ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES IN THE STATE OF NEW YORK PHASE II INVESTIGATIONS

INS EQUIPMENT
NYS SITE I.D. 915031
CITY OF TONAWANDA
ERIE COUNTY
NEW YORK STATE

Prepared For

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INS EQUIPMENT SITE

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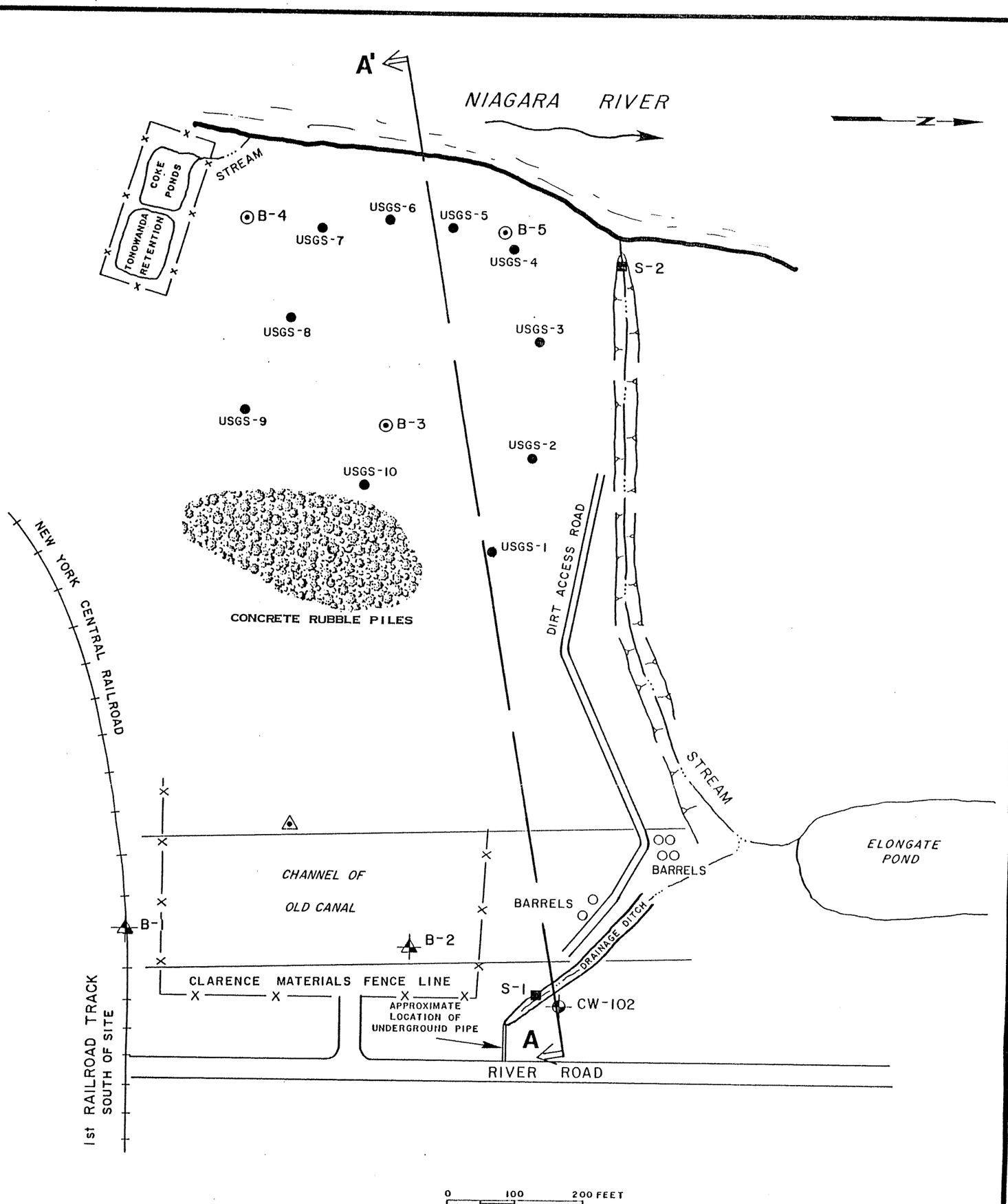
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EXPLANATION:

- USGS TEST BORINGS, 1982 (NIAGARA RIVER TOXICS' STUDY)
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION
- MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- PRIVATE WELL
- CROSS SECTION LOCATION
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION (NO LONGER EXIST)
- SURFACE WATER AND SEDIMENT SAMPLE

NOTES: ① Elevations in feet above mean sea level.
② Reference datum by Town of Tonowanda.

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
PHASE II REPORT

PLOT PLAN
INS EQUIPMENT

FIGURE I-2

SECTION I
EXECUTIVE SUMMARY

SITE BACKGROUND

The INS Equipment site (Site I.D. 915031) is located on River Road in Tonawanda, Erie County, New York (see Figure I-1). The site is in an industrial area, bordered to the west by the Niagara River, to the north by property owned by Niagara Mohawk, and to the south by the unused Wickwire Steel Company (see Figure I-2). The INS Equipment plant is located across the street and is not associated with the site of concern.

The INS Equipment site was used by the Seaway Corporation to dispose of fly ash, bottom ash, foundry sand, slag and liquid boiler cleaning waste from 1957 to 1970 (Koczaja, 1983). It is also alleged that Hooker-Durez Division disposed of phenol tars, possibly containing chlorinated benzenes at this site (NYSDEC, 1983; Koczaja, 1983).

Two settling ponds were used on this site in the early 1960's. The effluent from these ponds was discharged to the Niagara River (ECDEP, 1982). It is not known who used these ponds in the early 1960's. Since before 1969, these ponds have been owned and operated by Tonawanda Coke Company to settle coke fines from their wastewater (Clare, 1986). The coke fine sludge is regularly dredged from the ponds. Disposal of this sludge on the INS Equipment site has been observed by NYSDEC Region 9 personnel in 1969 to 1971 (Clare, 1986). This sludge is currently trucked back to the Tonawanda Coke Plant and is combined with a coal mix and recycled (Kamholz, 1986).

Other waste material has been disposed on this site by Clarence Materials Corporation and Wickwire Steel Company. The piles of concrete

blocks on the site are from Clarence Materials Corporation (Clare, 1986). Wickwire Steel has landfilled material on the southwest corner of the site (Clare, 1986). The Wickwire Steel Company is no longer in business.

PHASE II INVESTIGATION

The Phase II investigation was conducted to gather sufficient information to calculate a final Hazard Ranking System (HRS) score and to formulate a conceptual evaluation of remedial alternatives for the site. The site investigation included electrical resistivity and magnetometer surveys to provide subsurface stratigraphic data and to assist in the location of the monitoring wells. In addition, sediment, groundwater, surface water, and air sampling and analysis was conducted to define the extent of contamination at the INS Equipment site.

The geological stratigraphy at the site can be summarized as follows:

- Fill
- Gray Alluvial and Lacustrine Sediments, Containing Lenses of Sand/Silts and Clays
- Gray Till
- Bertie Limestone

Two aquifers were identified at this site. The upper aquifer piezometric surface is in the fill layer; this water is perched on low permeable lenses in the alluvial deposit layer. The lower aquifer exists in the gray till and fractures in the bedrock. An aquitard composed of lower permeability lacustrine sediments (primarily silts) separates these two aquifers.

SITE ASSESSMENT

Groundwater, surface water, and sediment samples were collected and analyzed for organics by gas chromatography/mass spectrometry (GC/MS)

scan and phenolics, mercury, chromium, lead, and cadmium. Several organic constituents, including phenolics (230 ug/l), benzene (96 ug/l) and 2-butanone (84 ug/l) were found in the B-3 sample (west central area of the site) at concentrations significantly higher than the other groundwater samples from the upper aquifer. Phenolics were also detected (330 ug/l) in the downgradient surface water sample. There were no elevated concentrations of metals that were tested for in the groundwater or surface water samples. Cadmium (4.5 mg/kg), lead (236 mg/kg) and phenol (0.1 mg/kg) were found at higher concentrations in the downgradient sample than the upgradient sample.

An HNU meter survey conducted in July, 1985 indicated that the concentration of volatile organic compounds in the air at this site was 1 to 2 ppm higher than background concentrations of 0.0 ppm.

HAZARD RANKING SYSTEM SCORE

In an attempt to quantify the risk associated with this site, the Hazard Ranking Scoring system (HRS) was applied as currently being used by the New York State DEC to evaluate abandoned hazardous waste sites in New York State. This system takes into account the types of wastes at the site, receptors, and transport routes to apply a numerical ranking of the site. As stated in 40 CFR Subpart H Section 300.81, the HRS scoring system was developed to be used in evaluating the relative potential of uncontrolled hazardous 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 for each site, 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, and 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 from migration of a hazardous substance away from the facility by routes involving groundwater, surface water or 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 study and previous studies, the HRS scores for the INS Equipment site have been calculated as follows:

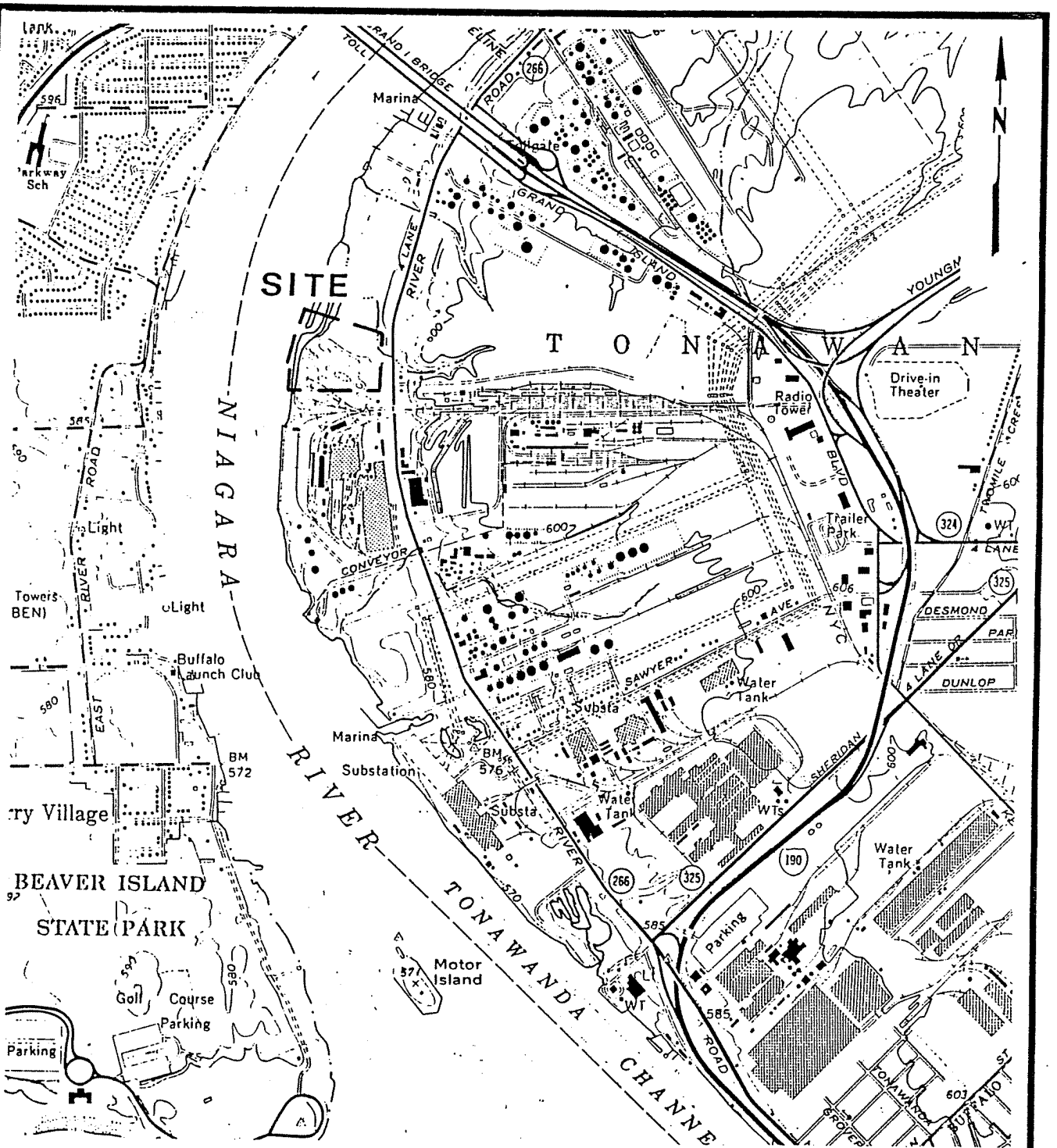
S_M	=	9.90	S_{GW}	=	6.12
S_{FE}	=	0.00	S_{SW}	=	16.00
S_{DC}	=	50.00	S_A	=	0.00

RECOMMENDATIONS

Based on the results of the Phase II investigation, the extent of contamination resulting from the landfilling operation at the INS Equipment site cannot be defined. A concurrent, detailed review of the INS Equipment and Cherry Farm Phase II Reports is recommended. Further study, if this review deems that it is necessary, should be a regional study of the entire River Road area.

The preliminary conceptual remedial alternative suggested for this site alone includes a soil cap over the site, a groundwater collection trench on the north and west sides of the site with an impermeable liner on the downgradient side of the trench, and treatment of the collected

groundwater with activated carbon. A preliminary conceptual cost for this alternative is $1.67 million. Further hydrological investigations including a pump test is necessary to better estimate the volume of groundwater to be collected in the trench.


SITE
NIAGARA RIVER
TONAWANDA CHANNEL
BEAVER ISLAND STATE PARK
Motor Island
Marina
Substation
Water Tank
Parking
Golf Course
Parking
Buffalo Launch Club
Drive-in Theater
Radio Tower
Trailer Park
Parkway Sch
Light
Towers
BEN)
Light
BM 572
BM 576
Water Tank
Water Tank
Parking
Parking
Substa
Substa
Marina
Motor Island
Water Tank
Water Tank
Parking
Parking
Golf Course
Parking
Parking
Parking

SECTION II
PURPOSE

BACKGROUND INFORMATION

The INS Equipment site (Site I.D. 915031) is located on River Road in Tonawanda, Erie County. This site is currently owned by Mr. Matthew Duggan of Amherst, New York, and the Clarence Materials Corporation, which is located on part of the site (Koczaja, 1983). The site is bordered by River Road on the east, the Niagara River on the west, and the Niagara Mohawk Cherry Farm property on the north. The INS Equipment Company is located on the west side of River Road (across the street) and is not associated with this site.

The INS Equipment site is a part of the adjacent "Cherry Farm Area" and was used to landfill foundry sand, pit sludge, and cutting oils (Koczaja, 1983; ECDEP, 1982). Soil analysis has revealed the presence of heavy metals and organic chemicals (USGS, 1982). Concern centers over the potential migration of these contaminants northward towards the adjacent Niagara River.

The Phase I investigation at the INS Equipment site was completed by Engineering-Science, Inc. in association with Dames and Moore in September of 1984. This report indicated that no surface water samples were sampled and/or analyzed at this site. Since insufficient information was available to formulate final HRS scores during the Phase I investigation, a Phase II program was implemented at the INS Equipment site.

OBJECTIVES

The purpose of this New York State Department of Environmental Conservation (NYSDEC) Phase II project was to conduct a preliminary engineering investigation and evaluation at the INS Equipment site in order to: (1) gather necessary data to calculate the final Hazard Ranking System (HRS) score; (2) formulate a conceptual evaluation of remedial alternatives for the site and to estimate a budgetary capital cost for each alternative; and (3) prepare a site investigation report.

SECTION III
SCOPE OF WORK

INTRODUCTION

The Phase II investigation at the INS Equipment site began in October 1984 and was completed in August 1985. A Phase II Work Plan was prepared and approved by the NYSDEC prior to field investigations to define the scope of work at the site. This work plan was later revised based on actual field conditions present during the site visit.

During the field investigation, it was determined that the monitoring wells on the site, installed by the Trautman Association for the Roblin Steel Company, could be used for groundwater samples for the Phase II investigation.

The field investigation for the Phase II project included electrical resistivity and magnetometer surveys to provide subsurface stratigraphic data and to assist in location of monitoring wells. In addition, sediment, groundwater, surface water, and air sampling and analysis was conducted to define the extent of potential contamination at the site.

A second round of groundwater, surface water, and sediment samples was collected in June, 1985 and analyzed for semi-volatile compounds. During this sampling operation, it was discovered that the upgradient well, B-3 had been damaged and a sample could not be collected from this well.

SITE INVESTIGATION

The scope of the investigation is summarized in Table III-1 and is described below.

Geophysical Survey

A geophysical study consisting of electrical resistivity and a magnetometer survey was conducted. The electrical resistivity survey was performed at various locations within the area of the site and beyond the perimeter of the site to define the geological stratigraphy and locate any potential contaminant plume. The magnetometer survey was conducted around the areas where the installation of wells was anticipated to ensure the proper placement of the wells. The field procedures for this survey are presented in Appendix A, and the results are presented in Appendix C.

Monitoring Well Installation

One monitoring well was installed on the site in an assumed upgradient location (CW-102) (see Figure III-1). This well was drilled near a drainage ditch. It is possible that water in the ditch could recharge the aquifer and influence the contamination found in this well.

Soil was drilled and sampled from the ground surface to the top of the bedrock. A PVC well was installed with a filter sand pack, and primary and secondary bentonite seals.

The well was visually logged during drilling. Additionally, aquifer characteristics were evaluated by means of in-situ falling head permeability tests and routine water level measurements. To further characterize the lithology of the site soils, a grain size analysis of each soil unit was performed in the laboratory according to ASTM D-422-63.

All field procedures are detailed in Appendix A. The boring log, well schematic, permeability test results, and grain size analyses are included in Appendix B.

Groundwater Sampling and Analysis

Groundwater samples were taken from the CW-102 well and three existing wells (B-3, B-4, B-5) in August of 1985. These samples were analyzed for cadmium, chromium, lead, mercury, phenolics, and organic constituents by gas chromatography/mass spectroscopy (GC/MS) scan. Additional samples from wells CW-102, B-4, and B-5 were collected in June, 1986 and were analyzed for semi-volatile compounds. NUS Corporation in Pittsburgh, PA performed the analytical testing and reported the results in accordance with the NYSDEC Superfund and Contract Laboratory Protocols, January 1985. The chemical analytical results are discussed in Section IV and listed in Appendix D. The field procedures are outlined in Appendix A.

Surface Water and Sediment Sampling and Analysis

Two surface water and sediment samples were collected from a small stream that runs along the northern boundary of the INS Equipment site. An upgradient sample (S-1) was collected near the culvert under River Road. The downgradient sample (S-2) was collected where the stream ponds prior to entering the Niagara River.

These samples were collected and analyzed in April, 1985. The analysis consisted of a GC/MS scan for organic constituents, and testing for cadmium, chromium, lead, mercury, and phenol. Additional samples were collected in June, 1986 and were analyzed for semi-volatile compounds. NUS Corporation performed the analytical tests in accordance with NYSDEC protocols (NYSDEC, 1985). The field procedures are outlined in Appendix A. The chemical analytical results are summarized in Section IV and detailed in Appendix D.

Since the sediment samples were collected, the New York State Department of Transportation has dredged the small stream that these samples were collected from (Kraje, 1985).

Air Survey

An HNU meter was used to analyze the air above the site for organic contaminants. Additionally, the air above the borings was monitored using an HNu meter during drilling operations to examine for potential release of organic contaminants to the environment.

TABLE III-1
WORK PLAN - TASK DESCRIPTION[1]
INS EQUIPMENT

Tasks	Description of Task
TASK	
II-A Update Work Plan	Reviewed the information in the Phase I report, conducted a site visit, examined aerial photography and revised the Phase II work plan.
II-B Conduct Geophysical Studies	Performed an electrical resistivity survey to define the subsurface stratigraphy and locate any potential plume. A magnetometer survey was conducted to ensure the proper placement of the wells.
II-C Conduct Boring/ Install Monitoring Wells	Installed one upgradient well. The well was installed and was constructed of PVC to a depth of 29.4 feet.
II-D Construct Test Pits/ Auger Holes	No further construction of test pits/auger holes was necessary.
II-E Perform Sampling and Analysis	
Soil samples from borings	Soil samples collected at intervals of 5-ft or less during drilling. One grain size analysis and permeability test was conducted at each subsurface lithology change.
Soil samples from surface soils	No sampling conducted.
Soil samples from test pits and auger holes	No sampling conducted.
Sediment samples from surface waters	Two sediment samples were analyzed for organics using a GC/MS scan, and cadmium, chromium, lead, mercury, and phenolics.

(1) As implemented during the Phase II investigation.

TABLE III-1 (Continued)
WORK PLAN - TASK DESCRIPTION
INS EQUIPMENT

	Tasks	Description of Task
	Ground-water samples	Four groundwater samples were analyzed for organics using a GC/MS scan, and cadmium, chromium, lead, mercury and phenolics.
	Surface water samples	Two surface water samples were analyzed for organics using a GC/MS scan, and cadmium, chromium, lead, mercury and phenolics.
	Air samples	Using the HNu, the presence of organic vapors were monitored.
II-F	Calculate Final HRS	Based on the field data collected in Tasks IIB - IIE, the HRS form was completed.
II-G	Conduct Site Assessment	A final report containing significant Phase I information, additional field data, final HRS score and HRS documentation records, and site assessments was written. The site assessment consisted of a conceptual evaluation of alternatives and a preliminary cost estimate of the most probable alternative.
II-H	Project Management	Project coordination, administration and reporting.

A'

NIAGARA RIVER

STREAM

COKE PONDS

TONOWANDA RETENTION

B-4

USGS-6

USGS-5

B-5

USGS-7

USGS-4

S-2

USGS-8

USGS-3

USGS-9

B-3

USGS-2

USGS-10

USGS-1

CONCRETE RUBBLE PILES

NEW YORK CENTRAL RAILROAD

DIRT ACCESS ROAD

STREAM

ELLICOTT POND

CHANNEL OF OLD CANAL

BARRELS

BARRELS

DRAINAGE DITCH

B-1

B-2

CLARENCE MATERIALS FENCE LINE

APPROXIMATE LOCATION OF UNDERGROUND PIPE

S-1

CW-102

A

RIVER ROAD

1st RAILROAD TRACK SOUTH OF SITE

0 100 200 FEET

EXPLANATION:

- ● USGS TEST BORINGS, 1982 (NIAGARA RIVER TOXICS STUDY)
- ⊙ MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION
- MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- PRIVATE WELL
- CROSS SECTION LOCATION
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION (NO LONGER EXIST)
- ■ SURFACE WATER AND SEDIMENT SAMPLE

NOTES: (1) Elevations in feet above mean sea level.

(2) Reference datum is from or follows USGS

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PLOT PLAN
INS EQUIPMENT

FIGURE 1.2-1

SECTION IV

SITE ASSESSMENT

SITE TOPOGRAPHY

This summary of site topography is based on information from USGS topographic maps, an air photo of the site, information from Erie County Department of Environment and Planning files, and observations and a recent site survey during Phase II field activities.

The INS site is an approximately 23 acre parcel of filled land located along the eastern shore of the Niagara River in the Town of Tonawanda, Erie County, New York State (see Figure IV-1). The site is bordered to the north by athletic fields owned and maintained by Niagara Mohawk Power Corporation, to the east by River Road, to the south by the unused Wickwire Steel Plant, and to the west by the Niagara River. Ownership of the INS site is divided between M. L. Duggan (northern half of site), and Clarence Materials Corp. (southern portion of the site). The Tonawanda Coke Company owns and controls the two ponds and adjacent fenced inland (Kamholz, 1986) on the southwestern edge of the site.

The original ground surface of this site was low and relatively flat (at an elevation of approximately 560 feet above mean sea level (MSL). The Niagara River floods areas of the site during the spring and periods of exceptionally high flow. The areas on the site that are affected include the stream channel and drainage ditch, marsh lands, ponds, and other low-lying areas adjacent to the river. Groundwater levels will also rise accordingly.

Fill activities on the site probably began in the early 1800's during the construction of a canal passing through the site, parallel to

the Niagara River (see Figure IV-2). Part of this old canal can be seen as an elongate pond on the adjacent Niagara Mohawk property. The old canal was probably created primarily by construction of a levee between the swamp and the river; deepening of the canal may have required periodic excavation of the channel through the swamp.

At the present time, the site is filled, reclaimed land; the average elevation of the site is 585 feet (MSL), which is several feet above river level. Surface water occurs at two ponds in the southwest corner of the site used for wastewater treatment by the Tonawanda Coke Company, and as a stream entering the site along the eastern border. The stream flows parallel and slightly north of the site's northern border before reaching the Niagara River. Drainage from the elongate pond (old canal bed) on the adjacent Niagara Mohawk property joins this stream near the northeast corner of the site. The stream channel is maintained by NYSDOT (most recently dredged in spring and summer 1985). Taken together, the stream, the elongate pond, and other small ditches and drainage features on the Niagara Mohawk property form a NYS recognized wetland. During Phase II drilling activities, numerous water fowl, grasses and wetland vegetation were observed along the stream channel. There are no known critical habitats for endangered species in the vicinity of the site. In general, the site surface consists of a grass cover with occasional mounds of fill material and concrete mounds (from Clarence Materials Corporation). Evidence of surface soil erosion is seen along steeper slopes adjacent to the stream channel and related drainage features.

The site is located in an industrial section of Erie County. The nearest residential area is 1.8 miles east of the site. These residences are served by a municipal water supply derived from the Niagara River. The closest water intake in the Niagara River is three miles downstream from the site and serves 18,538 people (NYS Atlas of Community Water System Sources, 1982). The aquifer of concern on this site is that within the upper parts of the lacustrine/alluvial sediment and fill. This aquifer is not used for residential water in the vicinity of the site. Clarence Materials Corporation (concrete plant), however,

does have an on-site well which produces water for cement-truck washing. This well is approximately 50 feet in depth (Schmidt, 1985) and draws water from a lower till-bedrock aquifer.

SITE HYDROGEOLOGY

Regional Geology and Hydrology

The site is located in the Erie-Ontario lowlands physiographic province. The bedrock of this region is predominantly limestone, dolostone, sandstone and shale. Most of the rocks are deep aquifers with regional groundwater flow to the south.

In the recent past, most of New York State, including the site, has been repeatedly covered by a series of continental ice sheets. The activity of the glaciers widened pre-existing valleys, and deposited widespread accumulations of till and stratified ice-contact sediments. The melting of ice, ending approximately 12,000 years ago, produced large volumes of meltwater; this water subsequently shaped channels and deposited thick accumulations of stratified, granular sediments.

As glacial ice retreated from the region, meltwater formed lakes in front of the ice margin. This region is covered by lake sediments, the most recent being from Lake Warren (a larger predecessor to Lake Ontario) and from Lake Tonawanda (an elongate lake which occupied an east-west valley and drained north into Lake Iroquois). The sediments consist of blanket sands and beach ridges which are occasionally underlain by lacustrine silts and clays (indicating quiet or deep water deposition).

Granular deposits in this region frequently act as shallow aquifers, whereas lacustrine clays, as well as tills, often inhibit groundwater movement. However, fine-grained, water-lain sediments, such as silts and clays, often contain horizontal laminations and sand seams. These internal features facilitate lateral groundwater movement through otherwise low permeability materials.

Site Geology

This summary of site geology is based on information from USGS topographic maps, NYS Museum and Science Service Bedrock Geology Map and Quaternary Geology Map, a study by Trautman Associates (1980), a study by USGS (1982), LaSala (1968), and information obtained during the Phase II field investigation.

The subsurface stratigraphy is shown on Figure IV-3. The bedrock beneath the site is the Bertie Limestone occurring at an elevation of approximately 530 feet (corresponding to a depth of approximately 50 feet). Bedrock was encountered in CW-102 and consisted of a grey non-fossiliferous limestone with numerous calcite-filled horizontal fractures.

Immediately above the bedrock surface is a grey dense sand/gravel till. This unit is approximately 15 feet thick and, together with the underlying bedrock, forms a lower aquifer on the site.

Overlying the grey till is a 20 foot thick sequence of lacustrine and alluvial sediments. These sediments range in size from gravels to clay. They appear to occur in discontinuous layers and lenses. In the upper part of this unit, the sediment is generally coarse and moderately permeable, possibly indicating an alluvial origin. In the lower parts, the sediment is primarily fine sand, silt, and clay, possibly deposited from glacial Lake Tonawanda.

Above the lacustrine/alluvial deposits in the eastern part of the site are the remains of a channel, a former canal. Although not visible on the surface, a levee probably existed west, and possibly east of the channel. Although no boring is known to have penetrated the levee(s), borings B-2 and B-1 encountered muck, suggesting that they are located in the channel and that the muck is the canal bottom sediment.

Blanketing nearly the entire site is a 15 to 20 foot thick layer of waste fill. The fill consists of cinders, slag, fire brick, and brown refractory material. In some parts of the site, vegetation has covered this fill material.

Surface Water Hydrology

Surface water occurs on the site in two separate features, as shown on Figure IV-2. In the southwest corner of the site, two wastewater treatment ponds, connected in series, are maintained by Tonawanda Coke Corp. These ponds discharge into the Niagara River via an outlet equipped with an oil boom to absorb floating oils. Sludge produced by coke fines that settle out is routinely dredged out of these ponds (Clare, 1986).

In the northeast corner and along the northern boundary of the site is a west flowing stream which conducts water from a pipe beneath River Road (storm sewer system) into the Niagara River. Additionally, water may enter this stream from an elongated pond (former canal) on the adjoining Niagara Mohawk property. This stream was dredged by the NYSDOT in July, 1985 (Kraje, 1985).

As stated earlier, the site is located on the shore of the Niagara River. Groundwater may discharge into the river along this shoreline.

Groundwater Hydrology

Two aquifers have been identified in the subsurface of this site. The uppermost aquifer, the aquifer of concern, is composed of the coarse grained soils in the upper zone of lacustrine/alluvial sediments and is perched on lenses of sand/silts and clays. A lower aquifer exists in the grey till and fractures of the bedrock. An aquitard composed of lower permeability lacustrine sediments (primarily silts) separates these two aquifers. The wells were installed only in the upper aquifer (the aquifer of concern) and as such, the interrelationship between the two aquifers is unknown. Based upon the grain size analyses of the

lower, finer grained, lacustrine materials, we have estimated the permeability of the aquitard to be approximately 10^{-6} cm/ sec to 10^{-7} cm/sec.

Permeability tests were performed in four on-site wells; the results are tabluated in Table IV-1. Water levels were recorded in these wells and were used to map the piezometric surface in the upper aquifer (see Figure IV-4).

There appears to be a groundwater mound in the south-central part of the site, with radial flow to the west, northwest, north, and northeast eventually flowing to the west towards the Niagara River. This result is consistent with an earlier study by Trautman Associates (1980). The buried channel of the canal is not believed to effect the groundwater flow pattern.

SITE CONTAMINATION ASSESSMENT

Potential contamination of the environment within the site boundary was determined by evaluation of the character and quantity of wastes suspected at the site, chemical analysis of the groundwater, surface water, and sediment samples, and a survey of the air quality with an HNu meter. Previous studies at this site included the sampling and analysis of soil collected from test holes (USGS, 1982), groundwater samples (Trautman, 1980), and liquid waste samples (NYSDEC, 1984). The sampling locations for surface water, groundwater, sediment and soil samples are shown in Figure IV-2.

Waste Characterization

Several industries have reportedly disposed of waste material on this site. Tonawanda Coke Company disposed of coke fine sludge at this site from 1969 to 1971 (Clare, 1986). Coke fines could be the source of phenols, cyanide compounds, and polycyclic aromatic hydrocarbons (PAHs), such as pyrenes, fluoranthenes, and anthracene. Wickwire Steel and Clarence Materials have disposed of solid wastes on this site (Clare,

1986). The hazardous nature of this material is unknown. From 1957 to 1970, fly ash, foundry sand and slag were disposed on this site by the Seaway Corporation, and phenolic tars, possibly containing chlorinated benzenes were disposed on this site by Hooker-Durez Division (Koczaja, 1983; NYSDEC, 1983). The quantity and period of disposal of the phenolic tars at this site is unknown.

Liquid wastes are treated at this site in two retention ponds on the southwest corner of this site. The Tonawanda Coke Company owns and maintains these ponds and discharges wastewater into them. An analysis of the wastewater was performed in 1984 by the NYSDOH. Several constituents including phenols (3 ug/l), cyanide (66 ug/l), toluene (10 ug/l), benzene compounds (27 ug/l), and xylene compounds (9 ug/l) (see Table IV-2) were detected in this sample (NYSDOH, 1984). The outfall from these ponds is discharged into the Niagara River. This discharge is regulated by NYS SPDES Permit Number NY-000-2399. Several constituents are monitored in this effluent including phenols, benzene, benzo-(a)pyrene, naphthalene, and toluene (Eismann, 1983).

Several 55 gallon drums were reported to be on the ground surface and partially buried on the INS site (Kraje, 1985). The contents of these drums is unknown.

Groundwater Contamination Data

Groundwater samples were collected at this site in August, 1985 as part of the Phase II investigation. The four samples collected were analyzed for organics (GC/MS scan), phenolics, mercury, chromium, lead, and cadmium (see Table IV-3A). Additional samples were collected in June, 1986 for reanalysis of semi-volatile compounds. Metals were not detected in any of the samples. Total phenolics concentrations of 230 ug/l (B-3) and 130 ug/l (B-5) were detected in the central and northwestern portions of the site. These concentrations are much higher than the New York State Water Quality Standard of 1.0 ug/l (NYSDEC, 1985). Benzene was also detected at levels higher than the NYSDEC Water Quality Standards. The groundwater sample collected on the eastern side of the

site (CW-102) had a benzene concentration of 5.3 ug/l. The samples west of the site had concentrations of 12 and 96 ug/l. The other organic compounds detected in the B-3 and B-5 samples were 2-butanone, toluene, xylene, 1,1 dichloroethane, and ethylbenzene.

The original boring logs for the B-5 well (Trautman, 1980) indicated that the soil from this well was contaminated with a "black oily substance with a strong odor". This substance could be the source of the high phenol, benzene, toluene, and xylene concentrations in this area.

A previous study conducted by Trautman Associates (1980) analyzed six groundwater samples for several metals, total organic carbon, and total halogenated organics (see Table IV-3B). Concentrations of iron, manganese, nickel, and zinc were greater in the downgradient (#5) sample than in the upgradient samples. The upgradient samples (#1, #6) had high concentrations of iron, aluminum, total organic carbon, and total halogenated organics, indicating a generally poor level of water quality in the vicinity of this site.

Surface Water Contamination Assessment

Surface water samples were collected from the creek that runs along the northern edge of the INS site, in an upgradient and downgradient location. These samples were analyzed for cadmium, chromium, lead, mercury, phenolics, and organic constituents. Additional surface water samples were collected in June 1986 for analysis of semi-volatile compounds. The results are summarized in Table IV-4 and detailed in Appendix D.

The analytical concentrations for the constituents that were detected in the samples are compared the the NYSDEC Water Quality Standards for surface waters. The stream that was sampled runs into a nearby wetland and then into the Niagara River. The river is used for drinking water supplies, recreation, and also supports a variety of aquatic wildlife. The Class AA, AA-s, A, or A-S standard for human health or the Class AA, AA-S, A, A-S, B, or C standard for aquatic life that was most stringent for each constituent was used for this comparison.

Analytical results show no increase in metal contamination levels from the upgradient to the downgradient sample locations. A high concentration (330 ug/l) of phenolics was detected in the downgradient (S-2) sample. The phenolic contamination in this sample consists of 2-methyl phenol, 2,4-methyl phenol, and 4-methyl phenol. This concentration is well above the water quality standard of 1 ug/l suggested by the NYSDEC and well above the upgradient water sample concentration of less than 20 ug/l.

The high level of phenolic compounds can be attributed to waste material disposed of at both the INS site and the Niagara Mohawk-Cherry Farm Site (915063), which is located immediately north of the stream. A soil sample collected by the USGS from the INS site reportedly had an "asphaltic smell" and contained elevated levels of phenolic compounds (USGS, 1982). Phenols on the INS Equipment site could be the result of Tonawanda Coke's nearby operation, although there is no direct evidence that this company disposed of coke fines at this site. Phenolic contamination could have also been caused by phenol tars alleged to have been disposed of by Hooker-Durez at the Cherry Farms site (Koczaja, 1983).

A surface water sample collected by O'Brien & Gere for their Phase II investigation at the Cherry Farm site showed elevated levels of phenols (5,320 ug/l) in a tributary to the stream that runs between the Cherry Farm and INS sites (O'Brien & Gere, 1985). This would indicate that the surface water is being contaminated with phenol from the Cherry Farm site. The effect of contamination at the INS site on the surface water is inconclusive.

No organic contaminants were found in the surface water samples that can be attributed specifically to the INS site.

Sediment Contamination Assessment

Sediment samples were collected in the immediate vicinity of the surface water samples, and were analyzed for the same constituents. The

results of this analysis are summarized in Table IV-5. Higher levels of cadmium, chromium, and lead were found in the downgradient sample. The concentration levels of these contaminants were higher than the typical concentration range of these constituents in uncontaminated soils (Friberg, 1979). Organic contamination in the downstream sample included phenolics (0.1 mg/kg) and several polycyclic aromatic hydrocarbons (PAHs). PAH compounds are a by-product of coal burning processes, and are constituents of fly ash, coal tar, coke fines, and slag wastes.

Due to the topography of the land, most of the sediments in this stream originate from upstream sources and hence, no conclusions about sediment contamination from the INS site can be drawn.

Since these samples were collected, the New York State Department of Transportation dredged the creek that these samples were collected from (Kraje, 1985). It is not known what percentage of the sediment contamination was removed during the dredging activities.

Soil Contamination Assessment

Soil samples were collected from ten test borings on the INS Equipment site as part of a USGS study (USGS, 1982). These samples were analyzed for the same constituents that the samples collected as part of the Phase II investigation were analyzed for. The results of this analysis are summarized in Table IV.6.

Two of the ten samples had contaminant levels that were significantly higher than the other samples. The first sample (#1) was the eastern-most sample collected during the USGS study. This sample had concentration levels of cadmium, chromium, iron and lead that were greater than the typical concentration of these constituents in uncontaminated soil (Friberg, 1979, Davies, 1980). This was also the only sample that showed an elevated concentration of phenolics. An "asphaltic smell" was reported (USGS, 1982) on the boring logs for this test pit. The presence of asphalt or its residues could contribute to this level of phenolics. Several polycylic aromatic hydrocarbons (PAH's)

were found in this sample. These constituents are the byproducts of coal, oil, and wood burning, such as coke fines and slag wastes, and are ubiquitous in the natural environment, with the levels of these constituents in the Buffalo area higher compared to non-industrial areas. Concentration levels of PAH compounds in sediments in Lake Erie, immediately upgradient of Buffalo were used as a background level of these constituents for comparison (Eadie, 1982). The concentration levels of PAH's in this sample were several orders of magnitude greater than the measured PAH concentrations in sediment samples from Lake Erie.

The second sample that had high contaminant levels was the #9 sample. This sample was the southern-most sample collected and analyzed. Several PAH compounds were detected in this sample, all at concentrations several orders of magnitude greater than the background levels of these constituents in Lake Erie sediments (Eadie, 1982). The well borings for this test pit report 6 inches of black cinder ash on the land surface. The presence of this cinder ash can explain the high PAH levels for this soil sample.

Air Contamination Assessment

Upwind and downwind air quality monitoring was conducted at the INS site as part of the Phase II investigation. An HNU photoionization meter was used for this study. On July 21, 1985, the readings on the site ranged from 1.0 to 2.0 ppm above background levels of 0.0 ppm. These concentrations of organic vapors in the are were not considered adequate for scoring an observed air release in the HRS score because no soil or leachate samples with elevated organic concentrations were collected concurrent with the HNU meter reading.

TABLE IV-1
IN SITU PERMEABILTY

Well No.	Permeability (cm/sec)
CW-102	4.6×10^{-5} (R)
	9.1×10^{-5} (F)
B-3	5.8×10^{-5} (R)
	5.8×10^{-5} (F)
B-4	2.9×10^{-4} (R)
	8.8×10^{-4} (F)
B-5	3.5×10^{-4} (R)
	4.4×10^{-4} (F)

(R) Rising head test.

(F) Falling head test.

TABLE IV-2
ANALYTICAL RESULTS OF LIQUID WASTE SAMPLE(1)

Constituent(2)	Concentration (ug/l)
Phenols	3
Cyanides, hydrolyzable	66
Benzene	25
Toluene	10
Para-xylene	2
Meta-xylene	5
Ortho-xylene	2
1,3,5 trimethlybenzene	1
1,2,4 trimethylbenzene	1

(1) Sample collected from waste outfall from Tonawanda Coke Corporation into lagoon at INS site. Sample collected by NYSDEC June 18, 1984, and analyzed by NYSDOH.

(2) Sample analyzed for primary and priority pollutants. Only constituents present in the sample are presented here.

TABLE IV-3A
ANALYTICAL RESULTS OF GROUNDWATER SAMPLES[1]

Constituent[2]	Sample Location CW-102 (ug/l)	B-3 (ug/l)	B-4 (ug/l)	B-5 (ug/l)	NYSDEC Water Qlty. Standard[3] (ug/l)
Phenolics	20u	230	20u	130	1
Benzene	5.3	96	5u	12	ND
2-butanone	10u	84	10u	10u	NS
Toluene	5u	21	5u	1.5J	50[4]
Xylene	5u	15	5u	20	50[4]
1,1 dichloroethane	5u	5u	5u	28	50[4]
Ethylbenzene	5u	5u	5u	5.1	50[4]
Bis(2-ethylhexyl) phthalate	20u	10u	3J	20u	4,200
Di-n-octylphthalate	20u	10u	3J	20u	50[4]

(1) Samples collected in August, 1985 by ES/D&M as part of Phase II Investigation. Samples of groundwater from wells CW-102, B-4, and B-5 were collected and analyzed for semi-volatiles in June, 1986.

(2) Metal constituents tested for (Cd, Pb, Cr, Hg) were not detected in any of the samples. Only those organics that were detected are listed in this table.

(3) "Groundwater Quality Standards and Effluent Standards and/or Limitations", 6 NYCRR Part 703, NYSDEC, 1978. Amended version in "Ambient Water Quality Standards and Guidance Criteria", NYSDEC Memorandum No. 85-W-38, July, 1985.

(4) Guidance criteria, not regulatory standard.

u Less than instrument detection limit.

NS No standard.

ND Not detectable.

J Concentration is an estimate, less than instrument detection limit.

TABLE IV-3B
ANALYTICAL RESULTS OF GROUNDWATER SAMPLES[1]

Constituent	Sample Location and Date						NYSDEC[2] Water Qlty. Standard (ug/l)
	Well #1 9/17/80 (ug/l)	Well #3 9/19/80 (ug/l)	Well #6 9/18/80 (ug/l)	Well #5 9/19/80 (ug/l)	Well #2 9/18/80 (ug/l)	Well #4 9/17/80 (ug/l)	
Iron	68,000	630	136,000	310,000	650	16,000	300
Manganese	2,040	600u	6,900	7,200	990	810	300
Nickel	600u	600u	600u	600	600u	620	NS
Zinc	200	50	450	600	2,500	1,800	5,000
Chromium	500u	500u	500u	500u	500u	500u	50
Aluminum	500	500u	500	500u	500u	500u	NS
Total Organic Carbon	34,000	57,500	63,000	14,500	30,000	38,500	NS
Total Halogenated Organics as Lindane	16.7	11.8	11.7	8.4	5.3	8.5	NS

(1) Samples collected as part of Trautman Associates Report, 1980.

(2) "Groundwater Quality Standards and Effluent Standards and/or Limitations", 6 NYCRR Part 703, NYSDEC, September 1, 1978. Amended version in NYSDEC "Ambient Water Quality Standards and Guidance Criteria", Memorandum No. 85-W-38, July 24, 1985.

NS Not specified.

TABLE IV-4
ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES[1]

Constituent[2]	Sample Locations S-1 (ug/l) Upgradient	S-2 (ug/l) Downgradient	NYSDEC Water Quality Standards[3] (ug/l)
Cadmium	5u	5u	10 [5]
Chromium	10u	10u	11 [4]
Lead	[4]	[4]	50 [5]
Mercury	0.2u	0.2u	0.2 [4]
Phenolics	20u	330	1 [5]
Di-n-butylphthalate	3J	10u	50 [5]
2-methylphenol	10u	32	1 [5]
4-methylphenol	10u	70	1 [5]
2,4-dimethylphenol	10u	62	1 [5]

(1) Samples collected in April 1985 as part of Phase II investigation. Additional samples collected in June, 1986 for analysis of semi-volatile compounds.

