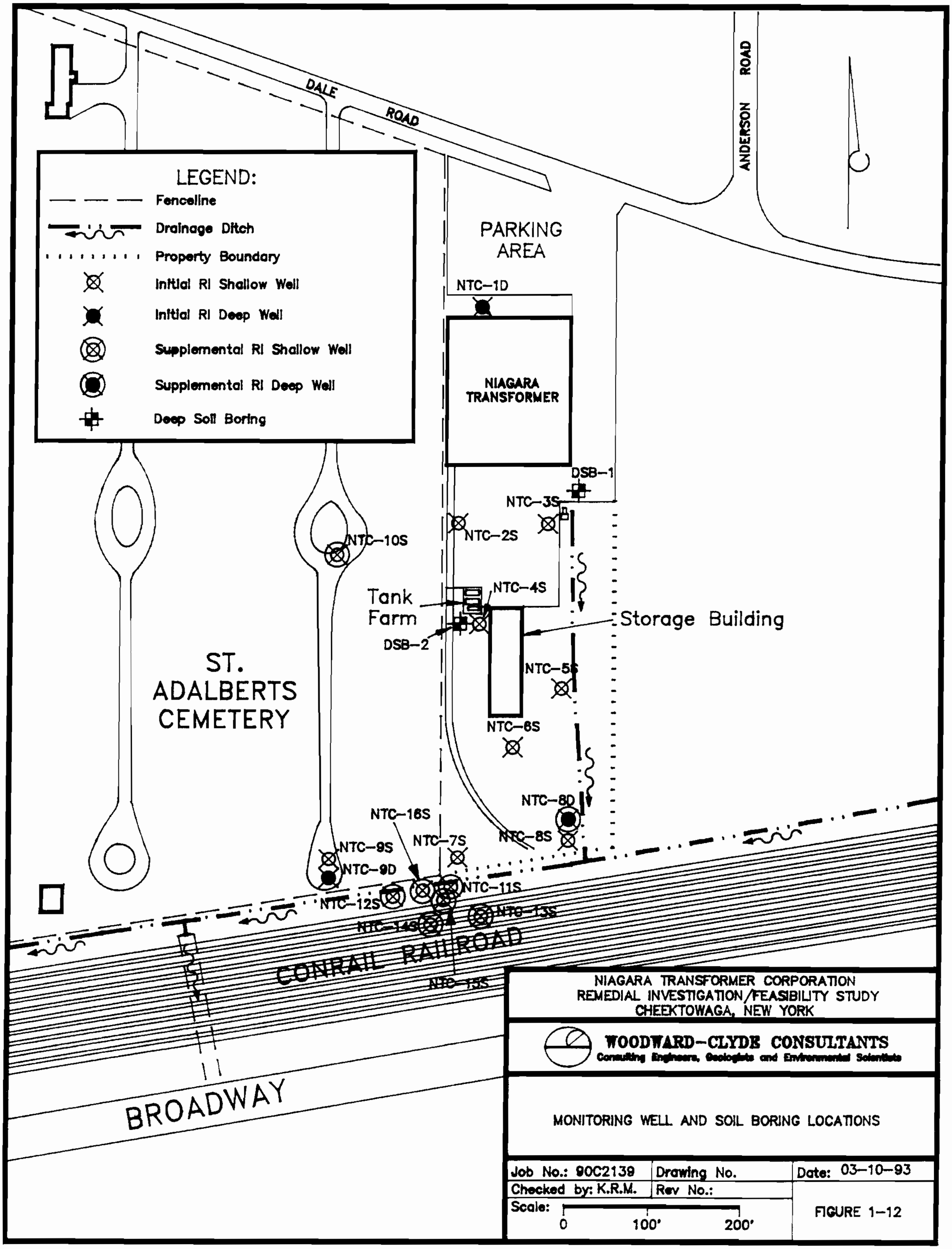
RESIDENTIAL AREA SAMPLING
PCB RESULTS

Job No.: 90C2139	Drawing No.	Date: 10/23/92
Checked by: KRM	Rev. No.:	FIGURE 1-11
Scale: NOT TO SCALE		



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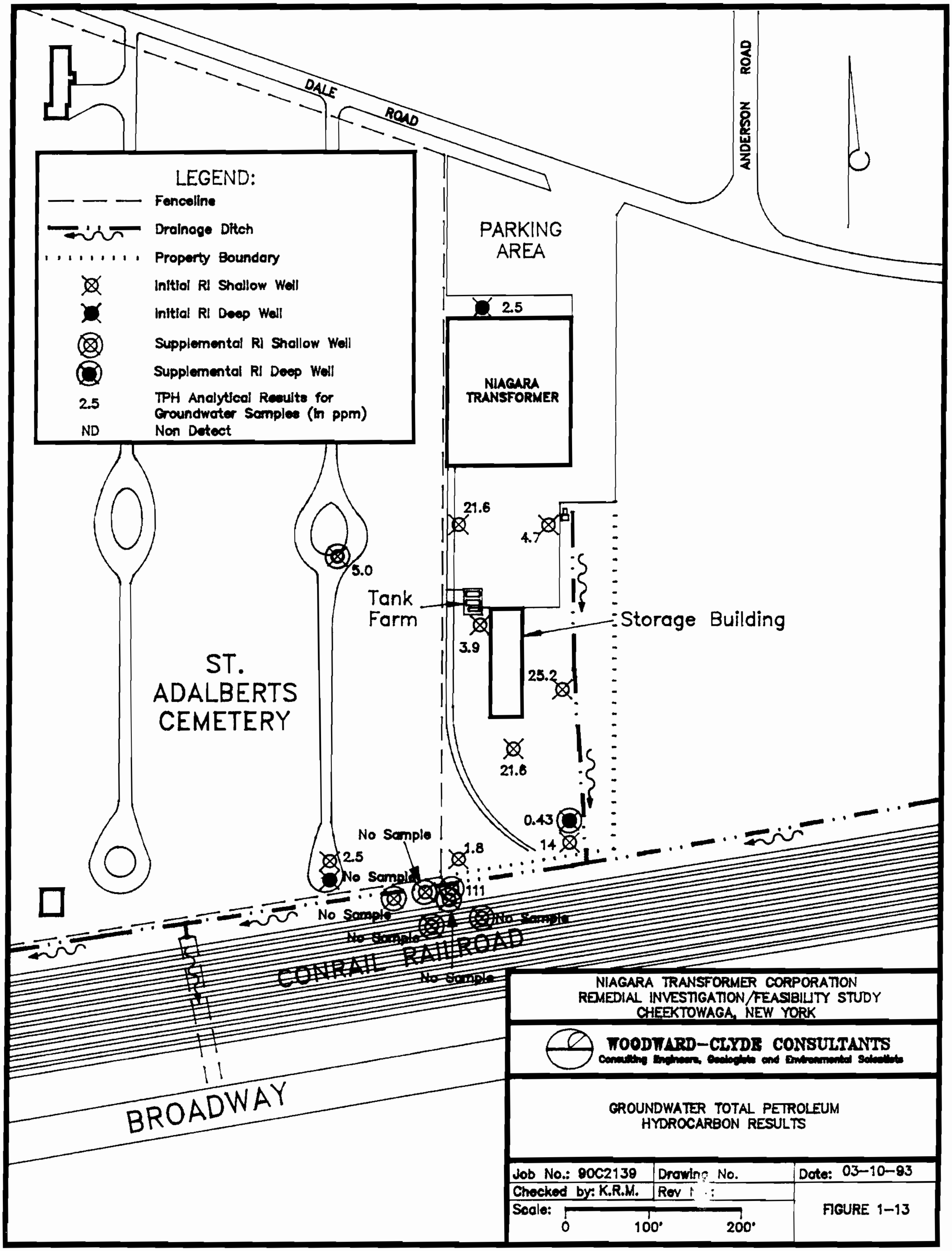
MONITORING WELL AND SOIL BORING LOCATIONS

Job No.: 90C2139	Drawing No.	Date: 03-10-93
Checked by: K.R.M.	Rev No.:	
Scale: 0 100' 200'		FIGURE 1-12



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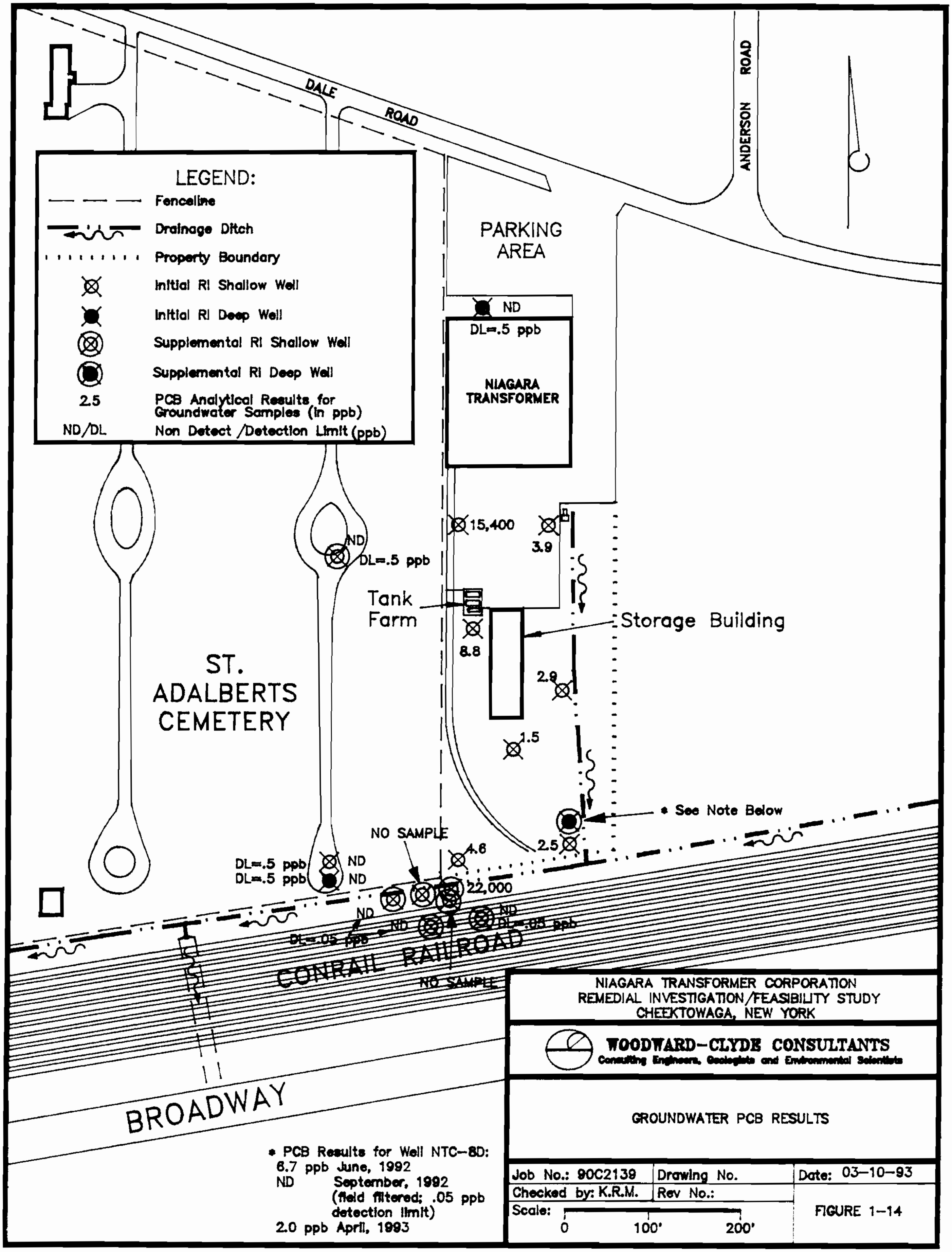
GROUNDWATER TOTAL PETROLEUM
HYDROCARBON RESULTS

Job No.: 90C2139	Drawing No.	Date: 03-10-93
Checked by: K.R.M.	Rev No.:	
Scale: 0 100' 200'		FIGURE 1-13



* PCB Results for Well NTC-8D:
6.7 ppb June, 1992
ND September, 1992 (field filtered; .05 ppb detection limit)
2.0 ppb April, 1993

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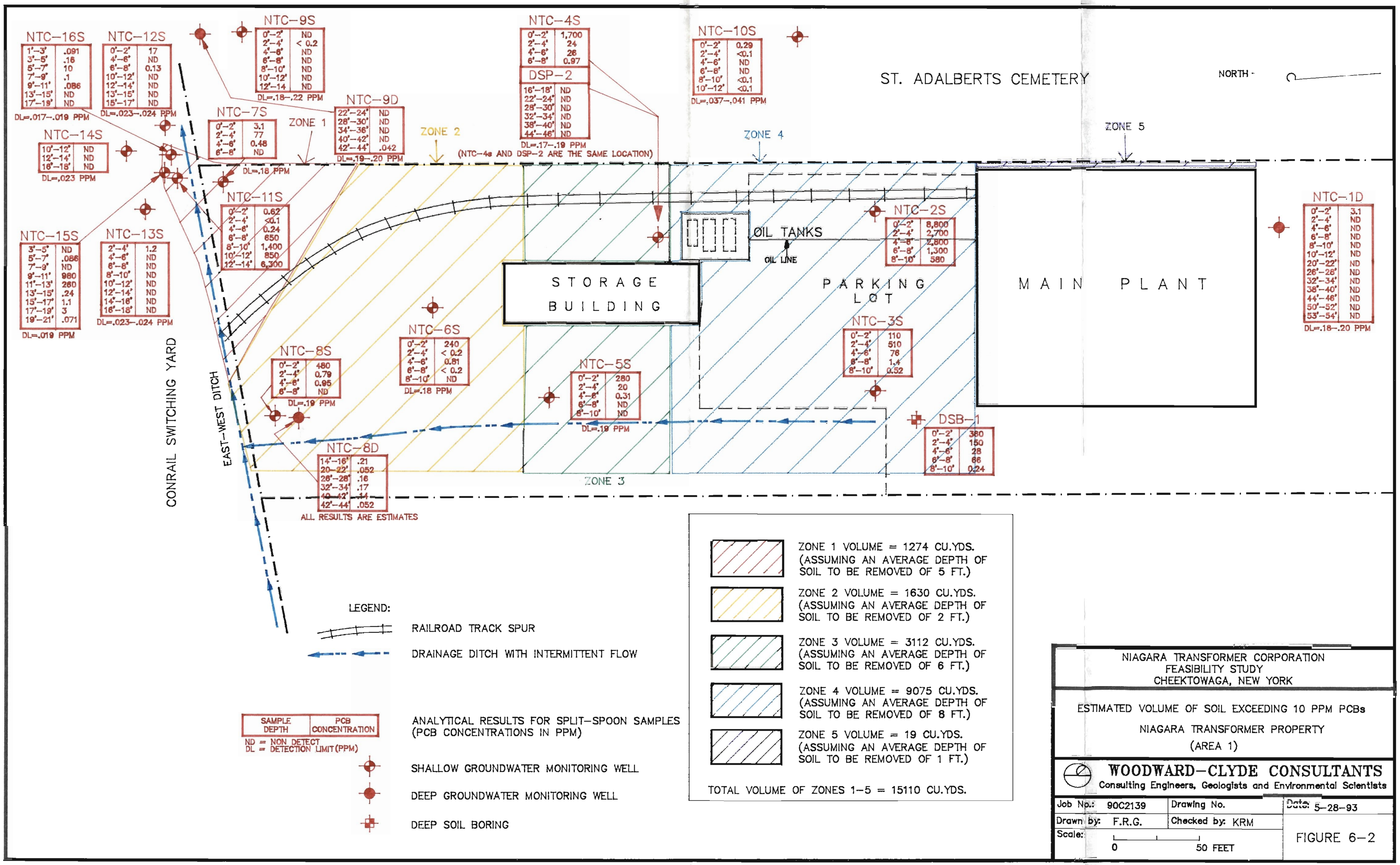
GROUNDWATER PCB RESULTS

Job No.: 90C2139	Drawing No.	Date: 03-10-93
Checked by: K.R.M.	Rev No.:	FIGURE 1-14
Scale: 0 100' 200'		



NTC-16S

1'-3'	.091
3'-5'	.16
5'-7'	10
7'-9'	.1
9'-11'	.086
13'-15'	ND
17'-19'	ND

DL=.017-.019 PPM

NTC-12S

0'-2'	17
4'-6'	ND
6'-8'	0.13
10'-12'	ND
12'-14'	ND
13'-15'	ND
15'-17'	ND

DL=.023-.024 PPM

NTC-14S

10'-12'	ND
12'-14'	ND
16'-18'	ND

DL=,023 PPM

NTC-15S

3'-5'	ND
5'-7'	.086
7'-9'	ND
9'-11'	980
11'-13'	260
13'-15'	.24
15'-17'	1.1
17'-19'	3
19'-21'	.071

DL=.019 PPM

NTC-13S

2'-4'	1.2
4'-6'	ND
6'-8'	ND
8'-10'	ND
10'-12'	ND
12'-14'	ND
14'-16'	ND
16'-18'	ND

DL=.023-.024 PPM

NTC-9S

0'-2'	ND
2'-4'	< 0.2
4'-6'	ND
6'-8'	ND
8'-10'	ND
10'-12'	ND
12'-14	ND

DL=.18-.22 PPM

NTC-7S

0'-2'	3.1
2'-4'	77
4'-6'	0.48
6'-8'	ND

DL=.18 PPM

NTC-9D

22'-24'	ND
28'-30'	ND
34'-36'	ND
40'-42'	ND
42'-44'	.042

DL=.19-.20 PPM

NTC-11S

0'-2'	0.62
2'-4'	<0.1
4'-6'	0.24
6'-8'	650
8'-10'	1,400
10'-12'	850
12'-14'	6,300

NTC-8S

0'-2'	480
2'-4'	0.79
4'-6'	0.95
6'-8'	ND

DL=.19 PPM

NTC-6S

0'-2'	240
2'-4'	< 0.2
4'-6'	0.81
6'-8'	< 0.2
8'-10'	ND

DL=.18 PPM

NTC-8D

14'-16'	.21
20-22'	.052
26'-28'	.16
32'-34'	.17
40-42'	.14
42'-44'	.052

ALL RESULTS ARE ESTIMATES

NTC-4S

0'-2'	1,700
2'-4'	24
4'-6'	26
6'-8'	0.97

DSP-2

16'-18'	ND
22'-24'	ND
28'-30'	ND
32'-34'	ND
38'-40'	ND
44'-46'	ND

DL=.17-.19 PPM

(NTC-4s AND DSP-2 ARE THE SAME LOCATION)

NTC-10S

0'-2'	0.29
2'-4'	<0.1
4'-6'	ND
6'-8'	ND
8'-10'	<0.1
10'-12'	<0.1

DL=.037-.041 PPM

NTC-5S

0'-2'	280
2'-4'	20
4'-6'	0.31
6'-8'	ND
8'-10'	ND

DL=.19 PPM

NTC-2S

0'-2'	8,800
2'-4'	2,700
4'-6'	2,800
6'-8'	1,300
8'-10'	580

NTC-3S

0'-2'	110
2'-4'	510
4'-6'	76
6'-8'	1.4
8'-10'	0.52

DSB-1

0'-2'	380
2'-4'	150
4'-6'	28
6'-8'	66
8'-10'	0.24

NTC-1D

0'-2'	3.1
2'-4'	ND
4'-6'	ND
6'-8'	ND
8'-10'	ND
10'-12'	ND
20'-22'	ND
26'-28'	ND
32'-34'	ND
38'-40'	ND
44'-46'	ND
50'-52'	ND
53'-54'	ND

DL=.18-.20 PPM

ZONE 1 VOLUME = 1274 CU.YDS. (ASSUMING AN AVERAGE DEPTH OF SOIL TO BE REMOVED OF 5 FT.)

