

**REPORT**

**Phase II Investigation  
One-Acre Site**

**City of Niagara Falls  
Niagara Falls, New York**

**April 2002**



**O'BRIEN & GERE**  
ENGINEERS, INC.

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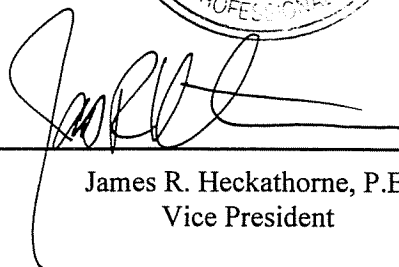
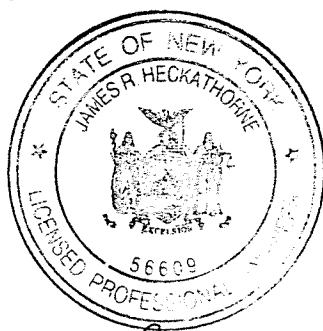
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*City of Niagara Falls  
Niagara Falls, New York*



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James R. Heckathorne, P.E.  
Vice President

April 2002



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## 1. Introduction

O'Brien & Gere Engineers, Inc. (O'Brien & Gere) was retained by the City of Niagara Falls to complete a Phase II Investigation of the One-Acre parcel. The One-Acre parcel, now referred to as the One-Acre site, is located within the City of Niagara Falls Corporate Limits immediately south of Buffalo Avenue and adjacent to the western border of the existing City of Niagara Falls Water Treatment Plant (WTP) (See Figure 1). The north, south and eastern side of the site is surrounded by the de-listed portion of the Buffalo Avenue site which is the location of the new City of Niagara Falls WTP (see Figure 2). The Occidental Petroleum Corporation S-Area is located approximately 1000 ft west of the site.

The One-Acre site was originally a portion of the de-listed Buffalo Avenue Site (Former site #932080B). The One-Acre site was not de-listed as elevated concentrations of lead and chlorinated benzene compounds were detected in subsurface soils and ground water. Coincident with the de-listing of the Buffalo Avenue Site, the One-Acre site was annexed to the Eastern Area of the City of Niagara Falls WTP Site, which is currently a Class 2a in the New York State Department of Environmental Conservation (NYSDEC) Registry of In-Active Hazardous Waste Sites (site code #932080A). This classification signifies that sufficient data does not exist to allow the NYSDEC to properly classify the site.

### 1.1. Site description

The topography of the site is generally flat with surface elevations of approximately 573 ft above mean sea level. Presently, the site is a vacant field surrounded by chain link fence. Access to the site is limited to authorized personnel only.

The site is part of a former low-lying area that was filled. Miscellaneous fill material was reportedly placed at the site between the 1930's and 1950's to reclaim land to facilitate construction in the area. The miscellaneous fill material reportedly consists of construction debris and potentially incinerator refuse. Between 1958 and 1963, "shot rock", which consists of gravel size angular dolostone in a matrix of reddish brown sand, was placed atop the miscellaneous fill. This "shot rock" was associated with the construction of the NYPA power project.

## 1.2. Previous investigations

Malcolm-Pirnie and Dames & Moore were retained by the City of Niagara Falls to complete preliminary and Phase II investigations at the former Buffalo Avenue site, which included the One-Acre site. As part of the preliminary site investigation, Malcolm-Pirnie completed three soil borings designated as BH-4, BH-5 and BH-6 at the One-Acre site. As part of the Phase II investigation, monitoring wells MW-7S and MW-7D were installed and ground water samples were collected and analyzed from these wells.

The majority of investigatory activities completed at the One-Acre site were completed by O'Brien & Gere in 1991 as part of the Buffalo Avenue Site Investigation (O'Brien & Gere, 1991). The investigatory tasks completed include:

- Sampling and analysis of ground water from monitoring wells MW-7S and MW-7D.
- Surface soil sampling and analyses at two locations (SS-20 and SS-23).
- Subsurface soil sampling and analysis at nine locations (SB-27, SB-28, SB-29, SB-33, SB-33A, SB-33B, SB-33C, SB-33D and SB-33E).

## 1.3. Report organization

This Phase II Report is divided into four sections. The contents of each section of this report are summarized below.

- Section 1 includes the introduction, site description, previous investigations, and the report organization.
- Section 2 describes background data, previous investigation results, and the field methods utilized in this investigation.
- Section 3 discusses site geology and hydrogeology, and discusses the results of surface and subsurface soil analyses.
- Section 4 presents a summary of the results as well as conclusions.

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## 2. Investigation

### 2.1. Background information review

Background information was reviewed to evaluate historic disposal procedures at the site. Documents reviewed as part of this investigation were obtained from the City of Niagara Falls and are listed in the reference section of this report. In summary, the previous investigations documented that the fill in the area likely progressed in three distinct phases as summarized below:

1. Miscellaneous waste, which includes refuse, incinerator residue and miscellaneous debris were alleged to be disposed of on-site from the 1930's to the 1950's.
2. Dredged material from the construction of the Niagara River Ice Canal was allegedly disposed on the property by the NYPA.
3. Soil, rock (i.e. "shot rock") and other materials excavated by the NYPA during construction of the Niagara Power Project conduits were placed on-site from 1958 to 1963.

Additional information about the origin of fill material specifically placed within the boundaries of the One-Acre site was not found during this information review.

### 2.2. Previous investigation results

As previously mentioned, Malcolm-Pirnie and Dames & Moore were retained by the City of Niagara Falls to complete preliminary and Phase II investigations, respectively. Additional information about the One-Acre site was obtained during the Buffalo Avenue Site Investigation completed by O'Brien & Gere and is summarized below:

- Two surface soils samples designated as SS-20 and SS-23 were collected at the One-Acre site during the Buffalo Avenue Site Investigation (see Figure 3). The primary concern in surface soil was the elevated concentrations of lead and chromium at SS-20 in the northern portion of the site. A complete discussion of the analytical results is presented in Section 3.3.1.

- Subsurface soil samples were collected at nine locations at the One-Acre site as part of the Buffalo Avenue Site Investigation. A complete discussion of the compounds detected in the subsurface soil is presented in section 3.3.2 of this report. In summary the One-Acre site was not de-listed as elevated lead concentrations were detected in the subsurface soil at SB-33, located in the northern portion of the site.
- A second reason that the One-Acre site was not de-listed was that chlorobenzene, 1,3-dichlorobenzene and 1,4-dichlorobenzene, which are considered indicators parameters of S-Area materials, were detected in the ground water at monitoring wells MW-7S and MW-7D. The concentration of individual compounds ranged between 2.7 and 7 µg/L. Data from soils collected between 5 and 13.5 ft bgs at soil boring SB-27, located approximately 20 ft south of MW-7S also contained 1,3-dichlorobenzene, 1,4-dichlorobenzene and 1,2,4-trichlorobenzene at concentrations ranging from 730 µg/Kg to 2,300 µg/Kg.

It is speculated that the ground water quality in this area was affected by soils in the vicinity of the monitoring well and therefore are localized in extent and are not migrating.

## 2.3. Field methods

The field methods utilized during this Phase II Investigation were completed in accordance with the protocols presented in the New Water Treatment Plant Site Suitability Assessment Work Plan and the New Water Treatment Site Acquisition Investigation Work Plan prepared by O'Brien & Gere in 1991. These work plans were approved by the NYSDEC.

The laboratory data completed as part of this investigation contained sufficient documentation and QA/QC samples to allow for the completion of a data usability assessment. The results of the data usability assessment are summarized in section 3.2.

### 2.3.1. Surface soil

As part of the Phase II investigation, six surface soil samples were collected at the One-Acre site in the immediate vicinity of SB-33 to evaluate the concentration of lead in the surface soils.

Surface soil sampling locations were selected based on previous analytical results which indicated elevated levels of lead in the subsurface at SB-33 and to the west of SB-33. Samples designated SB-33F, SB-33G, SB-33I, SB-33J, and SB-33K were collected at



approximately 25-foot intervals away from SB-33 to the south, southwest, northwest, north and east (see Figure 4). The sample SB-33H was collected 75 ft west of SB-33 to assess the western extent of elevated lead concentrations. Soil descriptions are presented on Table 1.

Surface soil samples SB-33F through SB-33K were collected from a depth of 0 to 2 feet by driving a split-spoon sampler. The samples were analyzed for total lead and leachable lead using TCLP analyses. The samples were submitted to O'Brien & Gere Laboratories, Inc. for laboratory analysis. Samples were not analyzed for EPTOX lead as was originally proposed based on discussions with Mr. Glenn May, the on-site NYSDEC representative. Surface soil results collected as part of this investigation, as well as surface results collected in 1991 as part of the Buffalo Avenue Site Investigation, are presented on Tables 2 through 5 and illustrated on Figure 4.

Each split spoon was cleaned using analconox wash, methanol rinse and a final distilled water rinse. Samples were immediately transferred to coolers packed with ice. Proper chain of custody documentation was maintained.

### **2.3.2. Subsurface soil sampling**

Five soil borings, designated SB-7A through SB-7E, were completed as part of the Phase II Investigation at the One-Acre site to evaluate the lateral extent of chlorinated benzene compounds previously identified at monitoring well MW-7S and soil boring SB-27. Locations of the soil borings designated as SB-7A through SB-7E are illustrated on Figure 5.

Additionally, one soil boring designated as SB-7F was completed adjacent to MW-7S (See Figure 5). A subsurface soil sample from the boring was analyzed using TCLP analyses to assess if the fill material present in the One-Acre site is characteristic of hazardous waste as defined in 40 CFR Part 261.

The soil borings were completed using hollow stem auger drilling methods. Continuous split-spoon soil samples were collected from the ground surface to the base of the fill material, in accordance with ASTM method D-1586-84. The soil samples were described by the on-site O'Brien & Gere hydrogeologist. The soil description included moisture content, color, density, and grain size distribution. A portion of each soil sample was placed in a glass jar and covered with aluminum foil. Each sample was allowed to equilibrate at a temperature of 70°F. A photoionization detector (PID) with a 10.2 eV lamp was then used to monitor the headspace of each sample. Samples for analyses were selected based on PID readings and visual inspection. Subsequent to completion, the boreholes were grouted to the ground surface. Soil descriptions and PID readings are described on the soil boring logs contained in Appendix A.

Subsurface samples from soil boring SB-7A through SB-7E were submitted to O'Brien & Gere Laboratories, Inc. for analyses using NYSDEC ASP with Superfund deliverables. The following analyses were completed:

- VOCs via NYSDEC ASP method 91-1
- SVOCs via NYSDEC ASP method 91-2
- PCB/Pesticides via NYSDEC ASP method 91-3.
- Chromium and lead via ASP methodologies.

Four additional parameters were also quantified with the SVOC analyses and included: 1,3,5-trichlorobenzene, 1,2,3-trichlorobenzene, 1,2,4,5-tetrachlorobenzene and 1,2,3,4-tetrachlorobenzene. Samples could not be analyzed for 1,2,3,5-trichlorobenzene as planned. This compound coeluted and could not be distinguished from other compounds. Analytical results are presented in Tables 5 through 9.

QA/QC samples collected included a field duplicate, equipment blank, matrix spike and matrix spike duplicate. A laboratory trip blank was also included in each cooler that contained samples for VOC analyses.

A subsurface sample from soil boring SB-7F was submitted to O'Brien & Gere Laboratories, Inc. for analysis according to the constituents outlined in 40 CFR Part 261. The following analyses were completed:

- TCLP VOCs via USEPA method 8240
- TCLP SVOCs via USEPA method 8270
- TCLP Pesticides via USEPA method 8080
- TCLP Inorganics via USEPA 6000-7000 series

NYS category B deliverables were provided by the laboratory for validation purposes of the SB-7F subsurface fill samples. QA/QC samples included a matrix spike, matrix spike duplicate and a blind duplicate. A trip blank was deemed not necessary given the higher detection limits associated with the TCLP methods. The analytical results are presented on Table 14.

Drilling equipment was decontaminated prior to initiating activities, between each boring location, and at the completion of the field program. The split-spoon was decontaminated between each location using analconox wash, methanol rinse and a final distilled water rinse. Decontamination fluids, drill cuttings and purge water generated during installation, sampling, and development were placed in labeled New York State Department of Transportation (NYSDOT) approved 55-gallon drums, and were temporarily stored at a designated location at the WTP. Samples of the drums were collected for characterization. Laboratory results are presented in Appendix B. The water was subsequently discharged to the City of Niagara Falls Waste Water Treatment Plant (WWTP) in accordance with applicable regulations. The drill cuttings will be placed in the near by S-Area landfill.

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### **3. Investigation results**

#### **3.1. Site geology/hydrogeology**

The unconsolidated deposits identified at the One-Acre site in descending order from the ground surface are “shot rock”, miscellaneous fill, lacustrine clay and glacial till. Beneath the till, dolostone bedrock is present (O’Brien & Gere, 1991c).

“Shot rock” is present immediately below the surface and typically extends to approximately 5 ft below the ground surface. The miscellaneous fill is also approximately 5 ft thick and extends to a depth of 10 ft below ground surface. The total thickness of the miscellaneous fill material and “shot rock” are illustrated on Figure 6. Beneath the miscellaneous fill material a lacustrine clay was encountered that extends to 28 ft below the ground surface at MW-7D. The till at MW-7D was 6.5 ft thick and extended to 34.5 ft below the ground surface, where bedrock is encountered. The bedrock is dolostone from the Silurian Lockport Group.

Ground water was encountered approximately 10 ft below the ground surface at MW-7S in July 1991 (O’Brien & Gere, 1991c). The overburden ground water flow direction in the area is generally to the south-southwest towards the Niagara River.

#### **3.2. Data usability**

A data usability assessment was performed in accordance with Guidance for Data Usability in Risk Assessment (USEPA Office of Emergency and Remedial Response 1992). The data usability assessment summarizes the results of both the Eastern Area and the One-Acre site. A data usability assessment was not completed for each separate site. The overall goal of this assessment was to evaluate the potential cumulative effects of data quality issues on the final data generated by the laboratory. Additionally, an assessment of the need for a complete data validation was performed.

The data usability assessment was performed on the samples collected during this investigation. The data were collected according to the scope of work specified in the Work Plan. The analytical methods specified in the scope of work were performed according to method criteria.

Additional questions that were answered during the data usability assessment involved various factors that could potentially impact the data quality. Chain of custody was maintained and field and analytical laboratory records were complete. The laboratory performed a typical level of review for this type of data package deliverable.

The laboratory method detection limits met method criteria; however, not all laboratory detection limits met regulatory standards.

The parameters that had detection limits greater than the regulatory limits are as follows:

Analyte	Regulatory Standard/Guidance (µg/L)	Method Detection Limit (µg/L)
Hexachlorobenzene	0.35	0.71
Pentachlorophenol	1	4.02
Benzo(a)anthracene	0.002	1.13
Chrysene	0.002	0.58
Benzo(b)fluoranthene	0.002	1.14
Indeno(1,2,3-cd)pyrene	0.002	0.63

It should be noted, however, that the regulatory limits identified are guidance values. While the laboratory detection limits do not meet regulatory standards, they did meet the sensitivity requirements of the analytical methods. This may affect the ability to interpret results with respect to standards and criteria; however, this deviation does not represent a significant impact to overall data quality, and does not in and of itself, necessitate a complete data validation.

Data quality with respect to precision was evaluated through the analysis of field and laboratory duplicate samples. Relative percent differences were calculated for field and laboratory duplicates and, for this investigation, the data were 100% usable with respect to precision.

Data quality with respect to accuracy is indicated by matrix spikes, laboratory control samples, and surrogate recoveries. The acid fraction of one subsurface soil for SVOCs analyses was determined to be unusable based on matrix spike recoveries less than 10 %. The results for two PCB/pesticides analytes were determined to be unusable in one surface soil sample based on matrix spike recoveries less than 10 %. Therefore, data usability with respect to accuracy was 99% for SVOC analyses and greater than 99% for PCB/pesticides.

The calculations for data usability are presented below:

Total # analytes per SVOC analyses = 88  
 Total # SVOC analyses = 17 samples  
 Total # of SVOC analytes analyzed = 1496

Rejected SVOC compounds(acid fraction in one sample) = 14  
Data Usability Calculation =

$$1496 - 14/1496 \times 100 = 99.06\%$$

Total # analytes per PCB/pesticide analyses = 28  
Total # PCB/pesticide analyses = 17 samples  
Total # of PCB/pesticide analytes analyzed = 476

Total of rejected PCB/pesticides = 2  
Data Usability Calculation =

$$476 - 2/476 \times 100 = 99.57\%$$

Holding times, sample preservation, and blank sample results are indicators of the representativeness of the analytical data. Data usability with respect to representativeness was unaffected by low level blank contamination detected in some blanks associated with these samples and for this investigation, the data were 100% usable with respect to representativeness.

Comparability is maintained provided that the analytical methods remained the same over time. A major component of comparability is the use of standard reference materials for calibration and QC. These standards are compared to other unknowns to verify their concentrations. Since standard analytical methods and reporting procedures as specified in the Work Plan were consistently used by the laboratory, the data usability with respect to comparability was not affected.

Data usability with respect to completeness is the percentage of sample results that have been determined to be usable during the data evaluation process. Data usability with respect to completeness was greater than 99% overall.

Data completeness is calculated as follows for each individual method:

$$\% \text{ Completeness} = \frac{\text{Total Number of sample results "usable" for qualitative and quantitative purposes}}{\text{total number of samples}}$$

(Number of total sample results = number of analytes per sample X number of samples)

Based on the results of the usability assessment, a further complete data validation is not needed for these samples to be used as part of this investigation.

### 3.3. Analytical results

As stated in Section 1.1 of this document, the site is located approximately 1000 ft. east of Occidental Petroleum Corporation S-Area. Compounds identified by the NYSDEC to be indicators of S-Area materials include:

VOCs: vinyl chloride, 1,2-dichloroethene, trichloroethene, benzene, tetrachloroethene, and chlorobenzene.

SVOCs: 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2 dichlorobenzene, 1,2,4-trichlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, 2,4,5- trichlorophenol, hexachlorobenzene, 1,2,3-trichlorobenzene, 1,2,4,5-tetrachlorobenzene, 1,2,3,4-tetrachlorobenzene, and octachlorocyclopentene.

In the discussions of the analytical results which follow, the VOCs and SVOCs have been subdivided into groups. For VOCs, the S-Area indicator compounds are discussed separately from the other VOCs detected. The SVOCs have been subdivided into three groups for clearer presentation of the results: S-Area indicator compounds, polynuclear aromatic hydrocarbons (PAHs), and other SVOCs.

Appendix D contains historical analytical data collected at Buffalo Avenue.

#### 3.3.1. Surface soils

Two surface soils samples designated as SS-20 and SS-23 were collected at the One-Acre site during the Buffalo Avenue Site Investigation (see Figure 3). In addition, six surface soil samples designated as SB-33F through SB-33K were collected as part of the Phase II Investigation. The laboratory data collected from the One-Acre site during the Buffalo Avenue Site Investigation as well as the Phase II Investigation are presented on Tables 2 through 5.

#### **Volatile organic compounds**

Surface Soils SS-20 and SS-23 were not analyzed for VOCs.

#### **Semivolatile organic compounds**

##### *S-Area SVOCs*

The only S-Area SVOC detected in surface soils was hexachlorobenzene in sample SS-20 at 210 µg/Kg (see Table 2). This concentration is below the 410 µg/Kg cleanup objective per NYS TAGM 4046. No S-Area SVOCs were detected at SS-23 located in the southern portion of the site.

#### *PAHs*

PAHs were detected in each sample. The following PAHs were detected in the surface soil at the site: naphthalene, 2-methylnaphthalene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene. Several of these compounds are above TAGM cleanup objectives per TAGM 4046 in SS-20. In SS-23, only benzo(a)pyrene is above cleanup objectives.

The data indicate that total concentrations of PAHs ranged between 9,474 µg/Kg at SS-20 in the northern portion of the site to 1048 µg/Kg at SS-23 in the southern portion of the site. The concentrations of PAHs detected are typical of Niagara Falls surface soils (NCHD, 1987).

#### *Other SVOCs*

Three other SVOC compounds were detected in the surface soil. Di-n-butylphthalate and bis(2ethylhexyl)phthalate which are common plasticizers and are commonly found in Niagara Falls surface soils were detected at concentrations ranging between 300 and 4,000 µg/Kg. The only other SVOC compound detected was dibenzofuran at 65 µg/Kg at SS-20 located in the northern portion of the site.

#### **PCBs/pesticides**

No PCBs were detected in the two surface samples and low concentrations of only two pesticide compounds were detected at SS-20 (see Table 3). The pesticides detected at SS-20 were 4,4'-DDE at 28 µg/Kg and heptachlor epoxide at 2.1 µg/Kg. The levels detected are below the cleanup objectives identified in TAGM 4046. No pesticides were detected at SS-23 located in the southern portion of the site.

#### **Inorganics**

With respect to inorganics seven constituents were detected at concentrations greater than typical surface soil concentrations presented in several articles (Shacklette et al(1971 and 1984), Bowen (1979), and Walsh (1981) (see Table 4). At location SS-20, chromium, copper, mercury, nickel and zinc were found to be at levels above the cleanup objectives and typical background soils. Mercury, nickel, and zinc were found above these levels in SS-23.

Although the concentration of lead at SS-20 was not above residential cleanup values, it was elevated with respect to other soils in the area. Therefore, additional surface soil samples designated as SB-33F through SB-33 K were collected at 50 ft intervals around SS-20 during the Phase II Investigation. The samples were analyzed for only lead and TCLP lead as agreed upon with the NYSDEC (see Table 5). The lead, TCLP and EPTOX lead data collected as part of previous investigations as well as this Phase II Investigation are illustrated on Figure 4.

The results indicate that lead concentrations in the surface soil in excess of the residential value of 400 mg/Kg are limited to a small area in the vicinity of SS-20. The concentrations of lead detected in the surface soil at the SS-20 area were below the residential cleanup objective of 400 mg/Kg with the exception of SB-33 (2-4') at 1510 mg/Kg, SB-33J (0-2') at 527 mg/Kg, and SB-7F (composite) at 3100 mg/Kg. Total lead concentrations at other locations ranged from 33 mg/Kg at SS-23 to 318 mg/Kg at SB-33I.

Samples were also analyzed for TCLP lead to evaluate the leaching potential of lead from the soils. A soil sample with a TCLP lead concentration greater than 5 mg/L exhibits the characteristics of hazardous waste as set forth by 40 CFR Part 261. The data indicate that only the surface soil samples collected at SB-33G and SB-7F exceeded the 5 mg/L criteria (see Table 5). The remaining TCLP lead concentrations ranged from non-detect at two locations (SB-33I and SB-33K) to 2 mg/L at SB-33H. The variations in concentrations are due to the heterogeneous nature of the fill material at the One-Acre site.

### **3.3.2. Subsurface soil samples**

Soil borings designated as SB-27, SB-28, SB-29 and SB-33 were completed in the One-Acre Parcel during the Buffalo Avenue Site Investigation. The analytical data are presented on Tables 5 through 9 and are illustrated on Figures 4 and 5. The results of previous investigations indicated elevated concentrations of chlorobenzene components in the vicinity of SB-27. Based on this information, five soil borings designated as SB-7A through SB-7E were completed during the Phase II Investigation. Subsurface samples collected during the Phase II Investigation were analyzed for VOCs, SVOCs, PCB/pesticides, and inorganics (lead and chromium only) in accordance with NYSDEC ASP procedures.

Results from SB-33 located in the northern portion of the site indicated that elevated concentrations of lead were noted in the subsurface soil samples. Five additional soil borings designated as SB-33A through SB-33E were completed in October 1991 to evaluate the lateral extent of lead contamination in subsurface soils in the northern portion of the site. These samples were analyzed for total EPTOX and TCLP lead. The results of these samples are discussed below as they were not discussed in the Buffalo Avenue Site Investigation Report. The lead data is summarized on Table 5 and illustrated on Figure 4.

### **Volatile organic compounds**

The results of the VOC analyses are presented on Table 6. Methylene chloride, acetone and 2-butanone were detected in each sample during the Phase II Investigation. These compounds are usually associated with laboratory interferences and, therefore, will not be discussed further.



#### *S-Area VOCs*

In general, low concentrations of S-Area VOCs were detected at the One-Acre site. No S-Area VOCs were detected in six of thirteen samples collected. At other locations, the concentrations ranged from 0.3 µg/Kg at SB-33(SR) to 170 µg/Kg at SB-7E. The data indicate that the highest concentrations of S-Area VOCs are found in borings SB-7C and SB-7E located in the south and southwestern portions of the site (see Figure 5). None of the levels are above the recommended cleanup goals as outlined in TAGM 4046.

#### *Other VOCs*

Other VOCs detected in the subsurface soils at the One-Acre site included carbon disulfide, chloroform, 1,1,1-trichloroethane, trans-1,3-dichloropropene, toluene, ethylbenzene, styrene and xylene. No other VOCs were detected in six samples: SB-7A, SB-27SR, SB-28W, SB-29SR, SB-29W, and SB-33W. Low concentrations of other VOCs were detected at concentrations ranging from 1 to 13 µg/Kg at SB-7B, SB-7D, SB-27W, SB-28SR, and SB-33SR. Similar to the S-Area VOCs, the highest total concentrations of other VOCs were detected at SB-7C (357 µg/Kg) and SB-7E (61 µg/Kg). None of the compounds were at concentrations above cleanup levels identified in TAGM 4046.

At SB-7E and SB-7E(dup), the total concentrations of "other VOCs" were 53 µg/Kg and 61 µg/Kg. The concentrations of most compounds were similar in these two samples with the exception of acetone, carbon disulfide and chloroform. This suggests some heterogeneity in the fill material.

#### *Semivolatile organic compounds*

The results of the SVOC analyses are presented on Tables 7 and are illustrated on Figure 5.

#### *S-Area SVOCs*

S-Area SVOCs were not detected in eight of the thirteen samples collected. In general, the data indicate that relatively low levels of S-Area SVOCs are found in the south and southwestern portions of the One-Acre site (Figure 5). Furthermore, the highest concentrations were detected in the deeper samples collected from the miscellaneous waste fill material, as compared to concentrations observed in the shallow samples collected from the "shot rock".

S-Area compounds were not detected at soil boring SB-7A, SB-7B, SB-7C, and SB-33 which are located southeast and north of MW-7S. At soil boring SB-27 and SB-28, SB-29, and SB-33, samples were collected from both the "shot rock" and miscellaneous waste fill material. The samples collected from the "shot rock" at SB-29 contained two S-Area SVOCs. However S-Area SVOCs at SB-27 and SB-28 were detected in the deeper samples, collected from the miscellaneous waste fill with total concentrations ranging from 4,310 to 870 µg/Kg. The total concentrations of S-Area SVOCs from the miscellaneous waste material at SB-7D and SB-7E were 3,400 and 4,280 µg/Kg, respectively. With the

exception of hexachlorobenzene, TAGM 4046 does not provide cleanup levels for the S-Area SVOCs.