(2) All of metals tested for are presented. Only organic constituents present in at least one sample are presented.

(3) NYSDEC (1974). "Surface Water Quality Standards", 6 NYCRR 701-702. Amended version in "Ambient Water Quality Standards and Guidance Values", NYSDEC Memorandum No. 85-W-38, July 24, 1985.

(4) Class A, A-S, AA, AA-S, B, C for aquatic life.

(5) Class A, A-S, AA, AA-S for human health.

u Concentration less than detection limit.

[ ] Concentration less than contract required detection limits.

* NUS reported possible laboratory contamination.

J Concentration listed is less than detection limits and is estimated.

TABLE IV-5
ANALYTICAL RESULTS FOR SEDIMENT SAMPLES[1]

Constituent[2]	Sample Number S-1 (mg/kg) Upgradient	Sample Number S-2 (mg/kg) Downgradient	Normal Concentration Range in Soils (mg/kg)
Cadmium	[0.5]	4.5	< 1 (3)
Chromium	22R	3,300R	Trace to 250 (3)
Lead	52	236	2 - 200 (3)
Mercury	0.16u	0.17u	< 1 (4)
Methylene Chloride	0.160 (5)	0.062 (5)	NA
Acetone	0.582 (5)	0.372 (5)	NA
1,1 Dichloroethane	0.39u	0.0095J	NA
2-Butanone	0.078u	0.050	NA
Toluene	0.039u	0.0049J	NA
Total Xylenes	0.039u	0.011	NA
Phenolics	0.010u	0.100	NA
Phenanthrene	1.584u	6.6J	NA
Anthracene	1.584u	3.1J (5)	0.02-0.05 (6)
Di-n-butylphthalate	0.340J	0.620J (5)	NA
Fluoranthene	1.584u	8.8J	NA
Pyrene	1.584u	6.8J	0.05-0.10 (6)
Benzo(a)anthracene	1.584u	2.2J	NA
Chrysene	1.584u	4.1J	0.07-0.10 (6)
Benzo(b)fluoranthene	1.584u	2.9J	0.05-0.07 (6)

(1) Samples collected in April 1985 for Phase II investigation. Additional samples collected in June, 1986 for analysis of semi-volatile compounds.
(2) All of metals tested are presented. Only those organics that were present in at least one of the samples are included.
(3) Handbook of the Toxicology of Metals. Friberg, L., et.al. (1978).
(4) Applied Soil Trace Elements. Davies, B. (1980).
(5) Corrected for concentration in the method blank. Methylene chloride = 0.0097 mg/kg, Acetone = 0.018 mg/kg, Di-n-butylphthalate = 0.27 mg/kg.
(6) Eadie, B. (1982). "Polycyclic Aromatic Hydrocarbons in Sediments and Associated Benthos in Lake Erie", Chemosphere.
[ ] Concentration less than contract detection limit.
R Spike sample recovery out of limits of 75-125% for one sample. Recovery of chromium in one of spiked samples was 15%.
u Concentration less than instrument detection limit.
J Concentration less than instrument detection limit, value is estimated.
NA Information not available.

TABLE IV-6
ANALYTICAL RESULTS FOR SOIL SAMPLES[1]

Constituent[2]	Sample Location 1 (14') (mg/kg)	2 (15') (mg/kg)	3 (18.5') (mg/kg)	4 (16.5') (mg/kg)	5 (15') (mg/kg)	6 (20') (mg/kg)	7 (8') (mg/kg)	8 (14') (mg/kg)	9 (4') (mg/kg)	10 (4') (mg/kg)	Normal Range of Concentration in Soils (mg/kg)	
Cadmium	53	20	1u	5	6	1	4	1	2	2	< 1	(3)
Chromium	430	70	3	30	180	7	120	30	20	120	Trace-250	(3)
Iron	100,000	26,000	3,700	16,000	41,000	6,000	29,000	2,900	23,000	19,000	10000-100000	(4)
Lead	2,500	630	10	110	170	30	120	30	130	100	2-200	(3)
Phenol	61	---	---	---	---	---	---	---	---	NA		(6)
2, Methylphenol	11	---	---	---	---	---	---	---	---	NA		(6)
4, Methylphenol	43	---	---	10u	---	---	---	---	---	NA		(6)
Bis(2-ethylhexyl)phthalate	52	---	10u	---	5	---	10u	---	---	NA		(6)
Di-n-butylphthalate	4.6J	---	---	---	11	---	---	---	---	NA		(6)
Acenaphthylene	6.2J	---	---	---	6.8J	---	---	---	21	NA		(5)
Anthracene	10u	---	---	---	---	---	---	---	26	NA	0.02-0.05	(6)
Benzo(a)anthracene	4.8J	---	---	---	10u	---	---	---	47	NA		(6)
Benzo(b)fluoranthene	---	---	---	---	---	---	---	---	33	NA		(5)
Benzo(k)fluoranthene	---	---	---	---	---	---	---	---	33	NA	0.05-0.07	(5)
Benzo(a)pyrene	---	---	---	---	---	---	---	---	23	NA	0.03-0.08	(5)
Chrysene	4.7J	---	---	---	10u	---	---	---	35	NA	0.07-0.10	(6)
Fluoranthene	25	---	---	---	---	---	---	---	150	NA		(6)
Fluorene	8.7J	---	---	---	NA	---	---	---	13	NA		(6)
Phenanthrene	41	---	10u	10u	33	---	---	---	70	NA		(5)
Pyrene	18	---	---	---	17	---	---	---	88	NA	0.05-0.10	(6)
Dibenzofuran	---	---	---	---	6.2J	---	---	---	12	NA		(7)
Total PAH's	108.4	---	10u	10u	63	---	---	---	539	NA	1-10	

TABLE IV-6
ANALYTICAL RESULTS FOR SOIL SAMPLES(1)

(1) Samples collected by USGS, August 1982.

(2) All metals tested for are presented. Only organic constituents present in at least one sample are presented.

(3) Friberg, L., et.al. (1979). Handbook of Toxicology of Metals.

(4) Davies, B. (1980). Applied Soil Trace Elements

(5) Eadie, B. (1982). "Polycyclic Aromatic Hydrocarbons in Sediments and Associated Benthos in Lake Erie", Chemosphere.

(6) Information not found.

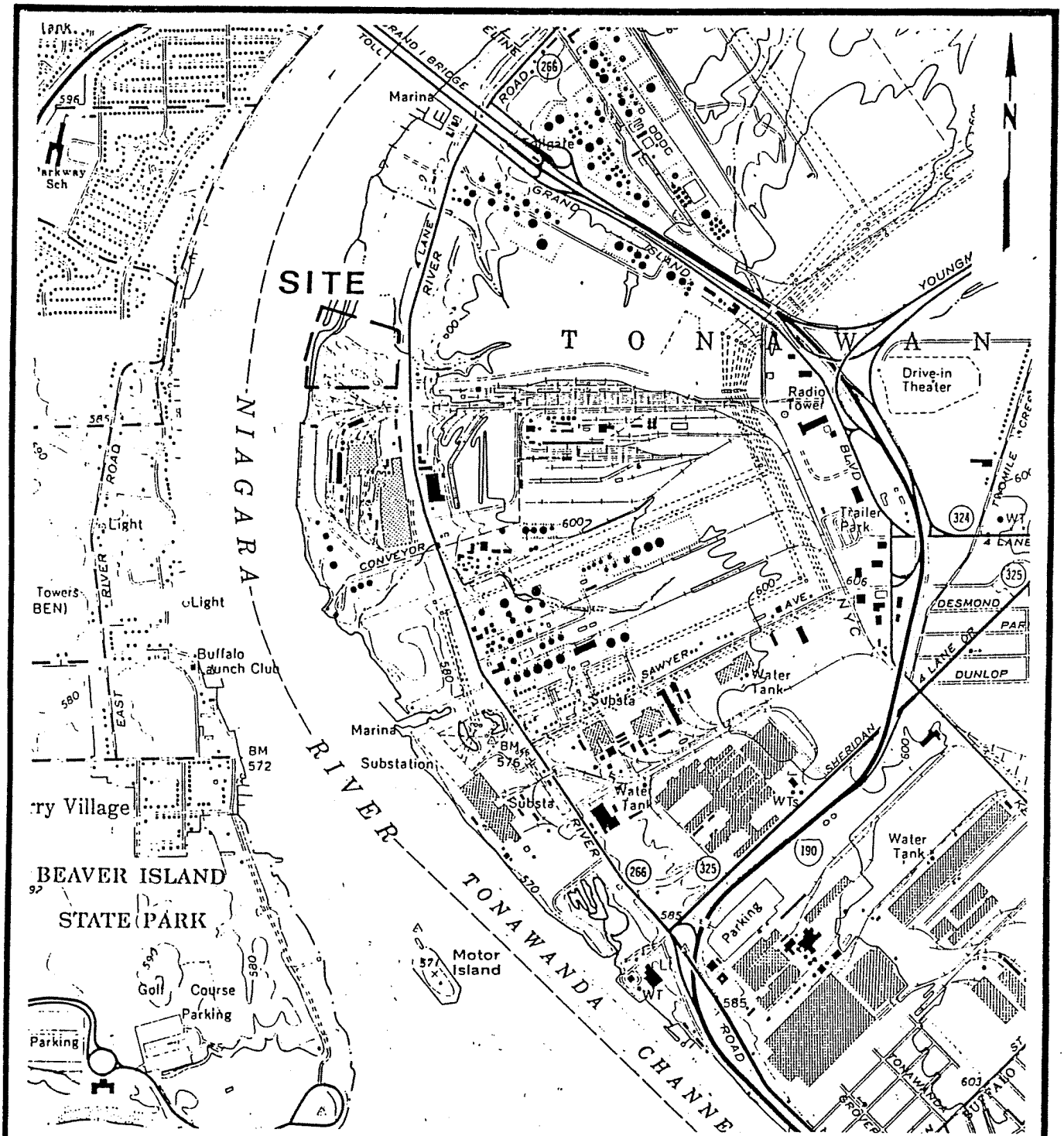
(7) Edwards, N. T. (1983). "Polycyclic Aromatic Hydrocarbons (PAH's) in the Terrestrial Environment - A Review". J. Env. Quality.

u Concentration is less than listed detection limit.

J Concentration listed is an esimtated value, less than the detection limit.

NA Not analyzed.

--- Not detected.



LONGITUDE: 78°56'4.9"
LATITUTDE: 42°59'23.3"

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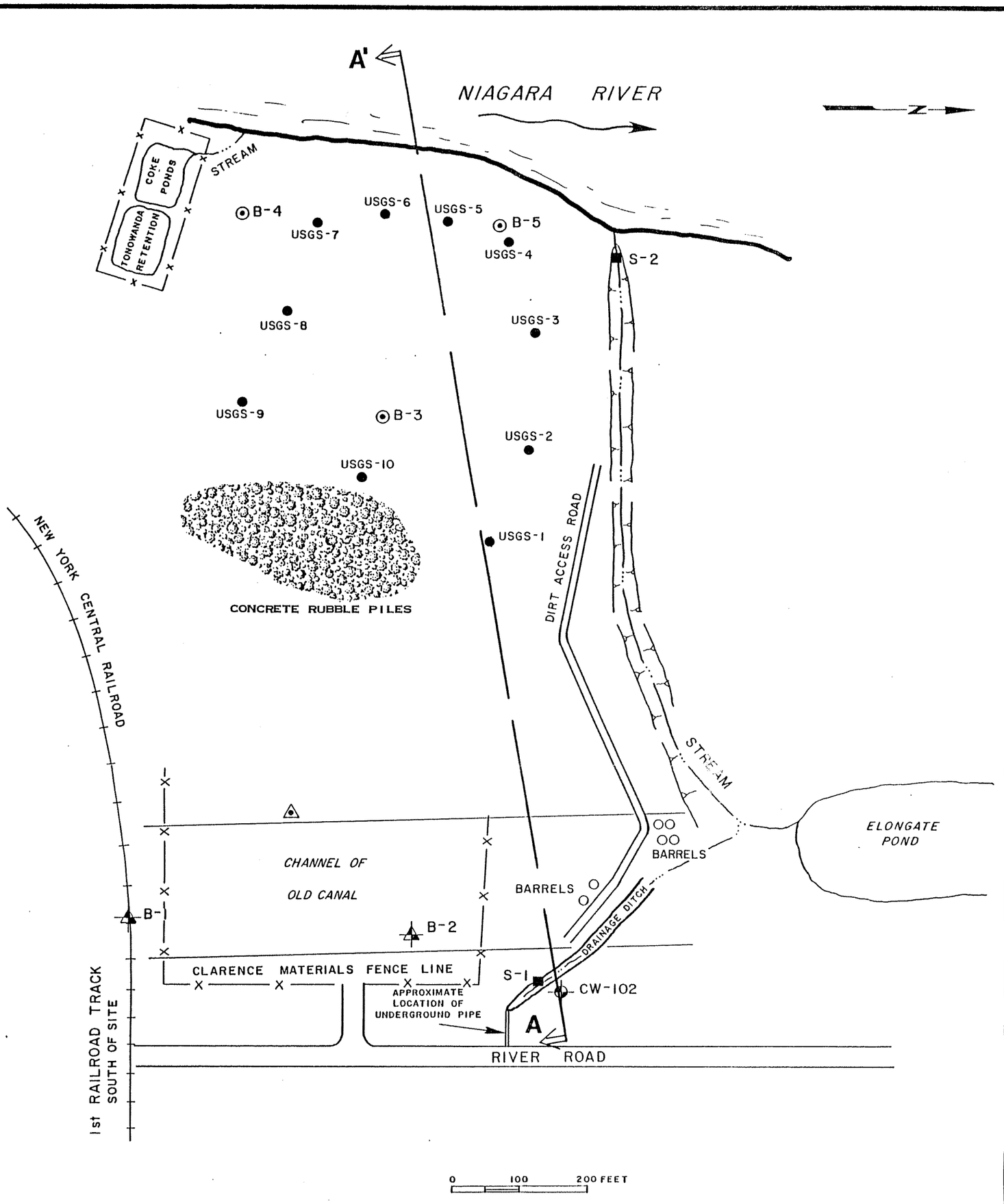
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SITE LOCATION MAP

INS EQUIPMENT

FIGURE IV-1

REFERENCE: BASE TAKEN FROM U.S.G.S. 7.5 MIN. TOPOGRAPHIC MAP, BUFFALO NW, NY-ONT (1965) QUADRANGLE



EXPLANATION:

- USGS TEST BORINGS, 1982 (NIAGARA RIVER TOXICS' STUDY)
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION
- MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- PRIVATE WELL
- CROSS SECTION LOCATION
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION (NO LONGER EXIST)
- SURFACE WATER AND SEDIMENT SAMPLE

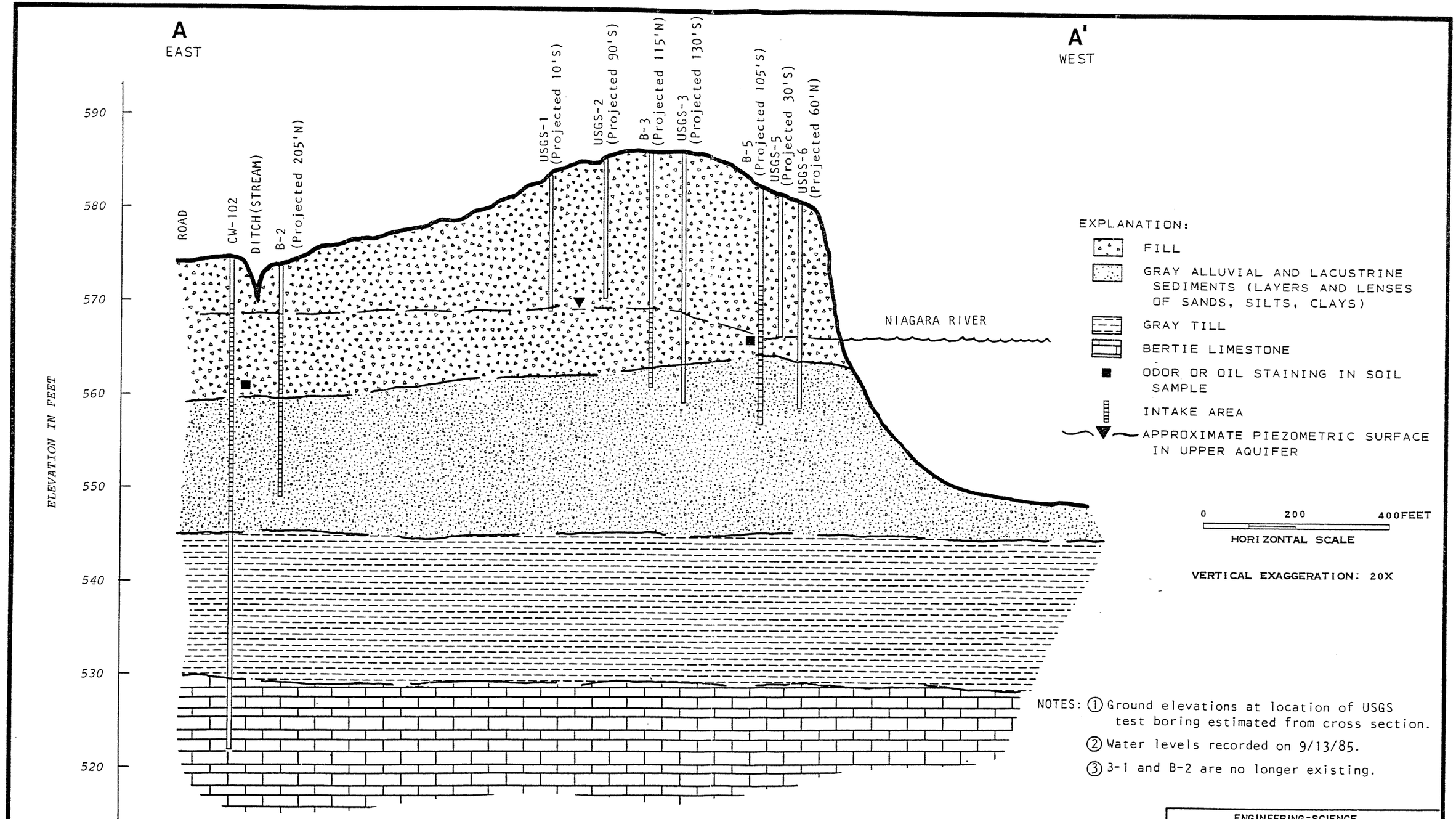
NOTES: ① Elevations in feet above mean sea level.
② Reference datum by Town of Tonowanda.

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PLOT PLAN
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FIGURE IV-2



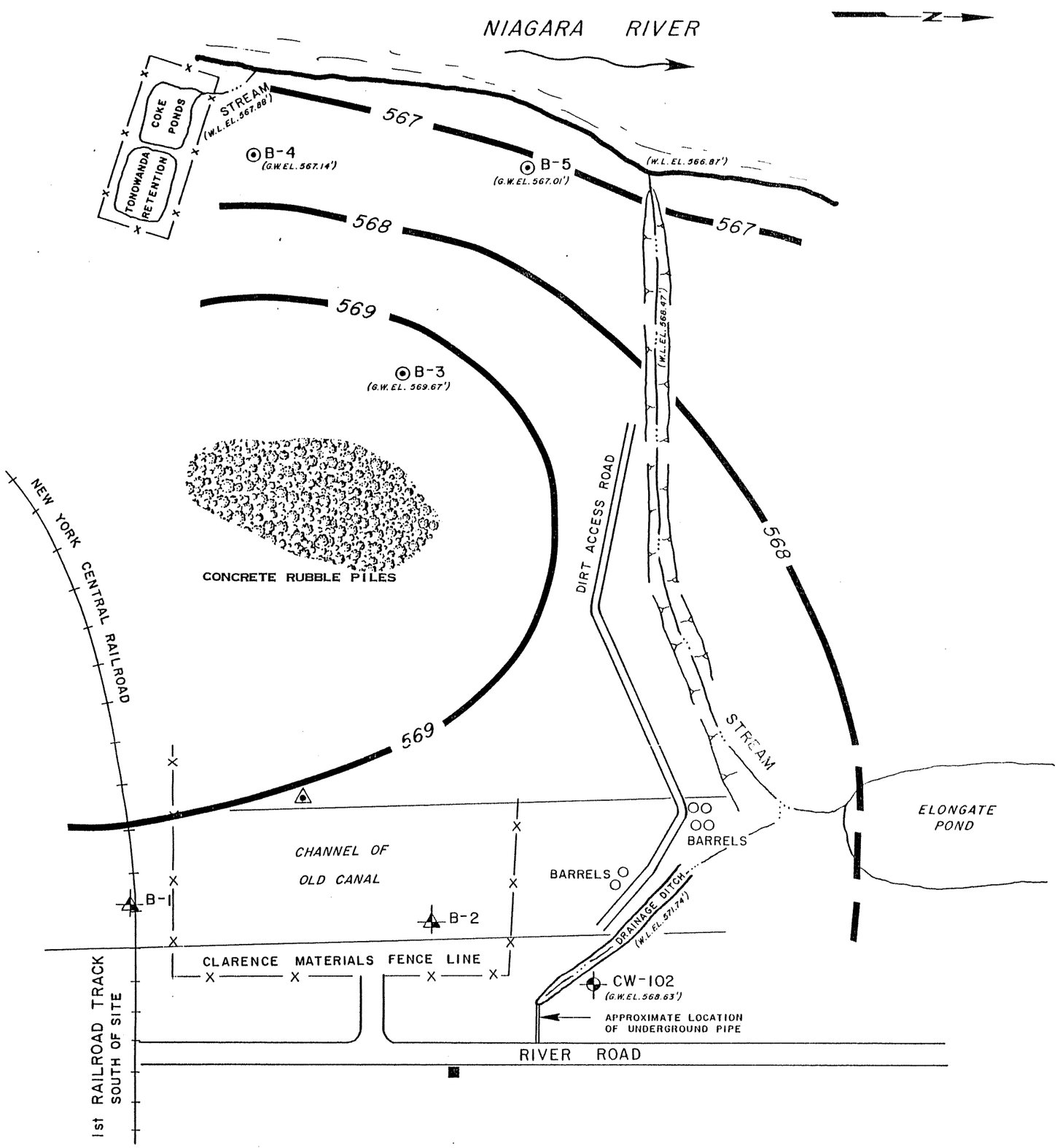
NOTES: (1) Ground elevations at location of USGS test boring estimated from cross section.
(2) Water levels recorded on 9/13/85.
(3) B-1 and B-2 are no longer existing.

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CROSS SECTION A-A'
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FIGURE IV-3



EXPLANATION:

- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION
- MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- PRIVATE WELL
- 567 WATER LEVELS IN UPPER AQUIFER
- HYDRANT AND BENCHMARK AT 581.31' U.S.G.S.
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION (NO LONGER EXIST)

NOTES: ① Elevations in feet above mean sea level.
② Reference datum by Town of Tonowanda.
③ Water levels recorded on 9/13/85.

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PIEZOMETRIC SURFACE IN UPPER AQUIFER
INS EQUIPMENT

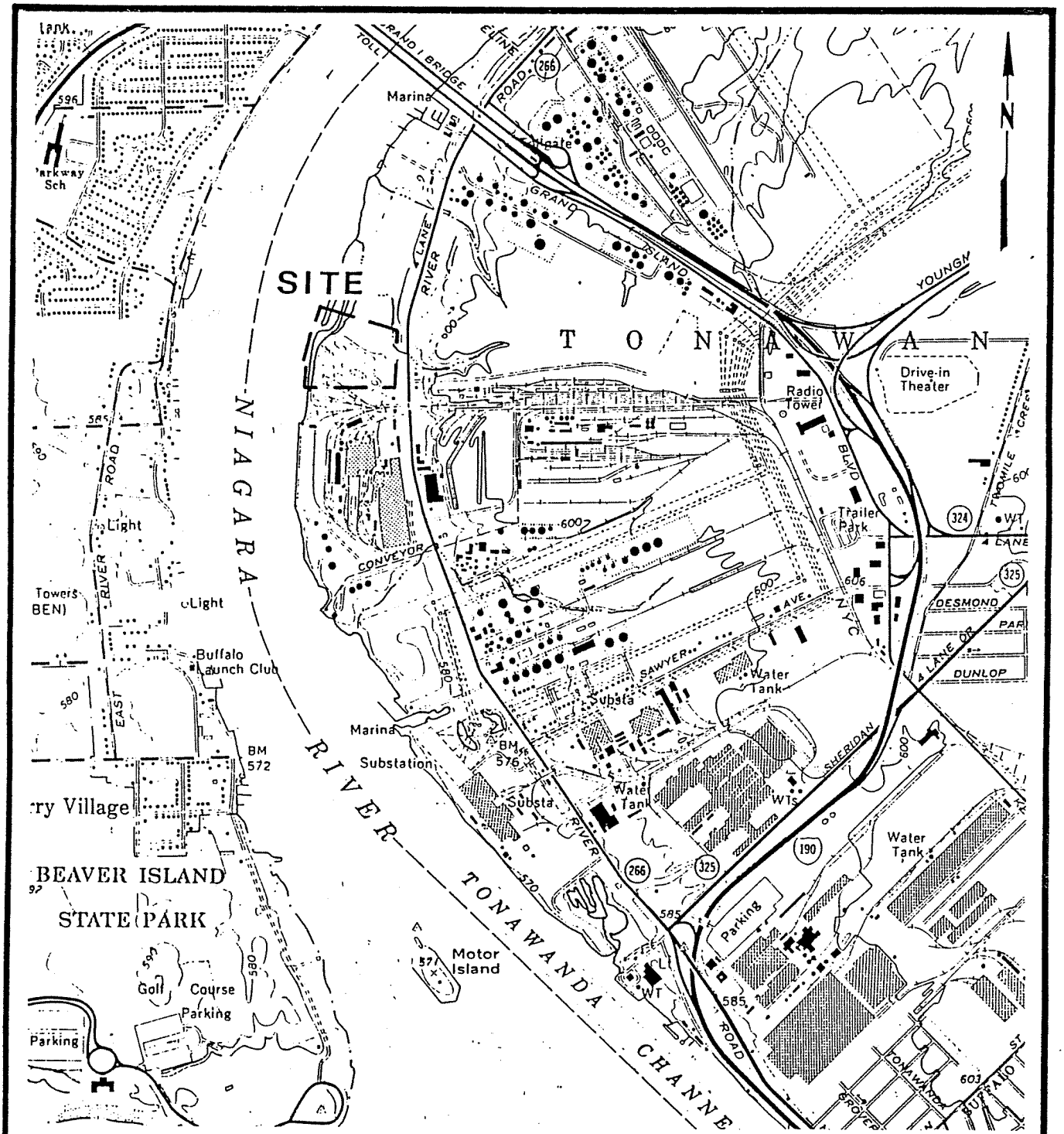
FIGURE IV-4

NARRATIVE SUMMARY

The INS Equipment site is a 23 acre inactive industrial landfill in an industrial section of the Town of Tonawanda, Erie County, New York State. This site is across the street from the INS Equipment Company whose property is not a part of the site. At the present time, the rectangular-shaped site can be divided by ownership into two parcels: the northern half is owned by M. L. Duggan, and the southern portion is owned by Clarence Materials Corporation.

Between 1957 and 1972, this area was allegedly used by several waste generators, including Niagara Mohawk Huntley Power Station, Hooker-Durez, Chevrolet Foundry Sand, and Dow Chemical Company (NYSDEC, 1983) to dispose of foundry slag and sand, flyash, pit sludge, cutting oils, liquid boiler cleaning wastes, and phenol tars. Waste quantities are unknown. This landfill has been used by the adjacent and now unused Wickwire Steel Plant and the Clarence Materials Corporation. The Tonawanda Coke Company uses two on-site treatment ponds to separate coke fines from the wastewater. The sludge produced in these ponds is regularly removed and has been disposed of on the INS Equipment Site in the past (Clare, 1986).

The nearest residential area is 1.8 miles east of the site; these homes are served by municipal water supply from the Niagara River. The closest intake in the river is just over 3 miles downstream. The stream in the northeast part of the site forms part of NYS recognized wetland, however, no known critical habitats for endangered species occur in the vicinity of the site. Recently, during NYSDOT on-site stream dredging, barrels were discovered on-site (Kraje, 1985), but no remediation or enforcement action has taken place.



LONGTIDUE: 78°56'4.9"
LATITUDE: 42°59'23.3"

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PHASE II REPORT

SITE LOCATION MAP
INS EQUIPMENT

FIGURE V-1

REFERENCE: BASE TAKEN FROM U.S.G.S. 7.5 MIN. TOPOGRAPHIC MAP, BUFFALO NW, NY-ONT (1965) QUADRANGLE

HRS COVER SHEET

Facility name: INS Equipment site

Location: Tonawanda, NY

EPA Region: II

Person(s) in charge of the facility: Matthew Duggan, Amherst, NY

Clarence Materials Corp., Tonawanda, NY

Name of Reviewer: E. Gilligan Date: 9/13/85

General description of the facility:
(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Site does not include INS Equipment property but is directly across street on river side. Site is part of "Cherry Farm Area" in which fly ash, cutting oils, grinding sludge and pit sludge were landfilled.

Scores: S_M = 9.90 (S_{gw} = 6.12 S_{sw} = 16.00 S_a = 0.00)

S_{FE} = 0.00

S_{DC} = 50.0

HRS COVER SHEET

Facility Name: INS Equipment site Date: 9/13/85

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	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	3	3	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			14	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	8	8	
Total Waste Characteristics Score			26	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			3510	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S_{gw} = 6.12		

GROUND WATER ROUTE WORK SHEET

Facility Name: INS Equipment Site Date: 9/13/85

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	6	6	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			11	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	8	8	
Total Waste Characteristics Score			26	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	6	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			12	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			10,296	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{sw} = 16.00		

SURFACE WATER ROUTE WORK SHEET

Facility Name: INS Equipment Site Date: 9/13/85

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: On-site on 6/21/85					
Sampling Protocol: HNu photoionization survey on-site and monitoring during drilling & sampling. Both upwind and downwind readings taken.					
If line [1] is 0, the S_a = 0. Enter on line [5]. No significant air contamination was detected. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					5.2
Reactivity and Incompatibility	0 (1) 2 3	1	1	3	
Toxicity	0 1 2 (3)	3	9	9	
Hazardous Waste	0 1 2 3 4 5 6 7 (8)	1	8	8	
Total Waste Characteristics Score			18	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	0	6	
Land Use	0 1 2 (3)	1	3	3	
Total Targets Score			24	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: INS Equipment Site Date: 9/13/85

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	15	15	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			10800	21,600	
7 Divide line 6 by 21,600 and multiply by 100			S_{DC} = 50.0		

DIRECT CONTACT WORK SHEET

Facility Name: INS Equipment Site Date: 9/13/85

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

FIRE AND EXPLOSION WORK SHEET

Facility Name: INS Equipment Site Date: 9/13/85

Worksheet for Computing S_M

	S	S^2
Groundwater Route Score (S_{gw})	6.12	37.45
Surface Water Route Score (S_{sw})	16.00	256.00
Air Route Score (S_a)	0.00	0.00
$S_{gw}^2 + S_{sw}^2 + S_a^2$		293.45
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		17.13
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		9.90

WORK SHEET FOR COMPUTING S_M

RECORD OF TELEPHONE CONVERSATION

DATE 9/18/85 JOB NO.: INS, Allied Che. Altiffl

RECORDED BY: EDGlupan OWNER/CLIENT: D+M

TALKED WITH: Jim Snieder OF DEC Fish + Wildlife

NATURE OF CALL: INCOMING ☒ OUTGOING ☒ Reg 9

ROUTE TO: INFORMATION ACTION (17)

(716) 847-4585

MAIN SUBJECT OF CALL: wetlands + critical habitats

ITEMS DISCUSSED:

All of our sites (INS, Allied Chemical Hopkins St and Altiff) are adjacent to wetlands and each may be used by eagles and ospreys during winter migration. However, they are not within 1 mile of any "critical habitats". They the wetlands are essential habitats for local wildlife: ducks, ~~geese~~ pheasants, muskrats.

The designation of the wetland north of INS is BW-8.

GROUNDWATER ROUTE

1. OBSERVED RELEASE

Contaminants detected (5 maximum):

Phenolic compounds, benzene, toluene, xylene, and 1,1 dichloroethane (Phase II Investigation Sampling and Analysis, 1985).

Rationale for attributing the contaminants to the facility:

Contaminants detected in downgradient wells at concentrations higher than concentrations in upgradient wells.

* * *

2. ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifer(s) in concern:

Shallow aquifer in alluvial deposits (Phase II Boring Logs, 1985).

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

Varies from 7 to 18 feet - Score = 3 (Phase II Boring Logs, 1985).

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

Approximately 20 feet (Trautman, 1980; USGS, 1982; Phase II Boring Logs, 1985).

Net Precipitation

(Climatic Atlas of the United States, U.S. Dept. of Commerce, National Climatic Center, 1979).

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

Mean annual precipitation is 32 inches.

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

Mean annual lake evaporation is 24 inches.

Net precipitation (subtract the above figures):

8 inches - Score = 2.

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Waste fill (Trautman, 1980; USGS, 1982; Phase II Boring Logs, 1985).

Permeability associated with soil type

Variable, but based on the coarse granular nature of slag and foundry sand, permeability estimated to be 10^{-3} cm/sec to 10^{-1} cm/sec (Freeze and Cherry, 1979) - Score = 3.

Physical State

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

Sludges, solids, liquids - score = 3 (Kraje, 1985, NYSDOH, 1984; Koczaja, 1983).

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Barrels, unlined landfill, and retention ponds (Kraje, 1985; Gilligan, 1985).

Method with highest score:

Unlined landfill and retention ponds - score = 3.

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Phenol, benzene, cadmium, chromium, and lead (Phase II Investigation, 1985).

Compound with highest score:

Cadmium, chromium, and lead have combined scores of 18.

Hazardous Waste Quantity

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):

550,000 cubic yards - score = 8.

Basis of estimating and/or computing waste quantity:

Volume of waste fill (20' deep x 1,220' x 610') (Phase II Boring Logs, 1985; USGS, 1982; Trautman, 1980).

5. TARGETS

Groundwater Use

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

No private or public drinking water wells in aquifer of concern (NYS Atlas of Community Water System Sources, 1982; Koczaja, 1985). Water from a 50-foot deep well is used for truck washing at the Clarence Material Company (Schmidt, 1985).

Distance to Nearest Well

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

No drinking water wells drawing from aquifer of concern (NYS Atlas of Community Water System Sources, 1982; Koczaja, 1985). Well for truck washing water located at the Clarence Material Company (Schmidt, 1985).

Distance to above well or building:

No drinking water wells in the aquifer of concern, distance more than 3 miles (NYS Atlas of Community Water System Sources, 1982; Koczaja, 1985).

Population Served by Groundwater 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:

No municipal wells (NYS Atlas of Community Water System Sources, 1982; Koczaja, 1985). The industrial water supply well at Clarence Material Company is not used for drinking water purposes (Schmidt, 1985).

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):

None (Nelson, 1986; Flanders, 1986).

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

None - score = 0.

SURFACE WATER ROUTE

1. OBSERVED RELEASE

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

No contaminants found that can be specifically attributed to the INS site (Phase II Investigation, 1985; O'Brien & Gere, 1985).

Rationale for attributing the contaminants to the facility:

Not applicable.

2. ROUTE CHARACTERISTICS

(USGS Topographic Map: Buffalo NW, NY-ONT Quadrangle.)

Facility Slope and Intervening Terrain

Average slope of facility in percent:

0%.

Name/description of nearest downslope surface water:

Niagara River.

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

0.65%.

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

No (Gilligan, 1985).

Is the facility completely surrounded by areas of higher elevation?

No (USGS Topographic Map: buffalo NW, NY-ONT Quadrangle.)

1-Year 24-Hour Rainfall in Inches

2.1" (U.S. Department of Commerce Technical Paper No. 40).

Distance to Nearest Downslope Surface Water

0.0 - adjacent to site on west and north sides (USGS Topographic Map: Buffalo NW, NY-ONT Quadrangle) - score = 3.

Physical State of Waste

Solid, liquid, and sludge (Kraje, 1985; NYSDOH, 1984; Koczaja, 1983) - score = 3.

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Exposed rusty barrels, uncovered solid waste slag, and retention ponds (USGS, 1982; Kraje, 1985; Site Visit, 1985).

Method with highest score:

Uncovered exposed rusty barrels and uncovered waste slag - score = 3.

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Lead, cadmium, chromium, benzene, and phenol (Phase II Investigation, 1985).

Compound with highest score:

Cadmium, lead, and chromium have combined scores of 18.

Hazardous Waste Quantity

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):

550,000 cubic yards (Phase II Investigation, 1985) - Score = 8.

Basis of estimating and/or computing waste quantity:

Total volume of waste fill (20' x 1,220' x 610') (Phase II Boring Logs, 1985).

* * *

5. TARGETS

Surface Water Use

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

Commerical, recreation (Gilligan, 1985).

Is there tidal influence?

No (Niagara River not subject to ocean tides).

Distance to a Sensitive Environment

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

None within 2 miles (western NYS not a coastal area).

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

0.0 miles - NYS Wetland BW-8 adjacent to site - score = 3 (Sneider, 1985).

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

None within 1 mile (Sneider, 1985).

Population Served by Surface Water

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:

None within 3 miles (NYS Atlas of Community Water System Sources, 1982; USGS Topographic Maps, Buffalo, NW, 1965, and Tonawanda West, 1980 Quadrangles).

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

None.

Total population served:

Zero.

Name/description of nearest of above water bodies:

Not applicable.

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

Not applicable.

AIR ROUTE

1. OBSERVED RELEASE

Contaminants detected:

No contaminants detected that can be validated as an observed release for the HRS air route.

Date and location of detection of contaminants:

6/21/85 with HNU meter.

Methods used to detect the contaminants:

Organic contamination detected during HNu meter survey and monitoring on 6/21/85 at levels of 1 - 2 ppm greater than background (Brod, 1985).

Rationale for attributing the contaminants to the site:

Contaminants not attributed to this site because of a lack of backup data (i.e., contaminated surface soils sampled concurrently with air monitoring).

* * *

2. WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Cadmium, benzene, phenol, and lead - Score = 1 (Phase II Sampling and Analysis, 1985; Sax, 1984).

Most incompatible pair of compounds:

No known incompatible compounds (Sax, 1984).

Toxicity

Most toxic compound:

Benzene and phenol both have a score of 3 (Phase II Investigation, 1985).

Hazardous Waste Quantity

Total quantity of hazardous waste:

550,000 cubic yards - score = 8 (Phase II Investigation, 1985).

Basis of estimating and/or computing waste quantity:

Total volume of waste fill (20' x 1,220' x 610') (Phase II Investigation, 1985).

* * *

3. TARGETS

Population Within 4-Mile Radius

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

102,366 (US Census Data, 1980).

Distance to a Sensitive Environment

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

None within 2 miles (western NYS not a coastal area).

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

0.0 - NYS Wetland BW-8 adjacent to site (Sneider, 1985).

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

None within 1 mile (Sneider, 1985).

Land Use

(Air Photo, 1972; Gilligan, 1985)

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

0.0 - adjacent to site (Gilligan, 1985).

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

1.5 miles (USGS Topographic Map).

Distance to residential area, if 2 miles or less:

1.8 miles (USGS Topographic Map).

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

None within 1 mile (Gilligan, 1985; USGS Topographic Map).

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

None within 2 miles (Gilligan, 1985; USGS Topographic Map).

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

No (Gilligan, 1985; USGS Topographic Map).

DIRECT CONTACT

1. OBSERVED INCIDENT

Date, location, and pertinent details of incident:

No known observed incidents.

2. ACCESSIBILITY

Describe type of barrier(s):

Barriers do not completely surround the site (Site Visit, 1985).

3. CONTAINMENT

Type of containment, if applicable:

Open retention ponds. Solid waste disposed of on this site within two feet of the ground surface, broken drums near stream (Site Visit, 1985; Dames & Moore (Boring Logs), 1985; USGS Boring Logs, 1983; Kraje, 1985).

4. WASTE CHARACTERISTICS

Toxicity

Compounds evaluated:

Phenol, benzene, cadmium, chromium, and lead (Phase II Sampling and Analysis, 1985).

Compound with highest score:

Benzene, phenol, cadmium, chromium, and lead all have scores of 3.

5. TARGETS

Population within one-mile radius

3,249 people (US Census Data, 1980).

Distance to critical habitat (of endangered species)

Greater than 1 mile (Sneider, 1985).

FIRE AND EXPLOSION

1. CONTAINMENT

Hazardous substances present:

No hazardous substances present that represent a specific fire and explosion threat to the public or a sensitive environment (Phase II INvestigation, 1985).

Type of containment, if applicable:

Open treatment ponds, solid wastes disposed of within two feet of the ground surface (ES/D&M Site Visit, 1985; Dames & Moore Boring Logs, 1985; USGS Boring Logs, 1983).

* * *

2. WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

Not applicable.

Ignitability

Compound used:

No known ignitable compounds present (Phase II Investigation, 1985; Sax, 1984).

Reactivity

Most reactive compound:

Cadmium benzene, phenol and lead - score = 1 (Phase II Sampling and Analytis, 1985; Sax, 1984).

Incompatibility

Most incompatible pair of compounds:

No known incompatible compounds (Sax, 1984).

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:

550,000 cubic yards (Phase II Investigation, 1985).

Basis of estimating and/or computing waste quantity:

Total volume of fill (20' x 1,220' x 610') (Phase II Investigation, 1985).

* * *

3. TARGETS

Distance to Nearest Population

1/3 mile (USGS Topographic Map - Buffalo, NY Quadrangle).

Distance to Nearest Building

500 feet (USGS Topographic Map - Buffalo, NY Quadrangle).

Distance to Sensitive Environment

Distance to wetlands:

0.0 mile - NYS Wetland BW-8 adjacent to the site (Sneider, 1985).

Distance to critical habitat:

More than 1 mile (Sneider, 1985).

Land Use

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

0.0 mile (Gilligan, 1985).

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

1.5 miles to Beaver Island State Park (USGS Topographic Map - Buffalo, NY Quadrangle).

Distance to residential area, if 2 miles or less:

1.8 miles (USGS Topographic Map - Buffalo, NY Quadrangle).

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

None within 1 mile (USGS Topographic Map - Buffalo, NY Quadrangle; Gilligan, 1985).

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

None within 1 mile (USGS Topographic Map - Buffalo, NY Quadrangle; Gilligan, 1985).

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

No (USGS Topographic Map - Buffalo, NY Quadrangle; Gilligan, 1985).

Population with 2-Mile Radius

Unknown.

Buildings Within 2-Mile Radius

Unknown.

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

FACILITY NAME: INS Equipment Site

LOCATION: West Side of River Road, Tonawanda, Erie County, New York

HRS DOCUMENTATION REFERENCES

INS EQUIPMENT SITE

1. Brod, J. (1985). Dames & Moore. Field Memo.

2. City of Buffalo (1972). Air Photograph.

3. Dames & Moore (1985). Phase II Investigation Boring Logs.

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6. Gilligan, E. D. (1985). Field Memorandum.

7. Koczaja, R. D. (1983). Erie County Department of Environment and Planning. Memo to D. Campbell. October 6, 1983.

8. Koczaja, R. D. (1985). Erie County Department of Environment and Planning. Telephone Conversation with E. D. Gilligan. September 20, 1985.

9. Kraje, J. (1985). NYS Dept. of Transportation. Note to L. Clare, NYSDEC, Region 9. June 20, 1985.

10. LaSala, A. M. (1968). United States Department of the Interior, Geological Survey. "Groundwater Resources of the Erie-Niagara Basin, New York".

11. Nelson, W. (1986), Erie County Cooperative Extension. Telephone Communication with J. Brod, D&M. February 21, 1986.

12. NYSDOH (1982). "New York State Atlas of Community Water System Sources".

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14. O'Brien & Gere (1985). "Site Investigation: Cherry Farms Site, Tonawanda, NY". Prepared for Niagara Mohawk Power Corporation.

15. Sax, N. I. (1984). Dangerous Properties of Industrial Materials. Van Nostrand Reinhold Company, New York.

16. Schmidt, P. (1985), Clarence Materials Company. Telephone Interview with E. D. Gilligan.

17. Sneider, J. (1985). NYSDEC, Region 9, Division of Fish and Wildlife. Telephone Conversation with E. D. Gilligan, September 18, 1985.