ZONE 2 VOLUME = 1630 CU.YDS. (ASSUMING AN AVERAGE DEPTH OF SOIL TO BE REMOVED OF 2 FT.)

ZONE 3 VOLUME = 3112 CU.YDS. (ASSUMING AN AVERAGE DEPTH OF SOIL TO BE REMOVED OF 6 FT.)

ZONE 4 VOLUME = 9075 CU.YDS. (ASSUMING AN AVERAGE DEPTH OF SOIL TO BE REMOVED OF 8 FT.)

ZONE 5 VOLUME = 19 CU.YDS. (ASSUMING AN AVERAGE DEPTH OF SOIL TO BE REMOVED OF 1 FT.)

TOTAL VOLUME OF ZONES 1-5 = 15110 CU.YDS.

NIAGARA TRANSFORMER CORPORATION
FEASIBILITY STUDY
CHEEKTOWAGA, NEW YORK

ESTIMATED VOLUME OF SOIL EXCEEDING 10 PPM PCBs

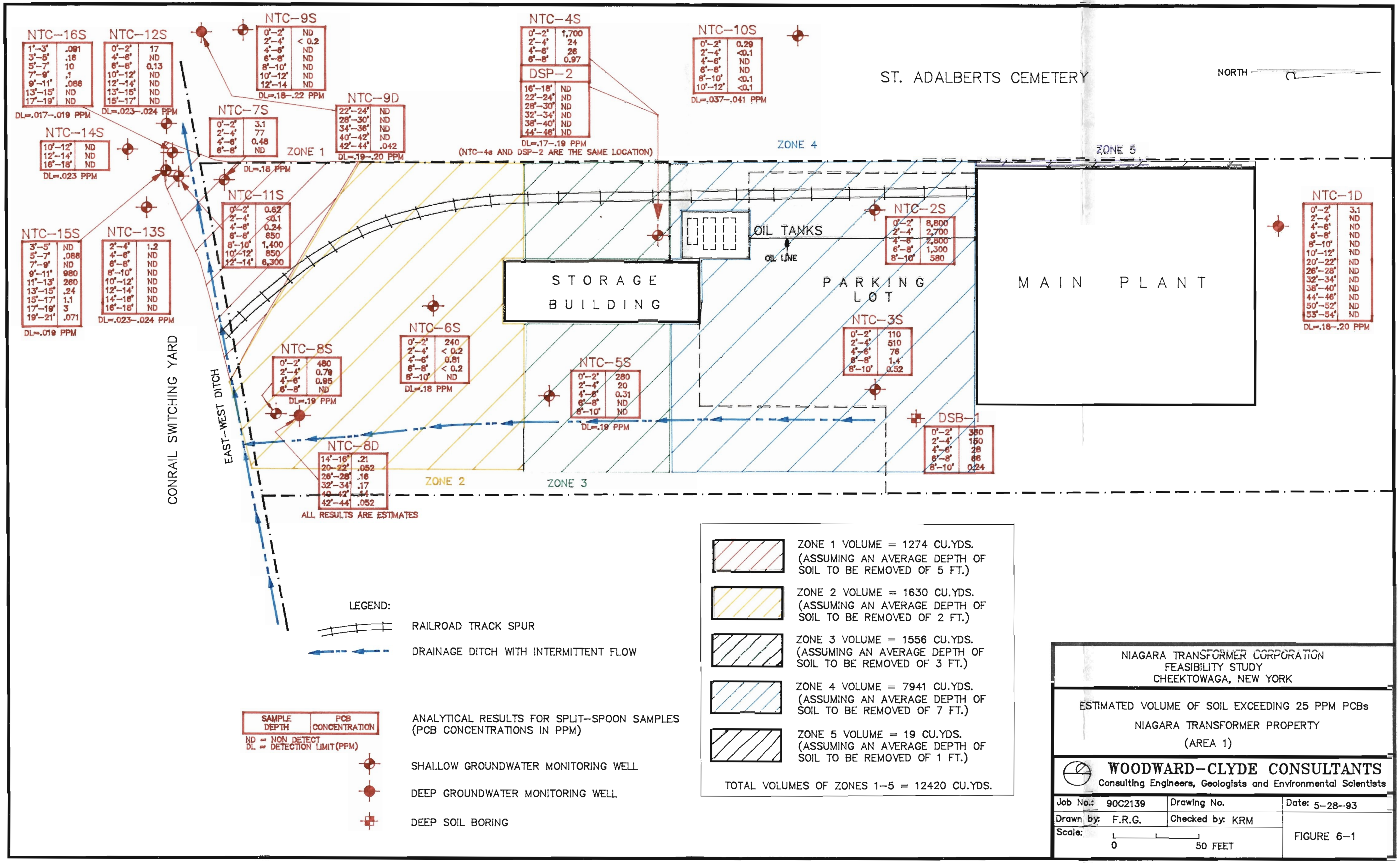
NIAGARA TRANSFORMER PROPERTY

(AREA 1)

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

Job No.: 90C2139
Drawing No.
Date: 5-28-93
Drawn by: F.R.G.
Checked by: KRM
Scale: 0 50 FEET

FIGURE 6-2



NTC-16S

1'-3'	.091
3'-5'	.16
5'-7'	10
7'-9'	.1
9'-11'	.086
13'-15'	ND
17'-19'	ND

DL=.017-.019 PPM

NTC-12S

0'-2'	17
4'-6'	ND
6'-8'	0.13
10'-12'	ND
12'-14'	ND
13'-15'	ND
15'-17'	ND

DL=.023-.024 PPM

NTC-9S

0'-2'	ND
2'-4'	< 0.2
4'-6'	ND
6'-8'	ND
8'-10'	ND
10'-12'	ND
12'-14	ND

DL=.18-.22 PPM

NTC-4S

0'-2'	1,700
2'-4'	24
4'-6'	26
6'-8'	0.97

DSP-2

16'-18'	ND
22'-24'	ND
28'-30'	ND
32'-34'	ND
38'-40'	ND
44'-46'	ND

DL=.17-.19 PPM

NTC-10S

0'-2'	0.29
2'-4'	<0.1
4'-6'	ND
6'-8'	ND
8'-10'	<0.1
10'-12'	<0.1

DL=.037-.041 PPM

NTC-14S

10'-12'	ND
12'-14'	ND
16'-18'	ND

DL=.023 PPM

NTC-7S

0'-2'	3.1
2'-4'	77
4'-6'	0.48
6'-8'	ND

DL=.18 PPM

NTC-9D

22'-24'	ND
28'-30'	ND
34'-36'	ND
40'-42'	ND
42'-44'	.042

DL=.19-.20 PPM

NTC-11S

0'-2'	0.62
2'-4'	<0.1
4'-6'	0.24
6'-8'	650
8'-10'	1,400
10'-12'	850
12'-14'	6,300

NTC-15S

3'-5'	ND
5'-7'	.086
7'-9'	ND
9'-11'	980
11'-13'	260
13'-15'	.24
15'-17'	1.1
17'-19'	3
19'-21'	.071

DL=.019 PPM

NTC-13S

2'-4'	1.2
4'-6'	ND
6'-8'	ND
8'-10'	ND
10'-12'	ND
12'-14'	ND
14'-16'	ND
16'-18'	ND

DL=.023-.024 PPM

NTC-8S

0'-2'	480
2'-4'	0.79
4'-6'	0.95
6'-8'	ND

DL=.19 PPM

NTC-6S

0'-2'	240
2'-4'	< 0.2
4'-6'	0.81
6'-8'	< 0.2
8'-10'	ND

DL=.18 PPM

NTC-5S

0'-2'	280
2'-4'	20
4'-6'	0.31
6'-8'	ND
8'-10'	ND

DL=.19 PPM

NTC-8D

14'-16'	.21
20-22'	.052
26'-28'	.16
32'-34'	.17
40-42'	.14
42'-44'	.052

NTC-2S

0'-2'	8,800
2'-4'	2,700
4'-6'	2,800
6'-8'	1,300
8'-10'	580

NTC-3S

0'-2'	110
2'-4'	510
4'-6'	76
6'-8'	1.4
8'-10'	0.52

DSB-1

0'-2'	380
2'-4'	150
4'-6'	28
6'-8'	66
8'-10'	0.24

NTC-1D

0'-2'	3.1
2'-4'	ND
4'-6'	ND
6'-8'	ND
8'-10'	ND
10'-12'	ND
20'-22'	ND
26'-28'	ND
32'-34'	ND
38'-40'	ND
44'-46'	ND
50'-52'	ND
53'-54'	ND

DL=.18-.20 PPM

🟥	ZONE 1 VOLUME = 1274 CU.YDS. (ASSUMING AN AVERAGE DEPTH OF SOIL TO BE REMOVED OF 5 FT.)
🟨	ZONE 2 VOLUME = 1630 CU.YDS. (ASSUMING AN AVERAGE DEPTH OF SOIL TO BE REMOVED OF 2 FT.)
▨	ZONE 3 VOLUME = 1556 CU.YDS. (ASSUMING AN AVERAGE DEPTH OF SOIL TO BE REMOVED OF 3 FT.)
🟦	ZONE 4 VOLUME = 7941 CU.YDS. (ASSUMING AN AVERAGE DEPTH OF SOIL TO BE REMOVED OF 7 FT.)
▨	ZONE 5 VOLUME = 19 CU.YDS. (ASSUMING AN AVERAGE DEPTH OF SOIL TO BE REMOVED OF 1 FT.)

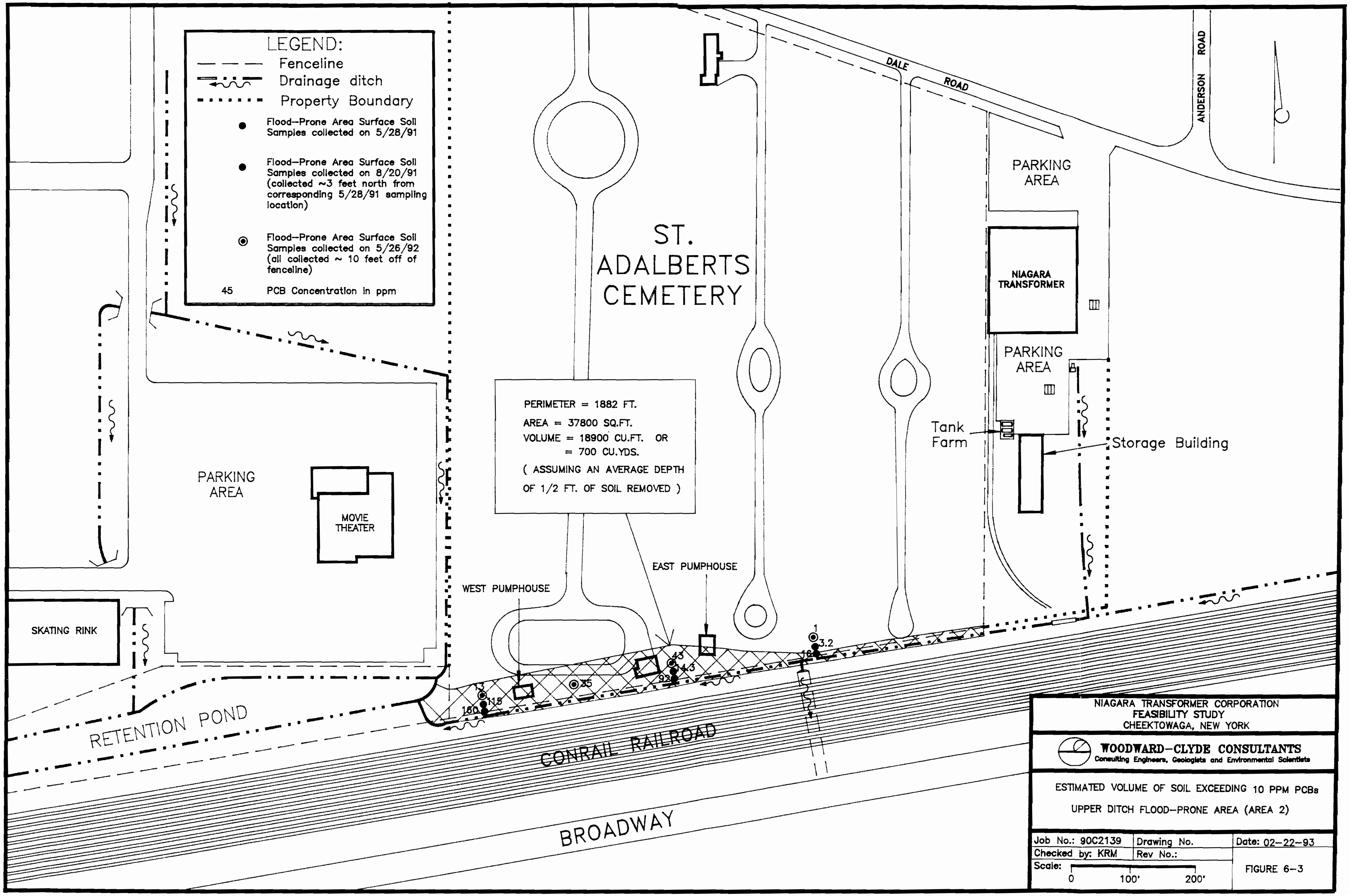
TOTAL VOLUMES OF ZONES 1-5 = 12420 CU.YDS.