#### *PAHs*

PAHs were detected in twelve of thirteen samples. The following PAHs were detected at the site: naphthalene, 2-methylnaphthalene, 2-chloronaphthalene, acenaphthalene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a) anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, ideno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene. Several of these PAHs were above TAGM levels in at least one subsurface soil sample.

In general, the highest PAH concentrations were found in the SB-33 waste fill sample collected from 4 to 7 ft below grade and three borings located on the southwest side of the area (SB-7D, SB-7C, and SB-27). Given the location of these samples at near opposite ends of the site, and the presence of significantly lower concentrations of PAHs between the samples, it appears that the elevated concentrations are localized and are due to the heterogeneous nature of the fill material.

#### *Other SVOCs*

Other SVOCs that were detected in the subsurface soils at the site include: phenol, 2-methylphenol, 4-methylphenol, 2,4-methylphenol, 4-chloroaniline, dibenzofuran, carbazole, butylbenzylphthalate, di-n-butylphthalate, bis(2-ethylhexyl)phthalate, and 3,3'-dichlorobenzidine. The only compound exceeding the cleanup level identified by TAGM/4046 was phenol at SB-7C, which was detected at 2900 µg/Kg. The total concentration of other SVOCs ranged from non-detect at SB-27 to 122,800 µg/Kg at SB-7D.

Other SVOCs were detected in each of the samples analyzed with the exception of the shot-rock samples from SB-27. In general, the data indicate that the highest concentrations of other SVOCs are primarily found in the south and southwest portions of the One-Acre site similar to the distribution pattern observed for PAHs.

At SB-7D, the majority of other SVOC concentrations are due to 3,3'-dichlorobenzidine and carbazole, which were detected at 91,000 µg/Kg and 27,000 µg/Kg. There are no cleanup levels established by TAGM 4046 for these compounds. The phenolic based compounds including phenol, 2-methylphenol, 4-methylphenol, 2,4-methylphenol were only detected at SB-7C located in southern portion of the site and at SB-33 located in the northern portion of the site. The distribution of these compounds is highly variable and is likely due to the heterogeneous nature of the fill material.

Other compounds detected in most samples were bis(2-ethylhexyl) phthalate and di-n-butylphthalate, which are common plasticizers. The compounds are commonly found in Niagara Falls surface soils or may be due to artifacts of the equipment used for sample collection and transport contamination. Dibenzofuran was detected in soil borings SB-7A

through SB-7E, SB-27W, SB-28W, SB-29SR, and SB-33W at concentrations ranging from 28 to 6000 µg/Kg.

#### **PCB/Pesticides**

Data collected from the One-Acre in 1991 as part of the Buffalo Avenue Site Investigation as well as data collected during the Phase II Investigation are summarized below and on Table 8. The data indicate that no PCB compounds were detected at any of the subsurface sample locations with the exception of 2200 µg/Kg of Aroclor 1242 at SB-27W (5 - 13.5 ft bgs) which is below the cleanup goal of 10,000 µg/Kg established by TAGM 4046.

Pesticides were detected in ten of thirteen subsurface samples collected during this investigation.

The waste sample from SB-22W (5-11") contained beta-BHC and dieldrin at concentrations above the cleanup goal identified in TAGM 4046. The "shot rock" sample from SB-29 (4-7') contained beta-BHC above the same cleanup goals. No other pesticide was found above cleanup goals.

#### **Inorganics**

Data collected from the One-Acre site in 1991 as part of the Buffalo Avenue Site Investigation as well as data collected during the Phase II Investigation are summarized below.

The analytical data from SB-27, SB-28, SB-29 and SB-33 are presented on Table 9. The data indicate that seven elements were detected slightly above typical background concentrations (Shacklette, et. al) or the cleanup goals set forth in TAGM 4046. These elements are antimony, arsenic, copper, mercury, nickel, and zinc. However, concentrations of lead, chromium and mercury at several locations appeared to be anomalously high. Therefore, selected samples were analyzed for TCLP and EPTOX lead, chromium and mercury. As previously discussed, the analytical data indicate that all samples were below regulatory criteria with the exception of SB-33 which had an EPTOX lead concentration of 39.1 mg/L. However, the TLCP lead result for this sample was only 0.66 mg/L.

Based on the elevated EPTOX lead concentration at SB-33, five additional subsurface soil samples were collected at 50-ft intervals away from SB-33 and a sample was collected adjacent to SB-33 in October 1991. These samples were analyzed for total TCLP and EPTOX lead. A summary of the results is provided in Table 5. The results indicated that the concentrations of lead in the subsurface soils ranged from 32 mg/Kg at SB-33B to 330 mg/Kg at SB-33D located to the west, which are below the criteria of 400 mg/Kg established for residential soils. Only the sample from SB-33 (4 to 7 ft) exhibited characteristics of hazardous waste per EPTOX analyses. Samples collected from SB-33A through SB-33E did not exhibit characteristics of hazardous waste per TCLP criteria.

As part of the Phase II Investigation completed in 1995, soil samples from SB-7A through SB-7E completed in the southern portion of the site were also analyzed for lead and chromium. Chromium and lead were detected in each of the subsurface soil samples as indicated on Table 52. Chromium levels were below the TAGM 4046 cleanup goal of 50 mg/Kg. Lead levels ranged from 19.9 mg/Kg at SB-7A to 292 mg/Kg at SB-7D, which are also below the TAGM cleanup goal.

### 3.3.3. Ground water

Monitoring wells MW-7S and MW-7D were installed at the One-Acre Site by Dames & Moore in 1987. Monitoring well MW-7S was installed in fill material to a depth of 11.8 ft bgs. Monitoring well MW-7D was installed in bedrock and was completed at to a depth of 44.3 ft bgs. As part of the Buffalo Avenue Site investigation completed in 1991 these monitoring wells were sampled on two occasions. The results of the 1991 analyses are summarized on tables 10 through 13 and are discussed below.

#### **Volatile organic compounds**

The results of the VOCs analyses are presented on Table 10.

##### *S-Area VOCs*

Chlorobenzene was the only VOC detected in the ground water at the One-Acre site. The New York State Class GA standard for chlorobenzene is 5 µg/L. In June 1991 chlorobenzene was detected at 5 µg/L at MW-7D, but was not detected in a duplicate sample collected. Chlorobenzene was also not detected in the ground water sample collected from MW-7S in June 1991.

Chlorobenzene was detected during the September 1991 sampling event in both wells. The concentration of chlorobenzene at MW-7S was 6 µg/L and the concentration at MW-7D was 2.7 µg/L. In summary, the data indicate low levels of VOCs in ground water at the One-Acre site.

##### *Other VOCs*

No other VOCs were detected in the ground water at MW-7S and MW-7D.

#### **Semivolatile organic compounds**

The results of the SVOC analyses are summarized on Table 11. SVOC analyses were completed on one occasion as part the Buffalo Avenue Site Investigation.

##### *S-Area SVOCs*

S-Area SVOCs were detected at low concentrations at MW-7S. The compounds detected were 1,3 dichlorobenzene, and 1,4-dichlorobenzene at individual concentrations of 6 µg/L. The concentrations detected slightly exceed the NYS Class GA standard of 5 µg/L for 1,3-dichlorobenzene and 4.7 µg/l for 1,4-dichlorobenzene. S-Area SVOCs

were not detected at monitoring well MW-7D. The data indicate that SVOCs have not migrated into bedrock.

*PAHs*

No PAHs were detected in ground water at the site.

*Other SVOCs*

No Other SVOCs were detected in ground water at the site.

**PCB/Pesticides**

The results of the PCB/Pesticide ground water analyses are presented on Table 12. The data indicate that no PCBs were detected in the ground water. In summary, low concentrations of several pesticides were detected in shallow and one pesticide was detected in deep ground water.

The pesticides detected in shallow well MW-7S include aldrin, Alpha-BHC, Beta-BHC, Delta-BHC, endosulfan I, endrin, and heptachlor epoxide at concentrations ranging between 0.008 µg/L and 0.81 µg/L. Total pesticide concentrations have ranged between 0.064 and 1.046 µg/L.

The ground water data collected from the shallow zone is similar to the other media in that the concentrations in a given sample can vary. A duplicate sample was collected at MW-7S during the June sampling event, indicated similar concentrations of most pesticides with the exception of Alpha-BHC. Alpha-BHC concentrations varied from 0.81 µg/L to 0.089 µg/L in a duplicate sample.

The only pesticide detected at MW-7D installed in bedrock was gamma-BHC at 0.16 µg/L; however gamma-BHC was not detected in a duplicate sample collected.

**Inorganics**

Ground water samples for inorganics were collected for both total(unfiltered) and soluble (filtered) analyses. Results of these analyses are presented on Table 13. Filtered samples were collected from each well since the ground water exhibited turbidity values greater than 50 NTU at each location. Ground water samples that exhibit elevated NTU readings generally contain suspended sediment, which in turn contains inorganics. As required by the analytical procedures, ground water samples are preserved with nitric acid. In samples with sediment, the preservation causes inorganics from the sediment to solubilize into the water. In our opinion samples for inorganic analyses collected from monitoring wells with a high turbidity are not considered representative of those inorganics which migrate with the ground water system. Filtered samples where the sediment is removed prior to preservation, are more likely to provide representative results of inorganics in solution.

In general, the data indicate that higher concentrations of inorganics in total (unfiltered) samples when compared to soluble (filtered) samples. Furthermore, lower concentrations of inorganics were detected at MW-

7D installed in bedrock as compared to monitoring well MW-7S installed in fill material. The results of the total (unfiltered) analyses from MW-7D indicate that iron, magnesium, sodium, chromium, lead and manganese were detected at concentrations above NYS Class GA standards. In the filtered samples only sodium exceeded NYS Class GA Standards. It is likely that sodium detected at MW-7D is naturally occurring, as other bedrock monitoring wells in the area contained similar concentrations of sodium. The results of the total (unfiltered) analyses from MW-7S indicate that antimony, chromium, iron, lead, manganese mercury, sodium and zinc were detected at concentrations above NYS Class GA Standards. The results of the soluble (filtered) analyses indicate that antimony, iron, lead, manganese and sodium were detected at concentrations marginally exceeding NYS Class GA standards.

#### **3.3.4. TCLP analyses**

A composite subsurface soil sample was collected from (8-10') in soil boring SB-7F, located in the southern portion of the site in February 1996. The sample was analyzed to assess if the material is characteristic of hazardous waste using TCLP in accordance with 40 CFR part 261. The results of the analyses are summarized on Table 14.

In summary, based on the results of the VOC, SVOC and PCB/Pesticide analyses, the fill material is not characteristic of hazardous waste as defined by 40CFR Part 261

The data indicate that no metals were detected with the exception of lead at 11 mg/L. The concentration of lead detected exceeds the regulatory limit of 5 mg/L, therefore the sample exhibits characteristics of hazardous waste as set forth by 40 CFR Part 261. As a result of the elevated TCLP lead concentrations the sample was also analyzed for total lead. A total lead concentration of 3100 mg/Kg was detected.

In summary, with the exception of lead in some areas, the fill material at the One-Acre site is not characteristic of hazardous waste. However, as indicated by analyses by other soil samples, the exceedance of the standard for leachable lead varies widely across the area. Of the 19 samples analyzed using either TCLP or EPTOX methods, only three samples had levels exceeding the 5 mg/l level.

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## 4. Summary/Conclusions

### 4.1. Summary

The One-Acre site is located immediately south of Buffalo Avenue. The north, south and western portions of the site are surrounded by the de-listed portion of the Buffalo Avenue Site, which is the location of the new City of Niagara Falls WTP. The western portion of the site is bordered by the City of Niagara Falls - Eastern Area, which is a Class 2A inactive hazardous waste site in the NYSDEC registry of inactive hazardous sites.

The overburden materials at the One-Acre site, in descending order from the ground surface are shot rock, miscellaneous fill, lacustrine clay, glacial till and bedrock. Background information reviewed documented that the fill in the area proceeded in three distinct phases as summarized below:

- Miscellaneous waste material which included incinerator refuse and other debris were alleged to be disposed of on-site from the 1930's to the 1950's.
- Dredged material from the construction of the Niagara River Ice Canal was allegedly disposed on the property by the NYPA.
- Shot rock and other material excavated by the NYPA during construction of the Niagara Power projects conduits were placed on-site from 1958 until 1963.

Ground water is generally encountered approximately 10 ft below the ground surface and flows to the south-southwest towards the Niagara River.

The analytical data indicate that the distribution of contaminants in surface soil and subsurface soil are highly variable across the site. The variability of contaminants at the site is indicative of the heterogeneous nature of the fill material present at the site. Based on data from the previous investigations the primary concern was elevated lead concentrations noted in several samples collected from the northern portion of the site, and the presence of organic compounds, primarily S-Area indicator compounds, in subsurface soils and ground water in the southern portion of the site. The sampling and subsequent analyses of samples collected during the Phase II investigation were focused on addressing these concerns.

The following discusses in more details the distribution of VOCs, SVOCs, inorganics and pesticides/PCBs in the media sampled. Analytical results for VOCs and SVOCs were divided into groups of compounds including, S-Area indicator parameters where they were identified to be present. S-Area indicator compounds are those associated with the Occidental Petroleum Corporation S-Area, which is located approximately 1000 ft west of the site.

#### *Volatile Organic Compounds*

VOCs were detected in ground water and subsurface soil samples. Surface soil samples were not analyzed for VOCs. Monitoring wells MW-7S, installed in fill material, and MW-7D, installed in bedrock, were sampled on two occasions. The data indicate that the only VOC detected in the ground water was chlorobenzene, an S-Area indicator parameter. At MW-7S the concentration of chlorobenzene ranged between non-detect and 6 µg/L, and at MW-7D the concentration ranged between non-detect and 5 µg/L. When detected these concentrations were slightly above the New York State Class GA Standards of 5 µg/L. No other VOCs were detected in either the shallow or deep ground water.

In subsurface soils, S-Area VOCs were primarily detected sporadically in the south and southwestern portions of the site. The variability of concentrations in a given sample is indicative of the heterogeneous nature of the fill. Other VOCs were detected at low concentrations in the southern portion of the site. No VOCs were identified at concentrations exceeding the cleanup goal identified by TAGM 4046.

#### *Semivolatile Organic Compounds*

SVOCs were detected in ground water, surface soil and subsurface soil. The identified compounds were divided into three groups for discussion: PAHs, other SVOCs and S-Area SVOCs.

In the surface soil samples, PAH compounds were detected in each of the two samples analyzed. The concentrations of PAHs detected are typical of Niagara Falls surface soils. In subsurface soil samples, several PAH compounds were detected at concentrations exceeding the cleanup levels identified in TAGM 4046. The locations where exceedances were noted were at all areas of the site, which indicates that PAHs are sporadically distributed and are related to the heterogeneous nature of the site. PAHs were not detected in the ground water at the site, which indicates that PAHs from soils are not migrating into the ground water.

Other SVOCs that were common to both surface soils and subsurface soil included di-n-butylphthalate and bis-(2ethylhexyl)phthalate and dibenzofuran. The phthalate compounds are plasticizers, which are commonly found in soils in the Niagara Falls area. In subsurface soils phenolic based compounds were only detected at two locations; SB-33 in the northern portion of the site and SB-7C located in the southern portion of the site. The concentration of phenol at SB-7C was the only other SVOC that exceeded the cleanup criteria identified in TAGM 4046.



Additionally in the southern portion of the site at SB-7D, 3,3'-dichlorobenzidine and carbazole were detected at elevated concentrations. The distribution of other SVOCs in subsurface soil is highly variable as a result of the heterogeneous nature of the fill material present. No other SVOCs were detected in the ground water at the site.

In surface soil, only one S-Area indicator was detected, and at a level less than the cleanup level established by TAGM 4046. With respect to subsurface soils, S-Area SVOCs were detected in five of the thirteen samples collected. With the exception of hexachlorobenzene, TAGM 4046 does not provide cleanup levels for S-Area VOCs. In ground water S-Area SVOCs were detected at monitoring well MW-7S screened in the fill material. The compounds detected were 1,3-dichlorobenzene and 1,4-dichlorobenzene at concentrations slightly exceeding the NYS Class GA standards. S-Area SVOCs were not detected at MW-7D screened in bedrock.

#### *Pesticide/PCBs*

No PCBs were detected in ground water or surface soil samples collected at the site. PCB (Aroclor 1242) was only detected in one of the thirteen subsurface soil samples collected at 2,200 µg/Kg. This level is below the cleanup level of 10,000 µg/Kg identified in TAGM 4046.

Pesticides were detected in surface soil, subsurface soil and ground water samples at low concentrations, none of which are above TAGM 4046 cleanup levels. In subsurface samples only 2 of the 13 samples analyzed for pesticides contained concentrations higher than the cleanup criteria identified in TAGM 4046. These samples were located in the center of the one-acre site.

In ground water higher concentrations of pesticides were detected in the shallow well than the deep well. The total pesticide concentration at MW-7S ranged between 0.064 and 1.046 µg/L. This variation is likely due to the heterogeneous nature of the fill material placed at the site. At MW-7D only gamma-BHC was detected at 0.16 µg/L which exceeds the ground water standard of 0.05 µg/l.

#### *Inorganics*

In summary the primary concern at the site is elevated levels of lead in surface and subsurface soil that are sporadically distributed. The concentrations of total lead detected in seven of the eight surface soil samples were below the TAGM cleanup criteria. In subsurface soils total lead concentrations detected were below TAGM levels as well.

For ground water both total (unfiltered) and soluble (filtered) samples were collected and analyzed. Due to the elevated turbidity of the samples collected only the filtered samples were considered representative of inorganics migrating in the ground water. In the deep zone only sodium, was detected above NYS Class GA Standards; however, it is likely that sodium detected at MW-7D is naturally occurring as other bedrock monitoring wells at the de-listed Buffalo Avenue site contained similar concentrations. The results of the filtered

analyses at MW-7S indicate that antimony, iron, lead, manganese and sodium were detected at concentrations marginally exceeding NYS Class GA standards. The concentrations are likely related to the fill material present at the site.

#### *TCLP Analyses*

Based on the elevated lead concentrations noted in surface soil and subsurface soils selected samples were analyzed to evaluate the leaching potential of lead from soil using EPTOX and or TCLP methods. Only one of the eight surface soil samples analyzed for lead exceeded the TCLP criteria of 5 mg/L.

In the northern portion of the site a sample collected at SB-33 (4 to 7 ft) was analyzed for both TCLP and EPTOX lead. The data indicate that the TCLP lead concentration was 0.66 mg/L which is below regulatory criteria, however the EPTOX lead concentration detected was 39.1 mg/L which exceeds regulatory criteria. Five additional subsurface soil samples were collected around the SB-33 area, and none of the samples exceeded the regulatory limit of 5 mg/L.

A sample of the fill material from the southern portion of the site was analyzed for the VOCs, SVOCs, pesticides and metals during 1996. The results indicated that with respect to VOCs, SVOCs and pesticides that the fill material was not considered characteristic of hazardous waste per 40 CFR part 261. The data indicated that no metals were detected with exception of lead at 11 mg/L. The concentration of lead detected exceed the regulatory limit of 5 mg/L, therefore the sample exhibits characteristics of hazardous waste as set forth by 40 CFR Part 261.

In summary three samples (one surface and two subsurface soils samples) from a total of eighteen samples collected and analyzed for EPTOX and/or TCLP lead exceeded regulatory limits.

## **4.2. Conclusions**

Part 371.1 of 6 NYCRR identifies which solid wastes are subject to regulation as hazardous wastes under Parts 370 through 373, 375 and 376 of 6 NYCRR. Under Part 371, Identification and Listing of Hazardous Wastes, criteria for identifying the characteristics of hazardous waste are presented. These criteria include characteristics of waste, and origin of wastes. Therefore, to evaluate whether the fill material in the One-Acre site is a hazardous waste, analytical laboratory testing was performed and background review was completed.

Analyses were completed on the surface soil and fill material for TCLP as defined in part 6 NYCRR Part 371.3 and 40 CFR Part 261. The results of these analyses indicate that with respect to VOCs, SVOCs, pesticides/PCBs and inorganics that the fill material at the One-Acre site is below the regulatory levels listed in Part 371.3. and 40 CFR Part 261

with the exception of lead in some samples. The data indicate that at most locations the concentrations of leachable lead are below the regulatory levels listed in part 371.3. One surface soil sample and two subsurface soil samples from a total of 18 samples collected and analyzed for leachable lead exceeded the regulatory criteria of 5 mg/L. The data indicate that the distribution of lead is highly variable and is due to the heterogeneous nature of the fill material.

VOCs, SVOCs, pesticides and inorganics were detected in ground water on at least one occasion at concentrations slightly exceeding NYS Class GA standards. Based on information presented in the Buffalo Avenue Site Investigation and the recently completed Phase II Investigation for the Eastern Area the data does not indicates that these constituents are migrating away from the One-Acre site. The constituents detected are due to the characteristics of the fill material in the area.



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Table 1  
Phase II Investigation  
Water Treatment Plant - One Acre Parcel  
Niagara Falls, New York

Surface Soil Descriptions

Sample #	Blow Counts/ 6 Inches	Description
<u>One Acre Parcel</u>		
SB-33G	9-13-14-24	Damp, med. Brown, med dense SILT, some very fine sand, little clay, little fine to med. angular gravel
SB-33F	8-8-9-8	Damp, dark brown, med. dense SILT, some very fine sand, some fine to med. angular gravel, little fine to coarse sand
SB-33H	7-16-9-6	Dry, brown to gray, med. dense SILT, some very fine sand, some fine to med. angular gravel, little fine to coarse sand
SB-33I	3-18-26-20	Dry to damp, brown to black, dense SILT, some fine sand, little fine to coarse angular gravel, trace cinders, trace clay
SB-33J	3-5-9-10	Dry, brown to black, med. dense SILT, some very fine sand, little fine to coarse angular gravel, trace white ash, trace cinders, trace orange brick
SB-33K	3-6-17-17	Dry to damp, gray to brown, med. dense SILT, some fine to coarse gravel, little fine to med. sand, trace clay



Table 2  
Phase II - Investigation  
One-Acre Site - Buffalo Avenue  
Surface Soils - Semivolatile Organic Compounds

Contaminant	Clean-up Objective (TAGM 4046)	SS-20 5/91	SS-23 5/91
1,2,4-Trichlorobenzene*	NE	810 u	730 u
1,2-Dichlorobenzene*	NE	810 u	730 u
1,3 - Dichlorobenzene*	NE	810 u	730 u
1,4 - Dichlorobenzene*	NE	810 u	730 u
2 - Chloronaphthalene**	NE	810 u	730 u
2,4,5 - Trichlorophenol*	NE	4000 u	3500 u
2,4,6 - Trichlorophenol	NE	810 u	730 u
2,4-Dichlorophenol	NE	810 u	730 u
2,4-Dimethylphenol	NE	810 u	730 u
2,4-Dinitrophenol	NE	4000 u	3500 u
2,4-Dinitrotoluene	NE	810 u	730 u
2,6-Dinitrotoluene	NE	810 u	730 u
2-Chlorophenol	NE	810 u	730 u
2-Methylphenol	NE	810 u	730 u
2-Nitroaniline	NE	4000 u	3500 u
2-Nitrophenol	NE	810 u	730 u
2-methylnaphthalene**	NE	120 j	730 u
3,3-Dichlorobenzidine	NE	1600 u	1500 u
3-Nitroaniline	NE	4000 u	3500 u
4,6-Dinitro-2-methylphenol	NE	4000 u	3500 u
4- methylphenol	NE	810 u	730 u
4-Bromophenyl-phenylether	NE	810 u	730 u
4-Chloro-3-methylphenol	NE	810 u	730 u
4-Chloroaniline	NE	810 u	730 u
4-Chlorophenol-phenylether	NE	810 u	730 u
4-Nitroaniline	NE	4000 u	3500 u
4-Nitrophenol	NE	4000 u	3500 u
Acenaphthene**	50000	810 u	730 u
Acenaphthylene**	41000	810 u	730 u
Anthracene**	50000	200 j	730 u
Benzo(a) anthracene**	224	920	75 j
Benzo(a)pyrene**	61	670 j	66 j
Benzo(b)fluoranthene**	224	1200	110 j
Benzo(g,h,i)perylene**	61	330 j	730 u
Benzo(k)fluoranthene**	224	590 j	730 u
Benzoic Acid	NE	4000 u	3500 u
Benzyl alcohol	NE	810 u	730 u
Bis(2-chloroethoxy)methane	NE	810 u	730 u
Bis(2ethylhexyl)phthalate	50000	4000	2000
Butylbenzylphthalate	50000	810 u	730 u
Chrysene**	400	980	730 u
Di-n-butylphthalate	8100	300 j	730 u
Di-n-octylphthalate	50000	810 u	730 u
Dibenz(a,h)anthracene**	14	94 j	730 u
Dibenzofuran	6200	65 j	730 u
Diethylphthalate	7100	810 u	730 u
Dimethylphthalate	2000	810 u	730 u

Table 2  
Phase II - Investigation  
One-Acre Site - Buffalo Avenue  
Surface Soils - Semivolatile Organic Compounds

Contaminant	Clean-up Objective (TAGM 4046)	SS-20 5/91	SS-23 5/91
Flourene**	50000	810 u	730 u
Fluoranthene**	50000	1500	730 u
Hexachlorobenzene*	410	210 j	730 u
Hexachlorobutadiene*	NE	810 u	730 u
Hexachlorocyclopentadiene*	NE	810 u	730 u
Hexachloroethane	NE	810 u	730 u
Indeno(1,2,3-cd)pyrene**	3200	420 j	730 u
Isophorone	4400	810 u	730 u
N-Nitrosodiphenylamine	NE	810 u	730 u
N-Nitroso-di-n-propylamine	NE	810 u	730 u
Naphthalene**	13000	120 j	730 u
Nitrobenzene	200	810 u	730 u
Pentachlorophenol	1000	4000 u	3500 u
Phenanthrene**	50000	930	67 j
Phenol	30	810 u	730 u
Pyrene**	50000	1400	730 j
bis(2-chloroethyl) ether	NE	810 u	730 u
bis(2-chloroisoprpyl)ether	NE	810 u	730 u
S-Area SVOCs		210	ND
PAHs		9,474	1,048
Other SVOCs		4,365	2,000

All Values (ug/kg)

u- Compound analyzed but not detected

j- Estimated value

NE - Not established

Table 3  
Phase II - Investigation  
One-Acre Site - Buffalo Avenue  
Surface Soils - Pesticide/PCBs

	Cleanup Objective (TAGM 4046)	SS-20 5/91	SS-23 5/91
4,4-DDD	2900	40 u	36 u
4,4-DDE	2100	28 j	18 u
4,4-DDT	2100	40 u	36 u
Aldrin	41	20 u	18 u
Alpha- BHC	110	20 u	18 u
Aroclor-1016	1000	200 u	18 u
Aroclor-1016	1000	200 u	18 u
Aroclor-1221	1000	200 u	18 u
Aroclor-1232	1000	200 u	18 u
Aroclor-1242	1000	200 u	18 u
Aroclor-1248	1000	200 u	18 u
Aroclor-1254	1000	400 u	36 u
Aroclor-1260	1000	400 u	36 u
Beta- BHC	200	20 u	18 u
Chlordane	540	200 u	180 u
Delta- BHC	300	20 u	18 u
Dieldrin	44	40 u	36 u
Endosulfan II	900	40 u	36 u
Endosulfan I	900	20 u	18 u
Endosulfan sulfate	1000	40 u	36 u
Endrin	100	40 u	36 u
Endrin Ketone	NE	40 u	36 u
Gamma-BHC	60	20 u	18 u
Heptachlor	100	20 u	18 u
Heptachlor epoxide	20	2.1 j	18 u
Methoxychlor	NE	200 u	18 u
Toxaphene	NE	400 u	36 u
Total Pesticides		30.1	ND

All Values (ug/Kg)

u- Compound analyzed but not detected

j- Estimated value

ND - Not detected

NE - Not established

Table 4  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Surface Soil

	Cleanup Objective (TAGM 4046)	TYPICAL RANGE **	SS-20	SS-23
ALUMINUM	SB	1000-25,000	9,140.0	8,590.0
ANTIMONY	SB	-----	1.2 UJ	1.1 UJ
ARSENIC	7.5 or SB	3-12	5.4 J	2.4 J
BARIUM	300 or SB	15-600	113.0 J	69.7 J
BERYLLIUM	0.16 (HEAST) or SB	0-1.75	1.2 UJ	1.1 UJ
CADMIUM	10	0.01-2	1.2 UJ	1.1 UJ
CALCIUM	SB	130-35,000	110,000.0	127,000.0
CHROMIUM	50	1.5-40	75.0 J	19.1 J
COBALT	30 or SB	2.5-60	9.3 J	7.4 J
COPPER	25 or SB	<1-15	37.3 J	15.1 J
CYANIDE	***	-----	1.2 U	1.1 U
IRON	2000 or SB	17,500-25,000	13,100.0	14,900.0
LEAD	400 ****	1-12.5	120.0 J	33.0
MAGNESIUM	SB	2,500-6,000	58,600.0	58,200.0
MANGANESE	SB	50-5,000	554.0 R	574.0 R
MERCURY	0.1	0.042-0.066	1.7 J	3.0 J
NICKEL	13 or SB	0.5-25	21.4 J	21.4 J
POTASSIUM	SB	8,500-43,000	1,750.0	3,220.0
SELENIUM	2 or SB	<1-0.125	1.2 R	1.1 R
SILVER	SB		1.5 UJ	1.3 UJ
SODIUM	SB	6,000-8,000	443.0 U	350.0 U
THALLIUM	SB	-----	1.2 UJ	1.1 UJ
VANADIUM	150 or SB	25-60	23.8 J	21.5 U
ZINC	20 or SB	37-60	220.0 J	150.0 J

Notes: All values reported in mg/kg (ppm).