18. Trautman Associates (1980). Report prepared for Roblin Steel Industries. "Groundwater Study: Lake Erie Rolling Mill, Inc. River Road Site."

19. United States Census Data (1980). Population Statistics.

20. United States Department of Commerce (1963). "Rainfall Frequency Atlas of the United States", Technical Paper No. 40.

21. United States Department of Commerce (1979). "Climatic Atlas of the United States."

22. United States Geological Survey (1965). Topographic Map, Buffalo NW, NY-ONT Quadrangle.

23. United States Geological Survey (1982). "Draft Report of Preliminary Evaluations of Chemical Migration to Niagara River from Hazardous Waste Disposal Sites in Erie and Niagara County".

FIELD MEMORANDUM

(1)

ACTION	INFO	
To:	EDG	File: 13305-014-019 INS Equipment
		X-Ref:
		Date:

From: JCBrod

Reply Required By:

Subject: Air quality monitoring @ INS Equipment.

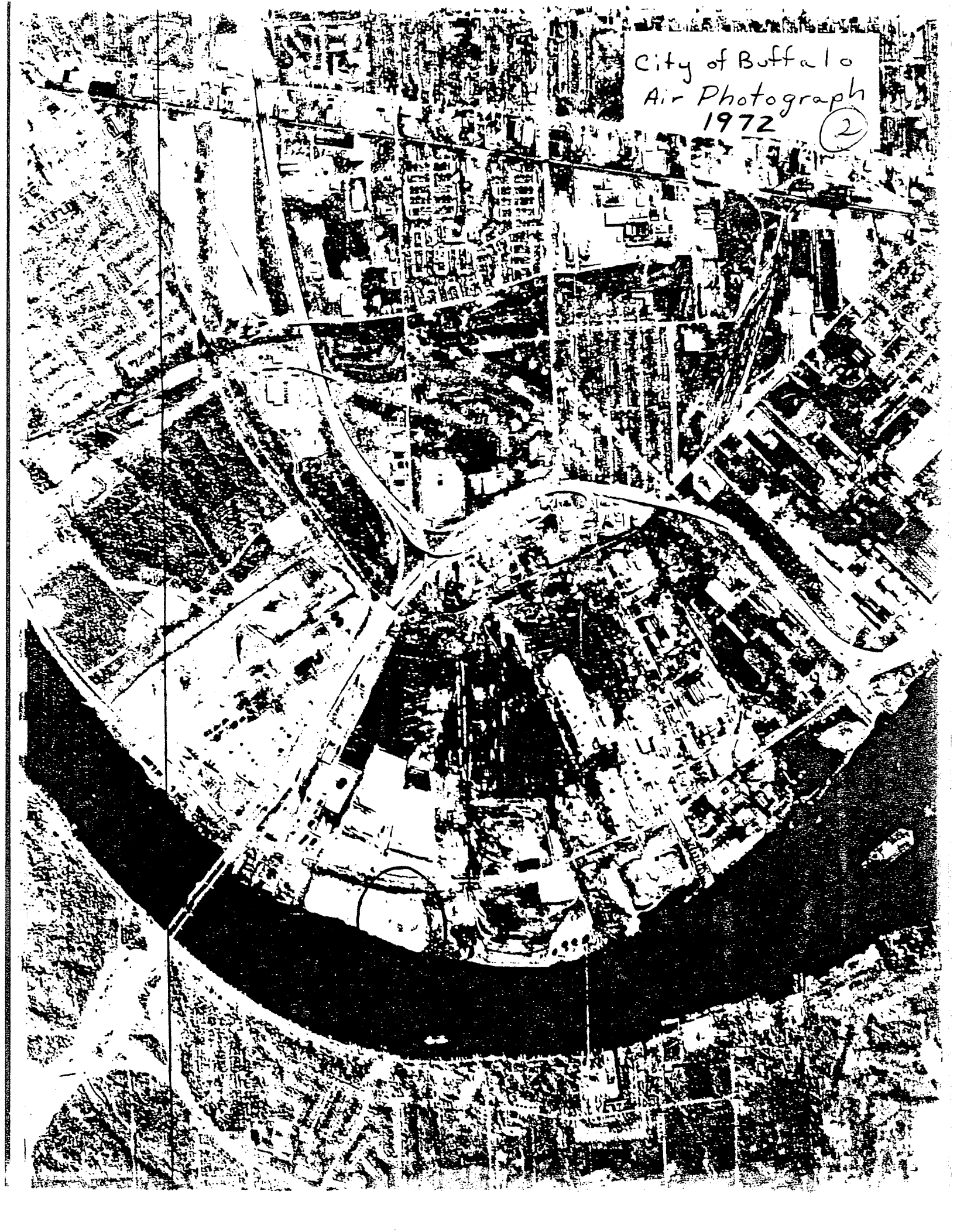
Reference(s):

Upwind and downwind air quality monitoring was done at the site with an HNu photoionization meter on 6-21-85.

The readings ranged from 1.0 to 2.0 ppm above background.

JCBrod

ROUTING


City of Buffalo
Air Photograph
1972
(2)

(3)

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: INS EQUIPMENT

BORING NO.: CW-102
SURFACE ELEV: 574.51'

DRILLING METHOD: Hollow stem augers

SAMPLING METHOD: Split spoon

DATE STARTED: 6/21/85
DATE FINISHED: 6/21/85

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
1	9	SS	0	ML	Dark brown, slightly moist silt, some gravel, little sand Hnu=1ppm
			1	CL	Reddish-brown moist clay, little gravel
2a,2b	26	SS	2	GP	Black, wet gravel, some fine sand Hnu=2ppm
			3		
3	13	SS	4	CL	Mottled brown, moist clay, some gravel, little fine sand and silt Hnu=1.5ppm
			5		
4	11	SS	6	SC	Brown, wet gravel, medium to fine sand and clay Hnu=1ppm
			7		
5	35	SS	8	GP	Brownish-black wet gravel and fine sand, trace silt Hnu=1ppm
			9	SW	Brown, wet, medium to coarse sand, little fine gravel
6a,6b	17	SS	10	GP	Gray-brown wet gravel, little fine to coarse sand Hnu=1ppm
			11		
7	70	SS	12	SP	Black-brown wet medium sand, trace gravel Hnu=1ppm
			13		
8	10	SS	14		grading to brown fine sand, some gravel
			15		Dark gray, very moist fine sand and silt, some clay (slight petroleum odor) Hnu=1ppm slight petroleum odor
9	8	SS	16	ML	Hnu=0.5ppm
			17		
10	7	SS	18		
			19		grades to silt, little clay Hnu=0.5ppm
11	8	SS	20		grades to silt and clay

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: INS EQUIPMENT

BORING NO.: CW-102

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			20	ML	Hnu=0.5ppm
			21		
12	8	SS	22	SP	Dark gray, very moist fine sand, little silt and clay Hnu=0.5ppm
			23		
13	15	SS	24	SM	Dark gray, moist fine sand, some silt and clay Hnu=0.5ppm
			25		
14	8	SS	26		grades to no clay Hnu=0.5ppm
			27		
15	14	SS	28		grades to very moist Hnu=0.5ppm
			29		
16	44	SS	30	SW	Gray, wet gravel and coarse sands, little fine sand Hnu=0.5ppm
			31		
17	100/5"	SS	32	GP	Gray, wet gravel, trace fine sand Hnu=0.5ppm
			33		
18	100/6"	SS	34	GW	Gray, wet gravel, some coarse sand Hnu=1ppm
			35		
19	50/6"	SS	36	SP	Bluish-gray, moist fine sand, some gravel, little silt Hnu=0.5ppm
			37		
20	75/3"	SS	38		grades to gray, wet
			39		
			40		

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: INS EQUIPMENT

BORING NO.: CW-102

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			40		
			41		
			42	SP	
			43		
			44		
20	60/0"	SS	45		Gray non-fossiliferous limestone (Bertie Formation), numerous horizontal fractures with calcite precipitates REC=75%, RQD=0
			46		
			47		
			48		
			49		
			50		
			51		
			52		Boring terminated at a depth of 52.0 feet on 6/21/85

Phase II Analytical Results (Engineering Science, 198

NUS CORPORATION

5350 CAMPBELLS RUN ROAD • PITTSBURGH, PA 15205
412 788 1080

LABORATORY SERVICES DIVISION

4

I certify that the analytical procedures used in the Engineering-Science, INS Equipment Site project are in accordance with USEPA Guidelines 44CFR46964, 40CFR136. or the NYSDEC Superfund and Contract Laboratory Protocol, January 1985.

Kathy DeAngelis
Inorganic Laboratory Supervisor

10/21/85
Date

David A. Damm
Organic Laboratory Supervisor

10/24/85
Date

Sample Number
CW-102

(ES, 1985)

Groundwater
CW-102

(4)

Organics Analysis Data Sheet
(Page 2)

Volatile Compounds (continued)

Case Number		ug/l **********	
79-34-5	1,1,2,2-Tetrachloroethane		5 u
78-87-5	1,2-Dichloropropane		5 u
10061-02-6	Trans-1,3-Dichloropropene		5 u
79-01-6	Trichloroethene		5 u
124-48-1	Dibromochloromethane		5 u
79-00-5	1,1,2-Trichloroethane		5 u
71-43-2	Benzene	5.3	
10061-01-5	cis-1,3-Dichloropropene		5 u
110-75-8	2-Chloroethylvinylether		10 u
75-25-2	Bromoform		5 u
591-78-6	2-Hexanone		10 u
108-10-1	4-Methyl-2-Pentanone		10 u
127-18-4	Tetrachlorethene		5 u
108-88-3	Toluene		5 u
108-90-7	Chlorobenzene		5 u
100-41-4	Ethylbenzene		5 u
100-42-5	Styrene		5 u
	Total Xylenes		5 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 explained.

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 indicated detection limit but greater than zero (e.g 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides)=10ng/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.

- Spiked compound.

NR - No value required

Sample Number
B-3.

(E 5, 1985)
Groundwater
B-3
(4)

Organics Analysis Data Sheet
(Page 2)

Volatile Compounds (continued)

Case Number		ug/l
		**********
79-34-5	1,1,2,2-Tetrachloroethane	5 u
78-87-5	1,2-Dichloropropane	5 u
10061-02-6	Trans-1,3-Dichloropropene	5 u
79-01-6	Trichloroethene	5 u
124-48-1	Dibromochloromethane	5 u
79-00-5	1,1,2-Trichloroethane	5 u
71-43-2	Benzene	96
10061-01-5	cis-1,3-Dichloropropene	5 u
110-75-8	2-Chloroethylvinylether	10 u
75-25-2	Bromoform	5 u
591-78-6	2-Hexanone	10 u
108-10-1	4-Methyl-2-Pentanone	10 u
127-18-4	Tetrachlorethene	5 u
108-88-3	Toluene	21
108-90-7	Chlorobenzene	5 u
100-41-4	Ethylbenzene	5 u
100-42-5	Styrene	5 u
	Total Xylenes	15

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 explained.

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 indicated detection limit but greater than zero (e.g. 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides>=10ng/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.

- Spiked compound.

NR - No value required.

Environmental Protection Agency
CLP Sample Management Office
P.O. Box 818
Alexandria, Virginia 22313 703/557-2490

(ES, 1985)
Groundwater
B-5
(4)

Sample Number

B-5

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: NUS CORPORATION
Lab Sample ID No: 15081917
Sample Matrix: Water
Data Release Authorized By: David P. Danner
****

Case No ES-INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 08/29/85

Volatile Compounds

Concentration: Low
Date Extracted/Prepared: 08/30/85
Date Analyzed: 08/30/85
Conc/Dil Factor: 1 pH NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

CAS Number		ug/l	
		**********	
74-87-3	Chloromethane	10	u
74-83-9	Bromomethane	10	u
75-01-4	Vinyl chloride	10	u
75-00-3	Chloroethane	10	u
75-09-2	Methylene Chloride	5.8 J	
67-64-1	Acetone	10	u
75-15-0	Carbon Disulfide	5	u
75-35-4	1,1-Dichloroethene	5	u
75-34-3	1,1-Dichloroethane	28	
156-60-5	Trans-1,2-Dichloroethene	5	u
67-66-3	Chloroform	5	u
107-06-2	1,2-Dichloroethane	5	u
78-93-3	2-Butanone	10	u
71-55-6	1,1,1-Trichloroethane	5	u
56-23-5	Carbon Tetrachloride	5	u
108-05-4	Vinyl Acetate	10	u
75-27-4	Bromodichloromethane	5	u

Data reporting qualifiers are explained on Page 2.
****

Sample Number
B-5

(ES, 1985)
Groundwater
B-5

(4)

Organics Analysis Data Sheet
(Page 2)

Volatile Compounds (continued)

Case Number		ug/l
		**********
79-34-5	1,1,2,2-Tetrachloroethane	5 u
78-87-5	1,2-Dichloropropane	5 u
10061-02-6	Trans-1,3-Dichloropropene	5 u
79-01-6	Trichloroethene	5 u
124-48-1	Dibromochloromethane	5 u
79-00-5	1,1,2-Trichloroethane	5 u
71-43-2	Benzene	12
10061-01-5	cis-1,3-Dichloropropene	5 u
110-75-8	2-Chloroethylvinylether	10 u
75-25-2	Bromoform	5 u
591-78-6	2-Hexanone	10 u
108-10-1	4-Methyl-2-Pentanone	10 u
127-18-4	Tetrachlorethene	5 u
108-88-3	Toluene	1 5 J
108-90-7	Chlorobenzene	5 u
100-41-4	Ethylbenzene	5.1
100-42-5	Styrene	5 u
	Total Xylenes	20

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 explained

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 indicated detection limit but greater than zero (e.g. 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides>=10ng/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.

- Spiked compound

NR - No value required

(25,1985) G.W. Phenols

ANALYST: 0223 Kapetanovich,D
DATE DUE: 09/04/85

PAGE NO: CF -13-073
DATE REC'D: 08/29/85
DATE SAMP.: 08/28/85

(4)

~~SPECIAL INSTRUCTIONS:~~

Q.C. one.

9/10 OK

TEST CODE: W500 Phenolics

FACTOR: 1.78 INSTR: ~~spec 21~~ WAVE: ~~520~~

CLIENT NO	SAMPLE NO	RESULT mg/l	P	DIST ALIQ	DIL	COLOR ALIQ	CELL	ABS	NET ABS
	BLANK: 0.007								
	STANDARD:								
ENGINEERING-SCIENCE NYSDEC PROTOCOL 90650189	15081914	L0.02	Y	500	100	5cm	0.009	0.002	
ENGINEERING-SCIENCE NYSDEC PROTOCOL 90650190	15081915	0.23	Y	500	100	5cm	0.134 ~~0.007~~ OK	0.127	
ENGINEERING-SCIENCE NYSDEC PROTOCOL 90650191	15081916	L0.02	Y	500	100	5cm	0.008 ~~0.006~~ OK	0.00	
ENGINEERING-SCIENCE NYSDEC PROTOCOL 90650192	15081917 (D)	0.13	Y	500	100	5cm	0.082 ~~0.013~~ OK	0.07	
~~QC~~ // all below									
	QC=0.134								
QC 15081917	W500-000-192								
DUP	100ml/	100ml/	5cm				0.021 ~~0.008~~ OK	0.014	0.125

$\rho = 1.00 \times \sigma$

(D) 9/11 CHECKED BY: JC
DATE: 9/11

(ES, 1985)

NUS CORPORATION

5350 CAMPBELLS RUN ROAD • PITTSBURGH, PA 15205
412/788-1080

LABORATORY SERVICES DIVISION

(4)

I certify that the analytical procedures used in the Engineering-Science, INS Equipment Site project are in accordance with USEPA Guidelines 44CFR46964, 40CFR136, or the NYSDEC Superfund and Contract Laboratory Protocol, January 1985.

Kathy A Del Signore
Inorganic Laboratory Supervisor

7-2-85
Date

David A Dawson
Organic Laboratory Supervisor

9/2/85
Date

(4)

Form I

(ES-1985-)

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
S-1 Sediment
INS Equipment (1)

Date June 11, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation CASE NO. Engineering-Science

SOW NO. 784

LAB SAMPLE ID. NO. 15040822 QC REPORT NO. _____

Elements Identified and Measured

Concentration: Low _____ Medium _____

Matrix: Water _____ Soil X Sludge _____ Other _____

ug/L or mg/kg dry weight (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic		15.	Mercury	0.16 U (C)
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	[0.5] (F)	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium	22 R (P)	20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	52 (P)	24.	Zinc	
Cyanide			Percent Solids (%)		

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: (1) ref: Identification immediately following the Cover Page.

Lab Manager M. J. Marple

(4)

Form I

(ES, 1985)

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
S-2 Sediment
INS Equipment (1)

Date June 11, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation CASE NO. Engineering-Science

SOW NO. 784

LAB SAMPLE ID. NO. 15040823 QC REPORT NO. _____

Elements Identified and Measured

Concentration: Low _____ Medium _____

Matrix: Water _____ Soil X Sludge _____ Other _____

ug/L or (mg/kg dry weight) (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic		15.	Mercury	0.17 U (C)
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	4.5 (F)	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium	3300 R (P)	20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	236 (P)	24.	Zinc	
	Cyanide			Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: (1) ref: Identification immediately following the Cover Page.

Lab Manager M. J. Marple

PHENOLICS
TEST NUMBER W500 INSTRUMENT NUMBER 0
PAGE NUMBER 6 DATE 05.01.85

(4) (E5,1985) S.W. Phenolics

QC # / SAMPLE #	ANALYST / DATE	ORIGINAL ALIQUOT	ORIGINAL VOLUME	DUPLICATE ALIQUOT XI	DUPLICATE VOLUME RESULT	TRIPLICATE ALIQUOT XJ	TRIPLICATE VOLUME	SPIKE	STANDARD CONCENTRATION THEORETICAL	STANDARD CONCENTRATION RESULT	STANDARD THEORETICAL	STANDARD ACTUAL	USED IN STAT OLD QC DATA #
W500-000-161	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l		10mg/l		
15031850	04.01.85	<0.02	mg/l	0.0000	<0.04 mg/l	0.0000	0mg/l		0mg/l		10.71mg/l		
W500-000-162	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l		10mg/l		
15031854	04.01.85	<0.02	mg/l	0.0000	<0.1 mg/l	0.0000	0mg/l		0mg/l		10.71mg/l		
W500-000-163	DK	500ml	500ml	100ml	500ml	100ml	500ml	10ml	10mg/l		10mg/l		XJ
15031859	04.04.85	<0.02	mg/l	0.0000	<0.1 mg/l	0.0196	1.04mg/l		1mg/l		11.05mg/l		
W500-000-164	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l		10mg/l		
15031869	04.04.85	<0.02	mg/l	0.0000	<0.1 mg/l	0.0000	0mg/l		0mg/l		11.05mg/l		
W500-000-165	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l		10mg/l		
15031873	04.04.85	<0.02	mg/l	0.0000	<0.1 mg/l	0.0000	0mg/l		0mg/l		11.05mg/l		
W500-000-166	DK	500ml	500ml	100ml	500ml	100ml	500ml	10ml	10mg/l		10mg/l		XJ
040444	04.10.85	<0.02	mg/l	0.0000	<0.1 mg/l	0.0431	1.09mg/l		1mg/l		11.75mg/l		
W500-000-167	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l		10mg/l		
040270	04.10.85	0.013mg/l		0.1875	0.019mg/l	0.0000	0mg/l		0mg/l		11.75mg/l		
W500-000-168	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l		10mg/l		
	04.10.85	<0.02	mg/l	0.0000	<0.1 mg/l	0.0000	0mg/l		0mg/l		11.75mg/l		W500-000-167
W500-000-169	DK	500ml	500ml	100ml (2)	500ml	100ml (2)	500ml	10ml	5mg/l		100mg/l		XJ
040825	04.17.85	0.326mg/l		~~0.8061~~	0.035mg/l	~~0.7250~~	0.084mg/l		0.535mg/l		106mg/l		
W500-000-170	DK	~~500ml~~	~~500ml~~	100ml	500ml	100ml	500ml	10ml	5mg/l		100mg/l		XI XJ
040825	04.17.85 (1)	0.326mg/l		0.0219	0.312mg/l	0.0410	0.748mg/l		0.812mg/l		106mg/l		W500-000-169
W500-000-171	DK	500ml	500ml	100ml	500ml	100ml	500ml	10ml	10mg/l		10mg/l		XI XJ
041330	04.22.85	0.3133mg/l		0.0997	0.3827mg/l	0.0345	1.2905mg/l		1.3827mg/l		10.8mg/l		
W500-000-172	DK	500ml	500ml	100ml	500ml	100ml	500ml	10ml	10mg/l		10mg/l		
040539	04.23.85	2.8mg/l		1.0000	<1 mg/l	0.0099	1.02mg/l		1mg/l		11.2mg/l		

(1) Engineering Science (S-2 surface water)

(2) Information was entered into the computer incorrectly; disregard the data.

INTERVIEW FORM

INTERVIEWEE/CODE BOB FLANDERS /

TITLE - POSITION TWN. OF TONAWANDA PARKS & RECREATION DEPT.

ADDRESS 500 WOODWARD AVE

CITY KENMORE, NY STATE NY ZIP 14217

PHONE (716) 875-8721 RESIDENCE PERIOD TO

LOCATION TELEPHONE CONVERSATION INTERVIEWER JOHN C. BROD

DATE/TIME 2/21/86

SUBJECT: IRRIGATION (INS EQUIPMENT - PHASE II)

REMARKS: THE SHERIDEN GOLF COURSE IRRIGATES ITS GREENS & FAIRWAYS W/ WATER SUPPLIED BY THE TWN. OF TONAWANDA MUNICIPAL WATER SUPPLIES - DIRECT FROM THE TREATMENT PLANT.

Robert Flanders

I AGREE WITH THE ABOVE SUMMARY OF THE INTERVIEW:

Robert Flanders
SIGNATURE

COMMENTS:

(6)

September 18, 1985

FIELD MEMORANDUM

ACTION	INFO	FILE:
		13305-014 - 1.7

FROM: Eileen Gilligan - SR

SUBJ: INS Equipment - (NYSDEC)

The following observations were made during INS site visits by the author on 6/21/85.

Land Usage

The INS site is located in the industrial section of Tonawanda. Usage in the vicinity of the site is as follows: trucking (INS Equipment Corporation), old abandoned and falling apart factory (Wickwire Steel), athletic fields and marinas along Niagara River shoreline, and largest of all, landfills on the eastern horizon. Regarding specific HRS questions, there are no forests within two miles of the site. There is, however, Beaver Island State Park on Grand Island 1.5 miles upriver from the site. There is no agricultural land within several miles of the site. The nearest residential area is 1.8 miles east of the site, in the section of Buffalo called Kenmore. There is no historic or landmark site within view of the site.

Surface Water Usage

Boating, water skiing, and fishing were major summer-time recreational activities which the author observed during the site visits. The numerous marinas and parks along the Niagara River shoreline downstream of the site are additional evidence of this usage. Of course, the river water is also used for drinking supply (see other references for documentation of this usage).

Eileen

COUNTY OF ERIE
DEPARTMENT OF ENVIRONMENT AND PLANNING
DIVISION OF ENVIRONMENTAL CONTROL

* * * MEMORANDUM * * *

(Koczaja, 1983)

(7)

FROM: Ronald D. Koczaja DATE: 10/6/83

TO: Donald Campbell

SUBJECT: Review of Consultants Report
INS Equipment & NMPC "Cherry Farm"

I.N.S. Equipment

This site was evaluated by Dames & Moore (under subcontract th Earth Sciences, Inc.). The report included additional information regarding the depth of fill, materials disposed of on site and current owner. Continued study through a phase II evaluation was recommended at a projected cost of $24000.

The site is currently owned by Mr. Matthew Duggan (Amherst) and the Clarence Materials Corp. Materials disposed of on site include foundry sands, pit sludges and cutting oils. Barrel disposal was also indicated for this site. Filling was reported to have reached a depth of 20 feet in some places.

I.N.S. equipment site received an overall Mitre score of 16.7. The groundwater hazard potential was scored at 4.0 and the surface water contamination potential was scored as 28.6. A high surface water source was reached due to a potable water supply intake located within 3 miles downstream of the site. The intake reported is for the ~~Erie County Water Authority~~ plant. This plant is located upstream of the site. The nearest downstream intake, City of Tonawanda, is believed to be located more than three stream miles downstream of the site. Scores assigned were also based on an inadequate data base, according to the consultant.

Inadequacies in available data cited by the consultant include:

1) Limited data on release of contaminants to groundwater, surface water, and air.

2) The only analytical data results are from the 1982 USGS study.

The consultant also reported two endangered species near the te, Falco Peregunus and Haliacetas Lecocephalus.

Recommended Phase II actions have been proposed to further

ee wells suggested. Three surface water monitoring points have ,en proposed. Sample analysis would include Cd, Pb, Cr and a GC/MS ,can. This would expand upon or confirm the USGS data. Air over the site would be monitored with an OVA meter. The additional Phase II data generated will allow completion of the Hazard Rating Score. Phase II will also include a conceptual evaluation of remedial ternatives and choice of the most favorable alternative. Phase II work will conclude with the completion of an investigation report.

(7)

The Dames & Moore report reviewed the USGS analytical data in the context of this site only. Data obtained from the sites on the River Rd. area indicate a general level of contamination may exist throughout this industrial area. The data generated for sites in this area should be compared against a background level and not considered independently.

Cherry Farm

This site was also evaluated by Dames and Moore. The consultant was able to obtain information not contained in the DEP ofile. Additional information included waste description and a more complete site history. Insufficient data was available for completion of a Hazard Rating Score in the opinion of the consultant. The lack of sufficient data resulted in a low Phase I score. The site received a overall score of 10.2 with a groundwater hazard potential score of 0.0 and a surface water hazard potential score 17.7. A phase II evaluation was proposed which would provide data to complete the Hazard Rating Score. The proposed study would cost an estimated $35,000.

Additional historical information uncovered by the Dames and Moore team included site ownership and operation data as well as waste materials received. Niagara Mohawk Power Corporation obtained the property in 1957. Shortly there-after the site was leased to the Seaway Corp. for operation. Seaway operated the site during the eriod 1957 to 1970. While under Seaway operation the site received yash (112,000 tons/year), bottom ash (23,000 tons/year) , foundry sand, slag, and liquid boiler cleaning waste. Frontier Chemical Waste Co. operated the site from 1970 to 1972. It has been rumored, but not confirmed, that the site also received chlorinated benzene tars from Hooker-Durez Division.

The consultant concluded that a Phase II study was needed to supplement known information and allow completion of a Hazard Ranking Score. Their Phase II proposal would collect additional (air and groundwater) field data, complete a conceptual evaluation of remedial alternatives with a cost estimate for the most feasible alternative, and prepare a site investigation report. Samples would be analyzed for Hg, Pb, phenol and include a GC/MS scan. The air would be monitored with a OVA meter. The cost estimate for the Phase II study is $35,000 with an expenditure of 342 manhours.

The recommendation for further site monitoring is in onflict with the EPA Superfund consultant report (Fred C. Hart Assoc.) which stated "no evidence of chemical dumping... site appear

(Koczaja 1983)

RECORD OF TELEPHONE CONVERSATION

DATE 9/20/85 ~8:30am JOB NO.: Phase II (8)

RECORDED BY: E D Gilpan OWNER/CLIENT: NYSDEC

TALKED WITH: Ron Koczaja OF Erie Co DOH

NATURE OF CALL: INCOMING ☐ OUTGOING ☒

ROUTE TO:	INFORMATION	ACTION

MAIN SUBJECT OF CALL: groundwater use at INS Allied-Hopkins and Allsift sites

ITEMS DISCUSSED:

Koczaja gave me the following information

INS - No known useage of upper aquifer

~~Are~~ 3 very deep (1000' possibly) bedrock wells may be used for cooling water supply at Dunlop (on River Rd & Sheridan), 1.2 miles S of site. When its in use, no one theoretically should come in contact with it, but conservatively speaking, a range may be 0-20 people

Allied Chem - Hopkins St / Allsift | No use for either shallow or deep aquifers within 2 or 3 miles of site

Donna Hanna Coke Company had an industrial well, but the factory is closed down now.

LARRY,

6/21/85

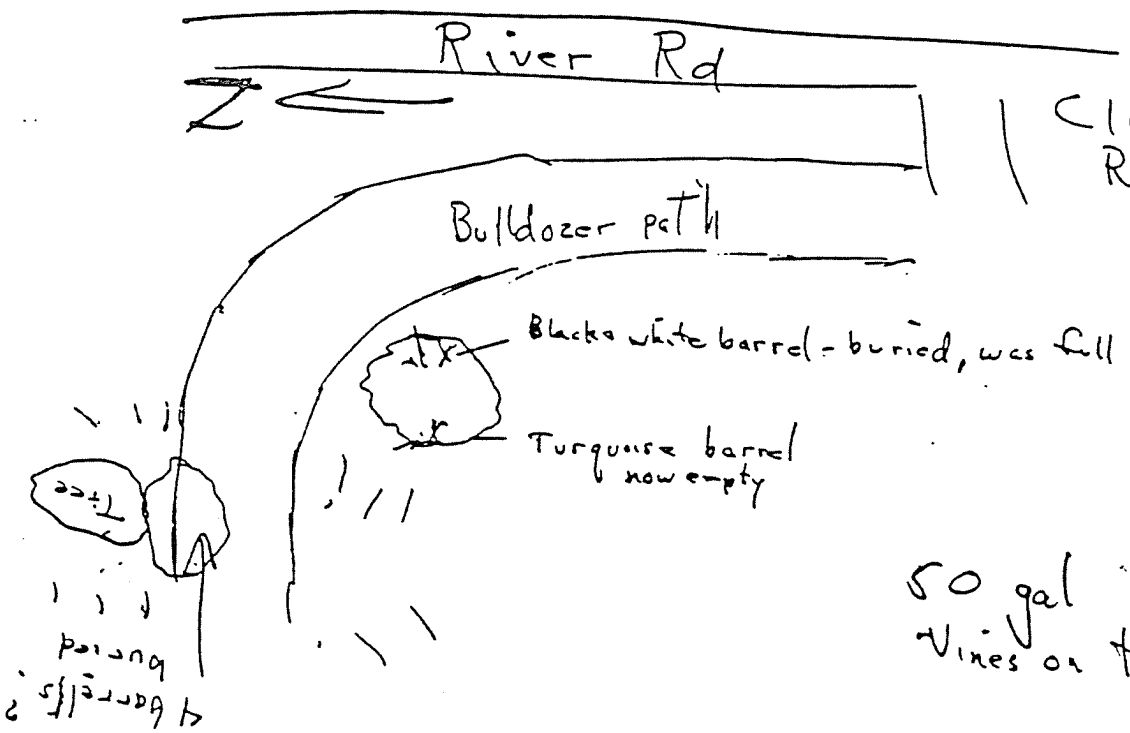
Here are some notes + maps that will help you find the drums. JACK KRAJE
6/20/85

(Kraje, 1985 - (9))

I.N.S. site visit

Jim Heineman } DOT
Jim Ebersole }

Site map (N.T.S.)



50 gal barrels
Vines on trees dead

Discovered ≈ 3 wks ago

NYS DOT
Indian Rd
Depew 14224



(Kraje, 1985)

La Sala, 1968

(10)

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

LaSala, 1968

(10)

...ound. The types of water-bearing joints in the limestone can be ...at the falls of Murder Creek at Akron. Not all of the flow of ...r Creek plunges over the falls. A considerable part of the flow ...colates into the limestone unit upstream from the falls and discharges ...m bedding joints both at the face and along the sides of the falls. ...rincipal zones of discharge are at the base of the Bertie, and at a ...act of a shaly zone and overlying thick-bedded dolomite 20 feet above ... base.

The falls at Akron also illustrate in an exaggerated way the role of ...tical joints. Water from Murder Creek percolates into the rock through ...ion-widened vertical joints before reaching the bedding-plane joints. ...continuous and concentrated flow of water in the creek has widened ... vertical joints to an unusual degree. Vertical joints are ordinarily ...y narrow. They probably are most effective in aiding the movement of ... to the bedding joints where the bedding joints are close to the ... surface.

Locally, solution along bedding joints in the limestone unit has been ...t enough to cause the rock overlying the solution opening to settle. ...ttling of this type probably accounts for at least some of the small ...pressions in the outcrop belt of the Onondaga Limestone. A collapsed ...tion zone in the Onondaga Limestone discharges a large volume of water ...a quarry (257-840-A) near Harris Hill. About 3,000 gpm is pumped ...om the quarry, and most of the water is reported to come from the ... zone.

The limestone unit is cut by a fault on the east side of Batavia. ...ts cutting limestone are likely to cause shattering along the fault ..., thus, create a permeable water-bearing zone.

...rologic and hydraulic characteristics

The limestone unit is similar to the Lockport Dolomite in structure. ...ever, its hydrology is different. The limestone unit is cut trans- ...sely by Tonawanda Creek and its major tributaries. Small tributaries ...low across it in northerly and westerly directions. The limestone unit ...eives water in the interstream areas by percolation into joints. The ...er is discharged laterally to the streams and at places along the ...rth-facing scarp or enters the Camillus Shale at depth.

The coefficient of transmissibility of the limestone unit probably ...ges from about 300 to 25,000 gpd per foot. Specific capacity data are ...ven in table 3. Drillers' reports indicate high transmissibilities for ...e limestone unit in Williamsville which probably arise from relatively ...tense circulation of ground water near Ellicott Creek. The coefficients ...r transmissibility given in table 3 were computed from specific capacity ...ata by the method described by Walton (1962, p. 12-13).

LA Sala, 1968

(10)

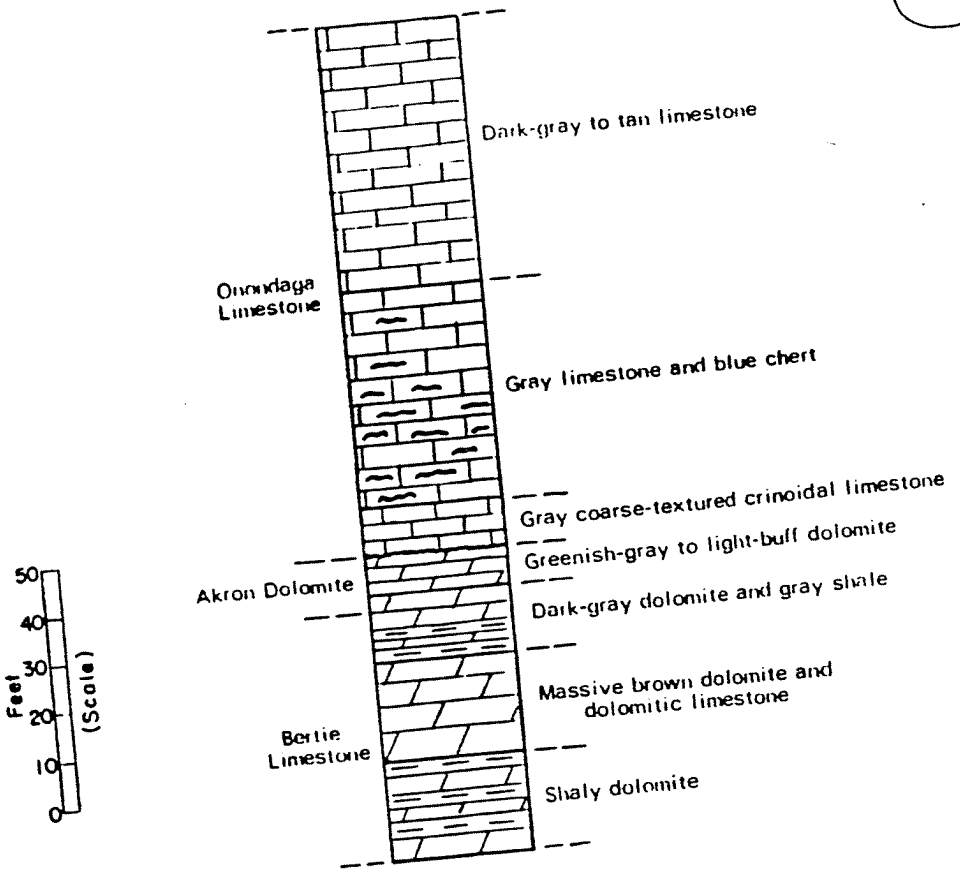


Figure 7.--Lithology of the limestone unit.

The Onondaga Limestone, about 110 feet thick, makes up the greatest thickness of the limestone unit. The formation consists of three members. The lowest member is a gray coarse-grained limestone, generally only a few feet thick. At places this member grades laterally into reef deposits which increases its thickness (Buehler and Tesmer, 1963, p. 35-36).

The middle member of the Onondaga is a cherty limestone. In some zones the chert exceeds the amount of limestone. The unit is probably 40-45 feet thick.

The upper unit is a dark-gray to tan limestone of varying texture and is probably about 50-60 feet thick.

Water-bearing openings

The limestone unit contains water-bearing openings that are similar to those of the Lockport Dolomite. Because the limestone unit is more soluble, however, solution widening of the openings appears to be more

LaSala, 1968

(10)

Yields of wells

The Camillus Shale is by far the most productive bedrock aquifer in the area. Except in the vicinity of Buffalo and Tonawanda, where industrial wells produce from 300 to 1,200 gpm, no attempt has been made to obtain large supplies from the formation. However, the inflow of water to gypsum mines near Clarence Center and Akron indicate that large supplies are not necessarily restricted to the Buffalo and the Tonawanda area. Two examples of large flows of water encountered in gypsum mining have already been mentioned. Pumpage from gypsum mines near Clarence Center (including the mine mentioned previously) is substantial. The water pumped is discharged to Got Creek. On July 2, 1963, the creek had a flow of 2.1 mgd (million gallons per day) about half a mile downstream from the mines, that was due almost entirely to the pumpage. Water for industrial use is pumped from a flooded, abandoned gypsum mine at Akron. This pumpage, at a rate of 500 to 700 gpm, has had no appreciable effect on the water level in the mine.

Probably the larger solution openings are most common in discharge areas near Tonawanda Creek and its tributaries and near the Niagara River; the flow of ground water becomes concentrated as it approaches the streams to which it discharges. Other discharge areas, such as low-lying swampy areas and headwaters of small streams that have perennial flow, are likely places to drill wells.

LIMESTONE UNIT

Bedding and lithology

The term "limestone unit" in this report is applied to a sequence of limestone and dolomite overlying the Camillus Shale. The limestone unit includes the Bertie Limestone at the base, the Akron Dolomite, and the Onondaga Limestone at the top. The lithology and thickness of these units are shown in figure 7. The Bertie Limestone and the Akron Dolomite are Silurian in age and are separated from the overlying Onondaga Limestone of Devonian age by an unconformity or erosional contact.

The Bertie Limestone is mainly dolomite and dolomitic limestone but contains interbedded shale particularly in the thin-bedded lower part of the formation. The middle part is brown, massive dolomite, and the upper part is gray dolomite and shale whose beds are of variable thickness. The total thickness of the formation is about 55 feet (Buehler and Tesmer, 1963, p. 30-31).

The Akron Dolomite is composed of greenish-gray and buff dolomite beds varying from a few inches to about a foot in thickness. The upper contact of the Akron is erosional and is often marked by remnants of shallow stream channels. Thin lenses of sandy sediments lie in the bottoms of some channels. The thickness of the formation is generally between 7 and 9 feet (Buehler and Tesmer, 1963, p. 33-34).

13305-014-T008

INTERVIEW FORM

INTERVIEWEE/CODE WALT NELSON /

TITLE - POSITION COOPERATIVE EXTENSION Agent

ADDRESS 21 S. GROVE ST.

CITY E. AURORA STATE NY ZIP 14052

PHONE (716) 652-5400 RESIDENCE PERIOD TO

LOCATION TELEPHONE CONVERSATION INTERVIEWER JOHN C. BROD

DATE/TIME 2/21/86 10:15 AM

SUBJECT: IRRIGATION (INSEQUIPMENT - PHASE II)

REMARKS: THE ONLY IRRIGATION - on the mainland W/IN 3MI OF THE SITE (JUST SOUTH OF THE LOWER G.I BRIDGE) IS A GOLFCOURSE - WHICH WATERS ~~ITS~~ ITS GREENS & FAIRWAYS. SOURCE OF IRRIGATION WATER IS UNKNOWN. OTHERWISE, THE AREA IS NOT AN AGRICULTURAL AREA.

There is an irrigated golf course on Grand Island near Beaver Island State Park. H_2O for this course is believed to come from the river.

I AGREE WITH THE ABOVE SUMMARY OF THE INTERVIEW:

Walter Nelson
SIGNATURE

COMMENTS: correct as interpreted

New York State Atlas of Community Water System Sources

1982

NEW YORK STATE
DEPARTMENT OF HEALTH

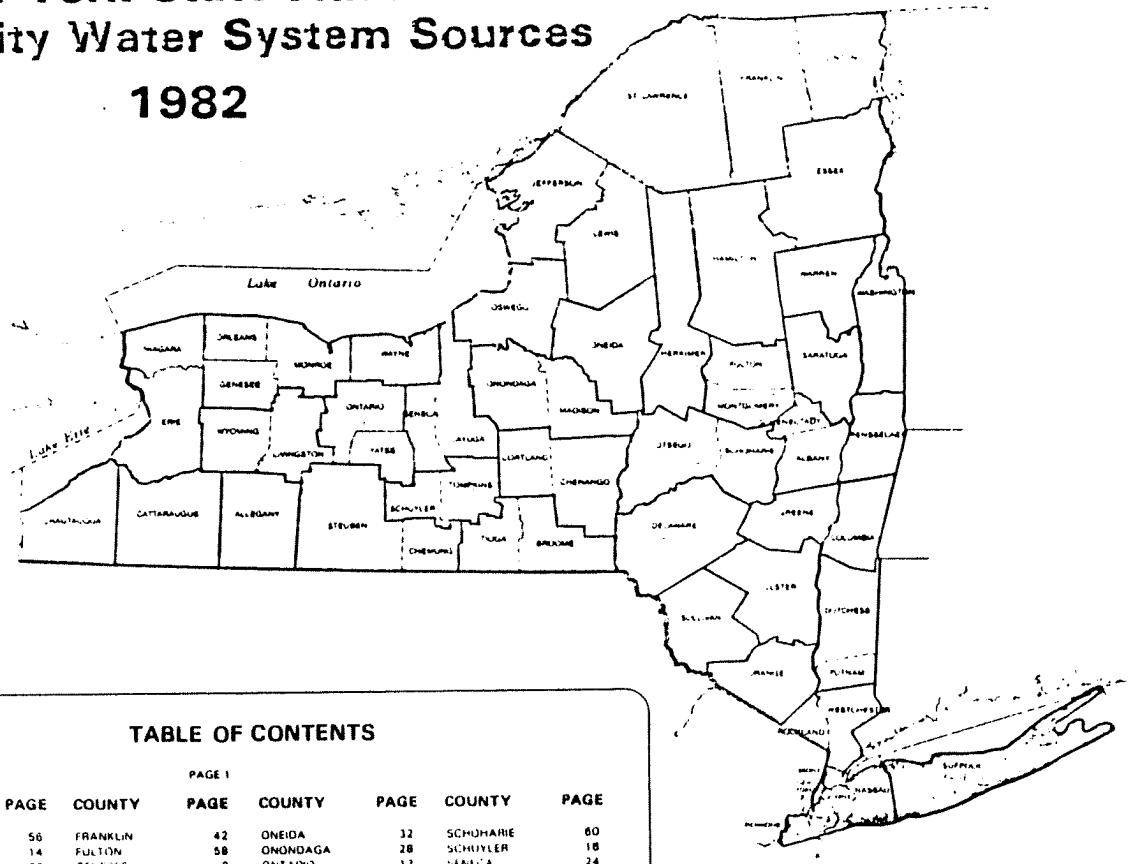


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BRONX	76	GENESEE	8	ONTARIO	12	SENECA	24
BROOME	20	GREENE	64	ORANGE	72	STEUBEN	16
CATTARAUGUS	4	HAMILTON	48	ORLEANS	8	SUFFOLK	78
CAYUGA	24	HERKIMER	34	OSWEGO	30	SULLIVAN	70
CHAUTAUQUA	2	JEFFERSON	38	OTSEGO	60	TIOGA	20
CHEMUNG	16	KINGS	76	PUTNAM	68	TOMPKINS	18
CHENANGO	22	LEWIS	36	QUEENS	76	ULSTER	68
CLINTON	44	LIVINGSTON	10	RENSSELAER	56	WARREN	50
COLUMBIA	64	MADISON	28	RICHMOND	76	WASHINGTON	52
CORTLAND	22	MONROE	8	ROCKLAND	74	WAYNE	26
DELAWARE	62	MONTGOMERY	58	ST LAWRENCE	40	WESTCHESTER	74
DUTCHESS	66	NASSAU	76	SARATOGA	54	WYOMING	10
ERIE	6	NEW YORK	76	SCHENECTADY	56	YATES	12
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LEGEND

BOUNDARIES AND PLACES

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 or U.S. Interstate or State Parkway
Touring Route Markers
State U.S. Interstate

Railroads
Operating Line
Service Discontinued
Operator
Owner of (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

NYSDOH
1982

NYSDOH
1982
(12)

LOCATION OF COMMUNITY WATER SYSTEM SOURCES-1982

ERIE and NIAGARA COUNTIES

DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF PUBLIC WATER SUPPLY PROTECTION

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

NIAGARA COUNTY

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
	Municipal Community		
	Lockport City (See No 12, Erie Co)	25000	
1	Middleport Village	2000	Wells (Springs)
	Niagara County Water District (See No 13, Erie Co)	48	
2	Niagara Falls City (See also No 14 Erie Co)	77384	Niagara River - East Branch
	North Tonawanda City (See No 16 Erie Co)	36000	
	Non-Municipal Community		
3	Country Estates Mobile Village	28	Wells

(12)

NYSDOH 1982

Pond on INS 5.6 | NYSDOH 1984

13

Location (Discharger): Tonawanda Coke Corp

Permit # 0023990I

Sampling Personnel: L. Ross, T. Wasiuk, A. Smith

Weather: Overcast

Air Temp: 22 C

Company Contact:

Precipitation: Heavy Rain in AM

Exact Sample Station: OUTFALL 001

Weather on Previous Day: Heavy Rain at night

Chain of Custody: Yes X No ____ Civil

Split Sample with Company: Yes X No ____

Discharge Time 0945 (START) Temp 29°C pH 7.2 ±0.5

Send copy to Company: Yes X No ____

Discharge Time 0955 (FINISH) Temp 35 pH 8.0 1.0

Composite Data: Start Date 6/18/84

Finish Date 6/19/84

Time 0955

Time 0955

Sampler Used: ISCO X Other ____

Company: Make ____ Model # ____

Model # 2100 Sampler # 1

Integrator Readings

Suction Tubing Type: Teflon X Tygon ____

START: ____ Time: ____

Discharge Tubing Type: Silicon

FINISH: ____ Time: ____

Cleaning (if company sampler used):

Difference: ____

Integrating Factor: ____

Setting to Time 10 mls./ 15 min.

