ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES

PHASE II INVESTIGATION

Buffalo Pumps Division–
Buffalo Forge Company

Site No. 932044

City of N. Tonawanda

Niagara County

Prepared for:

New York State Department of Environmental Conservation

50 Wolf Road, Albany, New York 12233

Thomas C. Jorling, *Commissioner*

Division of Hazardous Waste Remediation

Michael J. O'Toole, P.E., *Director*

By:

ENGINEERING–SCIENCE

ENGINEERING INVESTIGATIONS AT

INACTIVE HAZARDOUS WASTE SITES

IN THE STATE OF NEW YORK - PHASE II INVESTIGATIONS

BUFFALO PUMPS

DIVISION OF BUFFALO FORGE COMPANY SITE

NEW YORK STATE SITE NUMBER 932044

CITY OF NORTH TONAWANDA

NIAGARA COUNTY, NEW YORK STATE

Prepared For

DIVISION OF HAZARDOUS WASTE REMEDIATION

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

50 WOLF ROAD

ALBANY, NEW YORK 12233-0001

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EXECUTIVE SUMMARY

SITE BACKGROUND

The Buffalo Pumps site is located approximately eight miles north of Buffalo, New York on Oliver Street in the City of North Tonawanda, Erie County, New York. Abandoned Conrail tracks pass through the property. The site is shown on the U.S.G.S. Tonawanda West, New York 7 1/2 minute quadrangle map (Figure I-1). The site is owned and operated by the Buffalo Pumps Division, Buffalo Forge Company, which manufactures centrifugal pumps. Operations at this site can be traced back to 1891.

There are two fill areas on the Buffalo Pumps property (Figure I-2). A two-acre area adjacent to and beneath the present facility received foundry sands from bronze and iron casting operations between 1900 and 1953. The second was formerly a low-lying swampy area on the west side of the railroad tracks. Both fill areas received ash from the incineration of wood, paper and paint sludge until 1971. Between 1978 and 1980, debris from the demolition of a portion of the manufacturing facility was placed in the former swampy area and was covered by debris and soil from a storm sewer excavation. The Buffalo Pumps site remains an active manufacturing facility, but the landfills have been inactive since the early 1980's. A portion of the former swampy areas has been paved over by the owner of that property. The areas recently landfilled by Buffalo Pumps are located north of that paved lot.

The USGS installed two monitoring wells in the area filled with demolition debris during 1982. No organic compounds were detected, but chromium, copper and iron were found in excess of applicable drinking water or Class GA groundwater standards. A sediment sample was also analyzed and found to contain a concentration of copper above that for undisturbed soils in the site vicinity.

PHASE II INVESTIGATION

Three groundwater monitoring wells were installed as part of this study. Three groundwater and three waste samples were collected and analyzed for Hazardous Substance List (HSL) organic compounds and metals. Air monitoring was also conducted to define the extent of hazardous substances at the Buffalo Pumps site.

The geophysical studies originally planned for this site were not performed due to delays in receiving permission to access the site by the site owners.

SITE ASSESSMENT

The geologic stratigraphy of the site can be summarized as up to 6.5 feet of fill overlying up to 5.5 feet of fine sand and silt over up to 22.3 feet of lacustrine clay over Camillus Shale bedrock. The depth to water in the monitoring wells during this Phase II investigation was less than 7 feet with local groundwater flow to the north, or northeast.

Three waste samples were collected from the fill areas with a split spoon sampler and tested for HSL organic compounds (volatiles, semivolatiles, pesticides/PCBs), metals and total organic halogens (TOX). Sixteen HSL organic compounds were detected in these samples. Most of these compounds were polynuclear aromatic hydrocarbons, and may be related to the boiler ash dumped in the fill areas. One sample contained a low concentration of Aroclor 1254, a polyvinyl chlorinated biphenyl (PCB) compound.

Nineteen HSL metals were detected in the waste samples. In sample B-1, cadmium and zinc were present at levels in excess of published, naturally-occurring ranges for New York State and conterminous United States soils. In samples B-2 and B-3, the concentration of manganese was above the published, naturally-occurring ranges.

Three groundwater samples were collected at the Buffalo Pumps site and analyzed for (HSL) organic compounds, metals and TOX. Seven HSL organic compounds were detected in these samples. The results for five of these compounds were rejected, since these compounds were also detected in laboratory or field blanks, and their presence was attributed to laboratory contamination. Of the remaining compounds, none were present in downgradient wells in excess of three times the concentration found in the most upgradient well. Seventeen HSL metals were detected in the groundwater samples. Eight metals were detected in downgradient samples at concentrations which exceeded that found in the most upgradient well concentration by at least three times. Of these eight metals, The Class GA groundwater standards or guidance values for barium, beryllium and zinc were exceeded in GW-3, a downgradient well. These data indicate that releases of metals to groundwater are occurring from the Buffalo Pumps site. These groundwaters are not known to be a drinking water supply source within three miles of the site.

The type and concentrations of organic compounds and metals present in the waste and groundwater are consistent with the former use of the site. Those compounds are likely to be present in an environment when incinerator debris, ash and foundry sand have been disposed in an unlined landfill.

The impact of these contaminants is not expected to be significant due to the small size of disposal areas, the relatively small quantities of waste reportedly disposed, and the lack of groundwater use for the aquifer monitored on-site. Since most of the region is served by municipal water with its sources of Lake Erie and the Niagara River, the impact of this groundwater contamination is likely to be minimal.

HAZARD RANKING SYSTEM SCORE

In an attempt to quantify the risk associated with this site, the Hazard Ranking System (HRS) was applied. As currently used by the NYSDEC, the HRS is employed to aid the evaluation of inactive hazardous waste sites in New York State. This system takes into account the types of wastes at the site, receptors, and transport routes to calculate a numerical score for the site. As stated in 40 CFR Subpart H Section 300.81, the HRS was developed to be used in evaluating the relative potential of uncontrolled hazardous waste disposal facilities to cause health or safety problems or ecological or environmental damage. It is assumed by the EPA that a uniform application of the ranking system in each state will permit EPA to identify those releases of hazardous substances that pose the greatest hazard to humans or the environment.

Under the HRS, three numerical scores are computed to express the relative risk or danger from the site, taking into account the population at risk, the potential for contamination of drinking water supplies, for direct human contact, for destruction of sensitive ecological systems and other appropriate factors. The three scores are:

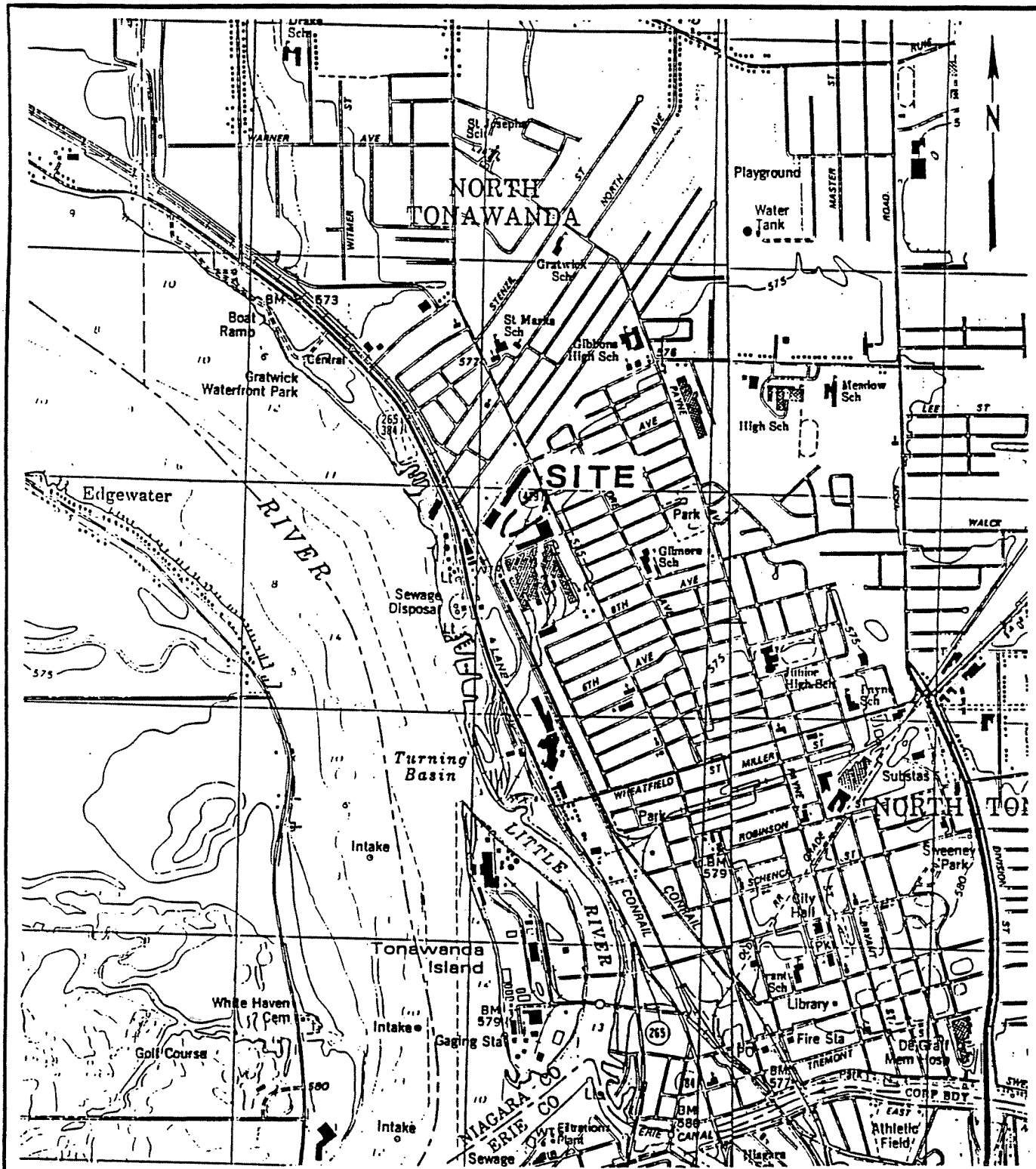
- S_M - reflects the potential for harm to humans or the environment by migration of a hazardous substance away from the facility by routes involving groundwater, surface water and air. It is a composite of separate scores for each of the three routes (S_{GW} = groundwater route score, S_{SW} = surface water route score, and S_A = air route score).
- S_{FE} - reflects the potential for harm from substances that can explode or cause fires.
- S_{DC} - reflects the potential for harm from direct contact with hazardous substances at the facility (i.e., no migration need be involved).

Based on the results of this and previous studies, the HRS scores for the Buffalo Pumps site have been calculated as follows:

S_M	=	3.86	S_{GW}	=	4.47
S_{FE}	=	0.00	S_{SW}	=	4.96
S_{DC}	=	0.00	S_A	=	0.00

RECOMMENDATIONS

Based on the site contamination assessment data, and the low HRS scores, this site does not appear to pose a significant threat to human health, and remediation of the site does not appear necessary for the protection of human health. However, the site has adversely impacted the shallow groundwater, based on data collected during the Phase II investigation. Resampling of the wells for volatiles may definitively determine whether benzene or other VOCs are present in the groundwater. Since the affected aquifer is not a principal regional aquifer, a corrective measure which warrants consideration at the Buffalo Pumps site would be to add clean, low permeability cover material to the fill areas to limit water infiltration and reduce direct contact with wastes exposed in those areas.



LATITUDE: 43°02'47"
LONGITUDE: 78°53'09"

SCALE

0 1000 2000 3000 4000 FEET

REFERENCE: U.S.G.S. 7.5' Topographic Map
Tonawanda West, NY (1980) and Tonawanda East, NY (1980) Quadrangles

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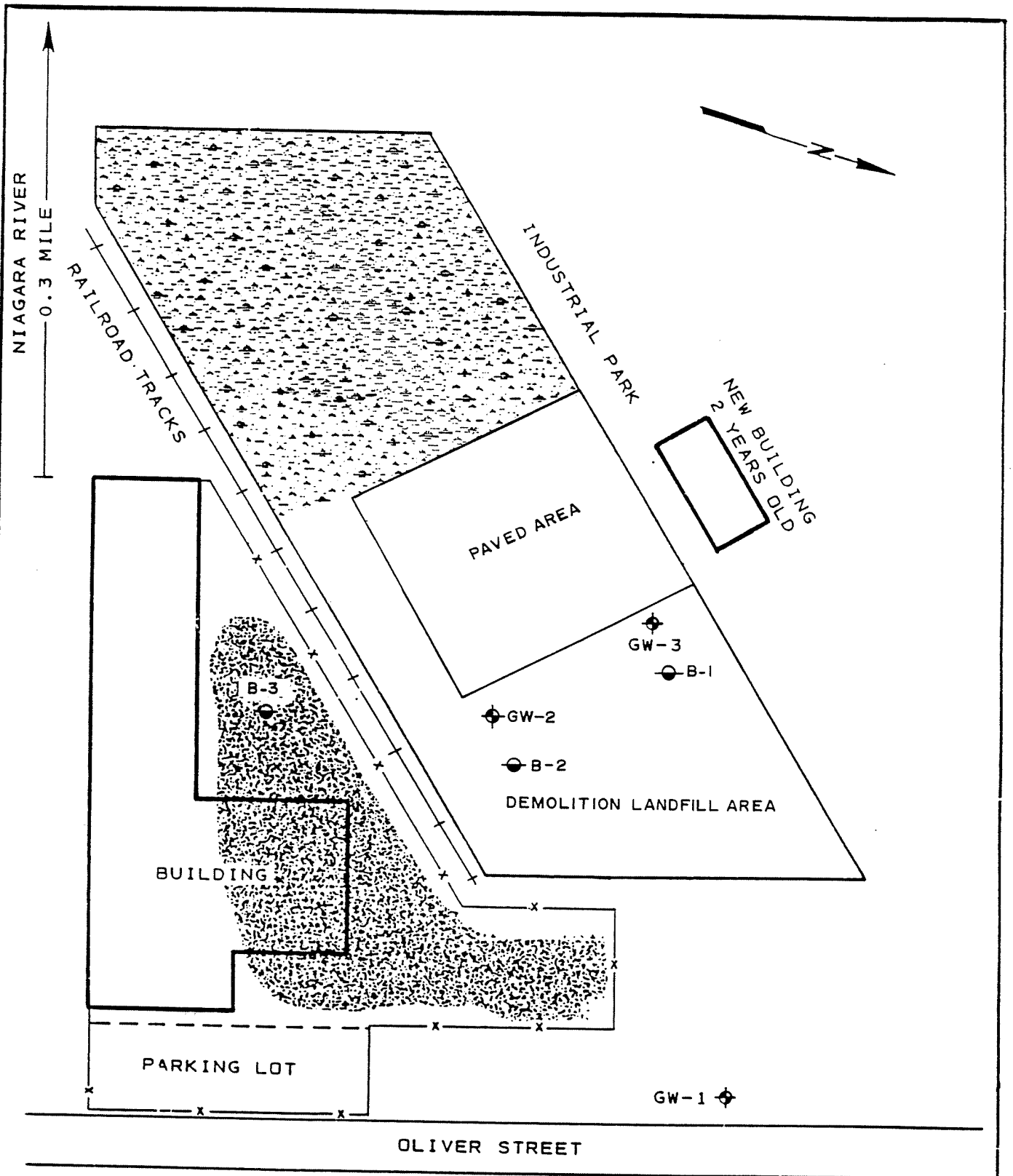
SITE LOCATION MAP
BUFFALO PUMPS

FIGURE I-1



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PLOT PLAN
BUFFALO PUMPS

FIGURE I-2

SECTION II

PURPOSE

The objective of a Phase II investigation is to determine if hazardous wastes have been disposed of in the site, if contaminants exist in the various mediums (air, groundwater, surface water or soils) and whether or not threats to human health or the environment exist. Information gathered relative to the above will allow the Department to reclassify the site or if warranted delist it.

The Buffalo pumps disposal areas, approximately 2-acres each, are adjacent to the Buffalo Pumps manufacturing facility at the intersection of East Avenue and Oliver Street in the City of North Tonawanda, Niagara County, New York. The Buffalo Pumps Division of Buffalo Forge Company has owned and operated the plant and the disposal areas from 1931 to present.

From 1900 to 1953, foundry sands were landfilled in the disposal site located adjacent to and beneath the plant building (Muench, 1985). From 1900 to 1971, boiler ash from the incineration of wood, paper, and paint wastes was also disposed in this area (NCHD, 1981). Soil cover was not placed over the fill area (Muench, 1985).

In 1978-79, debris from the demolition of a portion of the Buffalo Pumps manufacturing facility was disposed in the low-lying fill area north of the foundry sand disposal site. In approximately 1980, construction debris and earth fill from a sewer excavation on Oliver Street in North Tonawanda were disposed on top of the demolition debris. Presently, both disposal sites are inactive.

Groundwater samples collected from two monitoring wells located within the demolition landfill were found to have 0.04 and 0.15 mg/liter chromium, 0.3 and 3.4 mg/liter copper and 51 and 260 mg/liter iron respectively (USGS, 1985).

This Phase II investigation was designed to supplement information previously compiled for the site, assess the presence of hazardous substances, and assess the potential for off-site migration.

SECTION III

SCOPE OF WORK

INTRODUCTION

Field work for the Phase II investigation at the Buffalo Pumps site began and was completed in January, 1988. The Phase II Work Plan dated April 28, 1986 was approved by NYSDEC prior to commencing the field investigations. The Work Plan was later revised with NYSDEC approval, based on the preliminary findings of the field investigations.

The original Work Plan included a geophysical survey. This survey was not performed, due to delays in being allowed access to the site. The proposed surface water sample was not collected since the area to be sampled since been filled and paved. All field work was performed in accordance with a NYSDEC-approved project Quality Assurance/Quality Control Plan and site-specific Health and Safety Plan.

PHASE II SITE INVESTIGATION

The scope of the investigation is summarized in Table III-1 and is described below. All field work was performed or supervised by qualified (ES) staff. Field procedures are described in Appendix A.

Monitoring Well Installations

Three monitoring wells were installed around the perimeter of the demolition debris landfill site between January 8 and January 11, 1988 by Rochester Drilling Company, Inc.(Figure III-1). Wells were installed upgradient and downgradient of the demolition debris landfill area (Table III-2). The upgradient well (GW-2) monitors the perched water table. Downgradient wells GW-1 and GW-3 monitor the perched water table along the north end of the site boundary.

The wells were drilled and constructed in accordance with NYSDEC guidelines. Soil samples were generally collected at intervals of two feet throughout the depth of the well at each location. Selected soil samples were analyzed for grain-size characteristics and Atterberg Limits.

The monitoring wells were constructed with two-inch inside diameter threaded, flush-joint PVC pipe and slotted screen. A quartz sandpack was backfilled around the screen. A bentonite pellet seal was used to isolate the screened section. Water levels in the wells were measured on at least two dates following installation and well development. Well development generally consisted of removing water by air-lift, utilizing compressed air. The monitoring wells were capped with a vented PVC cap and a locking steel protective casing.

Field procedures for the monitoring well installations are presented in Appendix A. Boring logs, well schematics and geotechnical analyses results are included in Appendix B.

Waste Samples

Three waste samples were collected on January 11, 1988 from three borings conducted in the disposal areas as shown on Figure III-2. Sample B-3 was relocated to the south from its proposed location in the work plan due to accessibility limitations. Samples were collected with a split spoon sampler which was decontaminated between each sample. The waste samples were tested for Hazardous Substance List (HSL) organic compounds (volatiles, semivolatiles), metals and total organic halogens (TOX) by Nanco Labs, Inc. The locations were resampled on October 12, 1988 and those samples were analyzed for HSL pesticide/PCBs by York Laboratories. A trip blank and field (wash) blank were also analyzed for HSL volatiles. Analyses and reporting were performed utilizing applicable NYSDEC Superfund and Contract Laboratory protocols dated 6/86 and its latest amendments (NYSDEC CLP). The samples were generally composited over the top several feet of fill.

The field procedures utilized during the field investigation are presented in Appendix A, and the analytical results are discussed in Section IV and listed in Appendix C.

Groundwater Sampling and Analysis

Groundwater samples were collected from each of the three Phase II Monitoring wells on January 27 and 28, 1988. These samples were analyzed for HSL volatile and semivolatile organic compounds, metals and TOX by Nanco Labs, Inc. In addition, a trip blank and field blank were analyzed for HSL volatiles. On October 12, 1988 the wells were resampled and analyzed for HSL pesticide/PCBs by York Laboratories. Analyses and reporting were performed utilizing applicable NYSDEC CLP methods. Groundwater samples were collected with teflon bailers and dedicated polyethylene or polypropylene line.

Field procedures for the groundwater sampling are presented in Appendix A. Analytical results are discussed in Section IV and listed in Appendix C.

Air Survey

A Photovac Total Ionizables Present (TIP-II) photoionization detector was used to determine the presence of volatile organic compounds in the air. This monitoring was performed as a health and safety measure during on-site field work. Air in the breathing zone (4 to 5 feet above ground) was monitored during drilling and sampling activities. Soil samples were also screened, as was the headspace over each monitoring well, as a preliminary means of determining the presence of volatile organic compounds.

TABLE III -1

SUMMARY OF PHASE II TASKS

BUFFALO PUMPS SITE

Task	Description of Task
Prepare and Update Work Plan	Reviewed the information in the Phase I report and supplemental data, conducted a site visit, examined available aerial photography and prepared the Phase II work plan.
Conduct Records Search/Data Compilation	Reviewed Phase I information and augmented it by contacting or visiting central and local offices of NYSDEC, NYSDOH, County DOH, etc.
Site Reconnaissance	Checked locations of monitoring wells, examined terrain for accessibility by drill rigs, examined suitability for geophysical surveys, and determined appropriate locations of sampling points.
Conduct Geophysical Studies	The geophysical survey was not performed due to delays in receiving permission to access the site.
Conduct Boring/Install Monitoring Wells	Installed three wells. The well borings were drilled to depths of 10 feet. Wells were constructed with 2-inch PVC pipe.
Soil Samples From Borings	Soil samples were collected at 2-foot intervals during drilling and at changes in subsurface lithology. Performed three grain size analyses and one Atterberg limits test.

TABLE III-1 CONTINUED

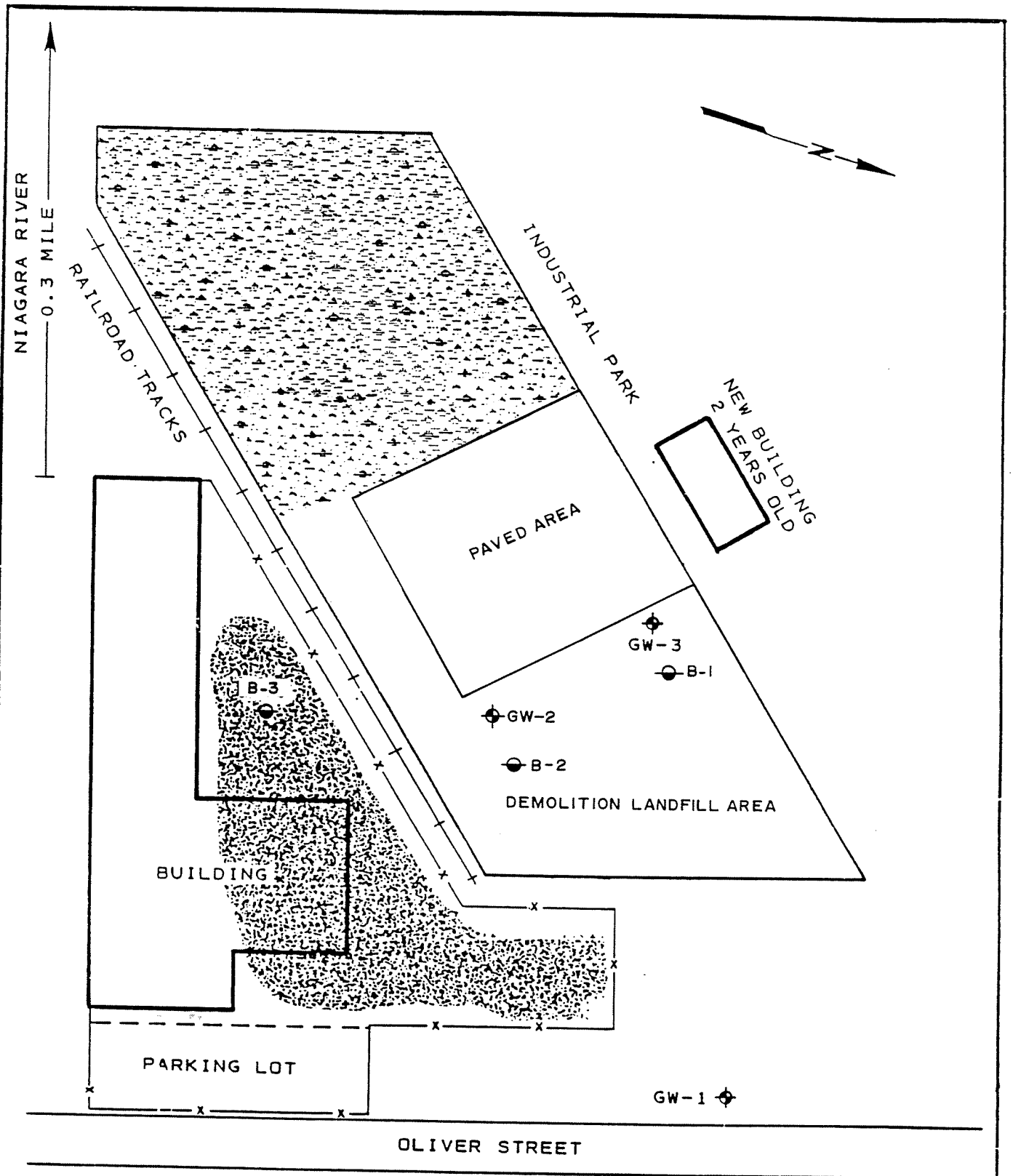
Task	Description of Task
Perform Sampling and Analysis	
Waste Samples	Three waste samples were collected and analyzed for HSL metals and organics and TOX.
Groundwater Samples	Three groundwater samples were collected and analyzed for HSL organics and metals and TOX (existing wells OW-1 and OW-2 were not found and could not be sampled).
Surface Water Samples	No samples were collected as the area has been filled and paved.
Air Samples	Using a Photovac TIP-II, the presence of volatile organic compounds was monitored during on-site activities.
Conduct Site Assessment	A preliminary site contamination assessment was conducted to complete the final HRS score and HRS documentation records.
Report Preparation	Prepared a final report containing significant Phase I information, additional field data, final HRS score, HRS documentation records, and site assessments.
Project Management	Project coordination, administration and reporting.

TABLE III-2

MONITORING WELL LOCATIONS AND SPECIFICATIONS

BUFFALO PUMPS SITE

Well Number	Unit Screened	Location	Depth (ft.)	Screened Interval (ft.)
GW-1	Silty Sand	Downgradient	10	5 - 10
GW-2	Fill/Silty Sand	Upgradient	10	5 - 10
GW-3	Silty Sand	Downgradient	10	5 - 10



EXPLANATION:

- PHASE II MONITORING WELL
- WASTE BORING
- REPORTED FOUNDRY SAND AND ASH DISPOSAL AREA
- MARSH

150 0 150 FT. RESIDENTIAL AREA

SCALE: 1" = 150'

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PLOT PLAN
BUFFALO PUMPS

FIGURE III-1

SECTION IV

SECTION IV

SITE ASSESSMENT

SITE HISTORY

The Buffalo Pumps site is located in the City of North Tonawanda, New York (Figure IV-1). The history of the Buffalo Pumps site has been traced back to 1891, when the property was purchased by Voelker and Felthousen, who operated the Buffalo Steam Pump Company (IATFR, 1979). In 1931, the plant became the Buffalo Pumps Division, Buffalo Forge Company (NCHD, 1981). Buffalo Pumps manufactures centrifugal pumps.

The Buffalo Pumps site includes two fill areas (Figure IV-2). One site is located within the fenced area, and is less than two acres in size. From 1900 to 1953, foundry sands used in bronze and iron casting operations were reportedly disposed in this area (Muench, 1985). Until 1971, boiler ash from the incineration of plant wastes including wood, paper and paint sludge was reportedly disposed in one or both fill areas. Soil cover was not placed over the wastes at the time. A portion of the Buffalo Pumps building, which was constructed in the early 1980s, is now located over part of the fill area. At the time of the building addition, soil may have been placed over the fill in some locations.

During 1978 to 1979, debris and soil fill from the demolition of a portion of the Buffalo Pumps manufacturing facility were disposed in the low-lying 2-acre area north of the foundry sand disposal site. Construction debris and soil fill from a storm sewer excavation project on Oliver Street in North Tonawanda were disposed of on-site in 1979-80. This fill material was reportedly placed over the material disposed during the plant demolition project (ES and D&M, 1985).

The Buffalo Pumps Division of Buffalo Forge Company presently maintains an active manufacturing facility at the site. The two disposal areas have been inactive since the early 1980s.

In 1982, the United States Geological Survey (USGS) installed two wells at the site as part of an investigation of hazardous waste sites in the vicinity of the Niagara River. The 1982 USGS wells were not found at the site during the Phase II investigation; this is probably due to construction of the paved area at the site. In January, 1986 a final Phase I investigation report was prepared for the site, including a preliminary Hazard Ranking System (HRS) score.

REGIONAL SETTING

Regional Geology

The Buffalo Pumps site lies within the Erie-Ontario Lowlands physiographic province of New York State. In the vicinity of the site, this lowland plain is gently sloping to the west.

The bedrock in the site vicinity is mapped as the Silurian-aged Camillus shale, deposited 410 to 440 million years ago. It is gray, red or green, thinly bedded, with lenses of gypsum (EPA, 1985). The thickness of the unit is estimated at 400 feet, but decreases to the north near the contact with the Lockport dolomite.

The unconsolidated deposits in the site vicinity consist of glacial sediments deposited during the Pleistocene, and lacustrine sediments deposited in glacial lakes about 10,000 years ago (EPA, 1985). These lacustrine deposits are mapped as silts and very fine sands, and may be remnants of glacial Lake Tonawanda, which covered the area adjacent to Tonawanda Creek (USDA, 1972). Tonawanda Creek lies about 1.6 miles south of the Buffalo Pumps site. Low permeability clayey lacustrine deposits are sometimes found beneath the silt and fine sands. A thin layer of glacial till is often encountered immediately overlying bedrock.

Regional Hydrology

The Buffalo Pumps site lies within the Lake Erie-Niagara River drainage basin (NYSDEC, 1985). The Niagara River is a Class A (drinking supply) stream located 1600 feet west of the site. The Niagara River flows from Lake Erie northward into Lake Ontario. Flow from Lake Ontario is via the St. Lawrence Seaway to the Atlantic Ocean.

The groundwater hydrology of the region is characterized by a bedrock aquifer overlain by an aquifer within the unconsolidated deposits (EPA, 1985). Within the Camillus Shale bedrock, groundwater flows through joints, fractures and solution cavities. The transmissivity of the Camillus shale is estimated at 7,000 to 70,000 gallons/day/foot (LaSala, 1968). Regional groundwater flow in the Camillus Shale is to the north.

Groundwater within the unconsolidated deposits is influenced by the low permeability clays overlain by coarser silt and fine sand lacustrine sediments. The low permeability clays create a perched water table during periods of high precipitation (EPA, 1985). The perched water table may discharge to areas of low topography or nearby surface water bodies, such as Tonawanda Creek or the Niagara River. In close proximity to these surface water bodies, groundwater flow in the unconsolidated deposits may be parallel to the surface water flow.

SITE GEOGRAPHY

Topography

The Buffalo Pumps site is located in the City of North Tonawanda, Niagara County, New York (Figure IV-1). The population of North Tonawanda was 35,760 in 1980 (Rand McNally, 1981).

The site consists of two former disposal areas which occur on two parcels. The first is an approximate two-acre area immediately adjacent to the plant building. This parcel is bordered by East Avenue to the south, Oliver Street to the east and abandoned Conrail railroad tracks to the north and west.

The second parcel is to the north, and is also about two acres in size. it is separated from the rest of the Buffalo Pumps facility by the abandoned Contrail railroad tracks. This second parcel was formerly a low-lying, swampy area which has received approximately four feet of demolition debris and soil fill. This parcel is bordered to the north and west by commercial properties, and to the south and east by the Conrail tracks.

Both disposal sites are at an elevation of approximately 575 feet above mean sea level (NYSDOT, 1976). There is little preferred surface drainage. Previously drainage was via ditches into a swampy area to the west. A portion of this area has been filled and paved.

Soils

The site lies in an area with natural soils mapped as lake-deposited fine sands and silts (USDA, 1972). Soils of this type were encountered in the Phase II well borings at depths of 4.5 to 6.5 feet. Overlying the fine sands and silts is a layer of fill, consisting of clay to gravel-size soil material mixed with brick and concrete debris.

SITE HYDROGEOLOGY

This discussion of site hydrogeology is based on three Phase II and two USGS well borings conducted on-site, NYS Geological Survey Maps, and USGS and NYSDOT topographic maps. Boring logs, well schematics and geotechnical analyses results are presented in Appendix B of this report.

Geology

The Phase II well borings were conducted in both waste disposal parcels. Well GW-1 was originally presumed to be the upgradient location, and is located near the foundry sand and boiler ash disposal area just west of Oliver Street (Figure IV-2). Wells GW-2 and GW-3 were installed in the demolition fill area, north of the abandoned Conrail tracks.

Each well boring encountered 4.5 to 6.5 feet of fill at the surface (Table IV-1). The fill was thickest at GW-2. The general characterization of the fill was the same for both areas; gray to black silt and fine sand, with less than 10 percent fine gravel and brick fragments.

A fine sand and silt layer was encountered beneath the fill at each location, and is believed to be the lake-laid deposit mapped for the area in the soils survey (USDA, 1972). The grain size characteristics of the fine sand and silt layer are summarized in Table IV-2. This unit was saturated in all borings. In GW-1 and GW-3, the fine sand and silt unit was 4.5 feet thick, and underlain by a clayey-silt deposit. At GW-2, the fine sand and silt was at least 5.5 feet thick, and the clayey-silt deposit was not encountered before the boring was terminated at 12.0 feet. The clayey-silt deposit was not saturated in GW-1 and GW-3. These well borings were only advanced one foot into the deposit before being terminated at 10 feet.

The USGS installed two wells in the demolition fill area in 1982. The well borings have been designated USGS-1 and USGS-2 for the purposes of this report. The locations of the wells are shown on Figure IV-2; the stratigraphic information from the well borings is summarized on Table IV-1. The USGS characterized the site geology as glacial lacustrine clay overlying the Camillus shale bedrock (EPA, 1985). USGS-1 was drilled to a depth of 30.0 feet. Bedrock was encountered at 28.5 feet. A clay unit 22.3 feet thick was described as overlying bedrock. Fill was encountered at the ground surface to a depth of 6.2 feet. In well boring USGS-2, fill was not encountered. Beneath the surficial one foot of topsoil, alternating layers of sand and clay were encountered to the final depth of the boring at 6.2 feet.

Based on the two USGS well borings and the three Phase II well borings, it is apparent that the upper ten feet of the subsurface is highly variable in the occurrence and thickness of the fill, sand, and clay layers. These types of variations are typical of glaciolacustrine sediments.

The Phase II well borings did not encounter bedrock. The bedrock mapped for the site vicinity is the Camillus shale (LaSala, 1968). The characteristics of the Camillus shale are discussed in more detail in the subsection on regional geology.

Groundwater Hydrology

Three monitoring wells were installed in the two disposal areas, with screened sections in the lacustrine fine sand and silt unit. Well GW-2 was also partially screened in the fill. Table IV-3 contains a summary of the monitoring well data. Table IV-4 contains the water level data for two measurement dates.

The groundwater elevation data for the January 12, 1988 measurement date indicate northerly groundwater flow in the fine sand and silt unit. This is roughly parallel to the regional flow direction of the Niagara River. For the February 17, 1988 data, the groundwater flow is indicated to be toward the north. At this shallow depth, groundwater flow may be localized, and influenced by subsurface features such as utility lines, by recharge from precipitation, and by other factors.

For both dates, the most upgradient well is GW-2; GW-1 and GW-3 are the downgradient wells. Because of its location within the demolition fill area, and the screened section occurring within the fill, samples from GW-2 may not be truly representative of upgradient or background groundwater quality conditions.

Based on the limited depth of exploration, it is not known what effect the clayey-silt unit beneath the fine sand and silt has on groundwater flow. If the unit is sufficiently thick, as indicated at USGS-1, it may inhibit downward groundwater flow. It is not known whether hydraulic connection exists between the unconsolidated soil aquifer monitored and the bedrock aquifer.

SITE CONTAMINATION ASSESSMENT

Potential contamination of the environment within the site boundary was evaluated by a review of the character and quantity of wastes suspected at the site, chemical analysis of the groundwater and waste samples and air quality monitoring with a Tip-II photoionization detector. In addition to the results of the Phase II field investigations,, previous sampling and analyses conducted by the USGS were also considered in the site contamination assessment.

Waste Characterization

The Buffalo Pumps site includes two disposal areas; each are approximately two acres in size. During the period 1900 to 1953, foundry sands and boiler ash from the incineration of wood, paper, and paint wastes were reportedly disposed adjacent to the Buffalo Pumps manufacturing facility, in one or both disposal area (Figure IV-2). Boiler ash continued to be landfilled at the site until 1971 (Muench, 1985).

From 1978 to 1979, debris and excavated soil from the demolition of a portion of the Buffalo Pumps manufacturing facility were disposed in the low-lying area north of the foundry sand-boiler ash disposal area. From 1979 to 1980, additional construction debris and soil from a North Tonawanda sewer excavation project were reportedly disposed on top of the demolition debris.

In 1982, the USGS installed two monitoring wells in the demolition fill area and collected groundwater samples from each. A sediment sample from the swampy area was also collected. Based on observations made during the Phase II investigation, it appears as though a paved area covers most of the USGS sample locations (Figure IV-2).

The USGS samples were analyzed for chromium, copper, iron and organic compounds. However, the sediment sample was analyzed for organic compounds at detection limits of several mg/kg instead of ug/kg as required by the analytical method. The analytical results are summarized on Table IV-5.

No organic compounds were detected in any of the samples. The concentration of chromium, copper and iron in the sample from USGS-1 exceeded the USEPA criteria for drinking water and the New York State Class GA groundwater standards (EPA, 1985). The concentration of

iron in USGS-2 exceeded the USEPA criteria for drinking water and the New York State Class GA groundwater standard. The sediment sample contained a concentration of copper above the typical range for undisturbed soils from the Tonawanda area.

During the Phase I investigation in 1985, air monitoring was performed at the Buffalo Pumps site. HNu meter readings for volatile organic compounds in the vicinity of the demolition fill area averaged 5 to 7 ppm above background. A high reading of 9 ppm was noted in the northwestern end of that fill area. Air monitoring conducted during the Phase II investigation in January 1988 did not direct concentrations above background.

The following subsections provide a summary of the results of the Phase II investigation sampling and analysis tasks. Whenever possible, samples were collected upgradient of the site to establish ambient or background conditions. These levels were compared to those found on-site, or downgradient of the site. Concentrations downgradient of the site in excess of three times the upgradient concentrations may indicate releases from a contamination source located on-site. The value of three times is generally recognized by the USEPA and NYSDEC as constituting a "significantly higher" concentration for purposes of scoring an HRS observed release for a particular pathway. Therefore, reference is made to the number and types of analytes considered to be observed releases under each pathway, as discussed in the following subsections.

For the purposes of the groundwater contamination assessment, GW-2 is considered to be the most upgradient well located on-site. However, GW-2 may not be truly representative of upgradient groundwater quality, because GW-2 is partially screened in the fill zone.

The analytical results have also been compared to applicable New York State standards or guidance values. Standards and guidance values are provided for the Class GA groundwater classification. Standards that have been promulgated for groundwater appear in 6 NYCRR Part 703. These regulations also provide authority for the use of guidance values when a standard does not exist for a given water classification. For Class GA groundwater, the standards and guidance values cited are for sources of drinking water. Waste results have been compared to published naturally-occurring ranges in New York State or conterminous United States soils.

The analytical data were reviewed and validated for data usability. Included in the evaluation was a review of the results of "blank" sample analyses. In cases where blank (method, trip, or field) contamination was detected, the individual constituent concentrations were judged as follows: 1) If the sample value was less than 10 times the highest blank value, the sample value was rejected (flagged "R"); 2) If the sample value was between 10 and 20 times the highest blank value, the sample was considered an estimate (flagged "X"); 3) If the sample was greater than 20 times the highest blank value, it was accepted (unflagged). These criteria were used as guidance limits to help determine whether blank contamination was potentially responsible for the presence of these constituents in the field samples.

As part of the Phase II investigation, three borings were advanced into the suspected waste areas to collect samples for analysis of HSL organics, metals and TOX. Samples B-1 and B-2 were collected from the demolition fill and composited from 0 to 1 foot at B-1, and from 0 to 7

feet at B-2. Sample B-3 was collected in the foundry sand/boiler ash disposal area, and was composited by volume over 0 to 4 feet. These soils samples were collected on January 11, 1988 using a split spoon sampler and resampled on October 12, 1988 for pesticide and PCBs.

Sixteen HSL organic compounds were detected in the waste samples (Table IV-6). Methylene chloride, acetone and bis(2-ethylhexyl)phthalate were also detected in laboratory blank samples. The presence of these compounds is therefore attributed to laboratory contamination and the results have been rejected. Sample B-2 contained the greatest number of organic compounds, and at the highest concentrations. Most of the organic compounds detected in the waste samples were members of a class of compounds known as polynuclear aromatic hydrocarbons (PAHs). PAHs can be found in any hydrocarbon combustion process and may be released from oil spills (Sittig, 1985). The major sources are heat and power generation, refuse burning, industrial activity, etc. The PAH compounds could be related to the boiler ash which was reportedly dumped on-site from about 1900 to 1971. The total PAH concentration was highest in B-2. In addition to the PAHs, one type of polychlorinated biphenyl known as Aroclor 1254 was found at a low concentration in B-1.

Nineteen HSL metals were detected in the waste samples (Table IV-7). In general, the highest concentrations were found in Sample B-2. The waste results have been compared to published naturally-occurring ranges in soils for New York State and the conterminous United States. For cadmium and zinc, the concentrations in Sample B-1 exceeded the applicable published range. The concentration of cadmium in B-1 was more than double the published naturally-occurring range. The concentrations of manganese in samples B-2 and B-3 were in excess of the published range as well.

These waste sample results indicate concentrations of PAHs, cadmium, manganese and zinc above naturally-occurring ranges in soil.

Groundwater Contamination Assessment

Three groundwater samples were collected on January 27, 1988 from the Phase II monitoring wells in January, 1988 and analyzed for HSL organics, metals and TOX. Seven HSL organic compounds were detected in those samples (Table IV-8). The results for methylene chloride, acetone, carbon disulfide, benzene and bis(2-ethylhexyl)phthalate were rejected due to their presence in laboratory and field blank samples. Of the remaining compounds, no downgradient concentrations were in excess of three times the concentration reported for upgradient well GW-2. The presence of benzene (2.8 ug/l) in a trip blank (Appendix C) indicates an external source of sample contamination. It may be necessary to resample the wells for HSL volatiles to document the presence or absence of benzene and other VOCs in the groundwater.

Seventeen HSL metals were detected in the groundwater samples (Table IV-9). In general, the highest concentrations were found in GW-3. For eight elements, the concentration in GW-3 exceeded the concentration in GW-2 by three times or more. These elements are barium, beryllium, chromium, iron, lead, vanadium, nickel and zinc. The Class GA standard for arsenic was

exceeded in sample GW-2. The Class GA standards for manganese, iron, and lead and the guidance value for magnesium were exceeded in all three groundwater samples. Class GA standards or guidance values for barium, beryllium, and zinc were also exceeded in GW-3. In addition, the EPA ambient water quality criterion for nickel was exceeded in GW-2 and GW-3.

The concentrations of the eight elements in GW-3 which are in excess of three times the concentrations in GW-2 indicate that the site is releasing these elements into the groundwater. Two other points are noteworthy. Class GA standards and guidance values may not be applicable in this case, since the overburden aquifer monitored is not a likely drinking water supply source. The City of Tonawanda has a municipal water system with intakes on the Niagara River. Also, of the compounds previously noted at high concentrations in the waste samples, manganese and zinc were noted at significant levels in the groundwater samples. The other metal noted in the waste samples, cadmium, was not detected in the groundwater samples. Some of the other metals detected at high concentrations in GW-3, barium, lead, chromium and copper, were not detected at abnormally high concentrations in the waste samples indicating other source areas for these compounds may be present in the fill on-site. Despite the possibility that GW-2 may not be truly representative of upgradient groundwater quality, a comparison of the downgradient groundwater sample results with GW-2 indicate releases of eight metals is occurring which may be attributed to the site. The types and concentration of organic compounds and metals present in the waste and groundwater samples are consistent with the former use of the site. In particular, the PAHs and metals are likely to be present in an environment where incinerator debris, ash and foundry sand have been disposed in an unlined landfill, and in an area with a high water table.

Due to the small size of the disposal areas, the relatively minor quantities of wastes reportedly disposed there, and the lack of groundwater use for the aquifer monitored on-site, the impact of the observed contamination is not expected to be significant. Since the region is largely serviced by municipal water systems having sources in Lake Erie and the Niagara River, there is not likely to be any impact on human health from the groundwater contamination.

However, the groundwater contamination condition may require some action be undertaken. The affected aquifer is not a principal drinking water supply, and groundwater remediation does not appear warranted. However, covering the fill areas with clean, low permeability soil fill to limit water infiltration and reduce the potential for direct contact with wastes exposed in those areas may be warranted and should be considered.

TABLE IV-1

STRATIGRAPHY SUMMARY

PHASE II WELL BORINGS

BUFFALO PUMPS SITE

(Depth in Feet Below Ground Surface)

Stratigraphic Unit (Elevations*)	GW-1 (498.7)	GW-2 (501.7)	GW-3 (499.2)	USGS-1	USGS-2
Topsoil					0 - 1.0
Fill	0 - 4.5	0 - 6.5	0 - 4.5	0 - 6.2	
Lacustrine	4.5 - 9.0	6.5 - 12.0	4.5 - 9.0		3.0 - 5.0
Fine Sand and Silt					5.5 - 6.2
Lacustrine	9.0 - 10.0		9.0 - 10.0	6.2 - 28.5	1.0 - 3.0
Clayey-Silt					5.0 - 5.5
Bedrock				28.5 - 30.0	

* Elevation of ground surface in feet referenced to an assumed on-site datum.

NOTE: USGS boring information referenced from "Preliminary Evaluation of Chemical Migration to Groundwater and the Niagara River from Selected Waste Disposal Sites" USEPA, 1985.

TABLE IV-2

GRAIN-SIZE CHARACTERISTICS SUMMARY

BUFFALO PUMPS SITE

Boring Number	Sample Depth (ft.)	% Gravel	% Sand	% Silt	% Clay	Unified Soil Classification
GW-1	4 - 6	0.1	26.1	61.8	12.0	CL
GW-2	10 - 12	11.1	53.3	25.6	10.0	SM
GW-3	6 - 8	0.0	50.4	35.5	14.1	SM

TABLE IV-3

MONITORING WELL DATA

BUFFALO PUMPS SITE

Well I.D.	Ground Surface Elevation (Feet*)	Top of Well Screen Stratigraphic Unit Screened	Bottom of Well Screen Depth/Elevation (Feet/Feet*)	Depth/Elevation (Feet/Feet*)
GW-1	498.7	Fine Sand and Silt	5.0 / 493.7	10.0 / 488.7
GW-2	501.7	Fine Sand, Silt and Fill	5.0 / 496.7	10.0 / 491.7
GW-3	499.2	Fine Sand and Silt	5.0 / 494.2	10.0 / 489.2

* Referenced to an assumed on-site datum.

TABLE IV-4

WATER LEVEL DATA

BUFFALO PUMPS SITE

Well I.D.	Ground Surface Elevation (Feet*)	Top of PVC Well Pipe Elevation (Feet*)	Well Screen Interval Elevation (Feet*)	Water Level Data Date 2/17/88 Depth to Water Level (Feet**)	Date 2/17/88 Water Level Elevation (Feet*)	Date 1/12/88 Depth to Water Level (Feet**)	Date 1/12/88 Water Level Elevation (Feet*)
GW-1	498.7	500.4	493.7 - 488.7	4.3	496.1	5.3	495.1
GW-2	501.7	504.1	496.7 - 491.7	6.2	497.9	5.8	498.3
GW-3	499.2	500.9	494.2 - 489.2	3.4	497.5	4.0	496.9

* Referenced to an assumed on-site datum.

** Water level depth from top of PVC.

TABLE IV-5

USGS SAMPLE RESULTS

BUFFALO PUMPS SITE

	Sample Number		
	Groundwater (ug/L)		Sediment (ug/Kg)
	1	2	3
Inorganic Constituents			
Chromium	150*	40	--
Copper	3,400*	300	1,500,000**
Iron	260,000*	51,000*	10,000,000
Organic Compounds	--	--	***

NOTE: Analyses of groundwater and sediment samples from Buffalo Pumps Division, Site 6, North Tonawanda, New York, June 21, 1982. Dashes indicated that compound was not found.

* Exceeds USEPA criterion for maximum permissible concentration in drinking water or New York standard for maximum concentration in groundwater.

** Exceeds concentrations in samples from undisturbed soils in the Tonawanda area. Undisturbed soils not analyzed for iron.

*** Analyzed at detection limit above that required by the study. No compounds detected.

Source: EPA, 1985.

TABLE IV-6
BUFFALO PUMPS
WASTE RESULTS
HSL ORGANIC COMPOUNDS (ug/kg)(a)

COMPOUND (b)	Sample Location (c) B-1		B-2		B-3	
Methylene Chloride	—	R	—	R	—	R
Acetone	—		—		—	R
Phenanthrene *	300.0	J	5600.0		—	
Di-n-Butylphthalate	230.0	J	—		—	
Fluoranthene *	770.0		5700.0		750.0	
bis(2-Ethylhexyl)Phthalate	—	R	—	R	—	R
Chrysene *	580.0	J	2600.0		—	
Benzo(b)fluoranthene *	720.0		1600.0		720.0	
Benzo(a)Pyrene *	520.0	J	2100.0		—	
Indeno(1,2,3-cd)Pyrene *	330.0	J	1200.0		—	
Acenaphthene *	—		1000.0	X	—	
Fluorene *	—		1100.0		—	
Pyrene *	—		4900.0	X	770.0	
Benzo(a)anthracene *	—		2600.0		—	
Benzo(k)fluoranthene *	—		1900.0		—	
Aroclor 1254	1700.0		—		—	
Total PAH's	3220.0		30300.0		2240.0	

FOOTNOTES:

(a) See Appendix C for concentration/dilution factors.
(b) Only HSL organic compounds that were detected are presented.
(c) Samples collected by Engineering Science Inc. on January 11, 1988 and resampled on October 12, 1988 for pesticides and PCBs.
* PAH - Polynuclear Aromatic Hydrocarbons

DATA QUALIFIERS:

J: Indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero.
---: Indicates that the compound was analyzed for but not detected. Refer to Appendix C for detection limit.
R: Data validation recomends this value be rejected.
X: Data validation recommends this value be considered an estimate.