U - Indicates element was analyzed for but not detected.

UJ - Not detected, detection limit is estimated

B - Indicates a value greater than or equal to the instrument detection limit, but less than the contract required detection limit.

NA - Not analyzed.

R - Rejected by data validator.

J - Indicates an estimated value.

SB - Site background

\*\*\* - Some forms of Cyanide are complex and very stable while other forms are pH dependent and hence are very unstable. Site-specific form(s) of Cyanide should be taken into consideration when establishing soil cleanup objective.

\*\*\*\* - Background levels for lead vary widely. Average background levels in metropolitan or suburban areas near highways are much higher and typically range from 200-500 ppm. The USEPA's interim Lead Hazard Guidance (July 14, 1994) establishes a residential screening level of 400 ppm.

Table 5  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Surface and Subsurface Soil - Lead and Chromium Concentrations

Surface Soils		SB-33F	SB-33G	SB-33H	SB-33I	SB-33J	SB-33K	SS-20	SS-23		
Location:					BLD DUP						
Date Collected:	2/10/95	2/10/95	2/10/95	2/10/95	2/10/95	2/10/95	2/10/95	5/91	5/91		
Depth:	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'	0-2'		
Lead (mg/Kg)	52.7	151	294	318	302	527	115	120	33		
TCLP Lead (mg/L)	0.5	21	2	0.8	0.5 U	0.7	0.5 U	0.018	NA		
EPTOX Lead (mg/L)	NA	NA	NA	NA	NA	NA	NA	0.26	NA		
Subsurface Soils		SB-33	SB-33A	SB-33B	SB-33C	SB-33D	SB-33E	SB-7F	SB-27W	SB-26W	SB-29SR
Location:											
Date Collected:	5/15/91	5/15/91	10/14/91	10/14/91	10/14/91	10/14/91	10/14/91	2/96	5/91	5/91	5/91
Depth:	2-4'	4-7'	4-7'	4-8'	4-8'	4-8'	4-8'	Comp	5-13.5'	5-11'	4-7'
Lead (mg/Kg)	121	1510	41	32	36	330	320	3100	179	371	175
TCLP Lead (mg/L)	0.018	0.66	0.5 U	0.5 U	0.5 U	1.6	0.5 U	11	0.223	0.16	0.079
EPTOX Lead (mg/L)	0.16	39.1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	1.87	0.225	0.885
Location:		SB-7A	SB-7B	SB-7C	SB-7D	SB-7E	SB-7E	SB-7E	SB-7E	SB-7E	SB-7E
Date Collected:		2/9/95	2/9/95	2/10/95	2/10/95	2/10/95	2/10/95	2/10/95	2/10/95	2/10/95	2/10/95
Depth:		10-12'	10-12'	8-10'	8-10'	8-10'	8-10'	8-10'	8-10'	8-10'	8-10'
Cleanup Objective (TAGM 4046)											
Chromium (mg/Kg)		13.4	10.3	16.1	42.8	29.3	14.2	29.3			
Lead (mg/Kg)		19.1	40.7	246	292	132	77.2	132			
% Total Solids		80.4	79.0	78.2	81.2	66.7	74.1	66.7			

Notes: U - Not Detected  
NA - Not Analyzed

Table 6  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Subsurface Soil - Volatile Organic Compounds  
Niagara Falls, New York

Cleanup Objective (TAGM 4046)	Location:	Date Collected:	SB-7A	SB-7B	SB-7C	SB-7D	SB-7E	SB-7E	SB-27S	SB-27W	SB-28S	SB-28W	SB-29SR	SB-29W	SB-29W	SB-33SR	SB-33SR	SB-33SR	SB-33W
		Depth:	10-12'	10-12'	8-10'	8-10'	8-10'	8-10'	2-4'	5-6'	2-4'	6-8'	4-6'	7-8'	7-8'	2-4'	2-4'	2-4'	4-6'
1,1,1-Trichloroethane	800		12 U	2 J	13 U	1 J	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
1,1,2,2-Tetrachloroethane	600		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
1,1,2-Trichloroethane	NE		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
1,1-Dichloroethane	200		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
1,1-Dichloroethene	400		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
1,2-Dichloroethane	100		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
1,2-Dichloroethene (total)*	550		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
1,2-Dichloropropane	300		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
2-Butanone	300		4 BJ	0.8 BJ	11 BJ	9 BJ	8 BJ	28	11 U	13 U	11 U	12 U	11 U	16 UJ	17 UJ	11 U	11 U	11 U	14 U
2-Hexanone	NE		12 U	13 U	13 U	12 U	13 U	15 U	11 U	13 U	11 U	12 U	11 U	16 UJ	17 UJ	11 U	11 U	11 U	14 U
4-Methyl-2-pentanone	100		12 U	13 U	13 U	12 U	13 U	15 U	11 U	13 U	11 U	12 U	11 U	16 UJ	17 UJ	11 U	11 U	11 U	14 U
Acetone	200		19	36	58	34	39	150	11 U	33 U	11 U	63 U	62 U	39 UJ	42 UJ	12 U	13 U	13 U	92 U
Benzene*	60		12 U	13 U	74	0.9 J	13 U	1 J	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Bromodichloromethane	NE		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Bromoform	NE		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Bromomethane	NE		12 U	13 U	13 U	12 U	13 U	15 U	11 U	13 U	11 U	12 U	11 U	16 UJ	17 UJ	11 U	11 U	11 U	14 U
Carbon disulfide	2700		12 U	3 J	4 J	7 J	2 J	38	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Carbon tetrachloride	600		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Chlorobenzene*	1700		12 U	13 U	6 J	5 J	12 J	160	6 U	19	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Chloroethane	1900		12 U	13 U	13 U	12 U	13 U	15 U	11 U	13 U	11 U	12 U	11 U	16 UJ	17 UJ	11 U	11 U	11 U	14 U
Chloroform	300		12 U	0.7 J	13 U	1 J	45	8 J	6 U	0.8 J	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Chloromethane	NE		12 U	13 U	13 U	12 U	13 U	15 U	11 U	13 U	11 U	12 U	11 U	16 UJ	17 UJ	11 U	11 U	11 U	14 U
Dibromochloromethane	NE		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Ethylbenzene	5500		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Methylene chloride	100		2 BJ	5 BJ	3 J	2 BJ	3 J	4 J	6 U	7 U	5 U	6 U	5 U	18 UJ	8 UJ	5 U	5 U	5 U	7 U
Styrene	NE		12 U	13 U	23	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Tetrachloroethene*	1400		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Toluene	1500		12 U	4 J	140	2 J	3 J	6 J	6 U	2 J	0.8 J	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Trichloroethene*	700		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
Vinyl chloride*	200		12 U	13 U	13 U	12 U	13 U	15 U	11 U	13 U	11 U	12 U	11 U	16 UJ	17 UJ	11 U	11 U	11 U	14 U
Xylenes (total)	1200		12 U	13 U	170	2 J	6 J	9 J	6 U	7 U	0.1 J	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
cis-1,3-Dichloropropene	NE		12 U	13 U	13 U	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
trans-1,3-Dichloropropene	NE		12 U	13 U	2 J	12 U	13 U	15 U	6 U	7 U	5 U	6 U	5 U	8 UJ	8 UJ	5 U	5 U	5 U	7 U
"S" Area VOCs			ND	ND	80	5.9	42	170	ND	19	ND	ND	ND	ND	ND	0.3	0.3	0.3	2
Other VOCs			19	9.7	357	13	53	61	ND	2.8	1	ND	ND	ND	ND	1	3	3	ND
Total VOCs			19	9.7	437	18.9	95	231	ND	21.8	1	ND	ND	ND	ND	1.3	3.3	3.3	ND
Total TICs			ND	ND	150 JN	60 JN	ND	1010 JN	60 JN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes: Concentration units in ug/kg (ppb).

J - Estimated value.

U - Not detected.

UJ - Not detected, detection limit is estimated

N - Spiked sample recovery not within control limits.

B - Analyte is found in the associated blank as well as in the sample.

ND - Not detected.

Maximum Concentration Detected at De-listed Buffalo Avenue Site (O'Brien & Gere, 1991a and NYSDEC)

SB-27 through SB-29 and SB-33 collected as part of the Buffalo Avenue Site Investigation.

NE - Not established.

Table 7  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Subsurface Soil Semivolatile Organic Compounds  
Niagara Falls, New York

Cleanup Objective (TAGM 4046)	Location: Date Collected: Depth:	SB-7A	SB-7A RE	SB-7B	SB-7B RE	SE-7C	SB-7C RE	SB-7D	SB-7D DL	SB-7E	SB-7E DL	BLD DUP	BLD DUP RE
		2/9/95 10-12'	2/9/95 10-12'	2/9/95 10-12'	2/9/95 10-12'	2/10/95 8-10'	2/10/95 8-10'	2/10/95 8-10'	2/10/95 8-10'	2/10/95 8-10'	2/10/95 8-10'	2/10/95 8-10'	2/10/95 8-10'
1,2,3,4-Tetrachlorobenzene(*)	NE	420 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	200 J	4500 U	500 U	500 U
1,2,3-Trichlorobenzene(*)	NE	420 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	350 J	280 J	32 J	32 J
1,2,4,5-Tetrachlorobenzene(*)	NE	420 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	90 J	4500 U	500 U	500 U
1,2,4-Trichlorobenzene(*)	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	940	690 JD	500 U	82 J
1,2-Dichlorobenzene(*)	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	2300	1500
1,3,5-Trichlorobenzene	NE	420 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
1,3-Dichlorobenzene(*)	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
1,4-Dichlorobenzene(*)	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	2700	1600 JD	870	550
2,2'-Oxybis(1-Chloropropane)	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
2,4,5-Trichlorophenol(*)	NE	1000 U	1000 U	1100 U	1100 U	32000 U	32000 U	310000 U	310000 U	1100 U	11000 U	1200 U	1200 U
2,4,6-Trichlorophenol	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
2,4-Dichlorophenol	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
2,4-Dinitrophenol	NE	1000 U	1000 U	1100 U	1100 U	32000 U	32000 U	310000 U	310000 U	1100 U	11000 U	1200 U	1200 U
2,4-Dinitrotoluene	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
2,4-Methylphenol	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
2,6-Dinitrotoluene	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
2-Chloronaphthalene(**)	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	120 J	4500 U	500 U	500 U
2-Chlorophenol	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
2-Methylnaphthalene(**)	NE	63 J	48 J	120 J	86 J	7700 J	5500 J	43000 J	120000 U	520	350 JD	500 U	38 J
2-Methylphenol	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
2-Nitroaniline	NE	1000 U	1000 U	1100 U	1100 U	32000 U	32000 U	310000 U	310000 U	1100 U	11000 U	1200 U	1200 U
2-Nitrophenol	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
3,3'-Dichlorobenzidine	NE	250 J	420 U	420 U	420 U	6700 J	3600 J	91000	68000 JD	2500	1500 JD	1000	520
3-Nitroaniline	NE	1000 U	1000 U	1100 U	1100 U	32000 U	32000 U	310000 U	310000 U	1100 U	11000 U	1200 U	1200 U
4,6-Dinitro-2-methylphenol	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
4-Bromophenyl-phenylether	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
4-Chloro-3-methylphenol	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
4-Chloroaniline	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	21 J
4-Chlorophenyl-phenylether	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
4-Methylphenol	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
4-Nitroaniline	NE	1000 U	1000 U	1100 U	1100 U	32000 U	32000 U	310000 U	310000 U	1100 U	11000 U	1200 U	1200 U
4-Nitrophenol	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
Acenaphthene(**)	50000	410 U	420 U	420 U	420 U	13000 U	13000 U	96000 J	65000 JD	450 U	4500 U	500 U	50 J
Acenaphthylene(**)	41000	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	90 J
Anthracene(**)	50000	71 J	47 J	29 J	25 J	14000	5700 J	28000 U	19000 JD	570	440 JD	300 J	200 J
Benzo(a)anthracene(**)	224	260 J	190 J	110 J	73 J	15000	11000 J	140000 E	77000 JD	3300	1900 JD	1600	1000
Benzo(a)pyrene(**)	61	410 U	250 J	420 U	420 U	13000 U	13000 U	120000 E	93000 JD	2800	2200 JD	1400	910
Benzo(b)fluoranthene(**)	224	410 U	260 J	420 U	420 U	13000 U	13000 U	93000	78000 JD	3000	2800 JD	1200	910
Benzo(g,h,i)perylene(**)	50000	410 U	420 U	420 U	420 U	13000 U	13000 U	53000	35000 JD	450 U	1000 JD	500 U	550
Benzo(k)fluoranthene(**)	224	410 U	230 J	420 U	420 U	13000 U	13000 U	130000 E	78000 JD	3000	1700 JD	1400	930
Butylbenzylphthalate	50000	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	210 JD	500 U	500 U
Carbazole	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	27000	16000 JD	310 J	220 JD	190 J	120 J
Chrysene(**)	400	290 J	190 J	140 J	96 J	12000 J	9400 J	140000 E	80000 JD	3600	2000 JD	1500	1000
Di-n-butylphthalate	8100	42 J	37 J	420 U	47 J	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	39 J
Di-n-octylphthalate	50000	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
Dibenz(a,h)anthracene(**)	14	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
Dibenzofuran	6200	410 U	28 J	38 J	420 U	5400 J	4100 J	4800 J	120000 U	330 J	190 JD	75 J	62 J
Diethylphthalate	7100	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
Dimethylphthalate	2000	410 U	420 U	420 U	420 U	13000 U	13000 U	140000 E	150000 D	4100 E	4400 JD	2400	1400
Fluoranthene(**)	50000	340 J	240 J	140 J	99 J	20000	12000 J	8300 J	120000 U	450 U	4500 U	500 U	85 J
Fluorene(**)	50000	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
Hexachlorobenzene(*)	410	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
Hexachlorobutadiene(*)	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U

Table 7  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Niagara Falls, New York  
Subsurface Soil Semivolatile Organic Compounds

Cleanup Objective (TAGM 4046)	Location: Date Collected: Depth:	SB-7A 2/9/95 10-12'	SB-7A RE 2/9/95 10-12'	SB-7B 2/9/95 10-12'	SB-7B RE 2/9/95 10-12'	SB-7C 2/10/95 8-10'	SB-7C RE 2/10/95 8-10'	SB-7D 2/10/95 8-10'	SB-7D DL 2/10/95 8-10'	SB-7E 2/10/95 8-10'	SB-7E DL 2/10/95 8-10'	BLD DUP 2/10/95 8-10'	BLD DUP RE 2/10/95 8-10'
Hexachlorocyclopentadiene(**)	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
Hexachloroethane	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
Indeno(1,2,3-cd)pyrene(**)	3200	410 U	170 J	420 U	420 U	13000 U	13000 U	60000 U	41000 JD	450 U	1300 JD	500 U	550
Isophorone	4400	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
N-Nitroso-di-n-propylamine	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
N-Nitrosodiphenylamine	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
Naphthalene(**)	13000	59 J	46 J	77 J	59 J	4700 J	3100 J	11000 J	6400 JD	560	360 JD	75 J	75 J
Nitrobenzene	200	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
Pentachlorophenol	1000	1000 U	1000 U	1100 U	1100 U	32000 U	32000 U	310000 U	310000 U	1100 U	11000 U	1200 U	1200 U
Phenanthrene(**)	50000	270	210 J	160 J	130 J	28000	21000	90000	71000 JD	2800	2200 JD	1000	710
Phenol	30	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
Pyrene(**)	50000	380 J	360 J	180 J	160 J	17000	18000	120000 E	99000 JD	6200 E	2900 JD	3000	4800
bis(2-Chloroethoxy)methane	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
bis(2-Chloroethyl)ether	NE	410 U	420 U	420 U	420 U	13000 U	13000 U	120000 U	120000 U	450 U	4500 U	500 U	500 U
bis(2-Ethylhexyl)phthalate	50000	150 BJ	130 BJ	420 U	240 BJ	13000 U	3200 BJ	5400 BJ	120000 U	450 U	4500 U	500 U	190 BJ
Total "S" Area Indicator Parameters.		ND	ND	ND	ND	ND	ND	3400	3400	4280	4280	3202	2164
Total PAHs		1733	2241	759	728	125600	97700	934200	934200	28020	28020	14039	13798
Other VOCs		292	55	38	47	39700	23100	122800	122800	3140	3140	1265	982
Total TICs		700 J	500 J	3800 J	8200 JN	266000 JN	300000 J	338900 JN	130000 J	57100 JN	500000 BJN	30000 BJN	1700 J
Total TICs in Blanks		40000 BJN	30000 BJN	30000 BJN	20000 BJN	20000 BJN	20000 BJN	20000 BJN	20000 BJN	30000 BJN	500000 BJN	30000 BJN	30000 BJN

Notes:  
Concentration units in ug/kg (ppb).  
J - Estimated value.  
U - Not detected.  
N - Spiked sample recovery not within control limits.  
B - Analyte is found in the associated blank as well as in the sample.  
E - Identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.  
D - Identifies all compounds identified in an analysis at a secondary dilution factor.  
NE - Not established



Table 7  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Subsurface Soil Semivolatile Organic Compound  
Niagara Falls, New York

Cleanup Objective (TAGM 4046)	Location: Date: Depth:	SB-27SR (2-5)	SB-27W (5-13.5)	SB-27W (5-13.5) DL	SB-28SR (2-5)	SB-28SR (2-5) DL	SB-28W (5-11)	SB-29SR (4-7)	SB-29W (7-11)	SB-33SR (2-4)	SB-33W (4-7)	SB-33W (4-7) DL
Phenol	30	740 U	850 R	8700 R	750 U	7500 U	920 U	740 U	790 U	17 J	1700 U	8400 U
bis(2-Chloroethyl)ether	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
2-Chlorophenol	NE	740 U	850 R	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
1,3-Dichlorobenzene*	NE	740 U	730 J	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
1,4-Dichlorobenzene*	NE	740 U	2300	8700 R	750 U	7500 U	390 J	120 J	790 U	680 U	1700 U	8400 U
1,2-Dichlorobenzene*	NE	740 U	380 J	8700 R	750 U	7500 U	200 J	740 U	790 U	680 U	1700 U	8400 U
2-Methylphenol	NE	740 U	850 R	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
4-Methylphenol	NE	740 U	850 R	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
N-Nitroso-di-n-propylamine	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
Hexachloroethane	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
Nitrobenzene	200	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
Isophorone	4400	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
2-Nitrophenol	NE	740 U	850 R	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
2,4-Dimethylphenol	NE	740 U	850 R	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
bis(2-Chloroethoxy)methane	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
2,4-Dichlorophenol	NE	740 U	850 R	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
1,2,4-Trichlorobenzene(*)	NE	740 U	900	8700 R	750 U	7500 U	280 J	140 J	790 U	680 U	1700 U	8400 U
Naphthalene(**)	13000	740 U	1100	8700 R	750 U	7500 U	580 J	740 J	69 J	680 U	15000	8700
4-Chloroaniline	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
Hexachlorobutadiene (*)	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
4-Chloro-3-Methylphenol	NE	740 U	850 R	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
2-Methylnaphthalene (**)	NE	740 U	560 J	8700 R	78 J	7500 U	170 J	370 J	47 J	680 U	17000	9700
Hexachlorocyclopentadiene (*)	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
2,4,6-Trichlorophenol	NE	740 U	850 R	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
2,4,5-Trichlorophenol (*)	NE	3600 U	4100 R	42000 R	3600 U	36000 U	4500 U	3600 U	3900 U	3300 U	8100 U	41000 U
2-Chloronaphthalene (**)	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
2-Nitroaniline	NE	3600 U	4100 U	42000 R	3600 U	36000 U	4500 U	3600 U	3900 U	3300 U	8100 U	41000 U
Dimethyl phthalate	2000	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
Acenaphthylene (**)	50000	740 U	320 J	8700 R	750 U	7500 U	97 J	200 J	790 U	680 U	620 J	8400 U
2,6-Dinitrotoluene	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
3-Nitroaniline	NE	3600 U	4100 U	42000 R	3600 U	36000 U	4500 U	3600 U	3900 U	3300 U	8100 U	41000 U
Acenaphthene (**)	41000	740 U	340 J	8700 R	750 U	7500 U	550 J	330 J	790 U	36 J	11000	6300 J
2,4-Nitrophenol	NE	3600 U	4100 R	42000 R	3600 U	36000 U	4500 U	3600 U	3900 U	3300 U	8100 U	41000 U
4-Nitrophenol	NE	3600 U	4100 R	42000 R	3600 U	36000 U	4500 U	3600 U	3900 U	3300 U	8100 U	41000 U
Dibenzofuran	6200	740 U	1500	460 J	750 U	7500 U	500 J	610 J	790 U	680 U	6000	3000 J
2,4-Dinitrotoluene	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
Diethylphthalate	7100	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
4-Chlorophenyl-phenylether	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
Fluorene (**)	50000	740 U	2000	8700 R	750 U	7500 U	750 J	760	790 U	680 U	11000	6200 J
4-Nitroaniline	NE	3600 U	4100 U	42000 R	3600 U	36000 U	4500 U	3600 U	3900 U	3300 U	8100 U	41000 U
4,6-Dinitro-2-methylphenol	NE	3600 U	4100 R	42000 R	3600 U	36000 U	4500 U	3600 U	3900 U	3300 U	8100 U	41000 U
N-Nitrosodiphenylamine	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
4-Bromophenyl-phenylether	NE	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
Hexachlorobenzene (*)	410	740 U	850 U	8700 R	750 U	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U

Table 7  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Subsurface Soil Semivolatile Organic Compound  
Niagara Falls, New York

Cleanup Objective (TAGM 4046)	Location:	SB-27SR	SB-27W	SB-27W	SB-28SR	SB-28W	SB-29SR	SB-29W	SB-33SR	SB-33W	SB-33W
	Date:	5/91	5/91	5/91	5/91	5/91	5/91	5/91	5/91	5/91	5/91
	Depth:	(2-5)	(5-13.5)	(5-13.5) DL	(2-5) DL	(5-11)	(4-7)	(7-11)	(2-4)	(4-7)	(4-7) DL
Pentachlorophenol	1000	3600 U	4100 R	42000 R	36000 U	4500 U	3600 U	3900 U	3300 U	8100 U	41000 U
Phenanthrene (**)	50000	740 U	14000 J	4900 J	7500 U	4700	3900	460 J	410 J	52000 J	37000
Anthracene (**)	50000	740 U	1800	700 J	7500 U	1200	920	790 U	81 J	14000	8300 J
Carbazole	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	8100	740 U	850 U	8700 R	7500 U	920 U	740 U	110 J	110 J	1700 U	8400 U
Fluoranthene (**)	50000	740 U	15000 J	5700 J	7500 U	5400	4200	490 J	630 J	62000 J	43000
Pyrene (**)	50000	740 U	10000	5600 J	7500 U	4200	3600	410 J	500 J	57000 J	39000
Butylbenzylphthalate	50000	740 U	850 U	8700 R	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
3,3-Dichlorobenzidine	NE	1500 U	1700 U	17000 R	15000 U	1800 U	1500 U	1600 U	1400 U	3400 U	17000 U
Benzo(a)anthracene (**)	224	740 U	6000	3000 J	7500 U	2800	2500	250 J	370 J	36000 J	22000
Chrysene (**)	400	740 U	4600	8700 R	7500 U	3000	2200	250 J	380 J	31000 J	22000
bis(2-Ethylhexyl)phthalate	50000	400 J	430 J	20000 J	39000	200 J	560 J	290 J	130 J	610 J	360 J
Di-n-octylphthalate	50000	740 U	850 U	8700 R	7500 U	920 U	740 U	790 U	680 U	1700 U	8400 U
Benzo(b)fluoranthene (**)	224	740 U	6000	2800 J	7500 U	3500	3000	260 J	440 J	50000 J	27000
Benzo(k)fluoranthene (**)	224	740 U	2200	1400 J	7500 U	1800	1600	110 J	220 J	17000	12000
Benzo(a)pyrene (**)	61	740 U	4200	2300 J	7500 U	2300	510 J	170 J	300 J	32000 J	21000
Indeno(1,2,3-cd)pyrene (**)	3200	740 U	1400	8700 R	7500 U	740 J	670 J	790 U	96 J	13000	14000
Dibenzo(a,h)anthracene (**)	14	740 U	250 J	8700 R	7500 U	260 J	160 J	790 U	680 U	590 J	2000 J
Benzo(g,h,i)perylene (**)	50000	740 U	1000	8700 R	7500 U	610 J	390 J	790 U	680 U	8600	11000
Total "S" Area SVOCs		ND	4310	4310	ND	870	1000	ND	ND	ND	ND
Total PAHs		ND	70700	70700	1788	32657	26050	2516	3463	323620	323620
Other SVOCs		ND	21150	21150	39130	700	1170	400	257	6692	6692