Flow: ____

Split Parameter with Company (*) notation below

Parameter	Sample Type	Date	Time	Preservation	Field Results	Observations
TSS BOD5 1L	Comp	6/18-19/84 0800	0955 0955			Surface Yes ____ Sheen: No ✓
NH3 1L				SNH2SO4		Unusual Yes ✓ Color: No ____ Slight Murky Grey
Phenol 610 1qt						Unusual Yes ✓ Odor: No ____ Phenol Slight
GC8 BHC 1qt						Floating Yes ____ Solids: No ✓ Describe ____
Cyanide 1L				SNHNO3		
VOA 602	Grab	6/19/84	0945	4 Aliquots Composite		Foam: Yes ____ No ✓ Describe ____

(NYSDOH, 1984)

0695 NEW YORK STATE DEPARTMENT OF HEALTH
CENTER FOR LABORATORIES AND RESEARCH

13

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 845000391 SAMPLE RECEIVED:84/06/19/12
PROGRAM: 525:DEC INDUSTRIAL WASTES NPDES
SOURCE ID: 239901 DRAINAGE BASIN:01 GAZETTEER CODE:1472
POLITICAL SUBDIVISION:TONAWANDA COUNTY:ERIE
LATITUDE:42 59 00. LONGITUDE:78 56 28. Z DIRECTION:
LOCATION: TONAWANDA COKE CORP ONT-158 NIAGARA RIVER
DESCRIPTION:OUTFALL 001
REPORTING LAB: 50:FIELD LABORATORY SERVICES-BUFFALO
TEST PATTERN: 50-999:BUFFALO 999
SAMPLE TYPE: 590:OTHER TREATED LIQUID WASTES
TIME OF SAMPLING: 84/06/18 09:55 TO 84/06/19 09:55 DATE PRINTED:84/07/30

	PARAMETER	RESULT	
01PH	PH	7.6	
01SOLIDSUS	SOLIDS, SUSPENDED	18.	MG/L
01B0D05	B.O.D. 5 DAY	3.3	MG/L
01B0D	PREPARATION OF SAMPLE FOR B.O.D. TEST	DONE.	

**** END OF REPORT ****

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N.Y.S.DEPT.OF ENVIRONMENTAL CONSERVATION
REGION 9
600 DELAWARE AVE.
BUFFALO,N.Y. 14202

SUBMITTED BY:WANTUCK

0747 N. Y[illegible] STATE DEPARTMENT OF [illegible]
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NYSDOH, 1984

(13)

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

[illegible]PLE ID: 845000393 SAMPLE RECEIVED:84/06/19/12
PROGRAM: 525:DEC INDUSTRIAL WASTES NPDES
SOURCE ID: 239901 DRAINAGE BASIN:01 GAZETTEER CODE:1472
POLITICAL SUBDIVISION:TONAWANDA COUNTY:ERIE
LATITUDE:42 59 00. LONGITUDE:78 56 28. Z DIRECTION:
LOCATION: TONAWANDA COKE CORP ONT-158 NIAGARA RIVER
DESCRIPTION:OUTFALL 001
REPORTING LAB: 50:FIELD LABORATORY SERVICES-BUFFALO
TEST PATTERN: 50-999:BUFFALO 999
SAMPLE TYPE: 590:OTHER TREATED LIQUID WASTES
TIME OF SAMPLING: 84/06/19 09:55 DATE PRINTED:84/07/18

	PARAMETER	RESULT	
02PH	PH, FIELD	8.0	
02TEMP	TEMPERATURE, WATER, FIELD	35.	DEG. C
11CHLORRES	CHLORINE RESIDUAL, TOTAL, FIELD	1.0	MG/L
01PHENOL	PHENOLS	3.	MCG/L

**** END OF REPORT ****

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PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 841005752 SAMPLE RECEIVED:84/06/20/11
PROGRAM: 525:DEC INDUSTRIAL WASTES NPDES
SOURCE ID: 239901 DRAINAGE BASIN:01 GAZETTEER CODE:1472
POLITICAL SUBDIVISION:TONAWANDA COUNTY:ERIE
LATITUDE:42 59 00. LONGITUDE:78 56 28. Z DIRECTION:
LOCATION: TONAWANDA COKE CORP OUT-158 NIAGARA RIVER
DESCRIPTION:OUTFALL 001
REPORTING LAB: 10:LABORATORY OF INORGANIC ANALYTICAL CHEMISTRY - ALBANY
TEST PATTERN: 10-999:NON SPECIFIC TEST PATTERN
SAMPLE TYPE: 590:OTHER TREATED LIQUID WASTES
TIME OF SAMPLING: 84/06/19 09:55 TO 84/06/19 09:55 DATE PRINTED:84/08/22

PARAMETER	RESULT
22SELENIUM SELENIUM, TOTAL	< 5. UG/L
02CHROMIUM CHROMIUM, TOTAL	< 0.1 MG/L
02COPPER COPPER, TOTAL	< 0.05 MG/L
02NICKEL NICKEL, TOTAL	< 0.05 MG/L
02SILVER SILVER, TOTAL	< 0.02 MG/L
01ZINC ZINC	< 0.05 MG/L
02AMMONIA NITROGEN, AMMONIA	2.7 MG/L
06DIGEST DIGESTION OF WATER FOR TOTAL METALS	DONE.
22ARSENIC ARSENIC, TOTAL	< 10. UG/L

**** END OF REPORT ****

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REGION [illegible]
[illegible]
BUFFALO, N.Y. 14203

SUBMITTED BY: [illegible]

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(13)

0628 NEW YORK STATE DEPARTMENT OF HEALTH
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GE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 841005753 SAMPLE RECEIVED:84/06/20/11
PROGRAM: 525:DEC INDUSTRIAL WASTES NPDES
SOURCE ID: 239901 DRAINAGE BASIN:01 GAZETTEER CODE:1472
POLITICAL SUBDIVISION:TONAWANDA COUNTY:ERIE
LATITUDE:42 59 00. LONGITUDE:78 56 28. Z DIRECTION:
LOCATION: TONAWANDA COKE CORP ONT-158 NIAGARA RIVER
DESCRIPTION:OUTFALL 001
REPORTING LAB: 10:LABORATORY OF INORGANIC ANALYTICAL CHEMISTRY - ALBANY
TEST PATTERN: 10-999:NON SPECIFIC TEST PATTERN
SAMPLE TYPE: 590:OTHER TREATED LIQUID WASTES
TIME OF SAMPLING: 84/06/19 09:55 DATE PRINTED:84/07/05

PARAMETER		RESULT
01FREON	FREON SOLUBLE MATTER	< 1.0 MG/L
01CYANIDE	CYANIDES, HYDROLYZABLE	0.066 MG/L

**** END OF REPORT ****

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(NYSDOH, 1984)

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CENTER FOR LABORATORIES AND RESEARCH

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 42262 SAMPLE RECEIVED:84/06/20/09
PROGRAM: 525:DEC INDUSTRIAL WASTES NPDES
SOURCE ID: 239901 DRAINAGE BASIN:01 GAZETTEER CODE:1472
POLITICAL SUBDIVISION:TONAWANDA COUNTY:ERIE
LATITUDE:42 59 00. LONGITUDE:78 56 28. Z DIRECTION:
LOCATION: TONAWANDA COKE CORP ONT-158 NIAGARA RIVER
DESCRIPTION:OUTFALL 001
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: 5031:EPA METHOD 503.1-AROMATIC VOLATILES
SAMPLE TYPE: 590:OTHER TREATED LIQUID WASTES
TIME OF SAMPLING: 84/06/18 09:55 TO 84/06/19 09:55 DATE PRINTED:84/08/10

	PARAMETER	RESULT	
T34409	BENZENE	25.	UG/L
T41109	TRICHLOROETHYLENE	< 1.	UG/L
T39209	TOLUENE	10.	UG/L
T41209	TETRACHLOROETHENE	< 1.	UG/L
T51009	ETHYLBENZENE	< 1.	UG/L
T85209	1-CHLOROCYCLOHEXENE-1	< 1.	UG/L
T70409	PARA-XYLENE	2.	UG/L
T70309	META-XYLENE	5.	UG/L
T40909	CHLOROBENZENE	< 1.	UG/L
T51409	ORTHO-XYLENE	2.	UG/L
T85309	CUMENE	< 1.	UG/L
T85409	STYRENE	< 1.	UG/L
T85509	P-BROMOFLUOROBENZENE	< 1.	UG/L
T51109	N-PROPYLBENZENE	< 1.	UG/L
T85609	TERT-BUTYLBENZENE	< 1.	UG/L
T85709	O/P-CHLOROTOLUENE	< 1.	UG/L
T51209	BROMOBENZENE	< 1.	UG/L
T50509	META-CHLOROTOLUENE	< 1.	UG/L
T85809	1,3,5-TRIMETHYLBENZENE	1.	UG/L
T85909	1,2,4-TRIMETHYLBENZENE	1.	UG/L
T86009	P-CYMENE	< 1.	UG/L
T44209	1,4-DICHLOROBENZENE	< 1.	UG/L
T86109	CYCLOPROPYLBENZENE	< 1.	UG/L
T49709	1,3-DICHLOROBENZENE	< 1.	UG/L
T86209	SEC-BUTYLBENZENE	< 1.	UG/L
T86309	N-BUTYLBENZENE	< 1.	UG/L
T86409	2,3-BENZOFURAN	< 1.	UG/L
T44109	1,2-DICHLOROBENZENE	< 5.	UG/L
T52509	HEXACHLOROBUTADIENE (C-46)	< 5.	UG/L
T44009	1,2,4-TRICHLOROBENZENE	< 5.	UG/L
T65609	NAPHTHALENE	< 5.	UG/L
T43909	1,2,3-TRICHLOROBENZENE	< 5.	UG/L
T68109	BIS(2-CHLOROISOPROPYL)ETHER		NA

**** CONTINUED ON NEXT PAGE ****

COPIES SENT TO: CO(1), RO(2), DPHE(0), FED(0), INFO-P(0), INFO-L(0)

N.Y.S.DEPT.OF ENVIRONMENTAL CONSERVATION
REGION 9
600 DELAWARE AVE.
BUFFALO, N.Y. 14202

SUBMITTED BY:WANTUCK

(NYSDOH, 198

(B)

SAMPLE ID: 42262 SAMPLE RECEIVED:84/06/20/09
POLITICAL SUBDIVISION:TONAWANDA COUNTY:ERIE
LOCATION: TONAWANDA COKE CORP ONT-158 NIAGARA RIVER
TIME OF SAMPLING: 84/06/18 09:55 TO 84/06/19 09:55 DATE PRINTED:84/08/10

	PARAMETER	RESULT	
T63909	BIS(2-CHLOROETHYL)ETHER	< 10.	MCG/L
T65909	N-NITROSODI-N-PROPYLAMINE	< 10.	MCG/L
T65309	HEXACHLOROETHANE	< 10.	MCG/L
T65709	NITROBENZENE	< 10.	MCG/L
T65509	ISOPHORONE	< 10.	MCG/L
T68609	BIS(2-CHLOROETHOXY)METHANE	< 10.	MCG/L
T49209	HEXACHLOROCYCLOPENTADIENE (C-56)	< 10.	MCG/L
T64109	2-CHLORONAPHTHALENE	< 10.	MCG/L
T64909	2,6-DINITROTOLUENE	< 10.	MCG/L
T63109	ACENAPHTHYLENE	< 10.	MCG/L
T64709	DIMETHYLPHTHALATE	< 10.	MCG/L
T63009	ACENAPHTHENE	< 10.	MCG/L
T64809	2,4-DINITROTOLUENE	< 10.	MCG/L
T64609	DIETHYLPHTHALATE	< 10.	MCG/L
T65209	FLUORENE	< 10.	MCG/L
T68409	4-CHLOROPHENYL PHENYL ETHER		NA
T66009	N-NITROSODIPHENYLAMINE	< 10.	MCG/L
T65109	1,2-DIPHENYLHYDRAZINE	< 10.	MCG/L
T68309	4-BROMOPHENYL PHENYL ETHER	< 10.	MCG/L
T48809	HEXACHLOROBENZENE	< 10.	MCG/L
T66109	PHENANTHRENE	< 10.	MCG/L
T63209	ANTHRACENE	< 10.	MCG/L
T64409	DI-N-BUTYLPHTHALATE	< 10.	MCG/L
T68009	FLUORANTHENE	< 10.	MCG/L
T66209	PYRENE	< 10.	MCG/L
T63809	BENZIDINE	< 200.	MCG/L
T64009	BUTYL BENZYL PHTHALATE	< 30.	MCG/L
T63309	BENZO(A)ANTHRACENE	< 30.	MCG/L
T64509	3,3'-DICHLOROBENZIDINE	< 30.	MCG/L
T64209	CHRYSENE	< 30.	MCG/L
T67909	BIS(2-ETHYLHEXYL)PHTHALATE	< 30.	MCG/L
T65009	DIOCTYLPHTHALATE	< 30.	MCG/L
T63409	BENZO(B)FLUORANTHENE		NA
T63509	BENZO(K)FLUORANTHENE		NA
T63609	BENZO(A)PYRENE	< 30.	MCG/L
T65409	INDENO(1,2,3-CD)PYRENE	< 30.	MCG/L
T64309	DIBENZO(A,H)ANTHRACENE	< 30.	MCG/L
T63709	BENZO(GHI)PERYLENE	< 30.	MCG/L
T15709	HCH,ALPHA	< 10.	MCG/L
T15809	HCH,BETA	< 10.	MCG/L
T35609	HCH,GAMMA (LINDANE)	< 10.	MCG/L
T16009	HCH,DELTA	< 10.	MCG/L
T08009	HEPTACHLOR	< 10.	MCG/L
T07709	ALDRIN	< 10.	MCG/L
T08309	HEPTACHLOR EPOXIDE	< 10.	MCG/L
T43309	ENDOSULFAN I	< 10.	MCG/L
T14809	DDE -PARA, PARA	< 10.	MCG/L
T08509	DIELDRIN	< 10.	MCG/L

**** CONTINUED ON NEXT PAGE ****

(NYSDOH, 1784)

0728 NEW YORK STATE DEPARTMENT OF HEALTH
CENTER FOR LABORATORIES AND RESEARCH

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 RESULTS OF EXAMINATION FINAL REPORT

AMPLE ID: 42262 SAMPLE RECEIVED:84/06/20/09
POLITICAL SUBDIVISION:TONAWANDA COUNTY:ERIE
LOCATION: TONAWANDA COKE CORP ONT-158 NIAGARA RIVER
TIME OF SAMPLING: 84/06/18 09:55 TO 84/06/19 09:55 DATE PRINTED:84/08/10

	PARAMETER	RESULT	
T08409	ENDRIN	< 10.	MCG/L
T14909	DDD -PARA, PARA	< 10.	MCG/L
T43409	ENDOSULFAN II	< 10.	MCG/L
T67409	ENDRIN ALDEHYDE	< 10.	MCG/L
T67309	ENDOSULFAN SULFATE	< 10.	MCG/L
T14709	DDT -PARA, PARA	< 10.	MCG/L
T39609	PCB,AROCLOR 1221	< 0.05	MCG/L
T38009	PCB,AROCLOR 1016/1242	< 0.05	MCG/L
T38109	PCB,AROCLOR 1254	< 0.05	MCG/L
T41609	PCB,AROCLOR 1260	< 0.05	MCG/L
T52209	PCB,AROCLOR 1248	< 0.05	MCG/L
T67109	PHENOL	< 10.	MCG/L
T66409	2-CHLOROPHENOL	< 10.	MCG/L
T66809	2-NITROPHENOL	< 10.	MCG/L
T66609	2,4-DIMETHYLPHENOL	< 10.	MCG/L
T66509	2,4-DICHLOROPHENOL	< 10.	MCG/L
T66309	4-CHLORO-3-METHYLPHENOL	< 10.	MCG/L
T67209	2,4,6-TRICHLOROPHENOL	< 10.	MCG/L
T49609	2,4,5-TRICHLOROPHENOL	< 10.	MCG/L
T66709	2,4-DINITROPHENOL	< 10.	MCG/L
T66909	4-NITROPHENOL	< 10.	MCG/L
T68509	2-METHYL-4,6-DINITROPHENOL	< 10.	MCG/L
T67009	PENTACHLOROPHENOL	< 10.	MCG/L
T85009	BENZOIC ACID		NA

**** END OF REPORT ****

O'Brien & Gere, 1985

14

Report

Site Investigation
Cherry Farm Site
Tonawanda, New York

NIAGARA MOHAWK

Niagara Mohawk Power Corporation
Syracuse, New York

November 1985

O'BRIEN & GERE

(OBrien & Gere, 1985
(14)

TABLE 5

SURFACE WATER/SEDIMENT ANALYSIS RESULTS
CHERRY FARM SITE
NIAGARA MOHAWK POWER CORPORATION

	Surface Water		Sediment	
	Upstream South	Downstream South	Upstream North	Downstream North
METALS*				
Antimony	<0.1	<0.1	30	30
Cadmium	<0.01	<0.01	3	<1.0
Chromium	<0.01	<0.01	19	15
Copper	0.04	0.02	31	21
Lead	<0.01	<0.01	92	36
Mercury	0.0012	<0.0005	0.19	0.01
Arsenic	0.04	0.01	4.0	6.2
Beryllium	<0.01	0.01	<1.0	5.0
Nickel	<0.01	<0.01	30	52
Total Phenols	5.32	0.580	0.091	0.091
PURGEABLES**				
1,1-Dichloroethane	<1	9	<10	<10
Tetrachloroethene	<1	2	<10	<10

* Water Samples presented in mg/l. Soil Samples presented in mg/kg-wet weight.

** Water Samples presented in ug/l. Soil Samples presented in ug/kg-wet weight.

(15)

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

(1984)

(SAX, 1984) (15)

daily exposure to conc of 100 ppm or less will usually cause damage if continued over a protracted period of time. In acute poisoning, the worker becomes confused and dizzy, complains of tightening of the leg muscles and of pressure over the forehead, then passes into a stage of excitement. If allowed to remain in exposure, he quickly becomes stupefied and lapses into coma. In non-fatal cases, recovery is usually complete and no permanent disability occurs. In chronic poisoning the onset is slow, with the symptoms vague; fatigue, headache, dizziness, nausea and loss of appetite, loss of weight and weakness are common complaints in early cases. Later, pallor, nosebleeds, bleeding gums, menorrhagia, petechiae and purpura may develop. There is great individual variation in the signs and symptoms of chronic benzene poisoning. Benzene is a common air contaminant. Exper MUT, CARC, TER, ETA, NEO.

Fire Hazard: Dangerous, when exposed to heat or flame; can react vigorously with oxidizing materials, such as BrF_5, Cl_2, CrO_3, O_2NClO_4, O_2, O_3, perchlorates, ($AlCl_3$ + $FClO_4$), (H_2SO_4 + permanganates), K_2O_2, ($AgClO_4$ + acetic acid), Na_2O_2.

Spontaneous Heating: No.

Explosion Hazard: Mod, when its vapors are exposed to flame. Use with adequate ventilation.

Disaster Hazard: Dangerous, highly flammable.

To Fight Fire: Foam, CO_2, dry chemical.

Incomp: diborane.

For further information see Vol. 2, No. 4 and Vol. 3, No. 3 of *DPIM Report.*

BENZENEACETALDEHYDE

CAS RN: 122781 NIOSH #: CY 1450000
mf: C_8H_8O; mw: 120.16

SYNS:

HYACINTHIN
PHENYLACETALDEHYDE
PHENYLETHANAL
ALPHA-TOLUALDEHYDE
ALPHA-TOLUIC ALDEHYDE

TOXICITY DATA:	2	CODEN:
skn-hmn 2%/48H		FCTXAV 17,357,79
orl-rat LD50:1550 mg/kg		FCTXAV 17,357,79
orl-mus LD50:3890 mg/kg		FCTXAV 17,357,79
orl-gpg LD50:3890 mg/kg		FCTXAV 17,357,79

Reported in EPA TSCA Inventory, 1980.

THR: MOD orl. Hmn skn irr. See also aldehydes.

Disaster Hazard: When heated to decomp it emits acrid smoke and irr fumes.

BENZENEARSONIC ACID

CAS RN: 98055 NIOSH #: CY 3150000
mf: $C_6H_7AsO_3$; mw: 202.05

Colorless crystals, water-sol. d: 1.760, mp: 160° decomp.

SYNS:

PHENYL ARSENIC ACID
PHENYLARSONIC ACID

TOXICITY DATA:	3	CODEN:
orl-rat LDLo:50 mg/kg		JPETAB 93,287,48
orl-mus LD50:270 ug/kg		CLDND*
ivn-rbt LD50:16 mg/kg		JPETAB 80,93,44

Reported in EPA TSCA Inventory, 1980.

THR: HIGH via oral and ivn routes. A deadly poison. See also arsenic compounds.

Disaster Hazard: When heated to decomp it emits tox fumes of As.

BENZENEBORONIC ACID

CAS RN: 98806 NIOSH #: CY 8575000
mf: $C_6H_7BO_2$; mw: 121.94

SYNS:

ACIDE PHENYLBORIQUE (FRENCH)
BOROPHENYLIC ACID
PHENYLBORIC ACID
USAF BO-2

TOXICITY DATA:	3-2	CODEN:
orl-rat LD50:740 mg/kg		14KTAK -,708,64
ipr-mus LD50:500 mg/kg		NTIS** AD277-689
ivn-mus LD50:320 mg/kg		CSLNX* NX#02033
ivn-dog LDLo:450 mg/kg		BANMAC 135,314,51
orl-rbt LDLo:600 mg/kg		14KTAK -,708,64
skn-rbt LDLo:4500 mg/kg		14KTAK -,708,64
ipr-gpg LD50:284 mg/kg		BANMAC 135,314,51

Reported in EPA TSCA Inventory, 1980.

THR: HIGH ivn, ipr. MOD orl, ipr, ivn, skn. See also boron compds.

Disaster Hazard: When heated to decomp it emits acrid smoke and irr fumes.

BENZENECARBOTHIOAMIDE

CAS RN: 63906898 NIOSH #: CV 5860000
mf: C_7H_7NS; mw: 137.21

SYNS:

BENZOTHIAMIDE
BENZOTHIOAMIDE
THIOBENZAMIDE
TIOBENZAMIDE (ITALIAN)

TOXICITY DATA:	3	CODEN:
orl-rat TDLo:6300 mg/kg/15W-C:ETA		BSIBAC 54,1027,78
ipr-mus LD50:500 mg/kg		PCJOAU 11,1383,77

THR: An exper ETA.

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

BENZENECARBOXALDEHYDE

CAS RN: 63021329 NIOSH #: CU 3750000
mf: $C_{19}H_{15}N$; mw: 257.35

SYNS:

7-ETHYLBENZ(C)ACRIDINE
9-ETHYL-3,4-BENZACRIDINE
PHENYLMETHANAL

TOXICITY DATA:	3	CODEN:
scu-mus TDLo:200 mg/kg:ETA		VOONAW 1,52,55

THR: An exper ETA. See also aldehydes.

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

(SAX, 1984) (15)

TOXICITY DATA:
Currently tested by NTP for carcinogenesis by standard bioassay protocol as of December 1980.
THR: No data. Under CARC test.
Disaster Hazard: When heated to decomp it emits acrid smoke and fumes.

CADMIUM

CAS RN: 7440439 NIOSH #: EU 9800000
mf: Cd; mw: 112.40

Hexagonal crystals, silver-white malleable metal. mp: 320.9°, bp: 767 ± 2°, d: 8.642, vap. press: 1 mm @ 394°.

SYNS:
C.I. 77180 KADMIUM (GERMAN)

TOXICITY DATA: 3	CODEN:
ivn-rat TDLo:1250 ug/kg/(9D preg):TER	EVHPAZ 28,245,79
ipr-mus TDLo:2248 ug/kg/(8D preg):TER	TJADAB 13,33A,76
ivn-ham TDLo:2 mg/kg/(8D preg):TER	EXPEAM 25,56,69
ims-rat TDLo:45 mg/kg/4W-I:NEO	NCIUS* PH-43-64-886,SEPT,71
ims-rat TD:70 mg/kg:ETA	BJCAAI 18,124,64
ims-rat TD:63 mg/kg:ETA	NATUAS 193,592,62
ihl-man TCLo:88 ug/m3/8.6Y:SYS	AEHLAU 28,147,74
ihl-hmn LCLo:39 mg/m3/20M	AIHAAP 31,180,70
unk-man LDLo:15 mg/kg	85DCAI 2,73,70
orl-rat LD50:225 mg/kg	TXAPA9 41,667,77
ipr-rat LD50:4 mg/kg	TXAPA9 41,667,77
scu-rat LD50:9 mg/kg	TXAPA9 41,667,77
ivn-rat LD50:3 mg/kg	TXAPA9 41,667,77
unk-rat LD50:712 mg/kg	GTPZAB 22(5),6,78
unk-mus LD50:636 mg/kg	GTPZAB 22(5),6,78
orl-rbt LDLo:70 mg/kg	AMPMAR 34,127,73
scu-rbt LDLo:6 mg/kg	PROTA* -,-,55
ims-ham LDLo:25 mg/kg	NCIUS* PH-43-64-886
cyt-ham:ovr 1 umol/L	CGCGBR 26,251,80
ipr-rat TDLo:1124 ug/kg (1D male)	TXAPA9 41,194,77
scu-rat TDLo:250 ug/kg (19D preg)	APTOD9 19,A122,80
orl-mus TDLo:448 mg/kg (MGN)	AEHLAU 23,102,71

Carcinogenic Determination: Animal Positive IARC** 2,74,73.
TLV: Air: 0.05 mg/m3 DTLVS* 4,59,80; TRBMAV 33(1),85,75; JDSCAE 58(12),1767,75; JFDSAZ 39,321,74; AMBOCX 3(2),55,74; QURBAW 7(1), 75,74; AEMBAP 40,239,73; NTIS** PB-221,198; KOTTAM 11(11),1300,75; FOREAE 7,313,42; STEVA8 2(4),341,74; FCTXAV 9,105,71; AJMEAZ 38,409,65; ENVRAL 4,71,71; 85CVA2 5,63,70; PEXTAR 12,102,69; PDTNBH 6,204,77; BNYMAM 54,413,78; AMTODM 3,209,77; GSAMAQ 123, 109,71. OSHA Standard: Air: TWA 200 ug/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**. "NIOSH Manual of Analytical Methods" VOL 1 191,223,224, VOL 3 S312, S313, VOL 5 173#. Reported in EPA TSCA Inventory, 1980.
THR: MUT data. An exper TER, NEO, ETA, CARC. A human SYS. HIGH hmn ihl, unk. HIGH orl, ipr, scu, ivn, ims. MOD unk. See also cadmium compounds.
Fire Hazard: Mod, in the form of dust when exposed to heat or flame or by chemical reaction with oxidizing agents, metals, HN_3, Zn, Se and Te.
Explosion Hazard: Mod, in the form of dust when exposed to flame.
Disaster Hazard: Dangerous; cadmium dust can react vigorously with oxidizing materials.
For further information see Vol. 1, No. 1 and Vol. 3, No. 5 of *DPIM Report.*

CADMIUM (II) ACETATE

CAS RN: 543908 NIOSH #: EU 9810000
mf: $C_2H_4O_2 \cdot 1/2Cd$; mw: 116.25

Monoclinic colorless crystals, odor of acetic acid. mp: 256°, bp: decomp, d: 2.341.

SYNS:
BIS(ACETOXY)CADMIUM C.I. 77185
CADMIUM DIACETATE

TOXICITY DATA: 3	CODEN:
otr-ham:emb 1 umol/L	CNREA8 39,193,79
dnd-ham:emb 1 umol/L	CNREA8 39,193,79
ipr-mus LD50:14 mg/kg	TXAPA9 49,41,79
cyt-hmn:lym 10 nmol/L	MUREAV 85,236,81
ipr-rat TDLo:2371 ug/kg (14D preg)	BECTA6 20,206,78
ipr-rat TDLo:1 mg/kg (14D preg)	BECTA6 23,25,79
ipr-rat TDLo:2 mg/kg (20D preg)	BECTA6 23,25,79

Reported in EPA TSCA Inventory, 1980.
THR: MUT data. HIGH ipr. See also cadmium compounds.
Disaster Hazard: When heated to decomp it emits tox fumes of Cd.

CADMIUM BIS(2-ETHYLHEXYL) PHOSPHITE

CAS RN: 7495934 NIOSH #: TG 6475000
mf: $C_{32}H_{66}O_6P_2 \cdot Cd$; mw: 723.34

SYN: PHOSPHORUS ACID, BIS(2-ETHYLHEXYL) ESTER, CADMIUM SALT

TOXICITY DATA: 3	CODEN:
ipr-mus LDLo:250 mg/kg	CBCCT* 7,790,55

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 PO_x and Cd.

CADMIUM CAPRYLATE

CAS RN: 2191108 NIOSH #: RH 0370000
mf: $C_{16}H_{30}O_4 \cdot Cd$; mw: 398.86

SYN: OCTANOIC ACID, CADMIUM SALT (2:1)

TOXICITY DATA: 3-2	CODEN:
orl-rat LD50:950 mg/kg	JHEMA2 18,144,74
itr-rat LDLo:10 mg/kg	JHEMA2 18,144,74
orl-mus LD50:300 mg/kg	JHEMA2 18,144,74

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

(SAX, 1984) (15)

CHROMIC ACID (MIXTURE)

NIOSH #: GB 2650000

mf: CrO_3; mw: 100.01

mp: 196°; d: 2.70; dark red cryst; decomp @ 250° to $Cr_2O_3 + O_2$; a powerful oxidizer. Water sol.

SYNS:
CHROMIUM TRIOXIDE CHROMIC ANHYDRIDE

TOXICITY DATA: CODEN:
DOT: Oxidizer, Label: Oxidizer FEREAC 41,57018,76. Occupational Exposure to Cr(VI) recm std: Air: TWA 25 ug(Cr(VI))/m3;CL 50 ug/m3/15M NTIS**.

THR: A poison. See also chromium compounds and chromates. A powerful irr of skn, eyes and mu mem; can cause a dermatitis, bronchoasthma, "chrome holes," damage to the eyes.

Disaster Hazard: May explode in a fire.

Incomp: Acetic acid; acetic anhydride; tetrahydronaphthalene; acetone; alcohols; alkali metals; ammonia; arsenic; bromine penta fluoride; butyric acid; n,n-dimethylformamide; hydrogen sulfide; peroxyformic acid; phosphorus; potassium hexacyanoferrate; pyridine; selenium; sodium; sulfur.

CHROMIC ACID (SOLUTION)

NIOSH #: GB 2670000

SYN: CHROMIC ACID SOLUTION (DOT)

TOXICITY DATA: 3 CODEN:
DOT: Corrosive Material, Label: Corrosive FEREAC 41,57018,76. Occupational Exposure to Cr(VI) recm std: Air: TWA 25 ug(Cr(VI))/m3;CL 50 ug/m3/15M NTIS**.

THR: See chromic acid, dry. See also chromium compounds.

CHROMIC CHLORIDE STEARATE

CAS RN: 15242963 NIOSH #: GB 7280000
mf: $C_{18}H_{36}Cl_4Cr_2O_3$; mw: 546.34

SYNS:
TETRACHLORO-MU-HYDROXY-(MU-OCTADECANOATO-O:O')DI-CHROMIUM
TETRACHLORO-MU-HYDROXY-(MU-STEARATO)DI-CHROMIUM
NCI-C60800
STEARATO-CHROMIC CHLORIDE COMPLEX

TOXICITY DATA: 3 CODEN:
ivn-mus LD50:180 mg/kg CSLNX* NX#03305

Reported in EPA TSCA Inventory, 1980.

THR: HIGH ivn. See also chromium compounds.

Disaster Hazard: When heated to decomp it emits tox fumes of Cl^-.

CHROMIC CHROMATE

CAS RN: 24613896 NIOSH #: GB 2850000
mf: $Cr_3O_{12}{\cdot}2Cr$; mw: 452.00

SYNS:
CHROMIC ACID, CHROMIUM (3+) SALT (3:2) CHROMIUM CHROMATE

TOXICITY DATA: 3 CODEN:
imp-rat TDLo:112 mg/kg:NEO AIHAAP 20,274,59

Carcinogenic Determination: Animal Positive IARC** 2,100,73. Occupational Exposure to Chromium(VI) recm std: Air: CL 1 ug(Cr(VI))/m3 NTIS**. Reported in EPA TSCA Inventory, 1980.

THR: An exper NEO, CARC. See also chromium compounds. Very powerful oxidizer.

CHROMITE (MINERAL)

CAS RN: 1308312 NIOSH #: GB 4000000
mf: Cr_2FeO_4; mw: 223.85

SYNS:
CHROME ORE IRON CHROMITE
CHROMITE ORE

TOXICITY DATA: 3 CODEN:
Carcinogenic Determination: Indefinite IARC** 23,-205,80.

THR: See also chromium compounds and iron. An exper ± CARC.

CHROMIUM

CAS RN: 7440473 NIOSH #: GB 4200000
Af: Cr; Aw: 52.0

SYN: CHROME

TOXICITY DATA: CODEN:
ivn-rat TDLo:2160 ug/kg/6W-I TFX:ETA JNCIAM 16,447,55
imp-rat TDLo:1200 ug/kg/6W-I TFX:ETA JNCIAM 16,447,55
imp-rbt TDLo:75 mg/kg:ETA ZEKBAI 52,425,42

Carcinogenic Determination: Animal Suspected IARC** 2,100,73; Animal Indefinite IARC** 23,205,80. TLV-TWA 500 ug/m3 DTLVS* 4,98,80. *Toxicology Review* 85CVA2 5,63,70; KOTTAM 11(11),1300,75; FOREAE 7,313,42; MIBUBI 9(4),321,75; FCTXAV 9,105,71; PEXTAR 12,102,69; 85DHAX Cr,22,74; BNYMAM 54,413,78; NTIS** Conf-691001. OSHA Standard: Air: TWA 1 mg/m3 (SCP-0) FEREAC 39,23540,74. "NIOSH Manual of Analytical Methods" VOL 1 152,182, VOL 3; S323,352, VOL 5 173#. NIOSH Current Intelligence Bulletin 4, 1975. Reported in EPA TSCA Inventory, 1980. Proposed OSHA Medical Records Rules FEREAC 47,30420,82.

THR: An exper ETA, CARC.

Disaster Hazard: Powder will explode spont in air.

Incomp: Oxidants.

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

CHROMIUM ACETATE HYDRATE

CAS RN: 628524 NIOSH #: AG 3000000
mf: $C_4H_6CrO_4{\cdot}H_2O$; mw: 188.12

Red crystals.

(SAX, 1984)

(15)

TOXICITY DATA: 3	CODEN:
orl-rat TDLo:790 mg/kg (MGN)	AEHLAU 23,102,71
orl-rat TDLo:1140 mg/kg (14D pre-21D post)	PHMCAA 20,201,78
orl-mus TDLo:1120 mg/kg (MGN)	AEHLAU 23,102,71
orl-mus TDLo:6300 mg/kg (1-21D preg)	EXPEAM 31,1312,75
orl-mus TDLo:12600 mg/kg (1-21D preg)	EXPEAM 31,1312,75
orl-mus TDLo:4800 mg/kg (1-16D preg)	BECTA6 18,271,77
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXPEAM 25,56,69
orl-dom TDLo:662 mg/kg (1-21W preg)	TXAPA9 25,466,73
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXPEAM 25,56,69
orl-wmn TDLo:450 mg/kg/6Y:CNS	JAMAAP 237,2627,77
ipr-rat LDLo:1000 mg/kg	EQSSDX 1,1,75
unr-pgn LDLo:160 mg/kg	HBAMAK 4,1289,35

Carcinogenic Determination: Indefinite IARC** 23, 325,80.

TLV: AIR: 0.15 mg/m3 DTLVS* 4,243,80; *Toxicology Review:* TRBMAV 33(1),85,75; PGMJAO 51(601),783,75; JDSCAE 58(12),1767,75; IRXPAT 12,1,73; CTPHBG 55,147,71; CTOXAO 6(3),377,73; QURBAW 7(1),75,74; RREVAH 54,55,75; JAVMA4 164(3),277,74; AEMBAP 40,239,73; CTOXAO 5(2),151,72; FOREAE 7,313,42; KOTTAM 11(11),1300,75; GEIGAI 20(3),291,73; STEVA8 2(4),341,74; CLCHAU 19,361,73; AJMEAZ 38,409,65; 85DHAX PB,254,72; PDTNBH 6,204,77; AMTODM 3,209,77. OSHA Standard: Air: TWA 200 ug/m3 (SCP-O) FEREAC 39,23540,74. Occupational Exposure to Inorganic Lead recm std: Air: TWA 0.10 mg(Pb)/m3 NTIS**. "NIOSH Manual of Analytical Methods" VOL 1 102,191,195,200,208,214,262, VOL 3 S341. Reported in EPA TSCA Inventory, 1980.

THR: See lead compounds. A hmn CNS. HIGH orl; MOD irr. A common air contaminant. It is a ± CAR of the lungs and kidney and an exper TER.

Fire Hazard: Mod, in the form of dust when exposed to heat or flame. See also powdered metals.

Explosion Hazard: Mod, in the form of dust when exposed to heat or flame.

Incomp: NH_4NO_3, ClF_3, H_2O_2, NaN_3, Na_2C_2, Zr. disodium acetylide; oxidants.

Disaster Hazard: Dangerous; when heated, emits highly tox fumes; can react vigorously with oxidizing materials.

For further information see Vol. 1, No. 1 of *DPIM Report.*

LEAD ACETATE

CAS RN: 301042 NIOSH #: AI 5250000
mf: $C_4H_6O_4 \cdot Pb$; mw: 325.29

Trihydrate, colorless crystals or white granules or powder. Slightly acetic odor; slowly effloresces; d: 2.55; mp: 75° when rapidly heated. Decomp above 200°; very sol in glycerol. Keep well closed.

SYNS:

ACETIC ACID LEAD (2+) SALT
ACETATE DE PLOMB (FRENCH)
BLEIACETAT (GERMAN)
LEAD (2+) ACETATE
LEAD(II) ACETATE
LEAD DIACETATE
LEAD DIBASIC ACETATE
NORMAL LEAD ACETATE
PLUMBOUS ACETATE
SALT OF SATURN
SUGAR OF LEAD

TOXICITY DATA: 3	CODEN:
dns-rat-ipr 50 ug/kg	PSEBAA 143,446,73
spm-mus-par 1 gm/kg	ARTODN 46,159,80
orl-rat TDLo:7854 mg/kg (6-16D preg)	FCTXAV 13,629,75
orl-rat TDLo:1800 mg/kg (1-22D preg/14D post)	TOLED5 7,373,80
orl-rat TDLo:113 gm/kg (70D pre-21D post)	PBBHAU 8,347,78
orl-mus TDLo:3150 mg/kg (1-21D preg)	CRSBAW 170,1319,76
orl-mus TDLo:4800 mg/kg (1-8D preg)	CRSBAW 172,1037,78
orl-mus TDLo:9 gm/kg (7-21D preg)	CRSBAW 170,1319,76
ipr-mus TDLo:35 mg/kg (8D preg)	BIMDB3 30,223,79
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXMPA6 7,208,67
ivn-ham TDLo:50 mg/kg (8D preg)	EXPEAM 25,56,69
ipr-pgn LDLo:150 mg/kg	ARTODN 46,265,80
cyt-hmn:lym 1 mmol/L/24H	TXCYAC 10,67,78
cyt-mus-orl 16800 mg/kg/4W	JTEHD6 2,619,77
cyt-mky-orl 5760 mg/kg/64W	MUREAV 45,77,77
ipr-mus TDLo:15 mg/kg/(8D preg):TER	BIMDB3 30,223,79
ivn-ham TDLo:50 mg/kg/(8D preg):TER	EXMPA6 7,208,67
orl-rat TDLo:250 gm/kg/47W-C:ETA	BJCAAI 16,283,62
ipr-rat LDLo:204 mg/kg	JPETAB 38,161,30
ipr-mus LD50:120 mg/kg	COREAF 256,1043,63
orl-dog LDLo:300 mg/kg	HBAMAK 4,1289,35
scu-dog LDLo:80 mg/kg	HBAMAK 4,1289,35
ivn-dog LDLo:300 mg/kg	EQSSDX 1,1,75
scu-cat LDLo:100 mg/kg	HBAMAK 4,1289,35
scu-rbt LDLo:300 mg/kg	HBAMAK 4,1289,35
ivn-rbt LDLo:50 mg/kg	EQSSDX 1,1,75
scu-frg LDLo:1600 mg/kg	HBAMAK 4,1289,35

Carcinogenic Determination: Animal Positive IARC 23,325,80; Human Suspected IARC** 23,325,80. *Toxicology Review:* ADTEAS 5,51,72; ENVRAL 13,36. 85DHAX Pb,256,72. OSHA Standard: Air: TWA ug(Pb)/m3 (SCP-O) FEREAC 29,23540,74. Occupational Exposure to Inorganic Lead recm std: Air: TWA 0.10 mg(Pb)/m3 NTIS**. Reported in EPA TSCA Inventory, 1980.

THR: MUT data. An exper + CARC, TER, ETA. A susp hmn CARC; HIGH ipr, orl, scu, ivn. See also lead compounds. A poison. An insecticide.

Disaster Hazard: When heated to decomp it emits tox fumes of Pb.

Incomp: $KBrO_3$; acids, sol sulfates, citrates, tartrates, chlorides, carbonates, alkalies, tannin phosphates, resorcinol, salicylic acid, phenol, chloral hydrate, sulfites, vegetable infusions, tinctures.