NIAGARA TRANSFORMER CORPORATION
FEASIBILITY STUDY
CHEEKTOWAGA, NEW YORK

ESTIMATED VOLUME OF SOIL EXCEEDING 25 PPM PCBs
NIAGARA TRANSFORMER PROPERTY
(AREA 1)

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

Job No.: 90C2139
Drawing No.
Date: 5-28-93
Drawn by: F.R.G.
Checked by: KRM
Scale: 0 50 FEET
FIGURE 6-1

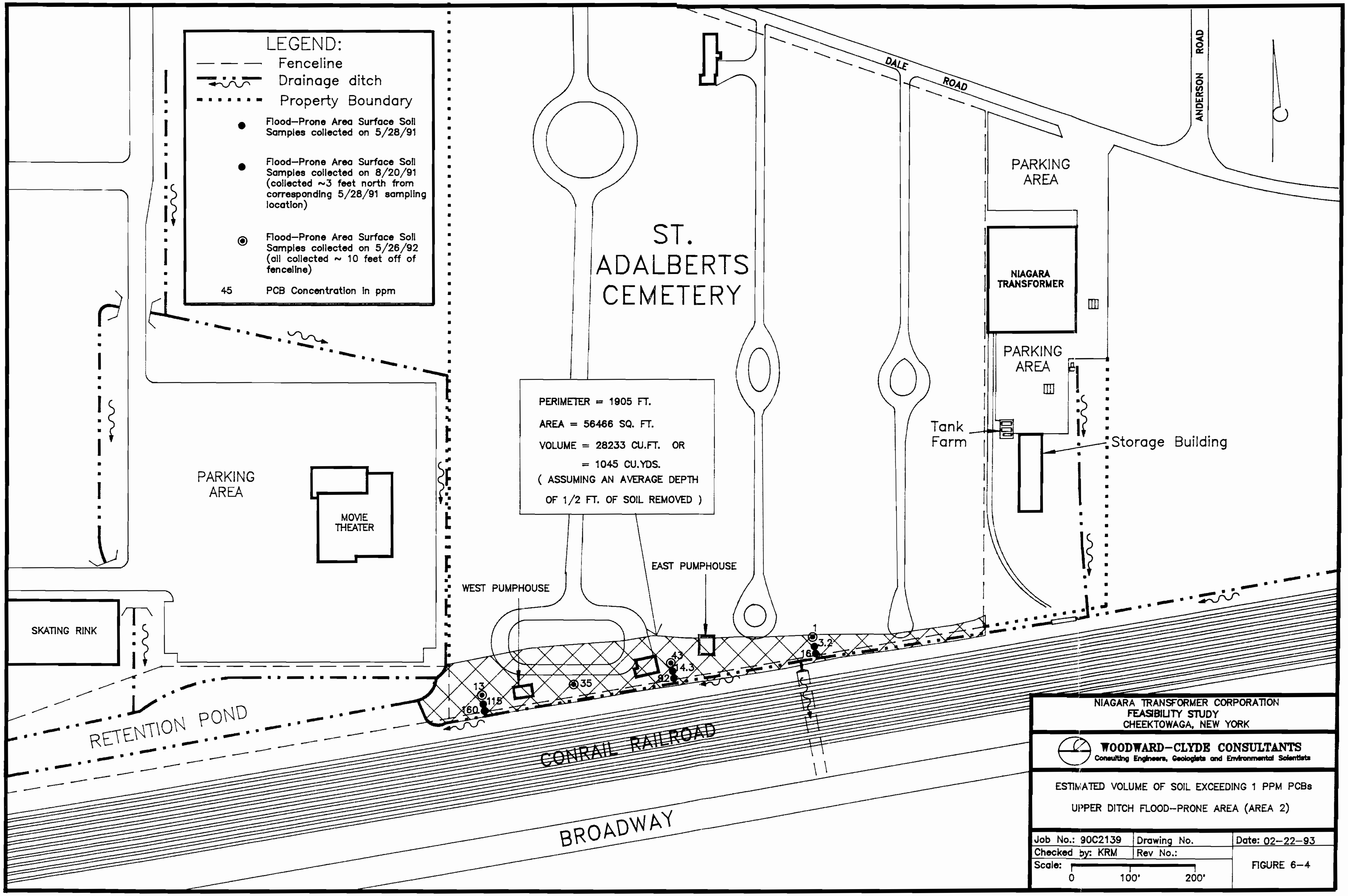


NIAGARA TRANSFORMER CORPORATION
FEASIBILITY STUDY
CHEEKTOWAGA, NEW YORK

WOODWARD–CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

ESTIMATED VOLUME OF SOIL EXCEEDING 10 PPM PCBs
UPPER DITCH FLOOD–PRONE AREA (AREA 2)

Job No.: 90C2139
Drawing No.
Date: 02–22–93
Checked by: KRM
Rev No.:
Scale: 0 100' 200'
FIGURE 6–3



NIAGARA TRANSFORMER CORPORATION
FEASIBILITY STUDY
CHEEKTOWAGA, NEW YORK

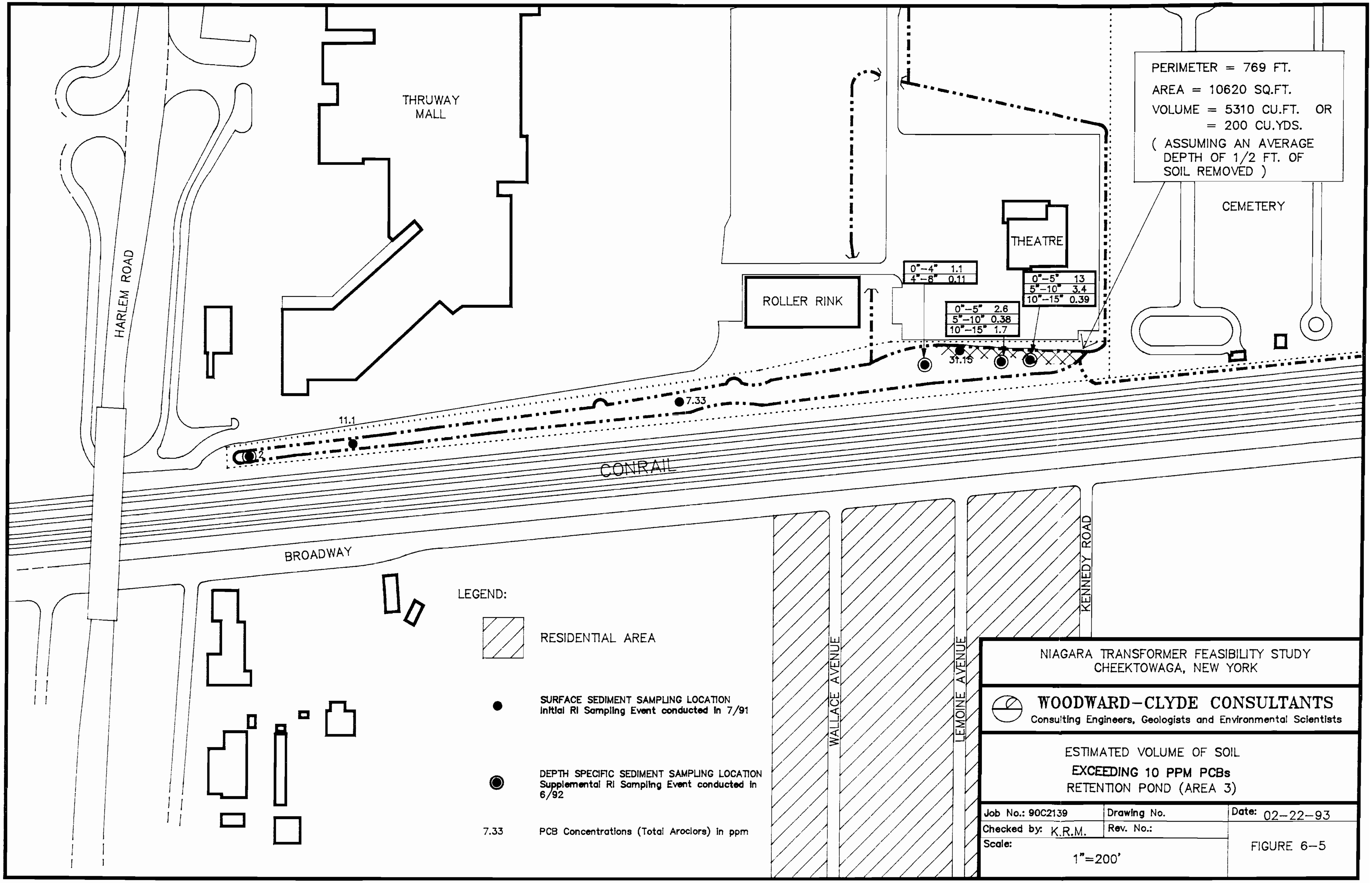
WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

ESTIMATED VOLUME OF SOIL EXCEEDING 1 PPM PCBs

UPPER DITCH FLOOD–PRONE AREA (AREA 2)

Job No.: 90C2139
Drawing No.
Date: 02–22–93
Checked by: KRM
Rev No.:
Scale: 0 100' 200'

FIGURE 6–4

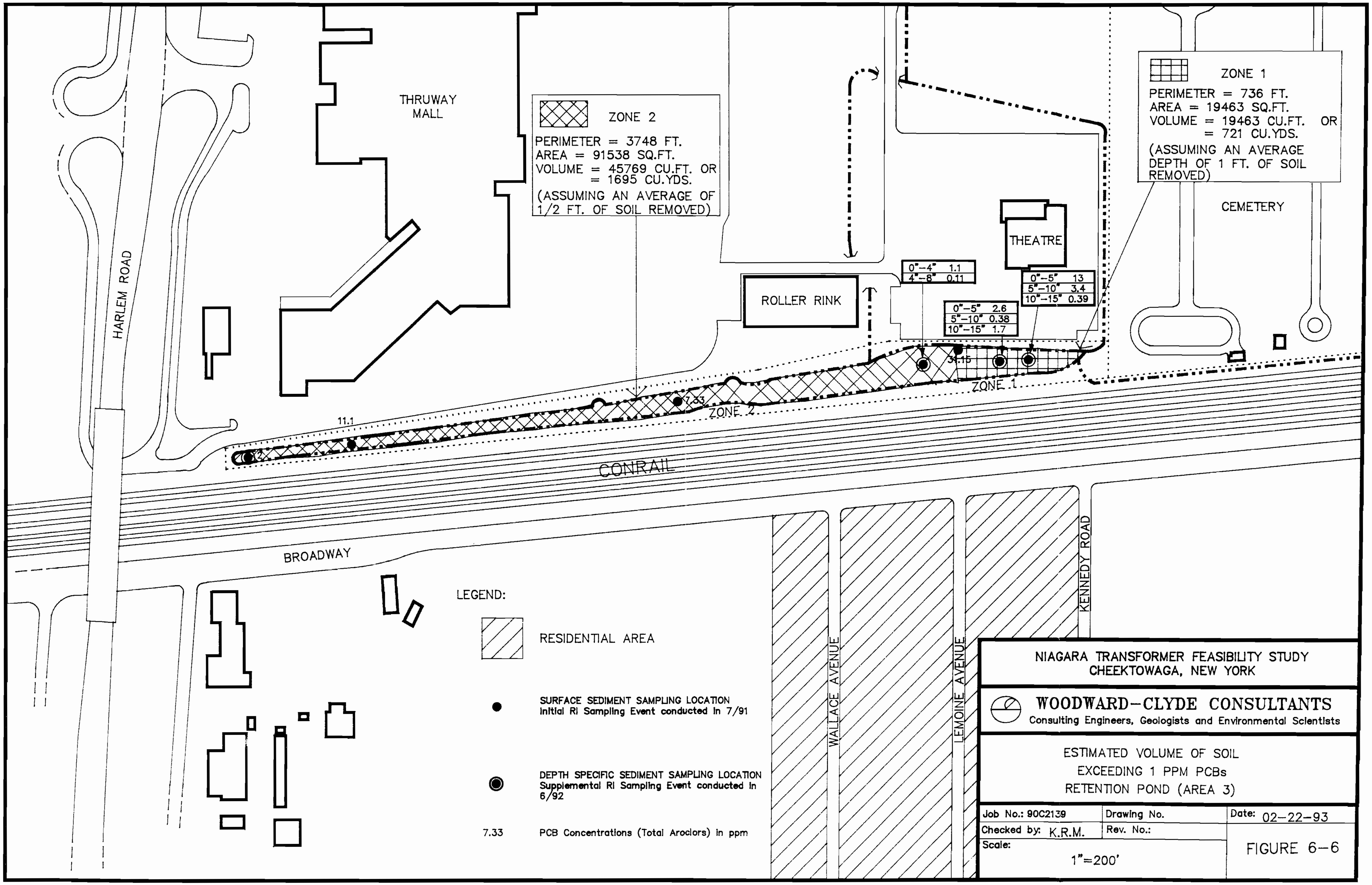


NIAGARA TRANSFORMER FEASIBILITY STUDY
CHEEKTOWAGA, NEW YORK

WOODWARD–CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

ESTIMATED VOLUME OF SOIL
EXCEEDING 10 PPM PCBs
RETENTION POND (AREA 3)

Job No.: 90C2139	Drawing No.	Date: 02–22–93
Checked by: K.R.M.	Rev. No.:	FIGURE 6–5
Scale: 1"=200'		



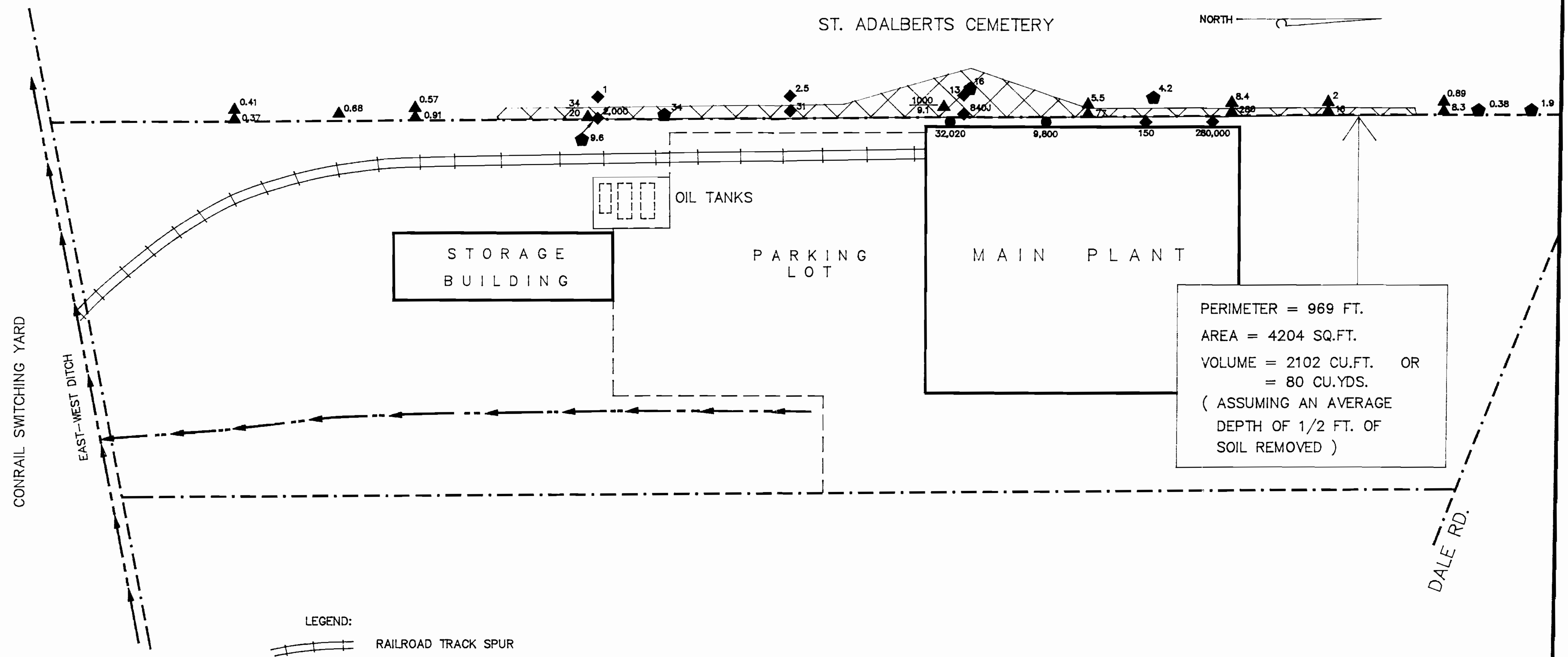
NIAGARA TRANSFORMER FEASIBILITY STUDY
CHEEKTOWAGA, NEW YORK

WOODWARD–CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

ESTIMATED VOLUME OF SOIL
EXCEEDING 1 PPM PCBs
RETENTION POND (AREA 3)

Job No.: 90C2139
Drawing No.
Date: 02–22–93
Checked by: K.R.M.
Rev. No.:
Scale: 1"=200'

FIGURE 6–6



PERIMETER = 969 FT.

AREA = 4204 SQ.FT.