Notes:

- Concentration units in ug/kg (ppb).
- J - Estimated value.
- U - Not detected.
- R - Rejected
- \* - "S" Area Indicator
- \*\* - PAH Compound

Table 8  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Subsurface Soil - PCB/Pesticides  
Niagara Falls, New York

Objective (TAGM 4046)	Location:	SB-7A	SB-7B	SB-7C	SB-7D	SB-7E	SB-7E DL	BLD DUP	SB-27SR	SB-27W	SB-28SR	SB-28W	SB-29SR	SB-29W	SB-33SR	SB-33W
	Date Collected:	2/9/95	2/9/95	2/10/95	2/10/95	2/10/95	2/10/95	2/10/95	5/91	5/91	5/91	5/91	5/91	5/91	5/91	5/91
Depth:	10-12'	10-12'	10-12'	8-10'	8-10'	8-10'	8-10'	8-10'	2-5'	5-13.5'	2-5'	5-11'	4-7'	7-11'	2-4'	4-7'
alpha-BHC	ND	0.19 JP	0.38 JP	2.1 U	0.91 JP	2.3 U	2.3 U	2.5 U	19 U	88 U	18 U	23 U	19 U	20 U	17 U	110 U
beta-BHC	23.0	2.1 U	2.1 U	2.1 U	2.1 U	2.3 U	2.3 U	2.5 U	19 U	88 U	18 U	2900 J	2200 J	20 U	17 U	110 U
delta-BHC	ND	2.1 U	2.1 U	2.1 U	2.1 U	63 EP	110	2.3 JP	19 U	88 U	18 U	30 J	6.8 J	20 U	17 U	35 J
Lindane	22.0	2.1 U	2.1 U	2.1 UB	2.1 UB	24 B	20 JP	2.5 UB	19 U	88 U	18 U	120	16 J	20 U	17 U	110 U
Heptachlor	6.7	2.1 UB	0.038 BJP	2.3 BP	2.1 UB	2.3 UB	23 UB	0.77 BJP	19 U	88 U	18 U	16 J	19	20 U	17 U	110 U
Aldrin	11.0	2.1 U	2.1 U	2.1 U	2.1 U	2.3 U	23 U	2.5 U	19 U	88 U	5 J	23 U	22	20 U	7.5 J	110 U
Heptachlor epoxide	24.0	2.1 U	0.075 JP	2.1 U	2.1 U	2.3 U	23 U	1.2 JP	19 U	88 U	18 U	23 U	19 U	20 U	17 U	110 U
Endosulfan I	ND	2.1 U	2.1 U	0.78 JP	2.1 U	2.3 U	23 U	2.5 U	19 U	88 U	18 U	23 U	19 U	20 U	21	110 U
Dieldrin	11.0	4.2 U	0.077 JP	1.2 JP	3.4 J	15 P	21 JP	9.8 P	38 U	180 U	36 U	56	37 U	40 U	34 U	320 U
4,4'-DDE	19.0	4.2 U	4.2 UB	4.3 UB	4.1 UB	26 BP	36 JP	5 UB	38 U	180 U	36 U	45 U	27 J	40 U	34 U	320 U
Endrin	ND	4.2 U	4.2 U	4.3 U	4.1 U	4.5 U	45 U	5 U	38 U	180 U	36 U	95	37 J	40 U	7.5 J	320 U
Endosulfan II	ND	4.2 UB	0.43 BJP	4.3 UB	4.1 UB	39 BP	56 BP	5 UB	38 U	180 U	36 U	45 U	37 U	40 U	10 J	320 U
4,4'-DDD	16.0	4.2 U	0.074 BJP	1 BJ	1.2 BJP	29 B	42 J	4.8 BJP	38 U	180 U	17 J	45 U	37 U	40 U	34 U	320 U
Endosulfan sulfate	7.0	4.2 UB	4.2 UB	4.3 UB	4.1 UB	13 BP	45 UB	5 UB	38 U	180 U	36 U	45 U	37 U	40 U	34 U	320 U
4,4'-DDT	21.0	4.2 UB	1.1 BJP	1.6 BJP	4.1 UB	4.5 UB	22 BJ	49 B	38 U	180 U	36 U	56	37 U	40 U	34 U	320 U
Methoxychlor	ND	21 UB	21 U	28 P	21 U	23 U	230 UB	25 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
Endrin ketone	ND	4.2 UB	4.2 UB	4.3 UB	3 BJP	4.5 UB	45 UB	5 UB	38 U	180 U	36 U	45 U	37 U	40 U	34 U	320 U
Endrin aldehyde	ND	4.2 U	4.2 UB	4.3 UB	4.1 UB	4.5 UB	45 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA
A-Chlordane	ND	1.6 BJP	2.1 UB	2.1 UB	1.5 BJP	2.3 UB	23 UB	1.6 BJP	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
G-Chlordane	ND	2.1 U	2.1 U	2.1 U	2.1 U	12 P	23 U	2.5 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
Toxaphene	ND	210 U	210 U	210 U	210 U	230 U	2300 U	250 U	380 U	1800 U	360 U	450 U	370 U	400 U	340 U	2200 U
PCB-1016	ND	42 U	42 U	43 U	41 U	45 U	450 U	50 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
PCB-1221	ND	83 U	84 U	85 U	82 U	90 U	900 U	100 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
PCB-1232	ND	42 U	42 U	43 U	41 U	45 U	450 U	50 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
PCB-1242	ND	42 U	42 U	43 U	41 U	45 U	450 U	50 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
PCB-1248	ND	42 U	42 U	43 U	41 U	45 U	450 U	50 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
PCB-1254	ND	42 U	42 U	43 U	41 U	45 U	450 U	50 U	380 U	1800 U	360 U	450 U	370 U	400 U	340 U	2200 U
PCB-1260	ND	42 U	42 U	43 U	41 U	45 U	450 U	50 U	380 U	1800 U	360 U	450 U	370 U	400 U	340 U	2200 U
Total		0.19	0.532	29.98	4.31	241	241	13.3	ND	ND	22	3273	2263.8	ND	46	35

Notes: Concentration units in ug/kg (ppb).

- J - Estimated value.
- U - Not detected.
- N - Spiked sample recovery not within control limits.
- B - Analyte is found in the associated blank as well as in the sample.
- P - Analyzed by ICP techniques.
- E - The flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.
- ND - Not detected.
- NA - Not Analyzed
- DL - Dilution.
- Maximum Concentration Detected at De-listed Buffalo Avenue Site.  
(O'Brien & Gere 1991a)

Table 8  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Subsurface Soil - PCB/Pesticides  
Niagara Falls, New York

Clean-up Objective (TAGM 4046)	Location: Date Collected: Depth:	SB-7A	SB-7B	SB-7C	SB-7D	SB-7E	SB-7E DL	BLD DUJ	SB-27SR	SB-27W	SB-28SR	SB-28W	SB-29SR	SB-29W	SB-33SR	SB-33W
		2/9/95 10-12'	2/9/95 10-12'	2/10/95 8-10'	2/10/95 8-10'	2/10/95 8-10'	2/10/95 8-10'	2/10/95 8-10'	2/10/95 8-10'	5/91 2-5'	5/91 5-13.5'	5/91 2-5'	5/91 5-11'	5/91 4-7'	5/91 7-11'	5/91 2-4'
4,4'-DDD	2900	4.2 U	0.074 BJP	1 BJ	1.2 BJP	29 B	42 J	4.8 BJP	38 U	180 U	17 J	45 U	37 U	40 U	34 U	320 U
4,4'-DDE	2100	4.2 U	4.2 UB	4.3 UB	4.1 UB	26 BP	36 JP	5 UB	38 U	180 U	36 U	45 U	27 J	40 U	34 U	320 U
4,4'-DDT	2100	4.2 UB	1.1 BJP	1.6 BJP	4.1 UB	4.5 UB	22 BJ	49 B	38 U	180 U	36 U	56	37 U	40 U	34 U	320 U
A-Chlordane	NE	1.6 BJP	2.1 UB	2.1 UB	1.5 BJP	2.3 UB	23 UB	1.6 BJP	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
Aldrin	41	2.1 U	2.1 U	2.1 U	2.1 U	2.3 UB	23 U	2.5 U	19 U	88 U	5 J	23 U	22	20 U	7.5 J	110 U
Dieldrin	44	4.2 U	0.077 JP	1.2 JP	3.4 J	15 P	21 JP	9.8 P	38 U	180 U	36 U	56	37 U	40 U	34 U	320 U
Endosulfan I	900	2.1 U	2.1 U	0.78 JP	2.1 U	2.3 U	23 U	2.5 U	19 U	88 U	18 U	23 U	19 U	20 U	21	110 U
Endosulfan II	900	4.2 UB	0.43 BJP	4.3 UB	4.1 UB	39 BP	56 BP	5 UB	38 U	180 U	36 U	45 U	37 U	40 U	10 J	320 U
Endosulfan sulfate	1000	4.2 UB	4.2 UB	4.3 UB	4.1 UB	13 BP	45 UB	5 UB	38 U	180 U	36 U	45 U	37 U	40 U	34 U	320 U
Endrin	100	4.2 U	4.2 U	4.3 U	4.1 U	4.5 U	45 U	5 U	38 U	180 U	36 U	95	37 J	40 U	7.5 J	320 U
Endrin aldehyde	NE	4.2 U	4.2 UB	4.3 UB	4.1 UB	4.5 UB	45 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NE	4.2 UB	4.2 UB	4.3 UB	3 BJP	4.5 UB	45 UB	5 UB	38 U	180 U	36 U	45 U	37 U	40 U	34 U	320 U
G-Chlordane	NE	2.1 U	2.1 U	2.1 U	2.1 U	12 P	23 U	2.5 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
Heptachlor	100	2.1 UB	0.038 BJP	2.3 BP	2.1 UB	2.3 UB	23 UB	0.77 BJP	19 U	88 U	18 U	16 J	19	20 U	17 U	110 U
Heptachlor epoxide	20	2.1 U	0.075 JP	2.1 U	2.1 U	2.3 U	23 U	1.2 JP	19 U	88 U	18 U	23 U	19 U	20 U	17 U	110 U
Lindane	NE	2.1 U	2.1 U	2.1 UB	2.1 UB	24 B	20 JP	2.5 UB	19 U	88 U	18 U	120	16 J	20 U	17 U	110 U
Methoxychlor	NE	21 UB	21 U	28 P	21 U	23 U	230 UB	25 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
PCB-1016	10000	42 U	42 U	43 U	41 U	45 U	450 U	50 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
PCB-1221	10000	83 U	84 U	85 U	82 U	90 U	900 U	100 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
PCB-1232	10000	42 U	42 U	43 U	41 U	45 U	450 U	50 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
PCB-1242	10000	42 U	42 U	43 U	41 U	45 U	450 U	50 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
PCB-1248	10000	42 U	42 U	43 U	41 U	45 U	450 U	50 U	190 U	880 U	180 U	230 U	190 U	200 U	170 U	1100 U
PCB-1254	10000	42 U	42 U	43 U	41 U	45 U	450 U	50 U	380 U	1800 U	360 U	450 U	370 U	400 U	340 U	2200 U
PCB-1260	10000	42 U	42 U	43 U	41 U	45 U	450 U	50 U	380 U	1800 U	360 U	450 U	370 U	400 U	340 U	2200 U
Toxaphene	NE	210 U	210 U	210 U	210 U	230 U	2300 U	250 U	380 U	1800 U	360 U	450 U	370 U	400 U	340 U	2200 U
alpha-BHC	110	0.19 JP	0.38 JP	2.1 U	0.91 JP	2.3 U	23 U	2.5 U	19 U	88 U	18 U	23 U	19 U	20 U	17 U	110 U
beta-BHC	200	2.1 U	2.1 U	2.1 U	2.1 U	2.3 U	23 U	2.5 U	19 U	88 U	18 U	2900 J	2200 J	20 U	17 U	110 U
delta-BHC	300	2.1 U	2.1 U	2.1 U	2.1 U	63 EP	110	2.3 JP	19 U	88 U	18 U	30 J	6.8 J	20 U	17 U	35 J
Total	10000	0.19	0.532	29.98	4.31	241	241	13.3	ND	ND	22	3273	2263.8	ND	46	35

Notes: Concentration units in ug/kg (ppb).

J - Estimated value.

U - Not detected.

N - Spiked sample recovery not within control limits.

B - Analyte is found in the associated blank as well as in the sample.

P - Analyzed by ICP techniques.

E - The flag identifies compounds whose concentrations exceed the

calibration range of the GC/MS instrument for that specific analysis.

ND - Not detected.

NA - Not Analyzed

DL - Dilution.

Maximum Concentration Detected at De-listed Buffalo Avenue Site.

(O'Brien & Gere 1991a)

NE - Not established.

Table 9  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Niagara Falls, New York

Subsurface Soil Inorganics

Clean-up Objective (TAGM 4046)	Location: Date Collected: Depth:	SB-27SR 5/91 (2-5)	SB-27W 5/91 (5-13.5)	SB-28SR 5/91 (2-5)	SB-28W 5/91 (5-11)	SB-29SR 5/91 (4-7)	SB-29W 5/91 (7-11)	SB-33SR 5/91 (2-4)	SB-33W 5/91 (4-7)
Aluminum	1000-25000	4620	4610	7880	3850	11200	11000	4960	3880
Antimony	---	1.1 UJ	135 J	1.1 UJ	22.0 J	4.3 J	1.1 UJ	2.1 J	8.8 J
Arsenic	3-12	4.1 J	7.5 J	4.7 J	6.3 J	5.8 J	3.4 J	3.4 J	10.9 J
Barium	15-600	49.7	38.2	86.5	76.0	107	93.1	118	1240
Beryllium	0-1.75	1.1 U	1.3 U	1.1 U	1.4 U	1.2 U	1.3	1.1 U	1.3 U
Cadmium	0.01-2.0	1.1 U	1.3 U	1.1 U	1.7 U	1.4 U	1.1 U	1.1 U	1.3 U
Calcium	130-35000	129000 J	55800 J	1720 J	35600	72900	56400	1250 J	57700
Chromium	1.5-40	13.0	26.7	29.4 J	708	57.0 J	13.9 J	126 J	26.4 J
Cobalt	2.5-60	4.3 U	5.3 U	11.3 UJ	14.5 UJ	11.9 UJ	11.2 UJ	10.6 UJ	13.1 UJ
Copper	<1-15	11.5	87.2	22.9	87.1	69.5	28.9	32.0	164
Cyanide	---	1.15 U	9.87	1.1 U	1.4 U	3.8	1.1 U	1.1 U	1.3 U
Iron	17500-25000	9200 J	7500 J	14100	77200	19000	10500	9920	32000
Lead	1-12.5	47.3	179	88.1	371 J	175 J	14.1 J	121 J	1510 J
Magnesium	2500-6000	66600 J	1470 J	50200	7630	24100	9440	78900	6000
Manganese	50-5000	676 J	44.7 J	486	244 J	456	322 J	546	293 J
Mercury	0.042-0.066	0.62	3.6	0.67	5.1	2.8	0.10 U	0.40	0.85
Nickel	0.5-25	15.1	62.2	19.3	56.9	29.7	37.8	14.7	20.0
Potassium	8500-43000	852	145	1270	569	1680	435	931	421
Selenium	<0.1-0.125	1.1 R	1.3 R	1.1 R	1.4 R	1.1 R	1.1 R	10.5 R	1.3 R
Silver	6000-8000	1.3 U	1.6 U	1.4 U	1.7 U	1.4 U	1.3 U	1.3 U	1.6 U
Sodium	---	195 U	269 U	678 U	873 U	1320 U	670 U	635 U	784 U
Thallium	---	1.1 U	1.3 U	1.1 U	1.4 U	1.1 U	1.1 U	1.0 U	1.3 U
Vanadium	25-60	10.0	29.5	24.9 J	33.3 J	29.7 J	38.0 J	33.9	23.5 J
Zinc	37-60	65.7 J	111 J	179 J	449 J	175 J	37.0 J	222 J	394 J
Leachability Testing (mg/L)	Regulatory Limit	NA	0.223	NA	0.16	0.079	NA	0.018	0.66
TCLP Lead	5	NA	1.87	NA	0.225	0.885	NA	0.16	39.1
EP TOX Lead	5	NA	NA	NA	0.024	NA	NA	0.017	NA
TCLP Chromium	5	NA	NA	NA	0.024	NA	NA	0.01	NA
EPTOX Chromium	5	NA	NA	NA	0.0002	NA	NA	NA	NA
TCLP Mercury	0.2	NA	NA	NA	0.0002	NA	NA	NA	NA
EPTOX Mercury	0.2	NA	NA	NA	0.0002	NA	NA	NA	NA

Notes:

All concentrations reported in mg/kg (ppm), except as noted.  
 \*\* - Referenced from Bowen (1979), Shacklette et al (1984), Shacklette et al (1971), Walsh et al (1977).  
 U - Indicates element was analyzed for but not detected.  
 B - Indicates a value greater than or equal to the instrument detection limit but less than the contract required detection limit.  
 J - Indicates an estimated value. (GC/MS only).  
 TCLP and Eptox results in mg/L (ppm).

Table 10  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Ground Water Volatile Organic Data

	NYS Class GA Water Quality Standards	MW-7S 6/91	MW-7S 9/91	MW-7D 6/91	BL Dup MW-7D 6/91	MW-7D 9/91
1,1,1-TRICHLOROETHANE	5	5 u	0.2 u	5 u	5 u	0.2 u
1,1,2,2-TETRACHLOROETHENE	5	5 u	0.2 u	5 u	5 u	0.2 u
1,1,2-TRICHLOROETHANE	1	5 u	0.2 u	5 u	5 u	0.2 u
1,1-DICHLOROETHANE	5	5 u	0.2 u	5 u	5 u	0.2 u
1,1-DICHLOROETHENE	5	5 u	0.2 u	5 u	5 u	0.2 u
1,2-DICHLOROETHANE	0.6	5 u	0.2 u	5 u	5 u	0.2 u
1,2-DICHLOROETHENE (TOTAL)*	5	5 u	0.2 u	5 u	5 u	0.2 u
1,2-DICHLOROPROPANE	5	5 u	0.2 u	5 u	5 u	0.2 u
2-BUTANONE MEK	50	10 u		10 u	10 u	
2-HEXANONE	NE	10 u		10 u	10 u	
4-METHYL-2-PENTANONE	NE	10 u		10 u	10 u	
ACETONE	5	10 u		10 u	10 u	
BENZENE*	1	0.8 u	0.2 u	5 u	5 u	0.2 u
BROMODICHLOROMETHANE	NE	5 u	0.2 u	5 u	5 u	0.2 u
BROMOFORM	NE	5 u	1 u	5 u	5 u	1 u
BROMOMETHANE	5	10 u	0.4 u	10 u	10 u	0.4 u
CARBON DISULFIDE	60	5 u		5 u	5 u	
CARBON TETRACHLORIDE	5	5 u	0.2 u	5 u	5 u	0.2 u
CHLOROBENZENE*	5	5 u	6 j	5	5 u	2.7
CHLOROETHANE	5	10 u	0.4 u	10 u	10 u	0.4 u
CHLOROFORM	7	5 u	0.2 u	5 u	5 u	0.2 u
CHLOROMETHANE	NE	10 u	0.4 u	10 u	10 u	0.4 u
CIS-1,3-DICHLOROPROPENE	0.4	5 u	0.2 u	5 u	5 u	0.2 u
DIBROMOCHLOROMETHANE	5	5 u	0.2 u	5 u	5 u	0.2 u
ETHYLBENZENE	5	5 u	0.2 u	5 u	5 u	0.2 u
METHYLENE CHLORIDE	5	5 u	0.2 u	5 u	5 u	0.2 u
STYRENE	NE	5 u		5 u	5 u	
TETRACHLOROETHENE*	5	5 u	0.2 u	5 u	5 u	0.2 u
TOLUENE	5	5 u	0.2 u	5 u	5 u	0.2 u
TOTAL XYLENES	5	5 u	0.2 u	5 u	5 u	0.2 u
TRANS-1,3-DICHLOROPROPANE	NE	5 u	0.2 u	5 u	5 u	0.2 u
TRICHLOROETHENE*	5	5 u	0.2 u	5 u	5 u	0.2 u
VINYL ACETATE	NE	5 u		5 u	5 u	
VINYL CHLORIDE*	2	10 u	0.4 u	10 u	10 u	0.4 u
Total S-Area VOCs		ND	6	5	ND	2.7
Other VOCs		ND	ND	ND	ND	ND

Notes: Data from Buffalo Avenue Site Investigation Report;  
O'Brien & Gere Engineers, Inc.; 1991C  
Results presented in ug/kg (ppb)  
U - Compound Analyzed but not detected  
J - Indicates an estimated value (GC/MS only)  
B - Analyte is found in the associated blank as well as in the sample.  
RE - Sample reanalyzed due to quality control assurances.  
\* - "S" Area Indicator  
NE - Not established

Table 11  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Ground Water - Semivolatile Organic Compounds

	NYS Class GA Water Quality Standards	MW-7D 6/91	BL Dup MW-7D 6/91	MW-7S 6/91
1,2,4-Trichlorobenzene*	NE	12 u	12 u	12 u
1,2-Dichlorobenzene*	NE	12 u	12 u	12 u
1,3 - Dichlorobenzene*	NE	12 u	12 u	6 j
1,4 - Dichlorobenzene*	NE	12 u	12 u	6 j
2-Chloronaphthalene*	NE	12 u	12 u	12 u
2,4,5 - Trichlorophenol*	1	62 u	62 u	62 u
2,4,6 - Trichlorophenol	NE	12 u	12 u	12 u
2,4-Dichlorophenol	1	12 u	12 u	12 u
2,4-Dimethylphenol	NE	12 u	12 u	12 u
2,4-Dinitrophenol	5	62 u	62 u	62 u
2,4-Dinitrotoluene	NE	12 u	12 u	12 u
2,6-Dinitrotoluene	5	12 u	12 u	12 u
2-Chlorophenol	50	12 u	12 u	12 u
2-Methylphenol	5	12 u	12 u	12 u
2-Nitroaniline	5	62 u	62 u	62 u
2-Nitrophenol	5	12 u	12 u	12 u
2-Methylnaphthalene**	50	12 u	12 u	12 u
3,3-Dichlorobenzidine	NE	25 u	25 u	25 u
3-Nitroaniline	5	62 u	62 u	62 u
4,6-Dinitro-2-methylphenol	NE	62 u	62 u	62 u
4- methylphenol	50	12 u	12 u	12 u
4-Bromophenyl-phenylether	NE	12 u	12 u	12 u
4-Chloro-3-methylphenol	5	12 u	12 u	12 u
4-Chloroaniline	5	12 u	12 u	12 u
4-Chlorophenol-phenylether	NE	12 u	12 u	12 u
4-Nitroaniline	NE	62 u	62 u	62 u
4-Nitrophenol	5	62 u	62 u	62 u
Acenaphthene**	NE	12 u	12 u	12 u
Acenaphthylene**	NE	12 u	12 u	12 u
Anthracene**	NE	12 u	12 u	12 u
Benzo(a) anthracene**	NE	12 u	12 u	12 u
Benzo(a)pyrene**	0.002(ND)	12 u	12 u	12 u
Benzo(b)fluoranthene**	NE	12 u	12 u	12 u
Benzo(g,h,i)perylene**	NE	12 u	12 u	12 u
Benzo(k)fluoranthene**	NE	12 u	12 u	12 u
Benzoic Acid	NE	62 u	62 u	62 u
Benzyl alcohol	NE	12 u	12 u	12 u
Bis(2-chloroethoxy)methane	5	12 u	12 u	12 u
Bis(2ethylhexyl)phthalate	5	12 u	12 u	12 u
Butylbenzylphthalate	NE	12 u	12 u	12 u
Chrysene**	NE	12 u	12 u	12 u
Di-n-butylphthalate	NE	12 u	12 u	12 u
Di-n-octylphthalate	NE	12 u	12 u	12 u
Dibenz(a,h)anthracene**	NE	12 u	12 u	12 u

Table 11  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Ground Water - Semivolatile Organic Compounds

	NYS Class GA Water Quality Standards	MW-7D 6/91	BL Dup MW-7D 6/91	MW-7S 6/91
Dibenzofuran	NE	12 u	12 u	12 u
Diethylphthalate	NE	12 u	12 u	12 u
Dimethylphthalate	NE	12 u	12 u	12 u
Fluoranthene**	NE	12 u	12 u	12 u
Fluorene**	NE	12 u	12 u	12 u
Hexachlorobenzene*	0.04	12 u	12 u	12 u
Hexachlorobutadiene*	0.05	12 u	12 u	12 u
Hexachlorocyclopentadiene.*	NE	12 u	12 u	12 u
Hexachloroethane	NE	12 u	12 u	12 u
Indeno(1,2,3-cd)pyrene**	NE	12 u	12 u	12 u
Isophorone	NE	12 u	12 u	12 u
N-Nitrosodiphenylamine	NE	12 u	12 u	12 u
N-Nitroso-di-n-propylamine	NE	12 u	12 u	12 u
Naphthalene**	NE	12 u	12 u	12 u
Nitrobenzene	0.4	12 u	12 u	12 u
Pentachlorophenol	1	62 u	62 u	62 u
Phenanthrene**	NE	12 u	12 u	12 u
Phenol	1	12 u	12 u	12 u
Pyrene**	NE	12 u	12 u	12 u
bis(2-chloroethyl) ether	NE	12 u	12 u	12 u
bis(2-chloroisoprpyl)ether	NE	12 u	12 u	12 u
Total S-Area SVOCs		ND	ND	12
PAHs		ND	ND	ND
Other SVOCs		ND	ND	ND