For further information see Vol. 1, No. 4 of *DPIM Report.*

LEAD ACETATE, BASIC

CAS RN: 1335326 NIOSH #: OF 8750000
mf: $C_4H_{10}O_8Pb_3$; mw: 807.71

(SAX, 1984) (B)

TOXICITY DATA:	3	CODEN:
skn-rbt 500 mg/24H SEV		BIOFX* 27-4/73
skn-rbt 535 mg open SEV		UCDS** 1/6/66
eye-rbt 5 mg SEV		UCDS** 1/6/66
mmo-sat 400 uL/plate		BECTA6 24,590,80
sce-hmn:lym 200 umol/L		CNREA8 40,1189,80
dnd-mam:lym 250 mmol/L		PNASA6 48,686,62
orl-rat TDLo:14 kg/kg/2Y-C:ETA		NCITR* NCI-CG-TR-203,80
orl-mus TDLo:27 kg/kg/2Y-C:ETA		NCITR* NCI-CG-TR-203,80
skn-mus TDLo:16 gm/kg/40W-I:CARC		CNREA8 19,413,59
skn-mus TD:4000 mg/kg/24W-I:NEO		CNREA8 19,413,59
orl-hmn LDLo:140 mg/kg		29ZWAE -,329,68
orl-rat LD50:414 mg/kg		BIOFX* 27-4/73
skn-rat LD50:669 mg/kg		BJIMAG 27,155,70
ipr-rat LD50:250 mg/kg		BJPCAL 13,20,58
scu-rat LDLo:650 mg/kg		HBAMAK 4,1319,35
orl-mus LD50:300 mg/kg		JPETAB 88,400,46
ipr-mus LD50:360 mg/kg		AFREAW 3,197,51
scu-mus LD50:344 mg/kg		INHEAO 5,143,67
ivn-mus LD50:112 mg/kg		QJPPAL 12,212,39
orl-dog LDLo:500 mg/kg		HBAMAK 4,1319,35
par-dog LDLo:2000 mg/kg		RMSRA6 15,561,1895
orl-cat LDLo:80 mg/kg		HBAMAK 4,1319,35
scu-cat LDLo:80 mg/kg		JPETAB 80,233,44
par-cat LDLo:500 mg/kg		RMSRA6 15,561,1895
orl-rbt LDLo:420 mg/kg		JPETAB 80,233,44
skn-rbt LD50:850 mg/kg		AIHAAP 37(10),596,76
ipr-rbt LDLo:620 mg/kg		JPETAB 80,233,44
scu-rbt LDLo:620 mg/kg		JPETAB 80,233,44
ivn-rbt LDLo:180 mg/kg		JPETAB 80,233,44
par-rbt LDLo:300 mg/kg		RMSRA6 15,561,1895
ipr-gpg LDLo:300 mg/kg		HBTXAC 1,228,56
scu-gpg LDLo:450 mg/kg		HBTXAC 1,228,56
scu-frg LDLo:75 mg/kg		HBAMAK 4,1319,35
par-frg LDLo:290 mg/kg		AEPPAE 166,437,32
scu-frg LDLo:290 mg/kg		HBTXAC 1,228,56

Aquatic Toxicity Rating: TLm96:100-10 ppm WQCHM* 4,-,74.

TLV: Air: 5 ppm (skin) DTLVS* 4,328,80. *Toxicology Review:* CMTVAS 10(3),49,73; JIHTAB 31,146,49; MUREAV 47(2),75,78; FNSCA6 2,67,73; ZKKOBW 78,99,72. OSHA Standard: Air: TWA 5 ppm (skin) (SCP-L) FEREAC 39,23540,74. DOT: Poison B, Label: Poison FEREAC 41,57018,76. Occupational Exposure to Phenol recm std: Air: TWA 20 mg/m3; CL 60 mg/m3/15M NTIS**. Carcinogenesis Bioassay Completed; Results Negative (NCITR* NCI-CG-TR-203,80). "NIOSH Manual of Analytical Methods" VOL 3 S330. Reported in EPA TSCA Inventory, 1980.

THR: MUT data. A skn, eye irr. An exper CARC, NEO, ETA. HIGH orl, ipr, scu, par. MOD skn, scu, orl, par. In acute phenol poisoning, the main effect is on the CNS. Absorption from spilling phenolic solutions on the skin may be very rapid, and death results from collapse within 30 min to several hrs. Death has resulted from absorption of phenol through a skin area of 64 in. Where death is delayed, damage to the kidneys, liver, pancreas and spleen and edema of the lungs may result. Absorbed phenol is partly excreted by the kidneys, partly oxidized. Part of the excreted portion is combined with sulfuric and glycuronic acids; the remainder is excreted unchanged. The symptoms develop rapidly, frequently within 15-20 min following [illegible] of phenol on the skin. Headache, dizziness, [illegible] weakness, dimness of vision, ringing in the ears, [illegible] lar and rapid breathing, weak pulse, and dy[illegible] all develop, and may be followed by loss of [illegible] ness, collapse and death. When taken internally, there is also nausea, with or without vomiting, severe abdominal pain, and corrosion of the lips, mouth, throat, esophagus and stomach. There may be perforation of the skin, the affected area is white, wrinkled and softened, and there is usually no immediate [illegible] of pain; later, intense burning is felt, followed by anesthesia and still later, by gangrene. Chronic poisoning, following prolonged exposures to low [illegible] vapor or mist, results in digestive disturbances (vomiting, difficulty in swallowing, excessive salivation, diarrhea, loss of appetite), nervous disorders (headache, fainting, dizziness, mental disturbances) and skin eruptions. Chronic poisoning may terminate fatally in uremia where there has been extensive damage to the kidneys or liver. Dermatitis resulting from contact with phenol or phenol-containing products is fairly common in industry. A common air contaminant. As little as 1 g (oral) has killed.

Fire Hazard: Mod, when exposed to heat, flame or oxidizers and reacts violently with ($AlCl_3$ + nitrobenzene), butadiene, peroxydisulfuric acid, peroxymonosulfuric acid.

Spontaneous Heating: No.

Disaster Hazard: Dangerous; when heated it emits [illegible] fumes; can react with oxidizing materials.

To Fight Fire: Alcohol foam, CO_2, dry chemical.

For further information see Vol. 3, No. 4 in *DPIM Report.*

PHENOL (liquid)

CAS RN: 108952 NIOSH #: SJ 3330000
mf: $C_6H_5{\cdot}OH$; mw: 94.11

Colorless needles; d: 1.071 @ 25°/4°; mp: 40.9°; bp: 181.8°; sol in water; misc in alc and ether. A liquid tar acid containing over 50% benzophenol (FEREAC 41,15972,76)

SYN: CARBOLIC ACID, LIQUID (DOT)

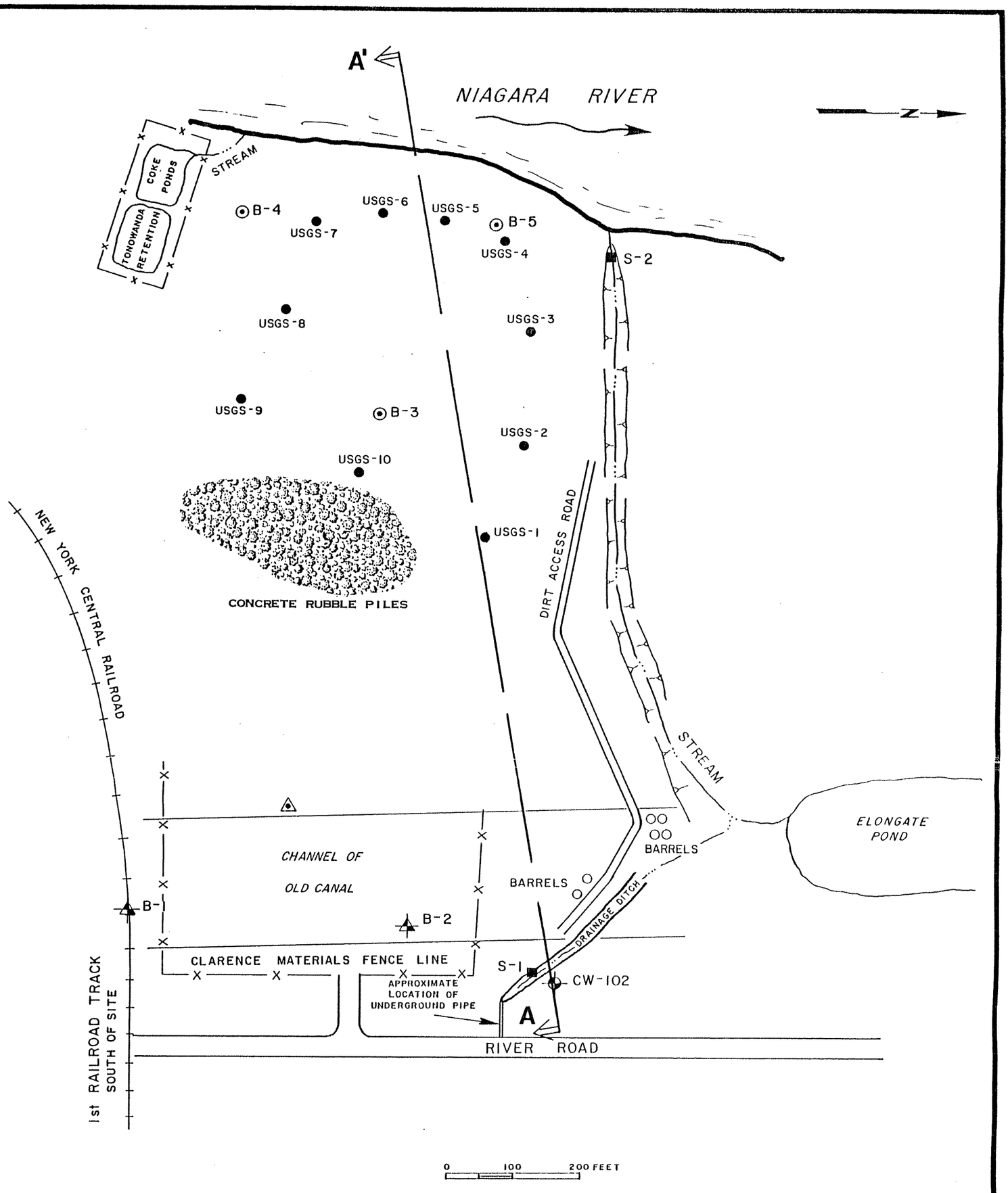
TOXICITY DATA:	3	CODEN:

Toxicology Review: JIHTAB 31,146,49. DOT: Poison B, Label: Poison FEREAC 41,57018,76. Occupational Exposure to Phenol recm std: Air: TWA 20 mg/m3; CL 60 mg/m3/15M NTIS**. Reported in EPA TSCA Inventory, 1980.

THR: HIGH orl, ihl, skn. A poison. See also phenol.

PHENOL-para-ARSONIC ACID

CAS RN: 98146 NIOSH #: CY 5075000
mf: $C_6H_7AsO_4$; mw: 218.05



EXPLANATION:

- ● USGS TEST BORINGS, 1982 (NIAGARA RIVER TOXICS' STUDY)
- ⊙ MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION
- ⊕ MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- △ PRIVATE WELL
- ⇑—⇑ CROSS SECTION LOCATION
- ✦ MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION (NO LONGER EXIST)
- ■ SURFACE WATER AND SEDIMENT SAMPLE

NOTES: ① Elevations in feet above mean sea level.
② Reference datum by Town of Tonowanda.

ENGINEERING-SCIENCE
IN ASSOCIATION WITH
DAMES & MOORE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
PHASE II REPORT

PLOT PLAN
INS EQUIPMENT

FIGURE V-2

TRAUTMAN ASSOCIATES

REPORT
GROUND WATER STUDY

LAKE ERIE ROLLING MILL INC.
RIVER ROAD SITE

TA PROJECT 8046
OCTOBER 1980

EARTH DIMENSIONS, INC.

Test Borings and Logs
797 Center Street • East Aurora, New York 14052 • (716) 655-1717

18

HOLE NO. 1 SURF. ELEV.

PROJECT Monitoring well installation — Roblin Steel Corporation, River Rd., Tn. Tonawanda LOCATION See survey

CLIENT Trautman Associates DATE STARTED 8/12/80 COMPLETED 8/12/80

DEPTH (ft)	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
	1	8	22	48	29	70	Slightly moist dark brown cindery slag with layers of white fire bricks, cindery slag partially cemented		Nonsoil fill to 8.3 feet over coarse silt loam with some sand "old alluvial" sediment to 18.0 feet over mostly water sorted sand to end of boring.
	2	10	12	15	13	27	----grades downward to --- 2.0		
	3	12	29	49	40	78	Moist black cindery slag with layers of white fire bricks, cindery slag partially cemented	2" PVC well pipe	
	4	15	25	35	63	60	----grades downward to --- 6.0 Extremely moist black cindery slag, slag partially cemented		
	5	5	5	7	7	12	8.3 Extremely moist distinctly mottled grayish brown silt loam (SANDY-SILT) with thin fine sand lenses, nonplastic	Bentonite seal	
10	6	4	5	5	7	10			
	7	1	2	2	4	4	13.0	13.0	← water level
	8	4	7	8	13	15	Wet black MUCK, soft (old tree root) 14.0	Number 2 size sand	
15	9	4	5	8	11	13	Wet dark gray coarse silt loam (SANDY-SILT) with thin fine sand lens, nonplastic		

continued on pg.2

(Trautman, 1980)

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16

HOLE NO. 1 continued SURF. ELEV. _____

PROJECT Monitoring well installation LOCATION See survey
Roblin Steel Corporation, River Rd., Tonawanda

CLIENT Trautman Associates DATE STARTED 8/12/80 COMPLETED 8/12/80

SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
9								
10	4	4	5	7	9	Wet dark gray coarse silt loam (SANDY-SILT) with thin fine sand lens, nonplastic		
10						18.0		
10						---clear transition to---		
10						Wet dark gray fine sandy loam (SILTY-SAND) with fine sand lens, nonplastic		
11	4	5	5	7	10			
11								
11								
11						---grades downward to--- 20.0		
12	3	4	8	10	12			
12						Wet dark gray loamy fine sand (SAND), loose	Well screen Number 2 sand size	—23.0
12								
13	3	4						
3								25.0
						Boring completed at 25.0 feet		

Water table 13.2 feet below surface at completion.

USGS elv. of 569.52

(TRAUTMAN, 1980)

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HOLE NO. 2

SURF. ELEV.

PROJECT Monitoring well installation
Roblin Steel Corp., River Rd., Tonawanda

LOCATION See survey

CLIENT Trautman Associates

DATE STARTED 8/12/80 COMPLETED 8/12/80

DEPTH (feet)	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
	1	11	15	15	52	30	Moist black coarse silt loam (SANDY-SILT) fill, very friable		Silty soil fill to 1.5 feet over mostly nonsoil fill to 8.0 feet over coarse silt loam with some sand loam "old alluvial" sediment to 15.0 feet over fine sandy loam "old alluvial" sediment to mostly water sorted sand to 21.0 feet over clayey lake sediment to end of boring.
	2	26	87	92	100/4				
	3	100/4	94	67	100/3		Moist black cindery slag with less than 10% (SANDY-SILT) soil fill, slag fill partially cemented		
							1.5		
							----grades downward to---- 6.0		
	4	33	34	13	5	47	Wet black cindery slag with less than 10% (SANDY SILT) soil fill, slag fill partially cemented		6.3
							8.0		
	5	6	5	5	6	10	Wet black MUCK, very soft 8.3		
10	6	7	8	7	7	15			
	7	3	5	6	6	11	Wet gray coarse silt loam (SANDY-SILT) with thin fine sand lenses, nonplastic		
	8	3	6	7	10	13			
15							----grades downward to---- 15.0		
	9	3	4	6	5	10	Wet dark gray fine sandy loam (SILTY-SAND) with thin silt lens, nonplastic		

Bentonite seal

2" PVC well pipe

Number 2 size sand

water level

continued on page 2

N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb WT FALLING 30 " PER BLOW

(Trautman, 1980)

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HOLE NO. 2 SURF. ELEV. _____

PROJECT Monitoring well installation
Roblin Steel Corp., River Rd., Tonawanda
LOCATION See survey

CLIENT Trautman Associates
DATE STARTED 8/12/80 COMPLETED 8/12/80

DEPTH (feet)	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
9									
10		3	8	12	17	20	Wet dark gray fine sandy loam (SILTY-SAND) with fine silt lens, nonplastic		
10									
10									
10							- - - -grades downward to - 18.0		
11		5	2	3	4	5	Wet dark gray loamy fine sand (SAND), loose		
11									
11									
11									
12		2	3	3	7	6	Wet gray (SILTY-CLAY), thinly laminated clays, soft		
12									
12									
12									
13		2	1						
13									
							Boring completed at 25.0 feet.		

21.0

WELL: 2" PVC well pipe; Well screen; number 2 size sand; 23.0; 25.0

The sand size became coarser immediately above the SILTY-CLAY lake sediment.

Water table at 6.3 feet below surface at completion.

USGS elev. ≈ 569.77

N = NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140 lb WT. FALLING 30" PER BLOW

(Trautman, 1980)

EARTH DIMENSIONS, INC.

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18

HOLE NO. 3

SURF. ELEV.

3H80 PROJECT Monitoring well installation
Roblin Steel Corp., River Rd., Tonawanda

LOCATION See survey

CLIENT Trautman Associates

DATE STARTED 8/15/80 COMPLETED 8/15/80

DEPTH (ft)	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
	1	6	7	9	11	16	Slightly moist black cindery slag, loose		
	1								
	1								
	1								
	2	7	6	10	13	16	----grades downwards to -- 2.0		Non-soil fill to end of boring.
	2								
	2								
	2								
	3	15	34	100/1					
5	3								
	3								
	4	100/o							
	5	100/3					Moist black and white cindery slag and brown broken bricks, loose when disturbed, cemented below 5.0 feet.		
10									
	6	4	5	10	100/o				
	6								
	6								
	6								
	7	100/o							
	8	100/o							
	9	100/o							
							----grades downward to -- 17.0		
							See next page		

2" PVC well pipe
Bentonite
(1)

NA for well
(1) Size number 2 sand

continued on pg.2

N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb WT. FALLING 30 " PER

(Trautman, 1980)

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Test Borings and Logs
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18

HOLE NO. 3 continued

SURF. ELEV. _____

PROJECT Monitoring well installation
Roblin Steel Corp., River Rd., Tonawanda

LOCATION See survey

CLIENT Trautman Associates

DATE STARTED 8/15/80 COMPLETED 8/15/80

SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
10	63	100/o						
10								
11	17	28	31	37	59	Wet dark gray cindery slag, partially cemented fill	2" PVC well pipe	
11								
11								
11								
	26	27	32	41	59			
12								
12								
12							Size number 2 sand	23.0
13	33	37						
13							Well screen	25.0
						Boring completed at 25.0 feet		

Water table 17.0 feet below surface at completion.

USGS elev of Airport 580.17

(Trautman, 1980)

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18

HOLE NO. 4 SURF. ELEV.

3H80 PROJECT Monitoring well installation LOCATION See survey
Roblin Steel Corp., River Rd., Town of Tonawanda
CLIENT Trautman Associates DATE STARTED 8/9/80 COMPLETED 8/9/80

DEPTH (feet)	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
	1	13	17	23	21	40	Slightly moist black cindery slag, loose		Non soil fill to 16.0 feet over silty "old alluvial" to 17.0 feet over mostly water sorted sand to end of boring.
	1								
	1								
	1								
	2	3	10	22	30	32	---grades downward to--- 2.0		
	2								
	2								
	2								
	3	4	5	7	9	12			
5	3								
	3								
	3								
	4	100/6					Moist mixed black and reddish brown cindery slag becoming cemented below 6.0 feet		
	5	100/.15							
10									
	6	100/0							
							---grades downward to--- 11.8		11.8 water level
	7	100/1.1							
	8	100/.2					Wet dark gray cindery slag, cemented		
5									
	9	4	5	10	16	15	16.0		
	9						Wet dark gray silt loam (CLAYEY-SILT), firm		
	9						---clear transition to--- 17.0		

2 inch PVC well pipe
Bentonite seal
Number 2 size sand

continued on pg. 2.. see next page

N = NUMBER OF BLOWS TO DRIVE 2" SPOON 12" WITH 140

EARTH DIMENSIONS, INC.

(Trautman, 1980)

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18

HOLE NO. 4 continued SURF. ELEV.

PROJECT Monitoring well installation
Roblin Steel Corp., River Rd., Tonawanda
LOCATION See survey

CLIENT Trautman Associates
DATE STARTED 8/9/80 COMPLETED 8/9/80

DEPTH (feet)	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
	9								
	10	17	16	15	19	31			
	10								
	10								
0	10								
	11	22	28	20	24	48	6' of sand Wet dark brown loamy sand (SAND), loose, stratified with thin fine sandy loam (SILTY-SAND) lenses,	2 inch PVC well pipe	
	11								
	11								
	11								
	12	11	15	16	22	31			
	12								
	12								23.0
	12								
	13	10	12						
5	13						25.0	Well screen	Number 2 size sand
							Boring completed to 25.0 feet		

USGS quad @ NAD 27 1.1

Water table at 11.8 feet below surface at completion.

N = NUMBER OF BLOWS PER 2 " SPOON 12 " WITH 140 lb WT FALLING 30 " PER BLOW

EARTH DIMENSIONS, INC.

(Trautman, 1980)

Test Borings and Logs
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18

HOLE NO. 5 SURF. ELEV.

PROJECT Monitoring well installation
Roblin Steel Corp., River Rd., Tonawanda
LOCATION See survey

CLIENT Trautman Associates
DATE STARTED 8/11/80 COMPLETED 8/11/80

SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
1	3	15	35	38	50	Slightly moist black cindery slag with brown refractory material, loose	2 inch PVC well pipe	Nonsoil fill to 16.5 feet over "old alluvial" fine sandy loam sediment to end of boring.
1								
1								
1								
						---- grades downward to ---- 2.0		
2	4	11	26	100/5	37			
2								
2								
2								
3	7	19	16	16	35	Moist black cindery slag with brown refractory material, loose	Bentonite seal	
3								
3								
3								
	10	16	10	9	26			
4								
4								
4								
5	4	6	5	7	11			
5								
5								
5								
						---- grades downward to ---- 10.0		10.0
6	14	9	21	24	30			water level
6								
6								
6								
7	9	22	13	21	35	Wet black cindery slag (black oily substance with strong odor between 12.5 and 16.5 foot depth)	Number 2 size sand	
7								
7								
7								
8	24	10	12	8	22			
8								
8								
8								
9	4	7	10	15	17			
						16.5		
9						see next page		continued on page 2

N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb WT FALLING 30 " PER BLOW

EARTH DIMENSIONS, INC. (Trautman, 1980)

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18

BORING NO. 5 continued SURF. ELEV.

PROJECT Monitoring well installation
Roblin Steel Corp., River Rd., Tonawanda LOCATION See survey

CLIENT Trautman Associates DATE STARTED 8/11/80 COMPLETED 8/11/80

SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
9								
10	3	4	8	11	12			
10								
10								
10								
11	3	5	9	13	14	Wet gray fine sandy loam (SILTY-SAND) with thin coarse silt lenses (SANDY-SILT), nonplastic	2 inch PVC well pipe	
11								
11								
11								
12	6	10	15		25			
12								23.0
12								
13	8	12	17		29		well screen	Number 2 size sand
13						25.0		
						Boring completed at 25.0 feet		

Water table at 10.0 feet below surface at completion.

USGS elev @ mean 575.K

N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb WT. FALLING 30 " PER BLOW.

LOGGED BY Donald W. Crum (Soil Scientist) SHEET 2 OF 2

EARTH DIMENSIONS, INC.

(Trautman, 1980)

Test Borings and Logs
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HOLE NO. 6

SURF. ELEV. _____

PROJECT Monitoring well installation
Roblin Steel Corp., River Rd., Tonawanda

LOCATION See survey

CLIENT Trautman Associates

DATE STARTED 8/12/80 COMPLETED 8/12/80

DEPTH (ft)	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
	1	27	27	27	15	54	Slightly moist black cindery slag, loose		Nonsoil fill to 14.0 feet over coarse silty "old alluvial" sediment to 16.0 feet over fine sandy loam "old alluvial" sediment to 18.0 feet over coarse silty "old alluvial" sediment to end of boring.
	1								
	1								
	1								
	2	12	32	13	00/4	45			
	2								
	2								
	2								
	3	28	31	25	18	56			
	3								
	3								
	3								
	4	5	5	6	6	11	Moist mixed black and brown cindery slag, loose		
	4								
	4								
	4								
	5	5	1	2	3	3			
	5								
	5								
	5								
							grades downward to 10.0		10.0 water level
	6	3	2	3	15	5			
	6								
	6								
	6								
	7	17	84	15	3	99	Wet black cindery slag, loose		
	7								
	7								
	7								
							14.0		
	8	4	6	7	9	13	Wet dark gray silt loam (SANDY-SILT), nonplastic		
	8								
	8								
	8								
	9	5	6	8	10	14	clear transition to 16.0		
	9						Wet dark gray fine sandy loam (SILTY-SAND), nonplastic		

2 inch PVC well pipe

Bentonite seal

Number 2 size sand

continued on pg. 2...

N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " W[illegible] 140 lb WT FALLING 30 " PER BLOW

(Trautman, 1980)

EARTH DIMENSIONS, INC.

Test Borings and Logs
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18

HOLE NO. 6 continued SURF. ELEV. _____

PROJECT Monitoring well installation LOCATION See survey
Roblin Steel Corp., River Rd., Tonawanda

CLIENT Trautman Associates DATE STARTED 8/12/80 COMPLETED 8/12/80

DEPTH	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	N	DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
							see previous page		
9							clear transition to		
10	2	3	4	4	7		18.0	2 inch PVC well pipe	
10									
10									
10									
11	3	3	4	6	7		Wet dark gray coarse silt loam (SANDY-SILT) with thin fine sand lenses, nonplastic		
11									
11									
11									
12	2	2	3	5	5				
12									
12									23.0
?									
13	4	8						Well screen	
13							25.0	Number 2 size sand	
							Boring completed at 25.0 feet		

USGS elev. Datum 571

Water table at 9.7 feet below surface at completion.

N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb WT FALLING 30 " PER BLOW

NOV 12 1985

(19)

1980 BLOCK GROUPS & CENSUS TRACTS

7 Block Group Number

Block Group Boundary

Tract Boundaries

Tract Boundaries Extending to the International Boundary

Tract Portion

Source: U S Bureau of the Census, 1980

Prepared: Erie County Department of Environment and Planning, Division of Planning. October 1980

INS

ERIE COUNTY

(19)

DEPARTMENT OF ENVIRONMENT AND PLANNING
DEVELOPMENT DECISION SUPPORT SYSTEM
TECHNICAL MEMORANDUM

3.1

1980 CENSUS TRACTS
and BLOCK GROUPS

DESCRIPTION OF INFORMATION

Information: The 1980 Census Tract Boundaries in Erie County.

Data Source: The U.S. Bureau of the Census, 1980.

Limitations: The 1980 Census Tract map should only be used for general reference and analysis, not for determining if a specific property is within a Census Tract.

TECHNICAL DESCRIPTION

Scale: The boundaries have been mapped at 1" = 1 mile using the 1967 NYSOPS County Base map.

Support Documentation: A file containing maps of block, tract, and enumeration districts is maintained in the Division of Planning Library.

Update Frequency: The map will be updated in 1990 with the next census.

Location of Maps: Department of Environment and Planning Map Room.

Reproduction of Maps: The 1" to 1 mile mylar overlay can be reproduced with the 1967 Base Map at Seneca Blueprint at a cost of approximately $6.00. A package of page size maps is available and can be photo copied at no charge.

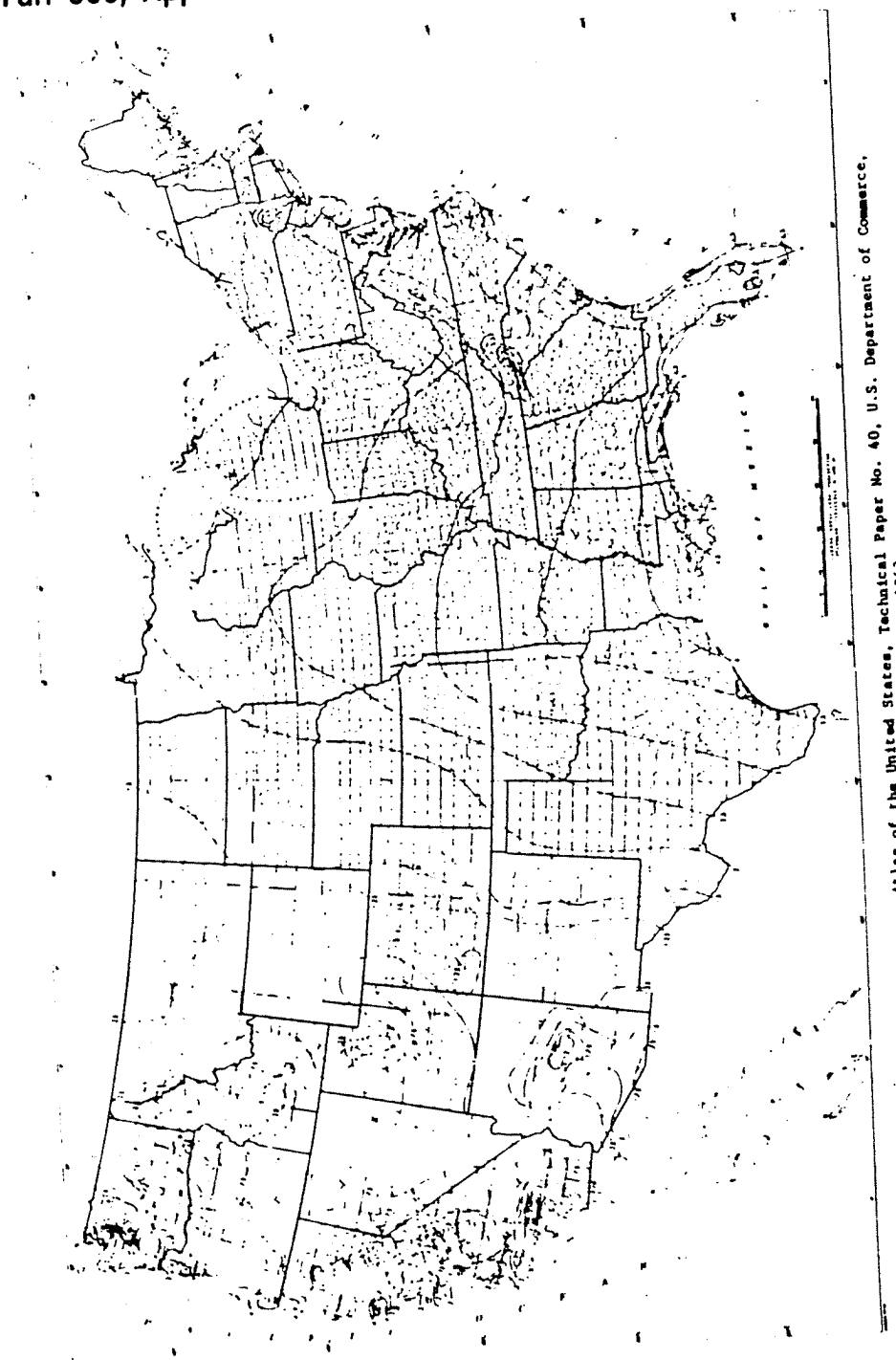
Prepared by: Diane Jarvis, 1981.

ADDITIONAL INFORMATION: Erie County DEP
95 Franklin Street, Room 1007
Buffalo, New York 14202 (716) 846-8390

DISCLAIMER: The County makes no representations, warranties or guarantees as to the accuracy or completeness of the material provided through the Development Decision Support System. The System makes available to the public, information which the County has received and compiled in order to assist in basic planning and physical development. The user of the System agrees to be responsible for determining the reliability of any information obtained and uses the information at his own risk. The County will not be responsible for any omissions, dissemination of


LEWISTON
CAMBRIA
Lockport
Lewiston
TUSCARORA INDIAN RES
Pekin
Sanborn
RESERVOIR STATE PARK
COLONIAL VILLAGE
CONRAIL
LOCKPORT AIR FORCE STATION
South Lockport
LOCKPORT
PENDLETON
TRANSIT
Pendleton
WHEATFIELD
Niagara Falls
NIAGARA
ERIE
POTOCZAK
CLARENCE
Swormville
North Tonawanda
Sandy Beach
BUCKHORN ISLAND STATE PARK
GRAND ISLAND
BIG SIX MILE CREEK STATE BOAT BASIN
Tonawanda
AMHERST
Clarence Center
Clarence
TONAWANDA
Kenmore
Williamsville
Harris Hill
BEAVER ISLAND STATE PARK
Depew
Lancaster
LANCASTER
BUFFALO CREEK
BUFFALO
Elma
WEST SENEGA
ELMA
Lackawanna
Spring Brook
Blasdell
ORCHARD PARK
Billington Heights
1/3 MILES
4 MILE RADIUS
4" = 1.3 =
1:250,000
1" = 5 Km
1" = 1 mile

20



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.

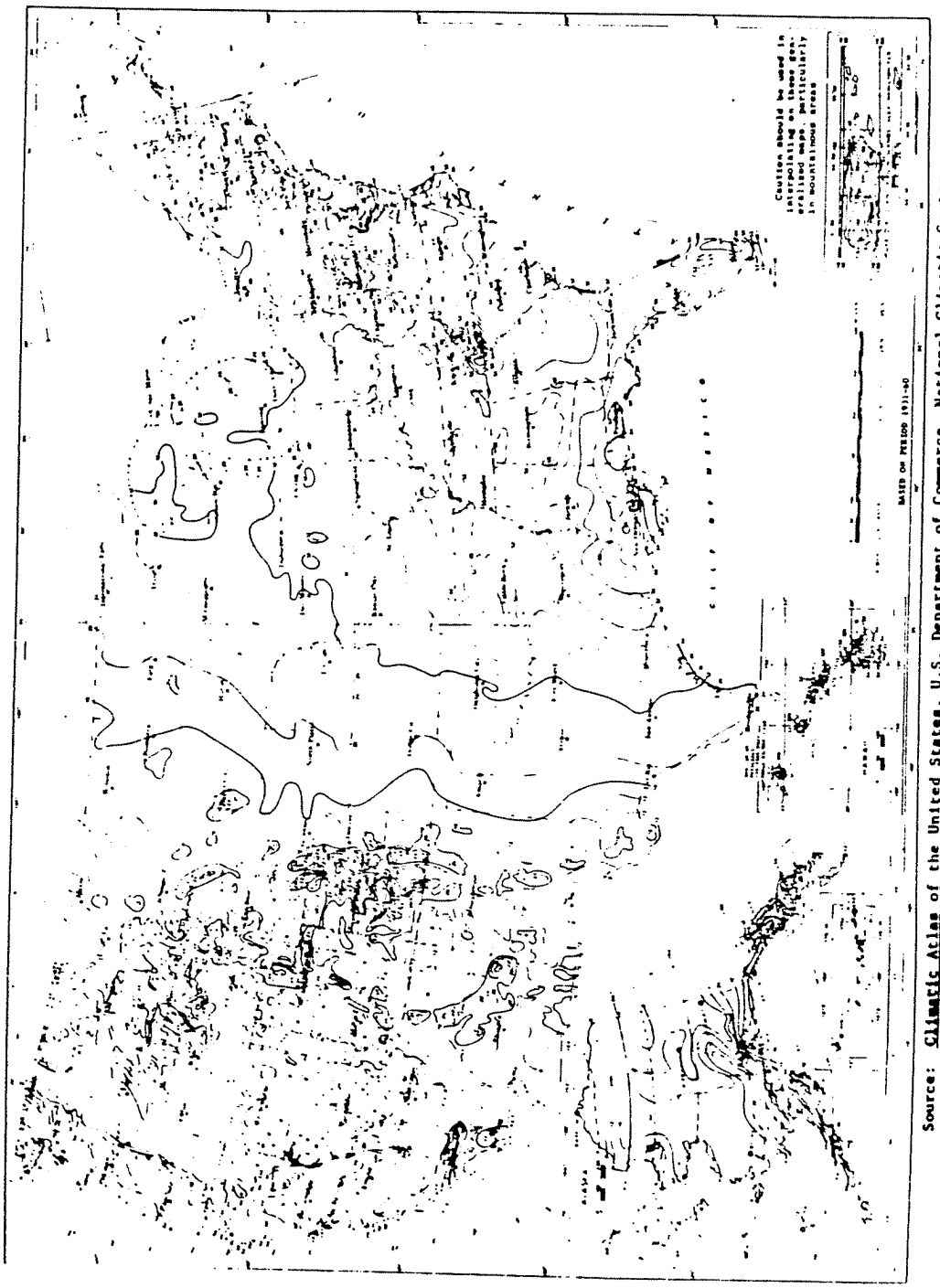
Figure 8

1-Year 24-Hour Rainfall (Inches)

(USDOC, 1963)

Figure 4

Mean . ..ual Lake Evaporation (In Inches)



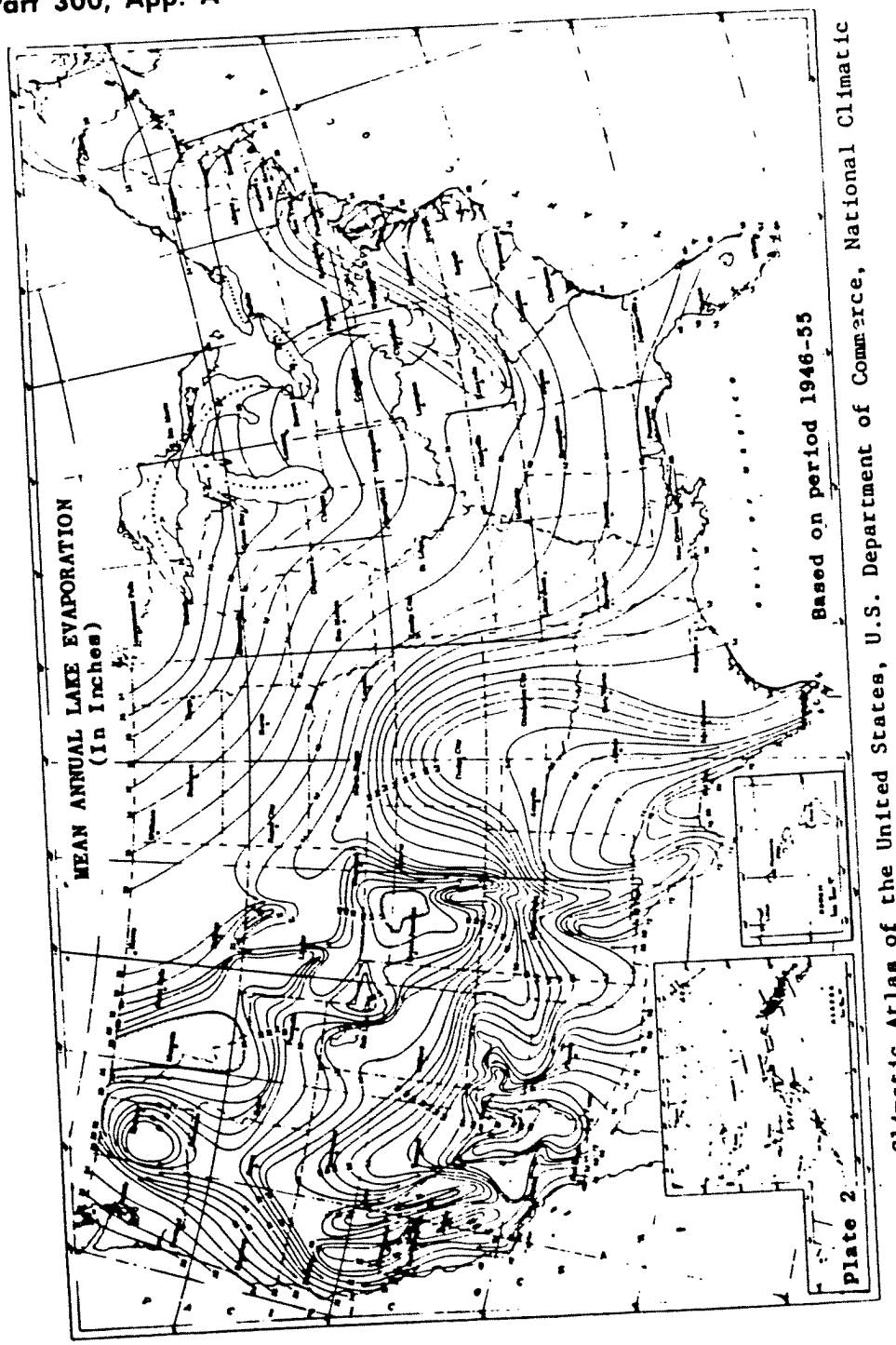
Source: Climatic Atlas of the United States, U.S. Department of Commerce, National Climatic Center, Asheville, N.C., 1979.

Figure 5

Normal Annual Total Precipitation (Inches)

(USDOC, 1979)

21

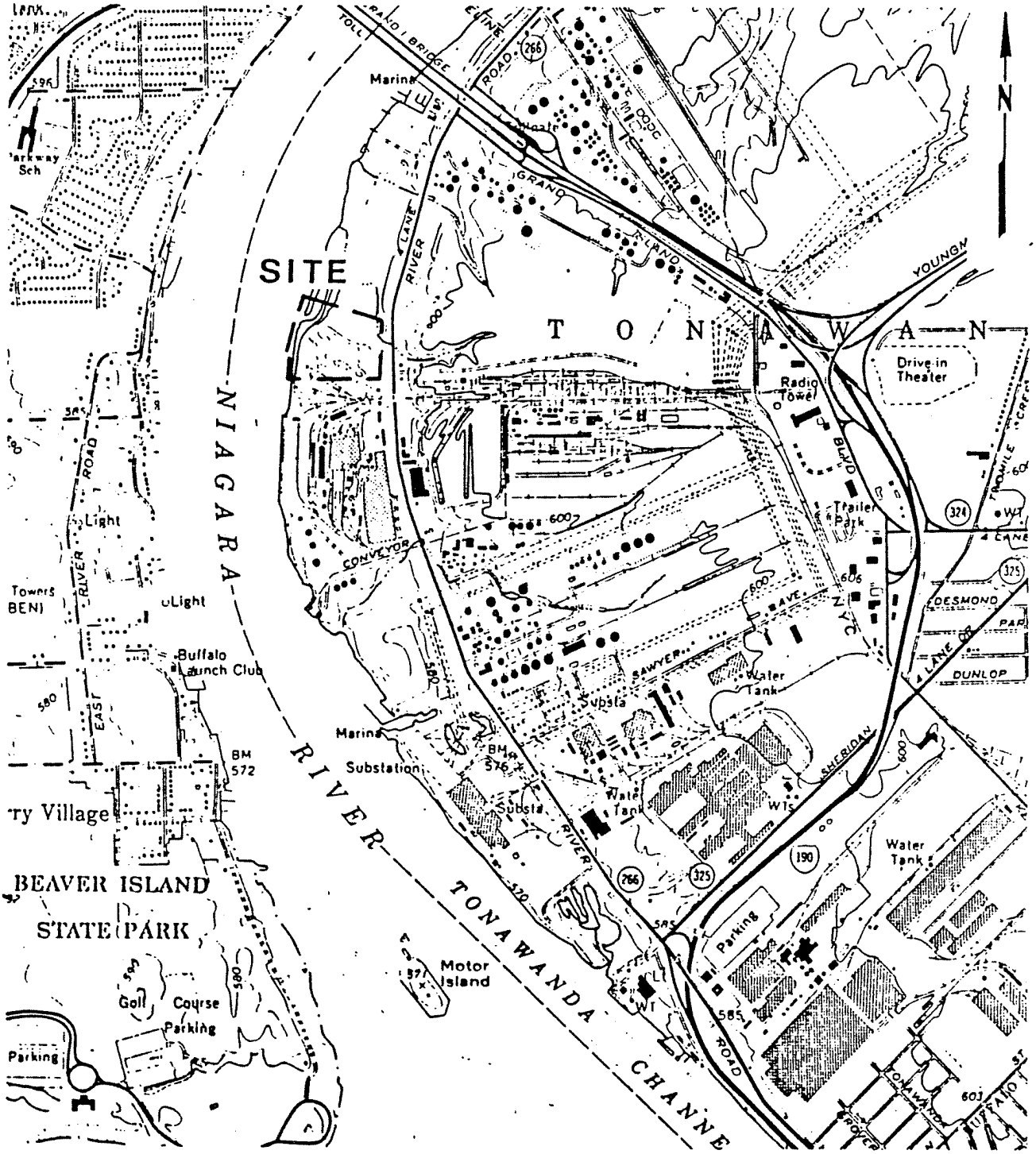


Source: Climatic Atlas of the United States, U.S. Department of Commerce, National Climatic Center, Ashville, N.C., 1979.