TABLE IV-7
WASTE RESULTS
HSL METALS (mg/kg)
BUFFALO PUMPS

METAL (a)	NATURALLY OCCURRING RANGES IN NYS SOILS (b)	Sample Location (c) B-1	B-2	B-3
Aluminum		8400.0 X	15100.0 X	3000.0 X
Arsenic	0.1-100	3.9 X	3.9 X	12.4 X
Barium	10-500	130.0	160.0	—
Beryllium	<1-15	[0.7]	[0.9]	—
Cadmium	0.01-7 (d)	14.9 X	— X	— X
Calcium		60400.0 X	127500.0 X	6200.0 X
Chromium	1-2000	21.0	19.3	—
Cobalt	<3-70	[10.5]	[14.1]	[11.7]
Copper	1-700	340.0	24.1	37.9
Iron		32400.0 X	20400.0 X	132800.0 X
Lead	<10-700	57.8 X	29.6 X	33.8 X
Magnesium		17800.0 X	32700.0 X	1400.0 X
Manganese	<2-700	650.0 X	960.0 X	760.0 X
Mercury	0.02-0.5	— R	— R	— R
Nickel	<5-7000	95.1	—	—
Potassium		— X	2100.0 X	— X
Sodium		—	[570.0]	—
Vanadium	20-500	[3.9]	[5.5]	[11.9]
Zinc	<5-3500	5100.0 X	190.0 X	56.2 X

FOOTNOTES:

(a) Only HSL metals that were detected are presented. If the result is a value greater than or equal to the instrument detection limit but less than the contract-required limit the value is reported in bracket (i.e.; [10]).
(b) USGS Professional Paper 1270 (1984): New York State Soils.
(c) Samples collected by Engineerrng Science Inc. on January 11, 1988.
(d) Booz, Allen & Hamilton, Inc. (1983): Range in U.S. Soils.

DATA QUALIFIERS:

—: Indicates that the metal was analyzed for but not detected. Refer to Appendix C for detection limit.
X: Data validation recommends this value be considered an estimate.
R: Data validation recommends this value be rejected.

TABLE IV-8
GROUNDWATER RESULTS
HSL ORGANIC COMPOUNDS (ug/L)
BUFFALO PUMPS

COMPOUND (a)	NYS STANDARDS/ GUIDANCE VALUES (b)	Sample Location (d) GW-2(c)	GW-1	GW-3
Methylene Chloride	50 G	R	R	R
Acetone		R	R	R
Carbon Disulfide		R	R	R
Benzene	ND (e)	R	R	R
bis(2-Ethylhexyl)Phthalate	4200	R		R
Di-n-Octyl Phthalate	50 G	—	32.0 (f)	—
Di-n-Butlyphthalate	770	52.0	—	54.0

FOOTNOTES:

(a) Only HSL organic compounds that were detected are presented.
(b) Referenced from; "Ambient Water Quality Standards and Guidance Values" for Class GA drinking supply waters, 6 NYCRR Part 703, NYSDEC, 9/1/78, as amended through 4/1/87. The value presented is the standard except where noted by "G", in which case it is the guidance value. All units are ug/L.
(c) Upgradient location.
(d) Samples collected by Engineering Science Inc. on January 27, 1988.
(e) ND = not detectable; i.e., the standard is the lower limit of detectability as defined by the NYSDEC.
(f) Concentration/dilution factor = 2.

DATA QUALIFIERS:

—: Indicates that the compound was analyzed for but not detected. Refer to Appendix C for detection limit.
R: Data validation recommends this value be rejected.

TABLE IV-9
GROUNDWATER RESULTS
HSL METALS (ug/L)
BUFFALO PUMPS

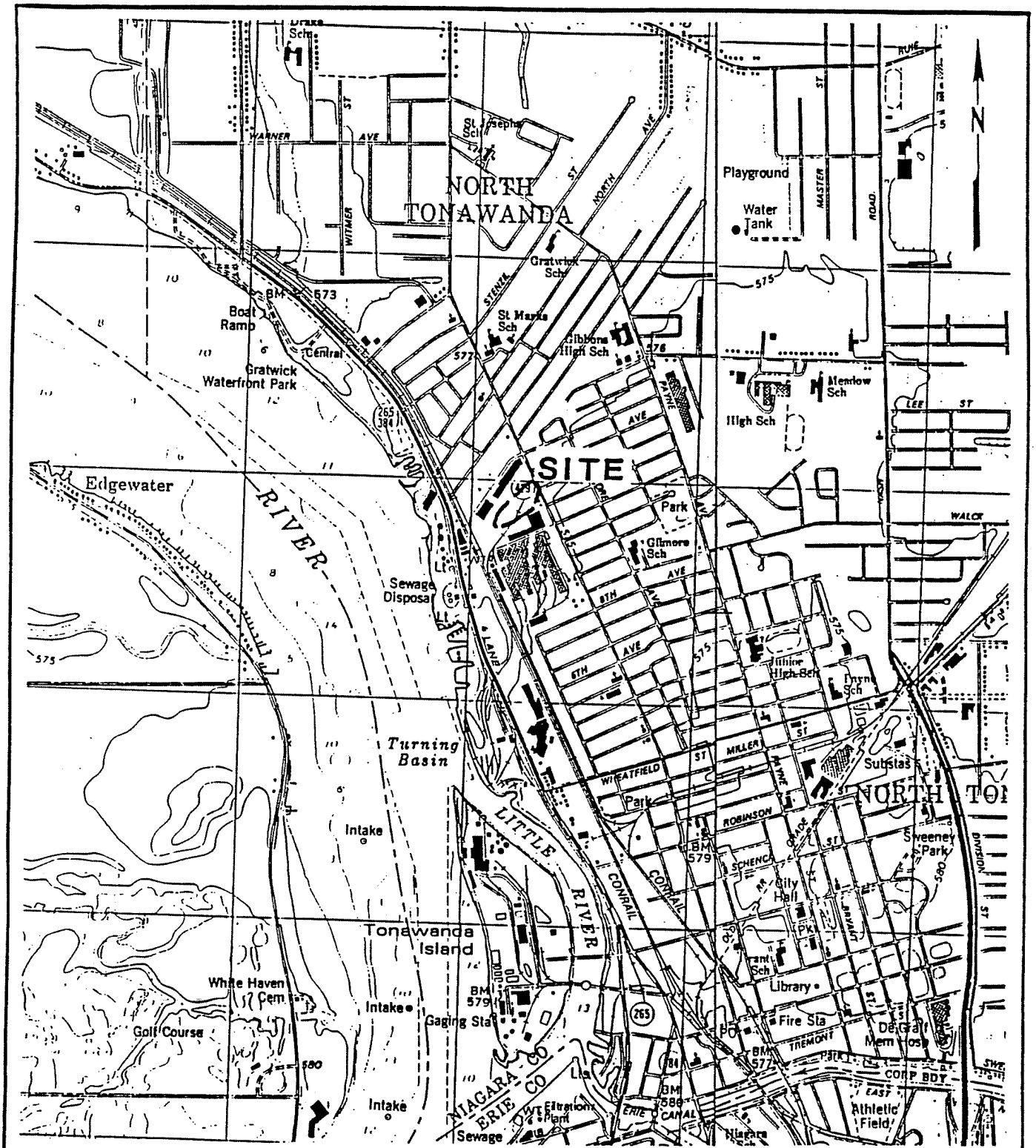
METAL (a)	NYS STANDARDS/ GUIDANCE VALUES (b)	Sample Location (d) GW-2(c)	GW-1	GW-3
Aluminum		64000.0	29700.0	184800.0
Arsenic	25	49.0	15.0	18.0
Barium	1000	430.0	240.0	5500.0
Beryllium	3 G	[2.4]	[0.7]	9.0
Calcium		657900.0	500000.0	966900.0
Chromium		170.0	90.0	1600.0
Cobalt		96.0	[41.0]	260.0
Copper	1000	280.0	110.0	670.0
Iron	300	126600.0 X	53300.0 X	433600.0 X
Lead	25	56.0	51.0	5400.0
Magnesium	35000 G	184200.0 X	110700.0 X	248500.0 X
Manganese	300	12900.0	1300.0	13100.0
Nickel	13.4 Z	96.0	---	450.0
Potassium		7600.0	5000.0	17100.0
Sodium		52600.0	71400.0	70100.0
Vanadium		110.0	[19.0]	420.0
Zinc	5000	480.0	210.0	19800.0
TOX		---	86.0	---

FOOTNOTES:

(a) Only HSL metals that were detected are presented. If the result is a value greater than or equal to the instrument detection limit but less than the contract-required limit the value is reported in brackets (i.e.; [10]).
(b) Referenced from; "Ambient Water Quality Standards and Guidance Values" for Class GA drinking supply waters, 6 NYCRR Part 703, NYSDEC, 9/1/78, as amended 4/1/87. The value presented is the standard except where noted by "G", in which case it is the guidance value. For nickel (flagged "Z") the value presented is the ambient water quality criterion for human health, from; "Quality Criteria for Water, 1986", USEPA, 5/1/87. All units are ug/L.
(c) Upgradient well location.
(d) Samples collected by Engineering Science Inc. on January 27, 1988.

DATA QUALIFIERS:

---: Indicates that the metal was analyzed for but not detected. Refer to Appendix D for detection limit.
X: Data validation recommends this value be considered an estimate.



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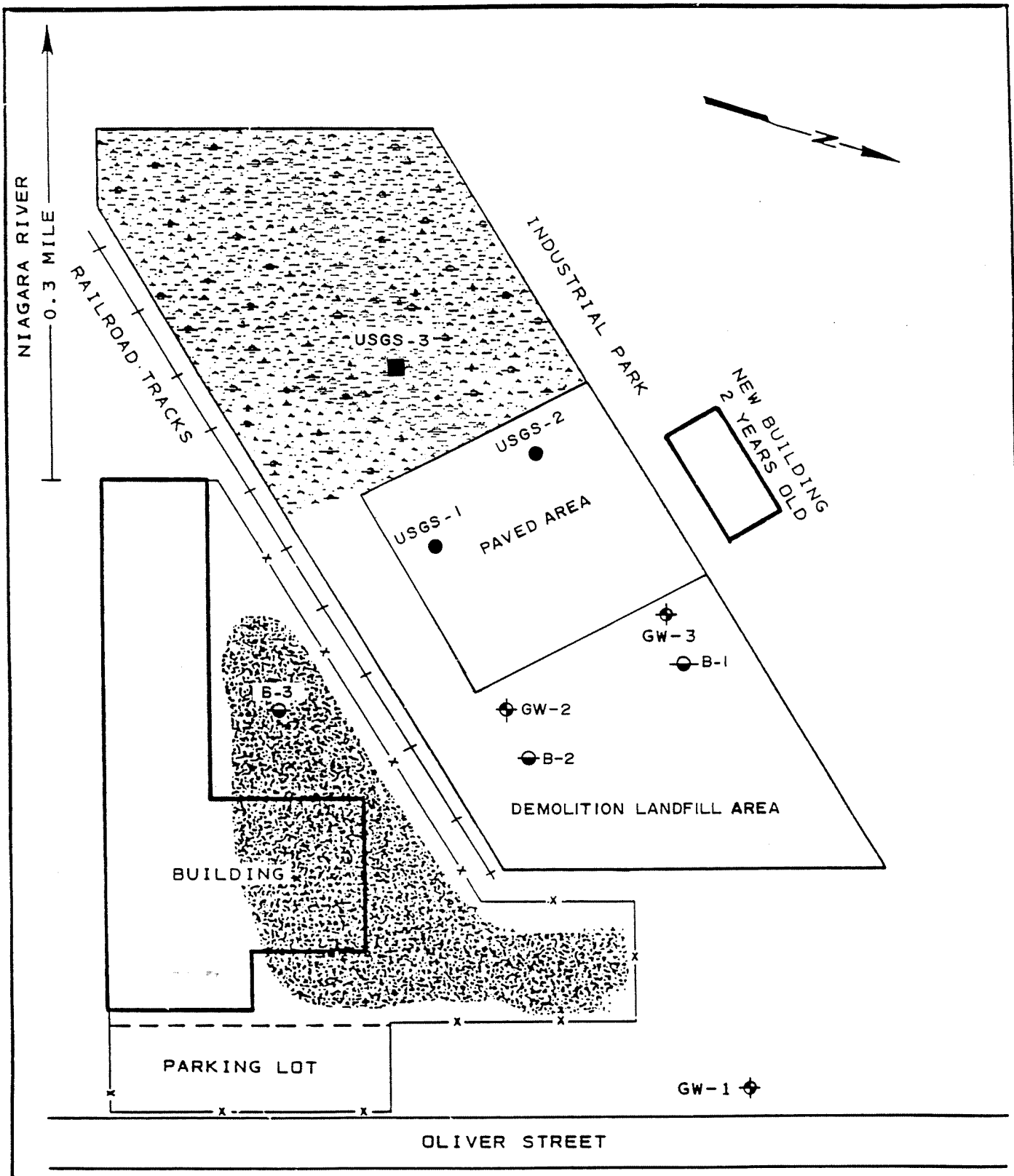
SITE LOCATION MAP
BUFFALO PUMPS

FIGURE IV-1

REFERENCE: U.S.G.S. 7.5' Topographic Map
Tonawanda West, NY (1980) and Tonawanda East, NY (1980) Quadrangles



EXPLANATION:

- PHASE II MONITORING WELL
- WASTE BORING
- REPORTED FOUNDRY SAND AND ASH DISPOSAL AREA
- FORMER LOCATION OF USGS MONITORING WELL
- USGS SEDIMENT SAMPLE LOCATION
- MARSH

150 0 150 FT.

SCALE: 1" = 150'

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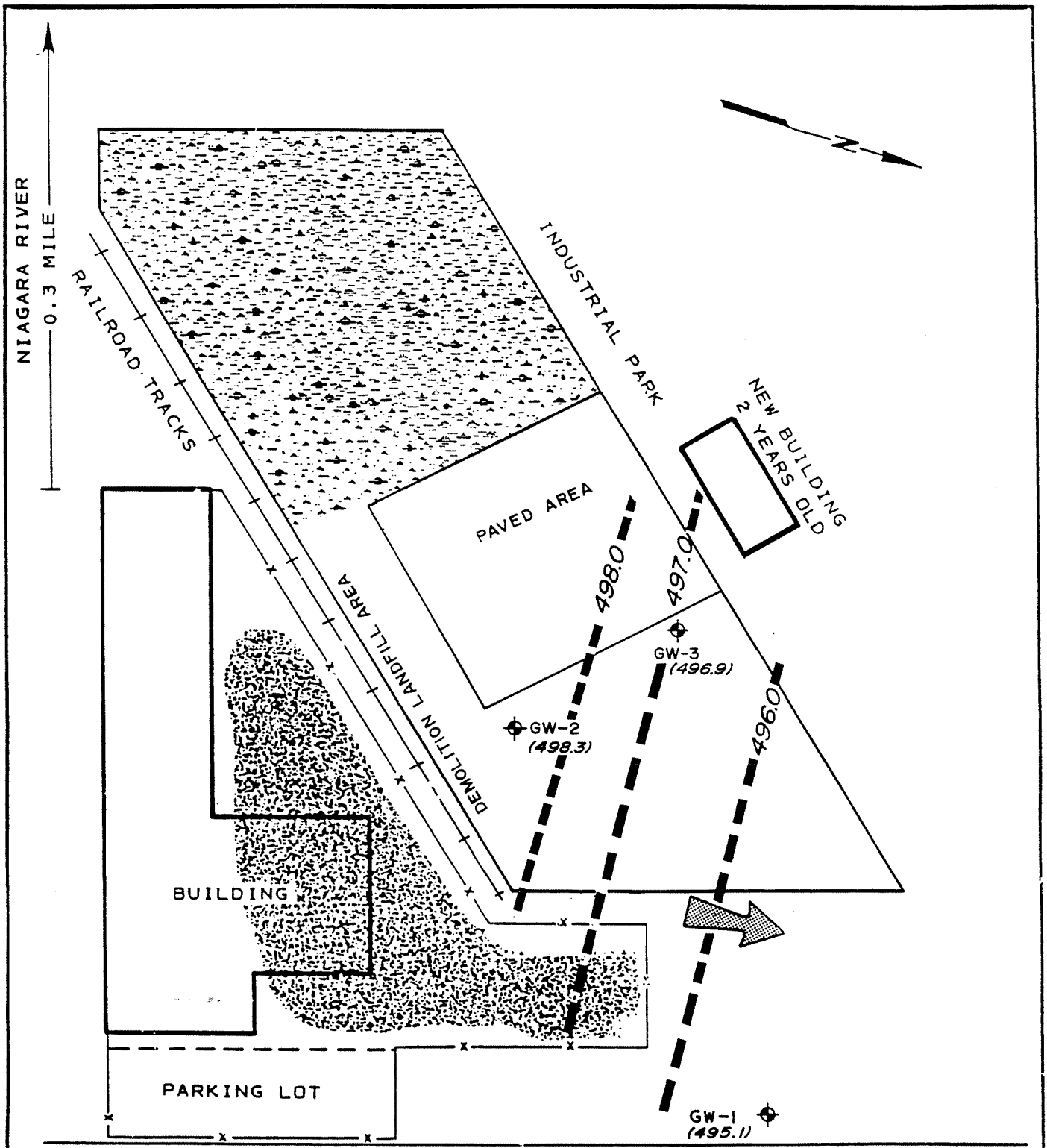
PLOT PLAN
BUFFALO PUMPS

FIGURE IV-2



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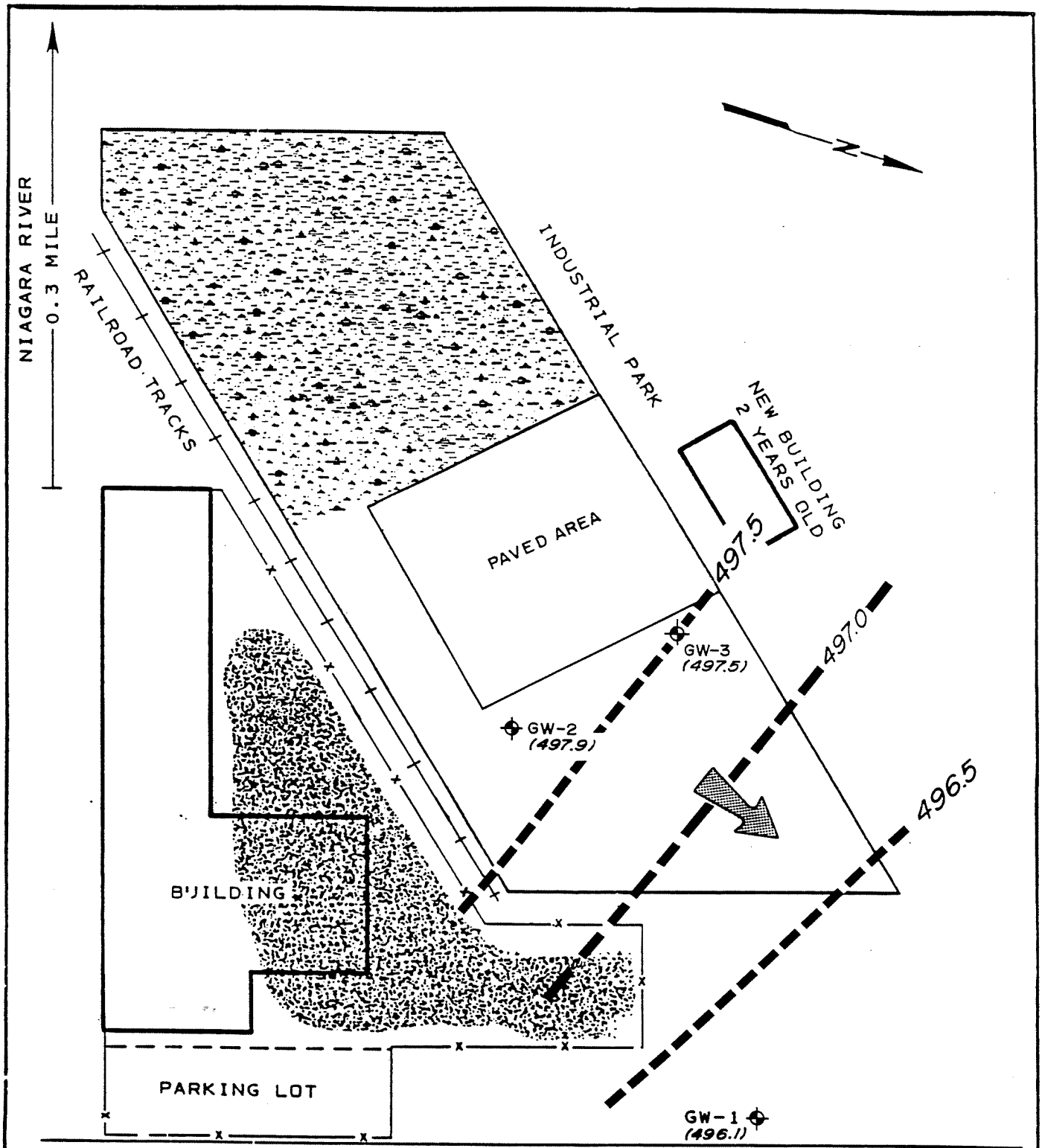
GROUNDWATER ELEVATION
CONTOUR MAP 1/12/88
BUFFALO PUMPS

FIGURE IV-3



EXPLANATION:

- PHASE II MONITORING WELL
- LINE OF EQUAL GROUNDWATER ELEVATION
- REPORTED FOUNDRY SAND AND ASH DISPOSAL AREA
- (496.1) GROUNDWATER ELEVATION MEASURED ON 2/17/88 REFERENCED TO AN ASSUMED ON-SITE DATUM
- DIRECTION OF GROUNDWATER FLOW
- MARSH

150 0 150 FT. RESIDENTIAL AREA

SCALE: 1" = 150'

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PHASE II REPORT

GROUNDWATER ELEVATION
CONTOUR MAP 2/17/88
BUFFALO PUMPS

FIGURE IV-4

SECTION V

SECTION V

FINAL APPLICATION OF HAZARD RANKING SYSTEM

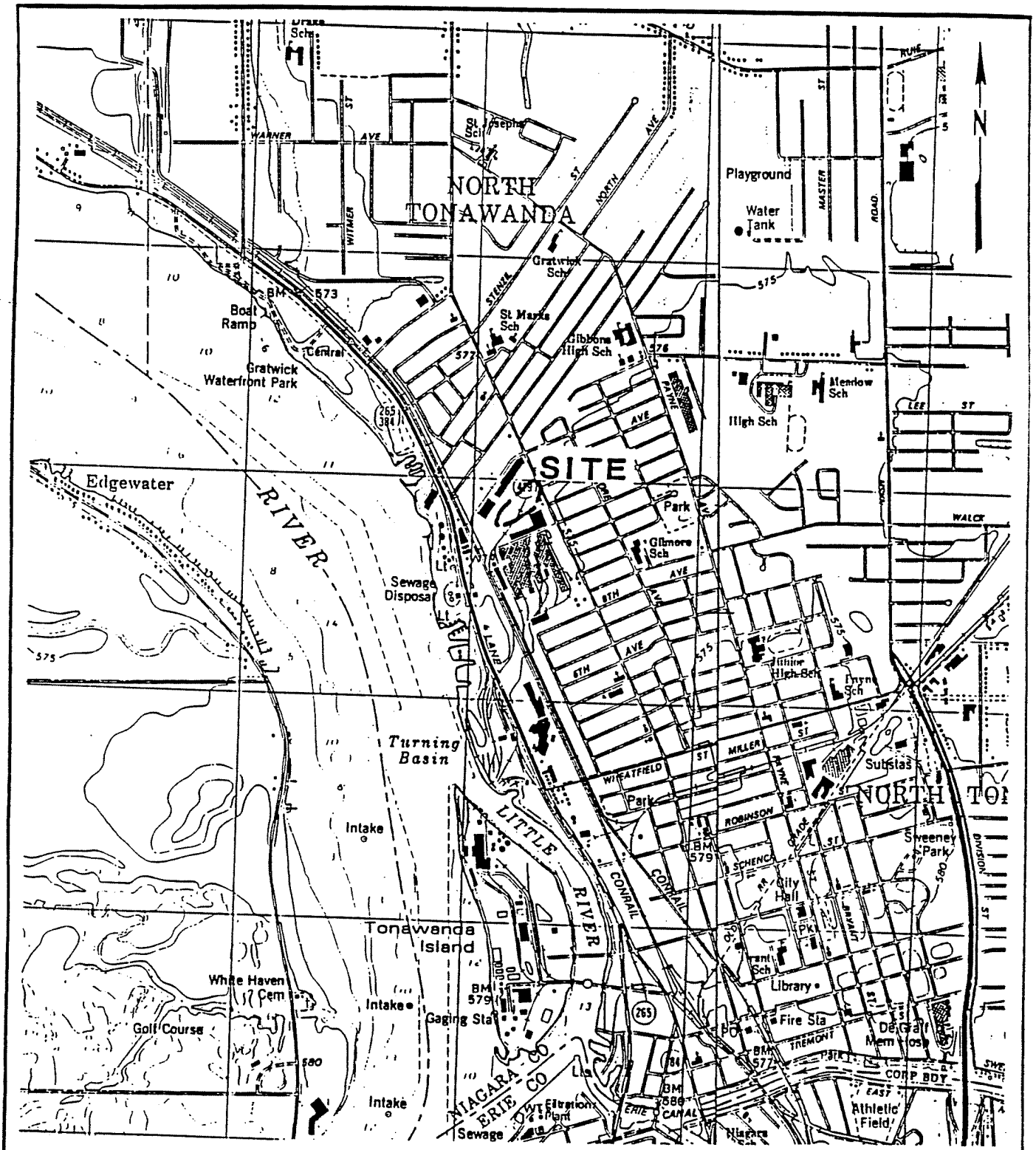
NARRATIVE SUMMARY

The Buffalo Pumps site is located on an eight-acre parcel located in the City of Tonawanda, Niagara County, New York. Since 1931, the Buffalo Pumps Division of Buffalo Forge Company has operated a pump manufacturing facility at the site. Two on-site areas have been used for waste disposal. A two-acre area located adjacent to and beneath a portion of the present facility building was used for disposal of foundry sands used in bronze and iron casting operations. The period of foundry sand disposal ended in approximately 1953. In this fill area, and in another two-acre area located to the north, boiler ash from the incineration of wood, paper and paint sludge was disposed. The disposal of boiler ash reportedly ended in 1971. Soil cover was apparently not placed over the wastes in either areas at the time of waste disposal. In the late 1970's and early 1980's, building demolition debris and soil fill were disposed in the northernmost fill areas. The plant facility is currently active; both fill areas are now inactive.

Sampling fo the waste and groundwater at the site during the Phase II investigation detected the presence of compounds on the Hazardous Substance List. The waste sample results indicate the presence of polynuclear aromatic hydrocarbons (PAHs), cadmium and zinc at concentrations above naturally-occurring ranges. The groundwater sample results indicate downgradient concentrations of eight HSL metals exceed the upgradient concentrations by three times or more.

Groundwater in the site vicinity is not known to be used as a drinking water source. The city of Tonawanda is served by a public water system which has Lake Erie and the Niagara River as its sources. No surface water was present on-site during the Phase II investigation field work. The Niagara River is located approximately 1,600 feet west of the site.

LOCATION



LATITUDE: 43°02'47"
LONGITUDE: 78°53'09"

SCALE
0 1000 2000 3000 4000 FEET

REFERENCE: U.S.G.S. 7.5' Topographic Map
Tonawanda West, NY (1980) and Tonawanda East, NY (1980) Quadrangles

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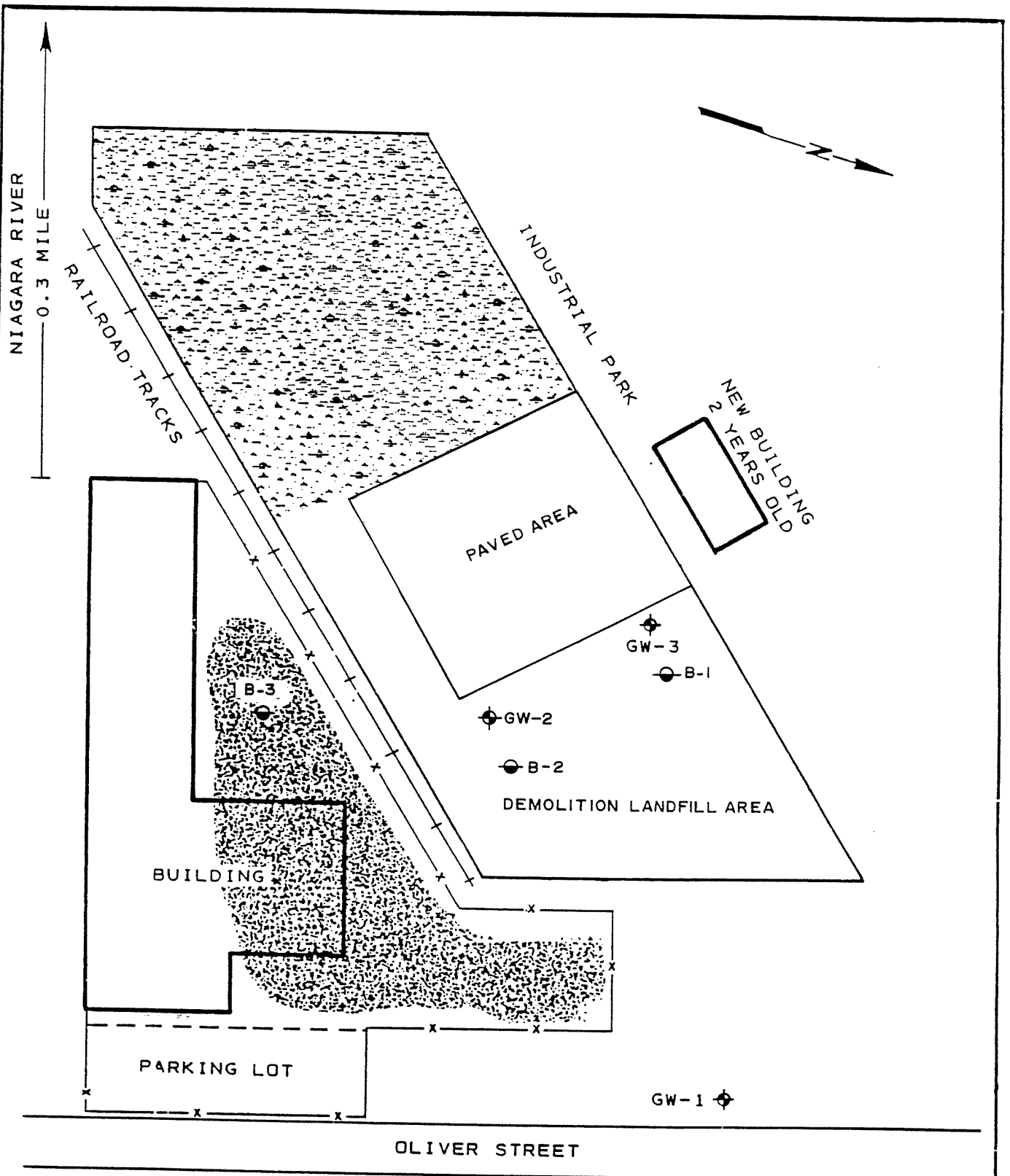
SITE LOCATION MAP
BUFFALO PUMPS

FIGURE V-1



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PHASE II REPORT

PLOT PLAN
BUFFALO PUMPS

FIGURE V-2

Facility Name: Buffalo Pumps Date: 5/16/88

Ground Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 (3)	2	6	6	
Net Precipitation	0 1 (2) 3	1	2	3	
Permeability of the Unsaturated Zone	0 1 (2) 3	1	2	3	
Physical State	0 (1) 2 3	1	1	3	
Total Route Characteristics Score			11	15	
3 Containment	0 1 2 (3)	1	3	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			19	26	
5 Targets					3.5
Ground Water Use	0 (1) 2 3	3	3	9	
Distance to Nearest Well/Population Served	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			3	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			2,565	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S_{gw} = 4.47		

GROUND WATER ROUTE WORK SHEET

Facility Name: Buffalo Pumps Date: 5/16/88

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	(0) 1 2 3	1	0	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 (2) 3	2	4	6	
Physical State	0 (1) 2 3	1	1	3	
Total Route Characteristics Score			7	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			19	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	0 (1) 2 3	2	2	6	
Population Served/ Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			8	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			3,192	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{SW} = 4.96		

SURFACE WATER ROUTE WORK SHEET

Facility Name: Buffalo Pumps Date: 5/16/88

Air Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
[1] Observed Release	(0) 45	1	0	45	5.1
Date and Location: January 8 & 11, 1988					
Sampling Protocol: Used Tip 2					
If line [1] is 0, the S_a = 0. Enter on line [5]. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					5.2
Reactivity and Incompatibility	(0) 1 2 3	1	0	3	
Toxicity	(0) 1 2 3	3	0	9	
Hazardous Waste	(0) 1 2 3 4 5 6 7 8	1	0	8	
Total Waste Characteristics Score			0	20	
[3] Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 (21) 24 27 30	1	21	30	
Distance to Sensitive Environment	0 (1) 2 3	2	2	6	
Land Use	0 1 2 (3)	1	3	3	
Total Targets Score			26	39	
[4] Multiply [1] x [2] x [3]			0	35,100	
[5] Divide line [4] by 35,100 and multiply by 100			S_a = 0		

AIR ROUTE WORK SHEET

Facility Name: Buffalo Pumps Date: 5/16/88

Fire and Explosion Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Containment	(1) 3	1	1	3	7.1
2 Waste Characteristics					7.2
Direct Evidence	(0) 3	1	0	3	
Ignitability	(0) 1 2 3	1	0	3	
Reactivity	(0) 1 2 3	1	0	3	
Incompatibility	(0) 1 2 3	1	0	3	
Hazardous Waste Quantity	(0) 1 2 3 4 5 6 7 8	1	0	8	
Total Waste Characteristics Score			0	20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 (5)	1	5	5	
Distance to Nearest Building	0 1 2 (3)	1	3	3	
Distance to Sensitive Environment	(0) 1 2 3	1	0	3	
Land Use	0 1 2 (3)	1	3	3	
Population Within 2-Mile Radius	0 1 2 3 4 (5)	1	5	5	
Buildings Within 2-Mile Radius	0 1 2 3 4 (5)	1	5	5	
Total Targets Score			21	24	
4 Multiply 1 x 2 x 3			0	1,440	
5 Divide line 4 by 1,440 and multiply by 100			S_{FE} = 0		

FIRE AND EXPLOSION WORK SHEET

Facility Name: Buffalo Pumps Date: 5/16/88

Direct Contact Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Incident	(0) 45	1	0	45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 (3)	1	3	3	8.2
3 Containment	(0) 15	1	0		8.3
4 Waste Characteristics Toxicity	0 1 2 (3)	5	15	15	8.4
5 Targets					8.5
Population Within 1-Mile Radius	0 1 2 3 (4) 5	4	16	20	
Distance to a Critical Habitat	(0) 1 2 3	4	0	12	
Total Targets Score			16	32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			0	21,600	
7 Divide line 6 by 21,600 and multiply by 100			S_{DC} = 0		

DIRECT CONTACT WORK SHEET

Facility Name: Buffalo Pumps Date: 5/16/88

Worksheet for Computing S_M

	S	S^2
Groundwater Route Score (S_{gw})	4.47	19.98
Surface Water Route Score (S_{sw})	4.96	24.60
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		44.58
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		6.68
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		3.86

WORK SHEET FOR COMPUTING S_M

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: The purpose of these records is to provide a convenient way to prepare an auditable record of the data and documentation used to apply the Hazard Ranking System to a given facility. As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference that will make the document used for a given data point easier to find. Include the location of the document and consider appending a copy of the relevant page(s) for ease in review.

FACILITY NAME: Buffalo Pumps Division of Buffalo Forge Company Site

LOCATION: North Tonawanda, New York, Niagara County

GROUND WATER ROUTE

1. OBSERVED RELEASE

Assigned Value = 45

Contaminants detected (5 maximum):

Barium, beryllium, chromium, iron, lead (Nanco Labs, Inc. 1988).

Rationale for attributing the contaminants to the facility:

The concentrations of these metals in downgradient well GW-3 exceeded the upgradient concentrations in GW-2 by more than 3 times.

***

2. ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Assigned Value = 3

Name/description of aquifer(s) of concern:

Shallow aquifer in fill and silty-sand unit.

NOTE: This aquifer is monitored by 3 wells on-site (GW-1, GW-2, GW-3) (ES, 1988a).

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

1.7 feet in well GW-3 on 2/17/88 (ES, 1988b).

Depth from the ground surface to the lowest point of waste disposal/storage:

The lowest point of fill being encountered in the Phase II borings is 6.5 feet in GW-2 (ES, 1988a).

Net Precipitation

Assigned Value = 2

Mean annual or seasonal precipitation (list months for seasonal):

Mean annual precipitation in the site area is 34 inches (USDOC, 1979, Figure 5).

Mean annual lake or seasonal evaporation (list months for seasonal):

Mean annual lake evaporation in the site area is 27 inches (USDOC, 1979, Figure 4).

Net precipitation (subtract the above figures):

Net precipitation = 7 inches. (34 inches - 27 inches = 7 inches).

Permeability of Unsaturated Zone **Assigned Value = 2**

Soil type in unsaturated zone:

Soils in the unsaturated zone consist of a 4.5- to 6.5-foot layer of sand, ash, and miscellaneous fill material overlying 5-6 feet of silty sand (ES, 1988a).

Permeability associated with soil type:

Permeability of granular fill is 1×10^{-3} cm/sec (Freeze and Cherry, 1979).

Physical State **Assigned Value = 1**

Physical state of substances at time of disposal (or at present time for generated gases):

Solids: demolition debris, excavation and fill materials, foundry sands, and boiler ash. Score = 1. Solids, unconsolidated or unstabilized (Muench, 1985).

***

3. CONTAINMENT

Containment **Assigned Value = 3**

Method(s) of waste or leachate containment evaluated:

Foundry wastes and demolition materials were placed in an unlined landfill with no leachate collection system (Muench, 1985 and NYSDEC, 1987).

Method with highest score:

Landfill, no liner, surface encourages ponding, no run-on control.

***

4. WASTE CHARACTERISTICS

Toxicity and Persistence **Assigned Value = 18**

Compound(s) evaluated:

HSL metals detected in groundwater sample GW-3: barium, beryllium, iron, vanadium, nickel and zinc (Nanco Labs, Inc., 1988).

Compound with highest score:

With the exception of vanadium all have toxicity/persistence scores of 18.

Hazardous Waste Quantity **Assigned Value = 1**

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

The quantity of hazardous substances disposed at the facility are unknown, but hazardous substances were detected in the groundwater; therefore, it is estimated at 1-10 cubic yards (Nanco Labs, Inc., 1988).

Basis of estimating and/or computing waste quantity:

A volume of 1 to 10 cubic yards of hazardous waste was assumed as a minimum since hazardous substances were detected during the Phase II investigation.

***

5. TARGETS

Ground Water Use **Assigned Value = 1**

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

Aquifer is not used, but potentially usable. Score = 1. There are no wells within a 3-mile radius of the facility which are drawing from the aquifer of concern (Hopkins, 1987 and Noll, 1987).

Distance to Nearest Well **Assigned Value = 0**

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

There are no wells within 3 miles of the facility which are drawing from the aquifer of concern (Hopkins, 1987 and Noll, 1987).

Distance to above well or building:

There are no wells within 3 miles of the facility which are drawing from the aquifer of concern (Hopkins, 1987 and Noll, 1987).

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

None is served by wells within a 3-mile radius of the site (Hopkins, 1987, Noll, 1987 and NYSDOH, 1982).

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

There are no wells drawing from the aquifer of concern within a 3-mile radius of the site (Hopkins, 1987 and Noll, 1987).

Total population served by ground water within a 3-mile radius:

Groundwater does not serve as a water supply source within a 3-mile radius of the site (Hopkins, 1987 and NYSDOH, 1982).

SURFACE WATER ROUTE

1. OBSERVED RELEASE

Assigned Value = 0

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

Surface waters were not sampled at the site.

Rationale for attributing the contaminants to the facility:

Surface waters were not sampled at the site.

***

2. ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain **Assigned Value = 0**

Average slope of facility in percent:

<1% (USGS, 1980).

Name/description of nearest downslope surface water:

Surface runoff flows into ditches, which drain west into a small swampy area. In addition, storm sewers drain runoff west to the Niagara River (0.3 miles to river). (ES Field Investigations, 1988, and USGS, 1980).

Average slope of terrain between facility and above-cited surface water body in percent:

0.7% (USGS, 1980).

Is the facility located either totally or partially in surface water?

No. The northernmost disposal area filled in a portion of the swamp along the western site border. However, no surface water was noted during the Phase II investigation field work in January, 1988 (Muench, 1988 and ES Field Investigations, 1988).

Is the facility completely surrounded by areas of higher elevation?

No (USGS, 1980).

1-Year 24-Hour Rainfall in Inches **Assigned Value = 2**

2.1 inches (USDOC, 1963).

Distance to Nearest Downslope Surface Water **Assigned Value = 2**

The Niagara River is approximately 1,600 feet west of the site (USGS, 1980).

Physical State of Waste **Assigned Value = 1**

Solids, unconsolidated: demolition debris, excavation and fill materials, foundry sands, and boiler ash (Muench, 1985).

***

3. CONTAINMENT

Containment **Assigned Value = 3**

Method(s) of waste or leachate containment evaluated:

Unlined landfill with no surface water drainage system (Muench, 1985, NYSDEC, 1987, ES Field Investigation, 1988).

Method with highest score:

Landfill not adequately covered and no diversion system present. Score = 3.

***

4. WASTE CHARACTERISTICS

Toxicity and Persistence **Assigned Value = 18**

Compound(s) evaluated

HSL metals detected in waste sample B-1: cadmium and zinc were detected at concentrations exceeding published naturally occurring ranges (Nanco Labs, Inc., 1988, and Booz, Allen and Hamilton, 1983 and USGS, 1984).

Compound with highest score:

Cadmium and zinc both have scores of 18.

Hazardous Waste Quantity **Assigned Value = 1**

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

The quantity of hazardous substances at the facility are unknown, therefore, a quantity of 1-10 cubic yards was estimated based on the presence of hazardous substances in waste samples (Nanco Labs, Inc., 1988).

Basis of estimating and/or computing waste quantity:

Unknown quantities of contaminated soil are present on-site. For purposes of rating the site, the minimum volume of 1 to 10 cubic yards of hazardous waste was assumed since the hazardous substances were detected during the Phase II waste sampling and analysis.

***

5. TARGETS

Surface Water Use **Assigned Value = 2**

Use(s) of surface water within 3 miles downstream of the hazardous substance:

The Niagara River is used for recreation and navigation within 3 miles downstream of the site (NCHD, 1981, NYSDOH, 1982).

Is there tidal influence?

No, the site is not near a coastal area (USGS, 1980).

Distance to a Sensitive Environment **Assigned Value = 1**

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

There are none within 2 miles; western New York is not in a coastal area (USGS, 1980).

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

There is a 102-acre wetland located about 3,000 feet northeast of the site (Farquhar, 1987).

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

There are none with 1 mile (Ozard, 1988).

Population Served by Surface Water **Assigned Value = 0**

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

There are none within 3 miles downstream of the facility (NYSDOH, 1982).

Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

No intakes within 3 miles of the site (NYSDOH, 1982).

Total population served:

Not applicable.

Name/description of nearest of above water bodies:

Surface waters within 3 miles downstream of the site are not used as water supplies (NYSDOH, 1982).

Distance to above-cited intakes, measured in stream miles:

There are no intakes within 3 miles downstream of the site (NYSDOH, 1982).

AIR ROUTE

1. OBSERVED RELEASE

Assigned Value = 0

Contaminants detected:

No readings above background were noted during air monitoring with a Photovac Tip-II during the Phase II investigation.

Date and location of detection of contaminants:

Not applicable. None detected on January 8 or 11, 1988; Buffalo Pumps fill area.

Methods used to detect the contaminants:

Photovac Tip-II.

Rationale for attributing the contaminants to the site:

Not applicable.

***

2. WASTE CHARACTERISTICS

Reactivity and Incompatibility

Assigned Value = 0

Most reactive compound:

Reactive compounds with the potential to impact the air pathway are not known to exist on-site (ES Site Investigations, 1988).

Most incompatible pair of compounds:

Incompatible compounds with the potential to impact the air pathway are not known to exist on-site (ES Site Investigations, 1988).

Toxicity **Assigned Value = 0**

Most toxic compound:

Toxic compounds with the potential to impact the air pathway are not known to exist on-site (ES Site Investigations, 1988).

Hazardous Waste Quantity **Assigned Value = 0**

Total quantity of hazardous waste:

Hazardous waste with the potential to impact the air pathway is not known to exist on-site (ES Site Investigations, 1988).

Basis of estimating and/or computing waste quantity:

None estimated because no hazardous waste which could impact the air pathway is known to exist on-site.

***

3. **TARGETS**

Population Within 4-Mile Radius **Assigned Value = 21**

Circle radius used, give population, and indicate how determined:

0 to 4 mi **0 to 1 mi** **0 to 1/2 mi** **0 to 1/4 mi**

40,212 people (1980 U.S. Census Bureau Data).

Distance to a Sensitive Environment **Assigned Value = 1**

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

There is none within 2 miles; western New York is not in a coastal area (USGS, 1980).

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

There is a 102-acre wetland located approximately 3,000 feet northeast of the site (Farquhar, 1987).

Distance to critical habitat of an endangered species, if 1 mile or less:

There are none within 1 mile (Ozard, 1988).

Land Use **Assigned Value = 3**

Distance to commercial/industrial area, if 1 mile or less:

0.0 mile. The site is located in an industrial/residential area (USGS, 1980).

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

There is none within 2 miles (USGS, 1980).

Distance to residential area, if 2 miles or less:

A residential area is located 0.1 mile east of the site on Oliver Street (USGS, 1980).

Distance to agricultural land in production within past 5 years, if 1 mile or less:

There is none within 1 mile; the area is industrial (USGS, 1980).

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

There is none within 2 miles (USGS, 1980).

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

There is none within view of the site (USDOI, 1983 and Federal Register, 1983).

FIRE AND EXPLOSION

1. CONTAINMENT

Assigned Value = 1

Hazardous substances present:

No hazardous substances in a form with the potential to ignite or explode are known to exist on-site (ES Site Investigations, 1988).

Type of containment, if applicable:

Not applicable. Score = 1.

***

2. WASTE CHARACTERISTICS

Direct Evidence **Assigned Value = 0**

Type of instrument and measurements:

Measurements taken on-site with an explosimeter indicated no readings above background (ES Site Investigations, 1988).

Ignitability **Assigned Value = 0**

Compound used:

No ignitable compounds are known to exist on-site (ES Site Investigations, 1988).

Reactivity **Assigned Value = 0**

Most reactive compound:

No reactive compounds are known to exist on-site (ES Site Investigations, 1988).

Incompatibility **Assigned Value = 0**

Most incompatible pair of compounds:

No incompatible compounds are known to exist on-site (ES Site Investigations, 1988).

Hazardous Waste Quantity **Assigned Value = 0**

Total quantity of hazardous substances at the facility:

No hazardous substances in a form which are ignitable or explosive are known to exist on-site (ES Site Investigations, 1988).

Basis of estimating and/or computing waste quantity: **Assigned Value = 0**

Not applicable.

***

3. **TARGETS**

Distance to Nearest Population **Assigned Value = 5**

Approximately 50 feet south is the Buffalo Pumps facility (ES Site Investigations, 1988).

Distance to Nearest Building **Assigned Value = 3**

Approximately 50 feet south is the Buffalo Pumps facility (ES Site Investigations, 1988).

Distance to Sensitive Environment **Assigned Value = 0**

Distance to wetlands:

There is a 102-acre wetland located 3,000 feet northeast of the site (Farquhar, 1987).

Distance to critical habitat:

There are none within 1 mile (Ozard, 1988).

Land Use **Assigned Value = 3**

Distance to commercial/industrial area, if 1 mile or less:

0.0 mile. The site is located in an industrial/residential area (USGS, 1980).

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

There is none within 2 miles (USGS, 1980).

Distance to residential area, if 2 miles or less:

A residential area is located 0.1 mile east of the site on Oliver Street (USGS, 1980).

Distance to agricultural land in production within past 5 years, if 1 mile or less:

There is none within 1 mile; the area is industrial/residential (USGS, 1980).

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

There is none within 1 mile; the area is industrial/residential (USGS, 1980).

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

No (USDOI, 1983 and Federal Register, 1985).

Population Within 2-Mile Radius **Assigned Value = 5**

28,263 people (1980 U.S. Census Bureau Data).

Buildings Within 2-Mile Radius **Assigned Value = 5**

7,438 - Estimated by dividing people within a 2-mile radius by 3.8.

DIRECT CONTACT

1. OBSERVED INCIDENT

Assigned Value = 0

Date, location, and pertinent details of incident:

No incidents are known to have occurred on-site (ES Site Investigations, 1988).

***

2. ACCESSIBILITY

Assigned Value = 3

Describe type of barrier(s):

The site is not completely surrounded by fencing (ES Site Investigations, 1987-1988).

***

3. CONTAINMENT

Assigned Value = 0

Type of containment, if applicable:

Landfill covered with 2-3 feet of soil fill material (NCHD, 1981, ES Site Investigations 1987-1988).

***

4. WASTE CHARACTERISTICS

Toxicity

Assigned Value = 3

Compounds evaluated:

HSL compounds in waste samples: Cadmium and Zinc (Nanco Labs, Inc. 1988).

Compound with highest score:

Cadmium has a score of 3 (Sax, 1984).

***

5. TARGETS

Population within one-mile radius

Assigned Value = 4

9,456 people (1980 U.S. Census Bureau Data).

Distance to critical habitat (of endangered species) **Assigned Value = 0**

There are none within 1 mile of the site (Ozard, 1988).