VOLUME = 2102 CU.FT. OR
= 80 CU.YDS.
(ASSUMING AN AVERAGE DEPTH OF 1/2 FT. OF SOIL REMOVED)

LEGEND:

RAILROAD TRACK SPUR

DRAINAGE DITCH WITH INTERMITTENT FLOW

● ANALYTICAL RESULT FOR RI SURFICIAL SOIL SAMPLING PROGRAM (PCB CONCENTRATIONS IN PPM)

4,400 ◆ ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES COLLECTED ON 5/26/92 (PCB CONCENTRATIONS IN PPM)

Depth specific sample results (0–1"/6–8") 1000/9.1 ▲

Single soil result ▲ 5.5

ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES COLLECTED ON 7/15/92 (PCB CONCENTRATIONS IN PPM)

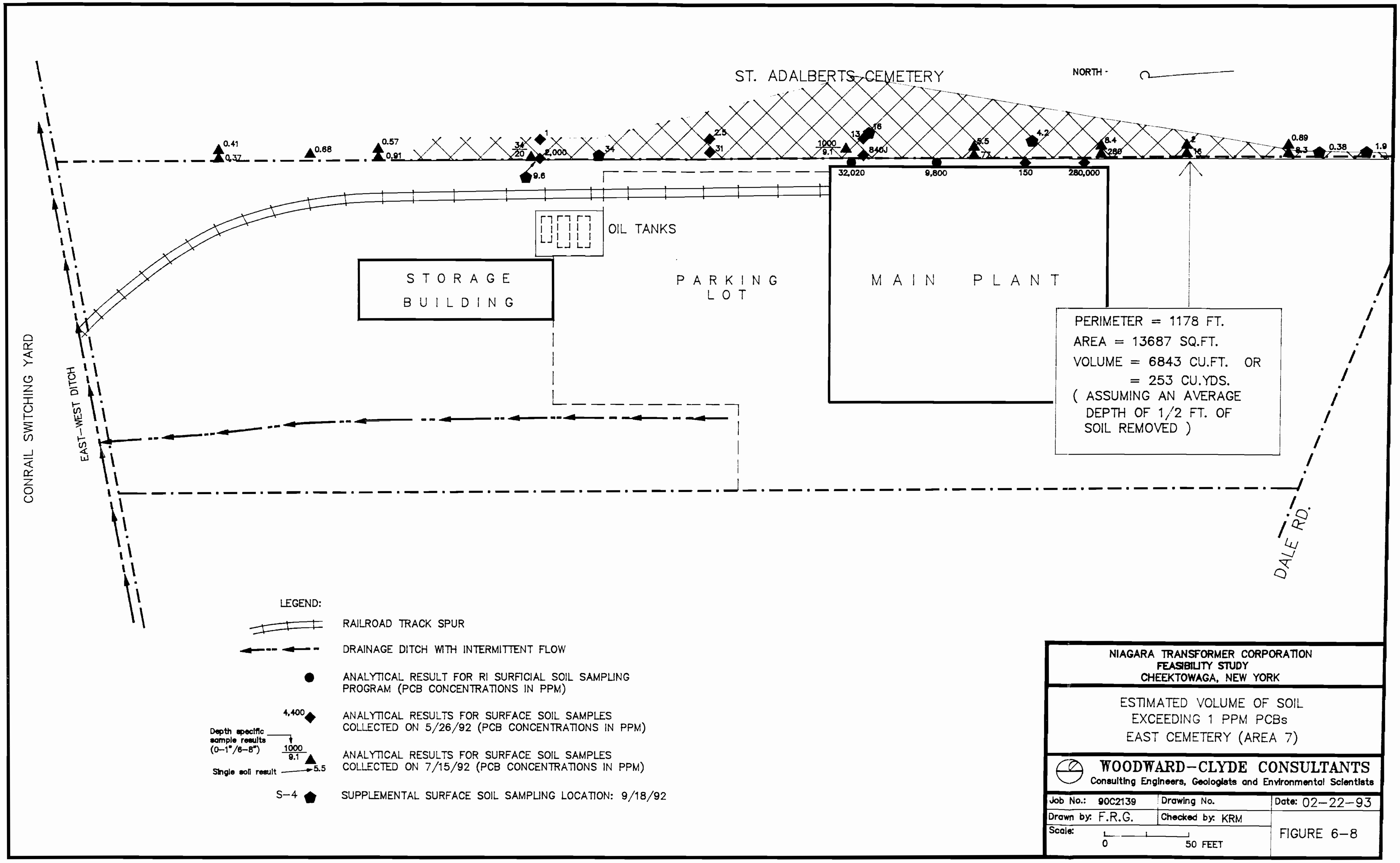
S–4 ⬟ SUPPLEMENTAL SURFACE SOIL SAMPLING LOCATION: 9/18/92

NIAGARA TRANSFORMER CORPORATION
FEASIBILITY STUDY
CHEEKTOWAGA, NEW YORK

ESTIMATED VOLUME OF SOIL
EXCEEDING 10 PPM PCBs
EAST CEMETERY (AREA 7)

WOODWARD–CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

Job No.: 90C2139	Drawing No.	Date: 02–22–93
Drawn by: F.R.G.	Checked by: KRM	FIGURE 6–7
Scale: 0 50 FEET		



PERIMETER = 1178 FT.
AREA = 13687 SQ.FT.
VOLUME = 6843 CU.FT. OR
= 253 CU.YDS.
(ASSUMING AN AVERAGE DEPTH OF 1/2 FT. OF SOIL REMOVED)

LEGEND:

	RAILROAD TRACK SPUR
	DRAINAGE DITCH WITH INTERMITTENT FLOW
●	ANALYTICAL RESULT FOR RI SURFICIAL SOIL SAMPLING PROGRAM (PCB CONCENTRATIONS IN PPM)
4,400 ◆	ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES COLLECTED ON 5/26/92 (PCB CONCENTRATIONS IN PPM)
Depth specific sample results (0–1"/6–8") 1000/9.1 ▲ Single soil result 5.5	ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES COLLECTED ON 7/15/92 (PCB CONCENTRATIONS IN PPM)
S–4 ⬟	SUPPLEMENTAL SURFACE SOIL SAMPLING LOCATION: 9/18/92

NIAGARA TRANSFORMER CORPORATION
FEASIBILITY STUDY
CHEEKTOWAGA, NEW YORK

ESTIMATED VOLUME OF SOIL
EXCEEDING 1 PPM PCBs
EAST CEMETERY (AREA 7)

WOODWARD–CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

Job No.: 90C2139	Drawing No.	Date: 02–22–93
Drawn by: F.R.G.	Checked by: KRM	FIGURE 6–8
Scale: 0 50 FEET		

APPENDIX A

COST BACKUP AND ASSUMPTIONS

Appendix A - Costing Backup and Assumptions

Table Note - All options = 1A,1B,1C,2A,2B,2C,3A,3B,3C,4A,4B,5A,5B,6A,6B,6C,7A,7B,7C
1 = 1A,1B,1C
2 = 2A,2B,2C
3 = 3A,3B,3C
4 = 4A,4B
5 = 5A,5B
6 = 6A,6B,6C
7 = 7A,7B,7C
NNS = No NAPL Soils
RP = Retention Pond

ITEM NUMBER AND DESCRIPTION	OPTION(S)	COST DETAILS AND ASSUMPTIONS
1. Health & Safety Plan	All options	Per Erick Sepulveda, Health and Safety Officer, WCC Wayne Office, estimated cost of $25,000 for H&S Plan.
2. Mob/Demob - Earthmoving Equipment	All options	Estimated cost for mobilization/demobilization, including transport and decontamination, of $40,000 for earth moving equipment per Majed Khoury, Senior Associate, WCC Wayne Office.
3. Clear and Grub Site	All options	Estimated impacted area = 2 acres
	All options	From Means 021-104-0200 - Site Clearing Medium Trees to 12" Diameter Cut and Chip - $3,625/acre Use $4000 per acre
4. Waste Profile Forms and Tests	1,2,4,5,6	Profiling of impacted soils with PCBs for off-site disposal in a TSCA landfill, including testing, estimated at $10,000 per Debbie Waddell, Waste Disposal Specialist, WCC Wayne Office.
	3	Profiling of treatment process waste streams (i.e. air scrubbing equipment, water treatment residues, and/or concentrated PCB oils off-site disposal), including testing, estimated at $10,000 per Debbie Waddell, Waste Disposal Specialist, WCC Wayne Office.

	7	Profiling of NAPL soils with PCBs for off-site disposal in a TSCA landfill, including testing, estimated at $5,000 per Debbie Waddell, Waste Disposal Specialist, WCC Wayne Office.
5. Air Emission Modeling For Excavation Activities	All options	Air modeling of potential impacts resulting from dust generated by excavation of impacted soils. Cost includes - a. Modeling Protocol Document b. Particle Size Distribution Determination c. Initial Screening Analysis d. Refined Computer Analysis e. Final Report Cost estimated at $50,000 per Ron Petherbridge, Air Quality Engineer, WCC Wayne Office.
6. Temporary Staging Area for Excavated Materials	1,2,3,4,7	Excavated soil staging prior to off-site land disposal or on-site treatment. Cost includes: a. Compact 0.5 acre for base b. 60 mil HDPE bottom liner c. 3" asphalt layer over HDPE c. 2' earth berm d. Ramps in/out e. Disposal of liner and asphalt in an off-site TSCA landfill f. Confirmatory testing after liner removal g. Contingency Cost estimated at $100,000 per Martin Leonard, Senior Project Engineer WCC Niagara Falls
	5,6	Excavated soil staging prior to on-site consolidation. Cost includes: a. Compact 0.25 acre for base b. 60 mil HDPE bottom liner c. 3" asphalt layer over HDPE c. 2' earth berm d. Ramps in/out e. Disposal of liner and asphalt in an off-site TSCA landfill f. Confirmatory testing after liner removal g. Contingency Cost estimated at $100,000 per Martin Leonard, Senior Project Engineer,WCC Niagara Falls.

7. Temporary Water Treatment System	All options	Equipment installation/6 month operation/demobilization estimated at $300,000 per Martin Leonard, Senior Project Engineer, WCC Niagara Falls. Equipment includes an equalization/settling tank, sand filter, carbon filter, and related pumps, piping, valves and controls.
8. Stormwater Pipe Cleaning	All options	Use $20/LF for 2000 LF of pipe per Sevenson Environmental.
9. Excavation/Transport of Impacted Soils	1,2,4	Use $15/CY to excavate and move soil off-site to rail site per Conti Construction.
	1,2,4	See Table 6.1 for impacted soil volume calculations.
	1A	Total Soil above 25 (On-site)/10 (Off-site) ppm PCB - 15190 CY
	1B	Total Soil above 10 (On-site)/ 1 (Off-site) ppm PCB - 21565 CY
	1C	Total Soil above 10 (On-site)/ 1 (Off-site) ppm PCB (RP >10 ppm) - 19265 CY
	2A	Total Soil above 25 (On-site)/10 (Off-site) ppm PCB (NNS) - 14815 CY
	2B	Total Soil above 10 (On-site)/ 1 (Off-site) ppm PCB (NNS) - 21190 CY
	2C	Total Soil above 10 (On-site)/ 1 (Off-site) ppm PCB (RP >10 ppm & NNS) - 18890 CY
	4A	Total Soil above 25 (On-site)/10 (Off-site) ppm PCB (No RP) - 14615 CY
	4B	Total Soil above 10 (On-site)/ 1 (Off-site) ppm PCB (No RP) - 18690 CY
10. Confirmatory Soil Testing	1,2,3,4	Assumed one sample per 25' x 25' grid at $200/ PCB sample, plus 25% additional samples for QA/QC
	1,2,3,4	Assumed one sample per 100' of off-site ditches (5000 LF total) at $200/ PCB sample, plus 25% additional samples for QA/QC
	1,2,3,4	Total samples on-site = (2 acres* 43560 sqft/acre)/ 625 sqft/sample)*1.25 = 175 Total samples off-site = (5000 LF / 100 LF/sample)*1.25 = 63
11. Off-site Transport & Incineration of Impacted Material	1	See Table 6.1 for impacted soil volume calculations.
	1	Total Soil above 50 ppm PCB level - 15773 Tons
	1	Per APTUS - Transport and incineration cost per ton = $1750/ton

12. Rail Transport to TSCA Landfill	5,6,7	Per USPCI - $170/ton for rail transport using lined and covered 20 CY bins to Utah, includes on-site transportation coordinator, and rail crane
	5,6,7	See Table 6.1 for impacted soil volume calculations.
13. TSCA Landfill Disposal	1,2,4	Per Chemical Waste Management-$190/ton for transport and disposal in a TSCA cell
	1,2,4	See Table 6.1 for impacted soil volume calculations.
	1A	Total Soil 25 to 50 (On-site)& 10 to 50 (Off-site) ppm PCB - 7013 tons
	1B	Total Soil 10 to 50 (On-site)& 1 to 50 (Off-site) ppm PCB - 16575 tons
	1C	Total Soil 10 to 50 (On-site)& 1 to 50 (Off-site) ppm PCB (No RP) - 13125 tons
	2A	Total Soil above 25 (On-site)/10 (Off-site) ppm PCB - 22785 tons
	2B	Total Soil above 10 (On-site)/1 (Off-site) ppm PCB - 32348 tons
	2C	Total Soil above 10 (On-site)/1 (Off-site) ppm PCB (RP >10 ppm - 28898 tons
	4A	Total Soil above 25 (On-site)/10 (Off-site) ppm PCB (No RP) - 22485 tons
	4B	Total Soil above 10 (On-site)/1 (Off-site) ppm PCB (No RP) - 28598 tons
14. Backfill Excavated Area (Off-Site Soil)	1,2,3	Per Conti Construction - $16/CY for off-site fill material placed and graded
	1,2,4	See Table 6.1 for impacted soil volume calculations.
	1A.2A	Total Soil removed above 25 (On-site)/10 (Off-site) ppm PCB - 15190 CY
	1B,2B	Total Soil removed above 10 (On-site)/1 (Off-site) ppm PCB - 21565 CY
	1C,2C	Total Soil removed above 10 (On-site)/1 (Off-site) ppm PCB (RP >10 ppm) - 19265 CY
	4A	Total Soil removed above 25 (On-site)/10 (Off-site) ppm PCB (No RP) - 14990 CY
	4B	Total Soil removed above 10 (On-site)/1 (Off-site) ppm PCB (No RP) - 19065 CY

15. Work Site Closure	All options	Cost includes: a. Removal and disposal of any solid waste in a landfill b. Decon of equipment c. Confirmatory testing of soil under cement pads if any
16. Plug and Abandon Existing Wells	All options	Per Kelly McIntosh, Senior Associate, WCC Niagara Falls - $2,000 per existing well of approx. 30' depth.
17. Site Restoration - 4" Top Soil, Hydroseed and Fertilize	All options	From Means 029300 Hydroseed and Fertilize - $45/1,000 sq. ft. Cost = 45/1,000*43,560sf.ft/acre = $1960/acre Per Conti Construction - $20/CY for top soil placed and graded Cost per acre = 4" /12" per foot/ 27cu.ft per CY*$20/CY*43,560sq.ft per acre = $10,755/acre Total Cost = 10,755 +1960 = $12,715/acre, use $13,000/acre
21. Long Term Annual GW & Surfacewater Monitoring/Reporting (10 yrs)	1,2,3,4	Per annual sampling event: 2 people*2 days field*$75/hr = $2,400 2 days*$250 Equipment Rental/day = $500 QA/QC - $200/sample Report - $1,500/sampling event Number of samples - 11 5 groundwater wells (1 up and 4 down gradient) 2 surfacewater samples (up and down gradient) 1 Trip blank 1 Equipment blank 1 MS/MS Dup. Analysis = 11*$500/ PCB & BN analysis =$5,500 Total cost per annual sampling event = $12,100 use $12,500
	1,2,3,4	10 year present worth cost based on 5% effective interest rate = $12,500*7.72 = 96,500 use $97,000
	1,2,3,4	30 year present worth cost based on 5% effective interest rate = $12,500*15.37 = 192,125 use $195,000
19. Excavate NAPL Contaminated Soils	2,4	See Table 6.1 for impacted soil volume calculations
	2,4	Use $25/CY to excavate NAPL contaminated soils Volume of NAPL contaminated soils - 375 CY

20. Stabilize NAPL Contaminated Soils	2,4	See Table 6.1 for impacted soil volume calculations
	2,4	Use $40/ton to stabilize NAPL contaminated soils in Portland Cement
	2,4	Volume of NAPL contaminated soils - 563 tons
21. Bench Work	3	Per Soiltech - $20,000 to work with site specific soil in lab
22. Air Permits for Mobile Thermal Desorption System	5	Initial Permit to Construct, excludes TSCA permitting and permit to operate. Cost estimated at $30,000 per Ron Petherbridge, Air Quality Engineer, WCC Wayne Office.
23. Site Prep for Thermal Desorption Unit	5	Per Soiltech - Cost includes: a. Reinforced cement pad, with ramps, and berm b. Fence c. Utilities to the site
24. Mobilization of Thermal Desorption Unit	3	Per Soiltech - Cost includes: a. Transport, assemble, initial drytest b. One week (clean dirt) processing c. Work Plan and Operations Manual
25. Process Unit Trial	3	Per Soiltech - Cost includes 2 days continuous operation, stack tests, and lab work
26. Excavation of Impacted Soils	3	See Table 6.1 for impacted soil volume calculations
	3A	Total Soil removed above 25 (On-site)/10 (Off-site) ppm PCB - 15190 CY
	3B	Total Soil removed above 10 (On-site)/1 (Off-site) ppm PCB - 21565 CY
	3C	Total Soil removed above 10 (On-site)/1 (Off-site) ppm PCB (RP >10 ppm) - 19265 CY

27. Thermal Desorp Impacted Material	3	Per Soiltech - a. Rate = 10 tons/hr b. Downtime = 25% c. Cost = $200/ton
	3	See Table 6.1 for impacted soil volume calculations
	3A	Total Soil above 25 (On-site)/10 (Off-site) ppm PCB - 22785 tons
	3B	Total Soil above 10 (On-site)/1 (Off-site) ppm PCB - 32348 tons
	3C	Total Soil above 10 (On-site)/1 (Off-site) ppm PCB (RP >10 ppm) - 28898 tons
28. Confirmatory Testing on Treated Material	3	Assume 1 sample per shift of operation 25% additional samples for trip blanks and MS/MS Dups
	3A	Rate of operation = 10 tons/hr * 8hrs/shift*30% downtime = 56 tons/shift Number of samples = (22785 tons/ 56 tons/shift)*1 sample/shift*1.25 = 509
	3B	Rate of operation = 10 tons/hr * 8hrs/shift*30% downtime = 56 tons/shift Number of samples = (32348 tons/ 56 tons/shift)*1 sample/shift*1.25 = 722
	3C	Rate of operation = 10 tons/hr * 8hrs/shift*30% downtime = 56 tons/shift Number of samples = (28898 tons/ 56 tons/shift)*1 sample/shift*1.25 = 645
29. Backfill Excavated Area (Treated Soil)	3	Per Conti Construction - $10/CY for treated material placed and graded
	3A	Total Soil removed above 25 (On-site)/10 (Off-site) ppm PCB - 15190 CY
	3B	Total Soil removed above 10 (On-site)/1 (Off-site) ppm PCB - 21565 CY
	3C	Total Soil removed above 10 (On-site)/1 (Off-site) ppm PCB (RP >10 ppm) - 19265 CY