Figure 4

Mean Annual Lake Evaporation (In Inches)

(USDOC, 1979)



LONGITUDE: 78°56'4.9"
LATITUDE: 42°59'23.3"

ENGINEERING-SCIENCE
IN ASSOCIATION WITH
DAMES & MOORE

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION
PHASE II REPORT

SITE LOCATION MAP
INS EQUIPMENT

FIGURE I-1

REFERENCE: BASE TAKEN FROM U.S.G.S. 7.5 MIN. TOPOGRAPHIC MAP, BUFFALO NW, NY-ONT (1965) QUADRANGLE

USGS
1982

136. INS EQUIPMENT CORP. #915031

Location and General Information

The INS Equipment Corporation site is located in the City of Tonawanda and is shown on plate 5. The site borders the Huntley Power Station site to the north and is also known as the "Cherry Farm Area."

The 55 acre site was used to dispose of an unknown quantity of pit sludge, cutting oils, grinding waste and foundry sand. The site has been covered, graded, and seeded.

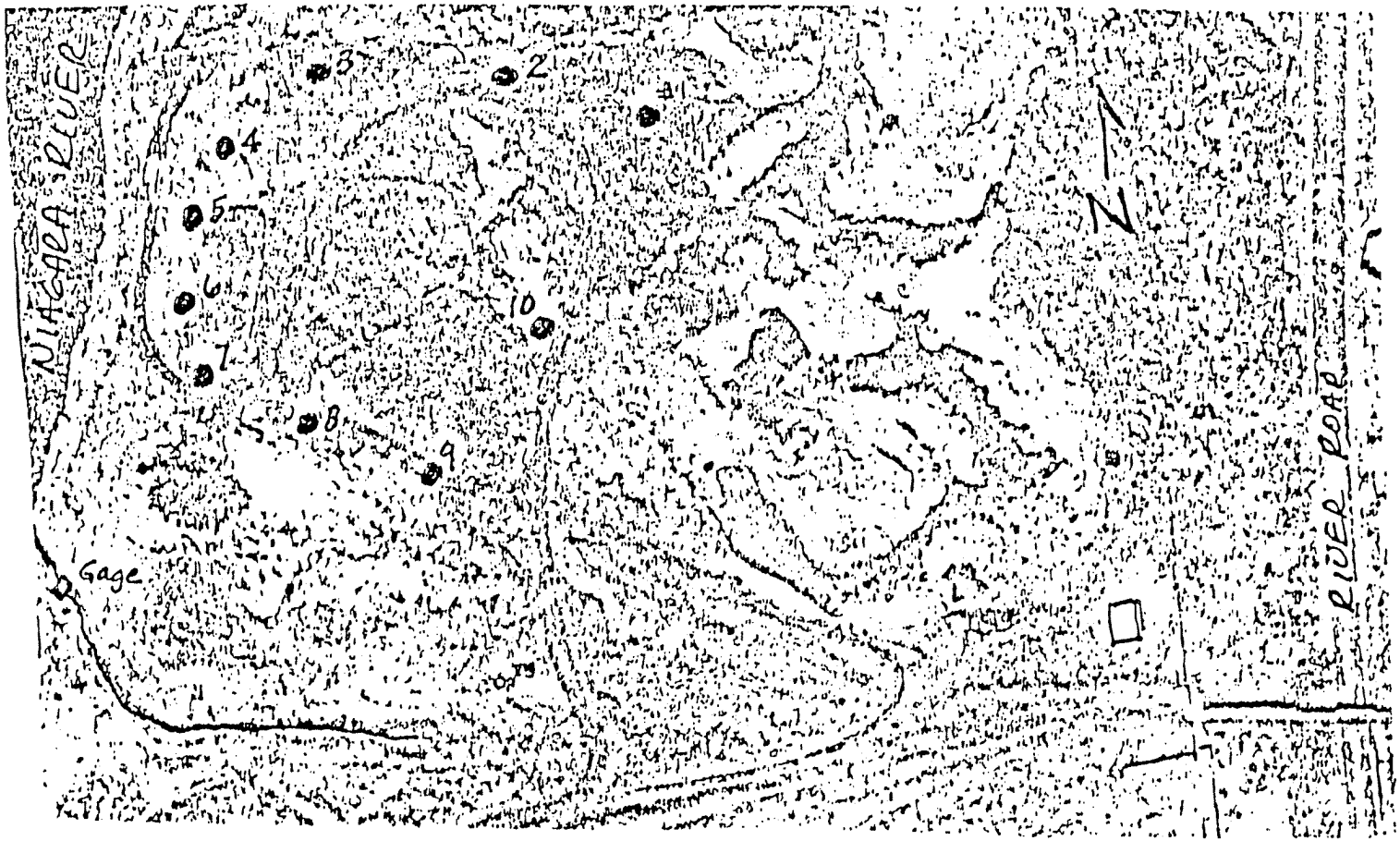
Geologic Information

The site consisted of wetlands and glacial lacustrine deposits prior to grading and seeding. The bedrock underlying the site is Camillus Shale.

Ten test borings were drilled on the site and their locations are shown in figure 1. The geologic description of the borings is as follows:

Well No.	Depth (ft)	Description
1	0 - 1.5	Topsoil.
	1.5 - 14.5	Black foundry sand, asphaltic smell, debris, rubble, everything. Hit hard zone at 14 ft; could barely make 6 inches more. SAMPLE: 14 ft.
2	0 - 15.0	Black and gray zones of foundry sands, debris. Hit hard zone at 15 ft. SAMPLE: 15 ft.
3	0 - 18.0	Black foundry sands, debris.
	18.0 - 18.5	Gravel and pebbles.
	18.5 - 21.5	Sand, black, wet.
	21.5 - 26.5	Clay, gray-green. SAMPLE: 18.5 ft.
4	0 - 16.5	Black foundry sands, cinder ash? debris.
	16.5 - 19.5	Same but saturated.
	19.5 - 21.5	Clay, gray-green. SAMPLE: 16.5 ft

-continued-



USGS, 1982

Figure 1. Location of sampling sites on the INS Equipment Corp. property

USGS, 1982

Well No.	Depth (ft)	Description
5	0 - 6.5	Black foundry sands, dry.
	6.5 - 11.5	Same, with rubble-gravel.
	11.5 - 16.5	Same with nuts, bolts, rubber hoses, wood, metal bindings, wet at 15 ft.
		SAMPLE: 15 ft.
6	0 - 6.5	Foundry sand, black to brown, medium.
	6.5 - 11.5	Same rubble at 10 - 11.5.
	11.5 - 16.5	Sand, brown to black, rubble, hard drilling, no returns.
	16.5 - 21.5	No returns, gray-green sandy clay on bit.
		SAMPLE: 20 ft.
7	0 - 8.0	Slag on top, then foundry sand, then limestone--couldn't drill.
		SAMPLE: 8 ft.
8	0 - 9.0	Topsoil, brown to black, slag, debris, gravel, hard drilling.
	9 - 15.0	Gravel, gray and pea rock. Can't drill through.
		SAMPLE: 14 ft.
9	0 - 0.5	Black cinder ash.
	0.5 - 4.0	"Iron ore" with gravel, couldn't drill through.
		SAMPLE: 4 ft.
10		Note: Had to move twice to get around hard zone at 1.0 ft. Tried again--still drilling in fresh wood. Fourth try:
	0 - 1.5	Topsoil and wood.
	1.5 - 4.0	Sand, dark brown to black, gravel, can't drill through.
		SAMPLE: 4 ft.

Hydrologic Information

Ground water was encountered in two of the ten boreholes at depth of 15 and 18 ft below land surface. Past history of the site indicated that some areas of the site were wetlands. The direction of ground-water flow is probably toward the Niagara River.

USGS, 1982

Chemical Information

A soil sample was collected at each borehole as indicated in the geologic descriptions. Each sample was analyzed for cadmium, chromium, iron, lead, and organic compounds using a GC/MS acid-base neutral scan. The organic analyses were performed by Mead Laboratories. The results of all the analyses are shown in table 1.

USGS, 1982

Table 1 .--Analyses of substrate samples from I.N.S. Equipment Corporation, Tonawanda, New York

	Sample Number				
	1	2	3	4	5
Date collected	081082	081082	081082	081082	081082
Depth (ft)	14.0	15.0	20.0	16.5	15.0
Sample Type[1]	s	s	s	s	s
pH					
Conductivity (uMHOS)					
Temperature (°C)					
Inorganic Constituents[2]					
Antimony					
Arsenic					
Cadmium	53000	20000	<1000	5000	6000
Chromium	430000	70000	3000	30000	180000
Copper					
Iron	1000000000	26000000	3700000	16000000	41000000
Lead	2500000	630000	10000	110000	170000
Mercury					
Nickel					
Selenium					
Zinc					
Flouride					
Sulfide					
Cyanide					
Organic Compounds[2]	(Mead)	(Mead)	(Mead)	(Mead)	(Mead)
2,4-Dimethyl-1,3-Dioxalane[4]	30000	-	-	-	-
1,3-Dimethylbenzene[4]	5200	-	-	-	-
Decane[4]	25000	-	-	-	-
Undecane[4]	55000	-	-	-	-
Tridecane[4]	90000	-	23000	-	26000
Tetradecane[4]	270000	13000	-	-	82000
Hexadecane[4]	305000	-	64000	-	-
Heptadecane[4]	160000	-	-	-	600000
Octadecane	310000	-	-	-	550000

1 Sample type: gw=ground water, sw=surface water, and s=substrate.
2 Concentrations: ug/L for water and ug/Kg for substrate. Blank spaces indicate that no analyses were performed; dashes indicate that constituents and compounds were not found.
3 Cu(D): analysis done by direct aspiration because of high iron concentration.
4 Identity determined by library match; no standard available. Concentration results are semiquantitative and are based on the response factor of the internal standard.
5 Identity based on less than library match; identification seemed reasonable. As for footnote 4, concentration results are semiquantitative.
6 Volatile found in GC/ms extractions. Concentration results probably less than actual.
7 Low surrogate recoveries.
8 Estimated value less than detection limit.
(Mead): Analyses performed by Mead CompuChem, Inc., Research Triangle Park NC

USGS, 1982

Table 1 .--Analyses of substrate samples from I.N.S. Equipment Corporation, Tonawanda, New York--continued

	Sample Number				
	1	2	3	4	5
Organic Compounds[2] (continued)					
Eicosane[4]	188000	-	-	-	570000
Hexcicosane[4]	97000	-	-	-	-
2,6,10,14-Tetramethyl-heptadecane[4]	88000	-	-	-	63000
4-Methyldecane[4]	7300	-	-	-	-
Dodecane[4]	-	-	5300	-	-
2,6,11-Trimethyldodecane[4]	-	-	8700	-	-
Pentadecane[4]	-	-	-	-	260000
2-Methylpentadecane[4]	-	-	-	-	49000
Phenol	61000	-	-	-	-
2-Methylphenol	11000	-	-	-	-
4-Methylphenol	43000	-	-	<100008	-
2,4-Dimethylphenol	62008	-	-	-	-
2-Methylnaphthalene	66008	-	-	-	<200008
Naphthalene	77008	-	-	-	<100008
Acenaphthalene	62008	-	-	-	68008
Flourene	87008	-	-	-	
Phenanthrene	41000	-	<100008	<100008	33000
Anthracene	<100008	-	-	-	-
Flouranthene	25000	-	-	-	-
Pyrene	18000	-	-	-	17000
Di-n-butyphthalate	46008	-	-	-	11000
Benzo(a)anthracene	48008	-	-	-	<100008
Chrysene	47008	-	-	-	<100008
Bis(2-ethylhexl)-phthalate	52000	-	<100008	-	5000
Dibenzofuran	-	-	-	-	62008

1 Sample type: gw=ground water, sw=surface water, and s=substrate.
2 Concentrations: ug/L for water and ug/Kg for substrate. Blank spaces indicate that no analyses were performed; dashes indicate that constituents and compounds were not found.
3 Cu(D): analysis done by direct aspiration because of high iron concentration.
4 Identity determined by library match; no standard available. Concentration results are semiquantitative and are based on the response factor of the internal standard.
5 Identity based on less than library match; identification seemed reasonable. As for footnote 4, concentration results are semiquantitative.
6 Volatile found in GC/ms extractions. Concentration results probably less than actual.
7 Low surrogate recoveries.
8 Estimated value less than detection limit.

USGS, 1982

Table 1 .--Analyses of substrate samples from I.N.S. Equipment Corporation, Tonawanda, New York--continued

	Sample Number				
	6	7	8	9	10
Date collected	081082	081082	081082	081082	081082
Depth (ft)	20.0	8.0	14.0	4.0	4.0
Sample Type[1]	s	s	s	s	s
pH					
Conductivity (uMHOS)					
Temperature (°C)					
Inorganic Constituents[2]					
Antimony					
Arsenic					
Cadmium	1000	4000	1000	2000	2000
Chromium	7000	120000	30000	20000	120000
Copper					
Iron	6000000	29000000	2900000	25000000	19000000
Lead	30000	120000	30000	130000	100000
Mercury					
Nickel					
Selenium					
Zinc					
Flouride					
Sulfide					
Cyanide					
Molecular sulfur			44000		
Organic Compounds[2]	(Mead)	(Mead)	(Mead)	(Mead)	(Mead)
1,5-Hexadiyne[4]	30000	-	-	-	
Cyclohexane[4]	11000	-	-	-	
3-Hexen-2-one[4]	4900	-	-	-	
Hexadecane[4]	-	2500	-	-	
4-Methylphenanthrene[4]	-	-	-	18000	
2-Phenynaphthalene[4]	-	-	-	7100	
1-Methylpyrene[4]	-	-	-	9500	
7 H-Benzo(DE)-Anthracene-7-one[4]	-	-	-	17500	

[1] Sample type: gw=ground water, sw=surface water, and s=substrate.
[2] Concentrations: ug/L for water and ug/Kg for substrate. Blank spaces indicate that no analyses were performed; dashes indicate that constituents and compounds were not found.
[3] Cu(D): analysis done by direct aspiration because of high iron concentration.
[4] Identity determined by library match; no standard available. Concentration results are semiquantitative and are based on the response factor of the internal standard.
[5] Identity based on less than library match; identification seemed reasonable. As for footnote 4, concentration results are semiquantitative.
[6] Volatile found in GC/ms extractions. Concentration results probably less than actual.
[7] Low surrogate recoveries.
[8] Estimated value less than detection limit.
(Mead): Analyses performed by Mead CompuChem, Inc., Research Triangle Park NC

USGS, 1982

Table 1 .--Analyses of substrate samples from I.N.S. Equipment Corporation, Tonawanda, New York--continued

	Sample Number				
	6	7	8	9	10
Organic Compounds[2] (continued)					
Benzo(k)phenanthrene[4]	-	-	-	6000	
Perylene[4]	-	-	-	16000	
Bis(2-ethylhexl)phthalate	-	<100008	-	-	
Dibenzofuran	-	-	-	12000	
Flourene	-	-	-	13000	
Phenanthrene	-	-	-	70000	
Anthracene	-	-	-	26000	
Flouranthene	-	-	-	150000	
Pyrene	-	-	-	88000	
Benzo(a)anthracene	-	-	-	47000	
Chrysene	-	-	-	35000	
Benzo(a)pyrene	-	-	-	23000	
Indeno(1,2,3-C,D)pyrene	-	-	-	180008	
Dibenzo(a,h)anthracene	-	-	-	59008	
Benzo(g,h,i)prylen	-	-	-	150008	
Benzo(b)flouranthene	-	-	-	33000	
Benzo(k)flouranthene	-	-	-	33000	
2-Methyl naphthalene	-	-	-	<200008	
Acenaphthylene	-	-	-	21000	

1 Sample type: gw=ground water, sw=surface water, and s=substrate.
2 Concentrations: ug/L for water and ug/Kg for substrate. Blank spaces indicate that no analyses were performed; dashes indicate that constituents and compounds were not found.
3 Cu(D): analysis done by direct aspiration because of high iron concentration.
4 Identity determined by library match; no standard available. Concentration results are semiquantitative and are based on the response factor of the internal standard.
5 Identity based on less than library match; identification seemed reasonable. As for footnote 4, concentration results are semiquantitative.
6 Volatile found in GC/ms extractions. Concentration results probably less than actual.
7 Low surrogate recoveries.
8 Estimated value less than detection limit.

COUNTY OF ERIE
DEPARTMENT OF ENVIRONMENT AND PLANNING
DIVISION OF ENVIRONMENTAL CONTROL

* * * MEMORANDUM * * *

(Koczaja, 1983)

(7)

FROM: Ronald D. Koczaja DATE: 10/6/83

TO: Donald Campbell

SUBJECT: Review of Consultants Report
INS Equipment & NMPC "Cherry Farm"

I.N.S. Equipment

This site was evaluated by Dames & Moore (under subcontract th Earth Sciences, Inc.). The report included additional information regarding the depth of fill, materials disposed of on site and current owner. Continued study through a phase II evaluation was recommended at a projected cost of $24000.

The site is currently owned by Mr. Matthew Duggan (Amherst) and the Clarence Materials Corp. Materials disposed of on site include foundry sands, pit sludges and cutting oils. Barrel disposal was also indicated for this site. Filling was reported to have reached a depth of 20 feet in some places.

I.N.S. equipment site received an overall Mitre score of 16.7. The groundwater hazard potential was scored at 4.0 and the surface water contamination potential was scored as 28.6. A high surface water source was reached due to a potable water supply intake located within 3 miles downstream of the site. The intake reported s for the ~~Erie County Water Authority~~ plant. This plant is located upstream of the site. The nearest downstream intake, City of Tonawanda, is believed to be located more than three stream miles downstream of the site. Scores assigned were also based on an inadequate data base, according to the consultant.

Inadequacies in available data cited by the consultant include:

1) Limited data on release of contaminants to groundwater, surface water, and air.

2) The only analytical data results are from the 1982 USGS study.

The consultant also reported two endangered species near the site, Falco Peregunus and Haliacetas Lecocephalus.

Recommended Phase II actions have been proposed to further

study of the site. Groundwater monitoring has been proposed with ee wells suggested. Three surface water monitoring points have ,en proposed. Sample analysis would include Cd, Pb, Cr and a GC/MS ,can. This would expand upon or confirm the USGS data. Air over the site would be monitored with an OVA meter. The additional Phase II data generated will allow completion of the Hazard Rating Score. hase II will also include a conceptual evaluation of remedial alternatives and choice of the most favorable alternative. Phase II work will conclude with the completion of an investigation report.

The Dames & Moore report reviewed the USGS analytical data in the context of this site only. Data obtained from the sites on the River Rd. area indicate a general level of contamination may exist throughout this industrial area. The data generated for sites in this area should be compared against a background level and not considered independently.

Cherry Farm

This site was also evaluated by Dames and Moore. The consultant was able to obtain information not contained in the DEP ·ofile. Additional information included waste description and a more complete site history. Insufficient data was available for completion of a Hazard Rating Score in the opinion of the consultant. The lack of sufficient data resulted in a low Phase I score. The site received a overall score of 10.2 with a groundwater hazard potential score of 0.0 and a surface water hazard potential score 17.7. A phase II evaluation was proposed which would provide data to complete the Hazard Rating Score. The proposed study would cost an estimated $35,000.

Additional historical information uncovered by the Dames and Moore team included site ownership and operation data as well as waste materials received. Niagara Mohawk Power Corporation obtained the property in 1957. Shortly there-after the site was leased to the Seaway Corp. for operation. Seaway operated the site during the ·eriod 1957 to 1970. While under Seaway operation the site received .yash (112,000 tons/year), bottom ash (23,000 tons/year) , foundry sand, slag, and liquid boiler cleaning waste. Frontier Chemical Waste Co. operated the site from 1970 to 1972. It has been rumored, but not confirmed, that the site also received chlorinated benzene tars from Hooker-Durez Division.

The consultant concluded that a Phase II study was needed to supplement known information and allow completion of a Hazard Ranking Score. Their Phase II proposal would collect additional (air and groundwater) field data, complete a conceptual evaluation of remedial alternatives with a cost estimate for the most feasible alternative, and prepare a site investigation report. Samples would be analyzed for Hg, Pb, phenol and include a GC/MS scan. The air would be monitored with a OVA meter. The cost estimate for the Phase II study is $35,000 with an expenditure of 342 manhours.

The recommendation for further site monitoring is in conflict with the EPA Superfund consultant report (Fred C. Hart Assoc.) which stated "no evidence of chemical dumping... site appear

(Koczaja 1983)

RECORD OF TELEPHONE CONVERSATION

DATE 9/20/85 ~8:30am JOB NO.: Phase II (8)

RECORDED BY: E D Gilman OWNER/CLIENT: NYSDEC

TALKED WITH: Ron Koczaja OF Erie Co DOH

NATURE OF CALL: INCOMING ☐ OUTGOING ☒

ROUTE TO:	INFORMATION	ACTION

MAIN SUBJECT OF CALL: groundwater use at INS Allied-Hopkins and Allbjt sites

ITEMS DISCUSSED:

Koczaja gave me the following information

INS - No known useage of upper aquifer
3 very deep (1000' possibly) bedrock wells may be used for cooling water supply at Dunlop (cor River Rd & Sheridan), 1.2 miles S of site. When it is in use, no one theoretically should come in contact with it, but, conservatively speaking, a range may be 0-20 people

Allied Chem - Hopkins St / Allbjt | No use for either shallow or deep aquifers within 2 or 3 miles of site
Donna Hanna Coke Company had an industrial well, but the factory is closed down now.

LARRY, 6/21/85

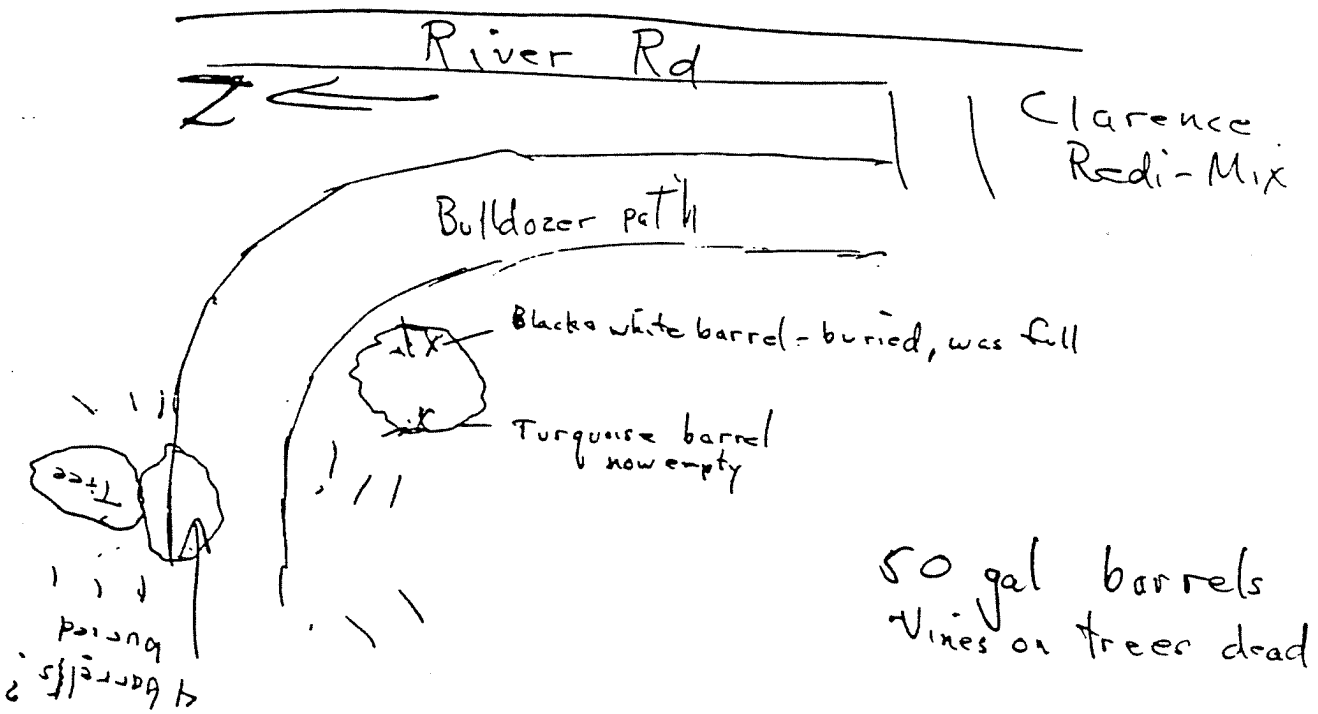
Here are some notes + maps that will help you find the drums. JACK KRAJE 6/20/85

I.N.S. site visit

Jim Heineman } DOT
Jim Ebersole }

(Kraje, 1985) (9)

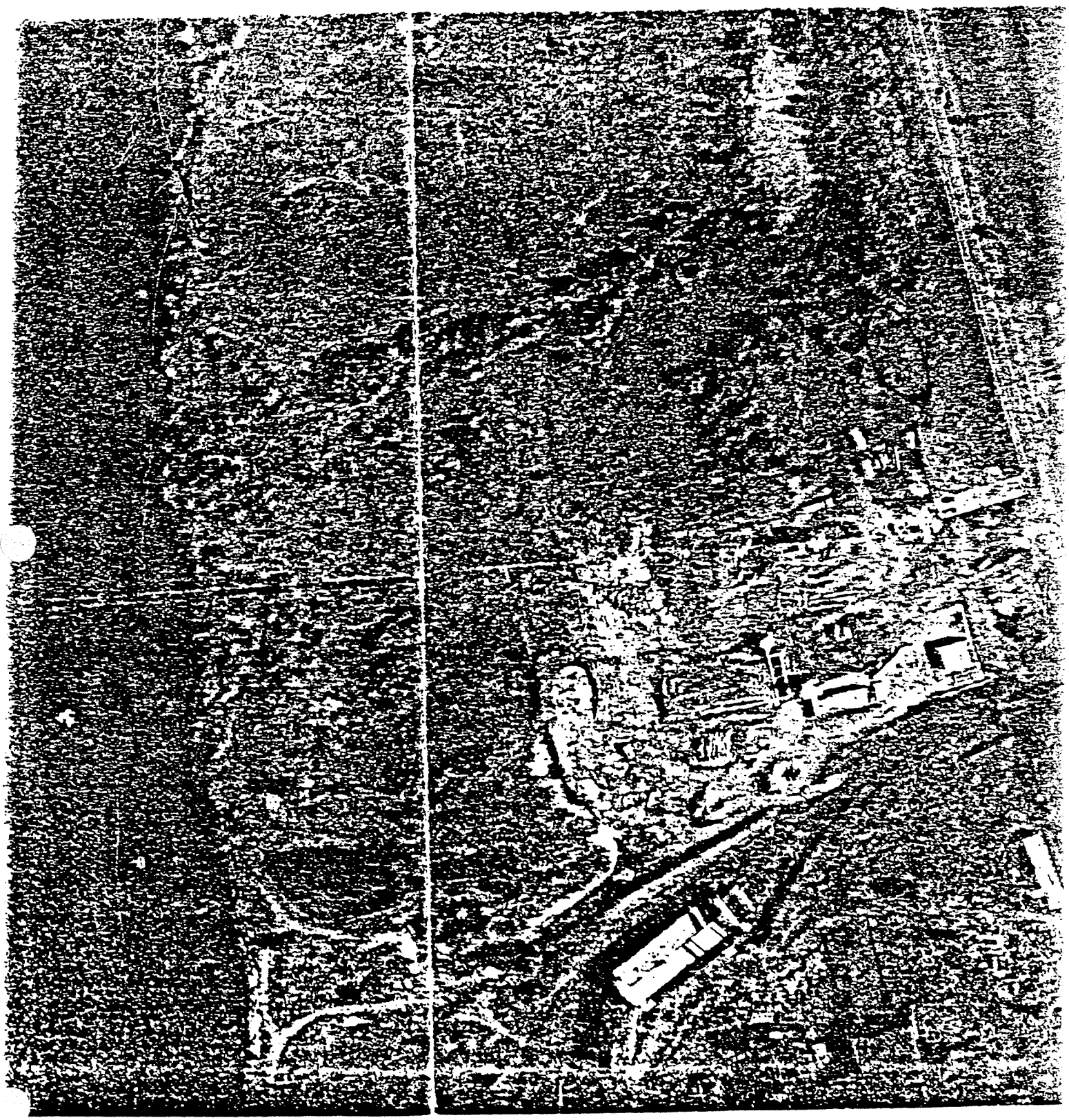
Site map (N.T.S.)



50 gal barrels
Vines on trees dead

Discovered ≈ 3 wks ago

NYS DOT
Indian Rd
Depew 14224



(Kraje, 1985)



Site Inspection Report

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

EPA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	915031

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
INS Equipment Site	West side of River Road

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Tonawanda	NY	14150	Erie	029	36

09 COORDINATES LATITUDE	LONGITUDE
42° 59' 23.3"	78° 56' 04.9"

10 TYPE OF OWNERSHIP (Check one)
☒ 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
8 / 27 / 85 (MONTH DAY YEAR)	☐ ACTIVE ☒ INACTIVE	BEGINNING YEAR _____ 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.
Eileen Gilligan	Geologist	Dames & Moore	(315) 638-2572

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
			( )
			( )
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
			( )
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☐ PERMISSION ☐ WARRANT	19:26	Clear and sunny

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
W. G. Christopher	Engineering-Science	(315) 451-9560

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
E. D. Gilligan		Dames & Moore	315-638-2572	8 / 27 / 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	915031

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☒ A. SOLID
- ☐ 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 550,000
- NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- ☒ 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	Unknown		Foundry sand
OLW	OILY WASTE	Unknown		Cutting oils
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	Unknown		Stored in lagoon
IOC	INORGANIC CHEMICALS	Unknown		Grinding waste
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	Lead	7439921	Landfill	236	mg/kg
OCC	Benzene	71432	Lagoon, landfill	96	ug/l
MES	Chromium	7440473	Landfill	3,300	mg/kg
OCC	2-butanone	78933	Lagoon, landfill	84	ug/l
OCC	Toluene	108883	Lagoon, landfill	21	ug/l
OCC	1,1 dichloroethane	1300216	Lagoon, landfill	28	ug/l
MES	Cadmium	7440439	Landfill	4.5	ug/l

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)

USGS, 1982; Kocjaza, 1983; NYSDOH, 1984; Kraje, 1985; Phase II Investigation, 1985

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	915031

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION
02 ☐ OBSERVED (DATE: 8/27/85) ☐ POTENTIAL [X] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 18,538
04 NARRATIVE DESCRIPTION

Groundwater contamination detected (Phase II Investigation, 1985).

01 [X] B. SURFACE WATER CONTAMINATION
02 ☐ OBSERVED (DATE: 4/85) ☐ POTENTIAL [X] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

Surface water contamination affected.

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

No contamination detected with NHu meter during Phase II field activities in 1985.

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

None known.

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

None known.

01 [X] F. CONTAMINATION OF SOIL
02 ☐ OBSERVED (DATE: 1982) ☐ POTENTIAL [X] ALLEGED
03 AREA POTENTIALLY AFFECTED: 23 (Acres)
04 NARRATIVE DESCRIPTION

USGS Soil sampling found heavy metals and organics in soil.

01 [X] G. DRINKING WATER CONTAMINATION
02 ☐ OBSERVED (DATE: 8/27) [X] POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 18,538
04 NARRATIVE DESCRIPTION

Potential due to location of site upstream of municipal water intakes in Niagara River, groundwater and surface water contamination detected (NYS Atlas of Community Water System Sources, 1982).

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

No workers on landfill area.

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

Site is unused by public.

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	915031

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

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

No apparent damage.

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

No apparent damage.

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

None apparent.

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills/Runoff/Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: 8/85) ☐ POTENTIAL ☒ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

Pieces of broken concrete and rusty barrels protruded from fill area.

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

None known.

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

None known.

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

Potential for illegal dumping due to unfenced, unguarded condition of area.

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

None.

III. TOTAL POPULATION POTENTIALLY AFFECTED: 18,578

IV. COMMENTS

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

USGS, 1982; NYS Atlas of Community Water System Sources, 1982; Site Inspection, 1985; Phase II Investigation, 1985.

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	915031

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 None				
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☒ G. STATE (Specify) SPEDES	NY-000-2399	11/1/83	11/1/88	at Tonawanda Coke Outfall
☐ 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	2-3	DR
☒ D. TANK, ABOVE GROUND	1	TK
☐ E. TANK, BELOW GROUND		
☒ F. LANDFILL	550,000	cu.yds.
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ 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

23 (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.

Old rusted drums, no liner under waste fill, unlined lagoon on-site.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☒ YES ☐ NO

02 COMMENTS

No fences or restrictions.

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

USGS, 1982; Kraje, 1985; Site Inspection, 1985.

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	915031

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. 3 (mi)
B. _____ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☐ B. DRINKING (Other sources available) ☒ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) ☐ D. NOT USED, UNUSEABLE

COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available)

02 POPULATION SERVED BY GROUND WATER Unknown

03 DISTANCE TO NEAREST DRINKING WATER WELL More than 4 (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
7 - 18 (ft)	NW, N, NE	Approx. 10 (ft)	Unknown (gpd)	☐ YES ☒ NO

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

Four monitoring wells exist in the fill area. One well, used for truck-wash water is located on Clarence Materials property.

10 RECHARGE AREA		11 DISCHARGE AREA	
☒ YES ☐ NO	COMMENTS	☒ YES ☐ NO	COMMENTS Groundwater discharges into Niagara River at western boundary of site.

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	☐	0.0 (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. 3249 NO. OF PERSONS	B. --- NO. OF PERSONS	C. 43797 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION

1.1 (mi)

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

3500

04 DISTANCE TO NEAREST OFF-SITE BUILDING

0.1 (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)

Area is largely industrial.

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	915031

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
45 (ft)	Unknown (ft)	Unknown

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE		
		SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
8 (in)	2.1 (in)	0 %	Radial	0.65 %

09 FLOOD POTENTIAL

SITE IS IN 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. (mi)	B. 0.0 (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

More than 2 (mi)

ENDANGERED SPECIES: Golden eagle, bald eagle Peregrine Falcon

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. 1.5 (mi)	More than C. 2 (mi)	More than D. 2 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

At the present time, the site is level and covered with tall grasses. The western boundary is formed by the Niagara River. A stream forms the northern border, and follows west into the Niagara River. This stream is routinely dredged by NYSDOT. Two retention ponds are located in the southwest corner; water from these ponds discharges into the Niagara River.

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

USGS Topographic Maps; Air photos of area; Sneider, 1985; Site Visit, 1985

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	915031

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03. ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	4	NUS	Oct.,1985
SURFACE WATER	2	NUS	July, 1985
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER Sediment	2	NUS	July, 1985

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
Air Quality	HNu photoionization meter survey during Phase II field activities.

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☒ GROUND ☒ AERIAL

02 IN CUSTODY OF Dames & Moore - Syracuse Office
(Name of organization or individual)

03 MAPS ☒ YES ☐ NO

04 LOCATION OF MAPS: Dames & Moore - Syracuse Office

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

Geophysical survey of site to provide subsurface stratigraphic information and to assist in locating driling location. Gamma logging of monitoring wells.

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

Phase II Investigation, 1985.

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	915031

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER	04 SIC CODE
Mr. Matthew Duggan		
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		
85 Crosby Blvd.		
05 CITY	06 STATE	07 ZIP CODE
Amherst	NY	14226
01 NAME	02 D+B NUMBER	04 SIC CODE
Clarence Material Corp.		
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		
River Road		
05 CITY	06 STATE	07 ZIP CODE
Tonawanda	NY	

PARENT COMPANY (If applicable)

08 NAME	09 D+B NUMBER	11 SIC CODE
10 STREET ADDRESS (P.O. Box, RFD #, etc.)		
12 CITY	13 STATE	14 ZIP CODE
08 NAME	09 D+B NUMBER	11 SIC CODE
10 STREET ADDRESS (P.O. Box, RFD #, etc.)		
12 CITY	13 STATE	14 ZIP CODE

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

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

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

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

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

NYSDEC

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	915031

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME	02 D+B NUMBER
Same	

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

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER

OPERATOR'S PARENT COMPANY (If applicable)

10 NAME	11 D+B NUMBER

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

14 CITY	15 STATE	16 ZIP CODE

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

01 NAME	02 D+B NUMBER
Unknown	

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

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

10 NAME	11 D+B NUMBER

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

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D+B NUMBER

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

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

10 NAME	11 D+B NUMBER

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

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D+B NUMBER

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

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

10 NAME	11 D+B NUMBER

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

14 CITY	15 STATE	16 ZIP CODE

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

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	915031

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
Niagara Mohawk			

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
Huntley Power Station			

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
Tonawanda,	NY				

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
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

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

NYS Hazard Registry Sheet

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	915031

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

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	915031

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED 04 DESCRIPTION No	02 DATE	03 AGENCY
01 ☐ S. CAPPING/COVERING 04 DESCRIPTION No	02 DATE	03 AGENCY
01 ☐ T. BULK TANKAGE REPAIRED 04 DESCRIPTION No	02 DATE	03 AGENCY
01 ☐ U. GROUT CURTAIN CONSTRUCTED 04 DESCRIPTION No	02 DATE	03 AGENCY
01 ☐ V. BOTTOM SEALED 04 DESCRIPTION No	02 DATE	03 AGENCY
01 ☐ W. GAS CONTROL 04 DESCRIPTION No	02 DATE	03 AGENCY
01 ☐ X. FIRE CONTROL 04 DESCRIPTION No	02 DATE	03 AGENCY
01 ☐ Y. LEACHATE TREATMENT 04 DESCRIPTION No	02 DATE	03 AGENCY
01 ☐ Z. AREA EVACUATED 04 DESCRIPTION No	02 DATE	03 AGENCY
01 ☐ 1. ACCESS TO SITE RESTRICTED 04 DESCRIPTION No	02 DATE	03 AGENCY
01 ☐ 2. POPULATION RELOCATED 04 DESCRIPTION No	02 DATE	03 AGENCY
01 ☐ 3. OTHER REMEDIAL ACTIVITIES 04 DESCRIPTION	02 DATE	03 AGENCY

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

USGS, 1982; Phase II Investigation, 1985

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	915031

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☒ NO

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

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

Phase II Investigation, 1985.

SECTION VI
PRELIMINARY REMEDIAL ALTERNATIVES AND COST

INTRODUCTION

The purpose of this conceptual remedial alternative evaluation is to identify potential remedial action technologies and prepare a conceptual cost estimate for the most likely remedial alternative for the INS Equipment site. Due to the preliminary nature of the data available, any remedial alternative evaluation must be considered very preliminary and, hence, would be conservative. A more detailed remedial investigation and feasibility study would be required to better define the groundwater flow direction, extent of soil contamination, and the integrity of the lacustrine deposit aquitard in order to determine the design criteria and more accurate costs for the applicable remedial alternatives.

IDENTIFICATION OF REMEDIAL METHODS

The conceptual remedial alternatives considered for the INS Equipment site were subjected to a three-tiered screening process. First, remedial action methods were screened to determine applicability to the site. The methods were selected to conform with the on-site actions for remediation of hazardous material releases, as presented in the National Contingency Plan. Three broad criteria were used in the initial screening: (1) cost of installing or implementing the remedial action, (2) the effectiveness of the action to minimize the threat of harm to public health and the environment, and (3) the feasibility of the remedial action from an engineering standpoint. Remedial action methods were eliminated if they were considered unnecessary at the INS Equipment site. The screening process and rationale for selection of engineering methods is summarized in Table VI-1.

Based on the initial screening, surface water controls, groundwater controls, treatment technologies, and excavation and removal of waste material and contaminated soil were retained to be considered in the secondary screening process.

IDENTIFICATION OF REMEDIAL ACTIONS (SECOND SCREENING)

In the second screening process, the engineering methods identified in the first screening process were further evaluated. The results of the second screening of remedial actions are presented in Table VI-2.

Surface Water Controls

Capping, grading, diversion trenches, revegetation and perimeter fencing of the INS Equipment site were considered to be the feasible remedial actions available for surface water control after the secondary screening. The combination of these actions would prevent ponding and infiltration of rainfall through the landfill. The cap would also cover exposed waste material and hence would protect human health by minimizing direct contact with the landfill.

Groundwater Controls

The groundwater controls retained after the secondary screening include monitoring, containment by a slurry wall or grout curtain, and a groundwater collection trench, in addition to the cap, grading, revegetation, and fencing.

The slurry wall or collection trench would contain the groundwater contamination. Flow of all water through the landfill would be curtailed by a slurry wall and clay cap combination assuming that the lacustrine deposit aquitard beneath the site is relatively impermeable. Lateral flow of groundwater through the waste material would still occur with a groundwater collection trench, but the contaminated groundwater could be collected and treated before being discharged to the local surface water.

Treatment Technology

Treatment of the contaminated groundwater and leachate at the INS Equipment site was considered to be applicable after the second screening. Carbon adsorption would be an efficient method of removing the organic contaminants in the groundwater (phenolics, benzene, xylene, and toluene). Groundwater collection will be required prior to treatment.

Insitu biological treatment was also considered. A treatability study to determine the design criteria should precede any remedial design of this action.

Excavation and Removal

Excavation and removal of contaminated sediments and soil to a secure location were retained as remedial action after the secondary screening process. The creek that runs along the northern boundary of the INS Equipment site was dredged by the NYS Department of Transportation in the summer of 1985 (Kraje, 1985). The quantity of sediments that were removed is unknown. Additional sediment samples should be collected and analyzed before further excavation of the sediments is considered.

Soil contamination was found in the central and northwestern portions of this site, although the extent of contamination is unknown. Test pits should be dug and sampled to define the extent of contamination before this action is given any further consideration.

EVALUATION OF REMEDIAL ALTERNATIVES (THIRD SCREENING)

Screening Methodology

The third screening process involved a more detailed evaluation of several combinations of remedial actions that had passed the first two screening steps. Four alternatives were considered for the INS Equip-

ment site, ranging from monitoring alone, to containment, and to collection and treatment of contaminated groundwater. Alternatives were scored in a general sense (unfavorable, fair, favorable) in each of four categories: technical feasibility, environmental impact, public health risk, and regulatory compliance. The alternatives are listed and ranked in each of these four categories in Table VI-3.

The total score for an alternative is not necessarily an indication of overall acceptability. For example, alternatives may score high in all categories except regulatory compliance, and therefore would be eliminated. Conversely, the monitoring alternative is retained throughout, regardless of its rating, to act as the baseline (i.e., lowest) level of effort for comparison.

The basic elements of each of the four criterion are as follows:

Technical Applicability

The technical applicability of a remedial action refers to its ability to achieve performance standards such as: (a) protection of the groundwater aquifer, and (b) minimization of emissions. In addition, the ease of implementation is important. This criterion provides an effective means of reducing a very large number of alternatives to only those that are applicable from an engineering standpoint.

Environmental Impact

The most important environmental impacts are the potentials for surface water, groundwater and air emission contamination. Each alternative was screened in consideration of its ability to prevent contamination of these three media.

Public Health Risk

The key concern of the Superfund Program is protection of the public health. Potential areas of risk are: contamination of ground-

water supplies and surface water supplies, emissions of volatile hazardous compounds to the atmosphere, spills of hazardous substances during transportation to acceptable disposal sites, exposure of the public or workers to toxic substances during cleanup operations, accidental or purposeful entry by unauthorized personnel into the sites and subsequent contact with hazardous wastes.

Regulatory Compliance/Acceptability

The involved regulatory agencies and their means of responsibility are as follows:

- o New York State Department of Environmental Conservation (Albany)
- o New York State Department of Health
- o Erie County Department of Health
- o New York State Department of Environmental Conservation, Region 9 (Buffalo)
- o U.S. Environmental Protection Agency, Region II (New York)

Prefered alternatives must comply with all regulatory requirements and have regulatory agency support.

Results of Screening

The simplest alternative is to monitor the groundwater and surface water contamination downgradient from the site. This alternative does not prevent further contamination of the aquifer but would indicate the extent and migration of contaminants.

Capping, grading, revegetating, surface water diversion, and fencing was considered to be a feasible alternative (#2) for the INS Equipment site. This alternative would prevent infiltration of rainwater and limit access to the landfill, but would not prevent further lateral movement of groundwater through the waste material.

A slurry wall constructed around the perimeter of the site into the aquitard layer, and dredging of the creek sediments in addition to the capping alternative (#3) might also prevent any further contamination of the groundwater. This alternative, however, is dependent on the integrity of the lacustrine deposit aquitard. Further geological studies are required to determine the integrity of the aquitard before this alternative is considered further.

A fourth alternative would include a groundwater collection trench on the north and west edges of the site. Collected groundwater would be pumped through a carbon adsorption unit to remove the organic constituents. This in addition to a soil cap, revegetation and grading would effectively prevent any further contamination of the downgradient groundwater or surface water.