Site Inspection Report

BUFFALO PUMPS DIVISION

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

EPA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	D002127199

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
Buffalo Pumps Division	874 Oliver Street				
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 COUNTY**	**07 COUNTY CODE**	**08 CONG DIST**
North Tonawanda	NY	14120	Niagara	063	36

09 COORDINATES LATITUDE	LONGITUDE	10 TYPE OF OWNERSHIP (Check one)
43° 02' 47"	78° 53' 09"	☒ A. PRIVATE ☐ B. FEDERAL _____ ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER _____ ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
3 / 20 / 85 (MONTH DAY YEAR)	☐ ACTIVE ☒ INACTIVE	1900 (BEGINNING YEAR) 1980 (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR Engineering-Science (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR _____ (Name of firm)
☐ E. STATE ☐ F. STATE CONTRACTOR Dames & Moore (Name of firm) ☐ G. OTHER _____ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
S. Robert Steele I		ES	(703) 591-7575
09 OTHER INSPECTORS	**10 TITLE**	**11 ORGANIZATION**	**12 TELEPHONE NO.**
Eileen Gilligan	Geologist	D & M	( )
			( )
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
Mr. Muench	plant manager	870 Oliver Street Niagara, NY 14120	(716) 693-1850
Mr. Richard Soos	maintenance department	-same as above-	(716) 693-1850
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT	8:30 AM	Cool 40° sunny

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
George Moreau	Engineering-Science(ES)	(315) 451-9560

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
S. Robert Steele II		ES	703-591-7575	3 / 20 / 85 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	D002107199

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- [X] A. SOLID
- [X] B. POWDER, FINES
- [ ] C. SLUDGE
- [ ] D. OTHER _____ (Specify)
- [ ] E. SLURRY
- [ ] F. LIQUID
- [ ] G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS _____

CUBIC YARDS _____

NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- [X] A. TOXIC
- [ ] B. CORROSIVE
- [ ] C. RADIOACTIVE
- [ ] D. PERSISTENT
- [ ] E. SOLUBLE
- [ ] F. INFECTIOUS
- [ ] G. FLAMMABLE
- [ ] H. IGNITABLE
- [ ] I. HIGHLY VOLATILE
- [ ] J. EXPLOSIVE
- [ ] K. REACTIVE
- [ ] L. INCOMPATIBLE
- [ ] M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
MES	chromium	7440-47-3	unknown	0.150	mg/kg
MES	copper	7440-50-8	unknown	1500	mg/kg
		boiler ash from incineration of wood paper and paint wastes			
		was also disposed on site			
MES	arsenic	7440-38-2	groundwater samples	49	mg/L
MES	beryllium	7440-41-7	groundwater samples	9	mg/L
MES	iron	7439-89-6	groundwater samples	433,600	mg/L
MES	lead	7439-92-1	groundwater samples	5,400	mg/L
MES	nickel	7440-02-0	groundwater samples	450	mg/L
OCC	fluoranthene	206-44-0	landfill	5,700	mg/kg
OCC	fluorene	86-73-7	landfill	1,100	mg/kg
OCC	pyrene	129-00-0	landfill	4,900	mg/kg
OCC	Aroclor 1260	11096-82-5	landfill	835	mg/kg

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

1. USGS site investigation, draft, study report
2. ES and D&M site investigations, 3/20/85
3. Niagara County Health Department, site investigation, 2/22/84
4. Nanco Laboratories, Inc. 1988

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	D00212799

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: 0
02 ☒ OBSERVED (DATE: 2/88) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The following were detected in downgradient wells, berryllium (9mg/L), iron (433,600 mg/L), lead (5,400 mg/L), and nickel (450 mg/L).

01 ☒ B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Due to runoff (via storm sewers) from improperly contained wastes.

01 ☐ C. CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No

01 ☐ E. DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Unknown

01 ☒ F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED: 2 (Acres)
02 ☐ OBSERVED (DATE: 2/88) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Calcium and zinc detected in wastes which are in direct contact with the soil. Concentrations were above published naturally occurring ranges.

01 ☐ G. DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No

01 ☐ H. WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No

01 ☐ I. POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Unknown

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	0002127199

II. HAZARDOUS CONDITIONS AND INCIDENTS *(Continued)*

01 ☒ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Not observed

01 ☒ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION *(Include name(s) of species)*

Not observed

01 ☒ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Not observed

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES *(Spills/Runoff/Standing liquids, Leaking drums)* — 02 ☒ OBSERVED (DATE: 1985) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

unlined landfill. Inadequate cover

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Possible midnight dumping- nonsecure area

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION *(Cite specific references, e. g., state files, sample analysis, reports)*

ES site visit, 1985,1988
Nanco Laboratories, Inc. 1988. Analytical data for waste samples.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	D002127199

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☐ A. SURFACE IMPOUNDMENT		
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☒ H. OPEN DUMP	unknown	
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)

- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER

- ☐ A. BUILDINGS ON SITE

06 AREA OF SITE

approx. 4 (Acres)

07 COMMENTS

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR ☒ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

The waste material (ie, boiler ash) was disposed directly on the ground. The inactive disposal area was covered by an estimated three(3) feet of soil fill.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☐ YES ☒ NO

02 COMMENTS

The landfill on the northern end of the property is covered with soil fill. There is n fence to prevent unauthorized entry.

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

Niagara County Health Department, Site Profile Report, 1981
Muench, 1985

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	D002127199

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY *(Check as applicable)*

	SURFACE	WELL
COMMUNITY	A. ☒	B. ☐
NON-COMMUNITY	C. ☐	D. ☐

02 STATUS

ENDANGERED	AFFECTED	MONITORED
A. ☐	B. ☐	C. ☐
D. ☐	E. ☐	F. ☐

03 DISTANCE TO SITE

A. more than 3.0 (mi)

B. _____ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY *(Check one)*

☐ A. ONLY SOURCE FOR DRINKING ☐ B. DRINKING *(Other sources available)* COMMERCIAL, INDUSTRIAL, IRRIGATION *(No other water sources available)* ☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION *(Limited other sources available)* ☒ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 0

03 DISTANCE TO NEAREST DRINKING WATER WELL more than 3.0 (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
1-2 (ft)	North	1-2 (ft)	unknown (gpd)	☐ YES ☒ NO

09 DESCRIPTION OF WELLS *(Including useage, depth, and location relative to population and buildings)*

Three industrial wells at Hooker-Durez Div., located 1.5 miles east of site, however, they have not been used for 15-20 years.

10 RECHARGE AREA		11 DISCHARGE AREA	
☐ YES ☐ NO	COMMENTS	☐ YES ☐ NO	COMMENTS

IV. SURFACE WATER

01 SURFACE WATER USE *(Check one)*

☒ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Niagara River	☐	0.3 (mi)
	☐	(mi)
	☐	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. 9,456 NO. OF PERSONS	B. 28,263 NO. OF PERSONS	C. 37,746 NO. OF PERSONS

1980 population census

02 DISTANCE TO NEAREST POPULATION

0.01 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE

7,438

04 DISTANCE TO NEAREST OFF-SITE BUILDING

0.0 (mi)

05 POPULATION WITHIN VICINITY OF SITE *(Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)*

Site is located in a densely populated residential/industrial area

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	D00212799

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☐ B. $10^{-4} - 10^{-6}$ cm/sec ☒ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☒ B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☐ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH	
30 (ft)	6.5 (ft)		

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
9 (in)	2.1 (in)	less than 0.5 %		0.7 %

09 FLOOD POTENTIAL
SITE IS IN more than 100 YEAR FLOODPLAIN

10
☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE	OTHER
A. more than 2.0 (mi)	B. 0.6 (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)
there are no more than 3 (mi) federally-designated critical habitats in NYS
ENDANGERED SPECIES:

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AG LAND
A. 0.0 (mi)	B. 0.01 (mi)	C. more than 2 (mi)	D. more than 1 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

Site is level filled area adjacent to a former lower-lying swamp. Surface runoff from the site and adjacent buildings to the North and South drains into the swamp.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Farquar, J.,1987. Letter to L. Dobson of ES, 9/2/87
Ozard,1988. Letter to W. Bradford of ES, 4/14/88
USDOC Technical paper No. 40
USDOC Climatic Atlas of the United States
NYS Atlas of Community Water System SOurces, 1982

Hooker Chemical, 1987. Telephone conversation between C. Noll of Hooker Chemical and L. Dobson of ES, 10/12/87.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	D002127199

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03. ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	3	Nanco Laboratories, Inc.	Now
SURFACE WATER			
WASTE	3	Nanco Laboratories, Inc.	Now
AIR			
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
HNU Meter	HNU readings were 5-7 ppm(at a distance of 5-6" above ground) over the fill area. The highest readings were found in the north-western end of the landfill(9ppm). Background readings at the site were 1-2 ppm. Subsequent readings during Phase II investigation were not above background.

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☐ GROUND ☐ AERIAL

02 IN CUSTODY OF _____ (Name of organization or individual)

03 MAPS
☒ YES
☐ NO

04 LOCATION OF MAPS: site map was updated during site inspection

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

ES and Dames and Moore site inspection, 3/20/85, January 1988.
Nanco Laboratories, Inc. 1988.

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	D002127199

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Buffalo Pumps Division		874 Oliver Street		North Tonawanda	NY	14120

PARENT COMPANY (If applicable)

08 NAME	09 D+B NUMBER	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	12 CITY	13 STATE	14 ZIP CODE
Buffalo Forge Company		490 Broadway Avenue		North Tonawanda	NY	

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Voelker and Felthousen		874 Oliver Street		North Tonawanda	NY	

IV. REALTY OWNER(S) (If applicable; list most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

ES and D&M site inspection, 3/20/85

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	D002127199

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME	02 D+B NUMBER
Buffalo Pumps Division	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
874 Oliver Street	

05 CITY	06 STATE	07 ZIP CODE
North Tonawanda		

08 YEARS OF OPERATION	09 NAME OF OWNER
1931-present	

OPERATOR'S PARENT COMPANY (If applicable)

10 NAME	11 D+B NUMBER
Buffalo Forge Company	

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE
490 Broadway Avenue	

14 CITY	15 STATE	16 ZIP CODE
Buffalo	NY	14204

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER
Buffalo Steam Pump Co.			

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE
874 Oliver Street			

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
North Tonawanda					

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1891-1931	same

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Niagara County Health Department, Site Profile Report

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	D002127199

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
none	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
unknown			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
not applicable			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	D002127199

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ F. WASTE REPACKAGED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ H. ON SITE BURIAL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ L. ENCAPSULATION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ N. CUTOFF WALLS — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	D002127199

II PAST RESPONSE ACTIVITIES *(Continued)*

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☒ S. CAPPING/COVERING — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
construction debris fill covers site (3-4 feet)

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
no

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

III. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

ES and D&M site inspection, 3/20/85

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	D002127199

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☒ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

none

III. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

Letter from Vance Bryant (NYSDEC Division Environmental Enforcement) to M. Anatra (ES)-7/7/87

HRS REFERENCES*

BUFFALO PUMPS SITE

1. Nanco Labs, Inc., 1988. Analytical results for Buffalo Pumps site.
2. Engineering-Science, Inc., 1988a. Boring logs for monitoring wells at Buffalo Pumps site.
3. Engineering-Science, Inc., 1988b. Phase II report for Buffalo Pumps site, Table IV-4.
4. U.S. Department of Commerce, National Climatic Center, Ashville, N.C. 1979. Climatic atlas of the United States.
5. Freeze and Cherry, 1979. Groundwater, Table 2.2, Prentice-Hall, Englewood Cliff, New Jersey.
6. Muench, Plant Manager, Buffalo Pumps, 1985. Interviews dated March 20, 1985 and April 10, 1985. Telephone conversation dated October 10, 1985.
7. NYSDEC, 1987. Inactive Hazardous Waste Disposal Report, Buffalo Pumps site.
8. Hopkins, 1987. Niagara County Health Department (Assistant Public Health Engineer), telephone interview, October 8, 1987.
9. Noll, 1987. Hooker Chemical - Dunez Division, telephone interview, October 12, 1987.
10. NYSDOH, 1982. New York State Department of Health, New York State Atlas of Community Water System Sources, 1982.
11. USGS, 1980. 7.5 minute Topographic Maps, Tonawanda West and Tonawanda East Quadrangles, New York.
12. USDOC, 1963. U.S. Department of Commerce Technical Paper No. 40.
13. Booz, Allen and Hamilton, 1983. An Overview of the Contaminants of Concern in the Disposal and Utilization of Municipal Sewage Sludge, updated on April 15, 1983.
14. USGS, 1984. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States, Professional Paper 1270.
15. NCHD, 1981. Niagara County Health Department, Site Report for Buffalo Pumps Site.
16. Farquhar, 1987. NYSDEC Fish and Wildlife Division, Letter to Elizabeth Dobson, (Engineering-Science, Inc.), September 2, 1987.

*All these references were used for HRS Documentation, while some of them were also used as general references.

17. Ozard, 1988. NYSDEC Wildlife Resources Center, telephone interview dated April 14, 1988.

18. U.S. Census Bureau Data, 1980.

19. USDOI, 1983. U.S. Department of the Interior, National Park Service National Register of Historic Places dated July, 1983.

20. Federal Register, 1983. Part III Department of the Interior National Registry of Natural Landmarks dated March 1, 1983.

21. Sax, 1984. Dangerous Properties of Industrial Materials, Sixth Edition, Van Nostrand Reinhold Company, New York.

GENERAL REFERENCES**

BUFFALO PUMPS SITE

22. ES and Dames and Moore, 1985; Site Inspection, March/April, 1985.

23. IATFR, 1979; Inter-Agency Task Force Report, Buffalo Pumps Site. (copy not provided)

24. LaSala, 1968; Groundwater Resources of the Erie-Niagara Basin, New York, Basin Planning Report ENB-3.

25. NYSDEC, 1985; NYSDEC Water Bulletin, August 1985. (copy not provided)

26. NYSDOT, 1976; New York State Department of Transportation 7.5 Minute Series Planimetric Map, Tonawanda West Quadrangle, Second Edition.

27. Rand McNally, 1981; Worldmaster World Atlas New Census Edition, Rand McNally and Company, New York.

28. Sittig, 1985; Handbook of Toxic and Hazardous Chemicals and Carcinogens, Second Edition, Noyes Publications, Park Ridge, New Jersey.

29. USDA, 1972; United Stated Department of Agriculture. Soil Survey of Niagara County, issued October 1972.

30. USEPA, 1985; Preliminary Evaluation of Chemical Migration to Groundwater and the Niagara River from Selected Waste Disposal Sites.

31. USGS, 1985; United States Geological Survey, Draft Report of Preliminary Evaluation of Chemical Migrations.

**These references were not used for HRS Documentation. See also "HRS References" above.

0000004 (1)

INORGANIC ANALYSIS DATA SHEET
FORM I

SMPL NO. : GW-2.18

Lab Name : NANCO LABORATORIES, INC.

Customer Name: Engineering Science

SOW NO. N/A

Lab Receipt Date : 01/30/88

Lab Sample ID: 88-EW-5342

Date Reported: 2/22/88

Location ID: Buffalo Pumps

ELEMENTS IDENTIFIED AND MEASURED

CONCENTRATION : LOW ___X___ MEDIUM _____

MATRIX : WATER __X____ SOIL _____ SLUDGE _____OTHER _____

(UG/L) OR MG/KG DRY WEIGHT (CIRCLE ONE)

1.	ALUMINUM	64000.0 P N		13.	MAGNESIUM	184200.0 P	
2.	ANTIMONY	50.0 UP		14.	MANGANESE	12900.0 P E	(1:10)
3.	ARSENIC	49.0 SF		15.	MERCURY	0.2 U C.V.	
4.	BARIUM	430.0 P		16.	NICKEL	96.0 P	
5.	BERYLLIUM	[2.4]P		17.	POTASSIUM	7600.0 P	
6.	CADMIUM	4.0 UP N		18.	SELENIUM	30.0 UF N	(1:10)
7.	CALCIUM	657900.0 P	(1:10)	19.	SILVER	10.0 UP	
8.	CHROMIUM	170.0 P		20.	SODIUM	52600.0 P	
9.	COBALT	96.0 P		21.	THALLIUM	2.0 UF N	
10.	COPPER	280.0 P		22.	VANADIUM	110.0 P	
11.	IRON	126600.0 P E		23.	ZINC	480.0 P	
12.	LEAD	56.0 F N	(1:2)		PRECENT SOLIDS (%)	N/A	
	CYANIDE	NR					

FOOTNOTES : FOR REPORTING RESULTS STANDARD RESULT QUALIFIERS ARE USED AS DEFINED ON PAGE 2.

COMMENTS : This sample was a brown liquid that was colorless after ICP digestion procedures and colorless after furnace digestion procedures. Pb was analyzed at a 1:2 dilution. Ca, Mn, and Se were analyzed at a 1:10 dilution.

LAB MANAGER

17. Ozard, 1988. NYSDEC Wildlife Resources Center, telephone interview dated April 14, 1988.

18. U.S. Census Bureau Data, 1980.

19. USDOI, 1983. U.S. Department of the Interior, National Park Service National Register of Historic Places dated July, 1983.

20. Federal Register, 1983. Part III Department of the Interior National Registry of Natural Landmarks dated March 1, 1983.

21. Sax, 1984. Dangerous Properties of Industrial Materials, Sixth Edition, Van Nostrand Reinhold Company, New York.

0000005 (1)

INORGANIC ANALYSIS DATA SHEET
FORM I

SMPL NO. : GW-3.18

Lab Name : NANCO LABORATORIES, INC.

Customer Name: Engineering Science

SOW NO. N/A

Lab Receipt Date : 01/30/88

Lab Sample ID: 88-EW-5343

Date Reported: 2/22/88

Location ID: Buffalo Pumps

ELEMENTS IDENTIFIED AND MEASURED

CONCENTRATION : LOW ___X___ MEDIUM _____

MATRIX : WATER __X____ SOIL _____ SLUDGE ____OTHER _____

(UG/L) OR MG/KG DRY WEIGHT (CIRCLE ONE)

1.	ALUMINUM	184800.0 P N		13.	MAGNESIUM	248500.0 P	
2.	ANTIMONY	50.0 UP		14.	MANGANESE	13100.0 P E	(1:10)
3.	ARSENIC	18.0 F	(1:5)	15.	MERCURY	0.2 U C.V.	
4.	BARIUM	5500.0 P		16.	NICKEL	450.0 P	
5.	BERYLLIUM	9.0 P		17.	POTASSIUM	17100.0 P	
6.	CADMIUM	4.0 UP N		18.	SELENIUM	30.0 UF N	(1:10)
7.	CALCIUM	966900.0 P	(1:10)	19.	SILVER	10.0 UP	
8.	CHROMIUM	1600.0 P		20.	SODIUM	70100.0 P	
9.	COBALT	260.0 P		21.	THALLIUM	2.0 UF N	
10.	COPPER	670.0 P		22.	VANADIUM	420.0 P	
11.	IRON	433600.0 P E		23.	ZINC	19800.0 P	(1:10)
12.	LEAD	5400.0 P			PRECENT SOLIDS (%)	N/A	
	CYANIDE	NR					

FOOTNOTES : FOR REPORTING RESULTS STANDARD RESULT QUALIFIERS ARE USED AS DEFINED ON PAGE 2.

COMMENTS : This sample was a brown liquid that was colorless after ICP digestion procedures and colorless after furnace digestion procedures. As was analyzed at a 1:5 dilution. Ca, Mn, Se and Zn were analyzed at a 1:10 dilution.

LAB MANAGER

0000003

(1)

INORGANIC ANALYSIS DATA SHEET
FORM I

SMPL NO.: B-1.18

Lab Name : NANCO LABORATORIES, INC.

Customer Name: ENGINEERING SCIENCE

SOW NO. : N/A

Lab Receipt Date : 1/12/88

Lab Sample ID: 87-ES-5069

Date Reported: 2/3/88

Location ID: Buffalo Pumps

ELEMENTS IDENTIFIED AND MEASURED

CONCENTRATION : LOW ___X___ MEDIUM _____

MATRIX : WATER _____ SOIL ___X___ SLUDGE ____OTHER _____

UG/L OR MG/KG DRY WEIGHT (CIRCLE ONE)

1.	ALUMINUM	8400.0 P*E	13.	MAGNESIUM	17800.0 P*E
2.	ANTIMONY	12.2 UPN	14.	MANGANESE	650.0 PE
3.	ARSENIC	3.9 FN	15.	MERCURY	0.8 CV*
4.	BARIUM	130.0 P	16.	NICKEL	95.1 P
5.	BERYLLIUM	[0.7]P	17.	POTASSIUM	1200.0 UP*
6.	CADMIUM	14.9 PN	18.	SELENIUM	7.3 UF(1:10)N
7.	CALCIUM	60400.0 PE	19.	SILVER	2.4 UPN
8.	CHROMIUM	21.0 P	20.	SODIUM	140.0 UP
9.	COBALT	[10.5]P	21.	THALLIUM	0.5 UF
10.	COPPER	340.0 P	22.	VANADIUM	[3.9]P
11.	IRON	32400.0 P*E	23.	ZINC	5100.0 P (1:10)N*E
12.	LEAD	57.8 F (1:10)N*		PERCENT SOLIDS (%)	82.0
	CYANIDE	NR			
	PHENOL	NR			

FOOTNOTES : FOR REPORTING RESULTS STANDARD RESULT QUALIFIERS ARE USED AS DEFINED ON PAGE 2.

COMMENTS : This sample was a brown/black liquid that became light yellow after ICP and furnace digestion procedures. Lead, Zinc, and Selenium were analyzed at a (1:10) dilution

LAB MANAGER

DRILLING CONTRACTOR:
Driller: M. Legave
Inspector: W. Tilley
Rig Type: Mobile 61
Drilling Method: 4¼" ID HSA

ENGINEERING-SCIENCE DRILLING RECORD

PROJECT NAME: DEC Phase II Buffalo Pump
PROJECT NO.: 540172 18

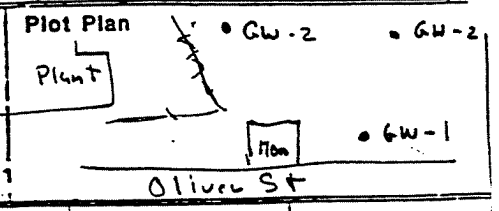
BORING NO.: GW-1
Sheet: 1 of 1
Location: Parking lot on Oliver St.

GROUND WATER OBSERVATIONS

Water Level			
Time			
Date			
Casing Depth			

Weather: Fair
Date/Time Start: 1/8/88 1:00 pm
Date/Time Finish: 1/8/88 3:0 pm

Plot Plan



Photovac Reading	SAMPLE DEPTHS	SAMPLE I.D.	SPT	FIELD IDENTIFICATION OF MATERIAL
0.0	0-2	S-1	21	Gray Brown Silt, some sand, Trace Clay & Fine Gravel (Fill)
	SS		11	
	Rec 18"		10	
			14	
0.0	2-4	S-2	9	
	SS		7	Black Silt and Fine Sand (Fill)
	Rec 8"		6	
			8	
0.0	4-6	S-3	3	4.5 Dark Gray Silt and Fine Sand (Fill)
	SS		3	Brown medium Fine sand + Silt (wet to Saturated)
	Rec 2"		5	
			7	
0.0	6-8	S-4	15	
	SS		4	
	Rec 3"		2	
			2	
0.0	8-10	S-5	7	
	SS		15	9.0
	Rec 10"		19	Brown Silt, little Clay and Fine Sand (moist)
			18	10.0
				Boring terminated at 10'

WELL SCHEMATIC: Grout; Bentonite Pellets; Sand; 2" PVC Riser (2.0'); 2" PVC Screen (4.0' – 10')

Comments

SPT - STANDARD PENETRATION TEST
D = DRY W = WASHED C = CORED
U = UNDISTURBED SS = SPLIT SPOON
P = PIT A = AUGER CUTTINGS

Soil Stratigraphy Summary: Fill to 4.5' over Brown Medium Fine Sand to 9.0 over Brown Clayey Silt to 10.

DRILLING CONTRACTOR:
Driller: M. Legare
Inspector: W. Lilley
Rig Type: Mobile 61
Drilling Method: 4¼" ID HSA

ENGINEERING-SCIENCE DRILLING RECORD

PROJECT NAME: DEC Phase II - Buffalo Pump
PROJECT NO.: 5401.28

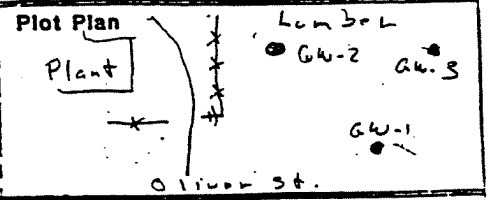
BORING NO.: GW-2
Sheet: 1 of 1
Location: Near Fense

GROUND WATER OBSERVATIONS

Water Level	4.3		
Time	9:00		
Date	1/8		
Casing Depth	10'		

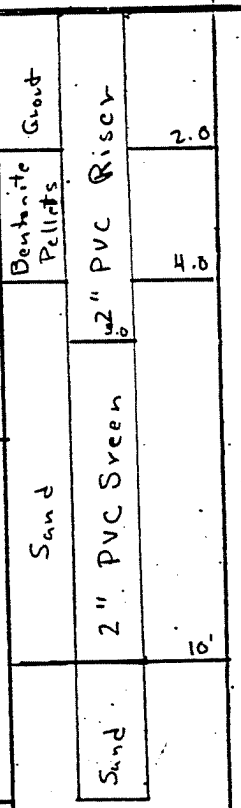
Weather: Fair
Date/Time Start: 1/8/88 7:00 am
Date/Time Finish: 1/8/88 9:30 am

Plot Plan



Photovac Reading	SAMPLE DEPTHS	SAMPLE I.D.	SPT	FIELD IDENTIFICATION OF MATERIAL
0.0	0-2	S-1	60	Black to Gray Silt, Sand and Gravel Trace of Brick (Fill) (Frozen)
	SS		78/3"	
	Rec 9"			
0.0	2-4	S-2	5	Dark Gray Silt, Fine Sand Trace of Gravel (Fill) (moist)
	SS		6	
	Rec 12"		6	
			5	
0.0	4-6	S-3	3	Black to Brown Silt, Fine Sand Trace Gravel (Fill) (moist)
	SS		2	
	Rec 8		2	
			2	
0.0	6-8	S-4	5	6.5'
	SS		15	Brown to Gray medium Fine Sand little Silt (wet)
	Rec 18"		20	
			18	
0.2	8-10	S-5	13	
	SS		13	
	Rec 4"		14	
			9	
0.0	10-12	S-6	5	
	SS		12	
	Rec 6"		11	
			10	
				Boring terminated at 12'

WELL SCHEMATIC



Comments

SPT - STANDARD PENETRATION TEST
D = DRY W = WASHED C = CORED
U = UNDISTURBED SS = SPLIT SPOON
P = PIT A = AUGER CUTTINGS

Soil Stratigraphy Summary: Fill to 6.5' over Brown to Gray medium Fine Sand to 12'.

DRILLING CONTRACTOR:
Driller: M. Legave
Inspector: W. Lilley
Rig Type: Mobile 61
Drilling Method: 4¼" ID HSA

ENGINEERING-SCIENCE DRILLING RECORD

PROJECT NAME: DEC Phase II Buffalo Pump
PROJECT NO.: S401218

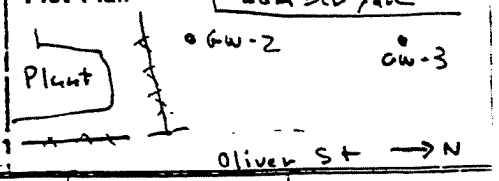
BORING NO.: GW-3
Sheet: 1 of 1
Location: North west Corner

GROUND WATER OBSERVATIONS

Water Level	3.0		
Time	8:00		
Date	1/8		
Casing Depth	10'		

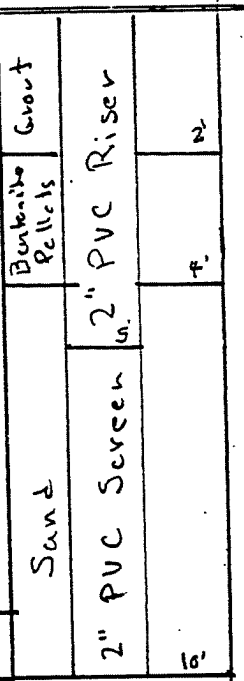
Weather: Fair
Date/Time Start: 1/8/88 9:30
Date/Time Finish: 1/8/88 11:30

Plot Plan



Photovac Reading	SAMPLE DEPTHS	SAMPLE I.D.	SPT	FIELD IDENTIFICATION OF MATERIAL
0.0	0-2	S-1	10	Brown Silt, some Fine Sand Trace of Gravel and Brick (fill)
	SS		13	
	Rec 12"		13	
			10	
0.0	2-4	S-2	6	Black Silt and Sand (fill)
	SS		6	
	Rec 6"		7	
			6	
0.5	4-6	S-3	7	4.5'
	SS		11	Brown-Gray medium Fine Sand little Silt (wet)
	Rec 22"		13	
			12	
1.0	6-8	S-4	3	
	SS		5	
	Rec 8"		6	
			4	
1.0	8-10	S-5	2	
	SS		5	9.0'
	Rec 12"		10	Gray-Brown Silt and Clay, little Fine Sand (moist)
			13	10'
				Boring terminated at 10'

WELL SCHEMATIC



Comments

SPT - STANDARD PENETRATION TEST
D = DRY W = WASHED C = CORED
U = UNDISTURBED SS = SPLIT SPOON
P = PIT A = AUGER CUTTINGS

Soil Stratigraphy Summary: Fill to 4.5' over Brown-Gray medium Fine Sand to 9.0' over Gray Brown Clayey Silt to 10'

TABLE IV-4

WATER LEVEL DATA

BUFFALO PUMPS SITE

Well I.D.	Ground Surface Elevation (Feet*)	Top of PVC Well Pipe Elevation (Feet*)	Well Screen Interval Elevation (Feet*)	Water Level Data Date 2/17/88 Depth to Water Level (Feet**)	Date 2/17/88 Water Level Elevation (Feet*)	Date 1/12/88 Depth to Water Level (Feet*)	Date 1/12/88 Water Level Elevation (Feet*)
GW-1	498.7	500.4	493.7 - 488.7	4.3	496.1	5.3	495.1
GW-2	501.7	504.1	496.7 - 491.7	6.2	497.9	5.8	498.3
GW-3	499.2	500.9	494.2 - 489.2	3.4	497.5	4.0	496.9

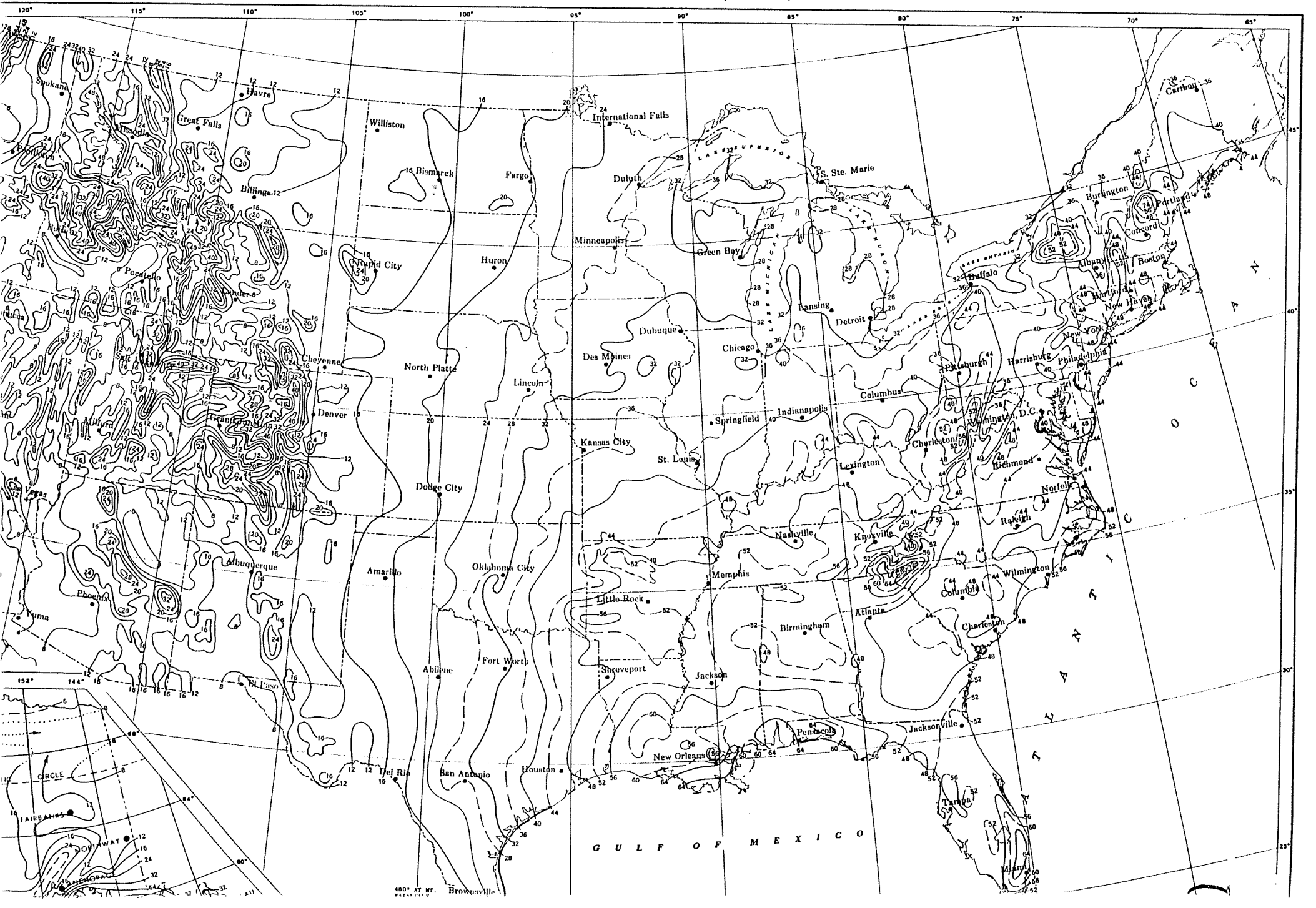
* Referenced to an assumed on-site datum.

** Water level depth from top of PVC.

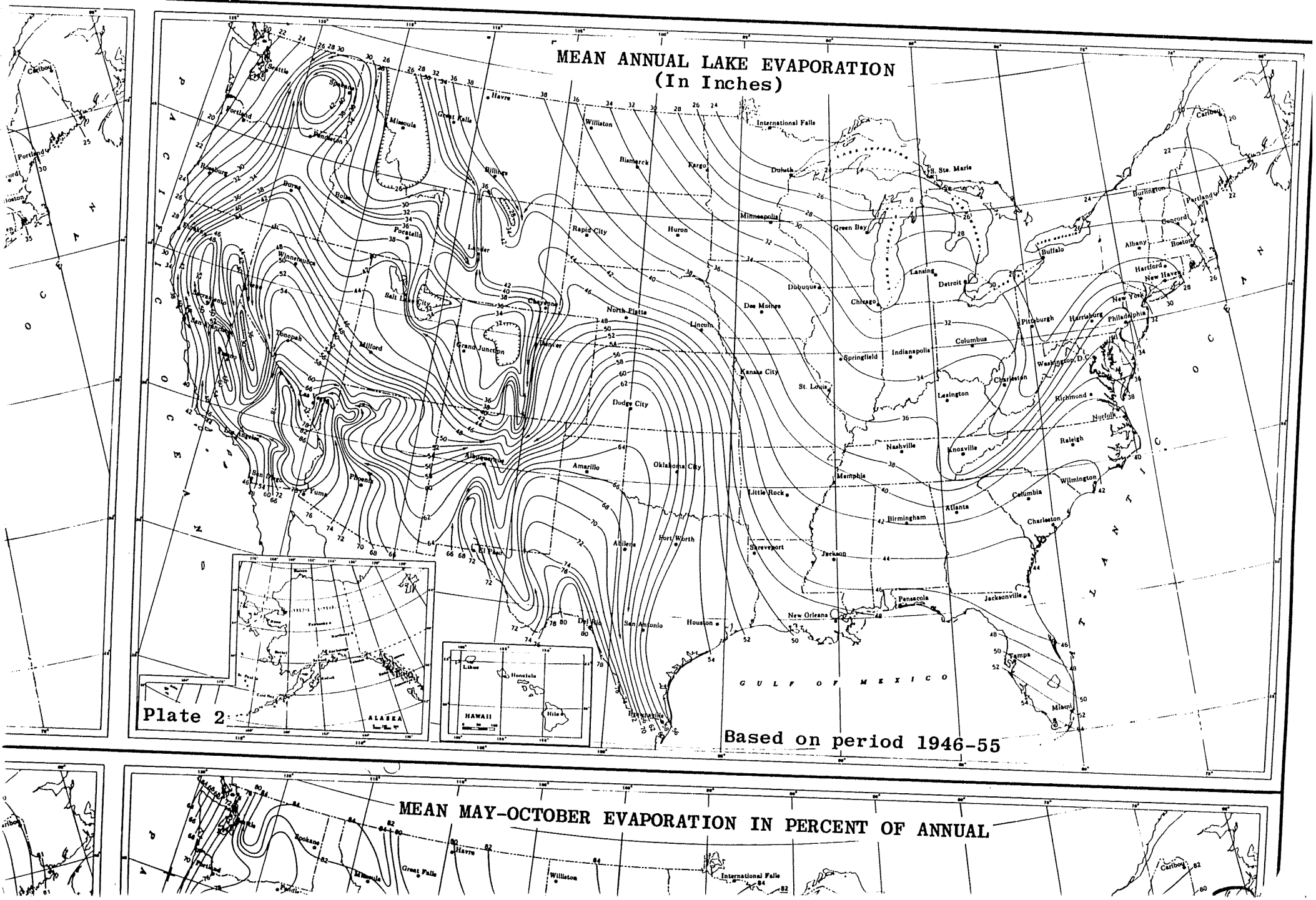
CLIMATIC ATLAS OF THE UNITED STATES

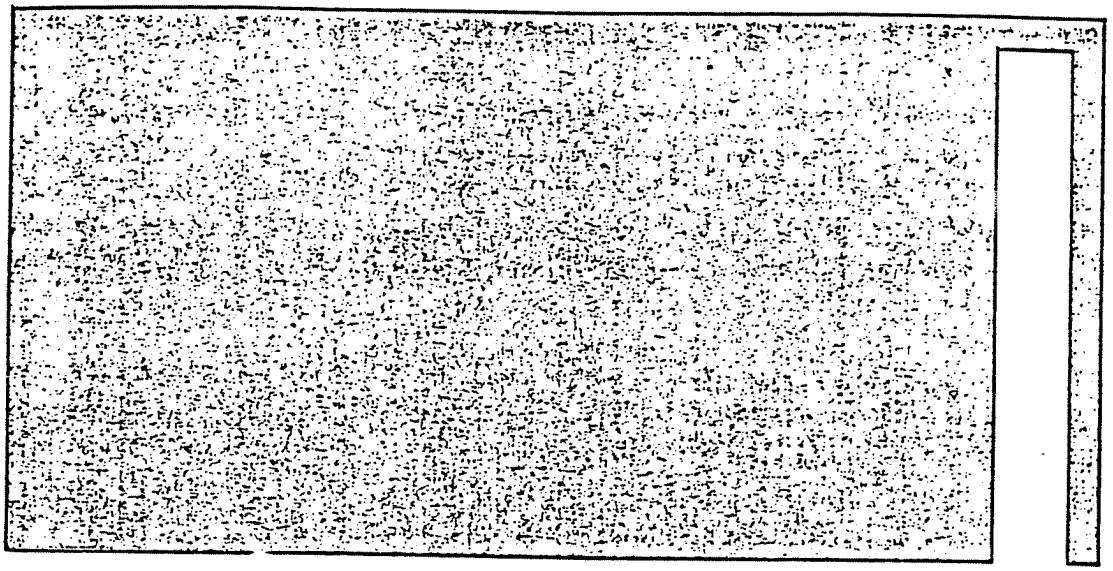
U.S. DEPARTMENT OF COMMERCE . Environmental Science Services Administration . Environmental Data Service

NORMAL ANNUAL TOTAL PRECIPITATION (Inches)



AN AND LAKE EVAPORATION





R. Allan Freeze

Department of Geological Sciences
University of British Columbia
Vancouver, British Columbia

John A. Cherry

Department of Earth Sciences
University of Waterloo
Waterloo, Ontario

GROUNDWATER

Prentice-Hall, Inc.
Englewood Cliffs, New Jersey 07632

Table 2.2 Range of Values of Hydraulic Conductivity and Permeability

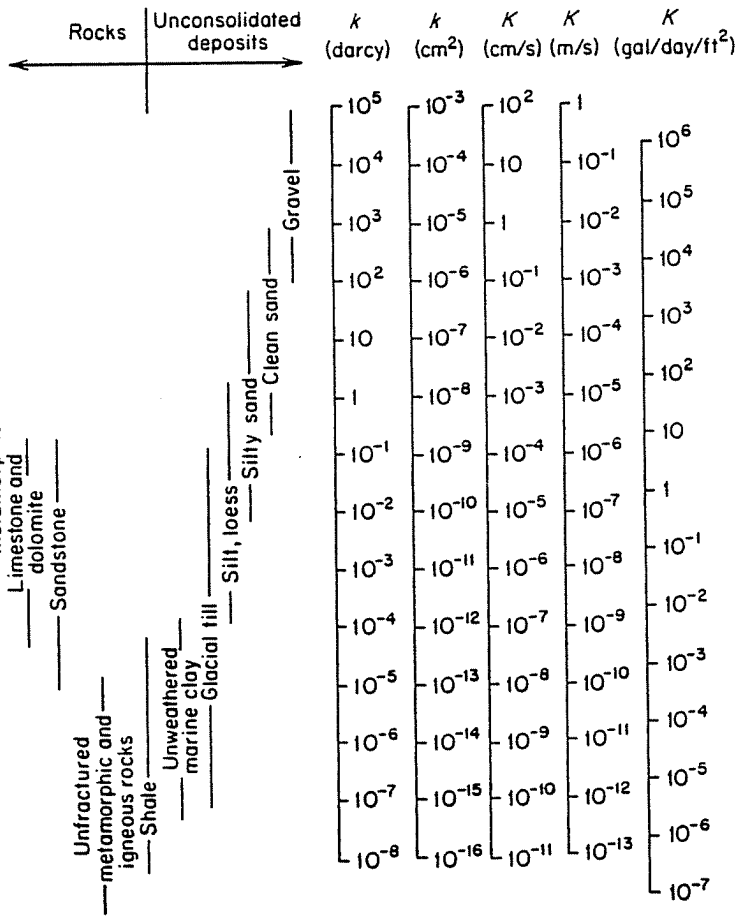


Table 2.3 Conversion Factors for Permeability and Hydraulic Conductivity Units

	Permeability, k*			Hydraulic conductivity, K		
	cm^2	ft^2	darcy	m/s	ft/s	gal/day/ft^2
cm^2	1	1.08×10^{-3}	1.01×10^{8}	9.80×10^{2}	3.22×10^{3}	1.85×10^{9}
ft^2	9.29×10^{2}	1	9.42×10^{10}	9.11×10^{5}	2.99×10^{6}	1.71×10^{12}
darcy	9.87×10^{-9}	1.06×10^{-11}	1	9.66×10^{-6}	3.17×10^{-5}	1.82×10^{1}
m/s	1.02×10^{-3}	1.10×10^{-6}	1.04×10^{5}	1	3.28	2.12×10^{6}
ft/s	3.11×10^{-4}	3.35×10^{-7}	3.15×10^{4}	3.05×10^{-1}	1	5.74×10^{5}
gal/day/ft^2	5.42×10^{-10}	5.83×10^{-13}	5.49×10^{-2}	4.72×10^{-7}	1.74×10^{-6}	1

*To obtain k in ft^2, multiply k in cm^2 by 1.08×10^{-3}.

(6)

INTERVIEW FORM

INTERVIEWEE/CODE Mr. Muench /

TITLE - POSITION plant manager / Buffalo Pumps

ADDRESS 875 Oliver St. "

CITY North Tonawanda STATE NY ZIP 14120

PHONE (716) 693-1850 RESIDENCE PERIOD _____ TO _____

LOCATION: Site inspection interview INTERVIEWER Bob Steele / John Botts

DATE/TIME 3/20/85 and 4/10/85

SUBJECT: onsite waste disposal / PHASE I Investigation

REMARKS: In the period 1900 to 1953 foundry sands used in bronze and iron casting were disposed adjacent to the manufacturing plant. In addition, during the same period through to 1971, boiler ash was disposed in this area. No soil cover has been applied to the site. In 1977 to 1978, construction debris and earthen material from the excavation of a storm sewer on Oliver Street was landfilled in an area north of an Erie Railroad easement. In 1979 to 1980, construction debris and earthen material from the demolition of an onsite building was added to the fill. The USGS has two monitoring wells in the fill area. One well may have been destroyed by construction activity conducted by a neighboring business.

I AGREE WITH THE ABOVE SUMMARY OF THE INTERVIEW:

SIGNATURE:

COMMENTS:

RECEIVED [illegible]

FILE

FILED INCOMING

COPIES TO 13305-029

CIRCULATE TO

6

INTERVIEW FORM

INTERVIEWEE/CODE Mr. Munch

TITLE - POSITION Buffalo Pumps Plant Manager

ADDRESS [illegible] Oliver St

CITY North Tonawanda STATE NY ZIP 14120

PHONE [illegible]-1350 RESIDENCE PERIOD TO

LOCATION over telephone INTERVIEWER Lisa Lyon

DATE/TIME 10/10/85 @ 11:15

SUBJECT: Buffalo Pumps Phase I Investigation

REMARKS: Mr. Munch clarified information concerning the locations of onsite dumping and the type of materials dumped. From 1900 to 1953 foundry sands were dumped adjacent to the plant building and until 1971 trees and logs also dumped. These materials were dumped over the entire fenced in area of the plant including the area subsequently covered by a plant addition (construction of building). No sand covers were ever added to this area.

A second disposal area is located to the N.W. of the main road related tanks. This area received construction debris and was later covered with clean materials from the excavation of a storm sewer on Oliver St. In this area landfilling occured in less than a year, and the area was backfilled to its present location.

I AGREE WITH THE ABOVE SUMMARY OF THE INTERVIEW:

Michael J Munch
SIGNATURE

COMMENTS: Construction debris as noted consisted of no more than 15 cubic yards of brick only.

(7)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION
INACTIVE HAZARDOUS WASTE DISPOSAL REPORT

CLASSIFICATION CODE: 2a REGION: 9 SITE CODE: 932044
EPA ID: NYD002127199

NAME OF SITE : Buffalo Pumps Div-Buf. Forge Comp
STREET ADDRESS: 874 Oliver Street
TOWN/CITY: COUNTY: ZIP:
North Tonawanda Niagara

SITE TYPE: Open Dump-X Structure- Lagoon- Landfill- Treatment Pond-
ESTIMATED SIZE: 4 Acres

SITE OWNER/OPERATOR INFORMATION:
CURRENT OWNER NAME....: Buffalo Pumps Div.- Buffalo Forg
CURRENT OWNER ADDRESS.: 490 Broadway, Buffalo, NY
OWNER(S) DURING USE...: Buf Pumps Div-Buf. Forge Company
OPERATOR DURING USE...: Buffalo Pumps Div. Buffalo Forge
OPERATOR ADDRESS.....: 490 Broadway, Buffalo, NY
PERIOD ASSOCIATED WITH HAZARDOUS WASTE: From Unknown To 1970

SITE DESCRIPTION:
Buffalo Pumps used coal fired boilers until 1970 and the boiler ash was disposed of in an area adjacent to the north side of the plant. It has been reported that no material other than ash was disposed at this site. Currently the prinicipal wastes generated by the plant include wood, paper, waste oil and paint sludge. They are hauled off-site for disposal, incineration or re-cycling according to a Niagara County Site Profile report of March 1982, or re-cycling according to a Niagara County Site Profile report of March 1982. USGS collected groundwater and surface water-sediment samples in June 1982. No organic compounds were detected. Iron and copper were found to be in high concentration. State Superfund Phase I investigation Report was completed in May 1985. The report recommends additional investigations. A Phase II investigation has been scheduled.

HAZARDOUS WASTE DISPOSED: TYPE	Confirmed-	Suspected-X QUANTITY (units)
Boiler Ash		Unknown

8

INTERVIEW FORM

INTERVIEWEE/CODE Mr. Mike Hopkins - Niagra County Dept. of Health
TITLE - POSITION Assistant Public Health Engineer
ADDRESS Main Post Office Box 428, 10th & East Falls St.
CITY Niagra Falls STATE NY ZIP 14302
PHONE (716) 284-3124 RESIDENCE PERIOD ____ TO ____
LOCATION Niagra Falls INTERVIEWER Liz Dobson
DATE/TIME October 8, 1987 / 1000 AM
SUBJECT: Groundwater use in vicinity of Phase II sites: Nash Road, Chisholm Ryder and Buffalo Pumps.

REMARKS: During our telephone conversation, Mr. Hopkins related the following information:

Buffalo Pumps - drinking source is public water supply water. There are no residential wells within a 3 mile radius of site. City of N. Tonawanda and Town of Wheatfield receive drinking water from Niagra River. There are no industrial or agricultural wells in the vicinity of the site.

Chisholm Ryder - four family homes located on Pennsylvania Ave (Town of Niagra) and Delaware Ave near Rte. 31 have shallow dug wells as their drinking water supply. These families are in the process of being hooked up to public water supply lines. Analyses of wells showed high bacterial content and some low volatile concentrations. Wells are probably upgradient of Chisholm Ryder site. Also in Town of Niagra Water District is a Junkyard (location?) which has a well that is not used for drinking, but is used as 'wash water' 2 wells which exist on Bellvadeer Ave. are now abandoned. No industrial wells or Agricultural wells exist within vicinity of Chisholm Ryder Site

? This should be confirmed with Town of Niagara Water District

foot of Pennsylvania Ave

8 (cont

INTERVIEW FORM

INTERVIEWEE/CODE Mr. Mike Hopkins - Niagra County Health Dept.
TITLE - POSITION Assistant Public Health Engineer
ADDRESS Main Post Office Box 428, 10th & East St.
CITY Niagra Falls STATE NY ZIP 14302
PHONE (716) 284-3124 RESIDENCE PERIOD ____ TO ____
LOCATION Niagra Falls INTERVIEWER Liz Dobson
DATE/TIME Oct. 08, 1987 / 10:00 AM
SUBJECT: Groundwater Use in vicinity of Phase II sites: Nash Road, Chisholm Ryder and Buffalo Pumps.

REMARKS:

Nash Road - ~~Town~~ City of North Tonawanda is on public water supply, no private drinking wells. Doesn't think Town of Wheatfield has any private drinking / municipal wells, this must be checked with Town of Wheatfield Water Authority

Other information: General Bedrock info for N. Tonawanda: Camillus Shale, approx 30 feet to top of bedrock. Overlain by Till, overlain by clay.

as corrected 10/15/87

(9)

ES ENGINEERING-SCIENCE COMPANIES

MEMORANDUM TO FILE

JOB NO. 8Y012.18 - Buffalo Pump

FILE DESIGNATION External Correspondence. Background info.