All Values (ug/L)

u- Compound analyzed but not detected

j- Estimated value

NE - Not established

\* - "S" Area Indicator

\*\* - PAH Compound



Table 12  
Phase II Investigation  
One-Acre Site - Buffalo Avenue Site  
Ground Water - Pesticides/PCBs

NYS Class	GA Water Quality Standards	MW-7S	MW-7S	BL DUP	MW-7D	BL DUP
		6/91	9/91	MW-7S 9/91	6/91	MW-7D 6/91
4,4-DDD	0.3	0.2 u	0.001 u	0.01 u	0.2 u	0.2 u
4,4-DDE	0.2	0.2 u	0.001 u	0.01 u	0.2 u	0.2 u
4,4-DDT	0.2	0.2 u	0.001 u	0.01 u	0.2 u	0.2 u
Aldrin	ND(<0.01)	0.07 u	0.071	0.067	0.07 u	0.07 u
Alpha- BHC	ND(<0.05)	0.064 j	0.81	0.089	0.07 u	0.07 u
Aroclor-1016	NE	0.7 u			0.7 u	0.7 u
Aroclor-1016	NE	0.7 u			0.7 u	0.7 u
Aroclor-1221	NE	0.7 u			0.7 u	0.7 u
Aroclor-1232	NE	0.7 u			0.7 u	0.7 u
Aroclor-1242	NE	0.7 u			0.7 u	0.7 u
Aroclor-1248	NE	0.7 u			0.7 u	0.7 u
Aroclor-1254	NE	2 u			2 u	2 u
Aroclor-1260	NE	2 u			2 u	2 u
Beta- BHC	NE	0.07 u	0.093	0.016	0.07 u	0.07 u
Chlordane	0.05	0.07 u	0.007 u	0.07 u	0.07 u	0.07 u
Delta- BHC	ND(<0.05)	0.07 u	0.017	0.004	0.07 u	0.07 u
Dieldrin	0.004	0.2 u	0.001 u	0.01 u	0.2 u	0.2 u
Endosulfan II	NE	0.2 u	0.001 u	0.01 u	0.2 u	0.2 u
Endosulfan I	NE	0.07 u	0.034	0.046	0.07 u	0.07 u
Endosulfan sulfate	NE	0.2 u	0.001 u	0.01 u	0.2 u	0.2 u
Endrin	ND	0.2 u	0.013	0.014	0.2 u	0.2 u
Endrin Aldehyde	5	0.2 u			0.2 u	0.2 u
Endrin Ketone	5	0.2 u	0.02 u	0.02 u	0.2 u	0.2 u
Gamma-BHC	ND(<0.05)	0.33 u	0.004 u	0.004 u	0.07 u	0.16
Heptachlor	0.04	0.07 u	0.004 u	0.004 u	0.07 u	0.07 u
Heptachlor epoxide	0.03	0.07 u	0.008	0.008	0.07 u	0.07 u
Methoxychlor	35	0.7 u	0.02 u	0.02 u	0.7 u	0.7 u
Toxaphene	0.06	2 u			2 u	2 u
Total Pesticides		0.064	1.046	0.24	ND	0.16
Total PCBs*		0.09	ND	ND	ND	ND

All Values (ug/L)

u- Compound analyzed but not detected

j- Estimated value

ND - Not detected

NE - Not established

\* - Standard applies to sum of PCBs

Table 13  
Phase II Investigation  
One-Acre Site - Buffalo Avenue  
Ground Water - Inorganic Analyses

NYS Class GA Water Quality Standards	MW-7S		MW-7S		MW-7S		MW-7S		MW-7D		MW-7D		MW-7D	
	TOTAL 6/91	TOTAL 9/91	TOTAL 6/91	TOTAL 9/91	TOTAL 6/91	TOTAL 9/91	TOTAL 6/91	TOTAL 9/91	TOTAL 6/91	TOTAL 9/91	TOTAL 6/91	TOTAL 9/91	SOLUBLE 6/91	SOLUBLE 9/91
ALUMINUM	10.4 J		0.05 U		3.171 J	13.4 J	0.05 U		0.05 U		0.05 U	0.05 U	0.05 U	0.05 U
ANTIMONY	0.34	0.075 R	0.07	0.022 R	0.005 U	0.005 U	0.005 U	0.005 R	0.005 U		0.005 U	0.005 U	0.005 U	0.005 U
ARSENIC	0.01		0.005 U		0.005 U	0.006			0.005 U		0.005 U	0.005 U	0.005 U	0.005 U
BARIUM	1		0.046		0.03 U	0.093			0.03 U		0.03 U	0.03 U	0.03 U	0.03 U
BERYLLIUM	NE		0.005 U		0.005 U	0.005 U			0.005 U		0.005 U	0.005 U	0.005 U	0.005 U
CADMIUM	0.01		0.005 U		0.005 UJ	0.005 UJ			0.005 U		0.005 U	0.005 U	0.005 U	0.005 UJ
CALCIUM	0.05		136		514	586			427		521 UJ	521		
CHROMIUM	1.12 J	1.94 J	0.01 U	0.01	0.021 J	0.068 J	0.026		0.01 U		0.01 UJ	0.01 UJ	0.01 UJ	0.01 UJ
COBALT	***** U		0.02 U		0.02 U	0.02 U			0.02 U		0.02 U	0.02 U	0.02 U	0.02 U
CONDUCTIVITY	920		920		>2000	>2000			>2000		>2000	>2000		
COPPER	0.3		0.01 U		0.057 U	0.059 U			0.021		0.021	0.017 J	0.017 J	0.017 J
CYANIDE	0.2		0.01 U		0.01 U	0.01 U			0.01 U		0.01 U			
HEXAVALENT	NE		0.01		0.01 UJ	0.01 UJ			0.01 UJ		0.01 UJ			
IRON	0.3		12.03		4.66 J	20.2 J			0.035		0.033	0.033	0.033	0.033
LEAD	0.025	0.979	2.4 J	0.386 J	0.017 J	0.089 J	0.022		0.004		0.007 J	0.007 J	0.007 J	0.007 J
MAGNESIUM	NE		30.5		137	180			144		182	182	182	182
MANGANESE	NE	1.01 J	0.415	0.003	0.157 J	0.687 J	0.286		0.017		0.018 J	0.018 J	0.018 J	0.018 J
MERCURY	0.0007		0.000 U		0.000 U	0.000 U			0.0002 U		0.002 U	0.002 U	0.002 U	0.002 U
NICKEL	0.1		0.02		0.02 U	0.041	0.000 U		0.02 U		0.02 U	0.02 U	0.02 U	0.02 U
POTASSIUM	NE		5.189		10	11.9			9.658		8.92	8.92	8.92	8.92
SELENIUM	0.01		0.005 U		0.005 U	0.005 U			0.005 U		0.005 U	0.005 U	0.005 U	0.005 U
SILVER	0.05		0.006 U		0.006 U	0.006 U			0.006 U		0.006 U	0.006 U	0.006 U	0.006 U
SODIUM	NE		28		230	235			220		230	230	230	230
THALLIUM	NE		0.005 U		0.005 UJ	0.005 UJ			0.005 U		0.005 UJ	0.005 UJ	0.005 UJ	0.005 UJ
TURBIDITY	5		FILTERED		>100	>100			FILTERED		FILTERED	FILTERED	FILTERED	FILTERED
VANADIUM	NE		0.03 U		0.03 U	0.03 U			0.03 U		0.03 U	0.03 U	0.03 U	0.03 U
ZINC	NE		1.54 J		0.168 J	0.218 J			0.005 U		0.005 U	0.005 U	0.005 U	0.005 U
pH	6.5-8.5		6.7		6.7	6.7			6.7		6.7	6.7	6.7	6.7

Notes:

- E - Indicates a value estimated or not reported due to the presence of interference
- N - Indicates spike sample recovery is not within control limits
- W - Post digestion spike for Furnance AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
- \* - Indicates duplicate analysis is not within control limits
- B - Indicates a value greater than or equal to the instrument detection limit but less than the contract required detection limit
- UJ - Indicates that detection level is an estimated value and element was not detected

Table 14

Phase II Investigation  
Water Treatment Plant - One Acre Site  
Niagara Falls, New York

TCLP Analyses

Location:	Maximum Concentration Per Part 261*	SB-7F 2/19/96
Date Collected:		
Pyridine	5	0.085 U
1,4-Dichlorobenzene	7.5	0.008 U
2-Methylphenol	---	0.007 J
3&4-Methylphenol	---	0.018
Hexachloroethane	0.13	0.008 U
Nitrobenzene	2	0.008 U
Hexachlorobutadiene	0.5	0.008 U
2,4,6-Trichlorophenol	2	0.008 U
2,4,5-Trichlorophenol	400.0	0.008 U
2,4-Dinitrotoluene	0.13	0.008 U
Hexachlorobenzene	0.13	0.008 U
Pentachlorophenol	---	0.004 U
Vinyl Chloride	0.2	<.002
1,1-Dichloroethene	0.7	<.001
Chlorobenzene	100.0	<.001
1,2-Dichloroethane	0.5	<.001
Chloroform	6	<.001
Benzene	0.5	<.001
Trichloroethene	0.5	<.001
2-Butanone	---	<.001
Tetrachloroethene	0.7	<.001
Carbon tetrachloride	0.5	<.001
Arsenic	5	<5.0
Barium	100.0	<10
Cadmium	1.0	<1
Chromium	5.0	<5
Lead	5.0	11
Mercury	0.2	<.0005
Selenium	1.0	<.1
Silver	5.0	<.5
Lindane	0.4	<.00025
Heptachlor	0.008	<.00025
Heptachlor Epoxide	---	<.00025
Endrin	0.02	<.00050
Methoxychlor	10.0	<.0025
Chlordane	0.03	<.0025
Toxaphene	0.5	<.0025

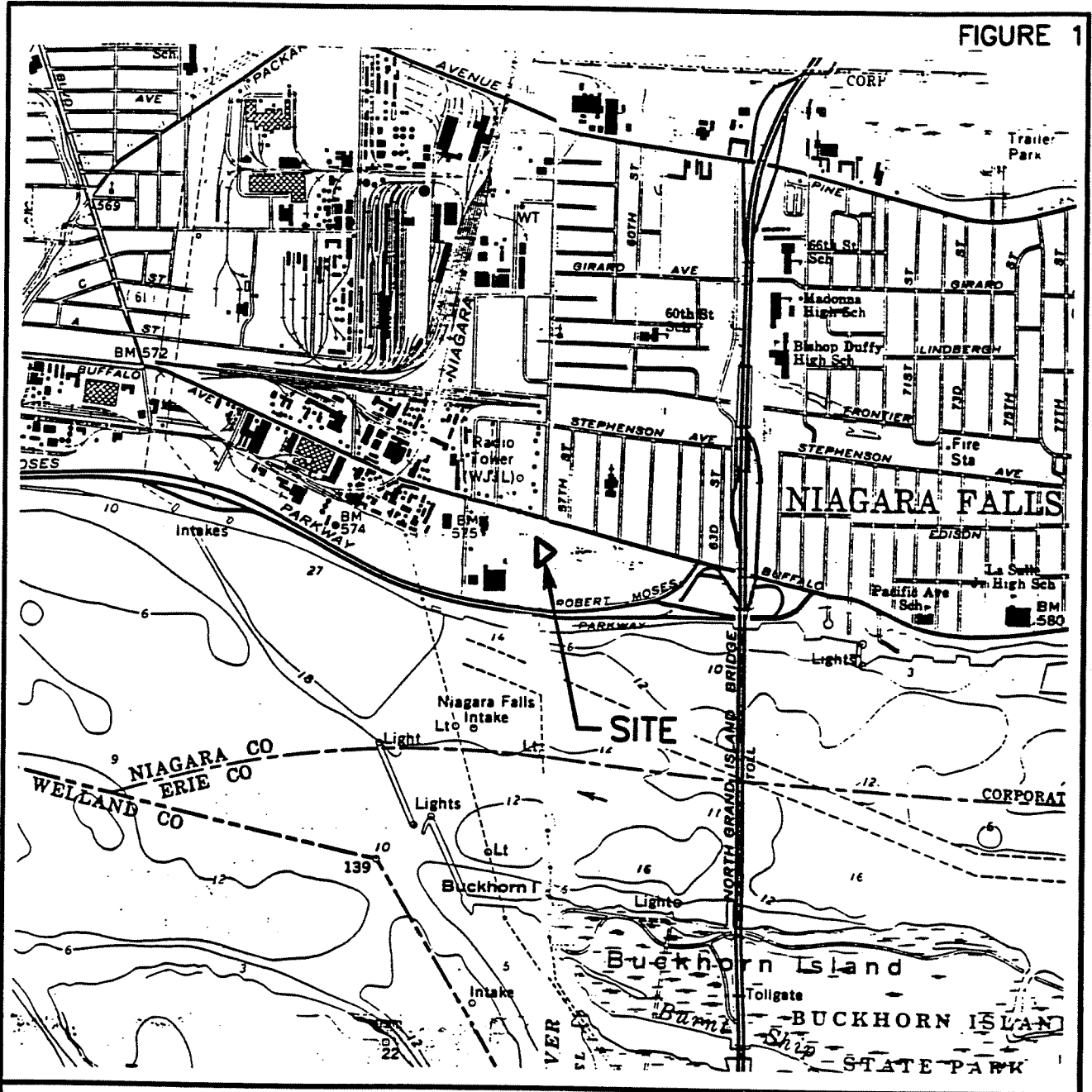
Notes: Results reported in mg/L (ppm)

J - Estimated value

U - Not detected

\* - 40CFR Part 261 Identification and Listing of Hazardous Waste

**FIGURES**

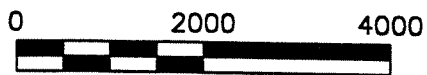


PHASE II INVESTIGATION  
 ONE-ACRE SITE-BUFFALO AVENUE  
 NIAGARA FALLS, NEW YORK

**LOCATION MAP**



QUADRANGLE LOCATION

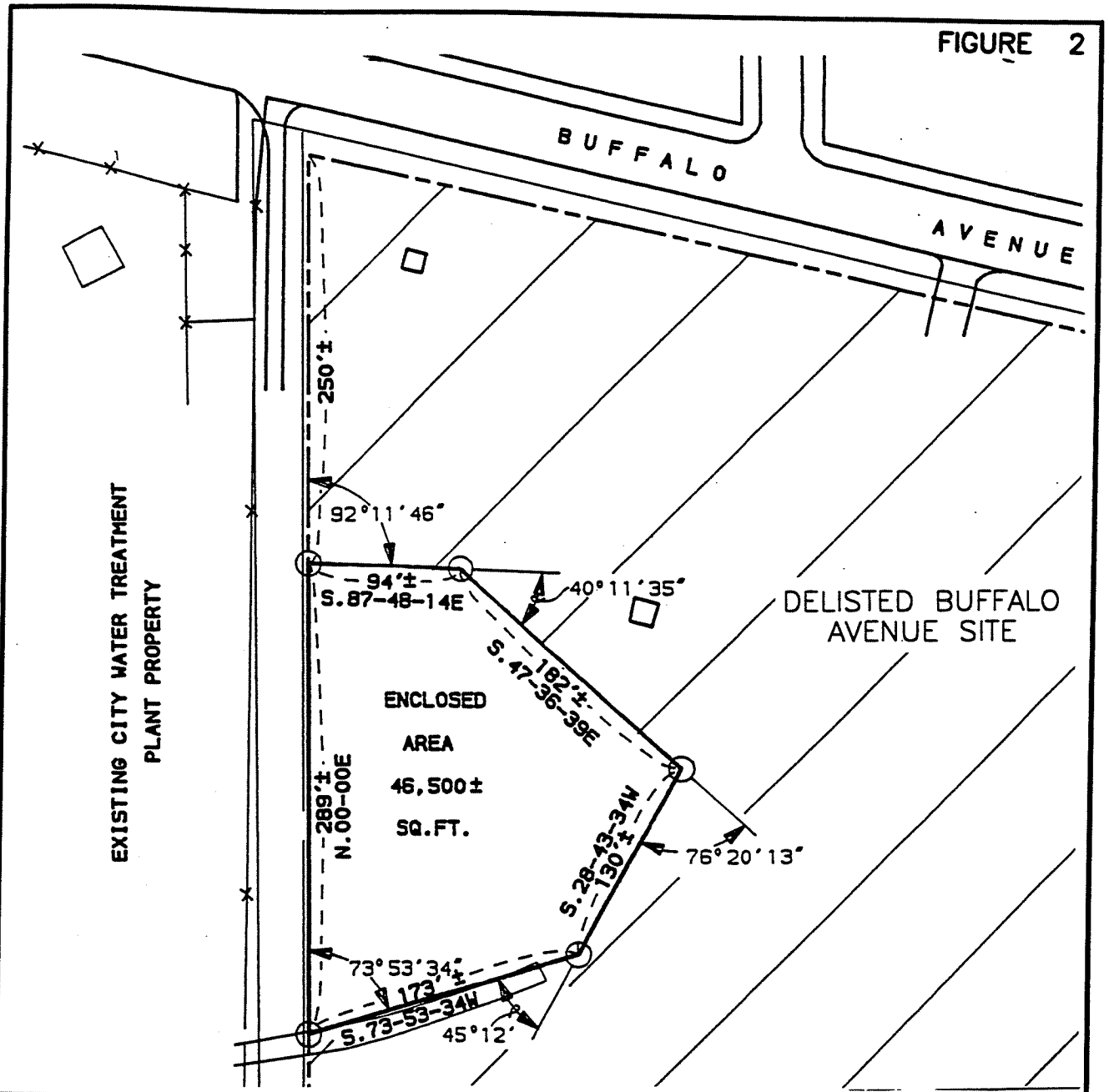


SCALE IN FEET



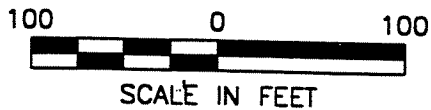
ADAPTED FROM THE NIAGARA FALLS &  
 TONAWANDA, WEST NEW YORK U.S.G.S. QUADRANGLE MAPS

FILE: 1736.078-001  
 DATE: OCT. 1996



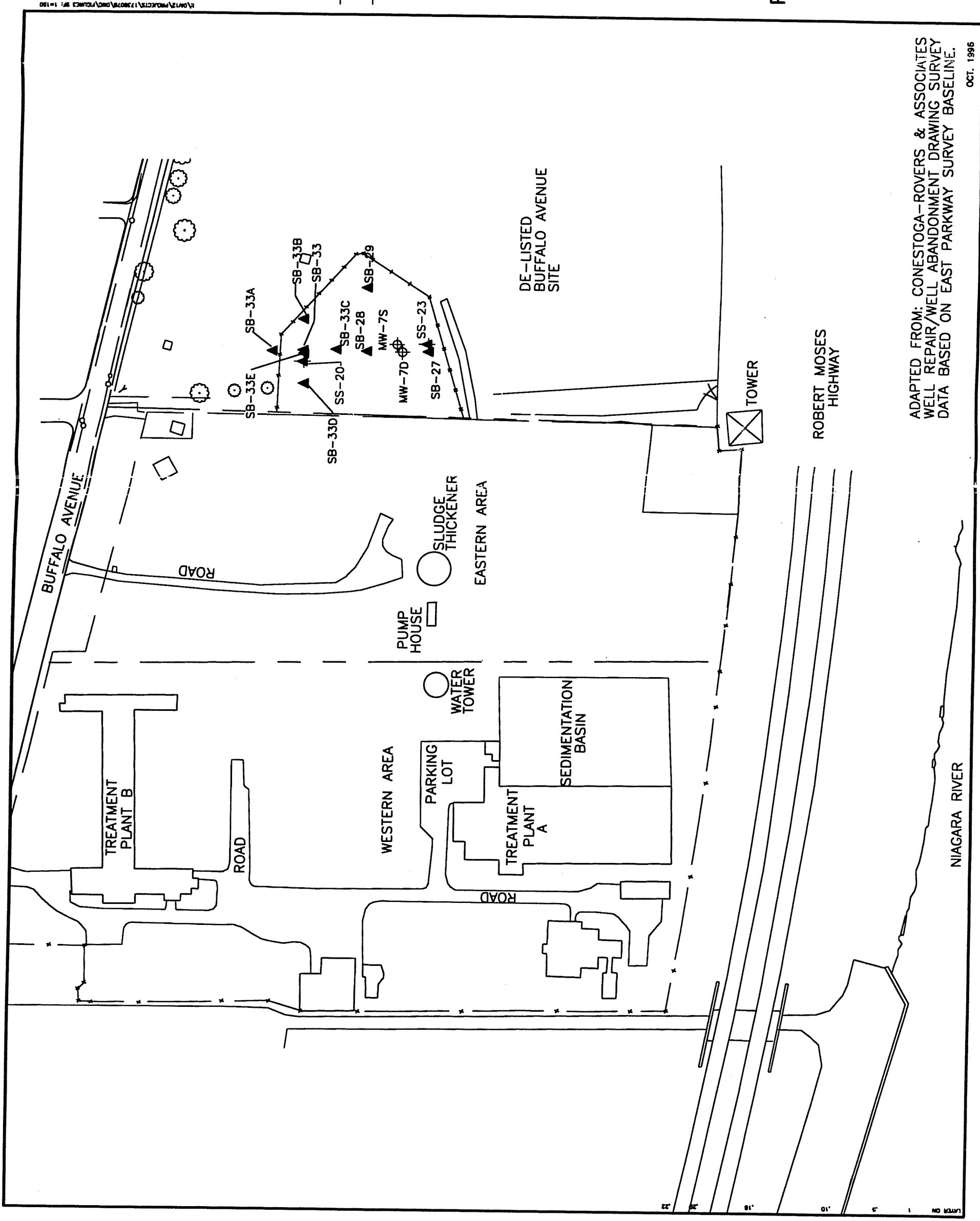
PHASE II INVESTIGATION  
ONE-ACRE SITE-BUFFALO AVENUE  
NIAGARA FALLS, NEW YORK

ONE-ACRE SITE DIMENSIONS



FILE: 1736.078-012  
DATE: OCT. 1996

FIGURE 3



**LEGEND**

- SITE BOUNDARY PER RRT STIPULATION
- FENCE
- ⊕ EXISTING MONITORING WELL
- ▲ SOIL BORING LOCATION
- ▲ SURFACE SOIL SAMPLE LOCATION

PHASE II INVESTIGATION  
 ONE-ACRE SITE-BUFFALO AVE.  
 NIAGARA FALLS, NEW YORK

**PREVIOUS SAMPLE LOCATIONS**



ADAPTED FROM: CONESTOGA-ROVERS & ASSOCIATES  
 WELL REPAIR/WELL ABANDONMENT DRAWING SURVEY  
 DATA BASED ON EAST PARKWAY SURVEY BASELINE.  
 OCT. 1996



1736.078-02F

FIGURE 4



**LEGEND**

- SITE BOUNDARY PER RRT STIPULATION
- - - FENCE
- ⊕ MONITORING WELL (OBG)
- ▲ SOIL BORING LOCATION
- ▲ SURFACE SOIL SAMPLE LOCATION