CONCEPTUAL COST ANALYSIS

A conceptual cost estimate was prepared for the four remedial alternatives developed for the INS Equipment site. It should be recognized that these costs are very preliminary and can be more precisely estimated once a feasibility study is conducted at the INS Equipment site. The capital costs prepared herein include an allowance of 20% for engineering and 30% for contingencies. All costs assume a 23 acre size and a 4,000 feet perimeter around the site. An example of the conceptual cost analysis for one alternative is presented.

Monitoring would be the least costly alternative. No capital costs would be involved in this alternative. A cost of $62,000 for 5 years of semi-annual sampling was estimated to be the total cost associated with this alternative. Because this is not a capital cost, no allowance for engineering or contingency was included.

The total conceptual capital cost for alternative #2 was $2.3 million. This price includes preparation and installation of a 23 acre, 30" clay cap, revegetation, and a new perimeter fence.

Alternative #3 adds a slurry wall to the clay cap alternative to reduce groundwater contamination by lateral movement of water through the fill layer. The clay cap would extend around the perimeter of the site, 4,000 feet and would extend to the aquitard layer approximately 25 feet deep. The integrity of this aquitard layer needs to be verified before the installation of a slurry wall. The total conceptual capital cost estimated for this alternative is $3.5 million.

The total conceptual cost estimate for the fourth alternative was $1.67 million. This includes the installation of a groundwater collection trench, a carbon adsorption treatment process, and a soil cap. The cost estimate for the carbon adsorption treatment system was based on the assumption that 25,000 gallons per day would be treated. The total flow rate of groundwater collected in the trench would have to be determined with a pump test before a better estimate of this quantity can be made. A breakdown of the capital costs incurred in this alternative are presented in Table VI-4. The total cost of this alternative is less than the previous alternatives. However, it should be noted that operation and maintenance costs for the sump pump and treatment process will be incurred for this alternative. In comparison, considerably less operation and maintenance costs will be associated with the clay cap and slurry wall alternative.

TABLE VI-1
IDENTIFICATION OF REMEDIAL ACTION METHODS (FIRST SCREENING)

Method	Applicable	Non-Applicable	Comments
No Action.		X	Groundwater, surface water and sediment contamination found.
Air Emission Controls		X	No air contaminants detected.
Surface Water Controls	X		Hazardous substances found in the downgradient surface water sample.
Groundwater Controls	X		Hazardous substances found in the groundwater samples.
Contaminated Water and Sewer Lines		X	No known municipal sewer or water lines affected.
Treatment	X		Treatment of contaminated groundwater or surface water may be warranted.
Excavation and Removal of Wastes	X		Removal of soil and sediments from the northwest quarter of this site would reduce further contamination of the groundwater and surface water.

TABLE VI-2
PRELIMINARY SCREENING OF REMEDIAL ACTIONS (SECOND SCREENING)

Action	Applic-able	Non-Applic-able	Comments
Surface Water Controls			
Capping	X		Would minimize infiltration of rainfall through waste material and reduce groundwater mounding that occurs in the shallow aquifer.
Grading	X		Prevents ponding.
Revegetation	X		Is necessary to prevent cap from drying out and eroding.
Diversion and Collection System	X		Diversion structures will minimize erosion and surface runoff.
Perimeter Fencing	X		Fencing is necessary to reduce the risk of direct contact.
Monitoring	X		Monitoring of surface water and groundwater is necessary to determine effectiveness of remedial action.
Groundwater Controls			
Capping (including grading and revegetation)	X		Cap would reduce groundwater contamination due to infiltration of rainwater through waste material.
Impermeable Barriers			
Slurry Walls	X		A slurry wall or grout curtain into the lacustrine sediment aquitard around the perimeter of the site would prevent further migration of contamination from this site.
Grout Curtain	X		

TABLE VI-2 (Continued)
PRELIMINARY SCREENING OF REMEDIAL ACTIONS (SECOND SCREENING)

Action	Applic-able	Non-Applic-able	Comments
Groundwater Collection	X		Groundwater can be collected with a trench on the north and west sides of the site. The trench would be to the depth of the aquitard. The groundwater flow direction and the integrity of the aquitard needs to be verified before a trench can be installed. Because of the proximity of the Niagara River, this trench will need an impermeable liner on the downgradient side of the trench.
Permeable Treatment Beds		X	Diversion of the groundwater to a treatment bed would be very difficult and expensive.
Leachate Control			
Subsurface Drains		X	Because the groundwater table is shallow, collection of the leachate alone would not be feasible.
Liners		X	Extensive excavation required to install a liner.
Monitoring	X		Monitoring of the groundwater is necessary to judge effectiveness of remedial action.
Treatment			
Insitu	X		Insitu biological treatment for phenols, benzenes, toluene, and xylenes should be considered. A treatability study to determine design criteria should precede any remedial design.

TABLE VI-2 (Continued)
PRELIMINARY SCREENING OF REMEDIAL ACTIONS (SECOND SCREENING)

Action	Applic-able	Non-Applic-able	Comments
Direct Source Treatment			
Incineration		X	Volume of waste fill is too large to make incineration an economically feasible alternative.
Liquid Waste Treatment		X	No known concentrated liquid wastes at this site.
Groundwater and Leachate Treatment	X		The groundwater can be treated for organic contamination with carbon adsorption.
Surface Water Treatment	X		Treatment of phenolics in surface water by biological and/or carbon adsorption is warranted. A combination of dredging the contaminated sediments and covering the site with a clay cap would reduce the need for surface water treatment.
Gaseous Emissions Treatment		X	No air contamination was detected.
Excavation and Removal			
Excavation of Source Material		X	Hazardous source material is not separable from soil. Total volume of fill material is too great to make excavation of source material economically feasible.
Excavation of Contaminated Soil		X	Volume of contaminated soil is expected to be too great to make this option economically feasible. Further study consisting of test pits can verify the extent of soil contamination.

TABLE VI-2 (Continued)
PRELIMINARY SCREENING OF REMEDIAL ACTIONS (SECOND SCREENING)

Action	Applic-able	Non-Applic-able	Comments
Excavation of Contaminated Sediments	X		Dredging of contaminated sediments would reduce further surface water contamination.

TABLE VI-3
EVALUATION OF POTENTIAL REMEDIAL ALTERNATIVES (THIRD SCREENING)

Alternative No./Description	Technical Feasibility	Environmental Impact	Public Health Risk	Regulatory Compliance/ Acceptance	Comments
1. Monitoring	2	2	2	2	Monitoring will not reduce the present extent of contamination or prevent further cntamination of the groundwater or surface water.
2. Capping, grading, revegetation, surface water diversion and dredging of the sediments from the creek.	3	2	2	2	This alternative will reduce the surface water and groundwater contamination, but will not prevent the migration of contaminants with the groundwater in a lateral direction.
3. Capping, grading, revegetation, surface water diversion, dredging of sediments, and installation of a slurry wall around the perimeter of the site.	3	3	3	3	This alternative will effectively prevent further migration of contaminants from the site. The integrity of the lacustrine sediment layer needs to be verified before implementation of this alternative.
4. Groundwater Collection trench with an impermeable sheet piling face on the downgradient side, treatment with carbon adsorption and a revegetated soil cap.	3	3	3	3	This alternative will prevent further migration of contaminants to the surface water and groundwater. The integrity of the aquitard layer and the groundwater flow direction needs to be verified before implementation of this alternative.

1 = Excellent.
2 = Good.
3 = Fair.

TABLE VI-4
SUMMARY OF CONCEPTUAL REMEDIAL COST ESTIMATE
FOR ALTERNATIVE 4 AT THE INS EQUIPMENT SITE

Item No.	Description	Approximate Cost[1][2]	
I	Preliminary Site Work (grubbing, grading, and surface water diversion ditches).	$ 177,100	(3)
II	Cover and Vegetation (6" topsoil, hydroseeding and mulch).	280,600	(4)
III	Perimeter Fence (4,000' including gates).	52,000	(4)
IV	Collection Trench (excavation and spreading of soil, gravel, fill, concrete drains and sump installation).	70,900	(3)
V	Sheet Piling Cutoff Wall Around Down-Gradient Side of Collection Trench.	400,000	(3)
VI	Carbon Adsorption Treatment System (assumes 25,000 gpd).	133,000	(5)
	Subtotal	$1,113,600	
	Engineering (20%)	222,720	
	Contingency (30%)	334,080	
	TOTAL CAPITAL COSTS	$1,670,400	

(1) Costs are in 1985 $.

(2) These costs are considered preliminary conceptual costs.

(3) Rishel, 1981.

(4) Environmental Law Institute, 1984.

(5) DeWolf, 1984.

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2. Carrington, T. J. and Watson, D. A. (1981). "Preliminary Evaluation of an Alternate Electrode Array for use in Shallow-Subsurface Electrical Resistivity Studies". Groundwater. Vol. 10, No. 1. January - February, 1981.

3. Clare, L. G. (1986), NYSDEC. Comments on Phase II - INS Equipment Report.

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5. Davies, B. E. (1980). Applied Soil Trace Elements. John Wiley and Sons, New York.

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7. Eadie, B. J. (1982). "Polycylic Aromatic Hydrocarbons in Sediments and Associated Benthos in Lake Erie". Chemosphere. Vol. 11, No. 2, pp 185-191.

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23. Rickard, L. V. and Fisher, D. W. (1970). New York Museum and Science Service Map and Chart Series No. 15. "Geologic Map of New York, Niagara Sheet."

24. Rishel, H. L., Boston, T. M., Schmidt, C. J. (1981). Cost of Remedial Response Actions of Uncontrolled Hazardous Waste Sites. EPA Contract #68-01-4885.

INSTRUCTION MANUAL

BISON INSTRUMENTS
EARTH RESISTIVITY
SYSTEMS
MODEL 2350 B



Preliminary Evaluation of an Alternate Electrode Array for Use in Shallow-Subsurface Electrical Resistivity Studies

by Thomas J. Carrington[a] and Don A. Watson[b]

ABSTRACT

Nine electrode arrays were examined under controlled laboratory conditions to evaluate their relative efficiency with regard to time and space requirements, and with regard to effective prediction of subsurface conditions in electrical resistivity surveys. Of the nine investigated, the Wenner and a modification thereof ("Modified Wenner") were selected for field testing and comparison. To a limited extent the Schlumberger array also was compared.

Field testing of the three chosen arrays suggested the superiority of the Modified Wenner over the Wenner array in reliability of data obtained under most conditions examined, speed of completion of a survey and minimal straight-line distance required for a 100-foot (30.5-meter) depth survey. Insufficient data were gathered with the Schlumberger array for proper comparison with the other two arrays.

Subsurface conditions predicted by resistivity data were confirmed by subsurface projections of geological features suggested by previous surficial mapping, by drillers' records and by seismic refraction data.

INTRODUCTION

Background and Purpose of the Research

During the Summer of 1974, shallow subsurface electrical resistivity exploration was conducted about 5 miles (8 km) south of Auburn, Lee County, Alabama. The study area included 3.25 square miles (5.23 sq km) within the poorly-defined boundary between the Alabama Piedmont and the Gulf Coastal Plain. Initial objectives of the study were (1) to study the subsurface configuration of the major angular unconformity between presumed Precambrian metamorphic rocks and overlying, unconsolidated Cretaceous sediments of the Tuscaloosa Group, (2) to identify the types of metamorphic rocks underlying the unconformity, (3) to construct a subsurface contour map of equal resistivities (Schwartz and McClymont, 1977) of the metamorphic rocks and (4) to construct a map of the subsurface topography of the permament water table.

Metamorphic rocks cropping out in the study area (Figure 1) include moderately thick sequences of dolomitic marble, chloritic schist, quartzite, augen gneiss and a feldspathic gneiss. The overlying, fluvial sediments of the Tuscaloosa Group consist of clayey, poorly-sorted, coarse-grained sands and scattered lenses and beds of gravel. Irregularly and locally interfingered with the sands and gravels are red, bioturbated clays and associated light gray-green, locally clayey and medium- to fine-grained sands. The angular unconformity separating the metamorphic rocks from the overlying Tuscaloosa sediments is an erosional surface of more than 250 feet (76 m) of relief as suggested by surficial exposures of the contact.

The resistivity surveys were conducted with a Soiltest R-40C Strata Scout electrical resistivity unit. The instrument is powered by a 6-volt gel-cell battery, and is designed to produce a 65-cycle square-wave alternating current. The manufacturer

[a]Department of Geology, Auburn University, Alabama 36849.

[b]Dixie Well Boring Company, Inc., LaGrange, Georgia 30240.

Discussion open until July 1, 1981.

(Clare, 1986)

3

COMMENT SUMMARY

INS SITE - 915031 LGC - 1/10/86

1) I-1 Site Background

No mention is made of disposal by Wickwire at the site.
What about current disposal of concrete on site by Clarence materials?
Tonawanda Coke's treatment ponds, which are on site are not mentioned.

2) Figure I-2 Incomplete Boundary description missing - railroad, fences, driveway (on easement) for Tonawanda Coke. Concrete rubble pile not shown.

3) III-3 When were water and sediment samples taken? - Before or after ditch cleaning by NYSDOT?

4) Figure III-1 Same comments as 2) above.

5) IV-1 Site Topography

A site profile prepared by Erie County DEP and given to the consultant is not reflected anywhere in this report.
1960 - Settling ponds are shown on the site in 1960. Use unknown.
What about topography? - elevations are not discussed.

6) IV-5 The Tonawanda Coke ponds are periodically dredged to remove coke fines.

7) IV-6 Waste Characterization

It is possible to differentiate between disposal at Cherry Farm and INS.
Coke waste disposal on site is not mentioned. Wickwire use of the site for disposal is not mentioned.

8) IV-7 Does Tonawanda Coke own the land their treatment ponds are on?
This discharge has a SPDES Discharge Permit. Why is it not mentioned?

9) IV-8 Last paragraph

The samples taken do not show contamination of the surface stream by this site. The stream flowing south from the Cherry Farm site was not sampled concurrently.
IT MUST BE to draw any definite conclusions.
Why is it suggested that the phenolic compounds found attributed to Hooker? Tonawanda Coke is actively removing of coke wastes from the pond. Coke has very high phenols.

IV-9 This study has not shown that surface water contamination from the INS site exists.

INTERVIEW FORM

INTERVIEWEE/CODE Lawrence G. Clare /

TITLE - POSITION New York State Dept. Environmental Conservation

ADDRESS 600 Delaware Ave

CITY Buffalo STATE NY ZIP 14202

PHONE (716) 847-4585 . RESIDENCE PERIOD _____ TO _____

LOCATION Phone INTERVIEWER S. Powers

DATE/TIME 9/12/86 / 9:00AM

SUBJECT: INS Equipment

REMARKS: Wickwire Steel Company used the southwest corner of the site (west of the ponds) as for the disposal of their waste material.

Tonawanda Coke, who uses the onsite treatment ponds to separate coke fines from their wastewater have disposed of the coke fine sludge on the INS Equipment site. This activity has been observed by Mr. Clare in 1969, 1970, and 1971.

I agree with the above interview summary:

Signature/Title:

Comments:

5

Applied Soil Trace Elements

Edited by

Brian E. Davies
Department of Geography, University College of Wales, Aberystwyth, Wales

A Wiley–Interscience Publication
1980

JOHN WILEY & SONS
Chichester · New York · Brisbane · Toronto

6

EPA-600/8-84-010
October 1984

The Cost Digest:

Cost Summaries of Selected Environmental Control Technologies

by

Glenn DeWolf, Pat Murin, James Jarvis, and Mary Kelly

Radian Corporation
Austin, TX 78766

EPA Contract No. 68-02-3171

EPA Project Officer
John Milliken
Industrial Environmental Research Laboratory
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

Office of Environmental Engineering and Technology
Office of Research and Development
U.S. Environmental Protection Agency
Washington, DC 20460

osphere, Vol.11, No.2, pp 185 - 191, 1982 0045-6535/82/020185-07$03.00/0
...ted in Great Britain
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Eadie (1982)

7

POLYCYCLIC AROMATIC HYDROCARBONS IN SEDIMENTS AND ASSOCIATED BENTHOS IN LAKE ERIE[1]

Brian J. Eadie*, Warren Faust, Wayne S. Gardner and Tom Nalepa

Great Lakes Environmental Research Laboratory
National Oceanic and Atmospheric Administration
2300 Washtenaw Avenue
Ann Arbor, Michigan 48104

Abstract

Polycyclic aromatic hydrocarbons (PAH) were analyzed in surficial sediments and benthic ...rganisms in southwestern Lake Erie near a large coal fired power plant. Sediment con...centrations (530-770 ppb PAH) were relatively homogenous throughout most of the 150 km^2 area, ...ugh river and nearshore concentrations reached nearly 4 ppm. Oligochaete worms and chiro... midges were near equilibrium with local sediments except for enhanced concentrations in ...nearshore midges.

Introduction

Polycyclic aromatic hydrocarbons (PAH) are compounds of environmental concern (1,2,3). The ...primary sources of these compounds are fugitive emissions from the incomplete combustion of ...fossil fuels (1,4). Their transport in both the atmosphere and aquatic environment is mediated ...by fine particles, indicating eventual concentration in the sediments. While many of this ...family of compounds are known or suspected carcinogens or mutagens, previous work (see 1) indi...cates that bioaccumulation by aquatic organisms generally appears to be small. Data on accumu...lation and biotransformation by freshwater benthos are sparse. This report presents data for ...concentration and distribution of 9 individual PAH among oligochaete worms, chironomids (midges) ...and their associated sediments for a region in southwestern Lake Erie, adjacent to a large coal-...fired power plant. We hypothesized that the plant would act as a source of PAH, both from fuga...tive combustion emissions and from leachates from the coal stored on the lake shore.

Methods

The study site (Figure 1) is located in the western basin of Lake Erie, offshore from the ...Detroit Edison Monroe Power Plant in Southeastern Michigan. The River Raisin, which loads Lake ...Erie with approximately 150,000 MT of suspended solids per year (5), flows past the plant.

[1] GLERL Contribution No. 276.

Eadie (1982)

(7)

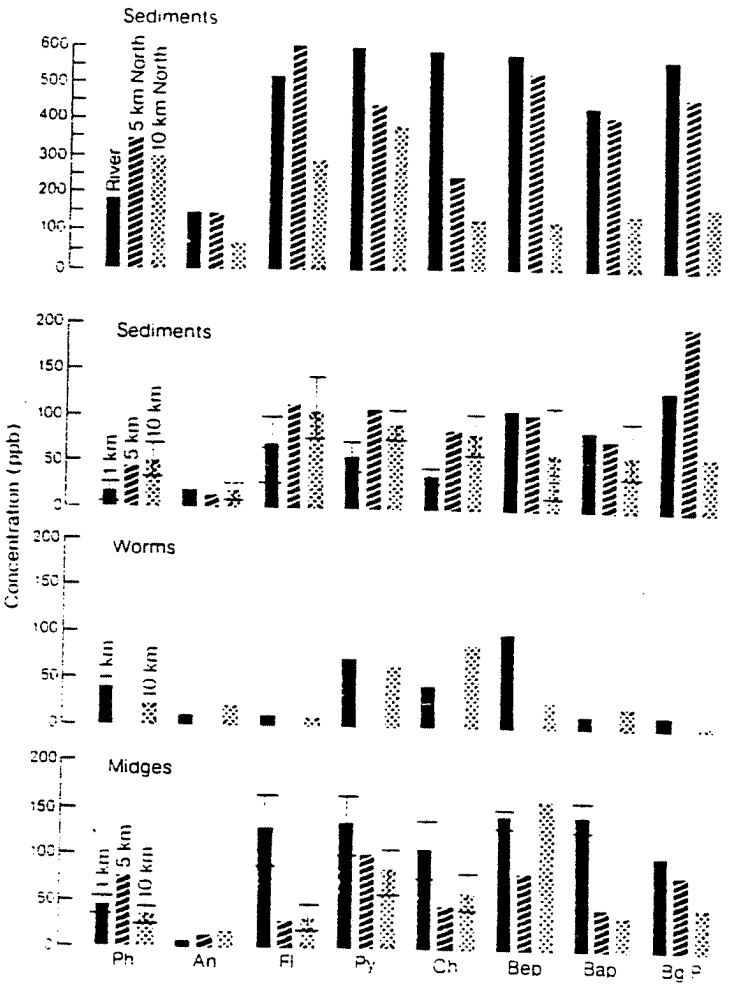


Figure 2. Concentrations of individual PAH. a) River, 5 km and 10 km north. b) Surficial sediments from the remainder of the study area. The bar represents 1 standard deviation from one composite sample and the individual samples shown in figure 1. c) concentrations in oligochaete worms from 1 and 10 km. d) concentration in chironomid midges from 1, 5 and 10 km. Bars represent 1 standard deviation, multiple analyses of a single extract.

Individual PAH concentrations for the samples of worms, midges and sediments from 1, 5 and 10 km offshore are shown in figure 2 (b - d). Since the biomass from the anomalous northern stations was insignificant, sediment concentrations from these stations were not included in the averages.

The sediment samples depicted in figure 2b are the averages of the individual samples for which total PAH are shown in figure 1 and a composite sample (1 tablespoon of surficial mud per grab) from each arc. Except for Benzo ghi Perylene(BgP), PAH were homogeneously distributed within the region.

The worms had rel
pyrene (BeP) (figure 2
lower than their assoc
PAH concentration
with distance offshore
organism concentration
ratios imply that the
nearshore station, but
trend was not observed

Sediments at the
those reported by Lafla
source. Our 1 km sedim
($C_{18}H_{12}$ = 10%) relativ
nearshore sediments are
Hudson Channel sediment
The anomalously hi
tive composition to the

Figure 3. PAH rat
for 1,

ENVIRONMENTAL CONTROL SERIES

Attachment 2

I.N.S. (ECDEP, 1982)

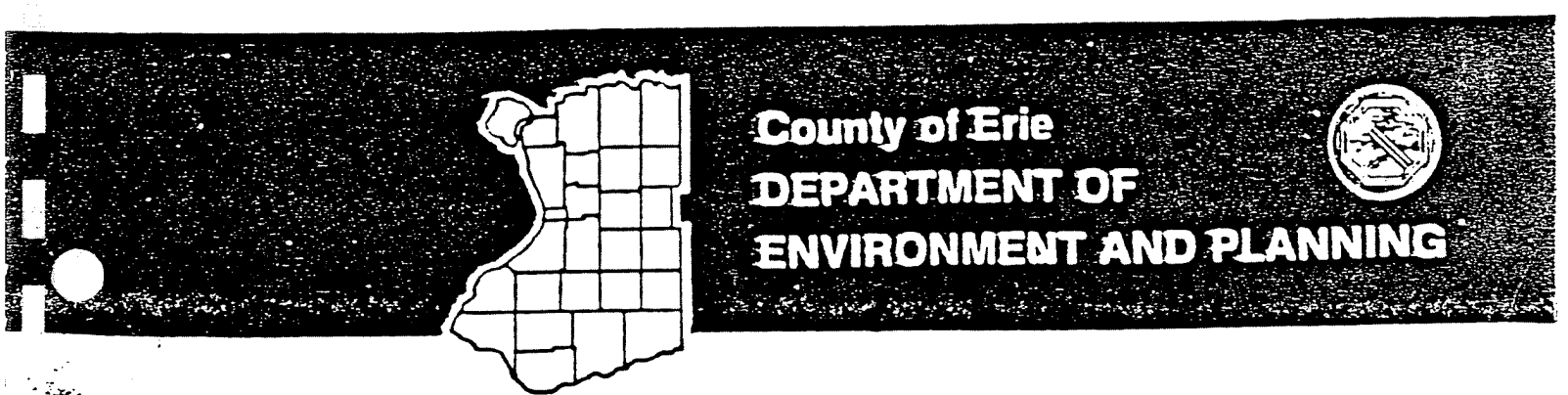
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HAZARDOUS WASTE INACTIVE SITE SURVEY PHASE I - REPORT

FEBRUARY, 1982



DIVISION OF ENVIRONMENTAL CONTROL
SOLID WASTE SECTION



(ECDEP, 1982)

(8)

I.N.S. EQUIPMENT #915031

A landfilling operation reportedly carried out by the I.N.S. Equipment Company was located north of the former Wickwire Steel Plant between the Niagara River and the River Road. This area is also referred to as a portion of the "Cherry Farm". The site is also referred to I.N.S. by the Colorado Fuel and Iron Company for use as a landfill and is presently owned by the Niagara Mohawk Power Company. Since acquisition of the site, Niagara Mohawk has covered, graded and seeded the area. Niagara Mohawk has stated that it has never used the iste as a disposal area. Review of aerial photographs indicated that this site was in operation during the 1960s and 70s. Extensive changes were made in the character of the site as a result of the operation. Little data was available regarding the materials disposed of at this site. It is our opinion that this site could contain industrial waste as the disposal of material here would have been very convenient for nearby industry. The aerial photographs showed that much of the site was swampy and filling into water undoubtedly occurred. It is believed that any leachate or runoff from the site would enter the Niagara River directly.

The New York State DEC sampled soil and surface water on March 27, 1981 at various points around the site. Review of the DEC analytical results found the presence of numerous organic compounds which we would not expect to find naturally. This finding reinforces our suspicion that industrial wastes are buried on site. We would, therefore, recommend a thorough field investigation of the site. The investigation would include

- continued -

(ECDEP, 1982)

(8)

I.N.S. EQUIPMENT #915031 (Cont)

borings with the analysis of water and soil for contamination by such organic pollutants as pyrenes, anthracene, benzene, and phenol as suggested by DEC sampling results. Heavy metals are also recommended in the list of analyses. We suggest the sampling and analysis be carried out by the DEC.

Of the River Road - Tonawanda sites examined, this site poses the most unanswered questions and should be the subject of additional investigation sampling and exploratory borings.

(ECDEP, 1982)

8

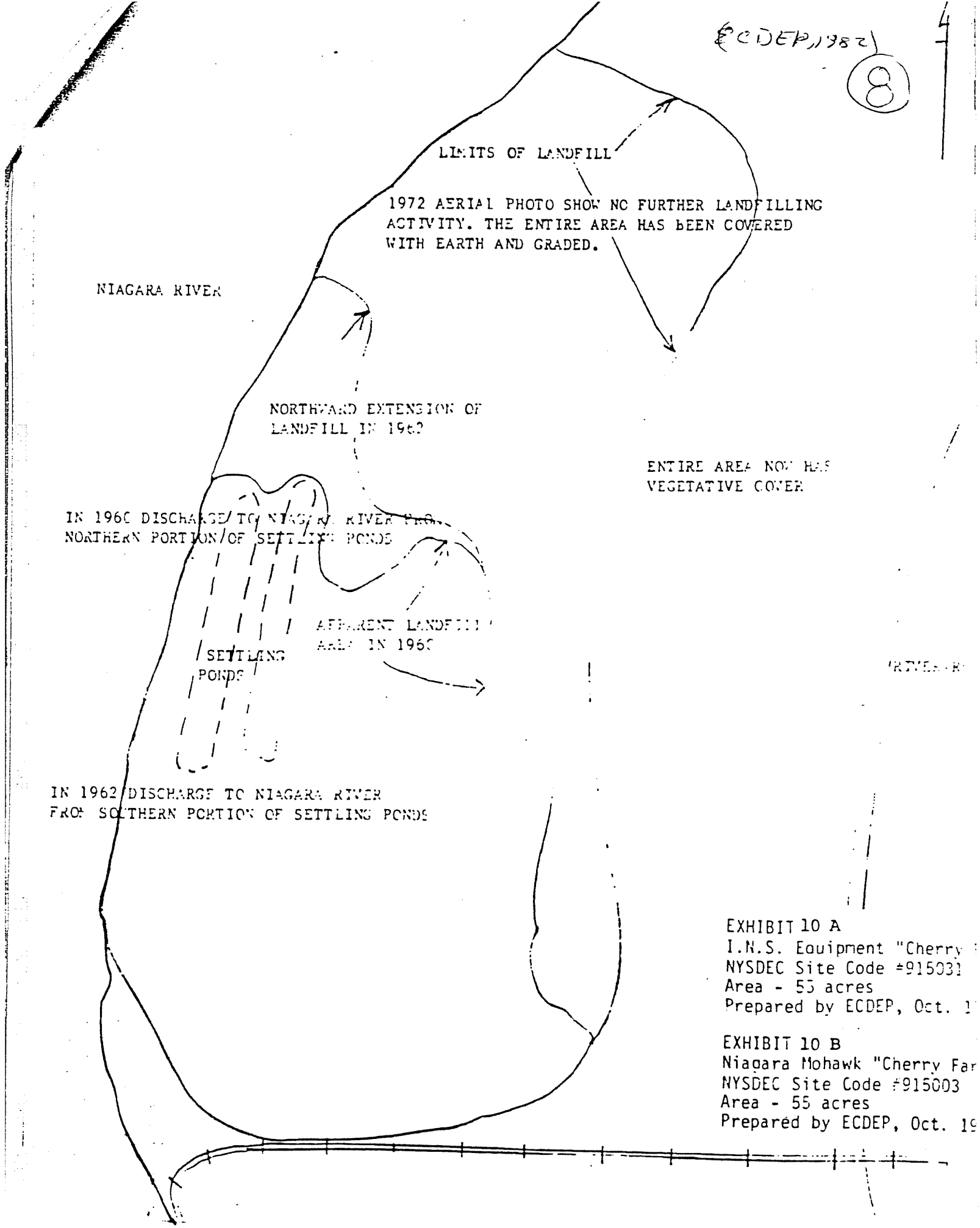


EXHIBIT 10 A
I.N.S. Equipment "Cherry
NYSDEC Site Code #915031
Area - 55 acres
Prepared by ECDEP, Oct. 1

EXHIBIT 10 B
Niagara Mohawk "Cherry Far
NYSDEC Site Code #915003
Area - 55 acres
Prepared by ECDEP, Oct. 19

(ECDEP, 1982)

8

HAZARD ANALYSIS

Site: #915031	Site operated by INS Equipment, portion of "Cherry Farm"
Owner:	Niagara Mohawk Power Corporation 535 Washington Street Buffalo, New York 14203 (Regional Office)
Surrounding Land Use:	Heavy industrial, nearest residential approximately 3/4 mile to the West, 2½ miles to the South, 2½ miles to the East, and ¼ mile to the North.

Anticipated Effect of Disposal Site On:

Groundwater Supplies:	None - Area served by surface source P.W.S.
Surrounding Area:	None - Site inactive and closed and no adjacent residential uses.
Airborne Transport of Pollutants:	None - Site inactive and vegetative cover should prevent airborne dust.
Need For Immediate Action:	None
Need for Future Action:	Field investigation by DEC to include borings sampling analysis.

Journal of
Environmental Quality

VOLUME 12 • OCTOBER-DECEMBER 1983 • NUMBER 4

REVIEWS AND ANALYSES

Polycyclic Aromatic Hydrocarbons (PAH's) in the Terrestrial Environment—A Review[1]

NELSON T. EDWARDS[2]

ABSTRACT

This review, while touching on sources of polycyclic aromatic hydrocarbons (PAH's) and their degradation, emphasizes research that addresses their fate in the terrestrial environment. Typical endogenous concentrations of PAH's in soil and vegetation range from 1 to 10 μg/kg and from 10 to 20 μg/kg, respectively. Endogenous PAH's are due to plant synthesis, forest and prairie fires, volcanoes, etc. Anthropogenic sources are primarily from fossil fuel burning. Estimated annual release of benzo(a)pyrene (BaP) from fossil fuel combustion is 4.6×10^4 kg. Concentrations of PAH's in air, soil, and vegetation vary with distances from known sources. Reported BaP concentrations in air of nonurban areas of the United States ranged from 0.01 to 1.9 μg/m³; concentrations in urban areas ranged from 0.1 to 61.0 μg/m³. Concentrations of BaP in soil may typically reach 1000 μg/kg, and values exceeding 100 000 μg/kg have been reported near known sources. Typically, concentrations for total PAH's (usually the sum of 5 to 20 PAH's) exceed BaP concentrations by at least one order of magnitude. The maximum PAH concentration in vegetation growing near a known source was 25 000 μg/kg, but values more typically range from 20 to 1000 μg/kg. Reported BaP concentrations in vegetation ranged from 0.1 to 150 μg/kg. Concentrations in vegetation were generally less than those in soil where the plants were growing. Concentration ratios (concentration in vegetation/concentration in soil) ranged from 0.0001 to 0.33 for BaP and from 0.001 to 0.18 for the sum of 17 PAH's tested. However, laboratory experiments demonstrated that plants can concentrate PAH's above those found in their environment. Controlled experiments with a few PAH's demonstrated uptake by both leaves and roots and subsequent translocation to other plant parts. Washing leaves of vegetation contaminated with PAH's removes no more than 25% of the contamination. There is some evidence that plants can catabolize PAH's, but metabolic pathways have not been defined well.

Additional Index Words: Benzo(a)pyrene, carcinogens, vegetation, soil plant uptake, sources.

Edwards, N. T. 1983. Polycyclic aromatic hydrocarbons (PAH's) in the terrestrial environment—a review. J. Environ. Qual. 12:427–441.

Polycyclic aromatic hydrocarbons (PAH's) occur naturally in the environment, primarily as a result of synthesis by some plants and formation during natural forest and prairie fires. However, by far the greatest amounts of PAH's released into the environment are formed during fossil fuel combustion and during anthropogenic forest and agricultural fires. The carcinogenic nature of some PAH's led to considerable research into their behavior in the aquatic environment, but relatively little research has been conducted on their fate in the terrestrial environment. Results of research on the movement of PAH's into vegetation directly from the atmosphere and indirectly from soil is somewhat contradictory. However, recent findings indicate that there is a potential for their accumulation in the terrestrial food chain. Most of the research has been on benzo(a)pyrene (BaP), a known carcinogen. The need for more research on a number of carcinogenic PAH's in the environment and an evaluation of research already conducted becomes increasingly important as the combustion of fossil fuel increases to keep pace with

[1] Research sponsored by the Ecological Research Division, Office of Health & Environmental Research, U.S. Department of Energy, under contract W-7405-eng-26 with Union Carbide Corp. Publication no. 2192, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830. Received 7 Mar. 1983.

[2] Research staff, Environ. Sci. Div., Oak Ridge Natl. Lab.

(9)

These collection and extraction problems have implications for all the data presented in this review. Also, the use of BaP as a model PAH has been so prevalent that BaP and PAH are often thought of synonymously. Suess (1976) emphasized that BaP constitutes only 1–20% of the total carcinogenic PAH's. We must be careful about general implications concerning PAH's, based on interpretations of BaP data. Katz and Chan (1980) pointed out that the use of BaP as an index of airborne PAH's may be subject to problems, especially in areas where motor vehicle traffic is one of the primary sources of air pollution. In Los Angeles, for example, the dominant PAH is benzo(ghi)perylene, a PAH with carcinogenic potential.

CONCENTRATIONS IN AIR

Concentrations of PAH's in air vary greatly, both spatially and temporally. Sawicki et al. (1960) examined the BaP content of air in 131 urban and nonurban areas of the United States. In nine large cities, the highest levels of BaP occurred during winter months and the lowest levels occurred during summer. Concentrations of BaP in the air of nonurban areas ranged from 0.01 to 1.9 ng/m^3, while concentrations in urban areas ranged from 0.1 to 61.0 ng/m^3. Pierce and Katz (1975) sampled five locations in the Toronto, Ontario, Canada area and found concentrations of BaP in air to range from 0.11 to 0.83 ng/m^3, with the highest concentrations in urban and suburban areas and the lowest concentrations in suburban-rural and rural areas. Lunde and Bjorseth (1977) and Bjorseth et al. (1979) analyzed air from a sampling station in southern Norway for 22 PAH's and determined the origins of air masses containing the PAH's from trajectories calculated from meteorological data. They found that concentrations were higher in air samples originating in England/France and northern England/Scotland (32 and 28 ng/m^3, respectively) than in air pollutants originating in northern and southern Norway (1.1 and 2.4 ng/m^3, respectively). Values for BaP ranged from 3 to 7% of the total PAH. Gordon (1976) reported the annual geometric mean concentration of 15 PAH's in air samples collected from 13 areas in Los Angeles County, Calif., to be 10.9 ng/m^3. Concentrations of BaP accounted for only 4.2% of the total. Bombaugh et al. (1981) reported maximum ambient concentrations of BaP downwind from a coal gasification plant in Yugoslavia to be ≈80 ng/m^3. The EPA's ambient multimedia environmental goal for BaP is 0.05 ng/m^3 (Bombaugh et al., 1981).

CONCENTRATIONS IN SOIL AND VEGETATION

Relatively few studies quantitied PAH concentrations in soil and vegetation at various distances from known sources. Most of the studies examined concentrations in soil or vegetation, but not both.

Typical concentrations of BaP in soils of the world ranged from ≈100 to 1000 μg/kg. A typical range for total PAH's (i.e., those quantified in the papers examined) was about 10 times the value for BaP alone. The actual measured range of BaP concentrations, including data from very highly polluted areas and from protected remote regions, is 0.4 μg/kg (Shabad et al., 1971) to 650 000 μg/kg (Fritz, 1971). However, BaP concentrations exceeding 1300 μg/kg were very close to known sources (Shabad, 1968; Shabad et al., 1971; Fritz, 1971). These investigators did not analyze the soil for total PAH's. Only 10–15 PAH's were known or suspected to be present in soils in the late 1960's, but with recently developed analytical techniques, these numbers have increased by at least two orders of magnitude (Blumer, 1976). The highest total PAH concentration reported was 300 000 μg/kg for a soil near a highway in Switzerland (Blumer et al., 1977). Shabad et al. (1971) suggest that endogenous BaP concentrations in soil are 1–3 μg/kg and never exceed 10 μg/kg.

The first reported PAH compounds isolated from vegetation was by Guddal (1959), who extracted a mixture of PAH from roots of *Chrysanthemum vulgare* Bernh. grown in the vicinity of a gas works facility in Norway. Three PAH's were identified in the mixture as pyrene, fluoranthene, and anthracene. The concentration of the PAH (12 300 μg/kg of root tissue) was much too great to have been accounted for by plant synthesis. The only concentration reported in the literature that exceeded 12 300 μg/kg was 25 000 μg anthracene/kg orange rind collected near a heavily traveled highway in California (Gunther et al., 1967).

Concentrations of PAH's in vegetation are generally less than concentrations in the soil where they grow. Concentration ratios (conc in vegetation/conc in soil) ranged from 0.002 to 0.33 for BaP. Concentrations of BaP in vegetation ranged from 0.1 (Kolar et al., 1975) to 150 μg/kg (Fritz, 1971), with typical concentrations of 1–10 μg/kg. Only one paper reported PAH data (other than just BaP data) for both plants and soil from the same location. Wang and Meresz (1981) analyzed onions, beets, tomatoes, and soil for 17 PAH's, including BaP. They found most of the PAH contamination in the "peels." Their vegetation/soil concentration ratios ranged from 0.0001 to 0.085 for BaP and 0.001 to 0.183 for total PAH's. Graf and Diehl (1966) suggested that actively growing green plant material has an endogenous concentration of BaP of about 10–20 μg/kg and that plant storage tissues usually contain only 1–10% of that found in the green portions of the plant. Both BaP and total PAH concentrations appeared to be higher in oils extracted from plants (Stevcevska & Jovanovic-Kolar, 1974; Grimmer & Hildebrandt, 1967) than from plant tissues. This finding, if true, would have implications for certain crops growing near PAH sources, because plant organs such as seeds are important in the human diet and also contain relatively high concentrations of oils.

The amounts and kinds of PAH's ingested by humans and other animals from vegetation are partially dependent on whether particular PAH's are absorbed vs. adsorbed and how easily they are rinsed off with water. Kveseth et al. (1981) suggested that lower molecular weight PAH's are adsorbed on leaves, while higher molecular weight particulated compounds are washed off by rain. Kolar et al. (1975) found that washing vegetables removed a maximum of 25% of PAH contamination and generally less. More detailed data on concentrations of PAH's in soil and vegetation are pre-

Attachments: General Conditions (Part II)
Compliance Schedul

RETURN RECEIPT REQUESTED

Attachment 3

Copies:

r. G. Palumbo
rie Co. Dept. of Env. & Plan.
E /Niagara Co. Reg. Plan. Board
r. Garvey, PAS
r. Baker, EPA, Region II
Dr. Spear, EPA, Edison, N.J.
r. Bloom
Ms. D. Reichert
Mr. B. Boyer

Facility ID No. : NY- 000-2399

Effective Date (EDP) : (November 1, 1983

Expiration Date (ExDP) : (November 1 1988)

DRA #90-83-1322 (Eismann, 1983)

(10)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM (SPDES)
DISCHARGE PERMIT

Special Conditions
(Part I)

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act, as amended, (33 U.S.C. §1251 et. seq.) (hereinafter referred to as "the Act").

Permittee Name: Tonawanda Coke Corporation

Attn: Mark L. Kamholz, Manager
Environmental Control
Tonawanda Coke Corp.
Box A - 500

Permittee Street: 3875 River Road

Permittee City: Tonawanda State: New York Zip Code: 14150

is authorized to discharge from the facility described below:

Facility Name: Tonawanda Coke Corporation

Facility Location (C,T,V): Tonawanda County: Erie

Facility Mailing Address (Street): P.O. Box A - 500

Facility Mailing Address (City): Tonawanda State: New York Zip Code: 14150

into receiving waters known as: Niagara River

Outfall 001: Latitude; 42° - 59 min. - 00 sec.; Longitude; 78° - 56 min. - 30 sec.
Outfall 002: Latitude; 42° - 59 min. - 00 sec.; Longitude; 78° - 56 min. - 15 sec.

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

This permit and the authorization to discharge shall expire on midnight of the expiration date shown above and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for permit renewal as prescribed by Sections 17-0803 and 17-0804 of the Environmental Conservation Law and Parts 621, 752, and 755 of the Departments' rules and regulations.

By Authority of Paul Eismann, Alternate Permit Administrator
Designated Representative of Commissioner of the
Department of Environmental Conservation

October 31, 1983
Date

Paul E. Eismann
Signature

(6/90)Pg.1

2-1

(Eismann, 1983)

(10)

INITIAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning (November 1, 1983)
and lasting until June 30, 1984
the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	(Gross) Discharge Limitations Daily Avg.	Daily Max.	Units	Monitoring Reqmts. Measurement Frequency	Sample Type
Outfall 001 (Combined Indirect Cooling, Boiler Blowdown, Coke Quenching and Site Run-Off)(2)					
Flow	Monitor	Monitor	MGD	Continuous	Recorder
BOD-5(1)	100.0	400.0	lbs/day	2 Per Month	24-hr. Comp. (3)
Suspended Solids (1)	300.0	1,100.0	lbs/day	2 Per Month	24-hr. Comp. (3)
Ammonia (As N) (1)	188.0	565.0	lbs/day	2 Per Month	24-hr. Comp. (3)
Cyanide, Total (1)(4)	12.0	36.0	lbs/day	2 Per Month	Grab
Phenols (4AAP) (1)	6.0	18.0	lbs/day	2 Per Month	Grab
Oil and Grease (1)	70.0	110.0	lbs/day	2 Per Month	Grab
pH (Range)	(6.0 - 9.0)		SU	Daily	Grab
Settleable Solids	*	$\leq$ 0.1	ml/l	Monthly	Grab
Temperature	*	102	°F	Monthly	Grab
Benzene (4)	*	0.070	lbs/day	Monthly	24-hr. Comp. (3)
Benzo(a)Pyrene (4)	*	0.400	lbs/day	Monthly	24-hr. Comp. (3)
Naphthalene (4)	*	0.400	lbs/day	Monthly	24-hr. Comp. (3)
Toluene (4)	*	0.070	lbs/day	Monthly	24-hr. Comp. (3)

(1) Net discharge limitations are applicable.

(2) The permit application must list all the corrosion/scale inhibitors or biocidal-type compounds used by the permittee. If use of new boiler/cooling water additives is intended, application must be made prior to use.

(3) Manual composites, not to be analyzed for purgeable aromatic organic pollutants, shall be made-up of grab samples that total at least 450 milliliters and collected every three hours during the operating day of the facility. Manual composites for purgeable aromatic organic pollutants shall be made-up of grab samples measuring 40 milliliters a piece, collected every three hours during the operating day of the facility, and composited in a laboratory under refrigerated conditions prior to analysis.

(4) Benzene and toluene shall be analyzed by Method 602, benzo(a)pyrene and naphthalene by Method 610. All analyses shall be carried out down to the lowest method detection limit. Analyze for total cyanide by Method 335.3 and for total phenols by Method 420.1 or 420.2.

*Report an average if more than one sample analysis is performed per month.