DATE 10/12/87 TIME 1115

PHONE CALL FROM Liz Dobson PHONE NO. (315) 451-9560

PHONE CALL TO Hooker Chemical - Durez Division PHONE NO. (716) 696-6000

Chuk Noll 696-634 in charge of Environmental

CONFERENCE WITH

PLACE telephone.

SUBJECT existance of industrial wells & construction.

10/12/87 - called Chuck Noll @ 1120 - Not in office.

10/14/87 - Called Chuck Noll backed 3 industrial wells have not been used for 15-20 years - wells are not capped however - There are no wells on site which are used for 'water usage' - lots of monitoring wells - Dunn Geoscience did a report here we may be able to get well logs and geologic cross-sections from report

SIGNED

New York State Atlas of Community Water System Sources 1982

NEW YORK STATE
DEPARTMENT OF HEALTH

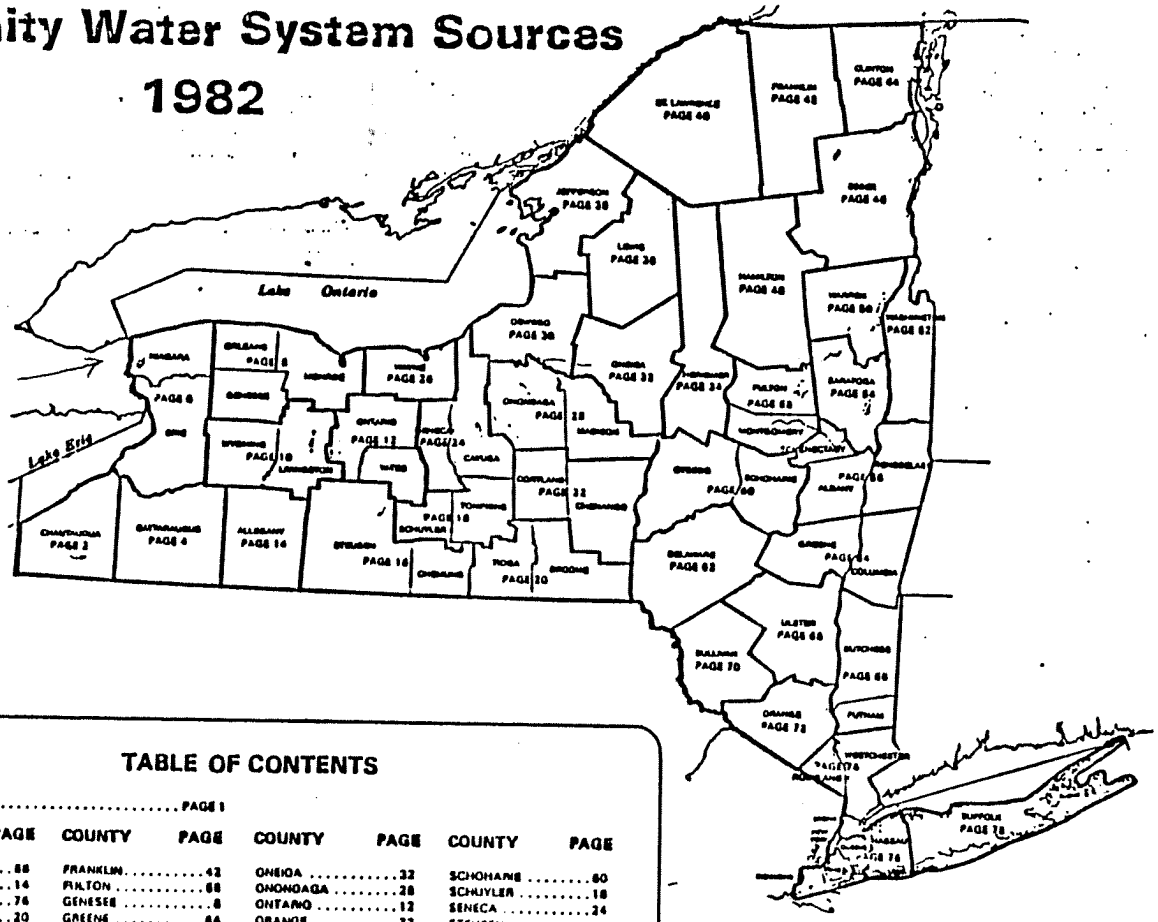


TABLE OF CONTENTS

LEGEND

BOUNDARIES AND PLACES

International
State
County
Town
Indian Reservation
City
Village
Unincorporated Place
Federal Reservation
Built-up Area (Over 25,000 population including any contiguous city or village)

CLASSIFICATION OF POPULATED PLACES

100,000 or more ..... YONKERS
50,000 to 100,000 ..... Levittown
12,500 to 50,000 ..... Poughkeepsie
2,500 to 12,500 ..... Hampton Bays
250 to 2,500 .....
250 or less .....

TRANSPORTATION

Highways
- Divided Highways
  - Full Control of Access
  - Partial or No Control of Access
- Undivided Highway
- Interchange
- Touring Route (State, U.S., Interstate or State Parkway)
- Touring Route Markers
  - State
  - U.S.
  - Interstate

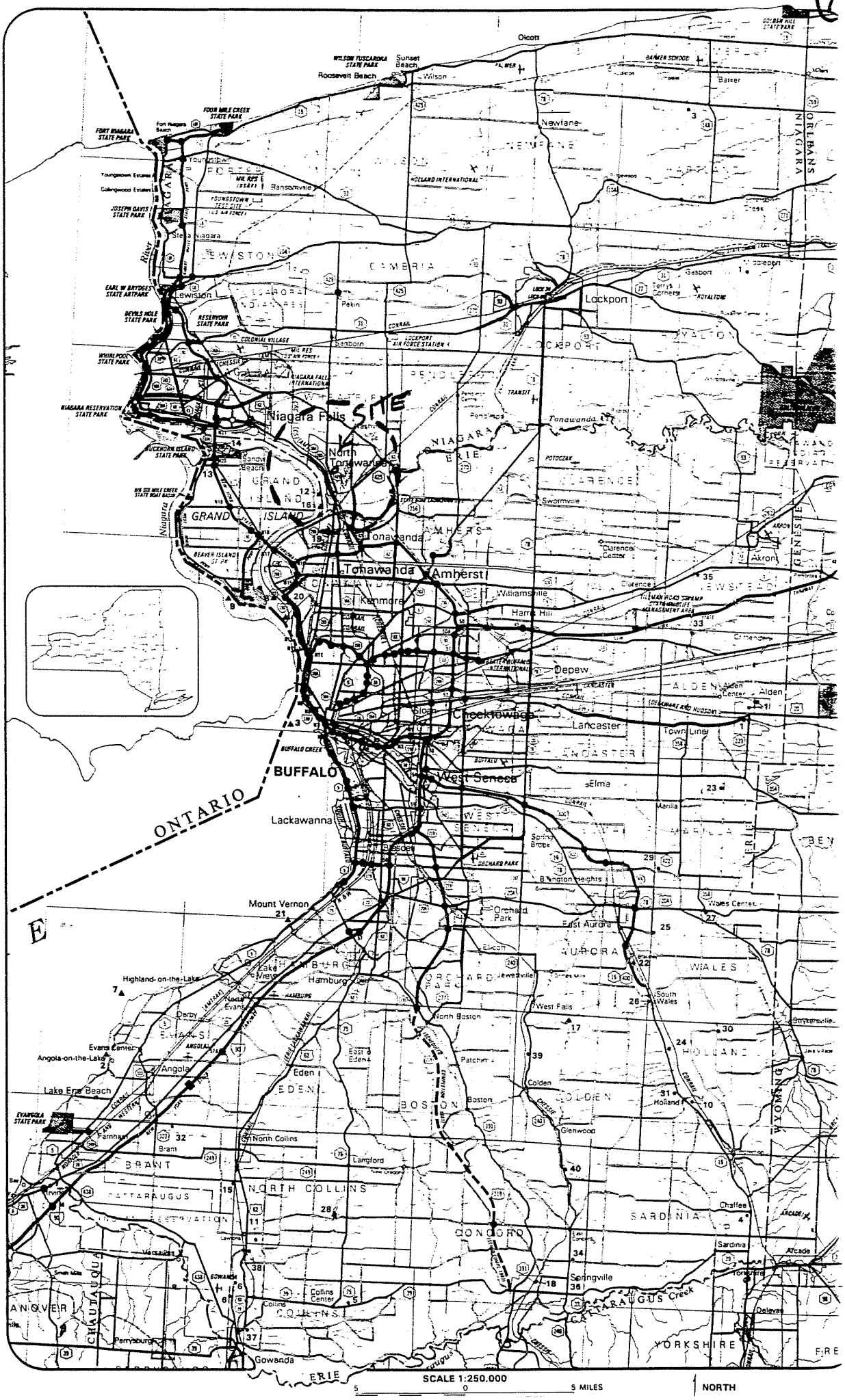
Railroads
- Operating Line
- Service Discontinued
- Operator
- Owner (If Other than Operator)
- Company Having Trackage Rights

Airports (Open to the Public, Military)
- Runway under 4000'
- Runway over 4000'

Rest Areas
- Food, Gas, Rest Rooms
- Rest Rooms
- Gas, Rest Rooms
- Parking Only

RECREATION FACILITIES

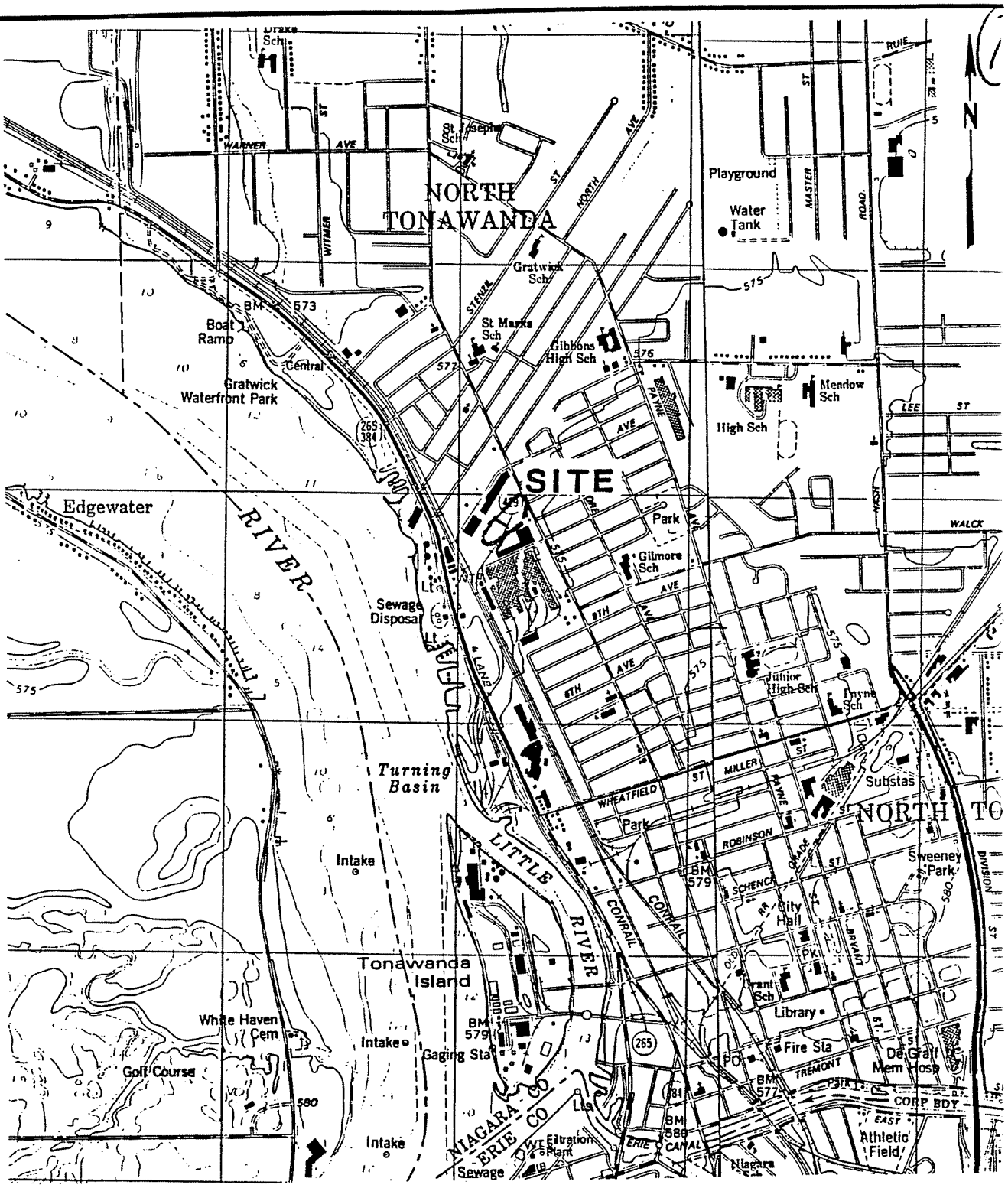
- State or National Recreation Area
- State Campground
- State Boat Launching Site
- State Canal Park
- State Fish Hatchery
- Other State Recreation Site


Olcott
Sunset Beach
Roosevelt Beach
Wilson
Barker
Newfane
Youngstown
Ransomville
Niagara River
Lewiston
Pekin
Lockport
Gasport
Niagara Falls
Tonawanda
North Tonawanda
Grand Island
Buckhorn Island State Park
Beaver Island State Park
Swormville
Akron
Clarence Center
Williamsville
Kenmore
Harris Hill
Depew
Alden
Alden Center
Cheektowaga
Lancaster
Town Line
BUFFALO
West Seneca
Elma
Manilla
Lackawanna
Orchard Park
East Aurora
Wales Center
Mount Vernon
Lake View
Hamburg
Highland-on-the-Lake
Derby
Evans
West Falls
South Wales
North Boston
Evans Center
Angola-on-the-Lake
Angola
Eden
Patchin
Colden
Boston
Holland
Lake Erie Beach
Farnham
Bram
North Collins
Langford
Glenwood
Chaffee
Sardinia
Springville
Versailles
Gowanda
Collins Center
Collins
Perrysburg
Delevan
Yorkshire
ONTARIO
ERIE
SCALE 1:250,000
5 0 5 MILES
NORTH

(10)

ERIE COUNTY

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
Municipal Community			
	Akron Village (See No 1 Wyoming Co, Page 10)	3640	
1	Alden Village	3460	Wells
2	Angola Village	8500	Lake Erie
3	Buffalo City Division of Water	357870	Lake Erie
4	Caffee Water Company	210	Wells
5	Collins Water District #3	704	Wells
6	Collins Water Districts #1 and #2	1384	Wells
7	Erie County Water Authority (Sturgeon Point Intake)	375000	Lake Erie
8	Erie County Water Authority (Van DeWater Intake)	NA	Niagara River - East Branch
9	Grand Island Water District #2	9390	Niagara River
10	Holland Water District	1670	Wells
11	Lawtons Water Company	138	Wells
12	Lockport City (Niagara Co)		Niagara River - East Branch
13	Niagara County Water District (Niagara Co)		Niagara River - West Branch
14	Niagara Falls City (Niagara Co)		Niagara River - West Branch
15	North Collins Village	1500	Wells
16	North Tonawanda City (Niagara Co)		Niagara River - West Branch
17	Orchard Park Village	3671	Pipe Creek Reservoir
18	Springville Village	4169	Wells
19	Tonawanda City	18538	Niagara River - East Branch
20	Tonawanda Water District #1	91269	Niagara River
21	Wanakah Water Company	10750	Lake Erie
Non-Municipal Community			
22	Aurora Mobile Park	125	Wells
23	Bush Gardens Mobile Home Park	270	Wells
24	Circle B Trailer Court	50	Wells
25	Circle Court Mobile Park	125	Wells
26	Creekside Mobile Home Park	120	Wells
27	Donnelly's Mobile Home Court	99	Wells
28	Gowanda State Hospital	NA	Clear Lake
29	Hillside Estates	160	Wells
30	Hunters Creek Mobile Home Park	150	Wells
31	Knox Apartments	NA	Wells
32	Maple Grove Trailer Court	72	Wells
33	Millgrove Mobile Park	100	Wells
34	Perkins Trailer Park	75	Wells
35	Quarry Hill Estates	400	Wells
36	Springville Mobile Park	114	Wells
37	Springwood Mobile Village	132	Wells
38	Taylors Grove Trailer Park	39	Wells
39	Valley View Mobile Court	42	Wells
40	Villager Apartments	NA	Wells



LATITUDE: 43°02'47"
LONGITUDE: 78°53'09"

SCALE
0 1000 2000 3000 4000 FEET

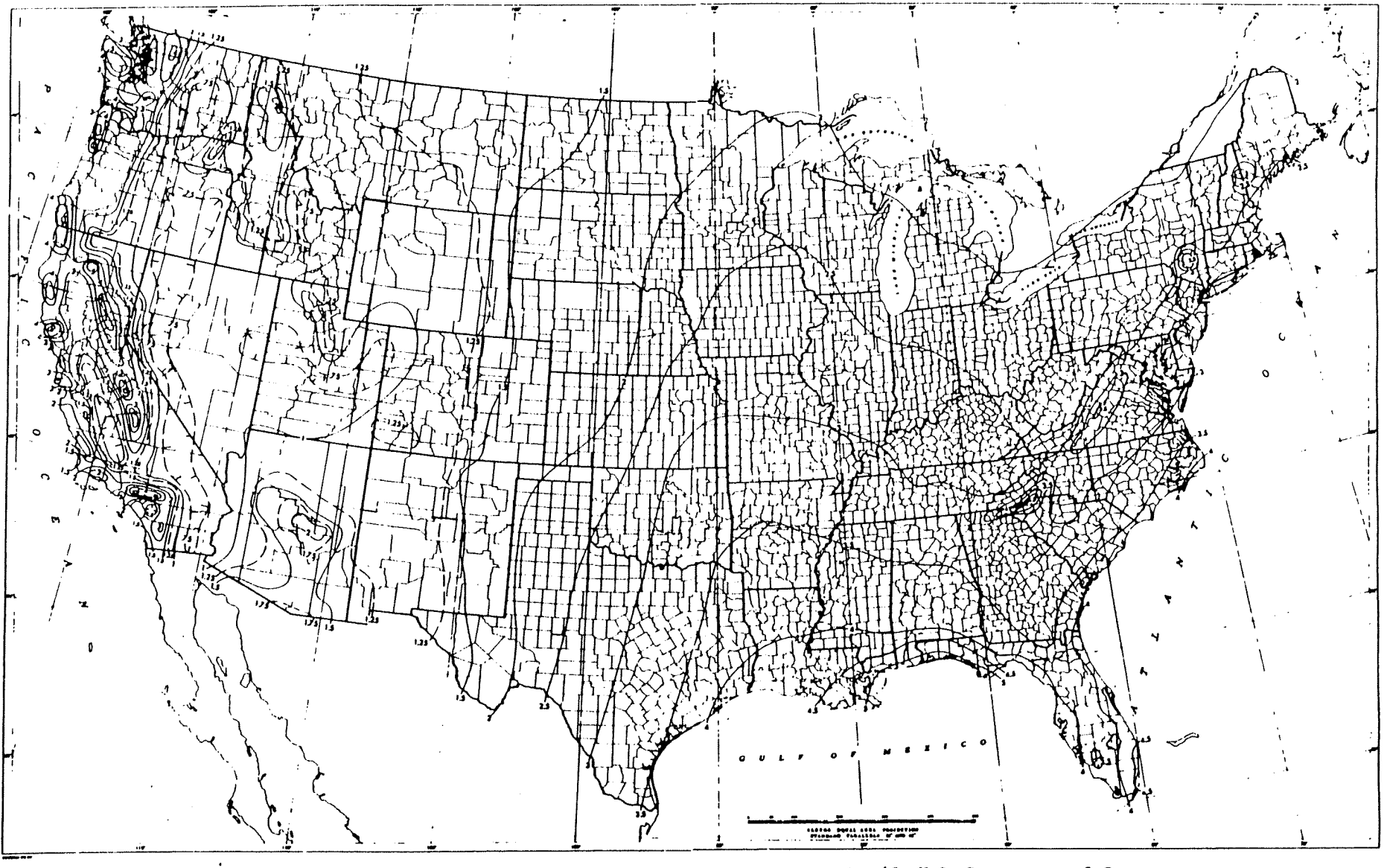
REFERENCE: U.S.G.S. 7.5' Topographic Map
Tonawanda West, NY (1980) and Tonawanda East, NY (1980) Quadrangles

ENGINEERING-SCIENCE, INC.
IN ASSOCIATION WITH
DAMES & MOORE

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION
PHASE I REPORT

SITE LOCATION MAP
BUFFALO PUMPS

FIGURE I-



Source: Rainfall Frequency Atlas of the United States, Technical Paper No. 40, U.S. Department of Commerce, U.S. Government Printing Office, Washington, D.C., 1963.

FIGURE 8
1-YEAR 24-HOUR RAINFALL
(INCHES)

(13)

EPA

AN OVERVIEW OF THE CONTAMINANTS OF CONCERN IN THE DISPOSAL AND UTILIZATION OF MUNICIPAL SEWAGE SLUDGE

REVISED DRAFT

FEBRUARY 11, 1983

Updated

April 15, 1983

FOR
ENVIRONMENTAL PROTECTION AGENCY
SLUDGE TASK FORCE
WASHINGTON, D.C.

BOOZ·ALLEN & HAMILTON INC.

DRAFT

13

(4) Cadmium (Cd)

Cadmium concentrations in natural soils are quite low; they range from 0.01 to 7 ppm with 0.06 ppm considered normal (3). Given that the range of Cd concentrations in sludges is between 1 to 3,410 ppm, with the median at 13 ppm, modest applications of sludge containing a few ppm of Cd would enrich the soil to levels beyond those typically observed (4, 7). The chemistry of cadmium in soils appears to be influenced by soil organic matter, clay content and type, hydrous oxide content, soil pH, and redox potential. The solubility and plant availability of Cd, as with other cationic heavy metals, decreases with increasing pH. Soil cation exchange capacity (CEC) is also correlated to the availability of cadmium in the soil.

Crops differ widely in Cd uptake characteristics. Cadmium tends to accumulate in the foliar, or leafy portions of plants rather than in the grain, fruit or roots, and can be phytotoxic to some plant species at varying tissue concentrations. However, in terms of the potential for animal and human health concerns, crops may contain undesirable concentrations of cadmium in their tissues without showing visible symptoms of toxicity. Clearly, the food chain is not protected from excessive Cd concentrations by a soil-plant barrier (4).

Chronic exposure to Cd may result in the accumulation of tissue concentrations in man and animals which cause serious health effects, including renal tubular dysfunction manifested in proteinuria and other kidney function abnormalities (glucosuria, aminoaciduria, phosphaturia, etc.). Kjellstrom, Nordberg, and Friberg have developed sophisticated metabolic models for Cd ingestion in humans, which predict the probability of proteinuria for populations at various rates of Cd intake (8). Other potential carcinogenic, mutagenic, and teratogenic effects of cadmium are currently under investigation.

As with most other heavy metals, risks of groundwater contamination due to application of sludge borne cadmium are quite small. Cadmium is held strongly in the soil in most situations (a pH-dependent mechanism), and does not move readily from surface soils through the soil profile to groundwater. Surface drainage from sludge applications sites may contribute to cadmium contamination of surface waters, but this is also unlikely.

Cadmium is currently the heavy metal of greatest concern as a public health risk in the land application of sludge, and in some cases, as a potential, but as yet

(14)

Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States

U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1270

MOREAU

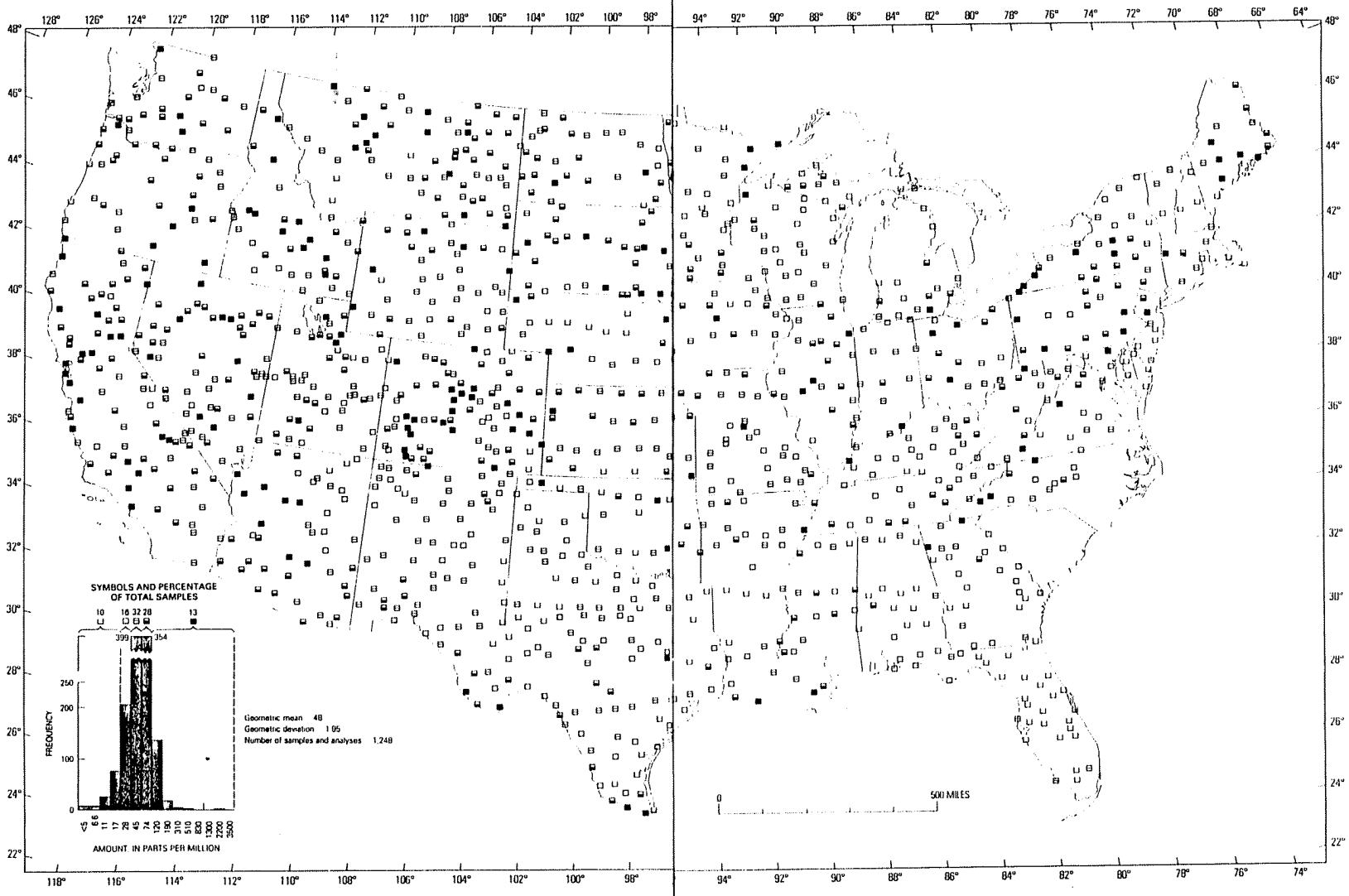


FIGURE 46.—Zinc content of surficial materials.

NCHD Report

Buffalo Pumps.

(15)

NAME

BUFFALO PUMPS DIVISION (DEC #932044)

LOCATION

The disposal area is located north of the Buffalo Pumps Plant at 874 Oliver Street, North Tonawanda, NY. This area is a 1.3 acre lot between the plant fence line and a property line running roughly parallel to and 200 feet south of Industrial Drive. The lot measures approximately 200 feet by 300 feet.

A site sketch is attached.

OWNERSHIP

The property is owned by Buffalo Pumps Division, Buffalo Forge Company. Contact can be made through Mr. Kibbe at the North Tonawanda Plant.

HISTORY

According to the Inter-Agency Task Force Report (1979) the plant was purchased in 1891 by Voelker and Felthousen and operated as the Buffalo Steam Pump Company until 1931. In 1931, the plant became the Buffalo Pump Division, Buffalo Forge Company. Buffalo Pumps manufactures centrifugal pumps.

Buffalo Pumps used coal fired boilers until 1970 when gas/oil burners were installed. Prior to 1971, boiler ash was disposed of in an area adjacent to the north side of the plant yard. After 1970 ash was not generated. The total volume of ash disposed of is not known.

An inspection of the inactive disposal area was made by this department in December, 1981. The area has recently received up to three feet of clean fill as part of an expansion by Buffalo Pumps. Because of this fill material, a visual inspection of waste material was not possible. According to Mr. Kibbe of Buffalo Pumps, no material other than ash was disposed of here. The lot has been vacant for many years previous to this writing.

Currently the principal wastes generated by Buffalo Pumps are wood, paper, waste oil and paint sludge. The wastes generated while the site was active are expected to be the same with the addition of boiler ash. Wood, paper and general refuse are hauled off-site by Rapid Disposal. Waste oils are removed by Booth Oil. Paint sludge and scraped metals are transported to the Cheektowaga Plant of Buffalo Forge where they are incinerated, recycled or hauled off-site for disposal.

A review of USGS maps (Tonawanda west - 7½') and USDA aerial photos (ARE 3V-75, 1958) provided no additional information.

RESULTS OF PREVIOUS SAMPLING AND ANALYSIS

There is no record of any prior sampling. Mr. Kibbe of Buffalo Forge was unaware of any previous sampling.

SOILS/GEOLOGY

The exact composition of the original soils is unknown. A detailed soil survey for this area is unavailable. Data from nearby areas indicates that the soils are likely to contain a large percentage of clay and exhibit a low permeability in one or more levels.

The structural fill being deposited here was found to contain a variety of soil types including coarse components such as gravel and bricks. The properties of this material are unknown.

If this site is built upon as planned, the buildings and the adjacent pavement should render the surface impermeable and provide for drainage of runoff.

The bedrock is expected to be Lockport Dolomite although this has not been documented. The thickness of the Dolomite and the depth to water bearing zones is not known.

GROUNDWATER

The depth to groundwater has not been determined. The direction of flow is expected to be generally toward the Niagara River(west).

There are no known drinking water wells within three miles of this site. Public water is available throughout this area. There are no industrial or other users of groundwater in the area. There are no monitoring wells near the site.

SURFACE WATER

The nearest surface water body is the Niagara River, 1500 feet away. Direct entry of runoff to the River is not possible, but storm sewers draining this area do enter the river. Groundwater beneath this site is expected to enter the Niagara River.

The Niagara River is used for industrial and drinking water, recreation, navigation and other uses. The City of Niagara Falls water intakes are located four miles downstream. The site is not subject to flooding and there are no wetlands within one mile.

AIR

There have been no complaints of odors or other air quality problems received regarding this site. Due to the nature of the wastes present, none are expected.

The nearest residence is less than 400 feet away. 3000 to 10,000 people live within one mile of the site. Commercial and industrial areas ajoin the former disposal area. The property is entirely within the City Limits of North Tonawanda.

FIRE AND EXPLOSION

The potential for fire or explosion is very small, due to the nature of the wastes present.

Several thousand buildings and over 10,000 people are located within 2 miles. The nearest off-site building is less than 200 feet away.

DIRECT CONTACT

Although physical access is not restricted, all wastes are or will be covered to prevent direct contact. When the expansion is complete access will presumably be restricted and standard plant security measures used.

CONCLUSIONS

This site is believed to be a disposal area for coal-boiler ash. There is no indication that other materials have been disposed of here. Future construction on this site should eliminate the infiltration through the wastes.

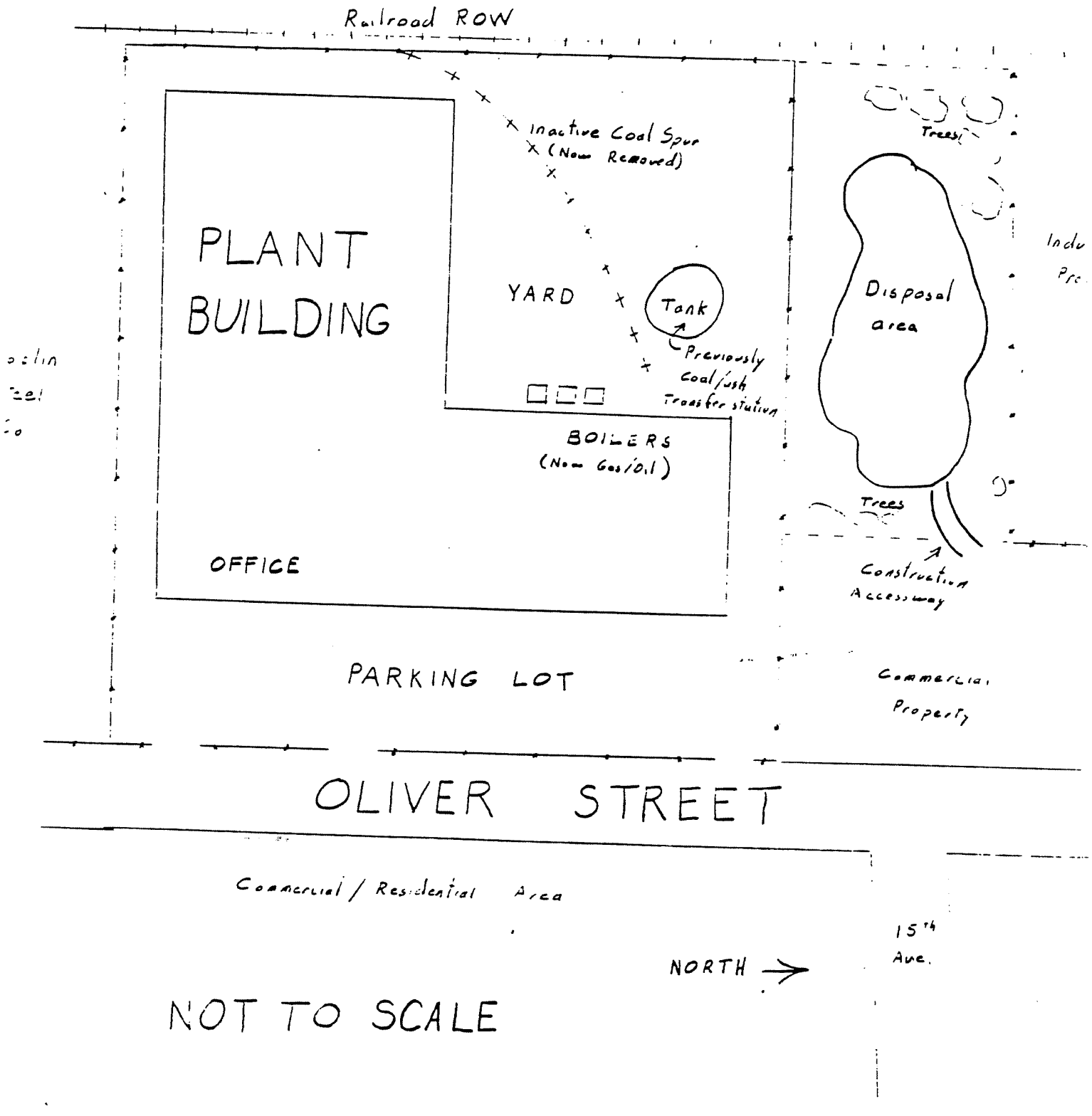
Samples of the waste materials could be obtained from augered holes if construction activities do not prevent access to the soil (for example by pouring concrete slabs, etc.) Groundwater and soil samples could be obtained from holes around the perimeter of the site. The western boundary of the property is expected to be the downgradient side. If borings or wells are placed, additional geotechnical and hydrological data could be obtained.

Further inspections are not recommended as the condition of the wastes is not detectable from the surface.

BUFFALO PUMPS DIV.; BUFFALO FORGE CO.

DEC # 932044

(15)



NOT TO SCALE

Michael Hopkins
NCHD
12/16/81

Buffalo Pumps (1t

New York State Department of Environmental Conservation
FISH AND WILDLIFE DIVISION - REGION 9
600 Delaware Avenue, Buffalo, New York 14202-1073
(716) 847-4550

Thomas C. Jorling
Commissioner

September 2, 1987

Ms. Elizabeth M. Dobson
Engineering-Science
290 Elwood Davis Road
Liverpool, New York 13088

Dear Ms. Dobson:

This letter will serve as verification that I traced NYS designated wetland boundaries on the accompanying maps. The boundaries shown are from official Department of Environmental Conservation Maps promulgated on September 10, 1986 (Erie County) and December 5, 1984 (Niagara County).

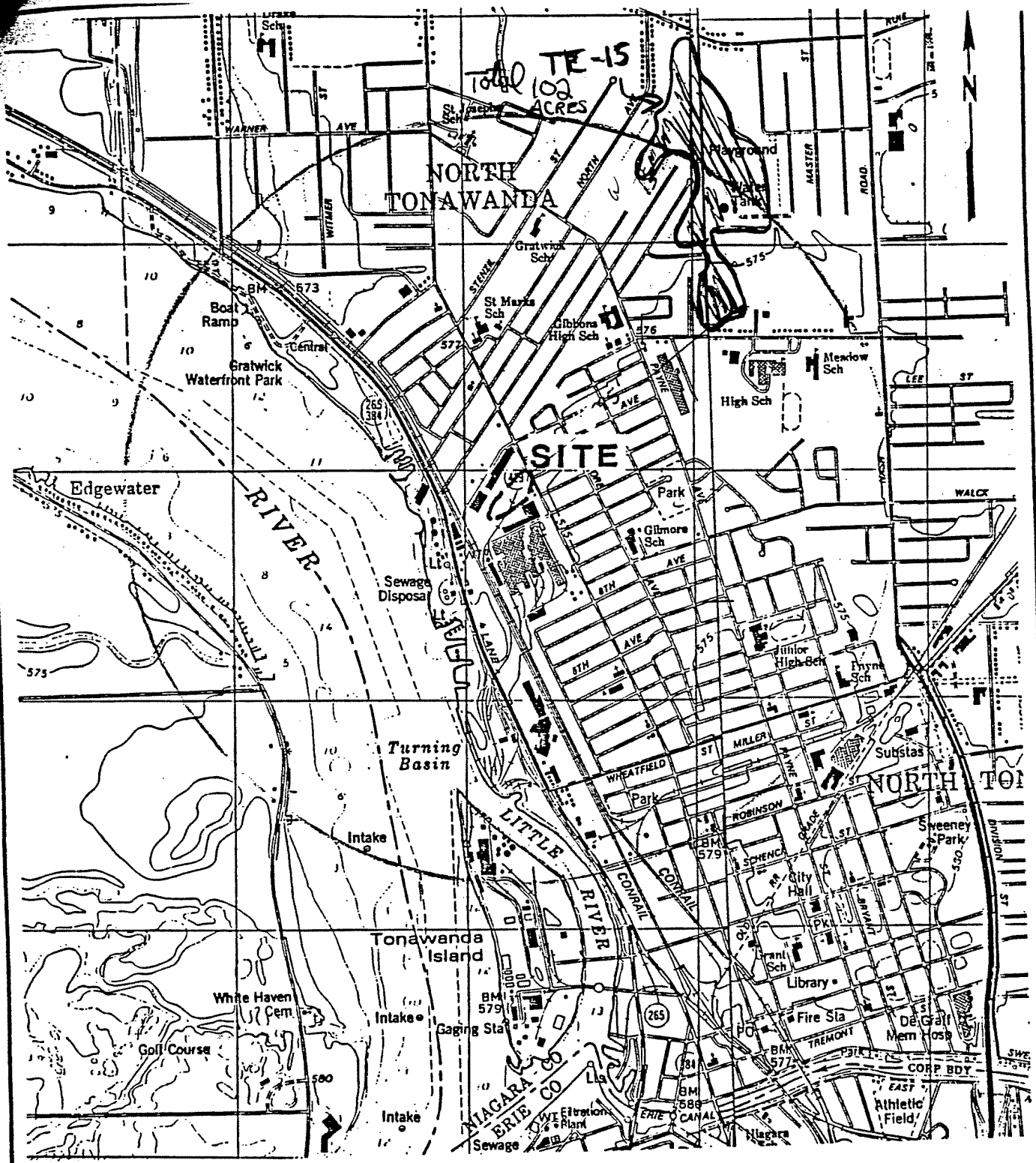
Very truly yours,

James F. Farquhar III
Fish and Wildlife Division

JFF:slm

cc: Mr. Gordon R. Batcheller

Enclosures



Niagra County

REFERENCE: U.S.G.S. 7.5' Topographic Map Tonawanda West, NY (1980) and Tonawanda East, NY (1980) Quadrangles

ENGINEERING-SCIENCE, INC.
IN ASSOCIATION WITH
DAMES & MOORE

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION
PHASE I REPORT

SITE LOCATION MAP
BUFFALO PUMPS

FIGURE iv-1

17

INTERVIEW FORM

INTERVIEWEE/CODE John W. Ozard /

TITLE - POSITION Senior Wildlife Biologist

ADDRESS WRC New York State DEC

CITY Delmar STATE NY ZIP 12054

PHONE (518) 439-7488 RESIDENCE PERIOD ____ TO ____

LOCATION phone conversation INTERVIEWER W. Bradford

DATE/TIME 4/14/88 / 11:00 AM

SUBJECT: Critical habitats in New York state.

REMARKS: There are no federally designated critical habitats of endangered species located within New York state.

I AGREE WITH THE ABOVE SUMMARY OF THE INTERVIEW: John W. Ozard

SIGNATURE: JOHN W. OZARD

COMMENTS:

REF-

(18)

US CENSUS DATA, 1980

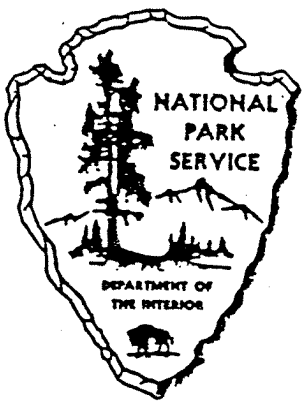
US Census Data used in the HRS scoring was obtained from various County Planning Offices. This data was not obtained from a report. The raw census data combined with County Planning Maps was used to estimate the population within 1, 2, 3, and 4 miles of the Phase I site being investigated. Because of the voluminous amount of data used, the data is not provided in this Appendix.

(19)

NATIONAL REGISTER OF HISTORIC PLACES

ANNUAL LISTING OF PROPERTIES

JANUARY 1979 THROUGH DECEMBER 1982



U.S. DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

JULY 1983

(20)

Federal Register

Tuesday
March 1, 1983

Part III

Department of the Interior

National Park Service

National Registry of Natural Landmarks

(21)

Dangerous Properties of Industrial Materials

Sixth Edition

N. IRVING SAX

Assisted by:

Benjamin Feiner/Joseph J. Fitzgerald/Thomas J. Haley/Elizabeth K. Weisburger

VNR VAN NOSTRAND REINHOLD COMPANY

New York

(21)

CADMIUM COMPOUNDS

NIOSH #: EV 0260000

TOXICITY DATA: 3
ihl-hmn TCLo:1500 ug/m3/14Y-I:CARC

CODEN:
ANYAA9 271,273,76

Toxicology Review: STEVA8 2(4),341,74. Occupational Exposure to Cadmium recm std: Air: TWA 40 ug/m3; CL 200 ug/m3/15M NTIS**.

THR: An exper CARC. The oral toxicity of Cd and its compounds is HIGH. However, when these materials are ingested, the irr and emetic action is so violent that little of the Cd is absorbed and fatal poisoning does not as a rule ensue. Cases of human Cd poisoning have been reported from ingestion of food or beverages prepared or stored in Cd-plated containers. The inhal of fumes or dusts of Cd primarily affects the respiratory tract; the kidneys may also be affected. Even brief exposure to high conc may result in pulmonary edema and death. Usually the edema is not massive, with little pleural effusion. In fatal cases, fatty degeneration of the liver and acute inflammatory changes in the kidneys have been noted. Ingestion of Cd results in a gastrointestinal type of poisoning resembling food poisoning in its symptoms. Inhal of dust or fumes may cause dryness of the throat, cough, headache, a sense of constriction in the chest, shortness of breath (dyspnea) and vomiting. More severe exposure results in marked lung changes, with persistent cough, pain in the chest, severe dyspnea and prostration which may terminate fatally. X-ray changes are usually similar to those seen in broncho-pneumonia. The urine is frequently dark. These symptoms are usually delayed for some hours after exposure, and fatal conc may be breathed without sufficient discomfort to warn the workman to leave the exposure. There is some evidence of teratogenicity. Ingestion of Cd results in sudden nausea, salivation, vomiting and diarrhea and abdominal pain and discomfort. Symptoms begin almost immediately after ingestion. A yellow discoloration of the teeth has been reported in workers exposed to Cd. Cadmium oxide fumes can cause metal fume fever resembling that caused by zinc oxide fumes.

CADMIUM DIAMIDE

mf: CdH_4N_2; mw: 144.45

Incomp: Self-explodes (water).

CADMIUM DIAZIDE

mf: CdN_6; mw: 196.44

Incomp: Explodes violently.

CADMIUM DICYANIDE

mf: C_2CdN_2; mw: 164.44

Incomp: Magnesium.

CADMIUM (II) EDTA COMPLEX

CAS RN: 15954913 NIOSH #: AH 4060000

SYN: (ETHYLENEDINITRILO)TETRAACETIC ACID CADMIUM (II) COMPLEX

TOXICITY DATA: 3
ipr-mus LD50:7800 ug(Cd)/kg

CODEN:
PABIAQ 11,853,63

Occupational Exposure to Cadmium recm std: Air: TWA 40 ug/m3; CL 200 ug/m3/15M NTIS**.

THR: HIGH ipr. See also cadmium compounds.

Disaster Hazard: When heated to decomp it emits tox fumes of NO_x and Cd.

CADMIUM FLUOBORATE

CAS RN: 14486192 NIOSH #: EV 0525000
mf: B_2CdF_8; mw: 286.02

SYN: FLUOROBORATE

TOXICITY DATA: 3
orl-rat LDLo:250 mg/kg
ihl-mus LCLo:650 mg/m3/10M

CODEN:
NCNSA6 5,27,53
NDRC** No.9-4-1-19,44

Occupational Exposure to Cadmium recm std: Air: TWA 40 ug/m3; CL 200 ug/m3/15M NTIS**. Reported in EPA TSCA Inventory, 1980.

THR: HIGH orl. MOD ihl. See fluoborates.

Disaster Hazard: When heated to decomp it emits very tox fumes of Cd and F^-.

For further information see Fluoroborate Vol. 2, No. 3 of *DPIM Report.*

CADMIUM FLUORIDE

CAS RN: 7790796 NIOSH #: EV 0700000
mf: CdF_2; mw: 150.40

Cubic white crystals. mp: 1100°, bp: 1758°, d: 6.64, vap. press: 1 mm @ 1112°.

SYN: CADMIUM FLUORURE (FRENCH)

TOXICITY DATA: 3
scu-frg LDLo:280 mg/kg

CODEN:
CRSBAW 124,133,37

Toxicology Review: AMSSAQ 400,5,63. OSHA Standard: Air: TWA 200 ug(Cd)/m3; CL 600 (SCP-W) FEREAC 39,23540,74. Occupational Exposure to Cadmium recm std: Air: TWA 40 ug/m3; CL 200 ug/m3/15M NTIS**. Reported in EPA TSCA Inventory, 1980.

THR: HIGH via scu route. Violent reaction with K. See fluorides and cadmium compounds.

Disaster Hazard: When heated to decomp it emits very tox fumes of Cd and F^-.

CADMIUM FLUOSILICATE

CAS RN: 17010218 NIOSH #: EV 0875000
mf: CdF_6Si; mw: 254.49

Hexagonal, colorless crystals.

SYN: TL 1070

TOXICITY DATA: 3
orl-rat LDLo:100 mg/kg
ihl-mus LCLo:670 mg/m3/10M

CODEN:
NCNSA6 5,27,53
NDRC** No.9-4-1-19,44

Occupational Exposure to Cadmium recm std: Air: TWA 40 ug/m3; CL 200 ug/m3/15M NTIS**.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	000212719 9 (2)

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Buffalo Pumps Division	874 Oliver Street

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
North Tonawanda	NY	14120	Niagara	063	36

09 COORDINATES LATITUDE	LONGITUDE
43° 02' 42"	78° 53' 09"

10 DIRECTIONS TO SITE (Starting from nearest public road)
The site is located on the northern end of the Buffalo Pumps property at the intersections of East Avenue and Oliver Street.