TOTAL LEAD CONCENTRATION (IN mg/kg)	121
TCLP LEAD CONCENTRATION (IN mg/L)	0.018
EPTOX LEAD CONCENTRATION (IN mg/L)	0.16

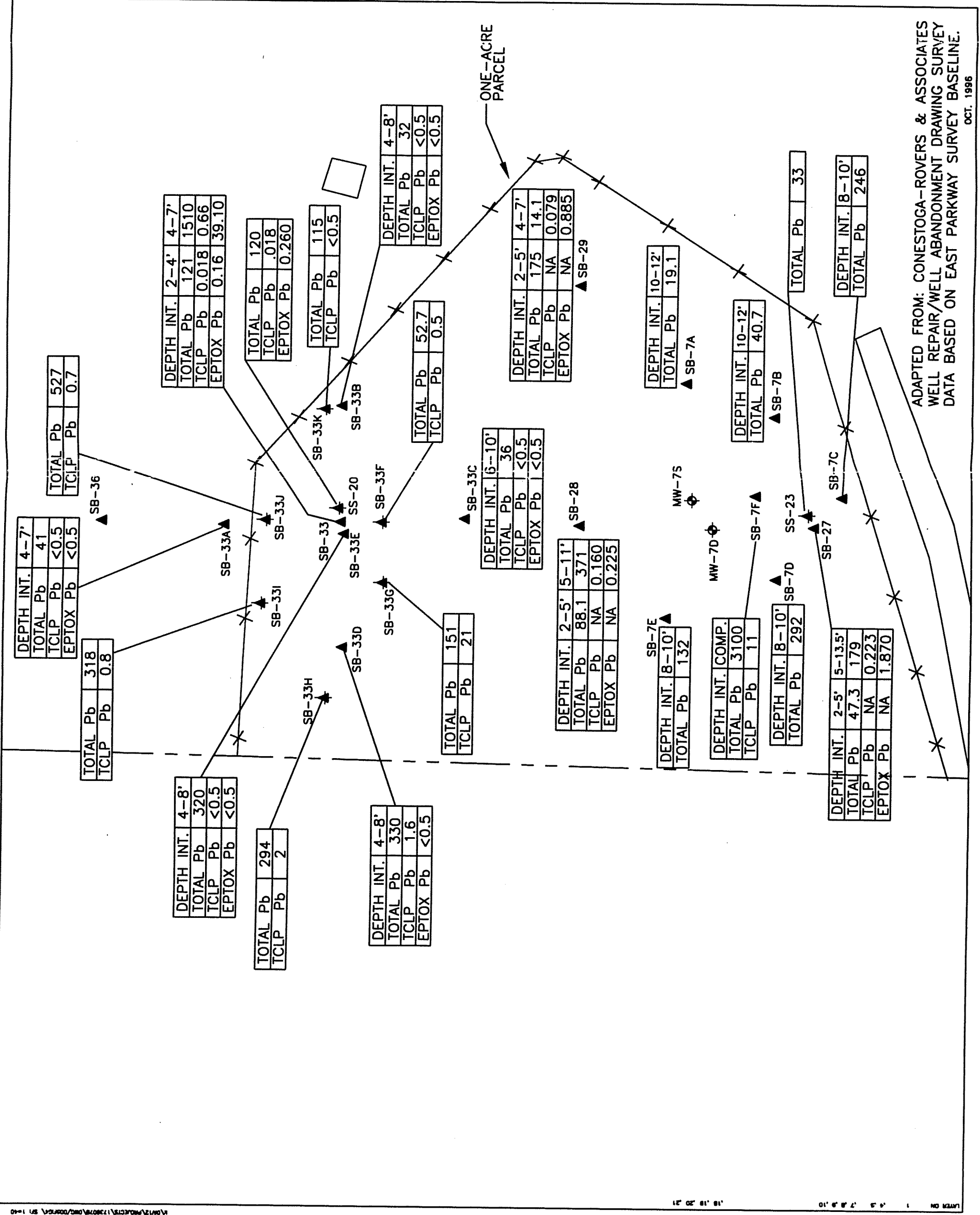
NA -- NOT ANALYZED

PHASE II INVESTIGATION  
ONE-ACRE SITE--BUFFALO AVE.  
NIAGARA FALLS, NEW YORK

**SOIL SAMPLE LOCATION MAP AND LEAD CONCENTRATIONS**



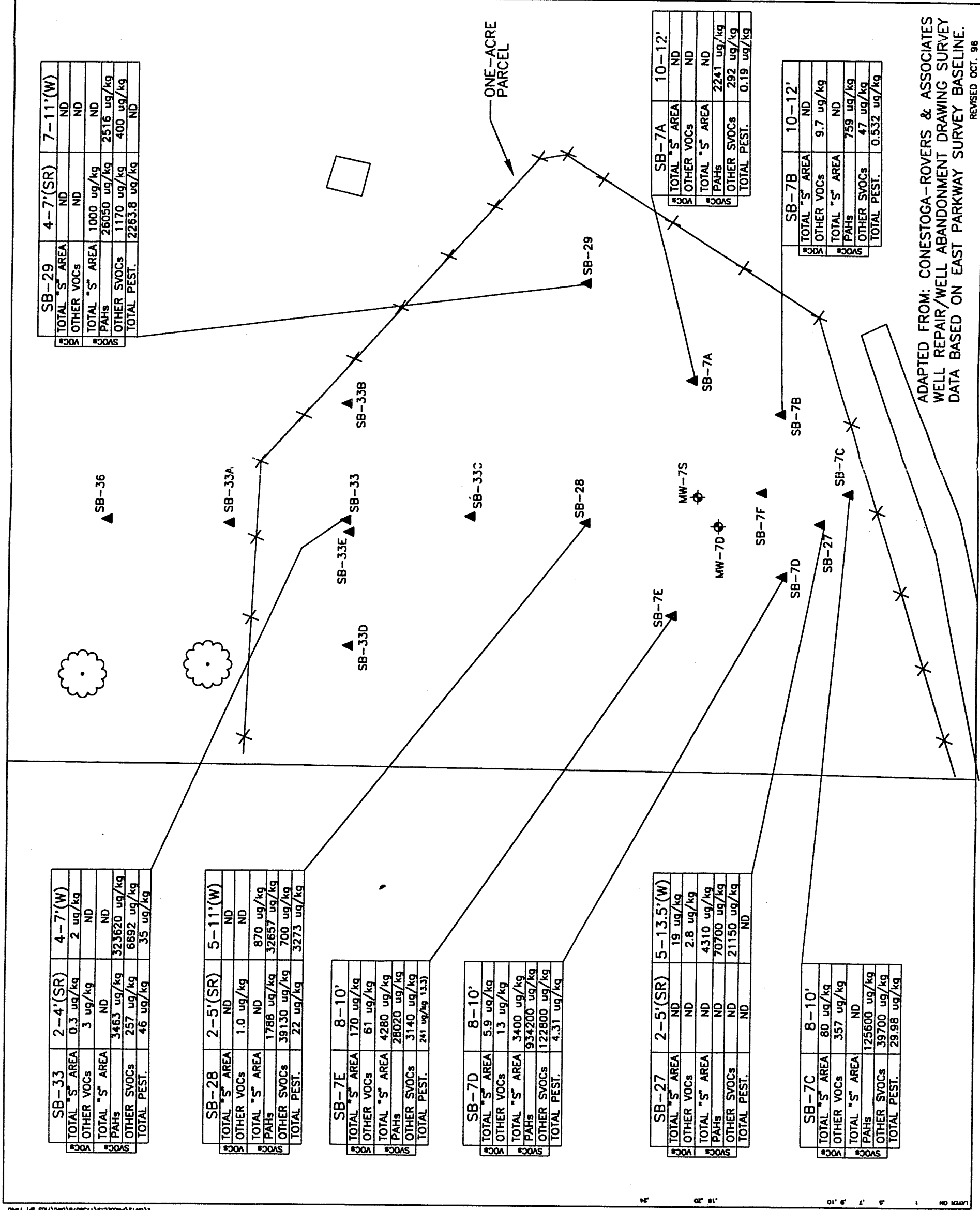
1736.078-005



ADAPTED FROM: CONESTOGA-ROVERS & ASSOCIATES  
WELL REPAIR/WELL ABANDONMENT DRAWING SURVEY  
DATA BASED ON EAST PARKWAY SURVEY BASELINE.  
OCT. 1996



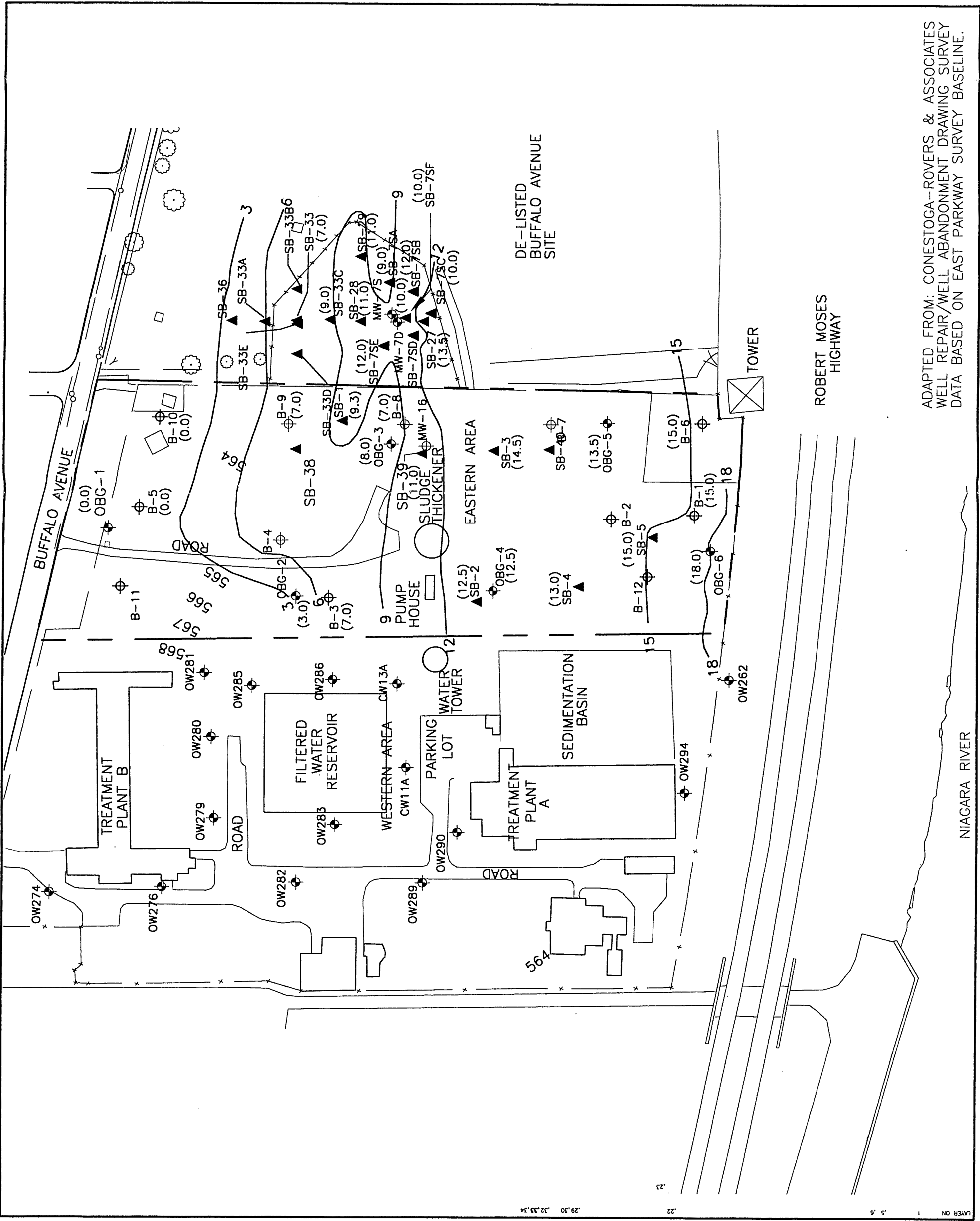
FIGURE 5



1736.078-006



FIGURE 6



**LEGEND**

- SITE BOUNDARY PER RRT STIPULATION
- +— FENCE
- ⊕ EXISTING MONITORING WELL
- ⊕ MONITORING WELL (OBG)
- ▲ SOIL BORING LOCATION
- ▲ SURFACE SOIL SAMPLE LOCATION
- (9.0) THICKNESS OF FILL IN FEET (NO DIFFERENTIATION BETWEEN FILL TYPES)

PHASE II INVESTIGATION  
 ONE-ACRE SITE—BUFFALO AVE.  
 NIAGARA FALLS, NEW YORK

**FILL THICKNESS MAP**



ADAPTED FROM: CONESTOGA-ROVERS & ASSOCIATES  
 WELL REPAIR/WELL ABANDONMENT DRAWING SURVEY  
 DATA BASED ON EAST PARKWAY SURVEY BASELINE.

1736.078-09F



NIAGARA RIVER

ROBERT MOSES HIGHWAY

DE-LISTED BUFFALO AVENUE SITE

EASTERN AREA

SLUDGE THICKENER

FILTERED WATER RESERVOIR

TREATMENT PLANT A

TREATMENT PLANT B

TOWER

BUFFALO AVENUE

ROAD

PARKING LOT

PUMP HOUSE

ROAD

WESTERN AREA

SEDIMENTATION BASIN

ROAD

BUFFALO AVENUE

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD

ROAD



**Appendix A**

**Soil Boring Logs and Monitoring Well Completion Diagrams**

**BRIEN & GERE ENGINEERS, INC.**

**TEST BORING LOG**

**REPORT OF BORING SB-27**

PAGE 1 OF 1

CLIENT: City of Niagara Falls  
 PROJECT LOCATION: Buffalo Ave. Site  
 FILE NO.: 1736.046

SAMPLER Split Spoon 2"  
 HAMMER: 140 lbs.  
 FALL: 30"

LOCATION: N500 E1100

START DATE: 5/14/91  
 END DATE: 5/14/91

ANALYTICAL SAMPLES		
DEPTH	ID #	ANALYSIS
2-4'	SB-27SR	TCL VOC
5-8'	SB-27W	TCL VOC
2-5'	SB-27SR	TCL Para.
5-13.5'	SB-27W	TCL Para.

LEGEND:	Grout	Screen
	Sand Pack	Filter
	Pellets	

BORING COMPANY: Parrati-Wolff, Inc.  
 FOREMAN: Jim Lansing  
 OBG GEOLOGIST: John Mason

GROUND ELEVATION: 572.1'

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /ft	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING	
									PID	HEAD-SPACE
0										
1										
2	1	2-4'	6-6-6-6	2'/1.5'	12	Dry, red brown, fine to very fine SAND, some angular medium gravel, some medium sand, little silt	SHOT ROCK		0	0
3										
4	2	4-6'	6-5-5-3	2'/2'	10	(4-5') Same as above			0	0
5						(5-8') Moist, black, medium SAND, some fine sand, white lime (reacts w/HCL) and purple zones	MISC FILL		0	0
6	3	6-8'	4-3-7-6	2'/1'	10	Same as above, moist to wet, possible ash				
7										
8	4	8-10'	9-6-5-12	2'/2'	11	Same as above, concoidally-fractured black glass-like particles, reddish clasts, very fine gravel, white zone, ~1" thick near top			0	0
9										
10	5	10-12'	16-12-10-8	2'/0.5'	22	Wet, black to red to purple, medium to coarse SAND, some fine gravel			0	0
11										
12	6	12-14'	12-4-6-6	2'/2'	10	(12-13.5') Same as above			0	0
13										
14						(13.5-14') Laminated CLAY and SILT	NATIVE CLAY			
15						Bottom of Fill 13.5 ft.				
16						Bottom of Boring 14.0 ft.				
17										
18										
19										
20										

and Headspace analysis values reported in ppm using HNU model PI-101.

O'BRIEN & GERE ENGINEERS, INC.						TEST BORING LOG		REPORT OF BORING SB-28 PAGE 1 OF 1			
CLIENT: City of Niagara Falls						SAMPLER Split Spoon 2"		LOCATION: N600.E1100			
PROJECT LOCATION: Buffalo Ave. Site						HAMMER: 140 lbs.		START DATE: 5/15/91			
FILE NO.: 1736.046						FALL: 30"		END DATE: 5/15/91			
BORING COMPANY: Parratt-Wolff, Inc.						ANALYTICAL SAMPLES		LEGEND:			
FOREMAN: Jim Lansing						DEPTH ID # ANALYSIS		Grout		Screen	
OBG GEOLOGIST: John Mason						2-4' SB-28Si1 TCL VOC		Sand Pack		Riser	
						6-8' SB-28W TCL VOC		Pellets			
						2-5' SB-28SR TCL Para.					
						5-11' SB-28W TCL Para.					
						GROUND ELEVATION: 573.0'					
DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /ft	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	PID	HEAD-SPACE	
0											
1											
2	1	2-4'	8-8-10-8	2'/1.5'	18	Dry, red/brown to olive green, very fine to fine SAND, some fine to medium angular, dark gray dolomite gravel, little silt and medium sand, trace clay	SHOT ROCK		0	0	
3											
4	2	4-6'	6-6-6-5	2'/1'	12	Same as above			0	0	
5						Changing to dry, black to red/brown, fine to medium SAND, little coarse and very fine sand, trace silt	5'				
6	3	6-8'	6-5-3-3	2'/2'	8	Same as above, black sand with white specs, trace black glass-like clasts	MISC FILL		0	0	
7											
8	4	8-10'	6-3-5-4	2'/2'	8	Same as above			0	0	
9											
10	5	10-12'	3-4-5-6	2'/1'	9	Same as above, wet			0	0	
11						Changing to damp, olive green to brown, silty CLAY	11'				
12	6	12-14'	9-8-13-14	2'/1'	21	Moist, red/brown to olive green, silty CLAY, trace fine gravel	NATIVE CLAY		0	0	
13											
14						Bottom of fill 11.0 ft. Bottom of Boring 14.0 ft.					
15											
16											
17											
18											
19											
20											

PID and Headspace analysis values reported in ppm using HNU model PI-101.

**BRIEN & GERE ENGINEERS, INC.**

**TEST BORING LOG**

REPORT OF BORING SB-29

PAGE 1 OF 1

CLIENT: City of Niagara Falls  
 PROJECT LOCATION: Buffalo Ave. Site  
 FILE NO.: 1736.046

SAMPLER: Split Spoon 2"  
 HAMMER: 140 lbs.  
 FALL: 30"  
**ANALYTICAL SAMPLES**  
 DEPTH ID # ANALYSIS  
 4-6' SB-29SR TCL VOC  
 7-8' SB-29W TCL VOC  
 4-7' SB-29SR TCL Para.  
 7-11' SB-29W TCL Para.  
 GROUND ELEVATION: 573.1'

LOCATION: N600 E1200  
 START DATE: 5/15/91  
 END DATE: 5/15/91

LEGEND: Grout Screen  
 Sand Pack Riser  
 Pellets

BORING COMPANY: Parratt-Wolff, Inc.  
 SUPERVISOR: Jim Lansing  
 OBG GEOLOGIST: John Mason

DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /ft	PENETRY RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	FIELD TESTING		
									PID	HEAD-SPACE	
0											
1											
2	1	2-4'	6-6-5-8	2'/0	11	No recovery Auger: Dry, red/brown, fine SAND, some silt, trace gravel	SHOT ROCK			-	-
3											
4	2	4-6'	9-10-10-11	2'/1'	20	Same as above Auger: trace black graphite-like chips				0	0
5											
6	3	6-8'	10-13-13-14	2'/2'	26	(6-7) Same as above				0	0
7						(7-8) Dry to moist, black (shiny), medium to coarse SAND, little fine gravel, graphite-like clasts	7' MISC FILL			0	0
8	4	8-10'	15-16-11-5	2'/1'	27	Moist, black to light green, medium SAND, little gravel and fine sand				0	0
9											
10	5	10-12'	2-2-4-5	2'/2'	6	(10-11) Same as above, wet				0	0
11						(11-12) Dry to moist, brown to olive green, fine SAND, some very fine sand, black spots	11' NATIVE			0	0
12	6	12-14'	12-13-18-13	2'/1'	31	Dry to moist, red/brown to olive green silty CLAY					
13											
14						Bottom of Fill 11.0 ft. Bottom of Boring 14.0 ft.					
15											
16											
17											
18											
19											
20											

PID and Headspace analysis values reported in ppm using HNU model PI-101.

O'BRIEN & GERE ENGINEERS, INC.						TEST BORING LOG		REPORT OF BORING SB-33 PAGE 1 OF 1			
CLIENT: City of Niagara Falls						SAMPLER Split Spoon 2"		LOCATION: N700 E1100			
PROJECT LOCATION: Buffalo Ave. Site						HAMMER: 140 lbs.		START DATE: 5/15/91			
FILE NO.: 1736.046						FALL: 30"		END DATE: 5/15/91			
BORING COMPANY: Parratt-Wolff, Inc.						ANALYTICAL SAMPLES		LEGEND:			
FOREMAN: Jim Lansing						DEPTH ID # ANALYSIS		Grout		Screen	
OBG GEOLOGIST: John Mason						2-4' SB-33SR TCL VOC		Sand Pack		Riser	
						4-6' SB-33W TCL VOC		Pellets			
						2-4' SB-33SR TCL Para.					
						4-7' SB-33W TCL Para.					
						GROUND ELEVATION: 573.1'					
DEPTH BELOW GRADE	NO.	DEPTH (FEET)	BLOWS /ft	PENETR/ RECOVERY	"N" VALUE	SAMPLE DESCRIPTION	STRATUM CHANGE GENERAL DESCRIPT	EQUIPMENT INSTALLED	PID	HEAD-SPACE	
0											
1											
2	1	2-4'	15-12-9-9	2'/1'	21	Dry, red/brown to brown, fine SAND, some silt and very fine sand, little angular dark gray dolomite fine gravel	SHOT ROCK		0	0	
3											
4	2	4-6'	5-5-4-3	2'/2'	9	Moist, black, medium to coarse SAND, some fine sand, little graphite, trace green lime and glass	4' MISC FILL		0	0	
5											
6	3	6-8'	4-3-3-2	2'/2'	6	(6-7) Same as above			0	0	
7						(7-8) Moist to wet, olive green to brown/orange clayey SILT, some very fine sand	7' NATIVE SILTY SAND				
8						Bottom of Fill 7.0 ft.					
9						Bottom of Boring 8.0 ft.					
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

PID and Headspace analysis values reported in ppm using HNU model PI-101.



**Client:** City of Niagara Falls  
**One Acre Site Investigation**  
**Proj. Loc:** Niagara Falls, NY

**Sampler:** 2" Split Spoon  
**Hammer:** 140 lbs.  
**Fall:** 30"

**Page 1 of 1**  
**Location:**  
**Start Date:** 2/9/95  
**End Date:** 2/9/95

**File No.:** 1736.078  
**Boring Company:** SJB Services Inc.  
**Foreman:** Ken Swinnich  
**OBG Geologist:** Chawn O'Dell

**Screen**  **Grout**  
**Riser**  **Sand Pack**  
**Bentonite**

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing	
									HS (ppm)	
0	1	0-2	34-13 12-10	2.0/1.3	25	Dry, brown, medium dense, SILT, some very fine to fine sand, little fine angular gravel, trace organics (plant roots).			0.9	
1										
2	2	2-4	9-9-7-7	2.0/1.5	16	Damp, brown, medium dense, SILT, some very fine to fine sand, little fine angular gravel.			0.8	
3										
4	3	4-6	7-8-5-8	2.0/1.3	13	Damp, medium brown to olive, medium dense SILT and fine sand, little clay.			0.3	
5										
6	4	6-8	4-5-4-4	2.0/1.2	9	Damp, medium brown to olive, loose SILT and fine SAND, some clay to 7.5 ft., then black cinders and white ash.			0.7	
7										
8	5	8-10	10-14 9-8	2.0/1.4	23	Damp, red to medium brown, medium dense SILT, some clay, an ash and cinder layer at 9.0-9.5 ft., then organics (plant stalks).			0.2	
9										
10	6	10-12	8-10 12-13	2.0/1.5	22	Damp to wet, brown to olive green, medium dense, SILT, some fine sand, some clay, little cinders, trace angular gravel.			2.1	
11										
12	7	12-14	6-7-3-2	2.0/1.7	10	Saturated, dark olive green, medium dense, very fine SAND and SILT.			0.7	
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										

borehole was grouted to the surface.  
no - Headspace

**BRIEN & GERE ENGINEERS, INC.**

**TEST BORING LOG**

**REPORT OF BORING  
SB-7B**

**Client:** City of Niagara Falls  
One Acre Site Investigation  
**Loc:** Niagara Falls, NY

**Sampler:** 2" Split Spoon  
**Hammer:** 140 lbs.  
**Fall:** 30"

Page 1 of 1  
**Location:**  
**Start Date:** 2/9/95  
**End Date:** 2/9/95

**File No.:** 1736.078  
**Drilling Company:** SJB Services Inc.  
**Operator:** Ken Swinnich  
**OBG Geologist:** Chawn O'Dell

**Screen**  **Grout**  
**Riser**  **Sand Pack**  
**Bentonite**

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing HS (ppm)
1	1	0-2	14-13 10-8	2.0/1.0	23	Dry, brown to gray, medium dense, medium to coarse GRAVEL, little silt, trace fine to medium sand, trace fine gravel.			1.3
2	2	2-4	35-18 14-13	2.0/1.3	32	Dry to damp, reddish brown to brown, dense, fine SAND, some silt, some fine to coarse gravel, little clay.			0.4
3	3	4-6	3-4-3-3	2.0/1.2	7	Damp to wet, brown, loose, SILT and fine SAND, little clay, trace fine angular gravel.			0.0
4	4	6-8	4-3-4-5	2.0/1.5	7	Same as above.			0.3
5	5	8-10	5-2-1-1	2.0/0.3	3	Saturated, black, very loose CINDER and ASH, little recovery.			1.0
6	6	10-12	5-6-6-4	2.0/1.5	12	Saturated, brown to black, medium dense, SILT and very fine SAND, some cinders, little fine angular gravel, trace clay.			1.5
7	7	12-14	4-5-5-10	2.0/1.4	10	Saturated, olive green to brown, medium dense, very fine SAND, some silt (olive) laminations, turning to brown clay, little silt at 13.5 ft.			0.8

was grouted to the surface.

**Client:** City of Niagara Falls  
One Acre Site Investigation  
**Proj. Loc:** Niagara Falls, NY

**Sampler:** 2" Split Spoon  
**Hammer:** 140 lbs.  
**Fall:** 30"

**Page 1 of 1**  
**Location:**  
**Start Date:** 2/10/95  
**End Date:** 2/10/95

**Boring Company:** SJB Services Inc.  
**Foreman:** Dave Maddox  
**OBG Geologist:** Chawn O'Dell

**Screen**  **Grout**  
**Riser**  **Sand Pack**  
**Bentonite**

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing	
									HS (ppm)	
0	1	0-2	2-4	2.0/1.5	18	Dry to damp, medium brown to gray, medium dense, SILT, some clay, little very fine sand to 1.5 ft., then coarse gravel.			0.6	
1			14-13							
2	2	2-4	7-9-7-6	2.0/1.4	16	Damp, medium brown, medium dense, SILT, some clay, little very fine to fine sand.			0.2	
3										
4	3	4-6	7-9-8-12	2.0/0.5	17	Dry, brownish gray, medium dense, medium to coarse, angular GRAVEL, little silt, little very fine sand.			0.9	
5										
6	4	6-8	10-8-8-7	2.0/0.7	16	Damp, dark brown to black, medium dense, fine to medium SAND, some cinders, little white ash, little silt, trace coarse gravel.			0.5	
7										
8	5	8-10	2-3-5-5	2.0/1.2	8	Wet, black, loose CINDERS, some silt, little orange brick, little fine angular gravel, little fine to coarse sand.			1.1	
9										
10	6	10-12	7-3-4-4	2.0/1.8	7	Saturated, olive green, loose, fine SAND, some silt, little medium sand.			0.3	
11										
12	7	12-14	4-5-7-5	2.0/2.0	12	Same as above, to 13.5 ft., then medium brown, medium dense, CLAY, some silt, trace horizontally and vertically bedded organics (plants).			0.0	
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										

The borehole was grouted to the surface.  
HS - Headspace

**O'BRIEN & GERE ENGINEERS, INC.**

**TEST BORING LOG**

**REPORT OF BORING  
SB-7D**

**Client:** City of Niagara Falls  
One Acre Site Investigation  
**Proj. Loc:** Niagara Falls, NY  
**File No.:** 1736.078

**Sampler:** 2" Split Spoon  
**Hammer:** 140 lbs.  
**Fall:** 30"

**Page 1 of 1**  
**Location:**  
**Start Date:** 2/10/95  
**End Date:** 2/10/95

**Boring Company:** SJB Services Inc.  
**Foreman:** Dave Maddox  
**OBG Geologist:** Chawn O'Dell

**Screen**  **Grout**  
**Riser**  **Sand Pack**  
**Bentonite**

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing	
									HS	(ppm)
0	1	0-2	3-4-4-5	2.0/1.7	8	Dry, medium brown, loose, SILT, some very fine to fine sand, little fine to medium angular gravel, trace cinders.			0.1	
1										
2	2	2-4	4-6 11-11	2.0/1.0	17	Dry, light to medium brown, medium dense, fine SAND, some silt, some fine to coarse angular gravel, little medium sand, trace coarse sand.			0.9	
3										
4	3	4-6	3-8-7-6	2.0/0.8	15	Damp, medium brown, medium dense, SILT, some very fine sand, little clay, trace fine angular gravel.			0.1	
5										
6	4	6-8	6-6-8-6	2.0/1.0	14	Damp to wet, brown to black medium dense, fine SAND, some silt, little cinders, little fine to medium angular gravel, trace orange brick.			0.4	
7										
8	5	8-10	3-6 81/0.2	1.2/1.1	87	Wet, black, loose SILT, some fine to coarse sand, little black cinders, little fine angular gravel to 9.0 ft., then very dense gravel/cobble, (spoon refusal). Auger/spoon refusal at 9.2 ft. Apparent large piece of shot rock. Boring terminated at 9.2 ft.			1.8	
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										

The borehole was grouted to the surface.