30. Disposal of Thermal Desorption Unit Waste Streams	3	Disposal cost per gallon of concentrated PCB oils = $20/gallon Assumed average concentration of 300 ppm PCBs in impacted soil
	3A	Oil disposal cost = [(22,785 tons of soil*(300ppm/1,000,000)*2,000lb/ton)/9lb/gallon *$20/gallon = $30,380 Per Soiltech - Estimated $15000 for air scubber wastes - Estimated $15000 for water treatment wastes Total cost = 30,380+15,000+15,000 = $60,380, use $60,000
	3B	Oil disposal cost = [(32,348 tons of soil*(300ppm/1,000,000)*2,000lb/ton)/9lb/gallon *$20/gallon = $43,130 Per Soiltech - Estimated $15000 for air scubber wastes - Estimated $15000 for water treatment wastes Total cost = 43,130+15,000+15,000 = $73,130, use $75,000
	3C	Oil disposal cost = [(28,898 tons of soil*(300ppm/1,000,000)*2,000lb/ton)/9lb/gallon *$20/gallon = $38,530 Per Soiltech - Estimated $15000 for air scubber wastes - Estimated $15000 for water treatment wastes Total cost = 38,530+15,000+15,000 = $68,530, use $70,000
31. Demobilization of Thermal Extraction Unit	3	Per Soiltech - Cost includes: a. 1 day of operation - flush with clean soil b. Rinse and disassemble
32. Bioremediate Retention Pond Sediments	4	Per WCC - Estimated cost $50/CY

33. Long Term Annual Retention Pond Monitoring/Reporting (30 yrs)	4A	Per annual sampling event: 2 people*1 days field*$75/hr = $1,200 1 days*$250 Equipment Rental/day = $250 QA/QC - $100/sample Report - $1500/sampling event Number of samples - 9 5 samples 1 Trip blank 1 Equipment blank 1 MS/MS Dup. Analysis = 9*$200/ PCB analysis =$1,800 Total cost per annual sampling event = $5,650 use $6000
	4A	30 year present worth cost based on 5% effective interest rate = $6,000*15.37 = 92,220 use $95,000
	4B	Per annual sampling event: 2 people*2 days field*$75/hr = $2,400 2 days*$250 Equipment Rental/day = $500 QA/QC - $100/sample Report - $1500/sampling event Number of samples - 14 10 samples 1 Trip blank 1 Equipment blank 1 MS/MS Dup. Analysis = 14*$200/ PCB analysis =$2,800 Total cost per annual sampling event = $8600 use $9000
	4B	30 year present worth cost based on 5% effective interest rate = $9,000*15.37 = 138,330 use $140,000
34. Excavation/Transport of >50 ppm PCB Off-Site Soils	5,6	See Table 6.1 for impacted soil volume calculations
	5,6	Total Off-Site Soil removed above 50 ppm PCB level - 1095 CY
35. Confirmatory Soil Testing of >50 ppm PCB Off-Site Soils	5,6	Total samples off-site for >50 ppm PCBs = (5000 LF / 100 LF/sample)*1.25 = 63

36. Transport NAPL & >50 ppm PCB Off-Site Soils to TCSA Landfill	5,6	Per USPCI - $170/ton for rail transport using lined and covered 20 CY bins to Utah, includes on-site transportation coordinator, and rail crane
	5,6	See Table 6.1 for impacted soil volume calculations.
	5,6	Total NAPL & >50 ppm Off-site Soil - 2205 tons
37. TSCA Landfill Disposal of NAPL and >50 ppm PCB Soils	5,6	Per USPCI - $140/ton for disposal of impacted soil in a TSCA cell
	5,6	See Table 6.1 for impacted soil volume calculations.
	5,6	Total NAPL & >50 ppm Off-site Soil - 2205 tons
38. Circumferential Slurry Wall	5,6	Perimeter of On-site Impacted Area (450 LF x 180 LF) = 1260 LF Assumed average depth of Slurry Wall = 8 ft Area of Slurry Wall with 3 ft thickness = 1260 LF * 8 ft = 10080 sqft Cost per sqft of 3 ft thick Slurry Wall = $30
39. Leachate Collection System	5,6	200 LF collection trench located at down gradient end of impacted area
40. Excavation of >10 ppm PCB Off-Site Impacted Soils	5A,6A	See Table 6.1 for impacted soil volume calculations
	5A	Total Off-Site Soil removed >10 ppm & <50 ppm PCB level (No RP) - 1475 CY
	6A	Total Off-Site Soil removed >10 ppm & <50 ppm PCB level - 1675 CY
	7A	Total Off-Site Soil removed >10 ppm PCB level - 2770 CY
41. Confirmatory Soil Testing of >10 ppm PCB Off-Site Soils	5A,6A	Total samples off-site for >10 ppm PCBs = (5000 LF / 100 LF/sample)*1.25 = 63
	7A	Total samples off-site for >10 ppm PCBs = (5000 LF / 100 LF/sample)*1.25 = 63
42. Backfill Excavated Off-Site Area (with Off-Site Soils)	5,6,7	See Table 6.1 for impacted soil volume calculations
	5A	Total Off-Site Soil removed >10 ppm PCB level (No RP) - 2570 CY
	5B	Total Off-Site Soil removed >1 ppm PCB level (No RP) - 3965 CY
	6A,7A	Total Off-Site Soil removed >10 ppm PCB level - 2950 CY
	6B,7B	Total Off-Site Soil removed >1 ppm PCB level - 6465 CY
	6C,7C	Total Off-Site Soil removed >1 ppm PCB level (RP > 10 ppm) - 4165 CY

43. Fill and Grade for Cap Slope Drainage	5,6,7	Per Conti Construction - $16/CY for fill material placed and graded
	5,6	Estimated volume of fill required for 4% drainage slope - 3500 CY
	7	Estimated volume of fill required for 4% drainage slope - 2000 CY
44. Final Grading of Consolidation Area	5,6,7	$0.11/sq.ft. for grading per Mike Zusi, Civil Engineer, WCC Wayne = $0.11*43,560sq.ft./acre = $4,791/acre, use $5,000
	5,6,7	Area to be graded = 450 x 180 = 1.86 acres, use 2.0 acres
45. Cap Consolidation Area with Composite Cap	5,6,7	Composition of Composite Cap - 24" of loamy/top soil, 60 mil HDPE, and a Gundseal layer with 20 mil backing. (See Figure E-2) Costs for cap components are as follows: a. Per Conti Construction - $20/cy for loamy/top soil placed and graded. b. Per Gundle - $0.75/sq.ft. for 60 mil HDPE installed c. Per Gundle - $0.75/sq.ft. for Gundseal (sodium bentonite clay/ polyethylene composite liner) installed.
	5,6,7	Area to be capped = (180ft+5ft)*(450ft+5ft)/9 = 9353 SY use 9400 SY
46. Long Term Groundwater Treatment System	5,6	Equipment installation/demobilization estimated at $100,000 per Martin Leonard, Senior Project Engineer, WCC Niagara Falls. Equipment includes an bag filter, equalization tank, sand filter, carbon filter, and related pumps, piping, valves and controls.
47. Fence for Consolidation Area	5,6,7	From Means 028-308-0600 Industrial Fence, 8' high chain link Cost = $16.8/LF, use $18/LF (includes gates) Add 15' to each side of the consolidation area - 1380 LF
48. Surface Water Drainage System	5,6,7	The following components are included : a. Means 12.3-110-2320 Excavation - Sandy Soils - 0.5:1 Slope Cost = $7.21/LF

		b. Means 027-164-2140 24" diameter perforated metal pipe, 14 gauge Cost = $26/LF
		c. Means 071-301-0600/061 Filter fabric to wrap pipe to prevent fines from entering pipe Cost = $0.30/sq.ft. Sq.ft. per LF of pipe = π*2*1 = 6.28 sq. ft./LF Cost = 6.28*0.30 = $1.88/LF
		d. Means 022-254-3090 2.25 CY Bucket 100' Haul Cost = $2.91/CY Means 1.1-294 example Gravel Cost = $14/CY Volume of Gravel per LF of system = (4*4)+(2*.5*2*4)-(π*2*2/4) = 0.77CY/LF Cost = (14+2.91)*0.77 = $13/LF
		e. Means 12.3-710-5840 Precast concrete catch basin, 4' ID riser, 6' deep Cost = $1,480 per catch basin One catch basin per 400' for purposes of sampling and cleaning pipe. Cost = (1,480/400) = $3.70/LF This cost will increase as frequency of catch basins increases.
		Total cost per LF of drainage system = $51.79, use $55/LF
	5,6,7	Add 10' to each side of the consolidation area to determine total linear feet of drainage system - 1340 LF
49. Long Term GW Treatment Operation (30 yrs)	5,6,7	Assumed $20,000 per year for labor and supplies 30 year present worth cost based on 5% effective interest rate = $20,000*15.37 = 307,400 use $310,000

50. Long Term Maintenance (30 yrs)	5,6,7	Annual cost based on 3% of capital items 30 year present worth cost based on 5% effective interest rate
	5,6	Capital items included: a. Slurry wall b. Leachate collection system c. Composite cap cost d. Groundwater treatment system e. Consolidation area fence f. Surface water drainage system g. Long term monitoring wells
	7	Capital items included: a. Composite cap cost b. Consolidation area fence c. Surface water drainage system d. Long term monitoring wells
51. Excavation of >1 ppm PCB Off-Site Impacted Soils	5B,6B,6C	See Table 6.1 for impacted soil volume calculations
	5B	Total Off-Site Soil removed >1 ppm & <50 ppm PCB level (No RP) - 2870 CY
	6B	Total Off-Site Soil removed >1 ppm & <50 ppm PCB level - 5370 CY
	6C	Total Off-Site Soil removed >1 ppm & <50 ppm PCB level (RP > 10 ppm) - 3070 CY
	7B	Total Off-Site Soil removed >1 ppm PCB level - 6465 CY
	7C	Total Off-Site Soil removed >1 ppm PCB level (RP > 10 ppm) - 4165 CY
52. Confirmatory Soil Testing of >1 ppm PCB Off-Site Soils	5B,6B,6C	Total samples off-site for >1 ppm PCBs = (5000 LF / 100 LF/sample)*1.25 = 63
	7B,7C	Total samples off-site for >1 ppm PCBs = (5000 LF / 100 LF/sample)*1.25 = 63
53. Transport NAPL Soils to TCSA Landfill	7	Per USPCI - $170/ton for rail transport using lined and covered 20 CY bins to Utah, includes on-site transportation coordinator, and rail crane
	7	See Table 6.1 for impacted soil volume calculations.
	7	Total NAPL Soils - 563 tons

54. TSCA Landfill Disposal of NAPL Soils	7	Per USPCI - $140/ton for disposal of impacted soil in a TSCA cell
	7	See Table 6.1 for impacted soil volume calculations.
	7	Total NAPL Soils - 563 tons
55. Stabilization of Impacted Materials	7	Per OHM - Cost $80 per ton
	7	See Table 6.1 for impacted soil volume calculations.
	7A	Total Soil above 25 (On-site)/10 (Off-site) ppm PCB = 22223 tons
	7A	Total Soil above 10 (On-site)/1 (Off-site) ppm PCB = 31785 tons
	7A	Total Soil above 10 (On-site)/1 (Off-site) ppm PCB (RP >10 ppm) = 28335 tons

APPENDIX B

REMEDIAL ALTERNATIVE SCORING FOR DALE ROAD FACILITY RI/FS NYSDEC TAGM #4030 METHODOLOGY

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Woodward-Clyde Consultants

September 17, 1993
90C2139-1

Mr. Fred W. Darby
Niagara Transformer Corporation
1747 Dale Road
P.O. Box 233
Buffalo, New York 14225

Subject: Remedial Alternative Scoring for Dale Road Facility RI/FS NYSDEC TAGM-Methodology

Dear Mr. Darby:

Woodward-Clyde Consultants (WCC) is pleased to submit the preliminary screening of alternatives for the Niagara Transformer Corporation (NTC) Dale Road Facility Remedial Investigation/Feasibility Study (RI/FS). The screening was performed in accordance with the New York Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum on Selection of Remedial Actions at Inactive Hazardous Waste Sites (HWR-90-4030) Revised May 15, 1990.

For the TAGM screening, the remedial alternatives were evaluated irrespective of the associated clean-up level (i.e., the "a", "b", and "c" designated alternatives are not separately rated). The results of the TAGM screening are summarized on Table 1. The completed TAGM worksheets showing the detailed scoring for each analysis factor are attached as Attachment 1. The cost analysis plot used for evaluating cost in the TAGM screening is presented on Figure 1.

The highest ranking alternative was thermal desorption (82 out of a possible score of 100). The second highest score was for the on-site stabilization alternative (78). Two alternatives were evenly ranked with scores of 74: disposal in an off-site TSCA landfill; and disposal in an off-site TSCA landfill with bioremediation of retention pond sediment. Two alternatives had scores of 72: on-site containment (slurry wall and cap) and on-site containment with bioremediation of retention pond sediment. Off-site incineration was the lowest ranked alternative with a score of 71.

Ntcrasco.let

The TAGM method is intended for preliminary screening purposes only. The NTC Feasibility Study presents the detailed analysis of alternatives and recommendations for site remediation.

Sincerely,

Kelly R. McIntosh, P.E., P.HGW.
Associate

James F Roetzer

James F. Roetzer, Ph.D.
Senior Associate

KRM/JFR:jee

cc: R. Fishlock

Tables

TABLE 1

NEW YORK STATE SCORING FOR REMEDIAL ALTERNATIVES

		REMEDIAL ALTERNATIVES						
TAGM CRITERIA	**SCORING WEIGHT**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
COMPLIANCE WITH ARARs	[10]	10	10	10	10	10	10	10
PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	[20]	17	17	17	17	17	17	17
SHORT-TERM EFFECTIVENESS	[10]	7	8	7	8	8	8	8
LONG-TERM EFFECTIVENESS AND PERMANENCE	[15]	11	10	14	10	6	6	8
REDUCTION IN TOXICITY, MOBILITY, OR VOLUME	[15]	15	2	15	2	2	2	8
IMPLEMENTABILITY	[15]	11	13	7	13	14	14	12
COST	[15]	0	14	12	14	15	15	15
NEW YORK TAGM SCORING TOTALS	**[100]**	**71**	**74**	**82**	**74**	**72**	**72**	**78**
SCORING RANKING		**7**	**3**	**1**	**3**	**5**	**5**	**2**

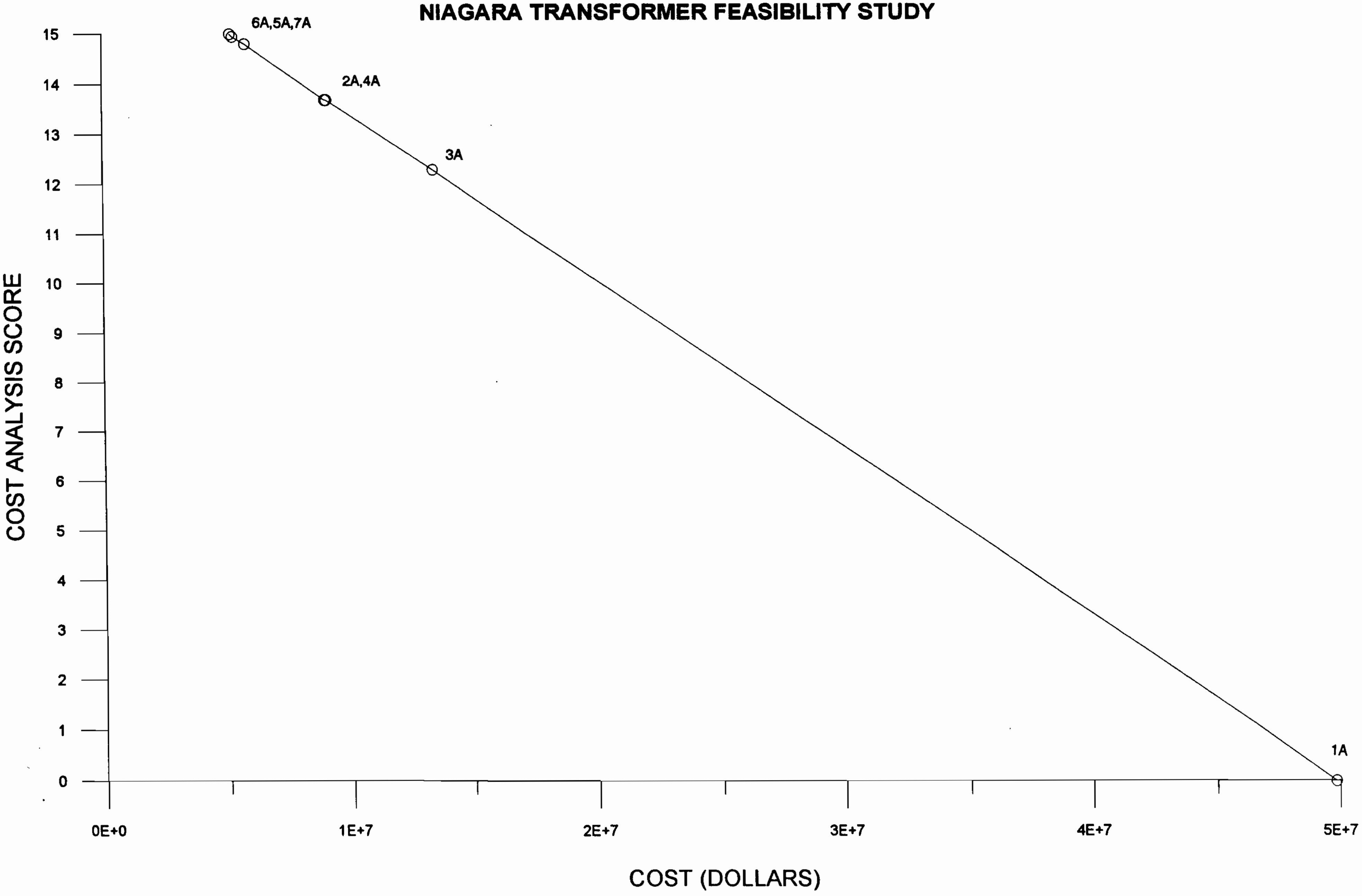
KEY:

1 = OFF-SITE INCINERATION (>50 PPM PCBs) & OFF-SITE TSCA LANDFILL (<50 PPM PCBs)
2 = OFF-SITE TSCA LANDFILL
3 = ON-SITE THERMAL DESORPTION
4 = OFF-SITE TSCA LANDFILL & BIOREMEDIATION OF RETENTION POND SEDIMENT
5 = CONTAINMENT (SLURRY WALL & CAP) OF ON-SITE SOIL AND OFF-SITE SOIL (<50 PPM PCBs) & BIOREMEDIATION OF RETENTION POND SEDIMENTS
6 = CONTAINMENT (SLURRY WALL & CAP) OF ON-SITE SOIL AND OFF-SITE SOIL (<50 PPM PCBs)
7 = ON-SITE CONSOLIDATION & STABILIZATION

NOTE: SEE FEASIBILITY STUDY FOR COMPLETE DESCRIPTIONS OF REMEDIAL ALTERNATIVES.