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)
Buffalo Forge Company	490 Broadway Avenue

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Buffalo	NY	14204	(716) 847-5121

07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)
Buffalo Pumps Division	874 Oliver Street

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
North Tonawanda	NY		(716) 693-1850

13 TYPE OF OWNERSHIP (Check one)
☑ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☑ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☑ YES DATE 11 17 81 (MONTH DAY YEAR)
☐ NO

BY (Check all that apply)
☑ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)
☐ A. ACTIVE ☑ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION
1900 (BEGINNING YEAR) | 1978 (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
Boiler ash and foundry sand were landfilled within fenced property north of the facility. Construction debris, excavated fill, and suspected foundry sands were disposed of in a swamp area at the northern boundry of the property

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
Suspected metals from incineration of paint wastes and suspected phenolic-based foundry sands pose a potential source of contamination of groundwater entering Niagara River. Volatile organic gases were detected by HNU meter (5-9 ppm)

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☑ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency-Organization)	03 TELEPHONE NUMBER
S. Robert Steele, II	Engineering-Science (ES)	(703) 591-7575

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
S. Robert Steele, II	—	ES	(703) 591-7575	4 8 85 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	D002127199

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- [X] A. SOLID
- [X] B. POWDER, FINES
- [ ] C. SLUDGE
- [ ] D. OTHER _____ (Specify)
- [ ] E. SLURRY
- [ ] F. LIQUID
- [ ] G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS _____

CUBIC YARDS _____

NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- [X] A. TOXIC
- [ ] B. CORROSIVE
- [ ] C. RADIOACTIVE
- [ ] D. PERSISTENT
- [ ] E. SOLUBLE
- [ ] F. INFECTIOUS
- [ ] G. FLAMMABLE
- [ ] H. IGNITABLE
- [ ] I. HIGHLY VOLATILE
- [ ] J. EXPLOSIVE
- [ ] K. REACTIVE
- [ ] L. INCOMPATIBLE
- [ ] M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	Suspected		phenols in foundry sand
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			Chromium, copper, and iron in groundwater sample
BAS	BASES			
MES	HEAVY METALS	1500	mg/kg	Copper in surface water sediment adjacent to landfill

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
OCC	Phenol	180-95-2	landfill	unknown	
MES	chromium	7440-47-3	unknown	0.150	mg/kg
MES	copper	7440-50-8	unknown	1500	mg/kg
	boiler ash from incineration of wood, paper and paint waster was also disposed on site				

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

1. USGS site investigation, ~~Draft~~ Study report, 1983
2. ES and D&M site investigation, 3/20/85
3. Niagara County Health Department, site investigation, 2/22/84

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: NY | 02 SITE NUMBER: 000212799

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A. GROUNDWATER CONTAMINATION
02 ☐ OBSERVED (DATE: 1953) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
Metal contamination detected in USGS sampling wells

01 ☒ B. SURFACE WATER CONTAMINATION
02 ☐ OBSERVED (DATE: 1953) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
Swamp sediment (adjacent & downgradient from disposal area) contained metal contamination

01 ☒ C. CONTAMINATION OF AIR
02 ☒ OBSERVED (DATE: 1985) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
Organic vapors detected near ground surface during HNU meter survey

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
No

01 ☒ E. DIRECT CONTACT
02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown
04 NARRATIVE DESCRIPTION

01 ☒ F. CONTAMINATION OF SOIL
02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (Acres)
04 NARRATIVE DESCRIPTION
1) Soil placed on site from sewer excavation may have contained contaminants
2) Contaminants may migrate with groundwater

01 ☐ G. DRINKING WATER CONTAMINATION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
No

01 ☐ H. WORKER EXPOSURE/INJURY
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
No

01 ☐ I. POPULATION EXPOSURE/INJURY
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
unknown

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	D002127190

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
unknown

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)
unknown

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
unknown

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills/Runoff/Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION
unlined facility

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
No

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
No

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Possible midnight dumping - non secure area

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS
—

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e. g., state files, sample analysis, reports)
Site Visit, 1985
USGS, 1983

(24)

GROUND-WATER RESOURCES OF THE ERIE-NIAGARA BASIN, NEW YORK

Prepared for the
Erie-Niagara Basin Regional Water Resources
Planning Board

by

A. M. La Sala, Jr.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

in cooperation with

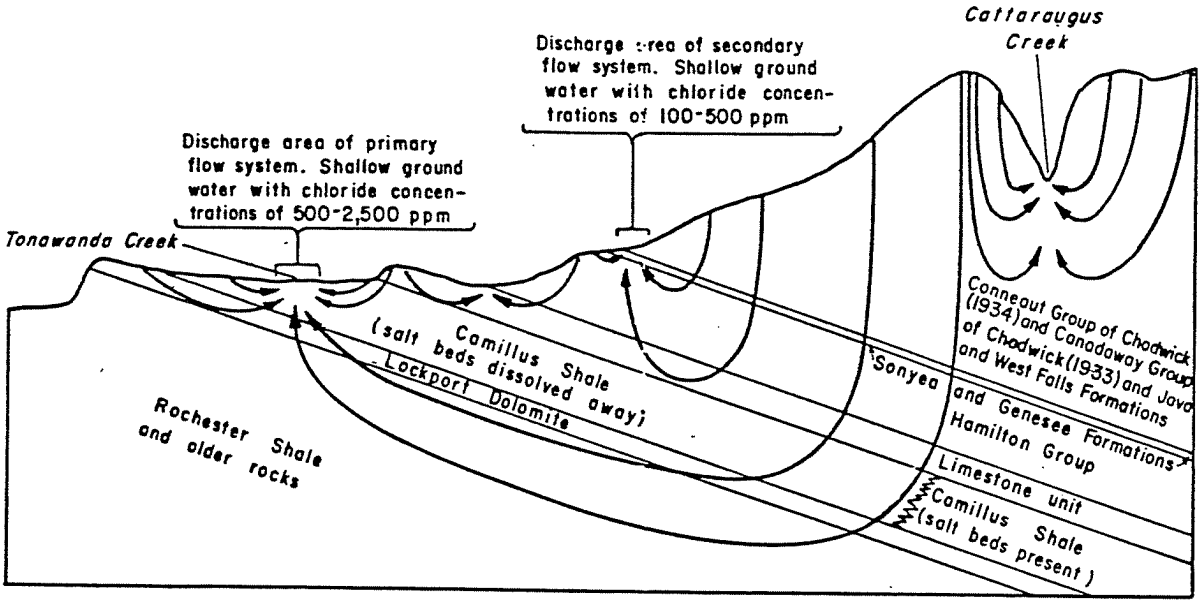
THE NEW YORK STATE CONSERVATION DEPARTMENT
DIVISION OF WATER RESOURCES

STATE OF NEW YORK
CONSERVATION DEPARTMENT
WATER RESOURCES COMMISSION

Basin Planning Report ENB-3

1968

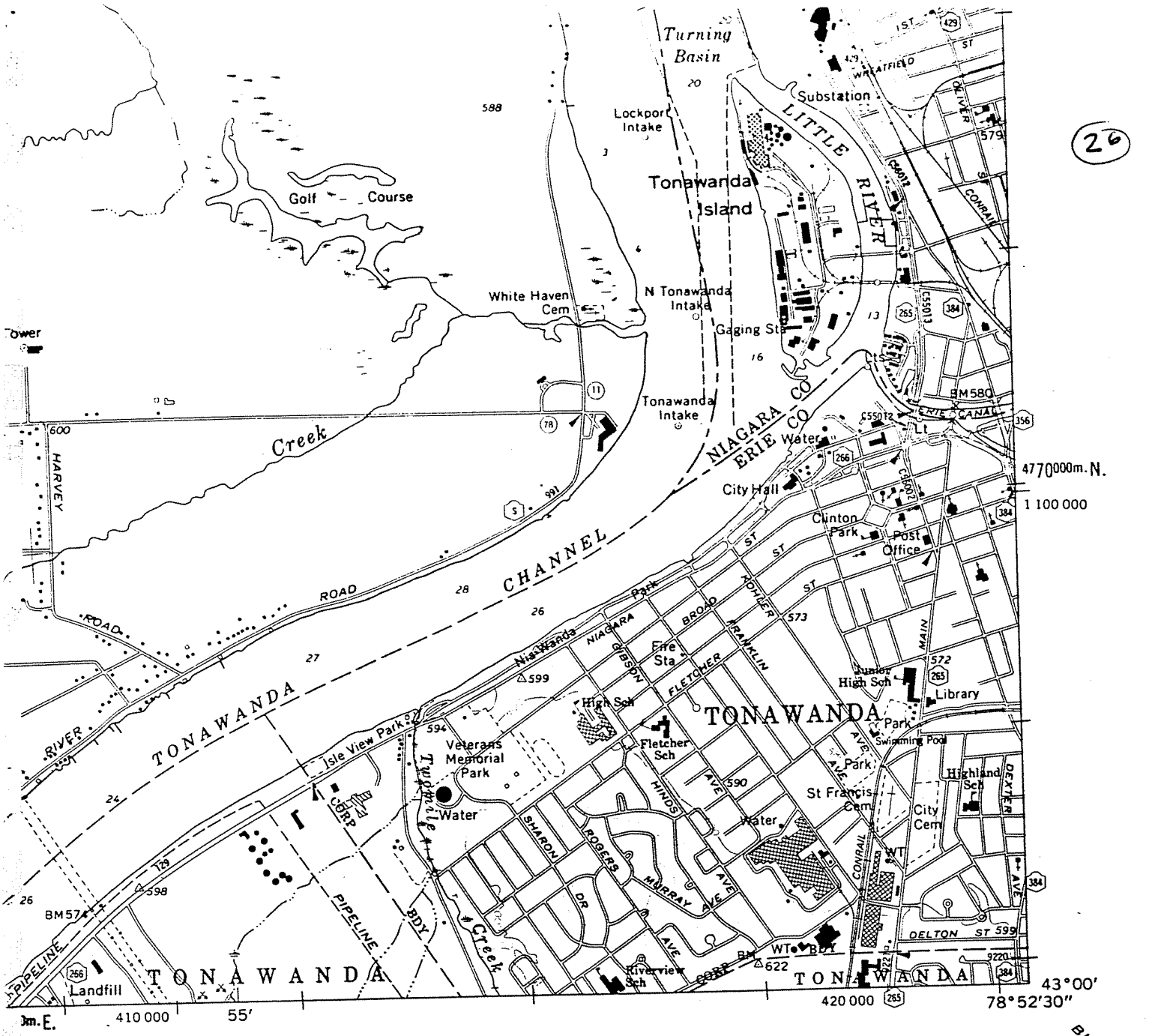
systems exist which are controlled by the major topographic features, as illustrated in figure 18. The quality of water at great depth in the area



Ground water circulates through a regional flow system from the Appalchian Uplands to the Erie-Ontario Lowlands and discharges near Tonawanda Creek and through less extensive but nevertheless major flow systems. Probable flow lines are shown. The deepest circulating water may move upward toward Tonawanda Creek through bedding joints in the Camillus Shale and Lockport Dolomite rather than through the underlying rocks.

Figure 18.--Inferred regional circulation of ground water to explain variations in chemical constituents in ground water at shallow depth.

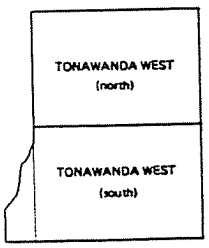
is shown by the analysis for well 250-821-1 (table 9). The concentrations of sulfate and chloride can be explained by the mixing of deeply circulating ground water with less highly mineralized shallow ground water. For example, it is possible that water moving along the deep flow path shown in figure 18 would contain a chloride content of 50,000 to 100,000 ppm and after mixing with ground water of a local flow system could produce the chloride contents of 1,500 to 2,500 ppm in samples from wells in the major discharge area along Tonawanda Creek. Ground water moving along the secondary flow system is likely to be highly mineralized but not to as great a degree as water moving along the deeper flow system. This water mixes with water of a local flow system and produces fairly high concentrations of sulfate and chloride in the secondary discharge area. Numerous abandoned gas wells in the area (Kreidler, 1963) may allow salty water to circulate upward and discharge through leaky casings into the shallow ground water. Data are not available to evaluate this possibility. The boundary of the salt beds shown in plate 5 roughly parallels the boundary of the Appalachian Uplands suggesting a topographic control for this boundary rather than a depositional one. Topography would determine the character of a flow system such as described in figure 18 and subsequent solution and removal of the



26

1 MILE
6000 7000 FEET
1 KILOMETER

INDEX TO
1:9600 (1"= 800')
MAP COVERAGE



BOUNDARIES:
State
County
Town or City
Incorporated Village
Federal-Aid Urban Area

ROADS:
Touring Route markers:
Interstate 87
U. S. 20
State 36
State Highway number and limit 9020
County road 72
Interchange number 31

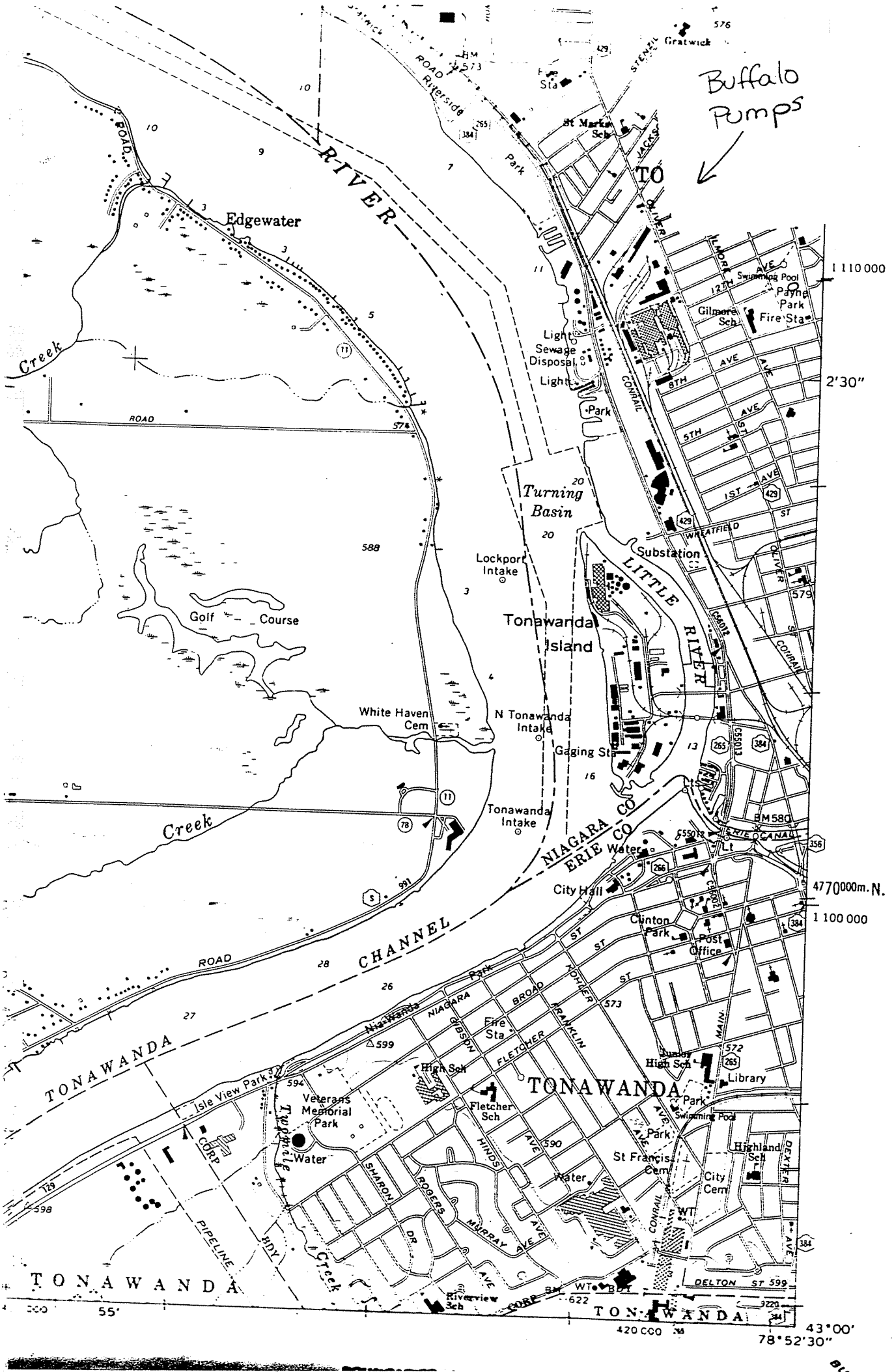
Divided highways and streets:
Wide mall
Narrow mall or barrier

Undivided highways and streets:
4 or more lanes
Less than 4 lanes

Vehicle track; trail

km.
cator grid.
the Universal Transverse
extensions of Zone 18.
dinate grid,

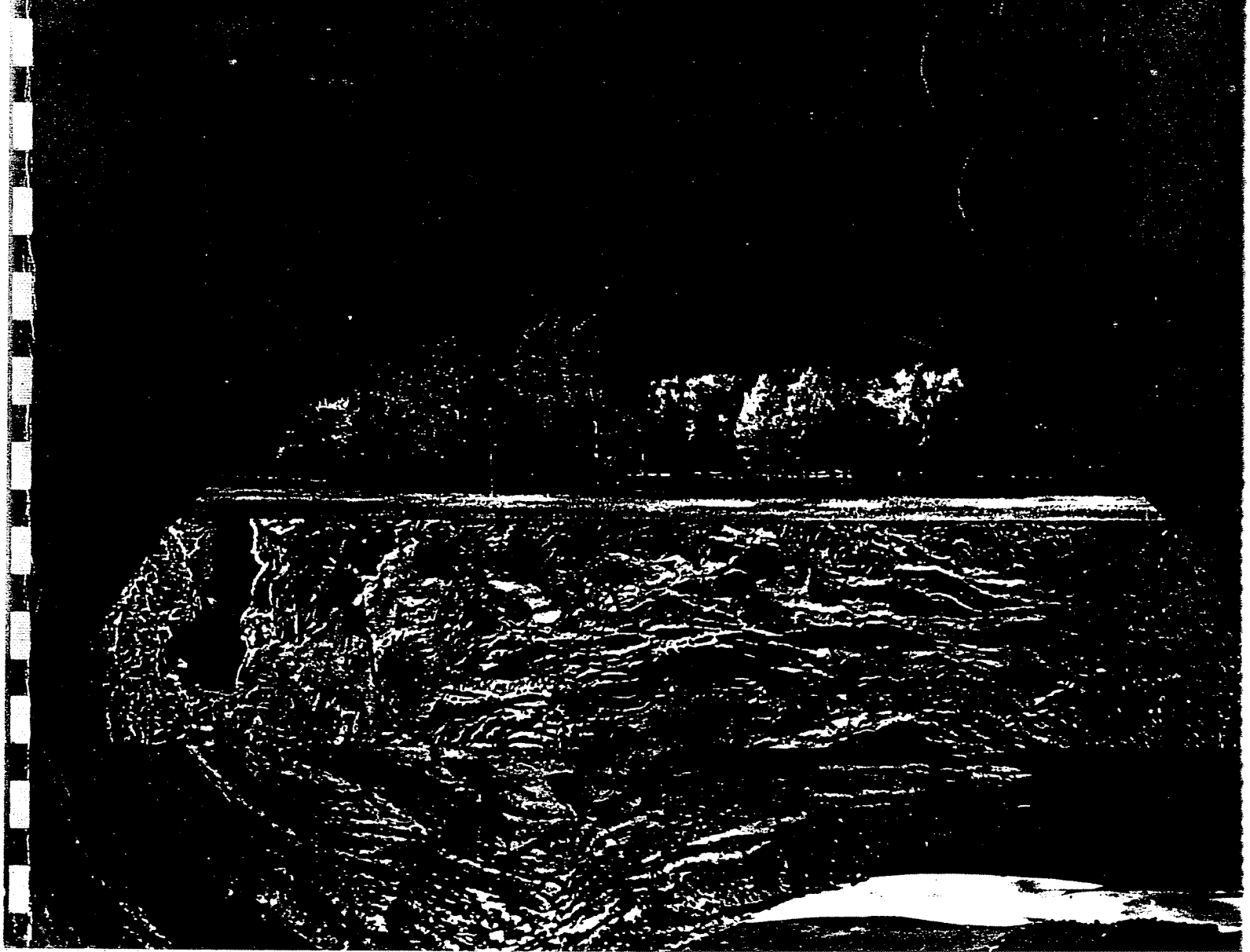
TONAWANDA WEST QUADRANGLE
SECOND EDITION - 1976


Buffalo Pumps
26
RIVER
Edgewater
Creek
ROAD
Riverside
Park
Gratwick
Sta
St Marks Sch
TO
Light
Sewage Disposal
Light
Park
CONRAIL
Turning Basin
Lockport Intake
Golf Course
Tonawanda Island
LITTLE RIVER
Substation
Swimming Pool
Payne Park
Gilmore Sch
Fire Sta
WHEATFIELD
DRIVER
COURAD
White Haven Cem
N Tonawanda Intake
Gaging Sta
Tonawanda Intake
NIAGARA CO
ERIE CO
ERIE CANAL
Water
City Hall
CHANNEL
Clinton Park
Post Office
Park
Fire Sta
Dunlop High Sch
Library
Swimming Pool
Isle View Park
Veterans Memorial Park
High Sch
Fletcher Sch
TONAWANDA
Water
St Francis Cem
City Cem
Highland Sch
Riverview Sch
CORP
PIPELINE
HWY
Tributary
Creek
DELTON ST
1 110 000
2'30"
4770000m.N.
1 100 000
43°00'
78°52'30"

Rand McNally

World Atlas

NEW CENSUS EDITION



27

Colonie A-S-T 8,869
Colton ..... 450 ○
Commack N.Y. ..... 24,300 ○
Congers N.Y. ..... 5,000 ○
Conklin BING ..... 1,900 ○
Constantia SYR ..... 900 ○
Cooperstown 2,342
Copake ..... 700 ○
Copenhagen 656
Copiague N.Y. ..... 21,000 ○
Coram N.Y. ..... 5,400 ○
Corfu BUF- 589
Corinth 2,782
Corning ELM- 12,953
Cornwall on the Hudson NWBG 3,164
Cortland 20,138
Coxsackie 2,786
Croghan 703
Croton-on-Hudson N.Y. 6,889
Crown Point ..... 900 ○
Cuba 1,739
Cutchogue ..... 1,000 ○
Dalton ..... 500 ○
Dannemora 3,770
Dansville 4,979
Deer Park N.Y. ..... 33,400 ○
Delanson A-S-T 448
Delevan 1,113
Delhi 3,374
Delmar A-S-T ..... 8,900 ○
Depew BUF- 19,819
Deposit 1,897
Derby BUF- ..... 1,200 ○
De Ruyter 542
De Witt SYR ..... 10,032 ○
Dexter WATN 1,053
Dix Hills N.Y. ..... 10,500 ○
Dobbs Ferry N.Y. 10,053
Downsville ..... 950 ○
Dryden ITH 1,761
Dundee 1,556
Dunkirk 15,310
Earlville 985
East Aurora BUF- 6,603
Eastchester N.Y. ..... 22,500 ○
East Glenville A-S-T ..... 11,800 ○
East Half Hollow Hills N.Y. ..... 9,691 ○
East Hampton 1,886
East Hills N.Y. 7,160
East Islip N.Y. ..... 13,700 ○
East Marion ..... 900 ○
East Meadow N.Y. ..... 47,300 ○
East Northport N.Y. ..... 22,200 ○
East Patchogue N.Y. ..... 8,300 ○
Eastport, N.Y. ..... 1,308 ○
East Randolph 655
East Rochester ROCH 7,596
East Rockaway N.Y. 10,917
East Vestal BING ..... 5,300 ○
Eden BUF- ..... 3,000 ○
Edmeston ..... 600 ○
Edwards 561
Elba 750
Elizabethtown 659
Elkenville 4,405
Ellicottville 713
ELMIRA ELM- 35,327
Elmira Heights ELM- 4,279
Elmont N.Y. ..... 30,000 ○
Elsmere A-S-T ..... 5,500 ○
Elwood N.Y. ..... 15,400 ○
Endicott BING 14,457
Endwell BING ..... 15,999 ○
Etna ITH ..... 500 ○
Evans Mills 651
Fair Haven 976
Fairmount SYR ..... 8,700 ○
Fairport ROCH 5,970
Fairview POK ..... 8,517 ○
Falconer JMST 2,778
Farmingdale N.Y. 7,946
Farmingville N.Y. ..... 5,700 ○
Fillmore 563
Fishkill POK 1,555
Floral Park N.Y. 16,805
Florida MIDD 1,947
Flower Hill N.Y. 4,558
Fonda A-S-T 1,006
Forestville 804
Fort Ann GLFLS 509
Fort Covington ..... 1,200 ○
Fort Edward GLFLS 3,561
Fort Plain 2,555
Frankfort UT-R 2,995
Franklin 440
Franklin Square N.Y. ..... 32,800 ○
Franklinville 1,887
Fredonia 11,126
Freeport N.Y. 38,272
Freeville ITH 449
Frewsburg JMST ..... 2,000 ○
Friendship ..... 1,285 ○
Fulton SYR 13,312
Galeville SYR ..... 5,600 ○
Gang Mills ELM- ..... 1,258 ○
Garden City N.Y. 22,927
Garden City Park N.Y. ..... 5,200 ○
Garrison N.Y. ..... 650 ○
Gasport LOCK ..... 950 ○
Gates ROCH ..... 29,756 ○
Geneseo 6,746
Geneva 15,133
Ghent ..... 600 ○
Gilbertsville 455
Glasco KNGST ..... 1,169 ○
Glen Cove N.Y. 24,618
Glenham POK ..... 2,720 ○
Glen Head N.Y. ..... 6,800 ○
GLENS FALLS GLFLS 15,897
Gloversville 17,836
Gorham ..... 800 ○
Goshen MIDD 4,874
Gouverneur 4,285
Gowanda 2,713
Grand Gorge 800
Granville 2,896
Great Neck (P.O.) N.Y. 5,804
Great Neck N.Y. 9,168
Great Neck Estates N.Y. 2,936

Greece ROCH ..... 63,700 ○
Greene 1,747
Green Island A-S-T 2,896
Greenlawn N.Y. ..... 8,500 ○
Greenport 2,273
Greenville N.Y. ..... 5,500 ○
Greenwich 1,955
Greenwood ..... 450 ○
Greenwood Lake N.Y. 2,809
Groton 2,313
Hadley ..... 500 ○
Haines Falls ..... 700 ○
Half Hollow Hills N.Y. ..... 12,800 ○
Hamburg BUF- 10,582
Hamilton 3,725
Hammondsport 1,065
Hampton Bays ..... 3,550 ○
Hannibal SYR 680
Harrison N.Y. 23,048
Harrisville 937
Hartsdale N.Y. ..... 12,226 ○
Hartwick ..... 600 ○
Hastings-on-Hudson N.Y. 8,573
Hauppauge N.Y. ..... 14,200 ○
Haverstraw N.Y. 8,800
Hawthorne N.Y. ..... 4,900 ○
Hemlock ROCH ..... 500 ○
Hempstead N.Y. 40,404
Henrietta ROCH ..... 1,200 ○
Herkimer UT-R 8,383
Hermon 490
Heuvelton 777
Hewlett N.Y. ..... 6,880 ○
Hicksville N.Y. ..... 50,000 ○
Highland POK ..... 2,184 ○
Highland Falls 4,187
Hillcrest N.Y. ..... 5,357 ○
Hilton ROCH 4,151
Hobart 473
Holbrook N.Y. ..... 12,800 ○
Holland BUF- ..... 1,000 ○
Holland Patent UT-R 534
Holley ROCH 1,882
Homer 3,635
Honeoye Falls ROCH 2,410
Hoosick Falls 3,609
Hopewell Junction POK ..... 2,055 ○
Hornell 10,234
Horseheads ELM- 7,348
Houghton ..... 1,620 ○
Hudson 7,986
Hudson Falls GLFLS 7,419
Huntington N.Y. ..... 12,601 ○
Huntington Bay N.Y. 3,943
Huntington Station N.Y. ..... 30,300 ○
Hurley KNGST ..... 4,081 ○
Hurleyville ..... 500 ○
Hyde Park POK ..... 2,805 ○
Ilion UT-R 9,190
Indian Lake ..... 450 ○
Interlaken 685
Inwood N.Y. ..... 8,200 ○
Irondequoit ROCH ..... 57,648 ○
Irvington N.Y. 5,774
Island Park N.Y. 4,847
Islip N.Y. ..... 12,100 ○
Islip Terrace N.Y. ..... 5,200 ○
ITHACA ITH 28,732
JAMESTOWN JMST 35,775
Jasper ..... 450 ○
Jay ..... 500 ○
Jeffersonville 554
Jericho N.Y. ..... 14,200 ○
Johnson City BING 17,126
Johnstown 9,360
Jordan SYR 1,371
Keene ..... 450 ○
Keeseville 2,025
Kenmore BUF- 18,474
Kennedy ..... 500 ○
Kerhonkson ..... 1,243 ○
Kinderhook A-S-T 1,377
Kings Point N.Y. 5,234
KINGSTON KNGST 24,481
Lackawanna BUF- 22,701
Lacona 582
LaFargeville ..... 500 ○
Lake Delta UT-R ..... 2,400 ○
Lake Erie Beach BUF- ..... 3,500 ○
Lake George 1,047
Lake Grove N.Y. 9,892
Lake Katrine KNGST ..... 1,092 ○
Lake Luzerne ..... 1,000 ○
Lake Placid 2,490
Lake Ronkonkoma N.Y. ..... 9,600 ○
Lake View BUF- ..... 4,600 ○
Lakeville ROCH ..... 950 ○
Lakewood JMST 3,941
Lancaster BUF- 13,056
Larchmont N.Y. 6,308
Larchmont North N.Y. ..... 11,500 ○
Latham A-S-T ..... 8,000 ○
Lawrence N.Y. 6,175
Leicester 462
Leonardsville ..... 500 ○
Le Roy 4,900
Levittown N.Y. ..... 65,400 ○
Lewiston BUF- 3,326
Liberty 4,293
Lima ROCH 2,025
Limestone 486
Lindenhurst N.Y. 26,919
Little Falls 8,186
Little Valley 1,203
Livingston Manor ..... 1,522 ○
Livonia ROCH 1,238
Lloyd Harbor N.Y. 3,405
Locke ..... 500 ○
LOCKPORT LOCK 24,844
Locust Grove N.Y. ..... 11,648 ○
Long Beach N.Y. 34,073
Long Lake ..... 500 ○
Loudonville A-S-T ..... 9,000 ○
Lowville 3,364
Lyndonville 918
Lyon Mountain 950
Lyons 4,180
Lyons Falls 756
Macedon ROCH 1,400

McGraw 1,188
Machias ..... 700 ○
Madrid ..... 800 ○
Mahopac N.Y. ..... 5,265 ○
Maine BING ..... 700 ○
Malone 7,668
Malverne N.Y. 9,262
Mamaroneck N.Y. 17,616
Manchester ROCH 1,698
Manhasset N.Y. ..... 8,530 ○
Manlius SYR 5,241
Mannsville 431
Manorhaven N.Y. 5,384
Marathon 1,046
Margaretville 755
Marilen ROCH ..... 950 ○
Marlboro NWBG ..... 1,580 ○
Massapequa N.Y. ..... 27,500 ○
Massapequa Park N.Y. 19,779
Massena 12,851
Mastic N.Y. ..... 5,200 ○
Mastic Beach N.Y. ..... 5,200 ○
Mattituck N.Y. ..... 1,200 ○
Mattydale SYR ..... 8,292 ○
Mayfield 944
Mayville 1,626
Mechanicville A-S-T 5,500
Medford N.Y. ..... 5,000 ○
Medina 6,392
Melville N.Y. ..... 8,550 ○
Menands A-S-T 4,012
Merrick N.Y. ..... 26,400 ○
Mexico 1,521
Middleburg 1,358
Middle Granville ..... 600 ○
Middleport LOCK 1,995
MIDDLETOWN MIDD 21,454
Middleville 647
Milford 514
Millbrook POK 1,343
Millerton 1,013
Mineola N.Y. 20,757
Minetto ..... 900 ○
Mineville ..... 1,000 ○
Mohawk UT-R 2,956
Monroe N.Y. 5,996
Monsey N.Y. ..... 7,400 ○
Montauk ..... 1,300 ○
Montgomery NWBG 2,316
Monticello 6,306
Montour Falls 1,791
Mooers 549
Moravia 1,582
Morlah ..... 500 ○
Morris 681
Morrisonville ..... 1,500 ○
Morristown 461
Morrisville 2,707
Mountain Dale ..... 1,200 ○
Mount Kisco N.Y. 8,025
Mount Morris 3,039
Mount Upton ..... 500 ○
Mount Vernon N.Y. 66,713
Munnsville 499
Nanuet N.Y. ..... 8,300 ○
Napanoch ..... 800 ○
Naples 1,225
Narrowsburg ..... 700 ○
Nassau A-S-T 1,285
Nassau Shores N.Y. ..... 5,500 ○
Natural Bridge ..... 650 ○
Nedrow SYR ..... 3,000 ○
Nesconset N.Y. ..... 8,300 ○
Newark 10,017
Newark Valley BING 1,190
New Baltimore ..... 700 ○
New Berlin 1,392
NEWBURGH NWBG 23,438
New Cassel N.Y. ..... 8,817 ○
New City N.Y. ..... 30,800 ○
Newcomb ..... 800 ○
Newfane LOCK ..... 2,700 ○
New Hyde Park N.Y. 9,801
New Lebanon ..... 800 ○
New Paltz 4,941
Newport 746
New Rochelle N.Y. 70,794
Newton Falls ..... 560 ○
New Windsor NWBG ..... 8,803 ○
New Woodstock SYR ..... 450 ○
NEW YORK N.Y. 7,071,030
Niagara Falls BUF- 71,384
Nichols BING 613
Niskayuna A-S-T ..... 17,471 ○
Norfolk ..... 1,379 ○
North Amityville N.Y. ..... 11,936 ○
North Babylon N.Y. ..... 23,000 ○
North Bellmore N.Y. ..... 23,600 ○
North Collins BUF- 1,496
North Creek ..... 950 ○
Northeast Henrietta ROCH ..... 12,000 ○
North Great River N.Y. ..... 12,400 ○
North Lindenhurst N.Y. ..... 11,400 ○
North Massapequa N.Y. ..... 23,100 ○
North Merrick N.Y. ..... 13,850 ○
North New Hyde Park N.Y. ..... 16,100 ○
North Norwich ..... 500 ○
North Patchogue N.Y. ..... 8,000 ○
Northport N.Y. 7,851
North Rose ..... 700 ○
North Syracuse SYR 7,970
North Tarrytown N.Y. 7,994
North Tonawanda BUF- 35,760
North Valley Stream N.Y. ..... 14,861 ○
Northville 1,304
North Wantagh N.Y. ..... 15,117 ○
Norwich 8,082
Norwood 1,902
Nunda 1,189
Nyack N.Y. 6,428
Oakdale N.Y. ..... 7,800 ○
Oakfield 1,791
Oceanside N.Y. ..... 36,400 ○
Odessa 613
Ogdensburg 12,375
Olcott LOCK 1,850
Old Bethpage N.Y. 7,180
Old Forge 950
Olean 18,207

Oneida 10,810
Oneonta 14,933
Ontario ROCH ..... 750 ○
Orchard Park BUF- 3,671
Orient ..... 800 ○
Oriskany UT-R 1,680
Oriskany Falls UT-R 802
Ossining N.Y. 20,196
Oswego 19,793
Otego 1,089
Ovid 566
Owego BING 4,364
Oxford 1,765
Oyster Bay N.Y. ..... 7,200 ○
Painted Post ELM- 2,196
Palmyra ROCH 3,729
Panama 511
Parish SYR 535
Parksville ..... 500 ○
Patchogue N.Y. 11,291
Patterson N.Y. ..... 950 ○
Pavilion ..... 550 ○
Pawling POK 1,996
Pearl River N.Y. ..... 17,146 ○
Peconic ..... 800 ○
Peekskill N.Y. 18,236
Pelham N.Y. 6,848
Pelham Manor N.Y. 6,130
Penfield ROCH ..... 9,600 ○
Penn Yan 5,242
Perry 4,198
Peru ..... 1,300 ○
Petersburg ..... 500 ○
Phelps 2,004
Philadelphia 855
Philmont 1,539
Phoenicia ..... 700 ○
Phoenix SYR 2,357
Pilot Bush NWBG ..... 1,200 ○
Pine Island MIDD ..... 950 ○
Plainview N.Y. ..... 32,300 ○
Plattsburgh 21,057
Pleasant Valley POK ..... 1,372 ○
Pleasantville N.Y. 6,749
Poland 553
Port Byron AUB 1,400
Port Chester N.Y. 23,565
Port Dickinson BING 1,974
Port Ewen KNGST ..... 2,600 ○
Port Henry 1,450
Port Jefferson N.Y. 6,731
Port Jefferson Station N.Y. ..... 7,500 ○
Port Jervis 8,899
Portland ..... 600 ○
Port Leyden 740
Portville 1,136
Port Washington N.Y. ..... 15,923 ○
Potsdam 10,635
Pottersville ..... 500 ○
POUGHKEEPSIE POK 29,757
Prattsburg ..... 750 ○
Prattsville ..... 500 ○
Pulaski 2,415
Randolph 1,398
Ransomville BUF- ..... 1,500 ○
Ravena A-S-T 3,091
Raymondville ..... 600 ○
Red Creek 645
Red Hook 1,892
Redwood ..... 600 ○
Remsen UT-R 621
Rensselaer A-S-T 9,047
Rhinebeck POK 2,542
Richburg 494
Richfield Springs 1,561
Richmondville 792
Ridgemont ROCH ..... 8,500 ○
Ripley ..... 1,000 ○
Riverhead ..... 7,400 ○
ROCHESTER ROCH 241,741
Rockville Centre N.Y. 25,405
Rooseleville A-S-T ..... 5,476 ○
Rome UT-R 43,826
Ronkonkoma N.Y. ..... 20,200 ○
Roosevelt N.Y. ..... 15,000 ○
Roslyn Heights N.Y. ..... 7,270 ○
Rotterdam A-S-T ..... 24,800 ○
Round Lake A-S-T 791
Rouses Point 2,266
Roxbury ..... 700 ○
Rushford ..... 500 ○
Rushville 548
Rye N.Y. 15,083
Sackets Harbor 1,017
Sag Harbor 2,581
St. James N.Y. ..... 11,000 ○
St. Johnsville 2,019
St. Regis Falls ..... 950 ○
Salamanca 6,890
Salem 959
Sandy Creek 765
San Remo N.Y. ..... 8,700 ○
Saranac Lake 5,578
Saratoga Springs A-S-T 23,906
Saugerties KNGST 3,882
Savannah ..... 636 ○
Savona ELM- 932
Sayville N.Y. ..... 15,300 ○
Scarsdale N.Y. 17,850
Schaghticoke A-S-T 877
Schenectady A-S-T 67,972
Schenevus 825
Schoharie 1,018
Schroon Lake ..... 1,000 ○
Schuylerville 1,256
Scotia A-S-T 7,280
Scottsville ROCH 1,789
Sea Cliff N.Y. 5,364
Seaford N.Y. ..... 17,150 ○
Selden N.Y. ..... 24,100 ○
Seneca Falls 7,466
Shandaken ..... 500 ○
Shelter Island ..... 1,000 ○
Sherburne 1,561
Sherman 775
Sherrill 2,830
Shirley N.Y. 8,200
Shortsville ROCH 1,869
Sidney 4,861

Sidney Center 600
Silver Creek BUF- 3,088
Silver Springs 801
Sinclairville 772
Skaneateles SYR 2,789
Sloan BUF- 4,529
Sloatsburg N.Y. 3,154
Smithtown N.Y. 23,000
Sodus ROCH 1,790
Sodus Point 1,334
Solvay SYR 7,140
Sound Beach N.Y. 5,400
Southampton 4,000
South Bethlehem A-S-T 500
South Corning ELM- 1,195
South Dayton 661
South Fallsburg 1,590
South Farmingdale N.Y. 20,500
South Glens Falls GLFLS 3,714
South Huntington N.Y. 9,115
South New Berlin 450
South Nyack N.Y. 3,602
Southold 2,030
South Otselic 450
Southport ELM- 8,700
South Stony Brook N.Y. 15,329
South Valley Stream N.Y. 6,600
South Westbury N.Y. 10,700
Spencer 863
Spencerport ROCH 3,424
Spring Valley N.Y. 20,537
Springville 4,285
Springwater 500
Staatsburg POK 950
Stamford 1,240
Stillwater A-S-T 1,572
Stony Brook N.Y. 6,600
Stony Creek 450
Stony Point N.Y. 8,270
Stottville 1,300
Suffern N.Y. 10,794
Sylvan Beach UT-R 1,243
Syosset N.Y. ..... 10,200 ○
SYRACUSE SYR 170,105
Tappan N.Y. ..... 6,100 ○
Tarrytown N.Y. 10,648
Terryville N.Y. ..... 5,900 ○
Theresa 827
Thornwood N.Y. ..... 5,400 ○
Three Mile Bay ..... 600 ○
Ticonderoga 2,938
Tillson KNGST ..... 1,300 ○
Tivoli KNGST 711
Tomkins Cove N.Y. ..... 700 ○
Tonawanda BUF- 18,693
Town of Tonawanda BUF- ..... 78,100 ○
Troy A-S-T 56,638
Trumansburg ITH 1,722
Tuckahoe N.Y. 6,076
Tully SYR 1,048
Tupper Lake 4,478
Unadilla 1,367
Uniondale N.Y. ..... 24,500 ○
Union Springs AUB 1,201
University Gardens N.Y. ..... 5,400 ○
UTICA UT-R 75,632
Valatie A-S-T 1,492
Valhalla N.Y. ..... 6,600 ○
Valley Cottage N.Y. ..... 6,007 ○
Valley Stream N.Y. 35,769
Van Etten 559
Vestal BING ..... 6,000 ○
Vestal Center BING ..... 900 ○
Victor ROCH 2,370
Waddington 980
Wading River ..... 2,500 ○
Walden NWBG 5,659
Wallkill NWBG ..... 1,849 ○
Walton 3,329
Wampsville 569
Wantagh N.Y. ..... 22,300 ○
Wappingers Falls POK 5,110
Warrensburg ..... 2,743 ○
Warsaw 3,519
Warwick N.Y. 4,320
Waterford A-S-T 2,405
Waterloo 5,303
WATERTOWN WATN 27,861
Waterville UT-R 1,672
Watervliet A-S-T 11,354
Watkins Glen 2,440
Waverly 4,738
Wayland 1,846
Webster ROCH 5,499
Weedsport SYR 1,952
Wellsburg ELM- 647
Wellsville 5,769
West Amityville N.Y. ..... 6,470 ○
West Babylon N.Y. ..... 32,500 ○
West Bay Shore N.Y. ..... 8,900 ○
Westbury N.Y. 13,871
West Carthage 1,824
West Chazy ..... 700 ○
West Elmira ELM- ..... 5,901 ○
Westfield 3,446
West Haverstraw N.Y. 9,181
West Hempstead N.Y. ..... 26,500 ○
West Huntington N.Y. ..... 6,170 ○
West Islip N.Y. ..... 21,500 ○
Westmere A-S-T ..... 8,500 ○
West Point ..... 8,000 ○
Westport 813
West Sayville N.Y. ..... 8,000 ○
West Seneca BUF- ..... 51,210 ○
Westvale SYR ..... 7,300 ○
West Webster ROCH ..... 10,800 ○
West Winfield 979
Whitehall 3,241
White Plains N.Y. 46,999
Whitesboro UT-R 4,480
Whitesville ..... 800 ○
Whitney Point BING 1,093
Willard ..... 700 ○
Williamson ROCH ..... 1,991 ○
Williamsville BUF- 8,017
Williston Park N.Y. 8,216
Willsboro 950
Wilmington 500
Wilson LOCK 1,259

Rand McNally estimate (not reported in census)
▲ Population of entire township or town, including rural area
● Independent city. Population not included in county total

Handbook of Toxic and Hazardous Chemicals and Carcinogens

Second Edition

Marshall Sittig

np

Abbreviation	Compound Designated
DBP	Dibenzopyrene
F	Fluorene
FL (also F)	Fluoranthene
IP	Indeno[1,2,3-cd]pyrene
P	Pyrene
PA (also Phen)	Phenanthrene
PR (also Per)	Perylene

Note: These abbreviations are not endorsed by any body such as the International Union of Chemistry; rather they are a form of shorthand used by authors for convenience, and they vary with the author.

Code Numbers: (For benzo[a]pyrene) CAS 50-32-8 RTECS DJ3675000

DOT Designation: —

Synonyms: PNAs, PAHs, PPAHs (Particulate Polycyclic Aromatic Hydrocarbons) and POMs (Polynuclear Organic Materials). (Benzo[a]pyrene is also known as BAP.)

Potential Exposures: PNAs can be formed in any hydrocarbon combustion process and may be released from oil spills. The less efficient the combustion process, the higher the PNA emission factor is likely to be. The major sources are stationary sources, such as heat and power generation, refuse burning, industrial activity, such as coke ovens, and coal refuse heaps. While PNAs can be formed naturally (lightning-ignited forest fires), impact of these sources appears to be minimal. It should be noted, however, that while transportation sources account for only about 1% of emitted PNAs on a national inventory basis, transportation-generated PNAs may approach 50% of the urban resident exposures.

Because of the large number of sources, most people are exposed to very low levels of PNAs. BAP has been detected in a variety of foods throughout the world. A possible source is mineral oils and petroleum waxes used in food containers and as release agents for food containers. FDA studies have indicated no health hazard from these sources.

The air pollution aspects of the carcinogenic polynuclear aromatic hydrocarbons (PAH) and of benzo[a]pyrene (BAP) in particular have been reviewed in some detail by Olsen and Haynes (1). The total emissions of benzo[a]pyrene (BAP) and some emission factors for BAP are as presented by Goldberg (2).

Permissible Exposure Limits in Air: A TLV of 0.2 mg/m^3 as benzene solubles has been assigned by ACGIH. These materials are designated by ACGIH as human carcinogens.

There have been few attempts to develop exposure standards for PAHs, either individually or as a class. In the occupational setting, a Federal standard has been promulgated for coke oven emissions, based primarily on the presumed effects of the carcinogenic PAH contained in the mixture as measured by the benzene soluble fraction of total particulate matter. Similarly, the American Conference of Governmental Industrial Hygienists recommends a workplace exposure limit for coal tar pitch volatiles, based on the benzene-soluble fraction containing carcinogenic PAH.

The National Institute for Occupational Safety and Health has also recommended a workplace standard for coal tar products (coal tar, creosote, and coal tar pitch), based on measurements of the cyclohexane-extractable fraction. These standards are summarized on the following page.

29 Poly

Substance	
Coke oven emissions	150 w
Coal tar products	0.1 w
Coal tar pitch and volatiles	0.2 u ti

Determination in Air: chromatographic separatic tector (A-10).

Permissible Concentrat as a class has been develc Standards for Drinking \ exceed 0.2 μg/ℓ. This recc of six PAHs in drinking perylene, benzo[b]fluora cd]pyrene.

The US EPA addressec They found that there wa tection of freshwater or c health, the concentration of 1 in 100,000 is posed b

Determination in Wat performance liquid chror tion or gas chromatogra plus mass spectrometry (E

Routes of Entry: Inha

Harmful Effects and strated as carcinogenic in found in urban air at ve that PNAs are photo-oxi Because PNAs are adsorb greatly, from a matter o that photo-oxidized PNA Environmental behavior/ whole.

It has been observed lipids. Most of the PNAs excreted. Effects of that been documented.

Benzo[a]pyrene (BaP of the PNAs has been th been summarized by the 100 ppm administered in in 70% of the mice stuc 100% of the mice after rats produced mammary duced in a variety of ani (length of application wa

landfills have been approved for PCB disposal. More recently treatment with metallic sodium has been advocated which yields a low molecular weight polyphenylene and sodium chloride.

References

(1) National Institute for Occupational Safety and Health, *Criteria for a Recommended Standard: Occupational Exposure to Polychlorinated Biphenyls,* NIOSH Doc. No. 77-225 (1977).
(2) U.S. Environmental Protection Agency, *Polychlorinated Biphenyls: Ambient Water Quality Criteria,* Washington, DC (1980).
(3) National Academy of Sciences, *Polychlorinated Biphenyls,* Washington, DC (1979).
(4) International Agency for Research on Cancer, *IARC Monographs on the Carcinogenic Risks of Chemicals to Humans,* Lyon, France, 7, 261 (1974) and 18, 43 (1978).
(5) World Health Organization, *Polychlorinated Biphenyls and Triphenyls,* Environmental Health Criteria No. 2, Geneva, Switzerland (1976).
(6) See Reference (A-62). Also see Reference (A-64).
(7) International Agency for Research on Cancer, *IARC Monographs on the Carcinogenic Risks of Chemicals to Humans,* Supplement 1, Lyon, France, p 41 (1979).
(8) Sax, N.I., Ed., *Dangerous Properties of Industrial Materials Report, 3,* No. 4, 95-100, New York, Van Nostrand Reinhold Co. (1983).
(9) Parmeggiani, L., Ed., *Encyclopedia of Occupational Health & Safety,* Third Edition, Vol. 2, pp 1753-55, Geneva, International Labour Office (1983).
(10) United Nations Environment Programme, *IRPTC Legal File 1983,* Vol. II, pp VII/644-60, Geneva, Switzerland, International Register of Potentially Toxic Chemicals (1984).

POLYNUCLEAR AROMATIC HYDROCARBONS

- Carcinogen (Benzo[a]pyrene) (Animal positive, IARC) (8)
- Hazardous wastes (EPA)
- Priority toxic pollutants (EPA)

Description: The polynuclear aromatic hydrocarbons constitute a class of materials of which benzo[a]pyrene is one of the most common and also the most hazardous.

Benzo[a]pyrene, $C_{20}H_{12}$, is a yellowish crystalline solid, melting at 179°C. It consists of five benzene rings joined together. Other polynuclear aromatics which are discussed in separate sections in this volume are as follows: acenaphthene, fluoranthene and naphthalene. A variety of abbreviations are in common use for the polynuclear aromatics as shown below:

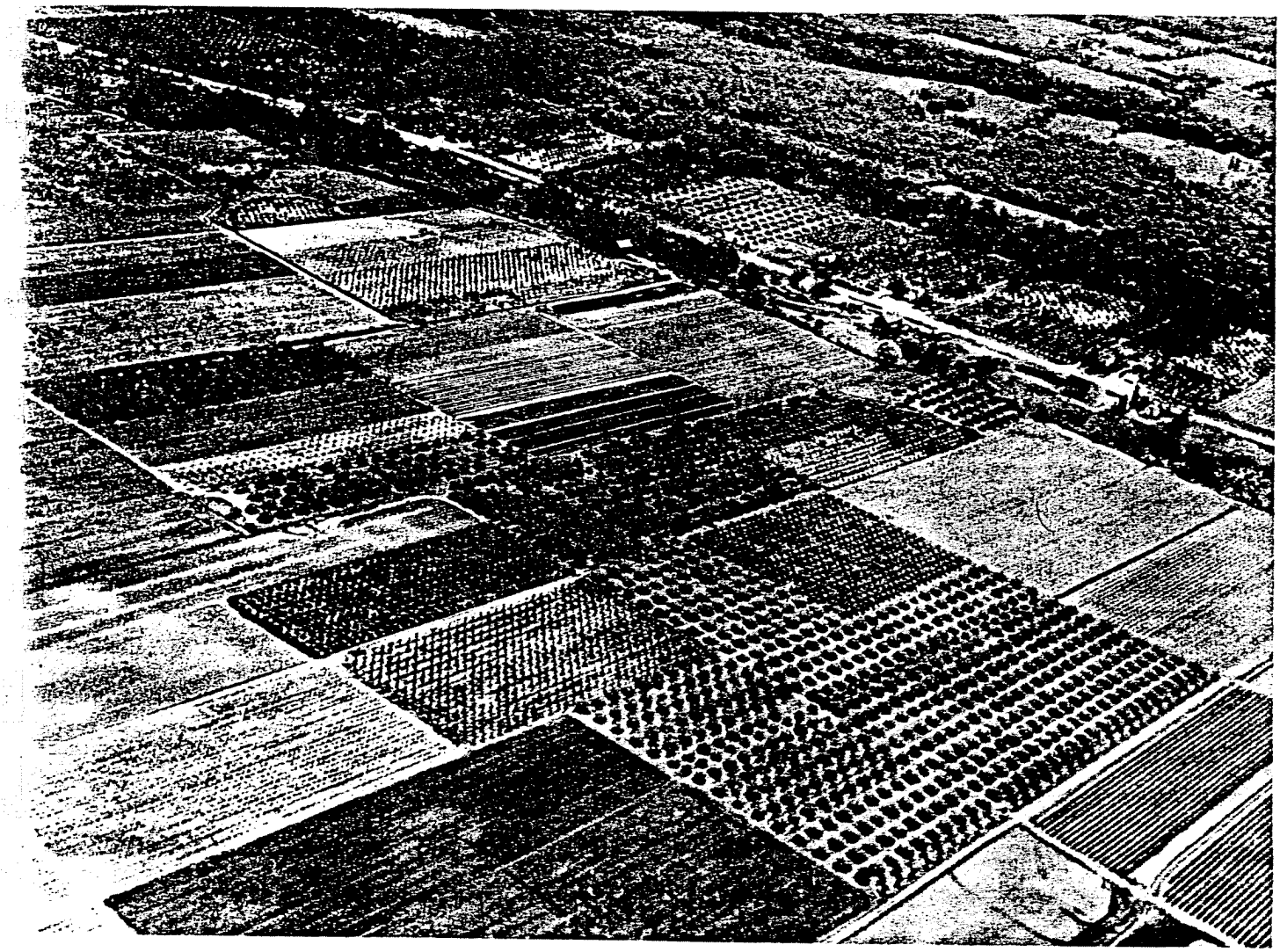
Abbreviation	Compound Designated
A	Anthracene
BaA	Benzo[a]anthracene (1,2-benzanthracene)
BaP (also BP)	Benzo[a]pyrene (3,4-benzopyrene)
BbFL (also BbF)	Benzo[b]fluoranthene
BeP	Benzo[e]pyrene
BjFL (also BjF)	Benzo[j]fluoranthene
BkFL (also BkF)	Benzo[k]fluoranthene (11,12-benzofluoranthene)
BPR	Benzo[ghi]perylene (1,12-benzoperylene)
CH (also CR)	Chrysene
DBA	Dibenzo[ah]anthracene (1,2,5,6-benzanthracene)
DBAc	Dibenz[a,h] and [a,j] acridine
DBC	Dibenzocarbazole

(continued)

(29)

SOIL SURVEY OF

Niagara County, New York



United States Department of Agriculture
Soil Conservation Service
In cooperation with
Cornell University Agricultural Experiment Station

Issued October 1972

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, is a general guide to the slope class. Symbols without a slope letter are for those soils or miscellaneous land types where slope is not significant to use and management. A final number 3, in the symbol indicates that the soil is eroded.