MS - Headspace

**O'BRIEN & GERE ENGINEERS, INC.**

**TEST BORING LOG**

**REPORT OF BORING  
SB-7E**

**Client:** City of Niagara Falls  
**One Acre Site Investigation**  
**Proj. Loc:** Niagara Falls, NY

**Sampler:** 2" Split Spoon  
**Hammer:** 140 lbs.  
**Fall:** 30"

**Page 1 of 1**  
**Location:**  
**Start Date:** 2/10/95  
**End Date:** 2/10/95

**File No.:** 1736.078

**Boring Company:** SJB Services Inc.  
**Foreman:** Dave Maddox  
**OBG Geologist:** Chawn O'Dell

**Screen**  **Grout**  
**Riser**  **Sand Pack**  
**Bentonite**

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing		
									HS (ppm)		
0	1	0-2	6-12	2.0/0.5	24	Damp, dark brown, medium dense, SILT, little very fine sand, little fine gravel, trace clay.			0.3		
			12-14								
1						No recovery.			-		
2	2	2-4	10-11	2.0/0	20						
			9-9								
3						Damp, white, medium dense, ASH, some brown silt, little fine to medium angular gravel, trace sand, trace cinder (moderate odor).			1.1		
4	3	4-6	14-14	2.0/1.3	24						
			10-7								
5						Damp, brown to black, medium dense, CINDER and SILT, little gravel, little white ash.			0.3		
6	4	6-8	11-11	2.0/1.5	16						
			5-5								
7						Damp to wet, white, brown, black, medium dense, SILT, CINDERS and ASH, little fine gravel, trace orange brick (moderate odor).			3.5		
8	5	8-10	8-4	2.0/2.0	11						
			7-13								
9						Wet, brown to black, medium dense SILT, some black cinders, little white ash, little fine angular gravel, little fine to coarse sand.			2.9		
10	6	10-12	6-5-5-5	2.0/1.5	10						
11						Wet, olive green to brown, loose, fine SAND and SILT to 13.0 ft., then CLAY, some silt.			0.0		
12	7	12-14	3-3-5-8	2.0/1.8	8						
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											

The borehole was grouted to the surface.

HS - Headspace

CLIENT: NYPA, BUFFALO AVE. JOB # 13796-002

BORING MW-7D

SURFACE ELEVATION (FT) 573.03

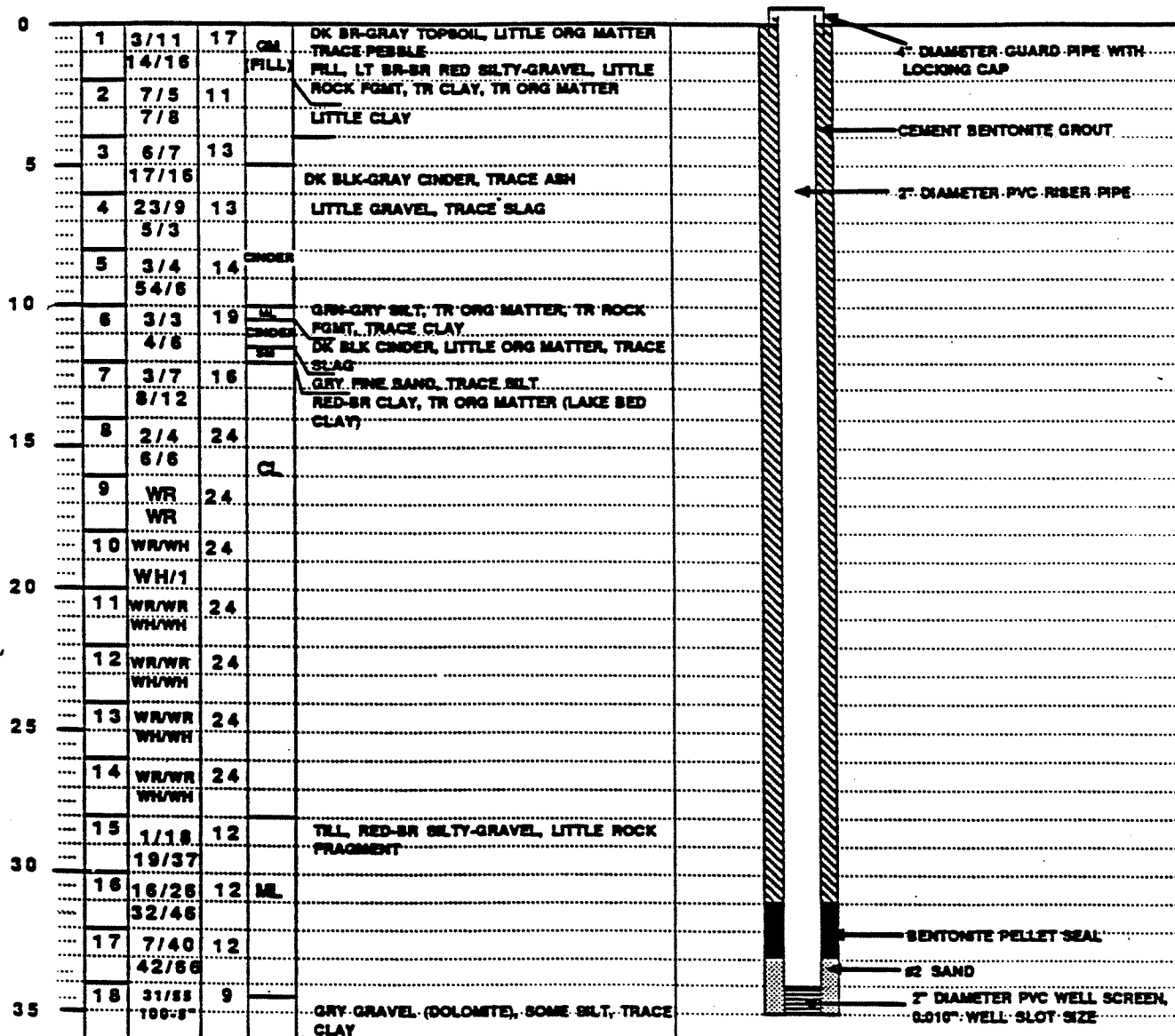
TOP OF CASING ELEVATION (FT) 575.18

DATE STARTED: 11/17/87  
DATE FINISHED: 11/19/87

DEPTH TO WATER (FT)	14.0	14.2	14.15
DATE	12/2/87	12/8/87	12/10/87

DEPTH (FT)  
SAMPLE NUMBER  
BLOW COUNT (PER 6")  
RECOVERY (INCHES)  
SOIL CLASSIFICATION  
DESCRIPTIONS

AS BUILT DIAGRAM



CLIENT: NYPA, BUFFALO AVE. 13796-002

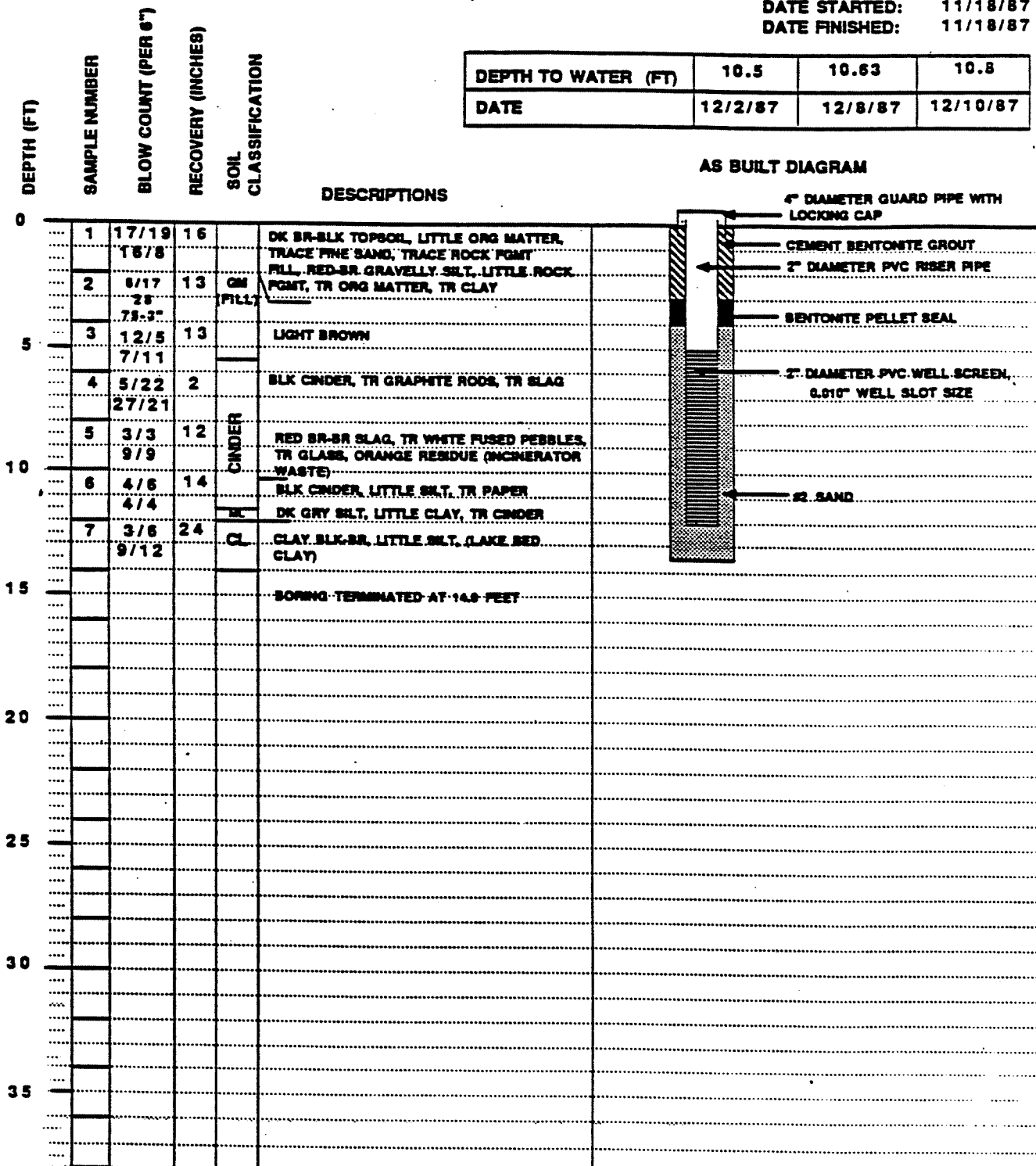
BORING MW-7S

SURFACE ELEVATION (FT) 573.52

TOP OF CASING ELEVATION (FT) 575.86

DATE STARTED: 11/18/87  
DATE FINISHED: 11/18/87

DEPTH TO WATER (FT)	10.5	10.63	10.8
DATE	12/2/87	12/8/87	12/10/87



DEPTH (FT)	SAMPLE NUMBER	BLOW COUNT (PER 6")	RECOVERY (INCHES)	SOIL CLASSIFICATION	DESCRIPTIONS
0	1	17/19 18/8	16		DK BR-BLK TOPSOIL, LITTLE ORG MATTER, TRACE FINE SAND, TRACE ROCK FGMT
	2	8/17 28 78.3"	13	GM FILL	RED-BR GRAVELLY SILT, LITTLE ROCK FGMT, TR ORG MATTER, TR CLAY
5	3	12/5 7/11	13		LIGHT BROWN
	4	5/22 27/21	2		BLK CINDER, TR GRAPHITE ROCK, TR SLAG
	5	3/3 9/9	12	CINDER	RED BR-BR SLAG, TR WHITE FUSED PEBBLES, TR GLASS, ORANGE RESIDUE (INCINERATOR WASTE)
10	6	4/6 4/4	14		BLK CINDER, LITTLE SILT, TR PAPER
	7	3/6 9/12	24	CL	DK GRY SILT, LITTLE CLAY, TR CINDER CLAY, BLK-BR, LITTLE SILT, (LAKE RED CLAY)
15					BORING TERMINATED AT 14.6 FEET
20					
25					
30					
35					

THE BORING LOG SHOWN REPRESENTS THE MOST PROBABLE CONDITIONS BASED UPON INTERPRETATION OF PRESENTLY AVAILABLE DATA. VARIATIONS FROM THESE CONDITIONS MAY OCCUR.

**Client:** City of Niagara Falls  
**Proj. Loc:** One Acre Site  
 Niagara Falls, New York  
**File No.:** 1736.078

**Sampler:** 2" Split Barrel  
**Hammer:** 140 lbs.  
**Fall:** 30"

Page 1 of 1  
**Location:** Approx. 10 ft South -  
 Southeast of MW-7S  
**Start Date:** 2/7/96  
**End Date:** 2/7/96

**Boring Company:** SJB Services, Inc.  
**Foreman:** Jeff Leavell  
**OBG Geologist:** Chawn O'Dell

**Screen** =   
**Riser**     
**Grout**  
**Sand Pack**  
**Bentonite**

Depth Below Grade	No.	Depth (feet)	Blows /6"	Penetr/ Recovery	"N" Value	Sample Description	Stratum Change General Descript	Equip. Installed	Field Testing	
									HNU ppm	UV
0	1	0-2	27-52 30-20	2/2'	82	Pale brown (5YR 5/2), damp (frozen), extremely dense, fine to medium SAND some slit, little coarse sand, little fine to coarse angular gravel, trace organics (plant roots)			0.1	
1										
2	2	2-4	14-12 14-8	2/1.5'	26	Moderate brown (5YR 4/4), damp, medium dense, fine to medium SAND, some SILT little clay, trace subangular to angular coarse sand and fine to coarse gravel			0.3	
3										
4	3	4-6	3-3 6-8	2/0.2'	9	Moderate brown (5YR 4/4), moist, loose, very fine SAND, some silt, little clay, trace medium to coarse sand, trace fine angular gravel			1.4	
5										
6	4	6-8	3-4 4-5	2/0.2'	8	Moderate brown (5YR 4/4), moist, loose, very fine SAND, some silt, little clay, trace medium to coarse sand trace fine angular gravel			1.9	
7										
8	5	8-10	3-5 7-10	2/1.2'	12	Black (N1), saturated, medium dense CINDERS and fine to medium angular GRAVEL			4.1	
9										
10	6	10-12	5-3 4-7	2/1.1'	7	Olive gray (5Y 4/1), saturated, loose, fine SAND, some medium sand, little silt, trace organics to approximately 11.5 ft, then light brownish gray (5YR 6/1), moist, medium dense, SILT, some clay trace organics			3.2	

The borehole was backfilled to the surface with a mixture of cuttings and cement/bentonite grout.



**Appendix B**

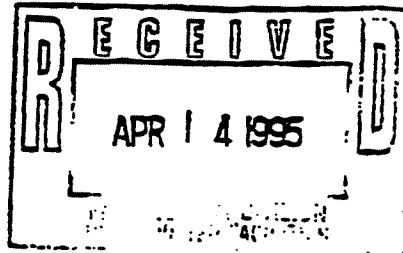
**Purge Water and Decontamination Fluids Laboratory Characterization**



**O'BRIEN & GERE  
ENGINEERS, INC.**

April 13, 1995

Mr. Al Zaepfel  
Industrial Monitoring Coordinator  
City of Niagara Falls  
Wastewater Treatment Plant  
P. O. Box 69  
Niagara Falls, New York 14302



Re: City of Niagara Falls  
Eastern Area

File: 1736.078

Dear Al:

In accordance with our recent conversations, enclosed are the results of the laboratory analysis performed on a composite water sample obtained from five 55-gallon drums located at the City of Niagara Falls Water Treatment Plant. The sample was composited from a grab from each one of the drums. As requested, the sample was analyzed for metals, PCB's, organics, pH, and SOC.

These drums contain water collected during ground water sampling activities at the one-acre Eastern Area adjacent to the construction site for the City's new water treatment plant. On behalf of the City of Niagara Falls Water Treatment Plant, we are requesting permission to discharge approximately 275 gallons of water to the Niagara Falls Wastewater Treatment Plant via a sanitary sewer in Buffalo Avenue.

If you have any questions or require additional information, please do not hesitate to contact me.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

Robert P. Lannon, Jr., P.E.  
Managing Engineer

RPL:bk

- cc: Mr. Robert E. Game, City of Niagara Falls
- Mr. Richard R. Roll, City of Niagara Falls
- Ms. Karen L. Moran, O'Brien & Gere Engineers, Inc.
- Ms. Deborah Y. Wright, O'Brien & Gere Engineers, Inc.



ACTS TESTING LABS, INC  
25 Anderson Road  
Buffalo, NY 14225-492  
Tel (716) 897-3300  
Fax (716) 897-087

Technical Report #5B-1679E R  
Project # 1736.076  
Project Name: City Niagara Falls Water T. Plant  
**REVISED**

April 4, 1995  
Page 1 of 4

Mr. Robert P. Lannon, Jr.  
O'BRIEN & GERE ENGINEERS, INC

**SUBJECT:**

Analysis of one (1) water sample for various parameters. The sample was received on March 13, 1995.

**RESULTS:**

See Pages Two and Three.

**EXPERIMENTAL:**

Organochlorine Pesticides in water were determined according to United States Environmental Protection Agency Method 608: Organochlorine Pesticides and PCBs.

Polychlorinated Biphenyls (PCBs) in water were determined according to United States Environmental Protection Agency Method 608: Organochlorine Pesticides and PCBs.

Priority Pollutant Purgeables in Water were determined according to United States Environmental Protection Agency Method 624: Purgeables.

Priority Pollutant Semi-volatile compounds in water were determined according to United States Environmental Protection Agency Method 625: Base/Neutrals and Acids.

The analyses were determined according to procedures listed in "Standard Methods for the Examination of Water and Wastewater," 17th Edition, 1989.

..... report is intended for your exclusive use. Any copying or reproduction of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our written permission. Our report is issued to the test samples identified herein. The results set forth in this report are not necessarily indicative or representative of the statistical quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof. You shall have thirty days from receipt of this report to request additional testing of the samples or to advise us of any errors or omissions relating to our report provided, however, such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

EPA 625

ACTS #5B-1679E  
COMPOSITE DRUM #1,2,3,4,5

2-Chlorophenol	< 1
1,3-Dichlorobenzene	< 1
1,4-Dichlorobenzene	< 1
1,2-Dichlorobenzene	< 1
2,4-Dichlorophenol	< 10
1,2,4-Trichlorobenzene	< 1
Naphthalene	< 1
Hexachlorobutadiene	< 1
4-Chloro-3-methylphenol	< 1
Hexachlorocyclopentadiene	< 1
2,4,6-Trichlorophenol	< 1
Dimethylphthalate	< 1
Acenaphthene	< 1
N-Nitrosodiphenylamine	< 1
Hexachlorobenzene	< 1
Phenanthrene	< 1
Dibutylphthalate	< 1
Fluoranthene	< 1
Pyrene	< 1
Butyl Benzyl Phthalate	< 1
Benzo(a)anthracene	< 1
Chrysene	< 1
Dichlorotoluene	< 1*
Trichlorotoluene	< 1*
Tetrachlorobenzene	< 1*
Dichlorobenzotrifluoride	< 1*

EPA 608

Heptachlor	< 0.05
Endosulfan sulfate	< 0.05
PCB 1016	< 0.25
PCB 1221	< 0.25
PCB 1232	< 0.25
PCB 1242	< 0.25
PCB 1248	< 0.25
PCB 1254	< 0.25
PCB 1260	< 0.25
Mirex	< 0.10
Decchlorane	< 1.0

\* Estimated Values

**RESULTS:**

ACTS #5B-1679E  
COMPOSITE DRUM #1,2,3,4,5

Cadmium, Total	< 0.005	
Chromium, Total	< 0.01	
Copper, Total	< 0.01	
Cyanide, Total	< 0.003	
Lead, Total	< 0.03	100/d
Nickel, Total	< 0.01	
Phenols, Total	0.044	.0001
Phosphorus, Total	< 0.05	
pH, Total	9.10	
Mercury, Total	< 0.0002	
Zinc, Total	1.03	.002
Total Suspended Solids	48.0 (68.0)*	
Soluble Organic Carbon	3.1	

Results are reported as milligrams per liter (mg/L).  
\*Duplicate

ACTS #5B-1679E  
COMPOSITE DRUM #1,2,3,4,5

<u>EPA 624</u>		
Benzene	0.5	o
Toluene	< 0.5	
Ethylbenzene	< 0.5	
M,P-Xylenes	< 1	
O-Xylene	< 0.5	
Vinyl Chlorine	< 0.5	
1,1-Dichloroethene	< 0.5	
Methylene Chloride	43B	o
Trans 1,2-Dichloroethene	< 0.5	
Chloroform	0.6	o
1,1,1-Trichloroethane	< 0.5	
Carbon Tetrachloride	< 0.5	
Trichloroethene	< 0.5	
Bromodichloromethane	< 0.5	
trans 1,3 Dichloropropene	< 0.5	
cis 1,3-Dichloropropene	< 0.5	
1,1,2-Trichloroethene	< 0.5	
Tetrachloroethane	< 0.5	
Dibromochloromethane	< 0.5	
Chlorobenzene	12	o
Bromoform	< 0.5	
1,1,2,2, Tetrachloroethane	< 0.5	
2-Chlorotoluene	< 0.5	
4-Chlorotoluene	< 0.5	

B-Found in method blank at 30.0 ug/L  
Results are reported as micrograms per liter (ug/L).

ACTS TESTING LABS, INC.

*Charles E. Hartke*

Charles E. Hartke  
Manager, Chemistry Laboratory

cnc

ACTS TESTING LABS, INC.

*Elizabeth R. Hausler*

Elizabeth R. Hausler, Supervisor  
Gas Chromatography Laboratory

ACTS TESTING LABS, INC.

*Lisa M. Clerici*

Lisa M. Clerici, Supervisor  
Wet Chemistry Laboratory

**Appendix C**

**Niagara Falls Background Concentrations  
(letter from NCHD to NYSDEC dated 1987)**



NIAGARA COUNTY

HEALTH DEPARTMENT  
HUMAN RESOURCES BUILDING  
MAIN POST OFFICE BOX 428  
10th AND EAST FALLS STREET  
NIAGARA FALLS, NEW YORK 14302

December 4, 1987

New York State DEC  
50 Wolf Road  
Room 222  
Albany, New York 12233

Attention: Mr. Omar Nagi

Dear Mr. Nagi:

This letter is a response to your request for information on background concentrations of various substances in Niagara Falls area soil. As we discussed, this department has access to the results of thousands of soil sample analyses from the Niagara Falls area. We have compiled background profiles for arsenic, chromium, copper, lead and zinc. That information was previously provided to you. While we have not formally compiled background profiles for other compounds, we have observed fairly consistent patterns of occurrence for the following parameters:

- 1) BHC/HCCH - We have observed that one or more isomers occur in concentrations of up to 1 ppm each in about one sample in ten of soils from the Niagara Falls area. The occurrence seems to be sporadic, without pattern and in both surface and subsurface soils. The occurrence of this substance seems to be distributed throughout the area and we have no scenario as to what the source of this substance is.
- 2) DDT/DDE/DDD: These compounds are detected in about one sample in ten to twenty in concentrations of up to 0.5 ppm for DDT and 0.3 ppm for DDE and DDD. When they are detected the concentrations are typically in a ratio of about 3:2:1 (DDT: DDE: DDD). The compound have rarely been reported in samples collected at depths exceeding 12 inches in the Niagara Falls area. It appears that when these compounds are detected that they are remnants of historic DDT pesticide application.



- 3) Other Pesticides: Other pesticide compounds are occasionally detected in area soil samples in small concentrations. Our policy has been to regard such detections as background if they occur in less than 10% of the samples, in concentrations less than .5 ppm and where the compound cannot be attributed to any specific source.
- 4) PAH and Related Compounds: One or more of these compounds in concentrations up to 10 ppm each are commonly reported in nearly all surface (less than 12 inches) soil samples from the Niagara Falls area. These compounds are also reported in 10% of the deeper samples at concentrations up to 1 ppm each. Concentrations are higher when ash or asphalt pieces are present in the sample. Phthalate compounds are common in all area soil samples. We assume these compounds have been deposited as airborne particles from combustion sources, vehicle emission, industrial processes, etc. and they seem to be present throughout the Niagara Falls area.
- 5) Chlorobenzene Compounds: Various chlorobenzene compounds are detected in area soils occasionally in concentrations less than 0.1 ppm. We have noted a trend that these compounds are detected fairly commonly in the less than 1 ppb range when detection limits are adequately low. Several scenarios have been suggested as to the possible source of these contaminants.
- 6) Phenol: 5 to 10% of the general soil samples taken in this area report phenol in the 0.5 to 1 ppm range. Total recoverable phenolics are reported in about 75% of the samples in detectable quantities.
- 7) Other Semi-volatile Compounds: Other semi-volatile compounds occur only occasionally (less than 5% of the samples), in particular, other acid extractable semi-volatile compounds occur only rarely in quantities over 2 to 3 times detection limits.
- 8) Methylene Chloride/Acetone: These compounds have been reported in most soil samples from the Niagara Falls area in concentrations up to 0.15ppm and occasionally much higher. These "detections" have often been attributed to the laboratory error or sampling problems but there is still some controversy as to whether or not this is completely correct. It probably was a more substantial factor in older analyses where these compounds were even more predominate. Reports of the occurrence of these compounds is equally common in both shallow and deep soils.
- 9) Toluene/Benzene - Toluene is reported in about 20% of area soil samples and benzene in about 10%, both in concentrations up to about 20 to 30 ppb. Petroleum product use may be responsible for some of this substance.

10) Other Volatiles: Other volatile compounds are rarely observed as "background".

11) Metals: Data and curves for several metals were previously provided. In addition to these we note that antimony is reported in about 10% of samples, usually less than 2 to 3 times the detection limits. Cadmium is detected in 30 to 50% of soil samples, with an average concentration of about 0.4 ppm (using non-detectable reports as zero for averaging). We would typically consider cadmium over 10 ppm as elevated. Mercury is detected in about 50% of soil samples. We have previously used 0.1 to 0.2 ppm as a typical background range for mercury.