Figures

FIGURE 1
COST ANALYSIS PLOT
NIAGARA TRANSFORMER FEASIBILITY STUDY



ATTACHMENT 1

TAGM SCORING WORKSHEETS
NIAGARA TRANSFORMER CORPORATION
DALE ROAD FACILITY RI/FS

ALTERNATIVES 1A, 1B, 1C

Table 6.2

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Compliance with chemical-specific SCGs	Meets chemical specific SCGs such as groundwater standards	Yes ✓ ① No ___ 0
2. Compliance with action-specific SCGs	Meets SCGs such as technology standards for incineration or landfill	Yes ✓ ③ No ___ 0
3. Compliance with location-specific SCGs	Meets location-specific SCGs such as Freshwater Wetlands Act	Yes ✓ ③ No ___ 0

TOTAL (Maximum = 10)

ALTERNATIVES 1A, 1B, 1C

Table 5.3

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes		20
		No	✓	0
TOTAL (Maximum = 20)				
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes	✓	3
		No		0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes	✓	4
		No		0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes	✓	3
		No		0
Subtotal (maximum = 10)				
3. Magnitude of residual public health risks after the remediation.	i) Health risk	≤ 1 in 1,000,000		5
	ii) Health risk	≤ 1 in 100,000	✓	2
Subtotal (maximum = 5)				
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable		✓	5
	ii) Slightly greater than acceptable			3
	iii) Significant risk still exists			0
Subtotal (maximum = 5)				
TOTAL (maximum = 20)				

ALTERNATIVES 1A, 1B, 1C

Table 5.4

SHORT-TERM EFFECTIVENESS
(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Protection of community during remedial actions.	° Are there significant short-term risks to the community that must be addressed? (If answer is no, go to Factor 2.)	Yes No	✓ 	[✓ 0] 4
	° Can the risk be easily controlled?	Yes No	✓ 	[✓ 1] 0
	° Does the mitigative effort to control risk impact the community life-style?	Yes No	 ✓	0 [✓ 2]
Subtotal (maximum = 4)				
2. Environmental Impacts	° Are there significant short-term risks to the environment that must be addressed? (If answer is no, go to Factor 3.)	Yes No	✓ 	[✓ 0] 4
	° Are the available mitigative measures reliable to minimize potential impacts?	Yes No	✓ 	[✓ 3] 0
Subtotal (maximum = 4)				
3. Time to implement the remedy.	° What is the required time to implement the remedy?	≤ 2yr. > 2yr.	 ✓	1 [✓ 0]
	° Required duration of the mitigative effort to control short-term risk.	≤ 2yr. > 2yr.	✓ 	[✓ 1] 0
Subtotal (maximum = 2)				
TOTAL (maximum = 10)				

ALTERNATIVES 1A, 1B, 1C

Table 5.5

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. On-site or off-site treatment or land disposal	° On-site treatment*			3
	° Off-site treatment*		✓	[✓ 1]
	° On-site or off-site land disposal			0
Subtotal (maximum = 3)				
*treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes				
2. Permanence of the remedial alternative.	° Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). **(If answer is yes, go to Factor 4.)**	**Yes**	✓	[✓ 3]
		No		0
Subtotal (maximum = 3)				
3. Lifetime of remedial actions.	° Expected lifetime or duration of of effectiveness of the remedy.	25-30yr.		3
		20-25yr.		2
		15-20yr.		1
		< 15yr.	NA	0
Subtotal (maximum = 3)				
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	**None**	✓	[✓ 3]
		≤ 25%		2
		25-50%		1
		≥ 50%		0
	ii) Is there treated residual left at the site? (If **answer is no, go to** Factor 5.)	**Yes**		0
		No	✓	[✓ 2]
	iii) Is the treated residual toxic?	**Yes**		0
		No	NA	1
	iv) Is the treated residual mobile?	**Yes**		0
		No	NA	1
Subtotal (maximum = 5)				

ALTERNATIVES 1A, 1B, 1C

Table 5.5 (cont'd)

LONG-TERM EFFECTIVENESS AND PERMANENCE
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	< 5yr.		1
		> 5yr.	✓	[✓ 0]
	ii) Are environmental controls required as a part of the remedy to handle potential problems? **(If answer is no, go to "iv")**	Yes	✓	[✓ 0]
		No		1
	iii) Degree of confidence that controls can adequately handle potential problems.	**Moderate to very confident**	✓	[✓ 1]
		Somewhat to not confident		0
	iv) Relative degree of long-term monitoring required **(compare with other remedial alternatives)**	**Minimum**		2
		Moderate	✓	[✓ 1]
		Extensive		0

Subtotal (maximum = 4)

TOTAL (maximum = 15)

ALTERNATIVES 1A, 1B, 1C

Table 5.6
REDUCTION OF TOXICITY, MOBILITY OR VOLUME
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. **Immobilization technologies do not score under Factor 1.**	**99-100%**	✓	⑧
		90-99%		7
		80-90%		6
		60-80%		4
		40-60%		2
		20-40%		1
		< 20%		0
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? **If answer is no, go to Factor 2**	**Yes**		0
		No	✓	②
Subtotal (maximum = 10) If subtotal = 10, go to Factor 3	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	**Off-site land disposal**		0
		On-site land disposal		1
		Off-site destruction or treatment		2
		NA		
2. Reduction in mobility of hazardous waste. If Factor 2 is not applicable, go to Factor 3	i) Quality of Available Wastes Immobilized After Destruction/ Treatment	**90-100%**		2
		60-90%		1
		< 60%		0
		NA		
	ii) Method of Immobilization			
	- Reduced mobility by containment			0
	- Reduced mobility by alternative treatment technologies			3
		NA		
Subtotal (maximum = 5)				
3. Irreversibility of the destruction or treatment or immobilization of hazardous waste	Completely irreversible		✓	⑤
	Irreversible for most of the hazardous waste constituents.			3
	Irreversible for only some of the hazardous waste constituents			2
	Reversible for most of the hazardous waste constituents.			0
Subtotal (maximum = 5)				
TOTAL (maximum = 15)				

ALTERNATIVES 1A, 1B, 1C

Table 5.7

IMPLEMENTABILITY
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Technical Feasibility				
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.		✓	③
	ii) Somewhat difficult to construct. No uncertainties in construction.			2
	iii) Very difficult to construct and/or significant uncertainties in construction.			1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.		✓	③
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.			2
c. Schedule of delays due to technical problems.	i) Unlikely			2
	ii) Somewhat likely		✓	①
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.		✓	②
	ii) Some future remedial actions may be necessary.			1
Subtotal (maximum = 10)				
2. Administrative Feasibility				
a. Coordination with other agencies.	i) Minimal coordination is required.			2
	ii) Required coordination is normal.		✓	①
	iii) Extensive coordination is required.			0
Subtotal (maximum = 2)				
3. Availability of Services and Materials				
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	**Yes**		1
		No	✓	⓪
	ii) Will more than one vendor be available to provide a competitive bid?	**Yes**	✓	①
		No		0

Table 5.7 (cont'd)

IMPLEMENTABILITY

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	**Yes** **No**	 ✓	1 [✓ 0]

Subtotal (maximum = 3)

TOTAL (maximum = 15)

ALTERNATIVES 2A, 2B, 2C

Table 5.2

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Compliance with chemical-specific SCGs	Meets chemical specific SCGs such as groundwater standards	Yes ✓ ④ No ___ 0
2. Compliance with action-specific SCGs	Meets SCGs such as technology standards for incineration or landfill	Yes ✓ ③ No ___ 0
3. Compliance with location-specific SCGs	Meets location-specific SCGs such as Freshwater Wetlands Act	Yes ✓ ③ No ___ 0

TOTAL (Maximum = 10)

ALTERNATIVES 2A, 2B, 2C

Table 5.3

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes		20
		No	✓	[✓ 0]
TOTAL (Maximum = 20)				
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes	✓	[✓ 3]
		No		0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes	✓	[✓ 4]
		No		0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes	✓	[✓ 3]
		No		0
Subtotal (maximum = 10)				
3. Magnitude of residual public health risks after the remediation.	i) Health risk	≤ 1 in 1,000,000		5
	ii) Health risk	≤ 1 in 100,000	✓	[✓ 2]
Subtotal (maximum = 5)				
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable		✓	[✓ 5]
	ii) Slightly greater than acceptable			3
	iii) Significant risk still exists			0
Subtotal (maximum = 5)				
TOTAL (maximum = 20)				

ALTERNATIVES 2A, 2B, 2C

Table 5.4

SHORT-TERM EFFECTIVENESS

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Protection of community during remedial actions.	° Are there significant short-term risks to the community that must be addressed? **(If answer is no, go to Factor 2.)**	**Yes** **No**	✓ ___	[✓ 0] 4
	° Can the risk be easily controlled?	**Yes** **No**	✓ ___	[✓ 1] 0
	° Does the mitigative effort to control risk impact the community life-style?	**Yes** **No**	___ ✓	0 [✓ 2]
Subtotal (maximum = 4)				
2. Environmental Impacts	° Are there significant short-term risks to the environment that must be addressed? **(If answer is no, go to Factor 3.)**	**Yes** **No**	✓ ___	[✓ 0] 4
	° Are the available mitigative measures reliable to minimize potential impacts?	**Yes** **No**	✓ ___	[✓ 3] 0
Subtotal (maximum = 4)				
3. Time to implement the remedy.	° What is the required time to implement the remedy?	**≤ 2yr.** **> 2yr.**	✓ ___	[✓ 1] 0
	° Required duration of the mitigative effort to control short-term risk.	**≤ 2yr.** **> 2yr.**	✓ ___	[✓ 1] 0
Subtotal (maximum = 2)				
TOTAL (maximum = 10)				

ALTERNATIVES 2A, 2B, 2C

Table 5.5

LONG-TERM EFFECTIVENESS AND PERMANENCE
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
1. On-site or off-site treatment or land disposal	° On-site treatment*		3
	° Off-site treatment*		1
	° On-site or off-site land disposal	✓	[✓ 0]
Subtotal (maximum = 3)			
*treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes			
2. Permanence of the remedial alternative.	° Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). **(If answer is yes, go to Factor 4.)**	**Yes** ____	3
		No ✓	[✓ 0]
Subtotal (maximum = 3)			
3. Lifetime of remedial actions.	° Expected lifetime or duration of of effectiveness of the remedy.	**25-30yr.** ✓	[✓ 3]
		20-25yr. ____	2
		15-20yr. ____	1
		< 15yr. ____	0
Subtotal (maximum = 3)			
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	**None** ✓	[✓ 3]
		≤ 25% ____	2
		25-50% ____	1
		≥ 50% ____	0
	ii) Is there treated residual left at the site? **(If answer is no, go to Factor 5.)**	**Yes**	0
		No ✓	[✓ 2]
	iii) Is the treated residual toxic?	**Yes** ____	0
		No ____	1
		NA	
	iv) Is the treated residual mobile?	**Yes** ____	0
		No ____	1
		NA	
Subtotal (maximum = 5)			

ALTERNATIVES 2A, 2B, 2C

Table 5.5 (cont'd)

LONG-TERM EFFECTIVENESS AND PERMANENCE
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	< 5yr.		1
		> 5yr.	✓	[✓ 0]
	ii) Are environmental controls required as a part of the remedy to handle potential problems? **(If answer is no, go to "iv")**	**Yes**	✓	[✓ 0]
		No		1
	iii) Degree of confidence that controls can adequately handle potential problems.	**Moderate to very confident**	✓	[✓ 1]
		Somewhat to not confident		0
	iv) Relative degree of long-term monitoring required **(compare with** other remedial alternatives)	**Minimum**		2
		Moderate	✓	[✓ 1]
		Extensive		0

Subtotal (maximum = 4)

TOTAL (maximum = 15)

ALTERNATIVES 2A, 2B, 2C

Table 5.6
REDUCTION OF TOXICITY, MOBILITY OR VOLUME
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. **Immobilization technologies do not score under Factor 1.**	99-100%	___	8
		90-99%	___	7
		80-90%	___	6
		60-80%	___	4
		40-60%	___	2
		20-40%	___	1
		< 20%	___	0
		NA		
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? **If answer is no, go to Factor 2**	Yes	___	0
		No	___	2
		NA		
Subtotal (maximum = 10) If subtotal = 10, go to Factor 3	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	Off-site land disposal	___	0
		On-site land disposal	___	1
		Off-site destruction or treatment	___	2
		NA		
2. Reduction in mobility of hazardous waste. If Factor 2 is not applicable, go to Factor 3	i) Quality of Available Wastes Immobilized After Destruction/ Treatment	90-100%	✓	[✓ 2]
		60-90%	___	1
		< 60%	___	0
	ii) Method of Immobilization			
	- Reduced mobility by containment		✓	[✓ 0]
	- Reduced mobility by alternative treatment technologies		___	3
Subtotal (maximum = 5)				
3. Irreversibility of the destruction or treatment or immobilization of hazardous waste	Completely irreversible		___	5
	Irreversible for most of the hazardous waste constituents.		___	3
	Irreversible for only some of the hazardous waste constituents		___	2
	Reversible for most of the hazardous waste constituents.		✓	[✓ 0]
Subtotal (maximum = 5)				
TOTAL (maximum = 15)				

ALTERNATIVES 2A, 2B, 2C

Table 5.7

IMPLEMENTABILITY
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
1. Technical Feasibility			
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.	✓	③
	ii) Somewhat difficult to construct. No uncertainties in construction.		2
	iii) Very difficult to construct and/or significant uncertainties in construction.		1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.	✓	③
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.		2
c. Schedule of delays due to technical problems.	i) Unlikely		2
	ii) Somewhat likely	✓	①
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.	✓	②
	ii) Some future remedial actions may be necessary.		1
Subtotal (maximum = 10)			
2. Administrative Feasibility			
a. Coordination with other agencies.	i) Minimal coordination is required.		2
	ii) Required coordination is normal.	✓	①
	iii) Extensive coordination is required.		0
Subtotal (maximum = 2)			
3. Availability of Services and Materials			
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	Yes ✓ No	① 0
	ii) Will more than one vendor be available to provide a competitive bid?	Yes ✓ No	① 0

ALTERNATIVES 2A, 2B, 2C

Table 5.7 (cont'd)

IMPLEMENTABILITY

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	Yes ✓ No ___	① 0

Subtotal (maximum = 3)

TOTAL (maximum = 15)

Table 5.2

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
1. Compliance with chemical-specific SCGs	Meets chemical specific SCGs such as groundwater standards	**Yes** ✓ **No** ___	[✓ 4] 0
2. Compliance with action-specific SCGs	Meets SCGs such as technology standards for incineration or landfill	**Yes** ✓ **No** ___	[✓ 3] 0
3. Compliance with location-specific SCGs	Meets location-specific SCGs such as Freshwater Wetlands Act	**Yes** ✓ **No** ___	[✓ 3] 0

TOTAL (Maximum = 10)

ALTERNATIVES 3A, 3B, 3C

Table 5.3

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes		20
		No	✓	[✓ 0]
TOTAL (Maximum = 20)				
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes	✓	[✓ 3]
		No		0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes	✓	[✓ 4]
		No		0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes	✓	[✓ 3]
		No		0
Subtotal (maximum = 10)				
3. Magnitude of residual public health risks after the remediation.	i) Health risk	≤ 1 in 1,000,000		5
	ii) Health risk	≤ 1 in 100,000	✓	[✓ 2]
Subtotal (maximum = 5)				
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable		✓	[✓ 5]
	ii) Slightly greater than acceptable			3
	iii) Significant risk still exists			0
Subtotal (maximum = 5)				
TOTAL (maximum = 20)				