SYMBOL	NAME
Ad	Alluvial land
Af	Altmar loamy fine sand
Am	Altmar gravelly fine sandy loam
AnA	Appleton gravelly loam, 0 to 3 percent slopes
ApA	Appleton silt loam, 0 to 3 percent slopes
ArB	Arkport very fine sandy loam, 0 to 6 percent slopes
ArC	Arkport very fine sandy loam, 6 to 12 percent slopes
AsA	Arkport fine sandy loam, gravelly substratum, 0 to 2 percent slopes
AsB	Arkport fine sandy loam, gravelly substratum, 2 to 6 percent slopes
BoA	Bombay fine sandy loam, 0 to 2 percent slopes
BoB	Bombay fine sandy loam, 2 to 6 percent slopes
BrA	Brockport silt loam, 0 to 4 percent slopes
Ca	Canandaigua silt loam
Cb	Canandaigua silty clay loam
CcA	Cayuga and Cazenovia silt loams, 0 to 2 percent slopes
CcB	Cayuga and Cazenovia silt loams, 2 to 6 percent slopes
CcC	Cayuga and Cazenovia silt loams, 6 to 12 percent slopes
CeA	Cazenovia gravelly silt loam, 0 to 3 percent slopes
CeB	Cazenovia gravelly silt loam, 3 to 8 percent slopes
CgA	Cazenovia gravelly silt loam, shale substratum, 0 to 3 percent slopes
CgB	Cazenovia gravelly silt loam, shale substratum, 3 to 8 percent slopes
Ch	Cheektowaga fine sandy loam
ClA	Churchville silt loam, 0 to 2 percent slopes
ClB	Churchville silt loam, 2 to 6 percent slopes
CmA	Claverack loamy fine sand, 0 to 2 percent slopes
CmB	Claverack loamy fine sand, 2 to 6 percent slopes
CnA	Collamer silt loam, 0 to 2 percent slopes
CnB	Collamer silt loam, 2 to 6 percent slopes
CoB	Colonie loamy fine sand, 0 to 6 percent slopes
Cs	Cosad fine sandy loam
Cu	Cut and fill land
DuB	Dunkirk silt loam, 2 to 6 percent slopes
DuC3	Dunkirk silt loam, 6 to 12 percent slopes, eroded
DvD3	Dunkirk and Arkport soils, 12 to 20 percent slopes, eroded
ElA	Elnora loamy fine sand, 0 to 2 percent slopes
ElB	Elnora loamy fine sand, 2 to 6 percent slopes
FaA	Farmington silt loam, 0 to 8 percent slopes
Fo	Fonda mucky silt loam
Fr	Fredon gravelly loam
GnA	Galen very fine sandy loam, 0 to 2 percent slopes
GnB	Galen very fine sandy loam, 2 to 6 percent slopes
Ha	Hamlin silt loam
HgA	Hilton gravelly loam, 0 to 3 percent slopes
HgB	Hilton gravelly loam, 3 to 8 percent slopes
HlA	Hilton silt loam, 0 to 3 percent slopes
HlB	Hilton silt loam, 3 to 8 percent slopes
HmA	Hilton and Cayuga silt loams, limestone substratum, 0 to 3 percent slopes
HmB	Hilton and Cayuga silt loams, limestone substratum, 3 to 8 percent slopes
HoA	Howard gravelly loam, 0 to 3 percent slopes
HoB	Howard gravelly loam, 3 to 8 percent slopes
HoC	Howard gravelly loam, 8 to 15 percent slopes
HsB	Hudson silt loam, 2 to 6 percent slopes
HtC3	Hudson silty clay loam, 6 to 12 percent slopes, eroded
HuF3	Hudson soils, 20 to 45 percent slopes, eroded
LaB	Lairdsville silt loam, 0 to 6 percent slopes
Lc	Lakemont silty clay loam
Ld	Lamson very fine sandy loam
Lg	Lamson fine sandy loam, gravelly substratum
Lo	Lockport silt loam
Ma	Madalin silt loam
Md	Madalin silt loam, loamy subsoil variant
Me	Made land
Mf	Massena fine sandy loam
Mn	Minoa very fine sandy loam
Ms	Muck, shallow
NoA	Niagara silt loam, 0 to 2 percent slopes
NoB	Niagara silt loam, 2 to 6 percent slopes
OdA	Odessa silty clay loam, 0 to 2 percent slopes
OdB	Odessa silty clay loam, 2 to 6 percent slopes
OnB	Ontario loam, 2 to 8 percent slopes
OnC	Ontario loam, 8 to 15 percent slopes
OnC3	Ontario loam, 8 to 15 percent slopes, eroded
OnD3	Ontario loam, 15 to 30 percent slopes, eroded
OoA	Ontario loam, limestone substratum, 0 to 3 percent slopes
OoB	Ontario loam, limestone substratum, 3 to 8 percent slopes
OsA	Otisville gravelly sandy loam, 0 to 3 percent slopes
OsB	Otisville gravelly sandy loam, 3 to 8 percent slopes
OvA	Ovid silt loam, 0 to 2 percent slopes
OvB	Ovid silt loam, 2 to 6 percent slopes
OwA	Ovid silt loam, limestone substratum, 0 to 3 percent slopes
OwB	Ovid silt loam, limestone substratum, 3 to 8 percent slopes
PsA	Phelps gravelly loam, 0 to 5 percent slopes
RaA	Raynham silt loam, 0 to 2 percent slopes
RaB	Raynham silt loam, 2 to 6 percent slopes
RbA	Rhinebeck silt loam, 0 to 2 percent slopes
RbB	Rhinebeck silt loam, 2 to 6 percent slopes
RhA	Rhinebeck silty clay loam, sandy substratum, 0 to 2 percent slopes
RhB	Rhinebeck silty clay loam, sandy substratum, 2 to 6 percent slopes
Rk	Rhinebeck silt loam, thick surface variant
RoA	Rock land, nearly level
RoF	Rock land, steep
ShB	Schoharie silty clay loam, 2 to 6 percent slopes
St	Stafford loamy fine sand
Su	Stafford loamy fine sand, gravelly substratum
Sw	Sun silt loam
Wa	Wayland silt loam

WORKS

Highways and roads

- Dual .....
- Good motor .....
- Poor motor .....
- Trail .....

Highway markers

- National Interstate .....
- U. S. .....
- State or county .....

Railroads

- Single track .....
- Multiple track .....
- Abandoned .....

Bridges and crossings

- Road .....
- Trail .....
- Railroad .....
- Ferry .....
- Ford .....
- Grade .....
- R. R. over .....
- R. R. under .....

Tunnel .....

Buildings .....

- School .....
- Church .....

Mine and quarry .....

Gravel pit .....

Power line .....

Pipeline .....

Cemetery .....

Dams .....

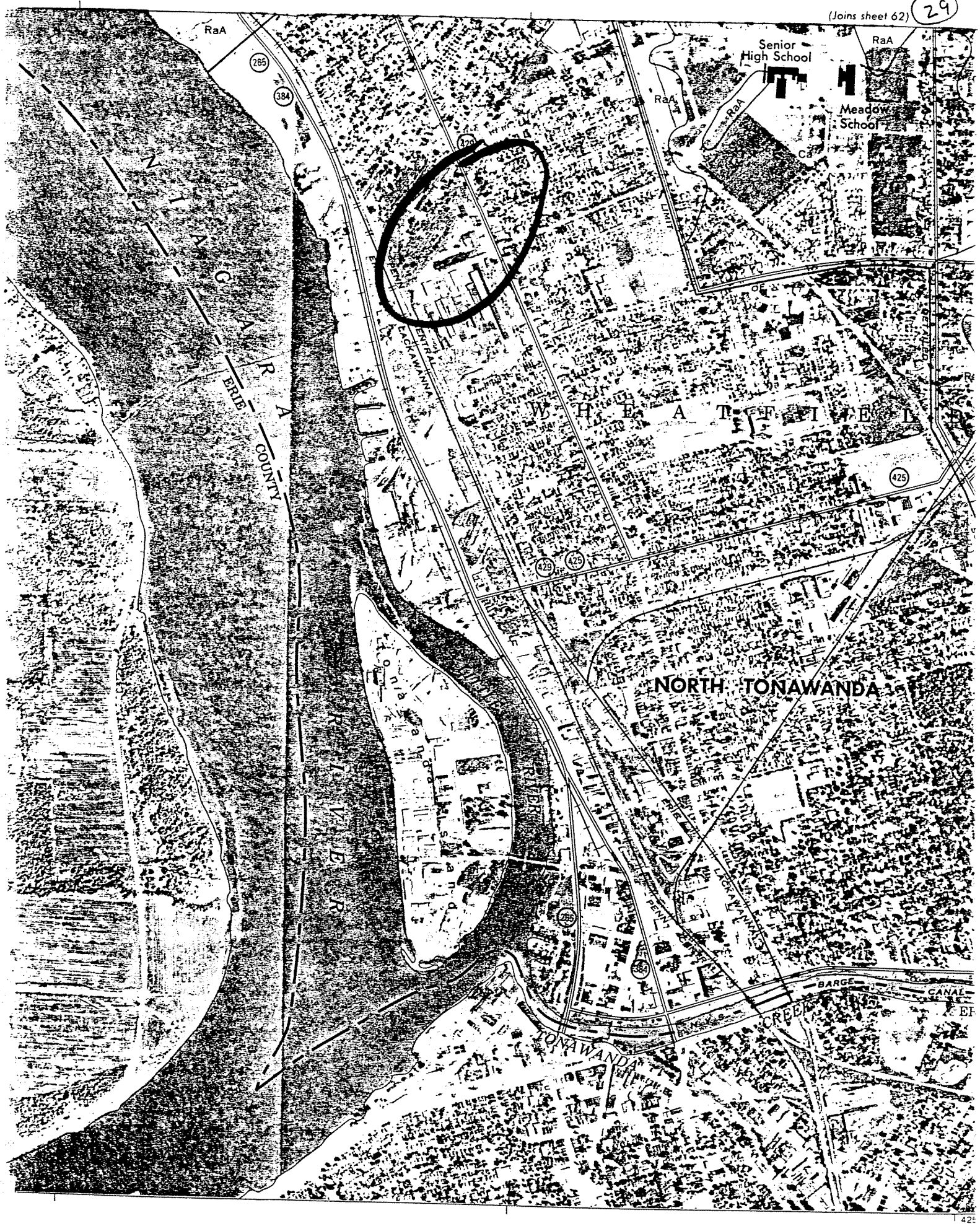
Levee .....

Tanks .....

Well, oil or gas .....

Forest fire or lookout .....

Windmill .....


(Joins sheet 62)
29
RaA
Senior High School
Meadow School
NIAGARA
ERIE COUNTY
WHEATFIELD
NORTH TONAWANDA
TONAWANDA
Grand Island
NIAGARA RIVER
BARGE CANAL
CREEK
DELAWARE LACKAWANNA & WESTERN
DETAILED
LIMIT
265
384
429
425

United States
Environmental Protection
Agency

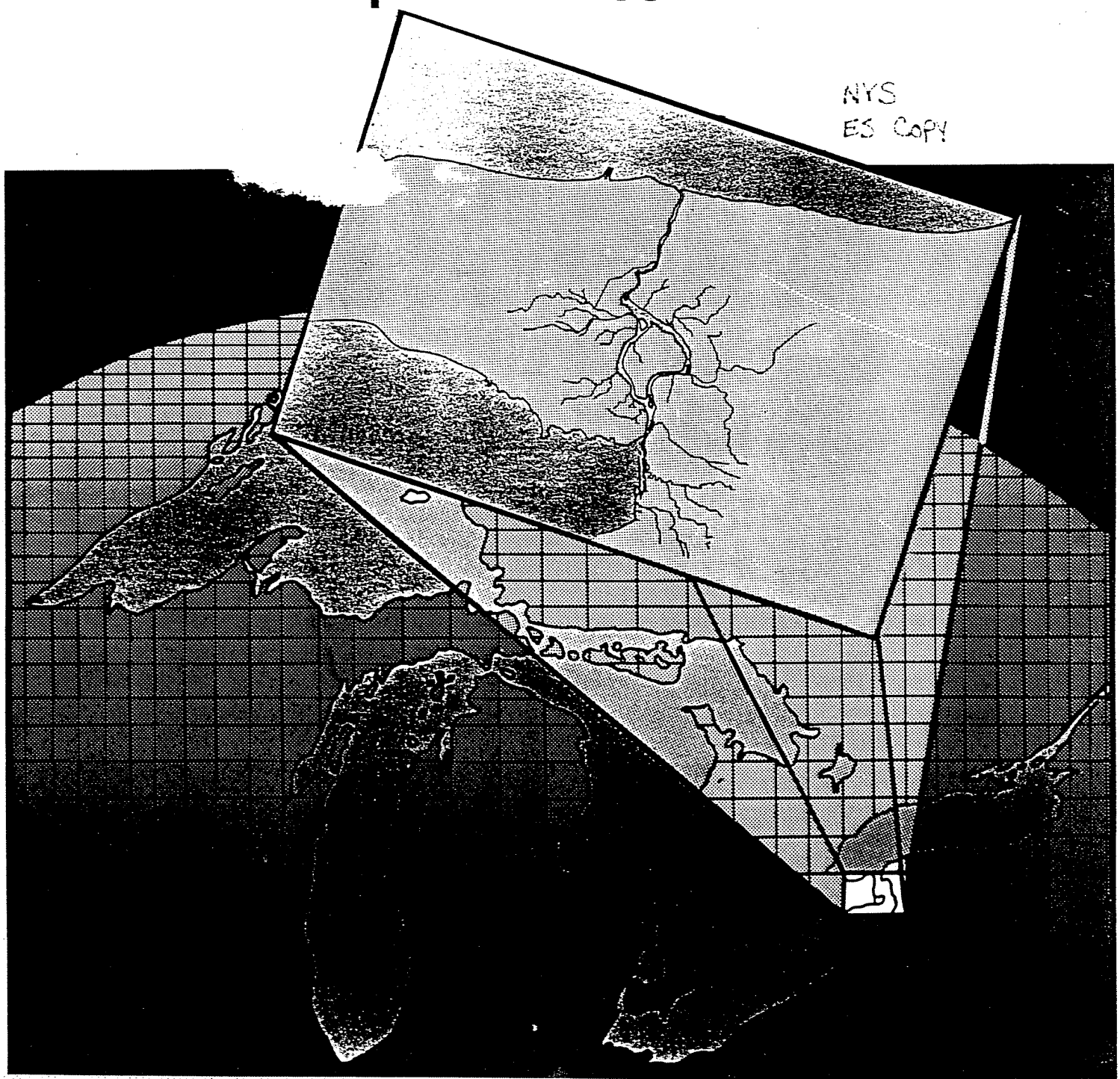
Great Lakes National
Program Office
536 South Clark Street
Chicago, Illinois 60605

EPA-905/4-85-001
March 1985

30

EPA

Preliminary Evaluation Of Chemical Migration To Groundwater and The Niagara River from Selected Waste-Disposal Sites



6. BUFFALO PUMPS DIVISION (USGS reconnaissance)

General information and chemical-migration potential.--The Buffalo Pumps Division site, in the City of North Tonawanda, was used to dispose of an unknown quantity of boiler ash. The site was closed in 1971 and has since been partly covered with grass.

Heavy-metals concentrations in a sediment sample from a wetland at the west end of the property were higher than in water samples from near the refuse area. Additional data would be needed to determine whether migration is taking place; thus, the potential for contaminant migration is indeterminable.

Geologic information.--The site consists of glacial lacustrine clay overlying bedrock of Camillus Shale. The U.S. Geological Survey drilled on the site in 1982; locations are shown in figure B-1. The geologic logs are as follows:

Boring no.	Depth (ft)	Description
1	0 - 6.2	Fill.
	6.2 - 11.2	Clay, tan, wet.
	11.2 - 27.0	Same, but wetter.
	27.0 - 28.5	Clay, sandy, pinkish.
	28.5 - 30.0	Bedrock.
		SAMPLE: 5 - 7 ft.
2	0 - 1.0	Topsoil.
	1.0 - 3.0	Clay, gray.
	3.0 - 5.0	Sand, clayey, dark, very wet.
	5.0 - 5.5	Clay, dry.
	5.5 - 6.2	Sand, dry, tight.
		SAMPLE: 3 - 5 ft.

Hydrologic information.--Water levels in the two wells indicated ground water to be 3 to 5 ft below land surface. The direction of ground-water flow appeared to be toward the Niagara River.

Chemical information.--The U.S. Geological Survey collected water samples from the two wells and a sediment sample from the swamp on the west side of the property (fig. B-1) for chromium, copper, iron, and organic-compound analyses. Results are given in table B-1. No organic compounds were found; however, the sediment sample was analyzed at a detection limit of mg/kg instead of µg/kg. The concentrations of chromium, copper, and iron in the water samples exceeded USEPA criteria for drinking water and the New York State ground-water standards. The substrate sample had a higher copper concentration than soil samples from undisturbed areas.

Table B-1.--Analyses of ground-water and sediment samples from Buffalo Pumps Division, site 6, North Tonawanda, N.Y., June 21, 1982.
[Locations shown in fig. B-1. Concentrations are in µg/L and µg/kg respectively; dashes indicate that compound was not found.]

	Sample number		
	Ground water		Surface-water sediment
	1	2	3
Inorganic constituents			
Chromium	150†	40	--
Copper	3,400†	300	1,500,000††
Iron	260,000†	51,000†	10,000,000
Organic compounds	--	--	***

† Exceeds USEPA criterion for maximum permissible concentration in drinking water or NYS standard for maximum concentration in ground water.
†† Exceeds concentrations in samples from undisturbed soils in the Tonawanda area. Undisturbed soils not analyzed for iron.
*** Analyzed at detection limit above that required by this study. No compounds detected.

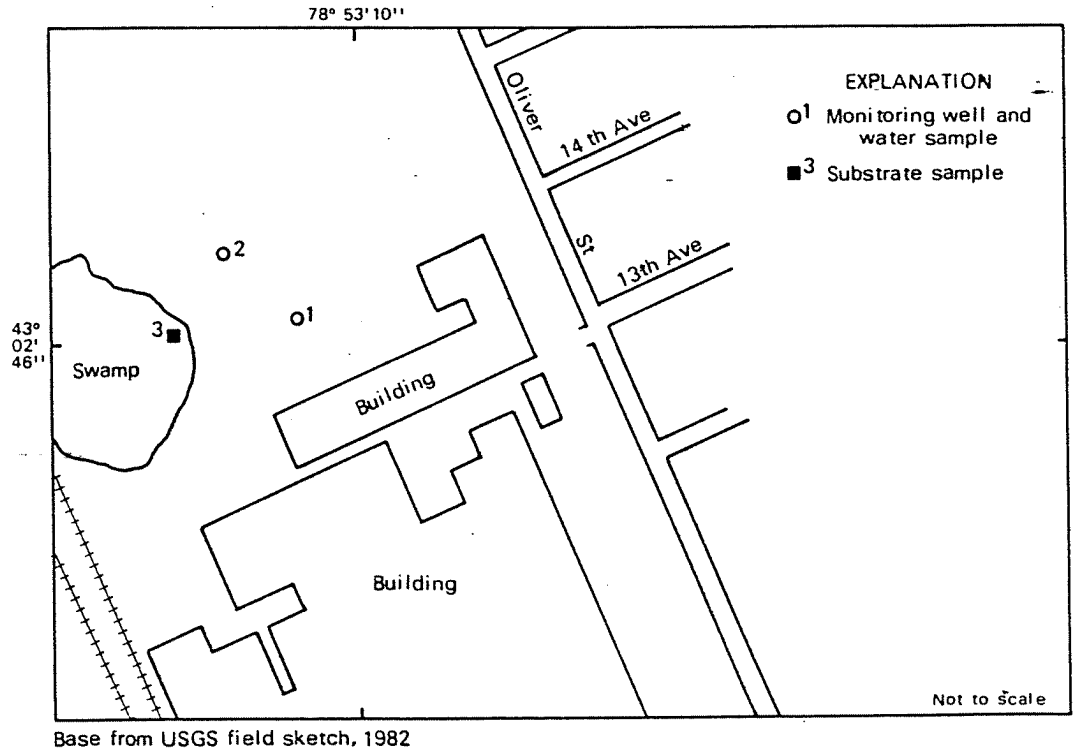


Figure B-1. Location of sampling holes and monitoring well at Buffalo Pumps Division, site 6, North Tonawanda.

Buffalo Pumps (31)
USGS Study draft
7/22/86

6. BUFFALO PUMPS DIVISION

General Information and Chemical Migration Potential

The Buffalo Pumps Division site is located in the City of North Tonawanda, and is shown on plate 2.

The site was used to dispose of an unknown quantity of boiler ash. The site was closed in 1971 and has since been partially covered with grass.

The potential for contaminant migration is minor because higher concentrations of heavy metals were found in a sediment sample from a swamp at the west site of the property than in samples from the refuse area. Additional data would be needed to determine whether migration is taking place. A map showing the location of test holes is given in figure __.

__ Figure __ --(caption on next page) belongs near here.

Geologic Information

The site consists of glacial lacustrine clay overlying bedrock of Camillus shale. The U.S. Geological Survey drilled on the site in 1982, the locations are shown in figure __. The geologic logs are as follows:

Borehole	Depth (ft)	Description
1	0 - 6.2	Fill.
	6.2 - 11.2	Clay, tan, wet.
	11.2 - 27.0	Same, but wetter.
	27.0 - 28.5	Clay, sandy, pinkish.
	28.5 - 30.0	Bedrock.
		SAMPLE: 5 - 7 ft.
2	0 - 1.0	Topsoil.
	1.0 - 3.0	Clay, gray.
	3.0 - 5.0	Sand, clayey, dark, very wet.
	5.0 - 5.5	Clay, dry.
	5.5 - 6.2	Sand, dry, tight.
		SAMPLE: 3 - 5 ft.

Hydrologic information

Water levels in the two wells indicated the water table to be 3 to 5 ft below land surface. The direction of ground-water flow appeared to be toward the Niagara River.

Chemical information

Water samples were collected from the two wells, and a sediment sample was collected in the swamp on the west side of the property (fig. __). Each sample was analyzed for chromium, copper, iron, and organic compounds. Results are given in table __. No organic compounds were found in the samples, however, the sediment sample was analyzed at a detection limit of mg/Kg instead of ug/Kg. The concentrations of chromium, copper, and iron were higher than the USEPA recommended criteria for drinking water. The substrate sample had a copper concentration higher than background soil samples from undisturbed sites in the Tonawanda area.

(31)

Table ..--Analyses of groundwater and surface-water sediment samples from Buffalo Pumps Division, North Tonawanda, N.Y., June ", 198". (Locations shown in fig. . Concentrations are in mg/kg; dashes indicate that compound was not found.)

	Sample number		
	Ground water		Surface-water sediment
	1	2	3
Inorganic constituents			
Chromium	150 †	40	--
Copper	3,400 †	300	1,500,000 ††
Iron	269,000 †	51,000 †	10,300,000
Organic compounds	--	--	**

† Exceeds USEPA criterion for maximum permissible concentration in drinking water.

†† Exceeds concentrations in samples taken from undisturbed soils in the Tonawanda area.

** Analyzed at detection limit above that required by the study. No compounds detected.

APPENDIX A

FIELD PROCEDURES

APPENDIX A

PHASE II FIELD PROCEDURES

These procedures have been utilized by Engineering-Science, Inc. field teams during the Phase II field investigations. These procedures are taken from the NYSDEC-approved "Quality Assurance Project Plan for the Phase II Engineering Investigations and Evaluations at Inactive Hazardous Waste Disposal Sites", dated June, 1987.

The following procedures are contained in this appendix: drilling overburden and bedrock, monitoring well installations, well development and sampling program, including groundwater sampling and waste sampling. Procedures for performing the geophysical surveys are presented in Appendix B.

DRILLING OVERBURDEN AND BEDROCK

The procedures utilized in drilling overburden and bedrock were taken from "Guidelines for Exploratory Boring, Monitoring Wells Installations, and Documentation of these Activities", as promulgated by NYSDEC. These procedures, as found in the project Work Plan and Quality Assurance Plan were modified in the field, with NYSDEC approval, in response to site-specific conditions encountered.

Prior to beginning each well boring the downhole drilling equipment and tools were steam-cleaned. During the progress of this work, the downhole equipment and tools were placed on wooden pallets or sheets of plastic to limit cross-contamination.

Drilling was accomplished with a Mobile B-61 truck-mounted drilling rig. Generally, the overburden was drilled with 4 1/4-inch inside diameter hollow-stem augers. In general, soil samples were collected at intervals of two feet and visually classified in terms of moisture content, color, texture, density and structure. The soil samples were also screened with a Photovac Tip-II to determine the presence of certain volatile organic compounds. The soil cuttings were also monitored with the Photovac. Since no readings in excess of 5 (ppm) above background were recorded, the soil materials were left on the ground surface.

MONITORING WELL INSTALLATIONS

All wells were constructed of two-inch inside diameter PVC riser pipe and .010-inch slotted screens 5 feet in length. All well materials were steam cleaned prior to insertion in the borehole.

Once the PVC well materials were set in place through the augers, quartz sand backfill was placed around the well screen with tremie, to a point one to two feet above the screen. Above the sandpack a bentonite pellet seal two feet thick was placed to isolate the screened zone. Above the bentonite pellets, a cement/bentonite grout was placed up to ground surface. A vented PVC cap

was placed on the well pipe, and the well was secured with the installation of a locking 4-inch inside diameter steel protective casing.

Well Development

Once the well installation was complete, the wells were generally allowed to set-up for a period of approximately 12 hours or more. Each well was then developed by removing water until the water contained turbidity of less than 100 Jackson Turbidity Units, or was largely sediment-free.

Development methods included bailing and air-lift pumping. For air-lift method, the discharge of the air line was first monitored with a Photovac to ensure readings were not above background. An oil-separating device was placed on the discharge line of the compressor. The air line was steam-cleaned prior to the placement in the well. Once the air line was in place just above the screened section, the air pressure was increased until the water could be lifted out of the top of the well casing. Under both development methods, the wells were periodically surged to aid in removing sediment.

SAMPLING PROGRAM

The sampling program at the Buffalo Pumps site consisted of groundwater and waste sampling. Samples were collected in accordance with the approved Quality Assurance Project Plan. In addition to the media sampled, two types of blanks were collected. A trip blank consisting of organic-free water was prepared by the laboratory and accompanied the sample bottle shipment. This blank provides a measure of the impact of bottle preparation procedures and shipment on the samples. A field wash blank was collected by pouring organic-free water provided by the laboratory or a commercial distributor over the sampling equipment as a measure of the field decontamination procedures. The wash blank was labelled 'field work' and was analyzed for volatile organic compounds. Prior to sampling at each location, the sampling equipment was decontaminated by successively rinsing with detergent (Alconox) water, methanol, and distilled water. After collection of the water samples, field tests were performed on a separate sample to determine pH, temperature and specific conductivity. Field sampling records are presented in Appendix D.

Groundwater Sampling

Prior to collecting the groundwater samples, the static water level in the well was recorded from the top of PVC well casing and at least three well volumes of water were removed with a teflon bailer. The sample bottles were then filled using the same teflon bailer. Dedicated polypropylene or polyethylene rope was used to bail each well.

Waste Sampling

Waste samples were collected by split spoon sampling at ranges of 0-7 feet below ground surface. Bottles were filled with a composite sample collected over the sampling range. The

samples were recollected for additional analyses by drilling to the appropriate sample depths with a bucket auger.

AIR QUALITY MONITORING

Air quality monitoring for volatile organic compounds with an Photovac Tip-II photoionization meter was implemented during the drilling and well installations and sampling events. The meter was calibrated on a daily basis before use with a 100 ppm isobutylene standard. Monitoring was generally performed as a health and safety measure. The intake of the instruments was held at head height for 30 seconds and the readings were recorded. During the drilling procedures, the split-spoon soil samples were held at approximately 1" from the intake to test for volatile organic vapors emanating from the soil samples. The air in the completed well as monitored by placing the intake over the well opening and removing the PVC cap. The intake was then placed into the well opening and any readings were recorded.

APPENDIX B

GEOLOGIC DATA

Boring Logs and Well Schematics

DRILLING CONTRACTOR:
Driller: M. Legave
Inspector: W. Tilley
Rig Type: Mobile 61.
Drilling Method: 4¼" ID HSA

ENGINEERING-SCIENCE DRILLING RECORD

PROJECT NAME: DEC Phase II Buffalo Pump
PROJECT NO.: 540172 18

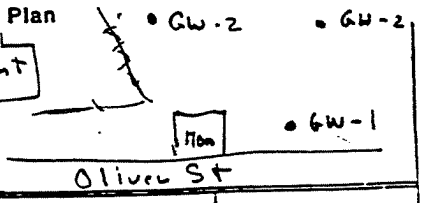
BORING NO.: GW-1
Sheet: 1 of 1
Location: Parking lot on Oliver St.

GROUND WATER OBSERVATIONS

Water Level			
Time			
Date			
Casing Depth			

Weather: Fair
Date/Time Start: 1 | 8 | 88 1:00 pm
Date/Time Finish: 1 | 8 | 88 3:0 pm

Plot Plan



Photovac Reading	SAMPLE DEPTHS	SAMPLE I.D.	SPT	FIELD IDENTIFICATION OF MATERIAL
0.0	0-2	S-1	21	Gray Brown Silt, some sand, Trace Clay & Fine Gravel (Fill)
	SS		11	
	Rec 18"		10	
			14	
0.0	2-4	S-2	9	
	SS		7	Black Silt and Fine Sand (Fill)
	Rec 8"		6	
			8	
0.0	4-6	S-3	3	4.5 Dark Gray Silt and Fine Sand (Fill)
	SS		3	Brown medium Fine sand + Silt (wet to Saturated)
	Rec 2"		5	
			7	
0.0	6-8	S-4	15	
	SS		4	
	Rec 3"		2	
			2	
0.0	8-10	S-5	7	
	SS		16	9.0
	Rec 10"		19	Brown Silt, little Clay and Fine Sand (moist)
			18	10.0
				Boring terminated at 10'

WELL SCHEMATIC: Grout; Bentonite Pellets; Sand; 2" PVC Riser (2.0'); 2" PVC Screen (4.0' – 10')

Comments

SPT - STANDARD PENETRATION TEST
D = DRY W = WASHED C = CORED
U = UNDISTURBED SS = SPLIT SPOON
P = PIT A = AUGER CUTTINGS

Soil Stratigraphy Summary: Fill to 4.5' over Brown Medium Fine Sand to 9.0 over Brown Clayey Silt to 10.

DRILLING CONTRACTOR:
Driller: M. Legare
Inspector: W. Lilley
Rig Type: Mobile 61
Drilling Method: 4¼" ID HSA

ENGINEERING-SCIENCE DRILLING RECORD

PROJECT NAME: DEC Phase II - Buffalo Pump
PROJECT NO.: 5401.218

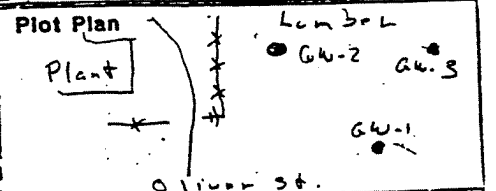
BORING NO.: GW-2
Sheet: 1 of 1
Location: Near Fense

GROUND WATER OBSERVATIONS

Water Level	4.3		
Time	9:00		
Date	1/8		
Casing Depth	10'		

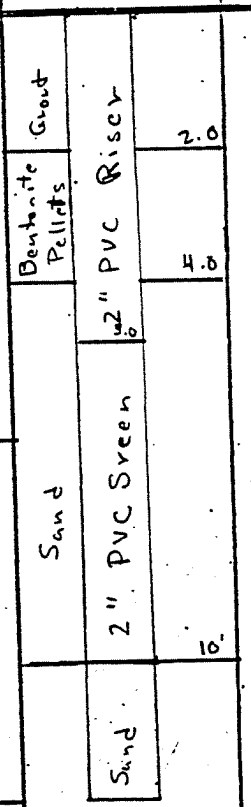
Weather: Fair
Date/Time Start: 1/8/88 7:00 am
Date/Time Finish: 1/8/88 9:30 am

Plot Plan



Photovac Reading	SAMPLE DEPTHS	SAMPLE I.D.	SPT	FIELD IDENTIFICATION OF MATERIAL
0.0	0-2	S-1	60	Black to Gray Silt, Sand and Gravel Trace of Brick (Fill) (Frozen)
	SS		78/3"	
	Rec 9"			
0.0	2-4	S-2	5	Dark Gray Silt, Fine Sand Trace of Gravel (Fill) (moist)
	SS		6	
	Rec 12"		6	
			5	
0.0	4-6	S-3	3	Black to Brown Silt, Fine Sand Trace Gravel (Fill) (moist)
	SS		2	
	Rec 8		2	
			2	
0.0	6-8	S-4	5	6.5'
	SS		15	Brown to Gray medium Fine Sand little Silt (wet)
	Rec 18"		20	
			18	
0.2	8-10	S-5	13	
	SS		13	
	Rec 4"		14	
			9	
0.0	10-12	S-6	5	
	SS		12	
	Rec 6"		11	
			10	
				Boring terminated at 12'

WELL SCHEMATIC



Comments

SPT - STANDARD PENETRATION TEST
D = DRY W = WASHED C = CORED
U = UNDISTURBED SS = SPLIT SPOON
P = PIT A = AUGER CUTTINGS

Soil Stratigraphy Summary: Fill to 6.5' over Brown to Gray medium Fine Sand to 12'.

DRILLING CONTRACTOR:
Driller: M. Legave
Inspector: W. Lilley
Rig Type: Mobile 61
Drilling Method: 4¼ ID HSA

ENGINEERING-SCIENCE DRILLING RECORD

PROJECT NAME: DEC Phase II Buffalo Pump
PROJECT NO.: 5401218

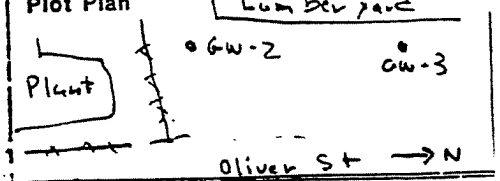
BORING NO.: GW-3
Sheet: 1 of 1
Location: North west Corner

GROUND WATER OBSERVATIONS

Water Level	3.0		
Time	13:00		
Date	1/8		
Casing Depth	10'		

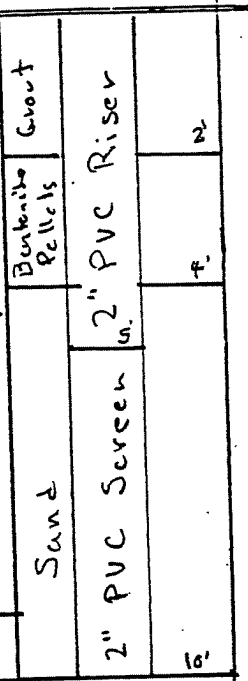
Weather: Fair
Date/Time Start: 1/8/88 9:30
Date/Time Finish: 1/8/88 11:30

Plot Plan



Photovac Reading	SAMPLE DEPTHS	SAMPLE I.D.	SPT	FIELD IDENTIFICATION OF MATERIAL
0.0	0-2	S-1	10	Brown Silt, some Fine Sand Trace of Gravel and Brick (fill)
	SS		13	
	Rec 12"		13	
			10	
2.0	2-4	S-2	6	Black Silt and Sand (fill)
	SS		6	
	Rec 6"		7	
			6	
0.5	4-6	S-3	7	4.5'
	SS		11	Brown-Gray medium Fine Sand little Silt (wet)
	Rec 22"		13	
			12	
1.0	6-8	S-4	3	
	SS		5	
	Rec 8"		6	
			4	
1.0	8-10	S-5	2	9.0'
	SS		5	Gray-Brown Silt and Clay, little Fine Sand (moist)
	Rec 12"		10	10'
			13	Boring terminated at 10'

WELL SCHEMATIC



Comments

SPT - STANDARD PENETRATION TEST
D = DRY W = WASHED C = CORED
U = UNDISTURBED SS = SPLIT SPOON
P = PIT A = AUGER CUTTINGS

Soil Stratigraphy Summary: Fill to 4.5' over Brown-Gray medium Fine Sand to 9.0' over Gray Brown Clayey Silt to 10'

Geotechnical Analyses Results

R&R INTERNATIONAL, INC.

PROJECT: ENGINEERING SCIENCE - BUFFALO PUMPS (SYO12-18) PROJECT NUMBER: 870837

MOISTURE AND GRADATION ANALYSIS

Gradation
(% Retained on Standard Sieve)

BORING NUMBER	DEPTH (FT.)	MOISTURE PERCENT	#4	#10	#40	#100	#200	SILT	CLAY	CLASSIFICATION
GW-1	4-6	24.9	0.1	0.3	2.3	5.7	17.8	61.8	12.0	CL
GW-2	10-12	23.9	11.1	4.9	23.5	9.9	15.0	25.6	10.0	SM
GW-3	6-8	23.1	0.0	0.0	0.6	7.0	42.8	35.5	14.1	SM

R&R
INTERNATIONAL, INC.

PROJECT: ENGINEERING SCIENCE - BUFFALO PUMPS (SY012-18) PROJECT NUMBER: 880837

ATTERBERG LIMITS

BORING NUMBER	DEPTH (FT.)	MOISTURE PERCENT	L.L.	P.L.	P.I.
GW-2	10-12	23.9	27.6	12.9	14.7

APPENDIX C

LABORATORY ANALYTICAL DATA

APPENDIX C

LABORATORY ANALYTICAL DATA

Waste Results

Groundwater Results

Field Sampling Records

Each group noted above is organized by sample number. Results are listed in the following orders: volatile organics, semivolatile organics, pesticide/PCBs, inorganics, and TOX. Organic data aquifiers can be found at the bottom of tach Form I, page 1 (volatile compounds). Inorganic data qualifiers are limited following this cover page.

0000002

Lab Name: NANCO LABORATORIES, INC.
Lab Address: Robinson Lane, RD 6
Wappingers Falls, New York

DATE REPORTED: 2/22/88

VALUE - IF THE RESULT IS A VALUE GREATER THAN OR EQUAL TO THE INSTRUMENT DETECTION LIMIT BUT LESS THAN THE CONTRACT-REQUIRED DECTECTION LIMIT, THE VALUE IS REPORTED IN BRACKETS (i.e., [10]. THE ANALYTICAL METHOD USED IS INDICATED WITH P (FOR ICP), A (FOR FLAME AA) OR F (FOR FURNACE AA).

U - INDICATES ELEMENT WAS ANALYZED FOR BUT NOT DETECTED. REPORTED WITH THE INSTRUMENT DETECTION LIMIT VALUE (e.g., 10 U).

E - INDICATES A VALUE ESTIMATED OR NOT REPORTED DUE TO THE PRESENCE OF INTERFERENCE.

s - INDICATES A VALUE DETERMINED BY METHOD OF STANDARD ADDITION.

N - INDICATES SPIKE SAMPLE RECOVERY IS NOT WITHIN CONTROL LIMITS.

* - INDICATES DUPLICATE ANALYSIS IS NOT WITHIN CONTROL LIMITS.

+ - INDICATES THE CORRELATION COEFFICIENT FOR METHOD OF STANDARD ADDITION IS LESS THAN 0.995

M - INDICATES DUPLICATE INJECTION RESULTS EXCEEDED CONTROL LIMITS.

P - INDICATES ICP ANALYSIS

F - INDICATES FURNACE ANALYSIS

[] - INDICATES SAMPLE VALUE IS BETWEEN IDL AND CRDL

COMMENTS :

Waste Results

SAMPLE DATA

B-1.18

ORGANICS ANALYSIS DATA SHEET

(PAGE 1)

SAMPLE NUMBER

Laboratory Name:NANCO LABORATORY INC.
Lab File ID No:>F1839
Sample Matrix: SOIL
Data Release Authorized By: Kathleen M. Kelly

Case No: ENGINEERING SCIENCE
QC Report No: N/A
Contract No: N/A
Date Sample Received: 01-12-88

B-1.18
BUFFALO PUMPS

VOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One)
Date Extracted/Prepared: 01-18-88
Date Analyzed: 01-18-88
Conc/Dil Factor: 1 pH: 8.9
Percent Moisture 18

CAS Number		ug/l or (ug/Kg) (Circle One)	CAS Number		ug/l or (ug/Kg) (Circle One)
74-87-3	Chloromethane	10.0 U	79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
74-83-9	Bromomethane	10.0 U	78-87-5	1,2-Dichloropropane	5.0 U
75-01-4	Vinyl Chloride	10.0 U	10061-02-6	Trans-1,3-Dichloropropene	5.0 U
75-00-3	Chloroethane	10.0 U	79-01-6	Trichloroethene	5.0 U
75-09-2	Methylene Chloride	15.0 B	124-48-1	Dibromochloromethane	5.0 U
67-64-1	Acetone	10.0 U	79-00-5	1,1,2-Trichloroethane	5.0 U
75-15-0	Carbon Disulfide	5.0 U	71-43-2	Benzene	5.0 U
75-35-4	1,1-Dichloroethene	5.0 U	10061-01-5	cis-1,3-Dichloropropene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U	110-75-8	2-Chloroethylvinylether	10.0 U
156-60-5	Trans-1,2-Dichloroethene	5.0 U	75-25-2	Bromoform	5.0 U
67-66-3	Chloroform	5.0 U	591-78-6	2-Hexanone	10.0 U
107-06-2	1,2-Dichloroethane	5.0 U	108-10-1	4-Methyl-2-Pentanone	10.0 U
78-93-3	2-Butanone	10.0 U	127-18-4	Tetrachloroethene	5.0 U
71-55-6	1,1,1-Trichloroethane	5.0 U	108-88-3	Toluene	5.0 U
56-23-5	Carbon Tetrachloride	5.0 U	108-90-7	Chlorobenzene	5.0 U
108-05-4	Vinyl Acetate	10.0 U	100-41-4	Ethylbenzene	5.0 U
75-27-4	Bromodichloromethane	5.0 U	100-42-5	Styrene	5.0 U
				Total Xylenes	5.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE

If the result is a value greater than or equal to the detection limit, report the value.

U

cates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U(e.g.10U based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected.The number is the minimum attainable detection limit for the sample.

J

Indicates an estimated value.This flag is used either when estimating a concentration for tentatively identified compounds where a 1 1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C

This flag applies to pesticide parameters where the identificatior has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmec by GC/MS

B

This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

OTHER

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANIC ANALYSIS DATA SHEET
(PAGE 2)

LABORATORY NAME: NANCO LABS. INC. SAMPLE NO.B-1.18
CASE NO: ENGINEERING SCIENCE - BUFFALO PUMPS

SEMIVOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One) GPC Cleanup: Yes_XXX_ No_____
Date Extracted/Prepared: 1/12/88 Separatory Funnel Extraction: Yes_____
Date Analyzed: 1/20/88 Continuous Liquid - Liquid Extraction: Yes__
Conc/Dil Factor:----------> 2
Percent Moisture: 18

CAS Number		ug/l or (ug/Kg) (Circle One)	CAS Number		ug/l or (ug/Kg) (Circle One)
			83-32-9	Acenaphthene	660.0 U
108-95-2	Phenol	660.0 U	51-28-5	2,4-Dinitrophenol	3200.0 U
111-44-4	bis(-2-Chloroethyl)Ether	660.0 U	100-02-7	4-Nitrophenol	3200.0 U
95-57-8	2-Chlorophenol	660.0 U	132-64-9	Dibenzofuran	660.0 U
541-73-1	1,3-Dichlorobenzene	660.0 U	121-14-2	2,4-Dinitrotoluene	660.0 U
106-46-7	1,4-Dichlorobenzene	660.0 U	606-20-2	2,6-Dinitrotoluene	660.0 U
100-51-6	Benzyl Alcohol	660.0 U	84-66-2	Diethylphthalate	660.0 U
95-50-1	1,2-Dichlorobenzene	660.0 U	7005-72-3	4-Chlorophenyl-phenylether	660.0 U
95-48-7	2-Methylphenol	660.0 U	86-73-7	Fluorene	660.0 U
39638-32-9	bis(2-chloroisopropyl)Ether	660.0 U	100-01-6	4-Nitroaniline	3200.0 U
106-44-5	4-Methylphenol	660.0 U	534-52-1	4,6-Dinitro-2-Methylphenol	3200.0 U
621-64-7	N-Nitroso-Di-n-Propylamine	660.0 U	86-30-6	N-Nitrosodiphenylamine (1)	660.0 U
67-72-1	Hexachloroethane	660.0 U	101-55-3	4-Bromophenyl-phenylether	660.0 U
98-95-3	Nitrobenzene	660.0 U	118-74-1	Hexachlorobenzene	660.0 U
78-59-1	Isophorone	660.0 U	87-86-5	Pentachlorophenol	3200.0 U
88-75-5	2-Nitrophenol	660.0 U	85-01-8	Phenanthrene	300.0 J
105-67-9	2,4-Dimethylphenol	660.0 U	120-12-7	Anthracene	660.0 U
65-85-0	Benzoic Acid	3200.0 U	84-74-2	Di-n-Butylphthalate	230.0 J
111-91-1	bis(-2-Chloroethoxy)Methane	660.0 U	206-44-0	Fluoranthene	770.0
120-83-2	2,4-Dichlorophenol	660.0 U	129-00-0	Pyrene	660.0 U
120-82-1	1,2,4-Trichlorobenzene	660.0 U	85-68-7	Butylbenzylphthalate	660.0 U
91-20-3	Naphthalene	660.0 U	91-94-1	3,3'-Dichlorobenzidine	1320.0 U
106-47-8	4-Chloroaniline	660.0 U	56-55-3	Benzo(a)Anthracene	660.0 U
87-68-3	Hexachlorobutadiene	660.0 U	117-81-7	bis(2-Ethylhexyl)Phthalate	1700.0 B
59-50-7	4-Chloro-3-Methylphenol	660.0 U	218-01-9	Chrysene	580.0 J
91-57-6	2-Methylnaphthalene	660.0 U	117-84-0	Di-n-Octyl Phthalate	660.0 U
77-47-4	Hexachlorocyclopentadiene	660.0 U	205-99-2	Benzo(b)Fluoranthene	720.0
88-06-2	2,4,6-Trichlorophenol	660.0 U	207-08-9	Benzo(k)Fluoranthene	660.0 U
95-95-4	2,4,5-Trichlorophenol	3200.0 U	50-32-8	Benzo(a)Pyrene	520.0 J
91-58-7	2-Chloronaphthalene	660.0 U	193-39-5	Indeno(1,2,3-cd)Pyrene	330.0 J
88-74-4	2-Nitroaniline	3200.0 U	53-70-3	Dibenz(a,h)Anthracene	660.0 U
131-11-3	Dimethyl Phthalate	660.0 U	191-24-2	Benzo(g,h,i)Perylene	660.0 U
208-96-8	Acenaphthylene	660.0 U			
99-09-2	3-Nitroaniline	3200.0 U			

(1) - Cannot be separated from diphenylamine

Soil

TABLE 2.4
30890-0092
ENGINEERING SCIENCE
EPA TCL PESTICIDES/PCB's

All results reported as ug/Kg.

	Sample Identification				
Dilution Factor	1.00	1.19	1.11	1.20	
Method Blank I.D.	1019 -B02	1019 -B02	1019 -B02	1019 -B02	
Compound	Method Blank	B-1	B-2	B-3	Lower Limits of Detection with no Dilution
alpha BHC	U	U	U	U	8.0
beta BHC	U	U	U	U	8.0
delta BHC	U	U	U	U	8.0
gamma BHC	U	U	U	U	8.0
Heptachlor	U	U	U	U	8.0
Aldrin	U	U	U	U	8.0
Heptachlor Epoxide	U	U	U	U	8.0
Endosulfan I	U	U	U	U	8.0
Dieldrin	U	U	U	U	16
4,4' DDE	U	U	U	U	16
Endrin	U	U	U	U	16
Endosulfan II	U	U	U	U	16
4,4' DDD	U	U	U	U	16
Endosulfan Sulfate	U	U	U	U	16
4,4' DDT	U	U	U	U	16
Methoxychlor	U	U	U	U	80
Endrin Ketone	U	U	U	U	16
alpha Chlordane	U	U	U	U	80
gamma Chlordane	U	U	U	U	80
Toxaphene	U	U	U	U	160
Aroclor - 1016	U	U	U	U	80
Aroclor - 1221	U	U	U	U	80
Aroclor - 1232	U	U	U	U	80
Aroclor - 1242	U	U	U	U	80
Aroclor - 1248	U	U	U	U	80
Aroclor - 1254	U	1,700	U	U	160
Aroclor - 1260	U	U	U	U	160

U - See Appendix for definition.