The above guidelines should be considered flexible and not yet fully documented, but we have compared data from several area studies (USGS "Preliminary Evaluation of Chemical Migration to Groundwater and Niagara River..." 1984; NUS, Investigation of eighteen sites in LaSalle Area, Niagara Falls, 1986; Woodward Clyde, Soil sampling from proposed Texas Brine Corporation ROW, 1986; NCHD, Investigation of surface soil contamination at Gratiot Park, 1986) and there seems to be a general agreement of these data sets and the guidelines given above. The above data sets comprise over 500 individual soil samples from the area.

Please note that reference to background in the above discussion refers to both naturally occurring substances and man-made substances which are typically present across a wide area and not apparently related to a localized source such as a particular disposal site or industrial process.

I hope that you find the above guidelines useful. Feel free to contact me with any questions at 716-284-3128.

Sincerely,



Michael E. Hopkins  
Ass't. Public Health Engineer

MEH:l j

cc: Messrs. Vaughn & Devald  
Mr. Tygart - DEC - Buffalo  
Ms. L. Rusin - NYSDOH - Buffalo  
Mr. R. Tramantano - NYSDOH - Albany



**Appendix D**

**NYSDEC - S-Area and Buffalo Avenue Analytical Tables**

**TABLE 1**  
**S-AREA SITE SPECIFIC PARAMETERS**

Vinyl Chloride
1,2-dichloroethene, Total
Trichloroethylene
Tetrachloroethylene
Benzene
Chlorobenzene
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
1,2,3-trichlorobenzene
1,2,4-trichlorobenzene
1,2,3,4-tetrachlorobenzene
1,2,4,5-tetrachlorobenzene
Hexachlorobutadiene
Octachlorocyclopentene
Total Organic Halides (TOX)
Hexachlorocyclopentadiene
Hexachlorobexzene
2,4,5-Trichlorophenol

:ers/div12/5notes&d/table1

TABLE 2  
BUFFALO AVENUE SITE, 932080A  
SUMMARY OF COMPOUNDS DETECTED IN SOIL SAMPLES

Borehole/Well Number	B-2	B-3	B-6	B-7	B-8	B-8	B-8	B-9	B-10	B-11	B-12	SB-38	SB-39	SB-40	SB-40	
Date Sampled	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	5/16/91	5/16/91	5/17/91	5/17/91	
Sample Depth	15'-17	20'-22	20'-22	30'-32	5'-7	5'-7	10'-12'	10'-12'	25'-27	5'-7	30'-32	2-6'	2-11'	2-5'	5-12'	
Sample Description	Native	Native	Native	Native	Ashes	Native	Native	Native	Native	Native	Native	Ashes	Ashes	Shot Rock	Ashes	
Depth to Native Deposits	12.0	9.0	12.0	15.0	N/A	8.0	8.0	8.0	0.0	0.0	16.0	N/A	N/A	N/A	N/A	
Parameter	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	
S-Area SSPL Volatiles																
1,2-Dichloroethene (Total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5J
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	13
Tetrachloroethane	ND	ND	ND	ND	72	ND	ND	ND	ND	ND	ND	1J	30	1100	30	
Other TCL Volatiles																
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1J
S-Area SSPL Semivolatiles																
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	68J
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	55J
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3400
Hexachlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1900
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1600
Other TCL Semivolatiles																
Hexachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phthalates																
Bis(2-ethylhexyl)phthalate	0.6	0.5	0.7	0.9	ND	1.0	1.0	1.0	0.6	1.0	0.9	610J	710J	1400	200J	
Di-n-octylphthalate	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	160J	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	41J	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	99J	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	310J	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	380J	150J	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	180J	59J	ND	ND
Benzo(e)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	260J	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	260J	ND	ND	ND
													120J	ND	ND	ND

TABLE 2  
BUFFALO AVENUE SITE, 932080A  
SUMMARY OF COMPOUNDS DETECTED IN SOIL SAMPLES

Borehole/Well Number	B-2	B-3	B-6	B-7	B-8	B-8	B-8	B-9	B-10	B-11	B-12	SB-38	SB-39	SB-40	SB-40	
Date Sampled	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	1983 *	5/16/91	5/16/91	5/17/91	5/17/91	
Sample Depth	15'-17'	20'-22'	20'-22'	30'-32'	5'-7'	10'-12'	10'-12'	10'-12'	25'-27'	5'-7'	30'-32'	2'-6'	2'-11'	2'-5'	2'-5'	
Sample Description	Native	Native	Native	Native	Ashtes	Native	Native	Native	Native	Native	Native	Ashtes	Ashtes	Shot Rock	Ashtes	
Depth to Native Deposits	12.0	9.0	12.0	15.0	N/A	8.0	8.0	8.0	0.0	0.0	16.0	N/A	N/A	N/A	N/A	
Parameter	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Polycyclic Aromatic Hydrocarbons (Continued)																
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	360J	320J	100J	ND	ND
Dibenzofuran	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	99J	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	920	670J	150J	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100J	150J	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	780J	570J	67J	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	640J	490J	130J	ND	ND
S-Area SSPL Pesticides																
Beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	34J	ND	ND
Delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.5J	ND	ND	ND	ND
Gamma-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100J	ND	ND	ND	ND
Other TCL Pesticides																
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2700	350	ND
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12J	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	52J	71J	2200	ND	ND
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	750	520	ND	ND
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1400	50J	ND
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	65	420	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12J	ND	ND	ND
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	52	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	41J	ND	ND	ND
Inorganic Compounds																
Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	164000J	212000J	434000J	52000J	1700
Mercury	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	910	2100	ND	ND	ND

ug/kg Micrograms/kilograms or parts per billion (ppb)

ND Non-detect

J Estimated concentration

N/A Not analyzed

\* Exact sampling date not known

TABLE 3  
THE ONE ACRE BUFFALO AVENUE SITE, 932080B  
SUMMARY OF COMPOUNDS DETECTED IN SOIL SAMPLES

Borehole/Well Number	SB-27	SB-27	SB-28	SB-28	SB-29	SB-29	SB-30	SB-30	SB-32	SB-33	SB-33	MW-6D
Date Sampled	5/14/91	5/14/91	5/15/91	5/15/91	5/15/91	5/15/91	5/15/91	5/15/91	5/15/91	5/15/91	5/15/91	11/20/87
Sample Depth	2'-5'	5'-13.5'	2'-5'	5'-11'	4'-7'	7'-11'	2'-11.5'	11.5'-12'	2'-4'	2'-4'	4'-7'	1'-3'
Sample Description	Shot Rock	Ashes	Shot Rock	Ashes	Shot Rock	Ashes	Shot Rock	Ashes	Shot Rock	Shot Rock	Ashes	Native
Parameter	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
S-Area SSPL Volatiles												
Benzene	ND	ND	ND	ND	ND	ND	ND	0.9J	ND	ND	ND	1.9J
Chlorobenzene	ND	19	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	10	0.9J	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	0.3J	0.3J	2J	8.6
Other TCL Volatiles												
2-Butanone	ND	ND	ND	ND	ND	ND	ND	34	ND	ND	ND	8.6J
Carbon Disulfide	ND	ND	ND	ND	ND	ND	ND	2J	ND	ND	ND	ND
Chloroform	ND	0.8J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	2J	0.8J	ND	ND	ND	2J	2J	1J	2J	ND	5.9
Total Xylenes	ND	ND	0.1J	ND	ND	ND	ND	ND	ND	1J	3.3J	3.3J
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.4
Vinyl Acetate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S-Area SSPL Semivolatiles												
1,2-Dichlorobenzene	ND	380J	ND	200J	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	730J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	2300	ND	390J	120J	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	900	ND	280J	140J	ND	ND	ND	ND	ND	ND	ND
Other TCL Semivolatiles												
Phenol	ND	ND	ND	ND	ND	ND	ND	4700	ND	17J	ND	ND
Phthalates												
Bis(2-ethylhexyl)phthalate	400J	430J	32000J	200J	560J	290J	650J	290J	360J	130J	610J	300J
Di-n-butylphthalate	ND	ND	130J	ND	ND	110J	370J	240J	130J	110J	ND	ND
Di-n-octylphthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Polyaromatic Hydrocarbons												
2-Methylnaphthalene	ND	560J	78J	170J	370J	47J	110J	73J	37J	ND	17000	ND
4-Methylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	82J	ND
Acenaphthene	ND	340J	ND	550J	330J	ND	ND	59J	ND	36J	11000	ND
Acenaphthylene	ND	320J	ND	97J	200J	ND	ND	ND	ND	ND	620J	ND
Polyaromatic Hydrocarbons (Cont.)												





TABLE 3  
THE ONE ACRE BUFFALO AVENUE SITE, 932080B  
SUMMARY OF COMPOUNDS DETECTED IN SOIL SAMPLES

Borehole/Well Number	Date Sampled	Sample Depth	Sample Description	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SB-27	5/14/91	2-5'	Shot Rock	47300	179000	88100	371000J	175000J	14100J	63400	N/A	76000	121000J	1510000J	MW-6D	11/20/87	1'-3'	Native
SB-27	5/14/91	5-13.5'	Ashes	620	3600	670	5100	2800	ND	640	1200	ND	400	850				
SB-27	5/14/91	2-5'	Shot Rock															
SB-28	5/15/91	2-5'	Shot Rock															
SB-28	5/15/91	5-11'	Ashes															
SB-29	5/15/91	4-7'	Shot Rock															
SB-29	5/15/91	7-11'	Ashes															
SB-30	5/15/91	2-11.5'	Shot Rock															
SB-30	5/15/91	11.5'-12'	Ashes															
SB-32	5/15/91	2-4'	Shot Rock															
SB-33	5/15/91	2-4'	Shot Rock															
SB-33	5/15/91	4-7'	Ashes															

Inorganic Compounds

ug/kg Micrograms/kilograms or parts per billion (ppb)  
 ND Non-detect  
 J Estimated concentration  
 DNU Data not useable due to QA/QC problems

TABLE 3  
THE ONE ACRE BUFFALO AVENUE SITE, 932080B  
SUMMARY OF COMPOUNDS DETECTED IN SOIL SAMPLES

Borehole/Well Number Date Sampled Sample Depth Sample Description	MW-6D 11/20/87 5'-6' Native	MW-6D 11/20/87 14-16' Native	MW-7S 11/18/87 8-10' Ashes	MW-7S 11/18/87 10-12' Clinders	MW-7D 11/17/87 1'-3' Misc. Fill	MW-7D 11/17/87 7-8' Ashes	MW-7D 11/17/87 15-17' Native	MW-8D 11/16/87 0'-6' Misc. Fill	MW-8D 11/16/87 9-16' Native	MW-8D 11/16/87 22-26' Native	MW-8D 11/16/87 29-33' Native
Parameter	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
S-Area SSPL Volatiles											
Benzene	ND	ND	ND	ND	1.3J	1.6J	1.4J	1.4J	2.4J	1.7J	1.4J
Chlorobenzene	ND	ND	81	ND	ND	ND	ND	ND	ND	ND	1.41
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Other TCL Volatiles											
2-Butanone	ND	1.8J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	ND	ND	6.1J	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	4.8J	1.4J	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	3.6J	ND	ND	ND	1.8J	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Acetate	ND	ND	ND	ND	ND	ND	9.4J	ND	ND	3.7J	4.9J
S-Area SSPL Semivolatiles											
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	101J	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Other TCL Semivolatiles											
Phenol	ND	ND	ND	ND	79J	ND	ND	ND	ND	ND	ND
Phthalates											
Bis(2-ethylhexyl)phthalate	ND	ND	ND	ND	350J	800	900	474.5J	440J	680	1000
Di-n-butylphthalate	ND	ND	ND	ND	870B	1101B	ND	1158.1B	41000B	ND	1401B
Di-n-octylphthalate	ND	ND	ND	ND	100J	270J	ND	ND	ND	ND	ND
Polyaromatic Hydrocarbons											
2-Methylnaphthalene	ND	ND	ND	ND	510J	260J	ND	ND	ND	ND	ND
4-Methylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	1600	980	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Polyaromatic Hydrocarbons (Continued)											



TABLE 3  
THE ONE ACRE BUFFALO AVENUE SITE, 932080B  
SUMMARY OF COMPOUNDS DETECTED IN SOIL SAMPLES

Boothole/Well Number Data Sampled Sample Depth Sample Description	MW-6D 11/20/87 5-6' Native	MW-6D 11/20/87 14-16' Native	MW-7S 11/18/87 8-10' Ashes	MW-7S 11/18/87 10-12' Cinders	MW-7D 11/17/87 1-3' Misc. Fill	MW-7D 11/17/87 7-8' Ashes	MW-7D 11/17/87 15-17' Native	MW-8D 11/16/87 0-6' Misc. Fill	MW-8D 11/16/87 9-16' Native	MW-8D 11/16/87 22-26' Native	MW-8D 11/16/87 29-33' Native
Parameter	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Inorganic Compounds											
Lead	DNU	DNU	DNU	DNU	DNU	DNU	DNU	DNU	DNU	DNU	DNU
Mercury	ND	ND	8.8	5.6	DNU	DNU	DNU	DNU	DNU	DNU	DNU
ug/kg	Micrograms/kilograms or parts per billion (ppb)										
ND	Non-detect										
J	Estimated concentration										
DNU	Data not useable due to QA/QC problems										

**TABLE 4**  
**WATER TREATMENT PLANT PROPERTY**  
**ADJACENT TO THE BUFFALO AVENUE SITE, 932080A**  
**SUMMARY OF COMPOUNDS DETECTED IN SOIL SAMPLES**

Borehole/Well Number	280	281	284	285	286	287	291	294	294
Date Sampled	5/13/87	5/7/87	6/1/87	5/11/87	5/13/87	6/5/87	6/18/87	5/27/87	5/27/87
Sample Depth	4'-8'	4'-8'	6'-8'	4'-8'	4'-8'	6'-20.8'	2'-19.8'	12'-30'	30'-32'
Sample Description	Native	Native	Native	Misc Fill	Slag/Misc	Ash/Misc	Ash/Slag	Ashes	Native
Parameter	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
<b>S-Area SSPL Volatiles</b>									
Chlorobenzene	ND	ND	ND	24	ND	39	33	18	ND
<b>S-Area SSPL Semivolatiles</b>									
Trichlorobenzene, Total	ND	ND	ND	ND	201	ND	1400	333	ND
Tetrachlorobenzene, Total	ND	ND	ND	ND	580	ND	1190	5360	158
Hexachlorobenzene	410	ND	ND	128	1700	1000	463	8450	267
Octachlorocyclopentene	ND	ND	ND	ND	ND	ND	ND	971	ND
Hexachlorocyclodecane,	ND	ND	ND	ND	267	ND	ND	13200	291
Total	ND	ND	ND	ND	ND	ND	ND	633	ND
Perchloropentacyclodecane									
<b>Miscellaneous Analyses</b>									
Total Organic Carbon	ND	ND	ND	ND	ND	59000	ND	46000	ND
Total Organic Halides	ND	ND	ND	ND	200	300	200	25000	100
ug/kg Micrograms/kilograms or parts per billion (ppb)									
ND Non-detect									
Note: Samples were only analyzed for S-Area Site Specific Parameters.									

TABLE 5  
BUFFALO AVENUE SITE, 932080A  
SUMMARY OF COMPOUNDS DETECTED IN SHALLOW GROUNDWATER SAMPLES

Well Number Date Sampled	B-1 12/7/82, 1/26/83 29.0-34.0 Native	B-2 12/7/82, 1/26/83 19.0-24.0 Native	B-3 12/7/82, 1/26/83 26.5-31.5 Native	B-4 12/7/82, 1/26/83 29.0-34.0 Native	B-5 12/7/82, 1/26/83 5.0-10.0 Native	B-6 12/7/82, 1/26/83 17.0-22.0 Native	B-7 12/7/82, 1/26/83 31.5-36.5 Native	B-8 12/7/82, 1/26/83 29.0-34.0 Native	B-9 12/7/82, 1/26/83 7.0-12.0 Native	B-10 12/7/82, 1/26/83 28.0-33.0 Native	B-11 12/7/82, 1/26/83 5.0-10.0 Native	B-12 12/7/82, 1/26/83 31.0-36.0 Native	MW-16S 9/19/91 5.0-15.0 Asb/Native	Ground- Water Standard	
Parameter	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
S-Area SSPL Volatiles															
TCL Semivolatiles															
Benzene	11	11	16	ND	100	ND	ND	29	ND	ND	ND	ND	ND	ND	
2-Methylpentane	24	17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	NS	
4-Hydroxy-4-Methyl-2-Pentanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	NS	
Hexanoic Acid	ND	ND	ND	ND	ND	ND	70	ND	ND	ND	ND	ND	N/A	NS	
Octanoic Acid	ND	ND	100	ND	ND	ND	400	ND	ND	ND	ND	ND	N/A	NS	
Caprolactam	ND	ND	ND	ND	ND	ND	800	ND	ND	ND	ND	ND	N/A	NS	
Phenol	20	10	20	ND	20	10	75	40	40	10	10	10	N/A	NS	
Phthalates															
Bis(2-ethylhexyl)phthalate	30	ND	100	300	43	ND	100	310	ND	100	70	ND	ND	50	
Di-n-butylphthalate	ND	ND	15	ND	ND	12	11	15	ND	ND	ND	ND	ND	50	
S-Area SSPL Pesticides															
Alpha-BHC	ND	0.05	ND	ND	0.07	ND	ND	ND	ND	ND	ND	ND	0.008	ND	
Beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.031J	ND	
Other TCL Pesticides															
Heptachlor Epoxide	ND	ND	ND	ND	0.07	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Endosulfan	ND	ND	ND	ND	ND	ND	ND	ND	0.29	ND	ND	ND	ND	ND	
Inorganic Compounds															
Lead	ND	400	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	640J	25	
Mercury	66	140	72	ND	510	53	310	120	220	100	3	56	7.6	2	
Miscellaneous Analyses															
Total Organic Carbon	40600	74600	58800	ND	110000	16200	36400	65200	203000	10300	41800	10600	N/A	NS	
Total Organic Halides	81	139	21	ND	38	63	27	16	37	25	30	493	N/A	NS	
* Ambient Water Quality Standards and Guidance Values. Standards or guidance values are for Class GA waters.															
NS											ug/l	Micrograms/liter or parts per billion (ppb)		ND	Non-detect
No standard											J	Estimated concentration		N/A	Not analyzed

**TABLE 6**  
**THE ONE ACRE BUFFALO AVENUE SITE, 932080B**  
**SUMMARY OF COMPOUNDS DETECTED IN SHALLOW GROUNDWATER SAMPLES**

Well Number Date Sampled	MW-6S 12/10/87	MW-6S 6/91	MW-7S 12/10/87	MW-7S 6/91	MW-7S 9/91	MW-8S 12/9/87	MW-8S 6/91	MW-8S 9/91	Ground- * Water Standard
	4.0-8.0 Alluvium		5.0-12.0 Ash/Cinders			11.0-21.0 Alluvium			
Parameter	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
<b>S-Area SSPL Volatiles</b>									
Benzene	ND	ND	1.7JB	0.8J	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	N/A	6	ND	ND	ND	5
<b>S-Area SSPL Semivolatiles</b>									
1,3-Dichlorobenzene	ND	ND	ND	6J	N/A	ND	ND	N/A	5
1,4-Dichlorobenzene	ND	ND	ND	6J	N/A	ND	ND	N/A	4.7
<b>Other TCL Semivolatiles</b>									
Benzoic Acid	ND	ND	1200	ND	N/A	ND	ND	N/A	NS
<b>Phthalates</b>									
Bis(2-ethylhexyl)phthalate	2700B	ND	2200B	ND	N/A	410B	ND	N/A	50
<b>S-Area SSPL Pesticides</b>									
Alpha-BHC	ND	ND	ND	0.064J	0.81	ND	ND	ND	ND
Beta-BHC	ND	0.09	ND	ND	0.093	ND	ND	ND	ND
Delta-BHC	ND	ND	2.76	ND	0.017	ND	ND	ND	ND
Gamma-BHC	ND	0.046J	ND	ND	ND	ND	0.049J	ND	ND
<b>Other TCL Pesticides</b>									
Aldrin	ND	ND	1.67	ND	0.071	ND	ND	ND	NS
Heptachlor Epoxide	ND	ND	0.12	ND	0.008	ND	ND	ND	ND
Endosulfan I	0.01J	ND	4.38	ND	0.034	ND	ND	ND	NS
Endrin	ND	ND	ND	ND	0.013	ND	ND	ND	ND
<b>Inorganic Compounds</b>									
Lead	DNU	78J	8861	1040J	979	DNU	4J	N/A	25
Mercury	ND	ND	50.6	0.6	N/A	2.1	0.5	N/A	2
<p>* Ambient Water Quality Standards and Guidance Values. Standards or guidance values are for Class GA waters.</p> <p>ug/l Micrograms/liter or parts per billion (ppb)</p> <p>ND Non-detect</p> <p>NS No standard</p> <p>B Compound detected in blank</p> <p>J Estimated concentration</p> <p>N/A Not analyzed</p> <p>DNU Data not useable do to QA/QC problems.</p>									

TABLE 7  
 WATER TREATMENT PLANT PROPERTY  
 ADJACENT TO THE BUFFALO AVENUE SITE, 937080A  
 SUMMARY OF COMPOUNDS DETECTED IN SHALLOW GROUNDWATER SAMPLES

Well Number Date Sampled Screened Interval Material Screened	CW-11A 3/3/88 11.0-26.0 F/A/C	CW-13A 3/8/88 1.5-16.5 Fill	OW-261 4/22/88 22.8-27.8 Alluvium	OW-262 4/19/88 27.4-32.4 Alluvium	OW-263 4/22/88 21.0-26.0 Alluvium	OW-280 3/25/88 4.1-9.1 A/C	OW-281 3/22/88 4.0-9.0 Clay	OW-284 3/22/88 4.0-9.0 F/A/C	OW-285 3/23/88 5.3-10.3 F/A/C	OW-286 3/23/88 6.2-11.2 F/A/C	OW-287 3/25/88 9.8-20.8 F/A	OW-291 3/24/88 8.3-20.5 F/A/C	OW-294 3/9/88 25.0-30.0 Alluvium	Ground* Water Standard
Parameter	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
S-Area SSPL Volatiles														
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	ND	5
S-Area SSPL Semivolatiles														
Trichlorobenzene, Total	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	180	ND	5
Tetrachlorobenzene, Total	ND	ND	ND	ND	ND	ND	ND	ND	ND	34	10	47	ND	5
Miscellaneous Analyses														
Total Organic Carbon	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Total Organic Halides	1900	100	300	ND	600	100	ND	24000	ND	ND	100	700	ND	NS

\* Ambient Water Quality Standards and Guidance Values. Standards or guidance values are for Class GA waters.  
 ug/l Micrograms/liter or parts per billion (ppb)  
 ND Non-detect  
 NS No standard  
 F/A/C Fill/Alluvium/Clay  
 F/A Fill/Alluvium  
 A/C Alluvium/Clay  
 Note: Samples were only analyzed for S-Area Site Specific Parameters.



**TABLE 8**  
**THE ONE ACRE BUFFALO AVENUE SITE, 932080B**  
**SUMMARY OF COMPOUNDS DETECTED IN BEDROCK GROUNDWATER SAMPLES**

Well Number Date Sampled	MW-6D 12/10/87	MW-6D 6/91	MW-6D 9/91	MW-7D 12/10/87	MW-7D 6/91	MW-7D 9/91	MW-8D 12/10/87	MW-8D 6/91	MW-8D 9/91	Ground- Water Standard
	32.0-42.0 Till/Bedrock			34.0-44.0 Till/Bedrock			35.0-45.0 Bedrock			
Parameter	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
<b>S-Area SSPL Volatiles</b>										
Benzene	1.5JB	ND	ND	1.5J	ND	ND	1.2J	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	5	2.7	ND	3J	3.3	5
Trichloroethene	ND	ND	ND	1.2J	ND	ND	ND	ND	ND	5
<b>Phthalates</b>										
Bis(2-ethylhexyl)phthalate	65B	ND	N/A	95B	ND	N/A	74B	ND	N/A	50
Di-n-butylphthalate	25	ND	N/A	ND	ND	N/A	ND	ND	N/A	NS
<b>S-Area SSPL Pesticides</b>										
Gamma-BHC	ND	0.086	ND	ND	0.16	N/A	ND	0.045	N/A	ND
<b>Other TCL Pesticides</b>										
Heptachlor Epoxide	1.8J	ND	ND	ND	ND	ND	ND	ND	ND	ND
<b>Inorganic Compounds</b>										
Lead	DNU	12J	N/A	DNU	16.9J	22.0	DNU	132J	N/A	25
Mercury	ND	ND	N/A	0.2	ND	N/A	0.3	ND	N/A	2

\* Ambient Water Quality Standards and Guidance Values. Standards or guidance values are for Class GA waters.

ug/l Micrograms/liter or parts per billion (ppb)

ND Non-detect

NS No standard

J Estimated concentration

B Compound detected in blank

N/A Not analyzed

DNU Data not useable do to QA/QC problems

TABLE 9  
 WATER TREATMENT PLANT PROPERTY  
 ADJACENT TO THE BUFFALO AVENUE SITE, 932080A  
 SUMMARY OF COMPOUNDS DETECTED IN BEDROCK GROUNDWATER SAMPLES

Well Number Date Sampled Screened Interval Material Screened	OW-200 8/26/87 30.6-46.2 Bedrock	OW-201 10/8/87 31.5-46.3 Bedrock	OW-202 10/27/87 37.0-52.0 Bedrock	OW-202 10/28/87 52.0-67.0 Bedrock	OW-215 12/9/87 37.7-55.6 Bedrock	OW-215 12/10/87 55.6-70.6 Bedrock	OW-216 1/21/88 30.8-45.8 Bedrock	OW-216 1/26/88 45.8-60.8 Bedrock	Ground- Water Standard
Parameter	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
S-Area SSPL Volatiles									
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	6580	5
S-Area SSPL Semivolatiles									
Trichlorobenzene, Total	ND	ND	ND	ND	ND	ND	ND	3880	5
Tetrachlorobenzene, Total	ND	ND	ND	ND	ND	ND	ND	3230	5
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	216	5
Hexachlorobenzene	ND	ND	ND	ND	ND	ND	ND	50	0.35
Octachlorocyclopentene	ND	ND	ND	ND	ND	ND	ND	246	NS
S-Area SSPL Pesticides									
Total BHC	ND	ND	ND	ND	ND	ND	ND	282	ND
Miscellaneous Analyses									
Total Organic Carbon	ND	ND	ND	ND	ND	ND	ND	ND	NS
Total Organic Halides	ND	ND	ND	ND	400	ND	ND	37000	NS

\* Ambient Water Quality Standards and Guidance Values. Standards or guidance values are for Class GA waters.  
 ug/l Micrograms/liter or parts per billion (ppb)  
 ND Non-detect  
 NS No standard

Note: Samples were only analyzed for S-Area Site Specific Parameters.