ALTERNATIVES 3A, 3B, 3C

Table 5.4

SHORT-TERM EFFECTIVENESS

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Protection of community during remedial actions.	° Are there significant short-term risks to the community that must be addressed? (If answer is no, go to Factor 2.)	Yes	✓	[✓ 0]
		No		1
	° Can the risk be easily controlled?	Yes	✓	[✓ 1]
		No		0
	° Does the mitigative effort to control risk impact the community life-style?	Yes		0
		No	✓	[✓ 2]
Subtotal (maximum = 4)				
2. Environmental Impacts	° Are there significant short-term risks to the environment that must be addressed? (If answer is no, go to Factor 3.)	Yes	✓	[✓ 0]
		No		4
	° Are the available mitigative measures reliable to minimize potential impacts?	Yes	✓	[✓ 3]
		No		0
Subtotal (maximum = 4)				
3. Time to implement the remedy.	° What is the required time to implement the remedy?	≤ 2yr.		1
		≥ 2yr.	✓	[✓ 0]
	° Required duration of the mitigative effort to control short-term risk.	≤ 2yr.	✓	[✓ 1]
		≥ 2yr.		0
Subtotal (maximum = 2)				
TOTAL (maximum = 10)				

ALTERNATIVES 3A, 3B, 3C

Table 5.5

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
1. On-site or off-site treatment or land disposal	° On-site treatment*	✓	[✓ 3]
	° Off-site treatment*		1
	° On-site or off-site land disposal		0
Subtotal (maximum = 3)			
*treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes			
2. Permanence of the remedial alternative.	° Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). **(If answer is yes, go to Factor 4.)**	Yes ✓	[✓ 3]
		No ___	0
Subtotal (maximum = 3)			
3. Lifetime of remedial actions.	° Expected lifetime or duration of of effectiveness of the remedy.	~~25-30yr. ___~~	3
		~~20-25yr. ___~~	2
		~~15-20yr. ___~~	1
		~~< 15yr. ___~~ NA	0
Subtotal (maximum = 3)			
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	None ✓	[✓ 3]
		≤ 25% ___	2
		25-50% ___	1
		≥ 50% ___	0
	ii) Is there treated residual left at the site? **(If answer is no, go to Factor 5.)**	Yes ✓	[✓ 0]
		No ___	2
	iii) Is the treated residual toxic?	Yes ___	0
		No ✓	[✓ 1]
	iv) Is the treated residual mobile?	Yes ___	0
		No ✓	[✓ 1]
Subtotal (maximum = 5)			

ALTERNATIVES 3A, 3B, 3C

Table 5.5 (cont'd)

LONG-TERM EFFECTIVENESS AND PERMANENCE
(Relative weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	< 5yr.	✓	[✓ 1]
		> 5yr.		0
	ii) Are environmental controls required as a part of the remedy to handle potential problems? **(If answer is no, go to "iv")**	**Yes**	✓	[✓ 0]
		No		1
	iii) Degree of confidence that controls can adequately handle potential problems.	**Moderate to very confident**	✓	[✓ 1]
		Somewhat to not confident		0
	iv) Relative degree of long-term monitoring required **(compare with other remedial alternatives)**	**Minimum**		2
		Moderate	✓	[✓ 1]
		Extensive		0
Subtotal (maximum = 4)				
TOTAL (maximum = 15)				

ALTERNATIVES 3A, 3B, 3C

Table 5.6
REDUCTION OF TOXICITY, MOBILITY OR VOLUME
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. Immobilization technologies do not score under Factor 1.	99-100% ✓	⑧
		90-99% ___	7
		80-90% ___	6
		60-80% ___	4
		40-60% ___	2
		20-40% ___	1
		< 20% ___	0
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? If answer is no, go to Factor 2	Yes ✓	⓪
		No ___	2
Subtotal (maximum = 10) If subtotal = 10, go to Factor 3	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	Off-site land disposal ___	0
		On-site land disposal ___	1
		Off-site destruction or treatment ✓	②
2. Reduction in mobility of hazardous waste. If Factor 2 is not applicable, go to Factor 3	i) Quality of Available Wastes Immobilized After Destruction/ Treatment	90-100% ___	2
		60-90% ___	1
		< 60% ___	0
		NA	
	ii) Method of Immobilization - Reduced mobility by containment	___	0
	- Reduced mobility by alternative treatment technologies	___	3
		NA	
Subtotal (maximum = 5)			
3. Irreversibility of the destruction or treatment or immobilization of hazardous waste	Completely irreversible	✓	⑤
	Irreversible for most of the hazardous waste constituents.	___	3
	Irreversible for only some of the hazardous waste constituents	___	2
	Reversible for most of the hazardous waste constituents.	___	0
Subtotal (maximum = 5)			
TOTAL (maximum = 15)			

Table 5.7

IMPLEMENTABILITY
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Technical Feasibility				
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.		___	3
	ii) Somewhat difficult to construct. No uncertainties in construction.		___	2
	iii) Very difficult to construct and/or significant uncertainties in construction.		✓	①
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.		___	3
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.		✓	②
c. Schedule of delays due to technical problems.	i) Unlikely		___	2
	ii) Somewhat likely		✓	①
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.		✓	②
	ii) Some future remedial actions may be necessary.		___	1
Subtotal (maximum = 10)				
. Administrative Feasibility				
a. Coordination with other agencies.	i) Minimal coordination is required.		___	2
	ii) Required coordination is normal.		___	1
	iii) Extensive coordination is required.		✓	⓪
Subtotal (maximum = 2)				
. Availability of Services and Materials				
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	**Yes** **No**	___ ✓	1 ⓪
	ii) Will more than one vendor be available to provide a competitive bid?	**Yes** **No**	✓ ___	① 0

Table 5.7 (cont'd)

IMPLEMENTABILITY

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	**Yes** **No**	 ✓	1 [✓ 0]

Subtotal (maximum = 3)

TOTAL (maximum = 15)

Table 6.2

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Compliance with chemical-specific SCGs	Meets chemical specific SCGs such as groundwater standards	Yes No	✓ 	① 0
2. Compliance with action-specific SCGs	Meets SCGs such as technology standards for incineration or landfill	Yes No	✓ 	③ 0
3. Compliance with location-specific SCGs	Meets location-specific SCGs such as Freshwater Wetlands Act	Yes No	✓ 	③ 0

TOTAL (Maximum = 10)

ALTERNATIVES 4A, 4B

Table 5.3

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes		20
		No	✓	⓪
TOTAL (Maximum = 20)				
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes	✓	③
		No		0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes	✓	④
		No		0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes	✓	③
		No		0
Subtotal (maximum = 10)				
3. Magnitude of residual public health risks after the remediation.	i) Health risk	≤ 1 in 1,000,000		5
	ii) Health risk	≤ 1 in 100,000	✓	②
Subtotal (maximum = 5)				
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable		✓	⑤
	ii) Slightly greater than acceptable			3
	iii) Significant risk still exists			0
Subtotal (maximum = 5)				
TOTAL (maximum = 20)				

ALTERNATIVES 4A, 4B

Table 5.4

SHORT-TERM EFFECTIVENESS
(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Protection of community during remedial actions.	° Are there significant short-term risks to the community that must be addressed? **(If answer is no, go to Factor 2.)**	**Yes** **No**	✓ 	[✓ 0] 4
	° Can the risk be easily controlled?	**Yes** **No**	✓ 	[✓ 1] 0
	° Does the mitigative effort to control risk impact the community life-style?	**Yes** **No**	 ✓	0 [✓ 2]
Subtotal (maximum = 4)				
2. Environmental Impacts	° Are there significant short-term risks to the environment that must be addressed? **(If answer is no, go to Factor 3.)**	**Yes** **No**	✓ 	[✓ 0] 4
	° Are the available mitigative measures reliable to minimize potential impacts?	**Yes** **No**	✓ 	[✓ 3] 0
Subtotal (maximum = 4)				
3. Time to implement the remedy.	° What is the required time to implement the remedy?	**≤ 2yr.** **≥ 2yr.**	✓ 	[✓ 1] 0
	° Required duration of the mitigative effort to control short-term risk.	**≤ 2yr.** **≥ 2yr.**	✓ 	[✓ 1] 0
Subtotal (maximum = 2)				
TOTAL (maximum = 10)				

ALTERNATIVES 4A, 4B

Table 5.5

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
1. On-site or off-site treatment or land disposal	° On-site treatment*		3
	° Off-site treatment*		1
	° On-site or off-site land disposal	✓	[✓ 0]
Subtotal (maximum = 3)			
*treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes			
2. Permanence of the remedial alternative.	° Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). **(If answer is yes, go to Factor 4.)**	**Yes** ___	3
		No ✓	[✓ 0]
Subtotal (maximum = 3)			
3. Lifetime of remedial actions.	° Expected lifetime or duration of of effectiveness of the remedy.	**25-30yr.** ✓	[✓ 3]
		20-25yr. ___	2
		15-20yr. ___	1
		< 15yr. ___	0
Subtotal (maximum = 3)			
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	**None** ✓	[✓ 3]
		≤ 25% ___	2
		25-50% ___	1
		≥ 50% ___	0
	ii) Is there treated residual left at the site? **(If answer is no, go to Factor 5.)**	**Yes** ___	0
		No ✓	[✓ 2]
	iii) Is the treated residual toxic?	**Yes** ___	0
		No ___ NA	1
	iv) Is the treated residual mobile?	**Yes** ___	0
		No ___ NA	1
Subtotal (maximum = 5)			

Table 5.5 (cont'd)

LONG-TERM EFFECTIVENESS AND PERMANENCE
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	< 5yr.		1
		> 5yr.	✓	[✓ 0]
	ii) Are environmental controls required as a part of the remedy to handle potential problems? **(If answer is no, go to "iv")**	**Yes**	✓	[✓ 0]
		No		1
	iii) Degree of confidence that controls can adequately handle potential problems.	**Moderate to very confident**	✓	[✓ 1]
		Somewhat to not confident		0
	iv) Relative degree of long-term monitoring required **(compare with other remedial alternatives)**	**Minimum**		2
		Moderate	✓	[✓ 1]
		Extensive		0

Subtotal (maximum = 4)

TOTAL (maximum = 15)

ALTERNATIVES 4A, 4B

Table 3.6
REDUCTION OF TOXICITY, MOBILITY OR VOLUME
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. **Immobilization technologies do not score under Factor 1.**	**99-100%**	___	8
		90-99%	___	7
		80-90%	___	6
		60-80%	___	4
		40-60%	___	2
		20-40%	___	1
		< 20%	___	0
		NA		
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? **If answer is no, go to Factor 2**	**Yes**	___	0
		No	___	2
		NA		
Subtotal (maximum = 10) If subtotal = 10, go to Factor 3	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	**Off-site land disposal**	___	0
		On-site land disposal	___	1
		Off-site destruction or treatment	___	2
		NA		
2. Reduction in mobility of hazardous waste. If Factor 2 is not applicable, go to Factor 3	i) Quality of Available Wastes Immobilized After Destruction/Treatment	**90-100%**	✓	[✓ 2]
		60-90%	___	1
		< 60%	___	0
	ii) Method of Immobilization			
	- Reduced mobility by containment		✓	[✓ 0]
	- Reduced mobility by alternative treatment technologies		___	3
Subtotal (maximum = 5)				
3. Irreversibility of the destruction or treatment or immobilization of hazardous waste	Completely irreversible		___	5
	Irreversible for most of the hazardous waste constituents.		___	3
	Irreversible for only some of the hazardous waste constituents		___	2
	Reversible for most of the hazardous waste constituents.		✓	[✓ 0]
Subtotal (maximum = 5)				
TOTAL (maximum = 15)				

Table 5.7

IMPLEMENTABILITY
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Technical Feasibility				
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.		✓	③
	ii) Somewhat difficult to construct. No uncertainties in construction.			2
	iii) Very difficult to construct and/or significant uncertainties in construction.			1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.		✓	③
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.			2
c. Schedule of delays due to technical problems.	i) Unlikely			2
	ii) Somewhat likely		✓	①
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.		✓	②
	ii) Some future remedial actions may be necessary.			1
Subtotal (maximum = 10)				
2. Administrative Feasibility				
a. Coordination with other agencies.	i) Minimal coordination is required.			2
	ii) Required coordination is normal.		✓	①
	iii) Extensive coordination is required.			0
Subtotal (maximum = 2)				
3. Availability of Services and Materials				
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	**Yes**	✓	①
		No		0
	ii) Will more than one vendor be available to provide a competitive bid?	**Yes**	✓	①
		No		0

Table 5.7 (cont'd)

IMPLEMENTABILITY
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	Yes ✓	①
		No	0

Subtotal (maximum = 3)

TOTAL (maximum = 15)

ALTERNATIVES 5A, 5B

Table 5.2

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Compliance with chemical-specific SCGs	Meets chemical specific SCGs such as groundwater standards	Yes ✓ ① No ___ 0
2. Compliance with action-specific SCGs	Meets SCGs such as technology standards for incineration or landfill	Yes ✓ ③ No ___ 0
3. Compliance with location-specific SCGs	Meets location-specific SCGs such as Freshwater Wetlands Act	Yes ✓ ③ No ___ 0

TOTAL (Maximum = 10)

ALTERNATIVES 5A, 5B

Table 5.3

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT
(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes		20
		No	✓	[✓ 0]
TOTAL (Maximum = 20)				
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes	✓	[✓ 3]
		No		0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes	✓	[✓ 4]
		No		0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes	✓	[✓ 3]
		No		0
Subtotal (maximum = 10)				
3. Magnitude of residual public health risks after the remediation.	i) Health risk	$\leq$ 1 in 1,000,000		5
	ii) Health risk	$\leq$ 1 in 100,000	✓	[✓ 2]
Subtotal (maximum = 5)				
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable		✓	[✓ 5]
	ii) Slightly greater than acceptable			3
	iii) Significant risk still exists			0
Subtotal (maximum = 5)				
TOTAL (maximum = 20)				

ALTERNATIVES 5A, 5B

Table 5.4

SHORT-TERM EFFECTIVENESS

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Protection of community during remedial actions.	° Are there significant short-term risks to the community that must be addressed? (If answer is no, go to Factor 2.)	Yes	✓	[✓ 0]
		No		4
	° Can the risk be easily controlled?	Yes	✓	[✓ 1]
		No		0
	° Does the mitigative effort to control risk impact the community life-style?	Yes		0
		No	✓	[✓ 2]
Subtotal (maximum = 4)				
2. Environmental Impacts	° Are there significant short-term risks to the environment that must be addressed? (If answer is no, go to Factor 3.)	Yes	✓	[✓ 0]
		No		4
	° Are the available mitigative measures reliable to minimize potential impacts?	Yes	✓	[✓ 3]
		No		0
Subtotal (maximum = 4)				
3. Time to implement the remedy.	° What is the required time to implement the remedy?	≤ 2yr.	✓	[✓ 1]
		> 2yr.		0
	° Required duration of the mitigative effort to control short-term risk.	≤ 2yr.	✓	[✓ 1]
		> 2yr.		0
Subtotal (maximum = 2)				
TOTAL (maximum = 10)				

ALTERNATIVES 5A, 5B

Table 5.5

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. On-site or off-site treatment or land disposal	° On-site treatment*			3
	° Off-site treatment*			1
	° On-site or off-site land disposal		✓	[✓ 0]
Subtotal (maximum = 3)				
*treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes				
2. Permanence of the remedial alternative.	° Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). **(If answer is yes, go to Factor 4.)**	**Yes**		3
		No	✓	[✓ 0]
Subtotal (maximum = 3)				
3. Lifetime of remedial actions.	° Expected lifetime or duration of of effectiveness of the remedy.	25-30yr.	✓	[✓ 3]
		20-25yr.		2
		15-20yr.		1
		< 15yr.		0
Subtotal (maximum = 3)				
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	**None**		3
		≤ 25%		2
		25-50%		1
		≥ 50%	✓	[✓ 0]
	ii) Is there treated residual left at the site? **(If answer is no, go to Factor 5.)**	**Yes**		0
		No	✓	[✓ 2]
	iii) Is the treated residual toxic?	**Yes**		0
		No		1
		NA		
	iv) Is the treated residual mobile?	**Yes**		0
		No		1
		NA		
Subtotal (maximum = 5)				

ALTERNATIVES 5A, 5B

Table 5.5 (cont'd)

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	< 5yr.		1
		> 5yr.	✓	[✓ 0]
	ii) Are environmental controls required as a part of the remedy to handle potential problems? **(If answer is no, go to "iv")**	**Yes**	✓	[✓ 0]
		No		1
	iii) Degree of confidence that controls can adequately handle potential problems.	**Moderate to very confident**	✓	[✓ 1]
		Somewhat to not confident		0
	iv) Relative degree of long-term monitoring required **(compare with other remedial alternatives)**	**Minimum**		2
		Moderate		1
		Extensive	✓	[✓ 0]

Subtotal (maximum = 4)

TOTAL (maximum = 15)

Table 5.6
REDUCTION OF TOXICITY, MOBILITY OR VOLUME
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. **Immobilization technologies do not score under Factor 1.**	**99-100%**		8
		90-99%		7
		80-90%		6
		60-80%		4
		40-60%		2
		20-40%		1
		< 20%		0
		NA		
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? **If answer is no, go to** Factor 2	**Yes**		0
		No		2
		NA		
Subtotal (maximum = 10) **If subtotal = 10, go to Factor 3**	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	**Off-site land disposal**		0
		On-site land disposal		1
		Off-site destruction or treatment		2
		NA		
2. Reduction in mobility of hazardous waste. If Factor 2 is not applicable, go to Factor 3	i) <u>Quality of Available Wastes Immobilized After Destruction/Treatment</u>	**90-100%**	✓	[✓ 2]
		60-90%		1
		< 60%		0
	ii) <u>Method of Immobilization</u>			
	- Reduced mobility by containment		✓	[✓ 0]
	- Reduced mobility by alternative treatment technologies			3
Subtotal (maximum = 5)				
3. Irreversibility of the destruction or treatment or immobilization of hazardous waste	Completely irreversible			5
	Irreversible for most of the hazardous waste constituents.			3
	Irreversible for only some of the hazardous waste constituents			2
	Reversible for most of the hazardous waste constituents.		✓	[✓ 0]
Subtotal (maximum = 5)				
TOTAL (maximum = 15)				