ORGANICS ANALYSIS DATA SHEET
(PAGE 4)

SAMPLE NUMBER

LABORATORY NAME :NANCO LABS.INC.
CASE NO: ENGINEERING SCIENCE

B-1.18
BUFFALO PUMPS

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	-----	PENTANE,2,2,4-TRIMETHYL	VOA	312	9.3 J
2					
3					
4	-----	UNKNOWN	BNA	49	1200.0 J
5	-----	UNKNOWN	BNA	95	44000.0 J
6	-----	UNKNOWN	BNA	119	27000.0 J
7	-----	UNKNOWN	BNA	130	440.0 J
8	-----	UNKNOWN	BNA	188	290.0 J
9	-----	UNKNOWN	BNA	264	790.0 J
10	-----	UNKNOWN	BNA	855	260.0 J
11	117828	1,2-BENZENE DICARBOXYLIC ACID,BIS(2 METHOXYETHYL)	BNA	1044	610.0 J
12	10544500	UNKNOWN	BNA	1158	550.0 J
13	-----	UNKNOWN	BNA	1355	770.0 J
14	-----	UNKNOWN	BNA	1504	500.0 J
15	-----	UNKNOWN	BNA	1584	460.0 J
16	-----	UNKNOWN	BNA	1619	480.0 J
17	-----	UNKNOWN	BNA	1677	700.0 J
18	-----	UNKNOWN	BNA	1715	610.0 J
19	-----	UNKNOWN	BNA	1770	390.0 J
20	-----	UNKNOWN	BNA	1801	440.0 J
21					
22					
23					
24					
25					
26					

0000003

INORGANIC ANALYSIS DATA SHEET
FORM I

SMPL NO.: B-1.18

Lab Name : NANCO LABORATORIES, INC.

Customer Name: ENGINEERING SCIENCE

SOW NO. : N/A

Lab Receipt Date : 1/12/88

Lab Sample ID: 87-ES-5069

Date Reported: 2/3/88

Location ID: Buffalo Pumps

ELEMENTS IDENTIFIED AND MEASURED

CONCENTRATION : LOW ___X___ MEDIUM _____

MATRIX : WATER _____ SOIL ___X___ SLUDGE _____ OTHER _____

UG/L OR MG/KG DRY WEIGHT (CIRCLE ONE)

1.	ALUMINUM	8400.0 P*E	13.	MAGNESIUM	17800.0 P*E
2.	ANTIMONY	12.2 UPN	14.	MANGANESE	650.0 PE
3.	ARSENIC	3.9 FN	15.	MERCURY	0.8 CV*
4.	BARIUM	130.0 P	16.	NICKEL	95.1 P
5.	BERYLLIUM	[0.7]P	17.	POTASSIUM	1200.0 UP*
6.	CADMIUM	14.9 PN	18.	SELENIUM	7.3 UF(1:10)N
7.	CALCIUM	60400.0 PE	19.	SILVER	2.4 UPN
8.	CHROMIUM	21.0 P	20.	SODIUM	140.0 UP
9.	COBALT	[10.5]P	21.	THALLIUM	0.5 UF
10.	COPPER	340.0 P	22.	VANADIUM	[3.9]P
11.	IRON	32400.0 P*E	23.	ZINC	5100.0 P (1:10)N*E
12.	LEAD	57.8 F (1:10)N*		PERCENT SOLIDS (%)	82.0
	CYANIDE	NR			
	PHENOL	NR			

FOOTNOTES : FOR REPORTING RESULTS STANDARD RESULT QUALIFIERS ARE USED AS DEFINED ON PAGE 2.

COMMENTS : This sample was a brown/black liquid that became light yellow after ICP and furnace digestion procedures. Lead, Zinc, and Selenium were analyzed at a (1:10) dilution

LAB MANAGER

MANCO LABS, INC.

0000302

Reporting Date: 1/15/88

TOX

Results of analysis on ~~Drinking Water~~ sample received 1/12/88

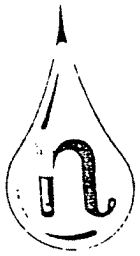
MFLS ID :

MANCO ID: 88-ES5069

PARAMETERS	RESULTS	UNITS
TOX	ND	mg/kg

ALL RESULTS ARE EXPRESSED IN UG/L UNLESS OTHERWISE INDICATED

CONSTANCE M. CRAVED
CHIEF EXECUTIVE OFFICER,
LABORATORY DIRECTOR



SAMPLE DATA

B-2.18

ORGANICS ANALYSIS DATA SHEET

(PAGE 1)

SAMPLE NUMBER

Laboratory Name:NANCO LABORATORY INC.
Lab File ID No:>F1840
Sample Matrix: SOIL
Data Release Authorized By: Kathleen M. Killip

Case No: ENGINEERING SCIENCE
QC Report No: N/A
Contract No: N/A
Date Sample Received: 01-12-88

B-2.18
BUFFALO PUMPS

VOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One)
Date Extracted/Prepared: 01-18-88
Date Analyzed: 01-18-88
Conc/Dil Factor: 1 pH: 8.2
Percent Moisture 42

CAS Number		ug/l or (ug/Kg) (Circle ~~One~~)	CAS Number		ug/l or (ug/Kg) (Circle One)
74-87-3	Chloromethane	10.0 U	79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
-83-9	Bromomethane	10.0 U	78-87-5	1,2-Dichloropropane	5.0 U
-01-4	Vinyl Chloride	10.0 U	10061-02-6	Trans-1,3-Dichloropropene	5.0 U
75-00-3	Chloroethane	10.0 U	79-01-6	Trichloroethene	5.0 U
75-09-2	Methylene Chloride	13.0 B	124-48-1	Dibromochloromethane	5.0 U
67-64-1	Acetone	10.0 U	79-00-5	1,1,2-Trichloroethane	5.0 U
75-15-0	Carbon Disulfide	5.0 U	71-43-2	Benzene	5.0 U
75-35-4	1,1-Dichloroethene	5.0 U	10061-01-5	cis-1,3-Dichloropropene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U	110-75-8	2-Chloroethylvinylether	10.0 U
156-60-5	Trans-1,2-Dichloroethene	5.0 U	75-25-2	Bromoform	5.0 U
67-66-3	Chloroform	5.0 U	591-78-6	2-Hexanone	10.0 U
107-06-2	1,2-Dichloroethane	5.0 U	108-10-1	4-Methyl-2-Pentanone	10.0 U
78-93-3	2-Butanone	10.0 U	127-18-4	Tetrachloroethene	5.0 U
71-55-6	1,1,1-Trichloroethane	5.0 U	108-88-3	Toluene	5.0 U
56-23-5	Carbon Tetrachloride	5.0 U	108-90-7	Chlorobenzene	5.0 U
108-05-4	Vinyl Acetate	10.0 U	100-41-4	Ethylbenzene	5.0 U
75-27-4	Bromodichloromethane	5.0 U	100-42-5	Styrene	5.0 U
				Total Xylenes	5.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE

If the result is a value greater than or equal to the detection limit, report the value.

U

'cates compound was analyzed for but not detected. Report tne minimum detection limit for the sample with the U(e.g.10U based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected.The number is the minimum attainable detection limit for the sample.

J

Indicates an estimated value.This flag is used either when estimating a concentration for tentatively identified compounds where a 1 1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C

This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS

B

This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

OTHER

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANIC ANALYSIS DATA SHEET
(PAGE 2)

LABORATORY NAME: NANCO LABS. INC. SAMPLE NO.B-2.18
CASE NO: ENGINEERING SCIENCE - BUFFALO PUMPS

SEMIVOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One) GPC Cleanup: Yes_XXX_ No_____
Date Extracted/Prepared: 1/12/88 Separatory Funnel Extraction: Yes_____
Date Analyzed: 1/20/88 Continuous Liquid - Liquid Extraction: Yes__
Conc/Dil Factor:----------> 2
Percent Moisture: 16

CAS Number		ug/l or (ug/Kg) (Circle One)	CAS Number		ug/l or (ug/Kg) (Circle One)
108-95-2	Phenol	660.0 U	83-32-9	Acenaphthene	1000.0
111-44-4	bis(-2-Chloroethyl)Ether	660.0 U	51-28-5	2,4-Dinitrophenol	3200.0 U
95-57-8	2-Chlorophenol	660.0 U	100-02-7	4-Nitrophenol	3200.0 U
541-73-1	1,3-Dichlorobenzene	660.0 U	132-64-9	Dibenzofuran	570.0 U
106-46-7	1,4-Dichlorobenzene	660.0 U	121-14-2	2,4-Dinitrotoluene	660.0 U
100-51-6	Benzyl Alcohol	660.0 U	606-20-2	2,6-Dinitrotoluene	660.0 U
95-50-1	1,2-Dichlorobenzene	660.0 U	84-66-2	Diethylphthalate	660.0 U
95-48-7	2-Methylphenol	660.0 U	7005-72-3	4-Chlorophenyl-phenylether	660.0 U
39638-32-9	bis(2-chloroisopropyl)Ether	660.0 U	86-73-7	Fluorene	1100.0
106-44-5	4-Methylphenol	660.0 U	100-01-6	4-Nitroaniline	3200.0 U
621-64-7	N-Nitroso-Di-n-Propylamine	660.0 U	534-52-1	4,6-Dinitro-2-Methylphenol	3200.0 U
67-72-1	Hexachloroethane	660.0 U	86-30-6	N-Nitrosodiphenylamine (1)	660.0 U
98-95-3	Nitrobenzene	660.0 U	101-55-3	4-Bromophenyl-phenylether	660.0 U
78-59-1	Isophorone	660.0 U	118-74-1	Hexachlorobenzene	660.0 U
88-75-5	2-Nitrophenol	660.0 U	87-86-5	Pentachlorophenol	3200.0 U
105-67-9	2,4-Dimethylphenol	660.0 U	85-01-8	Phenanthrene	5600.0
65-85-0	Benzoic Acid	3200.0 U	120-12-7	Anthracene	660.0 U
111-91-1	bis(-2-Chloroethoxy)Methane	660.0 U	84-74-2	Di-n-Butylphthalate	210.0 U
120-83-2	2,4-Dichlorophenol	660.0 U	206-44-0	Fluoranthene	5700.0
120-82-1	1,2,4-Trichlorobenzene	660.0 U	129-00-0	Pyrene	4900.0
91-20-3	Naphthalene	660.0 U	85-68-7	Butylbenzylphthalate	660.0 U
106-47-8	4-Chloroaniline	660.0 U	91-94-1	3,3'-Dichlorobenzidine	1320.0 U
87-68-3	Hexachlorobutadiene	660.0 U	56-55-3	Benzo(a)Anthracene	2600.0
59-50-7	4-Chloro-3-Methylphenol	660.0 U	117-81-7	bis(2-Ethylhexyl)Phthalate	1700.0 B
91-57-6	2-Methylnaphthalene	660.0 U	218-01-9	Chrysene	2600.0
77-47-4	Hexachlorocyclopentadiene	660.0 U	117-84-0	Di-n-Octyl Phthalate	660.0 U
88-06-2	2,4,6-Trichlorophenol	660.0 U	205-99-2	Benzo(b)Fluoranthene	1600.0
95-95-4	2,4,5-Trichlorophenol	3200.0 U	207-08-9	Benzo(k)Fluoranthene	1900.0
91-58-7	2-Chloronaphthalene	660.0 U	50-32-8	Benzo(a)Pyrene	2100.0
88-74-4	2-Nitroaniline	3200.0 U	193-39-5	Indeno(1,2,3-cd)Pyrene	1200.0
131-11-3	Dimethyl Phthalate	660.0 U	53-70-3	Dibenz(a,h)Anthracene	250.0 U
208-96-8	Acenaphthylene	660.0 U	191-24-2	Benzo(g,h,i)Perylene	660.0 U
99-09-2	3-Nitroaniline	3200.0 U			

(1) - Cannot be separated from diphenylamine

Soil

TABLE 2.4
30890-0092
ENGINEERING SCIENCE
EPA TCL PESTICIDES/PCB's

All results reported as ug/Kg.

	Sample Identification				
Dilution Factor	1.00	1.19	1.11	1.20	
Method Blank I.D.	1019 -B02	1019 -B02	1019 -B02	1019 -B02	
Compound	Method Blank	B-1	B-2	B-3	Lower Limits of Detection with no Dilution
alpha BHC	U	U	U	U	8.0
beta BHC	U	U	U	U	8.0
delta BHC	U	U	U	U	8.0
gamma BHC	U	U	U	U	8.0
Heptachlor	U	U	U	U	8.0
Aldrin	U	U	U	U	8.0
Heptachlor Epoxide	U	U	U	U	8.0
Endosulfan I	U	U	U	U	8.0
Dieldrin	U	U	U	U	16
4,4' DDE	U	U	U	U	16
Endrin	U	U	U	U	16
Endosulfan II	U	U	U	U	16
4,4' DDD	U	U	U	U	16
Endosulfan Sulfate	U	U	U	U	16
4,4' DDT	U	U	U	U	16
Methoxychlor	U	U	U	U	80
Endrin Ketone	U	U	U	U	16
alpha Chlordane	U	U	U	U	80
gamma Chlordane	U	U	U	U	80
Toxaphene	U	U	U	U	160
Aroclor - 1016	U	U	U	U	80
Aroclor - 1221	U	U	U	U	80
Aroclor - 1232	U	U	U	U	80
Aroclor - 1242	U	U	U	U	80
Aroclor - 1248	U	U	U	U	80
Aroclor - 1254	U	1,700	U	U	160
Aroclor - 1260	U	U	U	U	160

U - See Appendix for definition.

ORGANICS ANALYSIS DATA SHEET
(PAGE 4)

SAMPLE NUMBER

LABORATORY NAME :NANCO LABS.INC.
CASE NO: ENGINEERING SCIENCE

B-2.18
BUFFALO PUMPS

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	-----	UNKNOWN ALKENE	VOA	257	6.3 J
2					
3					
4	-----	UNKNOWN	BNA	48	1000.0 J
5	-----	UNKNOWN	BNA	95	36000.0 J
6	2216333	OCTANE,3-METHYL	BNA	130	640.0 J
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

INORGANIC ANALYSIS DATA SHEET
FORM I

SMPL NO.: B-2.18

Lab Name : NANCO LABORATORIES, INC.

Customer Name: ENGINEERING SCIENCE

SOW NO. : N/A

Lab Receipt Date : 1/12/88

Lab Sample ID: 87-ES-5070

Date Reported: 2/3/88

Location ID: Buffalo Pumps

ELEMENTS IDENTIFIED AND MEASURED

CONCENTRATION : LOW ___X___ MEDIUM _____

MATRIX : WATER _____ SOIL ___X___ SLUDGE _____ OTHER _____

UG/L OR MG/KG DRY WEIGHT (CIRCLE ONE)

1.	ALUMINUM	15100.0 P * E	13.	MAGNESIUM	32700.0 P * E
2.	ANTIMONY	17.2 UP N	14.	MANGANESE	960.0 P E
3.	ARSENIC	3.9 SF N	15.	MERCURY	5.2 CV *
4.	BARIUM	160.0 P	16.	NICKEL	7.6 UP
5.	BERYLLIUM	[0.9]P	17.	POTASSIUM	2100.0 P *
6.	CADMIUM	1.4 UP N	18.	SELENIUM	10.3 UF(1:10) N
7.	CALCIUM	127500.0 P E	19.	SILVER	3.4 UP N
8.	CHROMIUM	19.3 P	20.	SODIUM	[570.0]P
9.	COBALT	[14.1]P	21.	THALLIUM	0.7 UF
10.	COPPER	24.1 P	22.	VANADIUM	[5.5]P
11.	IRON	20400.0 P * E	23.	ZINC	190.0 P N * E
12.	LEAD	29.6 SF(1:10) N *		PERCENT SOLIDS (%)	58.0
	CYANIDE	NR			
	PHENOL	NR			

FOOTNOTES : FOR REPORTING RESULTS STANDARD RESULT QUALIFIERS ARE USED AS DEFINED ON PAGE 2.

COMMENTS : This sample was a brown/black liquid that became light yellow after ICP and furnace digestion procedures. Selenium and lead were analyzed at a (1:10) dilution.

LAB MANAGER

****
MANCO LABS, INC.
****

0000303

Reporting Date: 1/15/88

TOX

Results of analysis on ~~Drinking Water~~ sample received 1/12/88

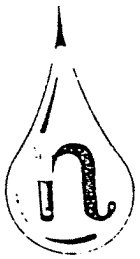
IPLS ID :

MCO ID: 88-ES5070

PARAMETERS	RESULTS	UNITS
TOX	ND	mg/kg

ALL RESULTS ARE EXPRESSED IN UG/L UNLESS OTHERWISE INDICATED

CONSTANCE M. CAIRD
CHIEF EXECUTIVE OFFICER,
LABORATORY DIRECTOR



SAMPLE DATA

B-3.18

ORGANICS ANALYSIS DATA SHEET

(PAGE 1)

SAMPLE NUMBER

Laboratory Name:NANCO LABORATORY INC.
Lab File ID No:>F1843
Sample Matrix: SOIL
Data Release Authorized By: Kathleen M. Kelly

Case No: ENGINEERING SCIENCE
QC Report No: N/A
Contract No: N/A
Date Sample Received: 01-12-88

B-3.18
BUFFALO PUMPS

VOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One)
Date Extracted/Prepared: 01-18-88
Date Analyzed: 01-18-88
Conc/Dil Factor: 1 pH: 7.8
Percent Moisture 16

CAS Number		ug/l or (ug/Kg) (Circle One)	CAS Number		ug/l or (ug/Kg) (Circle One)
74-87-3	Chloromethane	10.0 U	79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
83-9	Bromomethane	10.0 U	78-87-5	1,2-Dichloropropane	5.0 U
-01-4	Vinyl Chloride	10.0 U	10061-02-6	Trans-1,3-Dichloropropene	5.0 U
75-00-3	Chloroethane	10.0 U	79-01-6	Trichloroethene	5.0 U
75-09-2	Methylene Chloride	12.0 B	124-48-1	Dibromochloromethane	5.0 U
67-64-1	Acetone	15.0	79-00-5	1,1,2-Trichloroethane	5.0 U
75-15-0	Carbon Disulfide	5.0 U	71-43-2	Benzene	5.0 U
75-35-4	1,1-Dichloroethene	5.0 U	10061-01-5	cis-1,3-Dichloropropene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U	110-75-8	2-Chloroethylvinylether	10.0 U
156-60-5	Trans-1,2-Dichloroethene	5.0 U	75-25-2	Bromoform	5.0 U
67-66-3	Chloroform	5.0 U	591-78-6	2-Hexanone	10.0 U
107-06-2	1,2-Dichloroethane	5.0 U	108-10-1	4-Methyl-2-Pentanone	10.0 U
78-93-3	2-Butanone	10.0 U	127-18-4	Tetrachloroethene	5.0 U
71-55-6	1,1,1-Trichloroethane	5.0 U	108-88-3	Toluene	5.0 U
56-23-5	Carbon Tetrachloride	5.0 U	108-90-7	Chlorobenzene	5.0 U
108-05-4	Vinyl Acetate	10.0 U	100-41-4	Ethylbenzene	5.0 U
75-27-4	Bromodichloromethane	5.0 U	100-42-5	Styrene	5.0 U
				Total Xylenes	5.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE

If the result is a value greater than or equal to the detection limit, report the value.

U

cates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U(e.g.10U based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected.The number is the minimum attainable detection limit for the sample.

J

Indicates an estimated value.This flag is used either when estimating a concentration for tentatively identified compounds where a 1 1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C

This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS

B

This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

OTHER

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANIC ANALYSIS DATA SHEET
(PAGE 2)

LABORATORY NAME: NANCO LABS. INC.
CASE NO: ENGINEERING SCIENCE - BUFFALO PUMPS

SAMPLE NO.B-3.18

SEMIVOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One)
Date Extracted/Prepared: 1/12/88
Date Analyzed: 1/20/88
Conc/Dil Factor:----------> 2
Percent Moisture: 18

GPC Cleanup: Yes_XXX_ No_____
Separatory Funnel Extraction: Yes_____
Continuous Liquid - Liquid Extraction: Yes___

CAS Number		ug/l or ug/Kg (Circle One)
108-95-2	Phenol	660.0 U
111-44-4	bis(-2-Chloroethyl)Ether	660.0 U
95-57-8	2-Chlorophenol	660.0 U
541-73-1	1,3-Dichlorobenzene	660.0 U
106-46-7	1,4-Dichlorobenzene	660.0 U
100-51-6	Benzyl Alcohol	660.0 U
95-50-1	1,2-Dichlorobenzene	660.0 U
95-48-7	2-Methylphenol	660.0 U
39638-32-9	bis(2-chloroisopropyl)Ether	660.0 U
106-44-5	4-Methylphenol	660.0 U
621-64-7	N-Nitroso-Di-n-Propylamine	660.0 U
67-72-1	Hexachloroethane	660.0 U
98-95-3	Nitrobenzene	660.0 U
78-59-1	Isophorone	660.0 U
88-75-5	2-Nitrophenol	660.0 U
105-67-9	2,4-Dimethylphenol	660.0 U
65-85-0	Benzoic Acid	3200.0 U
111-91-1	bis(-2-Chloroethoxy)Methane	660.0 U
120-83-2	2,4-Dichlorophenol	660.0 U
120-82-1	1,2,4-Trichlorobenzene	660.0 U
91-20-3	Naphthalene	660.0 U
106-47-8	4-Chloroaniline	660.0 U
87-68-3	Hexachlorobutadiene	660.0 U
59-50-7	4-Chloro-3-Methylphenol	660.0 U
91-57-6	2-Methylnaphthalene	660.0 U
77-47-4	Hexachlorocyclopentadiene	660.0 U
88-06-2	2,4,6-Trichlorophenol	660.0 U
95-95-4	2,4,5-Trichlorophenol	3200.0 U
91-58-7	2-Chloronaphthalene	660.0 U
88-74-4	2-Nitroaniline	3200.0 U
131-11-3	Dimethyl Phthalate	660.0 U
208-96-8	Acenaphthylene	660.0 U
99-09-2	3-Nitroaniline	3200.0 U

CAS Number		ug/l or ug/Kg (Circle One)
83-32-9	Acenaphthene	660.0 U
51-28-5	2,4-Dinitrophenol	3200.0 U
100-02-7	4-Nitrophenol	3200.0 U
132-64-9	Dibenzofuran	660.0 U
121-14-2	2,4-Dinitrotoluene	660.0 U
606-20-2	2,6-Dinitrotoluene	660.0 U
84-66-2	Diethylphthalate	660.0 U
7005-72-3	4-Chlorophenyl-phenylether	660.0 U
86-73-7	Fluorene	660.0 U
100-01-6	4-Nitroaniline	3200.0 U
534-52-1	4,6-Dinitro-2-Methylphenol	3200.0 U
86-30-6	N-Nitrosodiphenylamine (1)	660.0 U
101-55-3	4-Bromophenyl-phenylether	660.0 U
118-74-1	Hexachlorobenzene	660.0 U
87-86-5	Pentachlorophenol	3200.0 U
85-01-8	Phenanthrene	300.0 U
120-12-7	Anthracene	660.0 U
84-74-2	Di-n-Butylphthalate	230.0 U
206-44-0	Fluoranthene	750.0
129-00-0	Pyrene	770.0
85-68-7	Butylbenzylphthalate	660.0 U
91-94-1	3,3'-Dichlorobenzidine	1320.0 U
56-55-3	Benzo(a)Anthracene	660.0 U
117-81-7	bis(2-Ethylhexyl)Phthalate	1700.0 B
218-01-9	Chrysene	580.0 U
117-84-0	Di-n-Octyl Phthalate	660.0 U
205-99-2	Benzo(b)Fluoranthene	720.0
207-08-9	Benzo(k)Fluoranthene	660.0 U
50-32-8	Benzo(a)Pyrene	520.0 U
193-39-5	Indeno(1,2,3-cd)Pyrene	330.0 U
53-70-3	Dibenz(a,h)Anthracene	660.0 U
191-24-2	Benzo(g,h,i)Perylene	660.0 U

(1) - Cannot be separated from diphenylamine

Soil

TABLE 2.4
30890-0092
ENGINEERING SCIENCE
EPA TCL PESTICIDES/PCB's

All results reported as ug/Kg.

	Sample Identification				
Dilution Factor	1.00	1.19	1.11	1.20	
Method Blank I.D.	1019 -B02	1019 -B02	1019 -B02	1019 -B02	
Compound	Method Blank	B-1	B-2	B-3	Lower Limits of Detection with no Dilution
alpha BHC	U	U	U	U	8.0
beta BHC	U	U	U	U	8.0
delta BHC	U	U	U	U	8.0
gamma BHC	U	U	U	U	8.0
Heptachlor	U	U	U	U	8.0
Aldrin	U	U	U	U	8.0
Heptachlor Epoxide	U	U	U	U	8.0
Endosulfan I	U	U	U	U	8.0
Dieldrin	U	U	U	U	16
4,4' DDE	U	U	U	U	16
Endrin	U	U	U	U	16
Endosulfan II	U	U	U	U	16
4,4' DDD	U	U	U	U	16
Endosulfan Sulfate	U	U	U	U	16
4,4' DDT	U	U	U	U	16
Methoxychlor	U	U	U	U	80
Endrin Ketone	U	U	U	U	16
alpha Chlordane	U	U	U	U	80
gamma Chlordane	U	U	U	U	80
Toxaphene	U	U	U	U	160
Aroclor - 1016	U	U	U	U	80
Aroclor - 1221	U	U	U	U	80
Aroclor - 1232	U	U	U	U	80
Aroclor - 1242	U	U	U	U	80
Aroclor - 1248	U	U	U	U	80
Aroclor - 1254	U	1,700	U	U	160
Aroclor - 1260	U	U	U	U	160

U - See Appendix for definition.

ORGANICS ANALYSIS DATA SHEET
(PAGE 4)

SAMPLE NUMBER

LABORATORY NAME :NANCO LABS.INC.
CASE NO: ENGINEERING SCIENCE

B-3.18
BUFFALO PUMPS

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	79209	ACETIC ACID,METHYL ESTER	VOA	129	20.4 J
2					
3					
4	141797	3 PENTE-2-ONE,4 METHYL	BNA	15	240.0 J
5	106978	BUTANE	BNA	78	1200.0 J
6	-----	UNKNOWN	BNA	94	39000.0 J
7	-----	UNKNOWN	BNA	104	220.0 J
8	-----	UNKNOWN	BNA	118	570.0 J
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

INORGANIC ANALYSIS DATA SHEET
FORM I

SMPL NO.: B-3.18

Lab Name : NANCO LABORATORIES, INC.

Customer Name: ENGINEERING SCIENCE

SOW NO. : N/A

Lab Receipt Date : 1/12/88

Lab Sample ID: 87-ES-5071

Date Reported: 2/3/88

Location ID: Buffalo Pumps

ELEMENTS IDENTIFIED AND MEASURED

CONCENTRATION : LOW ___X___ MEDIUM _____

MATRIX : WATER _____ SOIL ___X___ SLUDGE _____ OTHER _____

UG/L OR MG/KG DRY WEIGHT (CIRCLE ONE)

1.	ALUMINUM	3000.0 P * E	13.	MAGNESIUM	1400.0 P * E
2.	ANTIMONY	11.9 UP N	14.	MANGANESE	760.0 P E
3.	ARSENIC	12.4 SF N	15.	MERCURY	0.2 CV *
4.	BARIUM	23.8 UP	16.	NICKEL	5.2 UP
5.	BERYLLIUM	0.1 UP	17.	POTASSIUM	1100.0 UP *
6.	CADMIUM	1.0 UP	18.	SELENIUM	0.7 UF N
7.	CALCIUM	6200.0 P	19.	SILVER	2.4 UP N
8.	CHROMIUM	1.4 UP	20.	SODIUM	140.0 UP
9.	COBALT	[11.7]P	21.	THALLIUM	0.5 UF
10.	COPPER	37.9 P	22.	VANADIUM	[11.9]P
11.	IRON	132800.0 P * E	23.	ZINC	56.2 P N * E
12.	LEAD	33.8 F (1:10) N *		PERCENT SOLIDS (%)	84.0
	CYANIDE	NR			
	PHENOL	NR			

FOOTNOTES : FOR REPORTING RESULTS STANDARD RESULT QUALIFIERS ARE USED AS DEFINED ON PAGE 2.

COMMENTS : This sample was a brown/black liqui that became light yellow after ICP and furnace digestion procedures. Lead was analyzed at a (1:10) dilution.

DeHuff

LAB MANAGER

0000306

MANCO LABS, INC.

Reporting Date: 1/15/88

TOX

Results of analysis on ~~Drinking Water~~ sample received 1/12/88

PLS ID :

MCO ID: 88-ES5071

PARAMETERS	RESULTS	UNITS
TOX	NO	mg/kg

ALL RESULTS ARE EXPRESSED IN UG/L UNLESS OTHERWISE INDICATED

CONSTANCE M. CHIED
CHIEF EXECUTIVE OFFICER,
LABORATORY DIRECTOR

SAMPLE DATA

Trip Blank
TB-1.18

ORGANICS ANALYSIS DATA SHEET

(PAGE 1)

SAMPLE NUMBER

Laboratory Name:NANCO LABORATORY INC.
Lab File ID No:>B3635
Sample Matrix: WATER
Data Release Authorized By: Kathleen M. Kelley

Case No: ENGINEERING SCIENCE
QC Report No: N/A
Contract No: N/A
Date Sample Received: 01-12-88

TB-1.18
BUFFALO PUMPS

VOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One)
Date Extracted/Prepared: 01-12-88
Date Analyzed: 01-12-88
Conc/Dil Factor: 1 pH: 9.5
Percent Moisture: N/A

CAS Number		(ug/l) or ug/Kg (Circle One)
74-87-3	Chloromethane	10.0 U
74-83-9	Bromomethane	10.0 U
75-01-4	Vinyl Chloride	10.0 U
75-00-3	Chloroethane	10.0 U
75-09-2	Methylene Chloride	5.8 B
67-64-1	Acetone	2.8 J
75-15-0	Carbon Disulfide	5.0 U
75-35-4	1,1-Dichloroethene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U
156-60-5	Trans-1,2-Dichloroethene	5.0 U
67-66-3	Chloroform	5.0 U
107-06-2	1,2-Dichloroethane	5.0 U
78-93-3	2-Butanone	10.0 U
71-55-6	1,1,1-Trichloroethane	5.0 U
56-23-5	Carbon Tetrachloride	5.0 U
108-05-4	Vinyl Acetate	10.0 U
75-27-4	Bromodichloromethane	5.0 U

CAS Number		(ug/l) or ug/Kg (Circle One)
79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
78-87-5	1,2-Dichloropropane	5.0 U
10061-02-6	Trans-1,3-Dichloropropene	5.0 U
79-01-6	Trichloroethene	5.0 U
124-48-1	Dibromochloromethane	5.0 U
79-00-5	1,1,2-Trichloroethane	5.0 U
71-43-2	Benzene	5.0 U
10061-01-5	cis-1,3-Dichloropropene	5.0 U
110-75-8	2-Chloroethylvinylether	10.0 U
75-25-2	Bromoform	5.0 U
591-78-6	2-Hexanone	10.0 U
108-10-1	4-Methyl-2-Pentanone	10.0 U
127-18-4	Tetrachloroethene	5.0 U
108-88-3	Toluene	5.0 U
108-90-7	Chlorobenzene	5.0 U
100-41-4	Ethylbenzene	5.0 U
100-42-5	Styrene	5.0 U
	Total Xylenes	5.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE

If the result is a value greater than or equal to the detection limit, report the value.

U

Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U(e.g.10U based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected.The number is the minimum attainable detection limit for the sample.

J

Indicates an estimated value.This flag is used either when estimating a concentration for tentatively identified compounds where a 1 1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C

This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS

B

This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

OTHER

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANICS ANALYSIS DATA SHEET
(PAGE 4)

SAMPLE NUMBER

LABORATORY NAME :NANCO LABS.INC.
CASE NO: ENGINEERING SCIENCE

TB-1.18
BUFFALO PUMPS

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	-----	NONE FOUND	VOA	-----	-----
2					
3					
4	-----	NOT REQUIRED	BNA	-----	-----
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

SAMPLE DATA

Field Blank

FB-1.18

ORGANICS ANALYSIS DATA SHEET

(PAGE 1)

SAMPLE NUMBER

Laboratory Name:NANCO LABORATORY INC.
Lab File ID No:>B3636
Sample Matrix: WATER
Data Release Authorized By: Kathleen M Kelly

Case No: ENGINEERING SCIENCE
QC Report No: N/A
Contract No: N/A
Date Sample Received: 01-12-88

FB-1.18
BUFFALO PUMPS

VOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One)
Date Extracted/Prepared: 01-12-88
Date Analyzed: 01-12-88
Conc/Dil Factor: 1 pH: 10.0
Percent Moisture: N/A

CAS Number		(ug/l) or ug/Kg (Circle One)
74-87-3	Chloromethane	10.0 U
74-83-9	Bromomethane	10.0 U
75-01-4	Vinyl Chloride	10.0 U
75-00-3	Chloroethane	10.0 U
75-09-2	Methylene Chloride	5.0 B
67-64-1	Acetone	3.1 J
75-15-0	Carbon Disulfide	5.0 U
75-35-4	1,1-Dichloroethene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U
156-60-5	Trans-1,2-Dichloroethene	5.0 U
67-66-3	Chloroform	5.0 U
107-06-2	1,2-Dichloroethane	5.0 U
78-93-3	2-Butanone	10.0 U
71-55-6	1,1,1-Trichloroethane	5.0 U
56-23-5	Carbon Tetrachloride	5.0 U
108-05-4	Vinyl Acetate	10.0 U
75-27-4	Bromodichloromethane	5.0 U

CAS Number		(ug/l) or ug/Kg (Circle One)
79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
78-87-5	1,2-Dichloropropane	5.0 U
10061-02-6	Trans-1,3-Dichloropropene	5.0 U
79-01-6	Trichloroethene	5.0 U
124-48-1	Dibromochloromethane	5.0 U
79-00-5	1,1,2-Trichloroethane	5.0 U
71-43-2	Benzene	5.0 U
10061-01-5	cis-1,3-Dichloropropene	5.0 U
110-75-8	2-Chloroethylvinylether	10.0 U
75-25-2	Bromoform	5.0 U
591-78-6	2-Hexanone	10.0 U
108-10-1	4-Methyl-2-Pentanone	10.0 U
127-18-4	Tetrachloroethene	5.0 U
108-88-3	Toluene	5.0 U
108-90-7	Chlorobenzene	5.0 U
100-41-4	Ethylbenzene	5.0 U
100-42-5	Styrene	5.0 U
	Total Xylenes	5.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE

If the result is a value greater than or equal to the detection limit, report the value.

U

Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U(e.g.10U based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected.The number is the minimum attainable detection limit for the sample.

J

Indicates an estimated value.This flag is used either when estimating a concentration for tentatively identified compounds where a 1 1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C

This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS

B

This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

OTHER

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANICS ANALYSIS DATA SHEET
(PAGE 4)

SAMPLE NUMBER

LABORATORY NAME :NANCO LABS.INC.
CASE NO: ENGINEERING SCIENCE

FB-1.18
BUFFALO PUMPS

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	-----	UNKNOWN	VOA	592	3.0 J
2					
3					
4	-----	NOT REQUIRED	BNA	-----	-----
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
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21					
22					
23					
24					
25					
26					

FORM I, PART B

Groundwater Results

SAMPLE DATA

GW-1.18

ORGANICS ANALYSIS DATA SHEET

(PAGE 1)

SAMPLE NUMBER

BUFFALO PUMPS

Laboratory Name:NANCO LABORATORY INC.
Lab File ID No:>G0288
Sample Matrix: WATER
Data Release Authorized By: Kathleen M. Kelly

Case No: ENG.SCI.
QC Report No: N/A
Contract No: N/A
Date Sample Received: 01/30/88

GW-1.18

VOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One)
Date Extracted/Prepared: 02/03/88
Date Analyzed:02/03/88
Conc/Dil Factor: 1 pH: 6.9
Percent Moisture: N/A

CAS Number		ug/l or ug/Kg (Circle One)	CAS Number		ug/l or ug/Kg (Circle One)
74-87-3	Chloromethane	10.0 U	79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
74-83-9	Bromomethane	10.0 U	78-87-5	1,2-Dichloropropane	5.0 U
75-01-4	Vinyl Chloride	10.0 U	10061-02-6	Trans-1,3-Dichloropropene	5.0 U
75-00-3	Chloroethane	10.0 U	79-01-6	Trichloroethene	5.0 U
75-09-2	Methylene Chloride	15.0 B	124-48-1	Dibromochloromethane	5.0 U
67-64-1	Acetone	11.0 B	79-00-5	1,1,2-Trichloroethane	5.0 U
75-15-0	Carbon Disulfide	27.0	71-43-2	Benzene	1.6 J
75-35-4	1,1-Dichloroethene	5.0 U	10061-01-5	cis-1,3-Dichloropropene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U	110-75-8	2-Chloroethylvinylether	10.0 U
156-60-5	Trans-1,2-Dichloroethene	5.0 U	75-25-2	Bromoform	5.0 U
67-66-3	Chloroform	5.0 U	591-78-6	2-Hexanone	10.0 U
107-06-2	1,2-Dichloroethane	5.0 U	108-10-1	4-Methyl-2-Pentanone	10.0 U
78-93-3	2-Butanone	10.0 U	127-18-4	Tetrachloroethene	5.0 U
71-55-6	1,1,1-Trichloroethane	5.0 U	108-88-3	Toluene	5.0 U
56-23-5	Carbon Tetrachloride	5.0 U	108-90-7	Chlorobenzene	5.0 U
108-05-4	Vinyl Acetate	10.0 U	100-41-4	Ethylbenzene	5.0 U
75-27-4	Bromodichloromethane	5.0 U	100-42-5	Styrene	5.0 U
				Total Xylenes	5.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE

If the result is a value greater than or equal to the detection limit, report the value.

U

Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U(e.g.10U based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected.The number is the minimum attainable detection limit for the sample.

J

Indicates an estimated value.This flag is used either when estimating a concentration for tentatively identified compounds where a 1 1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C

This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS

B

This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

OTHER

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANIC ANALYSIS DATA SHEET
(PAGE 2)

LABORATORY NAME: NANCO LABS. INC.
CASE NO: ENGINEERING SCIENCE
BUFFALO PUMPS

SAMPLE NO.
GW.1.18

SEMIVOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: 2/01/88
Date Analyzed: 2/10/88
Conc/Dil Factor:----------> 2
Percent Moisture: N/A

GPC Cleanup: Yes_____ No__XX__
Separatory Funnel Extraction: Yes__XX__
Continuous Liquid - Liquid Extraction: Yes___

CAS Number		ug/l or ug/Kg (Circle One)
108-95-2	Phenol	20.0 U
111-44-4	bis(-2-Chloroethyl)Ether	20.0 U
95-57-8	2-Chlorophenol	20.0 U
541-73-1	1,3-Dichlorobenzene	20.0 U
106-46-7	1,4-Dichlorobenzene	20.0 U
100-51-6	Benzyl Alcohol	20.0 U
95-50-1	1,2-Dichlorobenzene	20.0 U
95-48-7	2-Methylphenol	20.0 U
39638-32-9	bis(2-chloroisopropyl)Ether	20.0 U
106-44-5	4-Methylphenol	20.0 U
621-64-7	N-Nitroso-Di-n-Propylamine	20.0 U
67-72-1	Hexachloroethane	20.0 U
98-95-3	Nitrobenzene	20.0 U
78-59-1	Isophorone	20.0 U
88-75-5	2-Nitrophenol	20.0 U
105-67-9	2,4-Dimethylphenol	20.0 U
65-85-0	Benzoic Acid	100.0 U
111-91-1	bis(-2-Chloroethoxy)Methane	20.0 U
120-83-2	2,4-Dichlorophenol	20.0 U
120-82-1	1,2,4-Trichlorobenzene	20.0 U
91-20-3	Naphthalene	20.0 U
106-47-8	4-Chloroaniline	20.0 U
87-68-3	Hexachlorobutadiene	20.0 U
59-50-7	4-Chloro-3-Methylphenol	20.0 U
91-57-6	2-Methylnaphthalene	20.0 U
77-47-4	Hexachlorocyclopentadiene	20.0 U
88-06-2	2,4,6-Trichlorophenol	20.0 U
95-95-4	2,4,5-Trichlorophenol	100.0 U
91-58-7	2-Chloronaphthalene	20.0 U
88-74-4	2-Nitroaniline	100.0 U
131-11-3	Dimethyl Phthalate	20.0 U
208-96-8	Acenaphthylene	20.0 U
99-09-2	3-Nitroaniline	100.0 U

CAS Number		ug/l or ug/Kg (Circle One)
83-32-9	Acenaphthene	20.0 U
51-28-5	2,4-Dinitrophenol	100.0 U
100-02-7	4-Nitrophenol	100.0 U
132-64-9	Dibenzofuran	20.0 U
121-14-2	2,4-Dinitrotoluene	20.0 U
606-20-2	2,6-Dinitrotoluene	20.0 U
84-66-2	Diethylphthalate	20.0 U
7005-72-3	4-Chlorophenyl-phenylether	20.0 U
86-73-7	Fluorene	20.0 U
100-01-6	4-Nitroaniline	100.0 U
534-52-1	4,6-Dinitro-2-Methylphenol	100.0 U
86-30-6	N-Nitrosodiphenylamine (1)	20.0 U
101-55-3	4-Bromophenyl-phenylether	20.0 U
118-74-1	Hexachlorobenzene	20.0 U
87-86-5	Pentachlorophenol	100.0 U
85-01-8	Phenanthrene	20.0 U
120-12-7	Anthracene	20.0 U
84-74-2	Di-n-Butylphthalate	20.0 U
206-44-0	Fluoranthene	20.0 U
129-00-0	Pyrene	20.0 U
85-68-7	Butylbenzylphthalate	20.0 U
91-94-1	3,3'-Dichlorobenzidine	40.0 U
56-55-3	Benzo(a)Anthracene	20.0 U
117-81-7	bis(2-Ethylhexyl)Phthalate	20.0 U
218-01-9	Chrysene	20.0 U
117-84-0	Di-n-Octyl Phthalate	32.0
205-99-2	Benzo(b)Fluoranthene	20.0 U
207-08-9	Benzo(k)Fluoranthene	20.0 U
50-32-8	Benzo(a)Pyrene	20.0 U
193-39-5	Indeno(1,2,3-cd)Pyrene	20.0 U
53-70-3	Dibenz(a,h)Anthracene	20.0 U
191-24-2	Benzo(g,h,i)Perylene	20.0 U

(1) - Cannot be separated from diphenylamine

Aqueous

TABLE 2.0
30890-0092
ENGINEERING SCIENCE
EPA TCL PESTICIDES/PCB's

All results reported as ug/L.

	Sample Identification				
Dilution Factor	1.0	1.0	1.0	1.0	
Method Blank I.D.	1018 -B01	1018 -B01	1018 -B01	1018 -B01	
Compound	Method Blank	GW-1	GW-2	GW-3	Lower Limits of Detection with no Dilution
alpha BHC	U	U	U	U	0.05
beta BHC	U	U	U	U	0.05
Delta BHC	U	U	U	U	0.05
Gamma BHC	U	U	U	U	0.05
Heptachlor	U	U	U	U	0.05
Aldrin	U	U	U	U	0.05
Heptachlor Epoxide	U	U	U	U	0.05
Endosulfan I	U	U	U	U	0.05
Dieldrin	U	U	U	U	0.10
4,4' DDE	U	U	U	U	0.10
Endrin	U	U	U	U	0.10
Endosulfan II	U	U	U	U	0.10
4,4' DDD	U	U	U	U	0.10
Endosulfan Sulfate	U	U	U	U	0.10
4,4' DDT	U	U	U	U	0.10
Methoxychlor	U	U	U	U	0.50
Endrin Ketone	U	U	U	U	0.10
alpha Chlordane	U	U	U	U	0.50
Gamma Chlordane	U	U	U	U	0.50
Toxaphene	U	U	U	U	1.0
Aroclor - 1016	U	U	U	U	0.50
Aroclor - 1221	U	U	U	U	0.50
Aroclor - 1232	U	U	U	U	0.50
Aroclor - 1242	U	U	U	U	0.50
Aroclor - 1248	U	U	U	U	0.50
Aroclor - 1254	U	U	U	U	1.0
Aroclor - 1260	U	U	U	U	1.0

U - See Appendix for definition.

ORGANICS ANALYSIS DATA SHEET
(PAGE 4)

SAMPLE NUMBER

LABORATORY NAME :NANCO LABS.INC.
CASE NO: ENGINEERING SCIENCE
BUFFALO PUMPS

GW-1.18

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	--------	UNKNOWN	VOA	9	21.0 J
2	--------	2-ETHENYLOXY, ETHANOL	VOA	97	21.0 JB
3	--------	UNKNOWN	VOA	370	16.0 JB
4					
5					
6	--------	UNKNOWN	BN/A	1177	19.0 J
7	--------	UNKNOWN	BN/A	1180	27.0 J
8	--------	UNKNOWN	BN/A	1191	22.0 J
9	--------	UNKNOWN	BN/A	1198	59.0 J
10	--------	UNKNOWN	BN/A	1208	42.0 J
11	--------	UNKNOWN	BN/A	1212	58.0 J
12	--------	UNKNOWN	BN/A	1229	43.0 J
13	--------	UNKNOWN	BN/A	1328	31.0 J
14	--------	UNKNOWN	BN/A	1332	35.0 J
15	--------	UNKNOWN	BN/A	1386	17.0 J
16	--------	UNKNOWN	BN/A	1475	17.0 J
17	--------	UNKNOWN	BN/A	1510	51.0 J
18	--------	UNKNOWN	BN/A	1593	21.0 J
19	--------	UNKNOWN	BN/A	1915	17.0 J
20					
21					
22					
23					
24					
25					
26					

INORGANIC ANALYSIS DATA SHEET
FORM I

SMPL NO. : GW-1.18

Lab Name : NANCO LABORATORIES, INC.

Customer Name: Engineering Science

SOW NO. N/A

Lab Receipt Date : 01/30/88

Lab Sample ID: 88-EW-5341

Date Reported: 2/22/88

Location ID: Buffalo Pumps

ELEMENTS IDENTIFIED AND MEASURED

CONCENTRATION : LOW ___X___ MEDIUM _____

MATRIX : WATER __X____ SOIL _____ SLUDGE _____OTHER _____

(UG/L) OR MG/KG DRY WEIGHT (CIRCLE ONE)

1. ALUMINUM	29700.0 P/N	13. MAGNESIUM	110700.0 P
2. ANTIMONY	50.0 UP	14. MANGANESE	1300.0 P/E
3. ARSENIC	15.0 SF	15. MERCURY	0.2 U C.V.
4. BARIUM	240.0 P	16. NICKEL	22.0 UP
5. BERYLLIUM	[0.7]P	17. POTASSIUM	5000.0 P
6. CADMIUM	4.0 UP/N	18. SELENIUM	30.0 UF/N (1:10)
7. CALCIUM	500000.0 P	19. SILVER	10.0 UP
8. CHROMIUM	90.0 P	20. SODIUM	71400.0 P
9. COBALT	[41.0]P	21. THALLIUM	2.0 UF/N
10. COPPER	110.0 P	22. VANADIUM	[19.0]P
11. IRON	53300.0 P/E	23. ZINC	210.0 P
12. LEAD	51.0 SF/N (1:2)	PRECENT SOLIDS (%)	N/A
CYANIDE	NR		

FOOTNOTES : FOR REPORTING RESULTS STANDARD RESULT QUALIFIERS ARE USED AS DEFINED ON PAGE 2.

COMMENTS : This sample was a brown liquid that was colorless after ICP digestion procedures and colorless after furnace digestion procedures. Pb was analyzed at a 1:2 dilution. Se was analyzed at a 1:10 dilution.

LAB MANAGER

MARCO LABS, INC.

Reporting Date: 2/2/88

Results of analysis on ~~Drinking Water~~ TOX sample received 1/30/88

SAMPLE ID :

MARCO ID: 88-EW5341

PARAMETERS	RESULTS	UNITS
TOX	86	ug/l

ALL RESULTS ARE EXPRESSED IN UG/L UNLESS OTHERWISE INDICATED

CONSTANCE M. GAIND
CHIEF EXECUTIVE OFFICER,
LABORATORY DIRECTOR

SAMPLE DATA

GW-9.18

ORGANICS ANALYSIS DATA SHEET

(PAGE 1)

SAMPLE NUMBER

BUFFALO PUMPS

Laboratory Name:NANCO LABORATORY INC.
Lab File ID No:>G0289
Sample Matrix: WATER
Data Release Authorized By: Kathleen M. Kelley

Case No: ENG.SCI.
QC Report No: N/A
Contract No: N/A
Date Sample Received: 01/30/88

GW-2.18

VOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One)
Date Extracted/Prepared: 02/03/88
Date Analyzed:02/03/88
Conc/Dil Factor: 1 pH: 6.9
Percent Moisture: N/A

CAS Number		ug/l or ug/Kg (Circle One)	CAS Number		ug/l or ug/Kg (Circle One)
74-87-3	Chloromethane	10.0 U	79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
74-83-9	Bromomethane	10.0 U	78-87-5	1,2-Dichloropropane	5.0 U
75-01-4	Vinyl Chloride	10.0 U	10061-02-6	Trans-1,3-Dichloropropene	5.0 U
75-00-3	Chloroethane	10.0 U	79-01-6	Trichloroethene	5.0 U
75-09-2	Methylene Chloride	15.0 B	124-48-1	Dibromochloromethane	5.0 U
67-64-1	Acetone	13.0 B	79-00-5	1,1,2-Trichloroethane	5.0 U
75-15-0	Carbon Disulfide	14.0	71-43-2	Benzene	1.7 J
75-35-4	1,1-Dichloroethene	5.0 U	10061-01-5	cis-1,3-Dichloropropene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U	110-75-8	2-Chloroethylvinylether	10.0 U
156-60-5	Trans-1,2-Dichloroethene	5.0 U	75-25-2	Bromoform	5.0 U
67-66-3	Chloroform	5.0 U	591-78-6	2-Hexanone	10.0 U
107-06-2	1,2-Dichloroethane	5.0 U	108-10-1	4-Methyl-2-Pentanone	10.0 U
78-93-3	2-Butanone	10.0 U	127-18-4	Tetrachloroethene	5.0 U
71-55-6	1,1,1-Trichloroethane	5.0 U	108-88-3	Toluene	5.0 U
56-23-5	Carbon Tetrachloride	5.0 U	108-90-7	Chlorobenzene	5.0 U
108-05-4	Vinyl Acetate	10.0 U	100-41-4	Ethylbenzene	5.0 U
75-27-4	Bromodichloromethane	5.0 U	100-42-5	Styrene	5.0 U
				Total Xylenes	5.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE

If the result is a value greater than or equal to the detection limit, report the value.

U

Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U(e.g.10U based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected.The number is the minimum attainable detection limit for the sample.