Table 5.7

IMPLEMENTABILITY

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
1. Technical Feasibility			
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.	✓	③
	ii) Somewhat difficult to construct. No uncertainties in construction.		2
	iii) Very difficult to construct and/or significant uncertainties in construction.		1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.	✓	③
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.		2
c. Schedule of delays due to technical problems.	i) Unlikely	✓	②
	ii) Somewhat likely		1
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.	✓	②
	ii) Some future remedial actions may be necessary.		1
Subtotal (maximum = 10)			
2. Administrative Feasibility			
a. Coordination with other agencies.	i) Minimal coordination is required.		2
	ii) Required coordination is normal.	✓	①
	iii) Extensive coordination is required.		0
Subtotal (maximum = 2)			
3. Availability of Services and Materials			
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	Yes ✓ No	① 0
	ii) Will more than one vendor be available to provide a competitive bid?	Yes ✓ No	① 0

Table 5.7 (cont'd)

IMPLEMENTABILITY

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	**Yes** ✓ ① **No** ___ 0

Subtotal (maximum = 3)

TOTAL (maximum = 15)

Table 5.2

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Compliance with chemical-specific SCGs	Meets chemical specific SCGs such as groundwater standards	**Yes** ✓ ① **No** 0
2. Compliance with action-specific SCGs	Meets SCGs such as technology standards for incineration or landfill	**Yes** ✓ ③ **No** 0
3. Compliance with location-specific SCGs	Meets location-specific SCGs such as Freshwater Wetlands Act	**Yes** ✓ ③ **No** 0

TOTAL (Maximum = 10)

ALTERNATIVES 6A, 6B, 6C

Table 5.3

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT
(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes		20
		No	✓	[✓ 0]
TOTAL (Maximum = 20)				
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes	✓	[✓ 3]
		No		0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes	✓	[✓ 4]
		No		0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes	✓	[✓ 3]
		No		0
Subtotal (maximum = 10)				
3. Magnitude of residual public health risks after the remediation.	i) Health risk	$\leq$ 1 in 1,000,000		5
	ii) Health risk	$\leq$ 1 in 100,000	✓	[✓ 2]
Subtotal (maximum = 5)				
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable		✓	[✓ 5]
	ii) Slightly greater than acceptable			3
	iii) Significant risk still exists			0
Subtotal (maximum = 5)				
TOTAL (maximum = 20)				

ALTERNATIVES 6A, 6B, 6C

Table 5.4

SHORT-TERM EFFECTIVENESS

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Protection of community during remedial actions.	° Are there significant short-term risks to the community that must be addressed? **(If answer is no, go to Factor 2.)**	**Yes**	✓	[✓ 0]
		No		4
	° Can the risk be easily controlled?	**Yes**	✓	[✓ 1]
		No		0
	° Does the mitigative effort to control risk impact the community life-style?	**Yes**		0
		No	✓	[✓ 2]
Subtotal (maximum = 4)				
2. Environmental Impacts	° Are there significant short-term risks to the environment that must be addressed? **(If answer is no, go to Factor 3.)**	**Yes**	✓	[✓ 0]
		No		4
	° Are the available mitigative measures reliable to minimize potential impacts?	**Yes**	✓	[✓ 3]
		No		0
Subtotal (maximum = 4)				
3. Time to implement the remedy.	° What is the required time to implement the remedy?	**≤ 2yr.**	✓	[✓ 1]
		> 2yr.		0
	° Required duration of the mitigative effort to control short-term risk.	**≤ 2yr.**	✓	[✓ 1]
		> 2yr.		0
Subtotal (maximum = 2)				
TOTAL (maximum = 10)				

ALTERNATIVES 6A, 6B, 6C

Table 5.5

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. On-site or off-site treatment or land disposal	° On-site treatment*			3
	° Off-site treatment*			1
	° On-site or off-site land disposal		✓	[✓ 0]
Subtotal (maximum = 3)				
*treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes				
2. Permanence of the remedial alternative.	° Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). **(If answer is yes, go to Factor 4.)**	Yes		3
		No	✓	[✓ 0]
Subtotal (maximum = 3)				
3. Lifetime of remedial actions.	° Expected lifetime or duration of of effectiveness of the remedy.	25-30yr.	✓	[✓ 3]
		20-25yr.		2
		15-20yr.		1
		< 15yr.		0
Subtotal (maximum = 3)				
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	None		3
		≤ 25%		2
		25-50%		1
		≥ 50%	✓	[✓ 0]
	ii) Is there treated residual left at the site? **(If answer is no, go to Factor 5.)**	Yes		0
		No	✓	[✓ 2]
	iii) Is the treated residual toxic?	~~Yes~~		~~0~~
		~~No~~	NA	~~1~~
	iv) Is the treated residual mobile?	~~Yes~~		~~0~~
		~~No~~	NA	~~1~~
Subtotal (maximum = 5)				

ALTERNATIVES 6A, 6B, 6C

Table 5.5 (cont'd)

LONG-TERM EFFECTIVENESS AND PERMANENCE
(Relative weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	< 5yr.		1
		> 5yr.	✓	⓪
	ii) Are environmental controls required as a part of the remedy to handle potential problems? **(If answer is no, go to "iv")**	**Yes**	✓	⓪
		No		1
	iii) Degree of confidence that controls can adequately handle potential problems.	**Moderate to very confident**	✓	①
		Somewhat to not confident		0
	iv) Relative degree of long-term monitoring required **(compare with other remedial alternatives)**	**Minimum**		2
		Moderate		1
		Extensive	✓	⓪

Subtotal (maximum = 4)

TOTAL (maximum = 15)

ALTERNATIVES 6A, 6B, 6C

Table 5.6
REDUCTION OF TOXICITY, MOBILITY OR VOLUME
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. Immobilization technologies do not score under Factor 1.	99-100% ___	8
		90-99% ___	7
		80-90% ___	6
		60-80% ___	4
		40-60% ___	2
		20-40% ___	1
		< 20% ___	0
		NA	
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? If answer is no, go to Factor 2	Yes ___	0
		No ___	2
		NA	
Subtotal (maximum = 10) If subtotal = 10, go to Factor 3	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	Off-site land disposal ___	0
		On-site land disposal ___	1
		Off-site destruction or treatment ___	2
		NA	
2. Reduction in mobility of hazardous waste.	i) Quality of Available Wastes Immobilized After Destruction/ Treatment	90-100% ✓	②
		60-90% ___	1
If Factor 2 is not applicable, go to Factor 3		< 60% ___	0
	ii) Method of Immobilization		
	- Reduced mobility by containment	✓	⓪
	- Reduced mobility by alternative treatment technologies	___	3
Subtotal (maximum = 5)			
3. Irreversibility of the destruction or treatment or immobilization of hazardous waste	Completely irreversible	___	5
	Irreversible for most of the hazardous waste constituents.	___	3
	Irreversible for only some of the hazardous waste constituents	___	2
	Reversible for most of the hazardous waste constituents.	✓	⓪
Subtotal (maximum = 5)			
TOTAL (maximum = 15)			

ALTERNATIVES 6A, 6B, 6C

Table 5.7

IMPLEMENTABILITY
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
1. Technical Feasibility		
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.	✓ ③
	ii) Somewhat difficult to construct. No uncertainties in construction.	2
	iii) Very difficult to construct and/or significant uncertainties in construction.	1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.	✓ ③
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.	2
c. Schedule of delays due to technical problems.	i) Unlikely	✓ ②
	ii) Somewhat likely	1
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.	✓ ②
	ii) Some future remedial actions may be necessary.	1
Subtotal (maximum = 10)		
2. Administrative Feasibility		
a. Coordination with other agencies.	i) Minimal coordination is required.	2
	ii) Required coordination is normal.	✓ ①
	iii) Extensive coordination is required.	0
Subtotal (maximum = 2)		
3. Availability of Services and Materials		
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	Yes ✓ ① No 0
	ii) Will more than one vendor be available to provide a competitive bid?	Yes ✓ ① No 0

ALTERNATIVES 6A, 6B, 6C

Table 5.7 (cont'd)

IMPLEMENTABILITY
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	Yes ✓ ① No 0

Subtotal (maximum = 3)

TOTAL (maximum = 15)

ALTERNATIVES 7A, 7B, 7C

Table 5.2

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs)

(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
1. Compliance with chemical-specific SCGs	Meets chemical specific SCGs such as groundwater standards	**Yes** ✓ **No** ___	[✓ 1] 0
2. Compliance with action-specific SCGs	Meets SCGs such as technology standards for incineration or landfill	**Yes** ✓ **No** ___	[✓ 3] 0
3. Compliance with location-specific SCGs	Meets location-specific SCGs such as Freshwater Wetlands Act	**Yes** ✓ **No** ___	[✓ 3] 0

TOTAL (Maximum = 10)

ALTERNATIVES 7A, 7B, 7C

Table 5.3

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

(Relative Weight = 20)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Use of the site after remediation.	Unrestricted use of the land and water. (If answer is yes, go to the end of the Table.)	Yes		20
		No	✓	⓪
TOTAL (Maximum = 20)				
2. Human health and the environment exposure after the remediation.	i) Is the exposure to contaminants via air route acceptable?	Yes	✓	③
		No		0
	ii) Is the exposure to contaminants via groundwater/surface water acceptable?	Yes	✓	④
		No		0
	iii) Is the exposure to contaminants via sediments/soils acceptable?	Yes	✓	③
		No		0
Subtotal (maximum = 10)				
3. Magnitude of residual public health risks after the remediation.	i) Health risk	$\leq$ 1 in 1,000,000		5
	ii) Health risk	$\leq$ 1 in 100,000	✓	②
Subtotal (maximum = 5)				
4. Magnitude of residual environmental risks after the remediation.	i) Less than acceptable		✓	⑤
	ii) Slightly greater than acceptable			3
	iii) Significant risk still exists			0
Subtotal (maximum = 5)				
TOTAL (maximum = 20)				

ALTERNATIVES 7A, 7B, 7C

Table 5.4

SHORT-TERM EFFECTIVENESS
(Relative Weight = 10)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Protection of community during remedial actions.	° Are there significant short-term risks to the community that must be addressed? **(If answer is no, go to Factor 2.)**	**Yes**	✓	[✓ 0]
		No		4
	° Can the risk be easily controlled?	**Yes**	✓	[✓ 1]
		No		0
	° Does the mitigative effort to control risk impact the community life-style?	**Yes**		0
		No	✓	[✓ 2]
Subtotal (maximum = 4)				
2. Environmental Impacts	° Are there significant short-term risks to the environment that must be addressed? **(If answer is no, go to Factor 3.)**	**Yes**	✓	[✓ 0]
		No		4
	° Are the available mitigative measures reliable to minimize potential impacts?	**Yes**	✓	[✓ 3]
		No		0
Subtotal (maximum = 4)				
3. Time to implement the remedy.	° What is the required time to implement the remedy?	**≤ 2yr.**	✓	[✓ 1]
		> 2yr.		0
	° Required duration of the mitigative effort to control short-term risk.	**≤ 2yr.**	✓	[✓ 1]
		> 2yr.		0
Subtotal (maximum = 2)				
TOTAL (maximum = 10)				

ALTERNATIVES 7A, 7B, 7C

Table 5.6

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
1. On-site or off-site treatment or land disposal	° On-site treatment*		3
	° Off-site treatment*		1
	° On-site or off-site land disposal	✓	[✓ 0]
Subtotal (maximum = 3)			
*treatment is defined as destruction or separation/ treatment or solidification/ chemical fixation of inorganic wastes			
2. Permanence of the remedial alternative.	° Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). **(If answer is yes, go to Factor 4.)**	**Yes**	3
		No ✓	[✓ 0]
Subtotal (maximum = 3)			
3. Lifetime of remedial actions.	° Expected lifetime or duration of of effectiveness of the remedy.	**25-30yr.** ✓	[✓ 3]
		20-25yr.	2
		15-20yr.	1
		< 15yr.	0
Subtotal (maximum = 3)			
4. Quantity and nature of waste or residual left at the site after remediation.	i) Quantity of untreated hazardous waste left at the site.	**None** ✓	[✓ 3]
		≤ 25%	2
		25-50%	1
		≥ 50%	0
	ii) Is there treated residual left at the site? **(If answer is no, go to Factor 5.)**	**Yes** ✓	[✓ 0]
		No	2
	iii) Is the treated residual toxic?	**Yes** ✓	[✓ 0]
		No	1
	iv) Is the treated residual mobile?	**Yes**	0
		No ✓	[✓ 1]
Subtotal (maximum = 5)			

Table 5.5 (cont'd)

LONG-TERM EFFECTIVENESS AND PERMANENCE

(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
5. Adequacy and reliability of controls.	i) Operation and maintenance required for a period of:	< 5yr. ____	1
		> 5yr. ✓	[✓ 0]
	ii) Are environmental controls required as a part of the remedy to handle potential problems? **(If answer is no, go to "iv")**	**Yes** ✓	[✓ 0]
		No ____	1
	iii) Degree of confidence that controls can adequately handle potential problems.	**Moderate to very confident** ✓	[✓ 1]
		Somewhat to not confident ____	0
	iv) Relative degree of long-term monitoring required **(compare with other remedial alternatives)**	**Minimum** ____	2
		Moderate ____	1
		Extensive ✓	[✓ 0]

Subtotal (maximum = 4)

TOTAL (maximum = 15)

ALTERNATIVES 7A, 7B, 7C

Table 5.6
REDUCTION OF TOXICITY, MOBILITY OR VOLUME
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis		Score
1. Volume of hazardous waste reduced (reduction in volume or toxicity). If Factor 1 is not applicable, go to Factor 2.	i) Quantity of hazardous waste destroyed or treated. **Immobilization technologies do not score under Factor 1.**	**99-100%** ___	8
		90-99% ___	7
		80-90% ___	6
		60-80% ___	4
		40-60% ___	2
		20-40% ___	1
		< 20% ___ NA	0
	ii) Are there untreated or concentrated hazardous waste produced as a result of (i)? **If answer is no, go to Factor 2**	**Yes** ___	0
		No ___ NA	2
Subtotal (maximum = 10) If subtotal = 10, go to Factor 3	iii) After remediation, how is the untreated, residual hazardous waste material disposed?	**Off-site land disposal** ___	0
		On-site land disposal ___	1
		Off-site destruction or treatment ___ NA	2
2. Reduction in mobility of hazardous waste. If Factor 2 is not applicable, go to Factor 3	i) Quality of Available Wastes Immobilized After Destruction/Treatment	**90-100%** ✓	②
		60-90% ___	1
		< 60% ___	0
	ii) Method of Immobilization		
	- Reduced mobility by containment		0
	- Reduced mobility by alternative treatment technologies	✓	③
Subtotal (maximum = 5)			
3. Irreversibility of the destruction or treatment or immobilization of hazardous waste	Completely irreversible	___	5
	Irreversible for most of the hazardous waste constituents.	✓	③
	Irreversible for only some of the hazardous waste constituents	___	2
	Reversible for most of the hazardous waste constituents.	___	0
Subtotal (maximum = 5)			
TOTAL (maximum = 15)			

ALTERNATIVES 7A, 7B, 7C

Table 5.7

IMPLEMENTABILITY
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis			Score
1. Technical Feasibility				
a. Ability to construct technology.	i) Not difficult to construct. No uncertainties in construction.			3
	ii) Somewhat difficult to construct. No uncertainties in construction.		✓	②
	iii) Very difficult to construct and/or significant uncertainties in construction.			1
b. Reliability of technology.	i) Very reliable in meeting the specified process efficiencies or performance goals.			3
	ii) Somewhat reliable in meeting the specified process efficiencies or performance goals.		✓	②
c. Schedule of delays due to technical problems.	i) Unlikely		✓	②
	ii) Somewhat likely			1
d. Need of undertaking additional remedial action, if necessary.	i) No future remedial actions may be anticipated.		✓	②
	ii) Some future remedial actions may be necessary.			1
Subtotal (maximum = 10)				
2. Administrative Feasibility				
a. Coordination with other agencies.	i) Minimal coordination is required.			2
	ii) Required coordination is normal.		✓	①
	iii) Extensive coordination is required.			0
Subtotal (maximum = 2)				
3. Availability of Services and Materials				
a. Availability of prospective technologies.	i) Are technologies under consideration generally commercially available for the site-specific application?	**Yes**	✓	①
		No		0
	ii) Will more than one vendor be available to provide a competitive bid?	**Yes**	✓	①
		No		0

Table 3.7 (cont'd)

IMPLEMENTABILITY
(Relative Weight = 15)

Analysis Factor	Basis for Evaluation During Detailed Analysis	Score		
b. Availability of necessary equipment and specialists.	i) Additional equipment and specialists may be available without significant delay.	**Yes**	✓	①
		No		0

Subtotal (maximum = 3)

TOTAL (maximum = 15)