J

Indicates an estimated value.This flag is used either when estimating a concentration for tentatively identified compounds where a 1 1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C

This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS

B

This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

OTHER

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANIC ANALYSIS DATA SHEET
(PAGE 2)

LABORATORY NAME: NANCO LABS. INC.
CASE NO: ENGINEERING SCIENCE
BUFFALO PUMPS

SAMPLE NO.
GW-2.18

SEMIVOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: 2/01/88
Date Analyzed: 2/10/88
Conc/Dil Factor:----------> 2
Percent Moisture: N/A

GPC Cleanup: Yes_____ No__XX__
Separatory Funnel Extraction: Yes__XX__
Continuous Liquid - Liquid Extraction: Yes___

CAS Number		ug/l or ug/Kg (Circle One)
108-95-2	Phenol	20.0 U
111-44-4	bis(-2-Chloroethyl)Ether	20.0 U
95-57-8	2-Chlorophenol	20.0 U
541-73-1	1,3-Dichlorobenzene	20.0 U
106-46-7	1,4-Dichlorobenzene	20.0 U
100-51-6	Benzyl Alcohol	20.0 U
95-50-1	1,2-Dichlorobenzene	20.0 U
95-48-7	2-Methylphenol	20.0 U
39638-32-9	bis(2-chloroisopropyl)Ether	20.0 U
106-44-5	4-Methylphenol	20.0 U
621-64-7	N-Nitroso-Di-n-Propylamine	20.0 U
67-72-1	Hexachloroethane	20.0 U
98-95-3	Nitrobenzene	20.0 U
78-59-1	Isophorone	20.0 U
88-75-5	2-Nitrophenol	20.0 U
105-67-9	2,4-Dimethylphenol	20.0 U
65-85-0	Benzoic Acid	100.0 U
111-91-1	bis(-2-Chloroethoxy)Methane	20.0 U
120-83-2	2,4-Dichlorophenol	20.0 U
120-82-1	1,2,4-Trichlorobenzene	20.0 U
91-20-3	Naphthalene	20.0 U
106-47-8	4-Chloroaniline	20.0 U
87-68-3	Hexachlorobutadiene	20.0 U
59-50-7	4-Chloro-3-Methylphenol	20.0 U
91-57-6	2-Methylnaphthalene	20.0 U
77-47-4	Hexachlorocyclopentadiene	20.0 U
88-06-2	2,4,6-Trichlorophenol	20.0 U
95-95-4	2,4,5-Trichlorophenol	100.0 U
91-58-7	2-Chloronaphthalene	20.0 U
88-74-4	2-Nitroaniline	100.0 U
131-11-3	Dimethyl Phthalate	20.0 U
208-96-8	Acenaphthylene	20.0 U
99-09-2	3-Nitroaniline	100.0 U

CAS Number		ug/l or ug/Kg (Circle One)
83-32-9	Acenaphthene	20.0 U
51-28-5	2,4-Dinitrophenol	100.0 U
100-02-7	4-Nitrophenol	100.0 U
132-64-9	Dibenzofuran	20.0 U
121-14-2	2,4-Dinitrotoluene	20.0 U
606-20-2	2,6-Dinitrotoluene	20.0 U
84-66-2	Diethylphthalate	20.0 U
7005-72-3	4-Chlorophenyl-phenylether	20.0 U
86-73-7	Fluorene	20.0 U
100-01-6	4-Nitroaniline	100.0 U
534-52-1	4,6-Dinitro-2-Methylphenol	100.0 U
86-30-6	N-Nitrosodiphenylamine (1)	20.0 U
101-55-3	4-Bromophenyl-phenylether	20.0 U
118-74-1	Hexachlorobenzene	20.0 U
87-86-5	Pentachlorophenol	100.0 U
85-01-8	Phenanthrene	20.0 U
120-12-7	Anthracene	20.0 U
84-74-2	Di-n-Butylphthalate	52.0
206-44-0	Fluoranthene	20.0 U
129-00-0	Pyrene	20.0 U
85-68-7	Butylbenzylphthalate	20.0 U
91-94-1	3,3'-Dichlorobenzidine	40.0 U
56-55-3	Benzo(a)Anthracene	20.0 U
117-81-7	bis(2-Ethylhexyl)Phthalate	26.0 B
218-01-9	Chrysene	20.0 U
117-84-0	Di-n-Octyl Phthalate	20.0 U
205-99-2	Benzo(b)Fluoranthene	20.0 U
207-08-9	Benzo(k)Fluoranthene	20.0 U
50-32-8	Benzo(a)Pyrene	20.0 U
193-39-5	Indeno(1,2,3-cd)Pyrene	20.0 U
53-70-3	Dibenz(a,h)Anthracene	20.0 U
191-24-2	Benzo(g,h,i)Perylene	20.0 U

(1) - Cannot be separated from diphenylamine

Aqueous

TABLE 2.0
30890-0092
ENGINEERING SCIENCE
EPA TCL PESTICIDES/PCB's

All results reported as ug/L.

	Sample Identification				
Dilution Factor	1.0	1.0	1.0	1.0	
Method Blank I.D.	1018 -B01	1018 -B01	1018 -B01	1018 -B01	
Compound	Method Blank	GW-1	GW-2	GW-3	Lower Limits of Detection with no Dilution
alpha BHC	U	U	U	U	0.05
beta BHC	U	U	U	U	0.05
delta BHC	U	U	U	U	0.05
gamma BHC	U	U	U	U	0.05
Heptachlor	U	U	U	U	0.05
Aldrin	U	U	U	U	0.05
Heptachlor Epoxide	U	U	U	U	0.05
Endosulfan I	U	U	U	U	0.05
Dieldrin	U	U	U	U	0.10
4,4' DDE	U	U	U	U	0.10
Endrin	U	U	U	U	0.10
Endosulfan II	U	U	U	U	0.10
4,4' DDD	U	U	U	U	0.10
Endosulfan Sulfate	U	U	U	U	0.10
4,4' DDT	U	U	U	U	0.10
Methoxychlor	U	U	U	U	0.50
Endrin Ketone	U	U	U	U	0.10
alpha Chlordane	U	U	U	U	0.50
gamma Chlordane	U	U	U	U	0.50
Toxaphene	U	U	U	U	1.0
Aroclor - 1016	U	U	U	U	0.50
Aroclor - 1221	U	U	U	U	0.50
Aroclor - 1232	U	U	U	U	0.50
Aroclor - 1242	U	U	U	U	0.50
Aroclor - 1248	U	U	U	U	0.50
Aroclor - 1254	U	U	U	U	1.0
Aroclor - 1260	U	U	U	U	1.0

U - See Appendix for definition.

ORGANICS ANALYSIS DATA SHEET
(PAGE 4)

SAMPLE NUMBER

LABORATORY NAME :NANCO LABS.INC.
CASE NO: ENGINEERING SCIENCE
BUFFALO PUMPS

GW-2.18

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	--------	UNKNOWN	VOA	10	55.0 J
2	--------	UNKNOWN	VOA	371	8.0 JB
3					
4					
5	--------	NONE FOUND	BN/A	------	----------
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

0000004

INORGANIC ANALYSIS DATA SHEET
FORM I

SMPL NO. : GW-2.18

Lab Name : NANCO LABORATORIES, INC.

Customer Name: Engineering Science

SOW NO. N/A

Lab Receipt Date : 01/30/88

Lab Sample ID: 88-EW-5342

Date Reported: 2/22/88

Location ID: Buffalo Pumps

ELEMENTS IDENTIFIED AND MEASURED

CONCENTRATION : LOW ___X___ MEDIUM _____

MATRIX : WATER __X____ SOIL _____ SLUDGE _____OTHER _____

(UG/L) OR MG/KG DRY WEIGHT (CIRCLE ONE)

1. ALUMINUM	64000.0 P N		13. MAGNESIUM	184200.0 P	
2. ANTIMONY	50.0 UP		14. MANGANESE	12900.0 PE	(1:10)
3. ARSENIC	49.0 SF		15. MERCURY	0.2 U C.V.	
4. BARIUM	430.0 P		16. NICKEL	96.0 P	
5. BERYLLIUM	[2.4]P		17. POTASSIUM	7600.0 P	
6. CADMIUM	4.0 UP N		18. SELENIUM	30.0 UFN	(1:10)
7. CALCIUM	657900.0 P	(1:10)	19. SILVER	10.0 UP	
8. CHROMIUM	170.0 P		20. SODIUM	52600.0 P	
9. COBALT	96.0 P		21. THALLIUM	2.0 UFN	
10. COPPER	280.0 P		22. VANADIUM	110.0 P	
11. IRON	126600.0 PE		23. ZINC	480.0 P	
12. LEAD	56.0 FN	(1:2)	PRECENT SOLIDS (%)	N/A	
CYANIDE	NR				

FOOTNOTES : FOR REPORTING RESULTS STANDARD RESULT QUALIFIERS ARE USED AS DEFINED ON PAGE 2.

COMMENTS : This sample was a brown liquid that was colorless after ICP digestion procedures and colorless after furnace digestion procedures. Pb was analyzed at a 1:2 dilution. Ca, Mn, and Se were analyzed at a 1:10 dilution.

LAB MANAGER

NANCO LABS, INC.

0000209

Reporting Date: 2/2/88

Results of analysis on ~~Drinking Water~~ TOX sample received 1/30/88

SAMPLE ID :

NANCO ID: 88- EW5342

PARAMETERS	RESULTS	UNITS
TOX	ND*	ug/l

* min detection level = 25 ug/l
Dilution Factor (1:5)

ALL RESULTS ARE EXPRESSED IN UG/L UNLESS OTHERWISE INDICATED

CONSTANCE M. GAIND
CHIEF EXECUTIVE OFFICER,
LABORATORY DIRECTOR

SAMPLE DATA

GW-3.18

ORGANICS ANALYSIS DATA SHEET

(PAGE 1)

SAMPLE NUMBER

BUFFALO PUMPS

Laboratory Name:NANCO LABORATORY INC.
Lab File ID No:>G0290
Sample Matrix: WATER
Data Release Authorized By: Kathleen M. Kelley

Case No: ENG.SCI.
QC Report No: N/A
Contract No: N/A
Date Sample Received: 01/30/88

GW-3.18

VOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One)
Date Extracted/Prepared: 02/03/88
Date Analyzed:02/03/88
Conc/Dil Factor: 1 pH: 6.9
Percent Moisture: N/A

CAS Number		(ug/l) or ug/Kg (Circle One)
74-87-3	Chloromethane	10.0 U
74-83-9	Bromomethane	10.0 U
75-01-4	Vinyl Chloride	10.0 U
75-00-3	Chloroethane	10.0 U
75-09-2	Methylene Chloride	17.0 B
67-64-1	Acetone	21.0 B
75-15-0	Carbon Disulfide	15.0
75-35-4	1,1-Dichloroethene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U
156-60-5	Trans-1,2-Dichloroethene	5.0 U
67-66-3	Chloroform	5.0 U
107-06-2	1,2-Dichloroethane	5.0 U
78-93-3	2-Butanone	10.0 U
71-55-6	1,1,1-Trichloroethane	5.0 U
56-23-5	Carbon Tetrachloride	5.0 U
108-05-4	Vinyl Acetate	10.0 U
75-27-4	Bromodichloromethane	5.0 U

CAS Number		(ug/l) or ug/Kg (Circle One)
79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
78-87-5	1,2-Dichloropropane	5.0 U
10061-02-6	Trans-1,3-Dichloropropene	5.0 U
79-01-6	Trichloroethene	5.0 U
124-48-1	Dibromochloromethane	5.0 U
79-00-5	1,1,2-Trichloroethane	5.0 U
71-43-2	Benzene	2.1 J
10061-01-5	cis-1,3-Dichloropropene	5.0 U
110-75-8	2-Chloroethylvinylether	10.0 U
75-25-2	Bromoform	5.0 U
591-78-6	2-Hexanone	10.0 U
108-10-1	4-Methyl-2-Pentanone	10.0 U
127-18-4	Tetrachloroethene	5.0 U
108-88-3	Toluene	5.0 U
108-90-7	Chlorobenzene	5.0 U
100-41-4	Ethylbenzene	5.0 U
100-42-5	Styrene	5.0 U
	Total Xylenes	5.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE

If the result is a value greater than or equal to the detection limit, report the value.

U

Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U(e.g.10U based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected.The number is the minimum attainable detection limit for the sample.

J

Indicates an estimated value.This flag is used either when estimating a concentration for tentatively identified compounds where a 1 1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C

This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS

B

This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

OTHER

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANIC ANALYSIS DATA SHEET
(PAGE 2)

LABORATORY NAME: NANCO LABS. INC.
CASE NO: ENGINEERING SCIENCE
BUFFALO PUMPS

SAMPLE NO.
GW-3.18

SEMIVOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: 2/01/88
Date Analyzed: 2/15/88
Conc/Dil Factor:----------> 2
Percent Moisture: N/A

GPC Cleanup: Yes_____ No__XX__
Separatory Funnel Extraction: Yes__XX__
Continuous Liquid - Liquid Extraction: Yes___

CAS Number		ug/l or ug/Kg (Circle One)
108-95-2	Phenol	20.0 U
111-44-4	bis(-2-Chloroethyl)Ether	20.0 U
95-57-8	2-Chlorophenol	20.0 U
541-73-1	1,3-Dichlorobenzene	20.0 U
106-46-7	1,4-Dichlorobenzene	20.0 U
100-51-6	Benzyl Alcohol	20.0 U
95-50-1	1,2-Dichlorobenzene	20.0 U
95-48-7	2-Methylphenol	20.0 U
39638-32-9	bis(2-chloroisopropyl)Ether	20.0 U
106-44-5	4-Methylphenol	20.0 U
621-64-7	N-Nitroso-Di-n-Propylamine	20.0 U
67-72-1	Hexachloroethane	20.0 U
98-95-3	Nitrobenzene	20.0 U
78-59-1	Isophorone	20.0 U
88-75-5	2-Nitrophenol	20.0 U
105-67-9	2,4-Dimethylphenol	20.0 U
65-85-0	Benzoic Acid	100.0 U
111-91-1	bis(-2-Chloroethoxy)Methane	20.0 U
120-83-2	2,4-Dichlorophenol	20.0 U
120-82-1	1,2,4-Trichlorobenzene	20.0 U
91-20-3	Naphthalene	20.0 U
106-47-8	4-Chloroaniline	20.0 U
87-68-3	Hexachlorobutadiene	20.0 U
59-50-7	4-Chloro-3-Methylphenol	20.0 U
91-57-6	2-Methylnaphthalene	20.0 U
77-47-4	Hexachlorocyclopentadiene	20.0 U
88-06-2	2,4,6-Trichlorophenol	20.0 U
95-95-4	2,4,5-Trichlorophenol	100.0 U
91-58-7	2-Chloronaphthalene	20.0 U
88-74-4	2-Nitroaniline	100.0 U
131-11-3	Dimethyl Phthalate	20.0 U
208-96-8	Acenaphthylene	20.0 U
99-09-2	3-Nitroaniline	100.0 U

CAS Number		ug/l or ug/Kg (Circle One)
83-32-9	Acenaphthene	20.0 U
51-28-5	2,4-Dinitrophenol	100.0 U
100-02-7	4-Nitrophenol	100.0 U
132-64-9	Dibenzofuran	20.0 U
121-14-2	2,4-Dinitrotoluene	20.0 U
606-20-2	2,6-Dinitrotoluene	20.0 U
84-66-2	Diethylphthalate	20.0 U
7005-72-3	4-Chlorophenyl-phenylether	20.0 U
86-73-7	Fluorene	20.0 U
100-01-6	4-Nitroaniline	100.0 U
534-52-1	4,6-Dinitro-2-Methylphenol	100.0 U
86-30-6	N-Nitrosodiphenylamine (1)	20.0 U
101-55-3	4-Bromophenyl-phenylether	20.0 U
118-74-1	Hexachlorobenzene	20.0 U
87-86-5	Pentachlorophenol	100.0 U
85-01-8	Phenanthrene	20.0 U
120-12-7	Anthracene	20.0 U
84-74-2	Di-n-Butylphthalate	54.0
206-44-0	Fluoranthene	20.0 U
129-00-0	Pyrene	20.0 U
85-68-7	Butylbenzylphthalate	20.0 U
91-94-1	3,3'-Dichlorobenzidine	40.0 U
56-55-3	Benzo(a)Anthracene	20.0 U
117-81-7	bis(2-Ethylhexyl)Phthalate	25.0 B
218-01-9	Chrysene	20.0 U
117-84-0	Di-n-Octyl Phthalate	20.0 U
205-99-2	Benzo(b)Fluoranthene	20.0 U
207-08-9	Benzo(k)Fluoranthene	20.0 U
50-32-8	Benzo(a)Pyrene	20.0 U
193-39-5	Indeno(1,2,3-cd)Pyrene	20.0 U
53-70-3	Dibenz(a,h)Anthracene	20.0 U
191-24-2	Benzo(g,h,i)Perylene	20.0 U

(1) - Cannot be separated from diphenylamine

Aqueous

TABLE 2.0
30890-0092
ENGINEERING SCIENCE
EPA TCL PESTICIDES/PCB's

All results reported as ug/L.

	Sample Identification				
Dilution Factor	1.0	1.0	1.0	1.0	
Method Blank I.D.	1018 -B01	1018 -B01	1018 -B01	1018 -B01	
Compound	Method Blank	GW-1	GW-2	GW-3	Lower Limits of Detection with no Dilution
alpha BHC	U	U	U	U	0.05
beta BHC	U	U	U	U	0.05
delta BHC	U	U	U	U	0.05
gamma BHC	U	U	U	U	0.05
Heptachlor	U	U	U	U	0.05
Aldrin	U	U	U	U	0.05
Heptachlor Epoxide	U	U	U	U	0.05
Endosulfan I	U	U	U	U	0.05
Dieldrin	U	U	U	U	0.10
4,4' DDE	U	U	U	U	0.10
Endrin	U	U	U	U	0.10
Endosulfan II	U	U	U	U	0.10
4,4' DDD	U	U	U	U	0.10
Endosulfan Sulfate	U	U	U	U	0.10
4,4' DDT	U	U	U	U	0.10
Methoxychlor	U	U	U	U	0.50
Endrin Ketone	U	U	U	U	0.10
alpha Chlordane	U	U	U	U	0.50
gamma Chlordane	U	U	U	U	0.50
Toxaphene	U	U	U	U	1.0
Aroclor - 1016	U	U	U	U	0.50
Aroclor - 1221	U	U	U	U	0.50
Aroclor - 1232	U	U	U	U	0.50
Aroclor - 1242	U	U	U	U	0.50
Aroclor - 1248	U	U	U	U	0.50
Aroclor - 1254	U	U	U	U	1.0
Aroclor - 1260	U	U	U	U	1.0

U - See Appendix for definition.

ORGANICS ANALYSIS DATA SHEET
(PAGE 4)

SAMPLE NUMBER

LABORATORY NAME :NANCO LABS.INC.
CASE NO: ENGINEERING SCIENCE
BUFFALO PUMPS

GW-3.18

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	--------	UNKNOWN	VOA	4	720.0 J
2	--------	UNKNOWN	VOA	96	27.0 JB
3					
4					
5	--------	UNKNOWN	BN/A	1165	22.0 J
6	--------	UNKNOWN	BN/A	1195	30.0 J
7	--------	UNKNOWN	BN/A	1252	33.0 J
8	--------	UNKNOWN	BN/A	1271	62.0 J
9	--------	UNKNOWN	BN/A	1302	56.0 J
10	--------	UNKNOWN	BN/A	1342	153.0 J
11	--------	UNKNOWN	BN/A	1351	55.0 J
12	--------	UNKNOWN	BN/A	1409	22.0 J
13	--------	UNKNOWN	BN/A	1531	37.0 J
14	--------	UNKNOWN	BN/A	1586	36.0 J
15	--------	UNKNOWN	BN/A	1638	29.0 J
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

0000005

INORGANIC ANALYSIS DATA SHEET
FORM I

SMPL NO. : GW-3.18

Lab Name : NANCO LABORATORIES, INC.

Customer Name: Engineering Science

SOW NO. N/A

Lab Receipt Date : 01/30/88

Lab Sample ID: 88-EW-5343

Date Reported: 2/22/88

Location ID: Buffalo Pumps

ELEMENTS IDENTIFIED AND MEASURED

CONCENTRATION : LOW ___X___ MEDIUM _____

MATRIX : WATER __X____ SOIL _____ SLUDGE _____OTHER _____

(UG/L) OR MG/KG DRY WEIGHT (CIRCLE ONE)

1. ALUMINUM	184800.0 PN		13. MAGNESIUM	248500.0 P	
2. ANTIMONY	50.0 UP		14. MANGANESE	13100.0 PE	(1:10)
3. ARSENIC	18.0 F	(1:5)	15. MERCURY	0.2 U C.V.	
4. BARIUM	5500.0 P		16. NICKEL	450.0 P	
5. BERYLLIUM	9.0 P		17. POTASSIUM	17100.0 P	
6. CADMIUM	4.0 UPN		18. SELENIUM	30.0 UFN	(1:10)
7. CALCIUM	966900.0 P	(1:10)	19. SILVER	10.0 UP	
8. CHROMIUM	1600.0 P		20. SODIUM	70100.0 P	
9. COBALT	260.0 P		21. THALLIUM	2.0 UF N	
10. COPPER	670.0 P		22. VANADIUM	420.0 P	
11. IRON	433600.0 PE		23. ZINC	19800.0 P	(1:10)
12. LEAD	5400.0 P		PRECENT SOLIDS (%)	N/A	
CYANIDE	NR				

FOOTNOTES : FOR REPORTING RESULTS STANDARD RESULT QUALIFIERS ARE USED AS DEFINED ON PAGE 2.

COMMENTS : This sample was a brown liquid that was colorless after ICP digestion procedures and colorless after furnace digestion procedures. As was analyzed at a 1:5 dilution. Ca, Mn, Se and Zn were analyzed at a 1:10 dilution.

LAB MANAGER

0000210

NANCO LABS, INC.

Reporting Date: 2/2/88

Results of analysis on ~~Drinking Water~~ TOX sample received 1/30/88

PLE ID :

NANCO ID: 88-EW5343

PARAMETERS	RESULTS	UNITS
TOX	ND**	ug/l

** min detection level 5ug/l

ALL RESULTS ARE EXPRESSED IN UG/L UNLESS OTHERWISE INDICATED

CONSTANCE M. GAIND
CHIEF EXECUTIVE OFFICER,
LABORATORY DIRECTOR

SAMPLE DATA

Trip Blank

ORGANICS ANALYSIS DATA SHEET

(PAGE 1)

SAMPLE NUMBER

BUFFALO PUMPS

TRIP BLANK

Laboratory Name:NANCO LABORATORY INC.
Lab File ID No:>G0292
Sample Matrix: WATER
Data Release Authorized By:

Case No: ENG.SCI.
QC Report No: N/A
Contract No: N/A
Date Sample Received: 01/30/88

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: 02/03/88
Date Analyzed:02/03/88
Conc/Dil Factor: 1 pH: 7.0
Percent Moisture: N/A

CAS Number		ug/l or ug/Kg (Circle One)
74-87-3	Chloromethane	10.0 U
74-83-9	Bromomethane	10.0 U
75-01-4	Vinyl Chloride	10.0 U
75-00-3	Chloroethane	10.0 U
75-09-2	Methylene Chloride	18.0 B
67-64-1	Acetone	14.0 B
75-15-0	Carbon Disulfide	11.0
75-35-4	1,1-Dichloroethene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U
156-60-5	Trans-1,2-Dichloroethene	5.0 U
67-66-3	Chloroform	5.0 U
107-06-2	1,2-Dichloroethane	5.0 U
78-93-3	2-Butanone	170.0
71-55-6	1,1,1-Trichloroethane	2.6 J
56-23-5	Carbon Tetrachloride	5.0 U
108-05-4	Vinyl Acetate	10.0 U
75-27-4	Bromodichloromethane	5.0 U

CAS Number		ug/l or ug/Kg (Circle One)
79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
78-87-5	1,2-Dichloropropane	5.0 U
10061-02-6	Trans-1,3-Dichloropropene	5.0 U
79-01-6	Trichloroethene	5.0 U
124-48-1	Dibromochloromethane	5.0 U
79-00-5	1,1,2-Trichloroethane	5.0 U
71-43-2	Benzene	2.8 J
10061-01-5	cis-1,3-Dichloropropene	5.0 U
110-75-8	2-Chloroethylvinylether	10.0 U
75-25-2	Bromoform	5.0 U
591-78-6	2-Hexanone	10.0 U
108-10-1	4-Methyl-2-Pentanone	10.0 U
127-18-4	Tetrachloroethene	5.0 U
108-88-3	Toluene	5.0 U
108-90-7	Chlorobenzene	5.0 U
100-41-4	Ethylbenzene	5.0 U
100-42-5	Styrene	5.0 U
	Total Xylenes	5.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE

If the result is a value greater than or equal to the detection limit, report the value.

U

Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U(e.g.10U based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected.The number is the minimum attainable detection limit for the sample.

J

Indicates an estimated value.This flag is used either when estimating a concentration for tentatively identified compounds where a 1 1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C

This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS

B

This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

OTHER

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANICS ANALYSIS DATA SHEET
(PAGE 4)

SAMPLE NUMBER

LABORATORY NAME :NANCO LABS.INC.
CASE NO: ENGINEERING SCIENCE
BUFFALO PUMPS

TRIP BLANK

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	--------	UNKNOWN	VOA	4	620.0 J
2	--------	UNKNOWN	VOA	23	58.0 J
3	109999	FURAN, TETRAHYCLORO	VOA	126	15.0 J
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

SAMPLE DATA

Field Blank

ORGANICS ANALYSIS DATA SHEET

(PAGE 1)

SAMPLE NUMBER

BUFFALO PUMPS

Laboratory Name:NANCO LABORATORY INC. Case No: ENG.SCI. FIELD BLANK

Lab File ID No:>G0291 QC Report No: N/A

Sample Matrix: WATER Contract No: N/A

Data Release Authorized By: Kathleen M. Kelley Date Sample Received: 01/30/88

VOLATILE COMPOUNDS

Concentration: (Low) Medium (Circle One)

Date Extracted/Prepared: 02/03/88

Date Analyzed:02/03/88

Conc/Dil Factor: 1 pH: 7.0

Percent Moisture: N/A

CAS Number		ug/l (Circle One) or ug/Kg
74-87-3	Chloromethane	10.0 U
74-83-9	Bromomethane	10.0 U
5-01-4	Vinyl Chloride	10.0 U
5-00-3	Chloroethane	10.0 U
75-09-2	Methylene Chloride	16.0 B
7-64-1	Acetone	13.0 B
5-15-0	Carbon Disulfide	8.0
5-35-4	1,1-Dichloroethene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U
56-60-5	Trans-1,2-Dichloroethene	5.0 U
7-66-3	Chloroform	5.0 U
107-06-2	1,2-Dichloroethane	5.0 U
78-93-3	2-Butanone	10.0 U
1-55-6	1,1,1-Trichloroethane	5.0 U
5-23-5	Carbon Tetrachloride	5.0 U
108-05-4	Vinyl Acetate	10.0 U
75-27-4	Bromodichloromethane	5.0 U

CAS Number		ug/l (Circle One) or ug/Kg
79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
78-87-5	1,2-Dichloropropane	5.0 U
10061-02-6	Trans-1,3-Dichloropropene	5.0 U
79-01-6	Trichloroethene	5.0 U
124-48-1	Dibromochloromethane	5.0 U
79-00-5	1,1,2-Trichloroethane	5.0 U
71-43-2	Benzene	2.5 J
10061-01-5	cis-1,3-Dichloropropene	5.0 U
110-75-8	2-Chloroethylvinylether	10.0 U
75-25-2	Bromoform	5.0 U
591-78-6	2-Hexanone	10.0 U
108-10-1	4-Methyl-2-Pentanone	10.0 U
127-18-4	Tetrachloroethene	5.0 U
108-88-3	Toluene	5.0 U
108-90-7	Chlorobenzene	5.0 U
100-41-4	Ethylbenzene	5.0 U
100-42-5	Styrene	5.0 U
	Total Xylenes	5.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE

I the result is a value greater than or equal to the detection l it, report the value.

U

Indicates compound was analyzed for but not detected. Report t minimum detection limit for the sample with the U(e.g.10U b ed on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should r d U-Compound was analyzed for but not detected.The number is t minimum attainable detection limit for the sample.

J

Indicates an estimated value.This flag is used either when e imating a concentration for tentatively identified compounds w re a 1 1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit b greater than zero (e.g. 10J).

C

This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS

B

This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

OTHER

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

ORGANICS ANALYSIS DATA SHEET
(PAGE 4)

SAMPLE NUMBER

LABORATORY NAME :NANCO LABS.INC.
CASE NO: ENGINEERING SCIENCE
BUFFALO PUMPS

FIELD BLANK

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	--------	UNKNOWN	VOA	4	1700.0 J
2	--------	UNKNOWN	VOA	18	40.0 J
3	--------	UNKNOWN	VOA	86	17.0 J
4	--------	UNKNOWN	VOA	97	29.0 JB
5	--------	UNKNOWN	VOA	371	7.0 JB
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

Field Sampling Records

FIGURE 6.4
FIELD SURFACE SAMPLING RECORD

B-1.18

Site Buffalo Pumps NYSDEC Site No. _____ Date: 1/11/88

Samplers: Wm Lilley of Engineering Science
M. Legault of Rochester Drilling

SAMPLING: Time 2:20 ___ a.m. X p.m.

Sample Type: Waste and soil

Sampling Method: Split Spoon

Depth of Sample: 0-1

Description of Sampling Point:
Drainage Direction: _____

Upstream From: _____

Downstream From: _____

Physical Appearance/Odor: Black silt & Sand some gravel

Wildlife Observed: none

Sampling Description:
Suspended Matter: —

Color/Stain: Black

Odor: None

Other: —

Texture: Sandy Silt

Analyze for: TOX, Metals & Organics

Refrigerated: Date: 1/11/88 Time ___ a.m. 6:30 p.m.

Field Tests:
Temperature (C°/°F) _____ Weather Fair
pH _____
Conductivity _____

Comments: Refusal at one foot after 6 9 Heights

FIGURE 6.1.
FIELD SAMPLING RECORD

te BUFFALO Bumps Site No. 5Y012-18 Date: 10/17/88
Well B-1

mplers: Mark Chauvin of ES
Bill Bradford of ES

itial Static Water Level. . . . . (from top of well protective casing)

acuation:
ing: Submersible ____ Centrifugal ____
Airlift ____ Positive Displacement ____
Bailed ____ ____ Times

Well Volume Calculation:
2" Casing: ____ ft. of water x .16 = ____ gals.
3" Casing: ____ ft. of water x .36 = ____ gals.
4" Casing: ____ ft. of water x .65 = ____ gals.

Depth to Intake from top of protective well casing ____
Volume of Water removed ____ Gals. (> 3 Well Volumes)

ampling: Time 1300 ___ a.m. X p.m.

Sampler ~~Bailer~~ Type: Stainless Steel spoon X
Teflon ____
From Pos. Dis. Pump Discharge Tube ____
Other ____ ____

	No. of Bottles Filled	I.D. No.	Analyses
Trip Blank			
ield Blank – Wash/Atmospheric. (circle one)			
~~Duplicate~~ Sample soil	1	B-1 (0'-1')	Pest/PCB

ysical Appearance and Odor FILL, Brown sandy silt w/ brick, glass metal & cinders

Refrigerate: Date 10/17/88 Time ____

ield Tests:
Temperature (C°/°F) ____ ____ ____
pH ____ ____
Spec. Conduc (umhos/cm) ____ ____

Weather ____

Comments Soil Sample, composite from 0'-1'

FIGURE 6.4
FIELD SURFACE SAMPLING RECORD

B2.18

Site Buffalo Pumps NYSDEC Site No. _____ Date: 1/11/88

Samplers: Wm Lilley of Engineering Scien
Mike Legaine of Rochester Drilling

SAMPLING: Time 3:20 ___ a.m. X p.m.

Sample Type: Soil and waste

Sampling Method: Split Spoon

Depth of Sample: 0-7'

Description of Sampling Point:
Drainage Direction: _____

Upstream From: _____

Downstream From: _____

Physical Appearance/Odor: Black sand and gray clay/silt
Strongo waste decomposition odor

Wildlife Observed: none

Sampling Description:
Suspended Matter: ——

Color/Stain: Black

Odor: strongo decomposition waste

Other: _____

Texture: sand & clay

Analyze for: Tox metals and Organics

Refrigerated: Date: 1/11/88 Time ___ a.m. 6:30 p.m.

Field Tests:
Temperature (C°/°F) _____ Weather Fair
pH _____ _____
Conductivity _____ _____

Comments: Clay layers mixed in waste and water table at five feet.

FIGURE 6.1.
FIELD SAMPLING RECORD

Buffalo Pumps Site No. 57012.18 Date: 10-12-88

~~Well~~ Soil boring B-2

Samplers: Mark Channing of ES
Bill Bradford of ES

Initial Static Water Level. . . . . (from top of well protective casing)

Evacuation:
Using: Submersible _____ Centrifugal _____ Positive Displacement _____ Airlift _____ Bailed _____ _____ Times

Well Volume Calculation:
2" Casing: _____ ft. of water x .16 = _____ gals.
3" Casing: _____ ft. of water x .36 = _____ gals.
4" Casing: _____ ft. of water x .65 = _____ gals.

Depth to Intake from top of protective well casing _____
Volume of Water removed _____ Gals. (> 3 Well Volumes)

Sampling: Time 15:40 ___ a.m. X p.m.

Sampler ~~Bailer~~ Type:

Stainless Steel bucket auger	X
Teflon	
From Pos. Dis. Pump Discharge Tube	
Other	

	No. of Bottles Filled	I.D. No.	Analyses
Trip Blank			
Field Blank – Wash/Atmospheric. (circle one)			
~~Ground Water~~ Soil Sample	1	B-2 (0'-3.5')	post/PCB

Physical Appearance and Odor clay silt (0-2'), gravelly + sandy silt (2'-3') sandy fill (3-3.5') — all fill – rocky throughout – no particular odor

Refrigerate: Date 10/12/88 Time _____

Field Tests:

Temperature (C°/°F)		
pH		
Spec. Conduc (umhos/cm)		

Weather _____

Comments Soil Sample, composite taken from B-2
Refusal @ 3.5'

FIGURE 6.4
FIELD SURFACE SAMPLING RECORD

B-3.18

Site Buffalo Pumps NYSDEC Site No. _____ Date: 1/9/87

Samplers: W. Lilley of Engineering Science
Mike Lagano of Reclamation Drilling

SAMPLING: Time 4:00 ___ a.m. X p.m.

Sample Type: Soil & Waste

Sampling Method: Split spoon

Depth of Sample: 0 - 4

Description of Sampling Point:
Drainage Direction: _____

Upstream From: _____

Downstream From: _____

Physical Appearance/Odor: Black Fe brown metallic sand and fine gravel

Wildlife Observed: none

Sampling Description:
Suspended Matter: —

Color/Stain: Black

Odor: none

Other: _____

Texture: Sandy Fgravel

Analyze for: Tox; metals Organics

Refrigerated: Date: 1/11/87 Time ___ a.m. 6:30 p.m.

Field Tests:

Temperature (C°/°F)		Weather Fair
pH		
Conductivity		

Comments: Appears Fe be metal waste behind plant

FIGURE 6.1
FIELD SAMPLING RECORD

Site: Buffalo Pumps Site No. S9012.18 Date: 10-12-88
~~Well~~ Soil boring B-3

Samplers: Mark Chauvin of ES.
Bill Bradford of ES

Initial Static Water Level. . . . . (from top of well protective casing)

Evacuation:
Casing: Submersible ____ Centrifugal ____
Airlift ____ Positive Displacement ____
Bailed ____ ____ Times

Well Volume Calculation:
2" Casing: ____ ft. of water x .16 = ____ gals.
3" Casing: ____ ft. of water x .36 = ____ gals.
4" Casing: ____ ft. of water x .65 = ____ gals.

Depth to Intake from top of protective well casing ____
Volume of Water removed ____ Gals. (> 3 Well Volumes)

Sampling: Time 15:40 ___ a.m. X p.m.

~~Bailer~~ Sander Type: Stainless Steel bucket auger X
Teflon
From Pos. Dis. Pump Discharge Tube
Other

	No. of Bottles Filled	I.D. No.	Analyses
Field Blank			
Field Blank – Wash/Atmospheric. (circle one)			
~~Ground water~~ Soil Sample	2	B-3 (0'-4')	Pest/PCB
		B-3 MS & MSD	"

Physical Appearance and Odor Fill, brown, black tan course to fine gravel + silt with brick, cinders, pieces of wood; water encountered + 2½ feet; No odor.

Refrigerate: Date 10/12/88 Time ____

Field Tests:

Temperature (C°/°F)		
pH		
Spec. Conduc (umhos/cm)		

Other ____

Comments Soil Sample, composite from B-3. Taken from area approx. 30' south of large above ground storage tank in rear of building.

FIELD SAMPLING RECORD

Site: Buffalo Pumps NYSDEC Site No. 932044 Date: 6/29/88
Well GW-1-18

Samplers: David Cameron of Engineering-Science
Clark Townsend of Engineering-Science

Initial Static Water Level . . . . . 5.30' TD=10'
(from top of well PVC casing)

Evacuation:
Using: Submersible ____ Centrifugal ____
Airlift ____ Positive Displacement ____
Bailed ✓ ____ 8 12 Times

65'
Well Volume Calculation:
2" Casing: 4.7 ft. of water x .16 = 1.04 gals.
3" Casing: ____ ft. of water x .36 = ____ gals.
4" Casing: ____ ft. of water x .65 = ____ gals.

Depth to intake from top of protective well casing ____
Volume of Water removed 3.12 Gals. (> 3 Well Volumes)

Sampling: Time 1550 ___ a.m. ✓ p.m.

Bailer Type: Stainless Steel ____
Teflon ✓ 3 feet
From Pos. Dis. Pump Discharge Tube ____
Other ____ ____

	No. of Bottles Filled	I.D. No.	Analyses
Trip Blank	____	____	____
Field Blank ~~Water/Atmospheric~~. (circle one)	0	____	____
Ground-water Sample	6	GW-1-18	see below

Physical Appearance and Odor ____

Refrigerate: Date 1/1/1 Time ____

Field Tests:

Temperature (C° ~~F~~)	6.1	____
pH	6.95	____
Spec. Conduc (umhos/cm)	1810 µS	____

Weather partly cloudy, ~~*~~15°F

Comments Analyses: Volatiles; Semivolatiles; Pest, PCB's; TOX, metals

FIGURE 6.1.
FIELD SAMPLING RECORD

Site BUFFALO Pumps Site No. SYO12.1B Date: 10/12/88
Well GW-1

Samplers: MARK CHANVIN of ES
BILL BRADFORD of ES

Initial Static Water Level. . . . . 5.60' Top of PVC casing
(from top of well protective casing) Total Depth = 11.20'

Evacuation:
Using: Submersible ____ Centrifugal ____
Airlift ____ Positive Displacement ____
Bailed X ____ Times

Well Volume Calculation:
2" Casing: 5.6 ft. of water x .16 = .90 gals.
3" Casing: ____ ft. of water x .36 = ____ gals.
4" Casing: ____ ft. of water x .65 = ____ gals.
.90 x 3 = 2.70 gal (3 volumes)

Depth to intake from top of protective well casing ____
Volume of Water removed ____ Gals. (> 3 Well Volumes)

Sampling: Time 1355 ___ a.m. X p.m.

Bailer Type: Stainless Steel ____
Teflon X
From Pos. Dis. Pump Discharge Tube ____
Other ____ ____

	No. of Bottles Filled	I.D. No.	Analyses
Trip Blank			
Field Blank – Wash/Atmospheric. (circle one)			
Ground-water Sample	4	GW-1	Best/PCB/MS/MSD

Physical Appearance and Odor Colorless, very slightly turbid, odorless

Refrigerate: Date ____ Time ____

Field Tests:
Temperature (C°/°F) ____ ____
pH ____ ____
Spec. Conduc (umhos/cm) ____ ____

Weather Cool, Cloudy 40° wind from north at 0-5 mph

Comments ____

FIELD SAMPLING RECORD

Site Buffalo Pumps NYSDEC Site No. 932044 Date: 5/12/88
Well GW-2.18

Samplers: David Cameron of Engineering-Science
Clark Townsend of Engineering-Science

Initial Static Water Level. . . . . 5.83' TD = 10'
(from top of well PVC casing)

Evacuation:
Using: Submersible _____ Centrifugal _____
Airlift _____ Positive Displacement _____
Bailed ✓ _____ 8 1/2 Times

Well Volume Calculation: 6.27 1.00
2" Casing: 4.17 ft. of water x .16 = ~~6~~ 7 gals.
3" Casing: _____ ft. of water x .36 = _____ gals.
4" Casing: _____ ft. of water x .65 = _____ gals.

Depth to intake from top of protective well casing _____
Volume of Water removed 2.0 3.0 Gals. (> 3 Well Volumes)

Sampling: Time 1630 ___ a.m. ✓ p.m.

Bailer Type: Stainless Steel _____
Teflon ✓ 3 feet
From Pos. Dis. Pump Discharge Tube _____
Other _____ _____

	No. of Bottles Filled	I.D. No.	Analyses
Trip Blank	_____	_____	_____
Field Blank - ~~Wash~~/Atmospheric. .(circle one)	_____	_____	_____
Ground-water Sample	6	GW-2.18	see below

Physical Appearance and Odor no odor - cloudy appearance

Refrigerate: Date 1/1/1 Time _____

Field Tests:

Temperature (C°/~~F~~)	5.9	_____
pH	7.08	_____
Spec. Conduc (umhos/cm)	2.09 ms	_____

Weather partly cloudy ; 15°F

Comments Analyses: volatiles; pest./PCB; semivolatiles; metals; TOX

FIGURE 6.1
FIELD SAMPLING RECORD

Site Buffalo Pumps Site No. SY012.18 Date: 10/12/83
Well GW-2

Samplers: Mark Chauvin of ES
Bill Bradford of ES

Initial Static Water Level (from top of well protective casing) 8.49' TOPV
Total Depth = 11.81'

Evacuation:
Using: Submersible ____ Centrifugal ____
Airlift ____ Positive Displacement ____
Bailed X Times ____

Well Volume Calculation:
2" Casing: 3.32 ft. of water x .16 = .53 gals.
3" Casing: ____ ft. of water x .36 = ____ gals.
4" Casing: ____ ft. of water x .65 = ____ gals.
.53 x 3 = 1.59 gal (3 volumes)

Depth to Intake from top of protective well casing ____
Volume of Water removed 1 (dry) Gals. (> 3 Well Volumes)

Sampling: Time 1330 ___ a.m. X p.m.

Bailer Type: Stainless Steel ____
Teflon X
From Pos. Dis. Pump Discharge Tube ____
Other ____

	No. of Bottles Filled	I.D. No.	Analyses
Trip Blank			
Field Blank - Wash/Atmospheric. (circle one)			
Ground-water Sample	2	GW-2	Pest/PCB/[redacted]

Physical Appearance and Odor Yellowish/Brown, turbid no odor

Refrigerate: Date ____ Time ____

Field Tests:
Temperature (C°/°F) ____
pH ____
Spec. Conduc (umhos/cm) ____

Weather Cool, Partly Cloudy 40° wind 0-5 mph from north

Comments ____

FIELD SAMPLING RECORD

Site Buffalo Pumps NYSDEC Site No. 932044 Date: 25 Feb 88
Well GW-3-18

Samplers: David Cameron of Engineering-Science
Mark Townsend of Engineering-Science

Initial Static Water Level . . . . . 3.98 TD=10'
(from top of well PVC casing)

Evacuation:
Using: Submersible _____ Centrifugal _____
Airlift _____ Positive Displacement _____
Bailed X 13 Times

Well Volume Calculation:
2" Casing: 7.62 ft. of water x .16 = 1.2 gals.
3" Casing: _____ ft. of water x .36 = _____ gals.
4" Casing: _____ ft. of water x .65 = _____ gals.

Depth to intake from top of protective well casing _____
Volume of Water removed 3.7 Gals. (> 3 Well Volumes)

Sampling: Time _____ X a.m. ____ p.m.

Bailer Type: Stainless Steel _____
Teflon X
From Pos. Dis. Pump Discharge Tube _____
Other _____ _____

	No. of Bottles Filled	I.D. No.	Analyses
Trip Blank			
Field Blank - Wash/Atmospheric. (circle one)			
Ground-water Sample	6	GW-3-18	see below

Physical Appearance and Odor no odor, very cloudy

Refrigerate: Date 1/1/1 Time _____

Field Tests:

Temperature (C°)	5.5	
pH	7.05	
Spec. Conduc (umhos/cm)	1.38 mS	

Weather Sunny 10°F

Comments Analyses: Volatiles; Semivolatiles; Pest, PCB's; TOX; Metals
Stickup = 1.6'
Baled dry.

FIGURE 6.1.
FIELD SAMPLING RECORD

Site Buffalo Pumps Site No. 570128 Date: 10/12/84
Well GW-3

Samplers: Mark Chanvin of ES
Bill Bradford of ES

Initial Static Water Level . . . . . 5.46' TOPC
(from top of well protective casing) Total Depth = 11.28'

Evacuation:
Using: Submersible ____ Centrifugal ____
Airlift ____ Positive Displacement ____
Bailed X ____ Times

Well Volume Calculation:
2" Casing: 5.82 ft. of water x .16 = .93 gals.
3" Casing: ____ ft. of water x .36 = ____ gals.
4" Casing: ____ ft. of water x .65 = ____ gals.
.93 x 3 = 2.79 gal (3 volumes)

Depth to intake from top of protective well casing ____
Volume of Water removed ~~Bailed~~ 2 Gals. (> 3 Well Volumes)

Sampling: Time 1330 HRS ____ a.m. X p.m.

Bailer Type: Stainless Steel ____
Teflon X
From Pos. Dis. Pump Discharge Tube ____
Other ____ ____

	No. of Bottles Filled	I.D. No.	Analyses
Trip Blank	____	____	____
Field Blank - Wash/Atmospheric. (circle one)	____	____	____
Ground-water Sample	2	GW-3	Pest/PCB

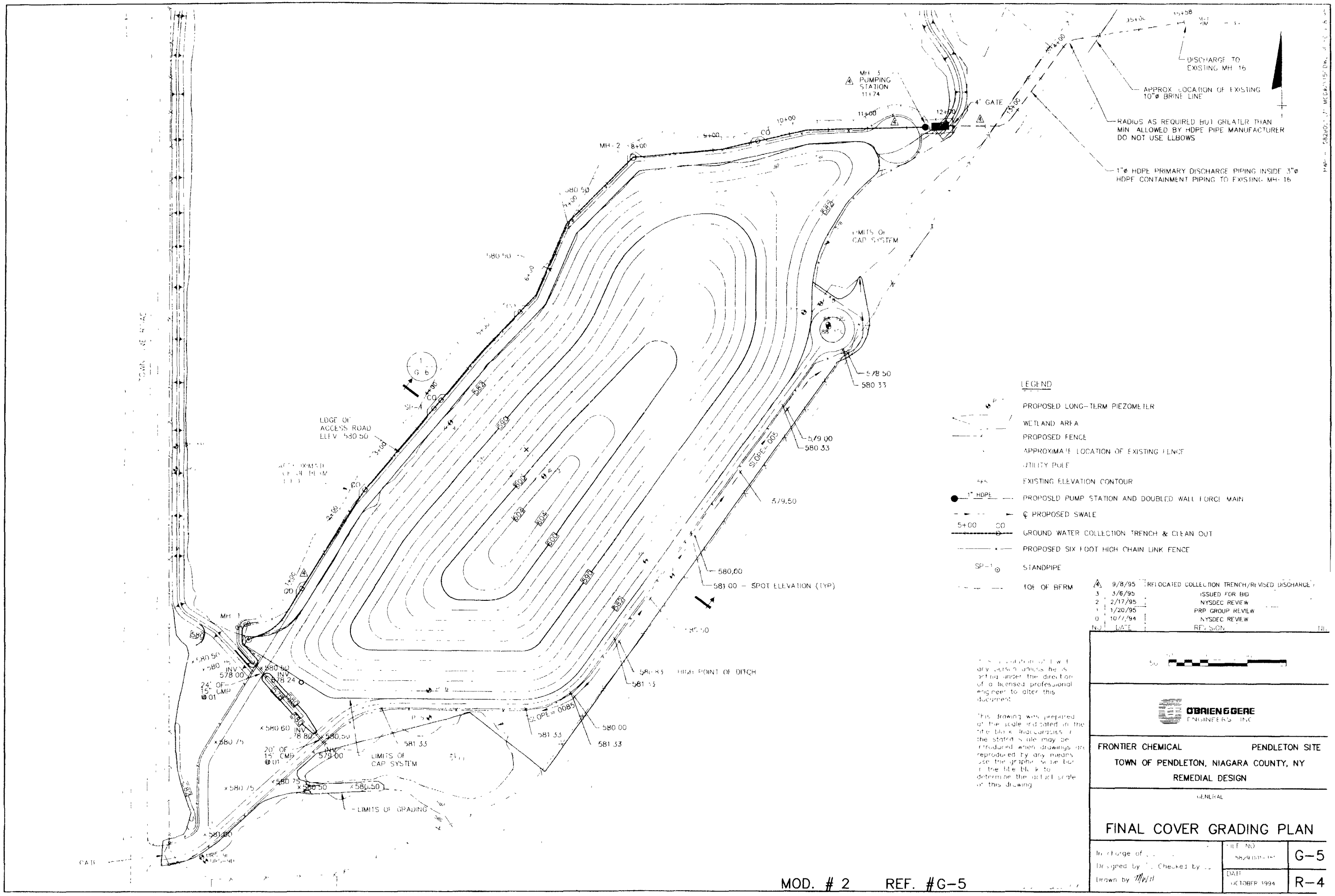
Physical Appearance and Odor Light yellowish/tan, slightly turbid, slight odor

Refrigerate: Date ____ Time ____

Field Tests:
Temperature (C°/°F) ____ ____
pH ____ ____
Spec. Conduc (umhos/cm) ____ ____

Other Cool, Partly Cloudy 40° wind 0-5 mph from north

Comments ____



NO.	DATE	REVISION	INI.
4	9/8/95	RELOCATED COLLECTION TRENCH/REVISED DISCHARGE	
3	5/6/95	ISSUED FOR BID	
2	2/17/95	NYSDEC REVIEW	
1	1/20/95	PRP GROUP REVIEW	
0	10/7/94	NYSDEC REVIEW	

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O'BRIEN & GERE ENGINEERS, INC.

FRONTIER CHEMICAL — PENDLETON SITE
TOWN OF PENDLETON, NIAGARA COUNTY, NY
REMEDIAL DESIGN

GENERAL

FINAL COVER GRADING PLAN

In charge of [illegible]	FILE NO. [illegible]	G-5
Designed by [illegible] Checked by [illegible]	DATE OCTOBER 1994	R-4
Drawn by MWH		

MOD. # 2 REF. #G-5