Eisenann, 1983

(10)

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning July 1, 1984
and lasting until November 1, 1988
the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	(Gross) Discharge Limitations Daily Avg.	Daily Max.	Units	Monitoring Reqmts. Measurement Frequency	Sample Type
Outfall 001 (Combined Indirect Cooling, Boiler Blowdown, Coke Quenching and Site Run-Off)(2)					
Flow	Monitor	Monitor	MGD	Continuous	Recorder
BOD-5 (1)	75.0	375.0	lbs/day	Weekly	24-hr. Comp. (3)
Suspended Solids (1)	271.0	523.0	lbs/day	5-day/wk	24-hr. Comp. (3)
Ammonia (As N) (1)	34.0	117.0	lbs/day	5-day/wk	24-hr. Comp. (3)
Cyanide, Total (1)(4)	8.0	14.0	lbs/day	Weekly	Grab
Phenols (4AAP) (1)	0.070	0.140	lbs/day	5-day/wk	Grab
Oil and Grease (1)	23.0	67.0	lbs/day	5-day/wk	Grab
pH (Range)	(6.0 - 9.0)		SU	Daily	Grab
Settleable Solids	*	$\leq$ 0.1	ml/l	Monthly	Grab
Temperature (4)	*	102	^{o}F	Monthly	Grab
Benzene (4)	*	0.070	lbs/day	Monthly	24-hr. Comp. (3)
Benzo(a)Pyrene (4)	*	0.070	lbs/day	Monthly	24-hr. Comp. (3)
Naphthalene (4)	*	0.070	lbs/day	Monthly	24-hr. Comp. (3)
Toluene (4)	*	0.070	lbs/day	Monthly	24-hr. Comp. (3)

(1) Net discharge limitations are applicable.

(2) The permit application must list all corrosion/scale inhibitors or biocidal-type compounds used by the permittee. If use of new boiler/cooling water additives is intended, application must be made prior to use.

(3) Manual composites, not to be analyzed for purgeable aromatic organic pollutants, shall be made-up of grab samples that total at least 450 milliliters and collected every three hours during the operating day of the facility. Manual composites for purgeable aromatic organic pollutants shall be made-up of grab samples measuring 40 milliliters a piece, collected every three hours during the operating day of the facility, and composited in a laboratory under refrigerated conditions prior to analysis.

(4) Benzene and toluene shall be analyzed by Method 602, benzo(a)pyrene and naphthalene by Method 610. All analyses shall be carried out down to the lowest method detection limit. Analyze for total cyanide by Method 335.3 and for total phenols by Method 420.1 or 420.2.

*Report an average if more than one sample analysis is performed per month.

ACTION LEVEL REQUIREMENTS

The parameters listed below have been reported present in the discharge but at levels that currently do not require water-quality or technology-based limits. Action levels have been established which if exceeded will result in reconsideration of Water Quality and Technology based limits.

Routine action level monitoring results shall be appended to the Discharge Monitoring Report (DMR) for the required monitoring period.

If any of the action levels is exceeded, the permittee shall undertake a short-term, high-intensity monitoring program for this parameter. Samples identical to those required for routine monitoring purposes shall be taken on each of three operating days and analyzed. Results shall be expressed in terms of both concentration and mass, and appended to a DMR. The results shall be submitted no later than with the DMR due for the third month following the month of such exceedance. If levels, higher than the action levels, are confirmed, the results shall constitute a revised application and the permit shall be reopened for consideration of revised action levels or effluent limits.

The permittee is not authorized to discharge any of the listed parameters at levels which may cause or contribute to a violation of water quality standards.

Outfall	Parameter	Gross Action Level
001	Arsenic, Total	1.67 lbs/day
001	Selenium, Total	0.380 lbs/day
001	Silver, Total	1.880 lbs/day
001	α- BHC	0.013 lbs/day
002	Chromium, Total	0.080 lbs/day
002	Copper, Total	0.960 lbs/day
002	Cyanide, Total	0.100 lbs/day
002	Nickel, Total	0.830 lbs/day
002	Zinc, Total	2.900 lbs/day

Monitoring for action level parameters shall be carried-out semi-annually using composite samples for all parameters at outfall 001 and grab samples at outfall 002. Manual composites shall be made-up of grab samples that total at least 325 milliliters collected every three hours during the operating hours of the facility. Grab samples taken at outfall 002 should total 2,500 milliliters. Method 608 shall be used to analyze for α - BHC, atomic absorption furnance techniques for all metals and Method 335.3 for total cyanide.

(Eismann, 1983) (10)

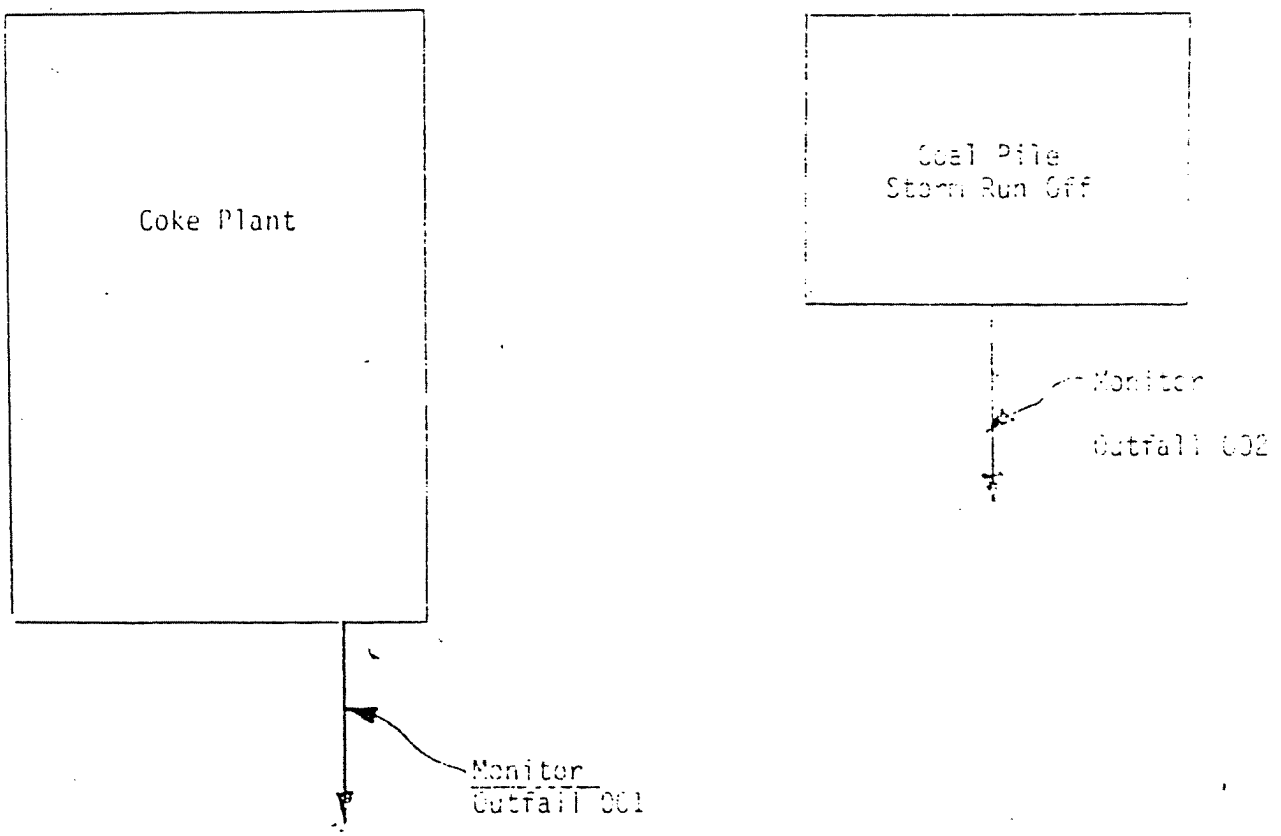
Definition of Daily Average and Daily Maximum

The daily average discharge is the total discharge by weight or in other appropriate units as specified herein, during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by this permit, the daily average discharge shall be determined by the summation of all the measured daily discharges in appropriate units as specified herein divided by the number of days during the calendar month when the measurements were made.

The daily maximum discharge means the total discharge by weight or in other appropriate units as specified herein, during any calendar day.

Monitoring Locations

Permittee shall take samples and measurements to meet the monitoring requirements at the location(s) indicated below: (Show locations of outfalls with sketch or flow diagram as appropriate).



The permit will be modified if the Department of Environmental Conservation is authorized to recover from the permittee all or part of the direct and indirect expenses of developing, administrating, processing, monitoring and/or enforcing SPDES permits.

(11)

PHASE I REPORT
ENGINEERING INVESTIGATIONS AND EVALUATIONS AT INACTIVE HAZARDOUS WASTE DISPOSAL SITES

INS Equipment
Erie County, NY

Prepared for:

New York State Department of Environmental Conservation

50 Wolf Road, Albany, New York 12233
Henry G. Williams, Commissioner

Division of Solid and Hazardous Waste
Norman H. Nosenchuck, P.E., Director

ENGINEERING-SCIENCE
in association with
DAMES & MOORE

SEPTEMBER 1984

(12)

PHASE II WORK PLANS
ENGINEERING INVESTIGATIONS AND EVALUATIONS AT INACTIVE HAZARDOUS WASTE DISPOSAL SITES

PREPARED FOR

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

50 WOLF ROAD, ALBANY, NEW YORK, 12233

Henry G. Williams, Commissioner

DIVISION OF SOLID AND HAZARDOUS WASTE
Norman H. Nosenchuck, P.E.
Director

MARCH 1985

ENGINEERING -SCIENCE
in association with
DAMES & MOORE

(13)

Environmental Law Institute
1346 Connecticut Avenue, N.W.
Washington D.C. 20036

COMPENDIUM OF COST OF REMEDIAL TECHNOLOGIES AT HAZARDOUS WASTE SITES

DRAFT

FEBRUARY 1984

A Report to the Office of Emergency and Remedial Response
U.S. Environmental Protection Agency

Project Officer:
Mr. Bruce Clemens
WH-586
401 M Street, S.W.
Washington, D.C. 20460

FROM EPA IN WASHINGTON
(202) 382-4632

ENVIRONMENTAL PROTECTION AGENCY NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN UNDER THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT OF 1980

(14)

(40 CFR 300; 47 FR 31203, July 16, 1982, Effective December 10, 1982; Amended by 48 FR 40669, September 8, 1983; 49 FR 19482, May 8, 1984; 49 FR 29197, July 18, 1984; 49 FR 37082, September 21, 1984; 50 FR 6321, February 14, 1985)

[*Editor's note:* This plan was made effective by EPA on December 10, 1982 (47 FR 55488).

It supersedes the plan (40 CFR 1510) originally mandated by Section 311 (c)(2) of the Clean Water Act, which was prepared by the Council on Environmental Quality.]

[*Editor's note:* EPA October 15, 1984 (49 FR 40341), included in its proposal to add 238 new sites to the National Priorities List (Appendix B), a republication of the 128 sites added to the list September 21 (49 FR 37082). This action did not further amend the September 21 listing but did include more detailed status codes for response and cleanup activities at the sites.]

PART 300—NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN

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Appendix A—Uncontrolled Hazardous Waste Site Ranking System; a users manual.
Appendix B — National Priorities List.
Appendix C — Revised Standard Dispersant Effectiveness and Toxicity Tests.

Authority: Sec 105, Pub. L. 96-510, 94 Stat. 2764, 42 U.S.C. 9605 and sec. 311(c)(2), Pub. L. 92-500, as amended, 86 Stat. 865, 33 U.S.C. 1321 (c)(2); E. O. 12316, 47 FR 42237; E.O. 11735, 38 FR 21243.

[Amended by 49 FR 29197, July 18, 1984]

Subpart A—Introduction

§ 300.1 Purpose and objectives.

The purpose of the National Oil and Hazardous Substances Pollution Contingency Plan (Plan) is to effectuate the response powers and responsibilities created by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERLA) and the authorities established by section 311 of the Clean Water Act (CWA), as amended.

§ 300.2 Authority.

The Plan is required by section 105 of CERCLA, 42 U.S.C. 9605, and by section 311(c)(2) of the CWA, as amended, 33 U.S.C. 1321(c)(2). In Executive Order 12316 (46 FR 42237) the President delegated to the Environmental Protection Agency the responsibility for the amendment of the NCP and all of the other functions vested in the President by section 105 of CERCLA. Amendments to the NCP shall be coordinated with members of the National Response Team prior to publication for notice and comment. Amendments shall also be coordinated with the Federal Emergency Management Agency and the Nuclear Regulatory Commission in order to avoid inconsistent or duplicative requirements in the emergency planning responsibilities of those agencies.

§ 300.3 Scope.

(a) The Plan applies to all Federal agencies and is in effect for:

(1) The navigable waters of the United States and adjoining shorelines, for the contiguous zone, and the high seas beyond the contiguous zone in connection with activities under the Outer Continental Shelf Lands Act or the Deep Water Port Act of 1974, or which may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States (including resources under the Fishery Conservation and Management Act of 1976). (See sections 311(b)(1) and 502(7) of the Clean Water Act.)

(2) Releases or substantial threats of releases of hazardous substances into the environment, and releases or substantial threats of releases of pollutants or contaminants which may present an imminent and substantial danger to public health or welfare.

(b) The Plan provides for efficient, coordinated and effective response to discharges of oil and releases of hazardous substances, pollutants and contaminants in accordance with the authorities of CERCLA and the CWA. It provides for:

(1) Division and specification of responsibilities among the Federal, State

information gathering as appropriate. These efforts shall be undertaken jointly by the Federal or State officials responsible for providing Fund-financed response and those responsible for enforcing legal requirements.

(2) A major objective of an inspection is to determine if there is any immediate danger to persons living or working near the facility. In general, the collection of samples should be minimized during inspection activities; however, situations in which there is an apparent risk to the public should be treated as exceptions to that practice. Examples of apparent risk include use of nearby wells for drinking water, citizen complaints of unusual taste or odor in drinking water, or chemical odors or unusual health problems in the vicinity of the release. Under those circumstances, a sampling protocol should be developed for the inspection to allow for the earliest possible detection of any human exposure to hazardous substances. The site inspection may also address:

(i) Determining the need for immediate removal action;

(ii) Assessing amounts, types and location of hazardous substances stored;

(iii) Assessing potential for substances to migrate from areas where they were originally located;

(iv) Determining or documenting immediate threats to the public or environment.

(d) *Methods for Establishing Priorities.* (1) States that wish to submit candidates for the National Priorities List must use the Hazard Ranking System (included in Appendix A) to rank the releases.

(2) EPA will notify States at least thirty days prior to the deadline for submitting candidate releases for the National Priorities List or any subsequent revisions.

(3) Each State may designate a facility as the State's highest priority release by certifying, in writing signed by the Governor or the Governor's designee, that the facility presents the greatest danger to public health, welfare or the environment among known facilities in the State.

(e) *National Priorities List.* (1) Compiling the National Priorities List—EPA Regional Office will review State hazard rankings to ensure uniform application of the Hazard Ranking System and may add, in consultation with the States, any additional priority releases known to EPA. The States' priorities will be reviewed and consolidated by EPA Headquarters into a National Priorities List pursuant to section 105(8) of CERCLA. To the extent practicable, each State's designated top priority facility will be included among the one hundred highest priority facilities.

(2) No facilities presently owned by the Federal Government will be included on the National Priorities List.

(3) EPA will submit the recommended National Priorities List to the NRT for review and comment.

(4) EPA will publish a proposed National Priorities List for public comment.

(5) The National Priorities List is presented in Appendix B.

(6) Ranking of Releases—Similar hazard ranking scores assigned to releases cannot accurately differentiate among risks represented by the releases. Thus, in order to avoid misleading the public that real differences in risk exist, similar scores may be grouped on the National Priorities List.

(7) EPA will revise and publish the National Priorities List at least once annually. In addition, revisions will give notice of the deletion (if any) of releases previously listed.

§ 300.67 Phase V—Planned removal.

(a) Planned removal may be undertaken pursuant to a contract or cooperative agreement when the lead agency determines that:

(1) There would be a substantial cost savings by continuing a response action with the equipment and resources mobilized for an immediate removal action taken pursuant to § 300.64, but terminate pursuant to § 300.64(c); or

(2) The public and/or environment will be at risk from exposure to hazardous substances if response is delayed at a release not on the National Priorities List.

(b) Planned removal must be requested by the Governor of the affected State or his designee. Requests must include:

(1) A description of the nature and extent of the release;

(2) A description of actions taken or underway at the site;

(3) A description of the proposed planned removal; and

(4) Assurances that the State will pay at least 10 percent of the costs of the action, including all future maintenance, or at least 50 percent or such greater amount as EPA may determine appropriate, taking into account the degree of responsibility of the State or political subdivision, of any sums expended in response to a release at a facility that was owned at the time of any disposal of hazardous substances therein by the State or a political subdivision thereof.

(c) Among the factors that EPA will use to determine whether a planned removal is appropriate under § 300.67(a)(2) are the following.

(1) Actual or potential direct contact with hazardous substances by nearby population;

(2) Contaminated drinking water at the tap;

(3) Hazardous substances in drums, barrels, tanks, or other bulk storage containers, that are known to pose a serious threat to public health or the environment;

(4) Highly contaminated soils largely at or near surface, posing a serious threat to public health or the environment;

(5) Serious threat of fire or explosion; or

(6) Weather conditions that may cause substances to migrate and pose a serious threat to public health or the environment.

(d) Planned removal actions shall be terminated when the lead agency determines that the risk to the public health or the environment has been abated. In making this determination, the lead agency shall consider whether the factors listed in § 300.66(c) continue to apply to the release and whether any contaminated waste materials transported off-site have been treated or disposed of properly.

(e) Unless the EPA finds that (1) continued response actions are immediately required to prevent, limit or mitigate an emergency, (2) there is an immediate risk to public health or welfare or the environment, and (3) such assistance will not otherwise be provided on a timely basis, obligations from the Fund, other than those authorized by section 104(b) of CERCLA, shall not continue after $1 million has been obligated for response actions or six months has elapsed from the date of initial response to the release.

§ 300.68 Phase VI—Remedial action.

(a) Remedial actions taken pursuant to this section (other than responses at Federal facilities) are those responses to releases on the National Priorities List that are consistent with permanent remedy to prevent or mitigate the migration of a release of hazardous substances into the environment.

(b) States are encouraged to undertake Fund-financed remedial actions in accordance with § 300.62 of this Plan.

(c) As an alternative or in addition to Fund-financed remedial action, the lead agency may seek, through voluntary agreement or administrative or judicial process, to have those persons

(14)

responsible for the release clean up in a manner that effectively mitigates and minimizes damage to, and provides adequate protection of, public health, welfare, and the environment. The lead agency shall evaluate the adequacy of clean-up proposals submitted by responsible parties or determine the level of clean-up to be sought through enforcement efforts, by consideration of the factors discussed in paragraphs (e) through (j) of this section. The lead agency will not, however, apply the cost balancing considerations discussed in paragraph (k) of this section to determine the appropriate extent of responsible party clean-up.

(d)(1) The lead agency, in cooperation with State(s), will examine available information and determine, based on the factors in paragraph (g) of this section, the type or types of remedial response that may be needed to remedy the release. This scoping will serve as the basis for requesting funding for a remedial investigation and feasibility study:

(i) In the case of initial remedial measures, a single request may be made by a State for funding the remedial investigation, feasibility study, design and implementation, in order that such measures may be expedited while continuing the remainder of the remedial planning process.

(ii) In the case of source control or off-site remedial action, the initial funding request should be for the remedial investigation and feasibility study. Requests for funding of design and implementation should be made after the completion of the feasibility study.

(2) As a remedial investigation progresses, the project may be modified if the lead agency determines that, based on the factors in 300.68(e), such modifications would be appropriate.

(e) In determining the appropriate extent of remedial action, the following factors should be used to determine the type or types of remedial action that may be appropriate:

(1) In some instances, initial remedial measures can and should begin before final selection of an appropriate remedial action if such measures are determined to be feasible and necessary to limit exposure or threat of exposure to a significant health or environmental hazard and if such measures are cost-effective. Compliance with § 300.67(b) is a prerequisite to taking initial remedial measures. The following factors should be used in determining whether initial remedial measures are appropriate:

(i) Actual or potential direct contact with hazardous substances by nearby population. (Measures might include fences and other security precautions.)

(ii) Absence of an effective drainage control system (with an emphasis on run-on control). (Measures might include drainage ditches.)

(iii) Contaminated drinking water at the tap. (Measures might include the temporary provision of an alternative water supply.)

(iv) Hazardous substances in drums, barrels, tanks, or other bulk storage containers, above surface posing a serious threat to public health or the environment. (Measures might include transport of drums off-site.)

(v) Highly contaminated soils largely at or near surface, posing a serious threat to public health or the environment. (Measures might include temporary capping or removal of highly contaminated soils from drainage areas.)

(vi) Serious threat of fire or explosion or other serious threat to public health or the environment. (Measures might include security or drum removal.)

(vii) Weather conditions that may cause substances to migrate and to pose a serious threat to public health or the environment. (Measures might include stabilization of berms, dikes or impoundments.)

(2) Source control remedial actions may be appropriate if a substantial concentration of hazardous substances remain at or near the area where they were originally located and inadequate barriers exist to retard migration of substances into the environment. Source control remedial actions may not be appropriate if most substances have migrated from the area where originally located or if the lead agency determines that the substances are adequately contained. Source control remedial actions may include alternatives to contain the hazardous substances where they are located or eliminate potential contamination by transporting the hazardous substances to a new location. The following criteria should be assessed in determining whether and what type of source control remedial actions should be considered:

(i) The extent to which substances pose a danger to public health, welfare, or the environment. Factors which should be considered in assessing this danger include:

(A) Population at risk;

(B) Amount and form of the substance present;

(C) Hazardous properties of the substances;

(D) Hydrogeological factors (e.g. soil permeability depth to saturated zone, hydrologic gradients, proximity to a drinking water aquifer); and

(E) Climate (rainfall, etc.).

(ii) The extent to which substances have migrated or are contained by either natural or man-made barriers.

(iii) The experiences and approaches used in similar situations by State and Federal agencies and private parties.

(iv) Environmental effects and welfare concerns.

(3) In some situations it may be appropriate to take action (referred to as offsite remedial actions) to minimize and mitigate the migration of hazardous substances and the effects of such migration. These actions may be taken when the lead agency determines that source control remedial actions may not effectively mitigate and minimize the threat and there is a significant threat to public health, welfare, or the environment. These situations typically will result from contamination that has migrated beyond the area where the hazardous substances were originally located. Offsite measures may include provision of permanent alternative water supplies, management of a drinking water aquifer plume or treatment of drinking water aquifers. The following criteria should be used in determining whether and what type of offsite remedial actions should be considered:

(i) Contribution of the contamination to an air, land or water pollution problem.

(ii) The extent to which the substances have migrated or are expected to migrate from the area of their original location and whether continued migration may pose a danger to public health, welfare or environment.

(iii) The extent to which natural or man-made barriers currently contain the hazardous substances and the adequacy of the barriers.

(iv) The factors listed in paragraph (e)(2)(i) of this section.

(v) The experiences and approaches used in similar situations by State and Federal agencies and private parties.

(iv) Environmental effects and welfare concerns.

(f) A remedial investigation should be undertaken by the lead agency (or responsible party if the responsible party will be developing a clean-up proposal) to determine the nature and extent of the problem presented by the release. This includes sampling and monitoring, as necessary, and includes the gathering of sufficient information to determine the necessity for and proposed extent of remedial action. During the remedial investigation, the original scoping of the project may be modified based on the factors in § 300.68(e). Part of the remedial investigation involves assessing whether the threat can be mitigated and

minimized by controlling the source of the contamination at or near the area where the hazardous substances were originally located (source control remedial actions) or whether additional actions will be necessary because the hazardous substances have migrated from the area of their original location (offsite remedial actions).

(g) *Development of Alternatives.* A limited number of alternatives should be developed for either source control or offsite remedial actions (or both) depending upon the type of response that has been identified under paragraphs (e) and (f) of this section as being appropriate. One alternative may be a no-action alternative. No-action alternatives are appropriate, for example, when response action may cause a greater environmental or health danger than no action. These alternatives should be developed based upon the assessment conducted under paragraphs (e) and (f) of this section and reflect the types of source control or offsite remedial actions determined to be appropriate under paragraphs (e) and (f) of this section.

(h) *Initial Screening of Alternatives.* The alternatives developed under paragraph (g) of this section will be subjected to an initial screening to narrow the list of potential remedial actions for further detailed analysis. Three broad criteria should be used in the initial screening of alternatives:

(1) *Cost.* For each alternative, the cost of installing or implementing the remedial action must be considered, including operation and maintenance costs. An alternative that far exceeds (e.g. by an order of magnitude) the costs of other alternatives evaluated and that does not provide substantially greater public health or environmental benefit should usually be excluded from further consideration.

(2) *Effects of the Alternative.* The effects of each alternative should be evaluated in two ways: (i) Whether the alternative itself or its implementation has any adverse environmental effects; and (ii) for source control remedial actions, whether the alternative is likely to achieve adequate control of source material, or for offsite remedial actions, whether the alternative is likely to effectively mitigate and minimize the threat of harm to public health, welfare or the environment. If an alternative has significant adverse effects, it should be excluded from further consideration. Only those alternatives that effectively contribute to protection of public health, welfare, or the environment should be considered further.

(3) *Acceptable Engineering Practices.* Alternatives must be feasible for the location and conditions of the release, applicable to the problem, and represent a reliable means of addressing the problem.

(i) *Detailed Analysis of Alternatives.*

(1) A more detailed evaluation will be conducted of the limited number of alternatives that remain after the initial screening in paragraph (h).

(2) The detailed analysis of each alternative should include:

(A) Refinement and specification of alternatives in detail, with emphasis on use of established technology;

(B) Detailed cost estimation, including distribution of costs over time;

(C) Evaluation in terms of engineering implementation, or constructability;

(D) An assessment of each alternative in terms of the extent to which it is expected to effectively mitigate and minimize damage to, and provide adequate protection of, public health, welfare, and the environment, relative to the other alternatives analyzed; and

(E) An analysis of any adverse environmental impacts, methods for mitigating these impacts, and costs of mitigation.

(3) In performing the detailed analysis of alternatives, it may be necessary to gather additional data in order to complete the analysis.

(j) The appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost-effective (i.e. the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, or the environment).

(k) Section 104(c)(4) of CERCLA requires that the need for protection of public health, welfare and the environment at the facility under consideration be balanced against the amount of money available in the Fund to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the need for immediate action. Accordingly, in determining the appropriate extent of remedy for Fund-financed response, the lead agency also must consider the need to respond to other releases with Fund monies.

§ 300.69 Phase VII—Documentation and cost recovery.

(a) During all phases, documentation shall be collected and maintained to support all actions taken under this Plan, and to form the basis for cost recovery. In general, documentation should be sufficient to provide the source and circumstances of the condition, the identity of responsible parties, accurate accounting of Federal costs incurred, and impacts and potential impacts to the public health, welfare and environment.

(b) The information and reports obtained by the lead agency for Fund-financed response action should be transmitted to the RRC. Copies can then be forwarded to the NRT, members of the RRT, and others as appropriate.

§ 300.70 Methods of remedying releases.

(a) The following section lists methods for remedying releases that may be considered by the lead agency in taking response action. This list of methods should not be considered inclusive of all possible methods of remedying releases.

(b) *Engineering Methods for On-Site Actions.*—(1)(i) *Air emissions control*—The control of volatile gaseous compounds should address both lateral movement and atmospheric emissions. Before gas migration controls can be properly installed, field measurements to determine gas concentrations, pressures, and soil permeabilities should be used to establish optimum design for control. In addition, the types of hazardous substances present, the depth to which they extend, the nature of the gas and the subsurface geology of the release area should, if possible, be determined. Typical emission control techniques include the following:

(A) Pipe vents;

(B) Trench vents;

(C) Gas barriers;

(D) Gas collection systems;

(E) Overpacking.

(ii) *Surface water controls*—These are remedial techniques designed to reduce waste infiltration and to control runoff at release areas. They also serve to reduce erosion and to stabilize the surface of covered sites. These types of control technologies are usually implemented in conjunction with other types of controls such as the elimination of ground water infiltration and/or waste stabilization, etc. Technologies applicable to surface water control include the following:

(A) Surface seals;

(B) Surface water diversion and collection systems:

(*1*) Dikes and berms;

(*2*) Ditches, diversions, waterways;

(*3*) Chutes and downpipes;

(*4*) Levees;

(*5*) Seepage basins and ditches;

(*6*) Sedimentation basins and ponds;

(*7*) Terraces and benches.

(C) Grading;

(D) Revegetation.

(iii) *Ground water controls*—Ground water pollution is a particularly serious problem because, once an aquifer has been contaminated, the resource cannot usually be cleaned without the expenditure of great time, effort and resources. Techniques that can be applied to the problem with varying degrees of success are as follows:

(A) Impermeable barriers:

(*1*) Slurry walls;

(*2*) Grout curtains;

(*3*) Sheet pilings.

(B) Permeable treatment beds;

(C) Ground water pumping:

(*1*) Water table adjustment;

(*2*) Plume containment.

(D) Leachate control—Leachate control systems are applicable to control of surface seeps and seepage of leachate to ground water. Leachate collection systems consist of a series of drains which intercept the leachate and channel it to a sump, wetwell, treatment system, or appropriate surface discharge point. Technologies applicable to leachate control include the following:

(*1*) Subsurface drains;

(*2*) Drainage ditches;

(*3*) Liners.

(iv) *Contaminated water and sewer lines*—Sanitary sewers and municipal water mains located down gradient from hazardous waste disposal sites may become contaminated by infiltration of leachate or polluted ground water through cracks, ruptures, or poorly sealed joints in piping. Technologies applicable to the control of such contamination to water and sewer lines include:

(A) Grouting;

(B) Pipe relining and sleeving;

(C) Sewer relocation.

(2) *Treatment technologies.* (i) *Gaseous emissions treatment*—Gases from waste disposal sites frequently contain malodorous and toxic substances, and thus require treatment before release to the atmosphere. There are two basic types of gas treatment systems:

(A) Vapor phase adsorption;

(B) Thermal oxidation.

(ii) *Direct waste treatment methods*—In most cases, these techniques can be considered long-term permanent solutions. Many of these direct treatment methods are not fully developed and the applications and process reliability are not well demonstrated. Use of these techniques for waste treatment may require considerable pilot plant work. Technologies applicable to the direct treatment of wastes are:

(A) Biological methods:

(*1*) Treatment via modified conventional wastewater treatment techniques;

(*2*) Anaerobic, aerated and facultative lagoons;

(*3*) Supported growth biological reactors.

(B) Chemical methods:

(*1*) Chlorination;

(*2*) Precipitation, flocculation, sedimentation;

(*3*) Neutralization;

(*4*) Equalization;

(*5*) Chemical oxidation.

(C) Physical methods:

(*1*) Air stripping;

(*2*) Carbon absorption;

(*3*) Ion exchange;

(*4*) Reverse osmosis;

(*5*) Permeable bed treatment;

(*6*) Wet air oxidation;

(*7*) Incineration.

(iii) *Contaminated soils and sediments*—In some cases where it can be shown to be cost-effective, contaminated sediments and soils will be treated on the site. Technologies available include:

(A) Incineration;

(B) Wet air oxidation;

(C) Solidification;

(D) Encapsulation;

(E) In situ treatment:

(*1*) Solution mining, (soil washing or soil flushing);

(*2*) Neutralization/detoxification;

(*3*) Microbiological degradation.

(c) *Offsite Transport for Storage, Treatment, Destruction or Secure Disposition.*—(1) *General*—Offsite transport or storage, treatment, destruction, or secure disposition offsite may be provided in cases where EPA determines that such actions:

(i) Are more cost-effective than other forms of remedial actions;

(ii) Will create new capacity to manage, in compliance with Subtitle C of the Solid Waste Disposal Act, hazardous substances in addition to those located at the affected facility; or

(iii) Are necessary to protect public health, welfare, or the environment from a present or potential risk which may be created by further exposure to the continued presence of such substances or materials.

(2) *Contaminated soils and sediments may be removed from the site.* Technologies used to remove contaminated sediments on soils include:

(i) Excavation;

(ii) Hydraulic dredging;

(iii) Mechanical dredging.

(d) *Provision of Alternative Water Supplies*—Alternative water supplies can be provided in several ways:

(1) Provision of individual treatment units;

(2) Provision of water distribution system;

(3) Provision of new wells in a new location or deeper wells;

(4) Provision of cisterns;

(5) Provision of bottled or treated water;

(6) Provision of upgraded treatment for existing distribution systems.

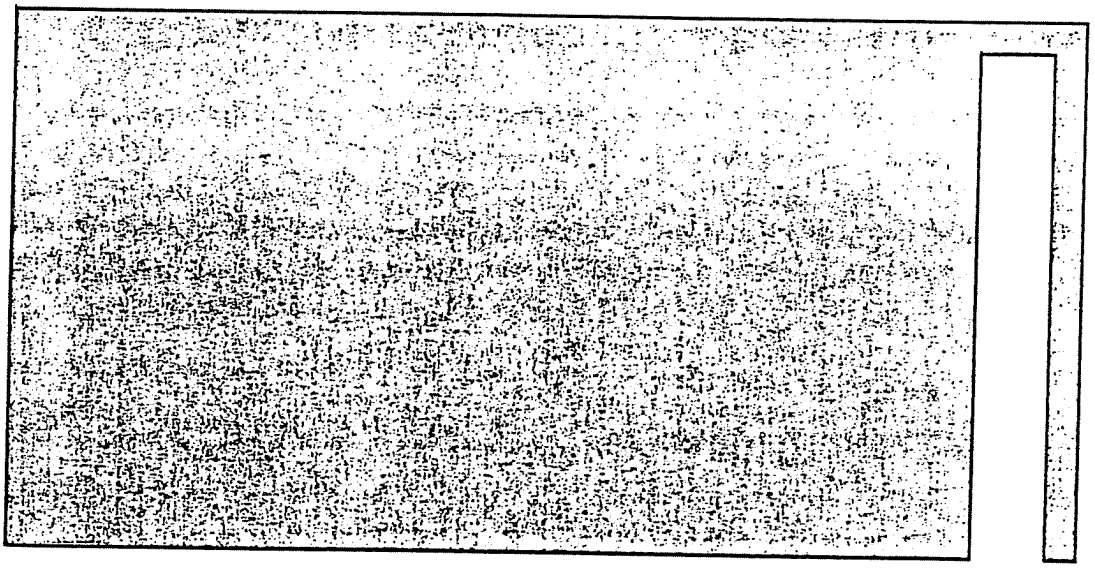
(e) *Relocation*—Permanent relocation of residents, businesses, and community facilities may be provided where it is determined that human health is in danger and that, alone or in combination with other measures, relocation would be cost-effective and environmentally preferable to other remedial response. Temporary relocation may also be taken in appropriate circumstances.

§ 300.71 Worker health and safety.

Lead agency personnel should be aware of hazards, due to a release of hazardous substances, to human health and safety and exercise great caution in allowing civilian or government personnel into an affected area until the nature of the release has been ascertained. Accordingly, the OSC or responsible official must conform to applicable OSHA requirements and other guidance. All private contractors who are working at the scene of a release must conform to applicable provisions of the Occupational Safety and Health Act and any other requirements deemed necessary by the lead agency.

[Sec. 300.71]

(15)



R. Allan Freeze

Department of Geological Sciences
University of British Columbia
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University of Waterloo
Waterloo, Ontario

GROUNDWATER

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

(1979)

(Freeze, 1979) (15)

Table 2.2 Range of Values of Hydraulic Conductivity and Permeability

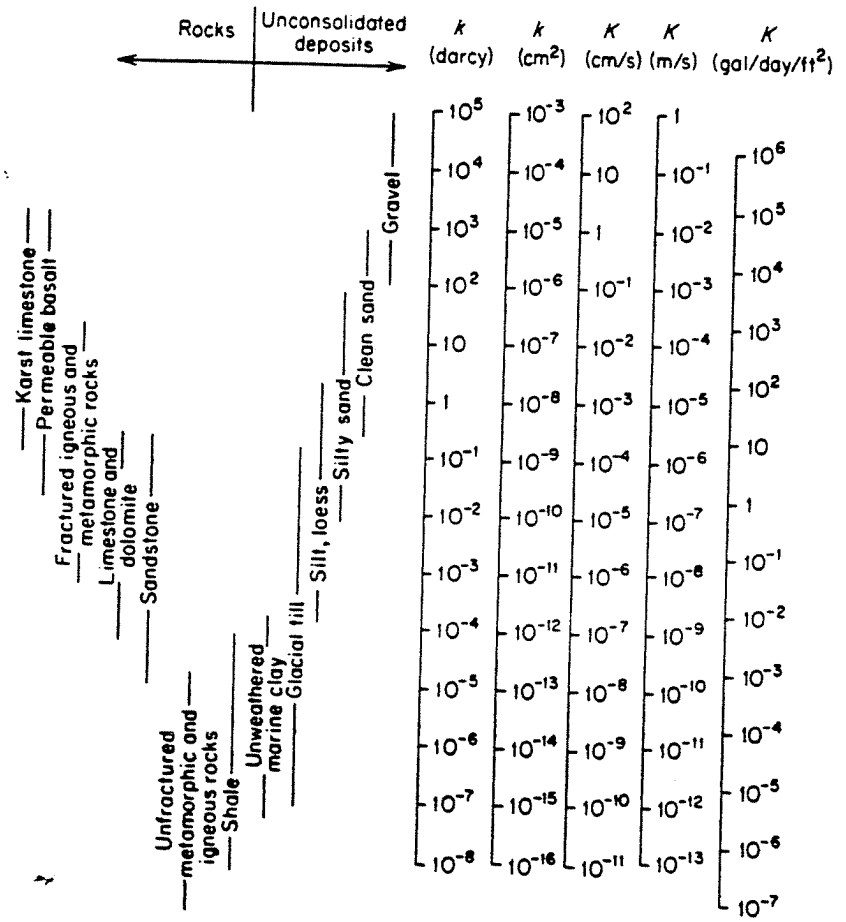


Table 2.3 Conversion Factors for Permeability and Hydraulic Conductivity Units

	Permeability, k*			Hydraulic conductivity, K		
	cm^2	ft^2	darcy	m/s	ft/s	U.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	6.46×10^{5}
U.S. gal/day/ft^2	5.42×10^{-10}	5.83×10^{-13}	5.49×10^{-2}	4.72×10^{-7}	1.55×10^{-6}	1

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

(16)

Handbook on the Toxicology of Metals

edited by
LARS FRIBERG, GUNNAR F. NORDBERG
and VELIMIR B. VOUK



1979

ELSEVIER/NORTH-HOLLAND BIOMEDICAL PRESS
AMSTERDAM · NEW YORK · OXFORD

(Friberg, 1979)

(16)

1974 for 15–20-year-old males (the period of highest caloric intake) have varied between 26 and 61 μg with an average of 39 μg (Mahaffey et al., 1975). In rural 'uncontaminated' areas of Japan the daily cadmium intake has been estimated at 59–113 μg (Japanese Association of Public Health, 1970).

Measurement of cadmium in feces gives an approximate of the daily intake since 90–95% of ingested cadmium remains unabsorbed. Studies performed on this material agree with the range estimated above for daily cadmium intake (Wester, 1974; Tati et al., 1976; Kjellström et al., 1978). Daily cadmium intake varies with age in a way similar to daily caloric intake (Kjellström et al., 1978).

5.1.2 *Water and soil*

In natural water cadmium is found mainly in bottom sediments and suspended particles, whereas the concentration in the water phase is low. Cadmium concentrations in non-polluted natural waters usually are lower than 1 μg/l. Contamination of drinking water may occur as a result of cadmium impurities in the zinc of galvanized pipes or of cadmium-containing solders in fittings, water heaters, water coolers and taps. Leaking of cadmium to ground water from dumped cadmium oxide sludge has also occurred.

Concentrations up to 16 mg/kg have been reported in fruit juices which had been in contact with cadmium-containing parts in vending machines (Nordberg et al., 1973). Regular drinking water usually does not have concentrations of cadmium exceeding 5 μg/l. Sea water contains between 0.04 and 0.3 μg/l.

Both waterborne and airborne cadmium can cause an increased concentration of cadmium in soil. In non-polluted areas the cadmium concentrations in soil will usually be less than 1 mg/kg. In certain areas of Japan where cadmium pollution has been suspected, levels of between 1 and 69 mg/kg have been found in the top soil of ricefields. The cadmium associated with the epidemic of Itai-itai disease (see below) came mainly from ricefield soil contaminated by cadmium-polluted irrigating water. The use of cadmium-containing sewage sludge and superphosphate as fertilizers in agriculture may also contaminate the soil. Sewage sludge may contain 100 mg cadmium/kg dry weight (Berrow and Webber, 1972). Information concerning the factors determining the uptake of cadmium in plants is scarce, but it has been shown that pH and concentrations of other minerals are of importance (Linnman et al., 1973). Both rice and wheat can take up considerable quantities of cadmium from soil. Chemical treatment of soil can considerably decrease uptake (Takijima and Katsumi, 1973; Takijima et al., 1973; Kobayashi et al., 1974).

5.1.3 *Ambient air*

Cadmium in ambient air occurs in particulate form. Its exact chemical form has seldom been reported but it is probable that cadmium oxide is an important part.

Annual averages during 1969 in larger cities of the U.S.A. ranged from 0.006–0.036 μg/m^3 (National Air Sampling Network, U.S.A., see Friberg et al., 1974). In European countries, urban values of 0.002–0.05 μg/m^3 have been reported. In Tokyo, mean values over several months varied from 0.01 to 0.053 μg/m^3. In nonurban areas lower values were found, 0.001–0.003 μg/m^3. Higher values, weekly means of 0.2–0.6 μg/m^3, have been recorded around certain cadmium-emitting industries (Friberg et al., 1974). Cad-

(Fribourg, 1979)

(16)

5 Environmental levels and exposures

5.1 *General environment*

5.1.1 *Food and daily intake*

The daily intake of chromium from food has been estimated to be in the range of 0.03–0.1 mg (Schlettwein-Gsell and Mommsen-Straub, 1973). Since other sources contribute only minor amounts in relation to these values they represent also en estimate of the total daily intake of chromium for the general population. Food items vary considerably in concentration of chromium. Among large sources are meat, vegetables and unrefined sugar, while fish, vegetable oil and fruits contain smaller amounts. Values are reported from non-detectable to about 0.5 mg/kg wet weight for various food items.

The glucose tolerance factor is predominantly found in yeast, liver and meats. Of all forms of chromium, this has the highest biological availability to man.

5.1.2 *Water, soil and ambient air*

The chromium concentration in rivers and lakes is usually between 1 and 10 μg/l, that in sea water being considerably less, from <0.1 to about 5 μg/l (NAS, 1974). Municipal drinking water has been reported to contain higher amounts of chromium than river water.

Soil content ranges from trace to 250 mg/kg with occasionally higher values. The average chromium concentration in the earth's crust is 125 mg/kg. Chromium in phosphates used as fertilizers may be an important source of chromium in soil, in water, and in some foods.

Urban air concentrations of chromium have been reported from less than 10 ng/m^3 up to about 50 ng/m^3. Annual mean values for rural stations seldom reached 10 ng/m^3 (NAS, 1974).

5.1.3 *Tobacco*

Cigarettes have been reported to contain 390 μg/kg of chromium (Schroeder et al., 1962), but no estimates of the inhaled amount from smoking have been published.

5.2 *Working environment*

Potentially hazardous exposures are incurred in the production of dichromate, in the use of chromates in the chemical industry, in the stainless steel industry, in the production and use of alloys, in refractory work, and in the chromium plating industry.

In the last-mentioned industry, the health hazard is related to the chromium-containing mist. Chromium exposure in welders may constitute a health hazard, both because chromium is an important constituent in stainless and acid-stable steel, and because chromate is extensively used in anticorrosive paints (Ruf, 1970; Gylseth et al., 1977).

Chromium levels in industry have been reported to only a limited degree. Mancuso (1951) reported exposure levels up to 1 mg/m^3 of chromium in a chromate plant. Most values were in the range of 0.26–0.51 mg/m^3. A 5-day, 8-h mean value of 1.35 mg/m^3 of chromates in air was reported for a sack-filling operation in an old chromate plant by

(16) (Friberg, 1979)

exceeded 50 μg/l, the U.S. Public Health Service standard (NAS, 1972). This is supported by Durfor and Becker (1964) who found that lead in water supplies in about 100 large American cities ranged from trace amounts to about 60 μg/l. However, when lead pipes or tanks are used and the water is soft, lead concentrations may be so high (up to 3000 μg/l, Goldberg, 1974) as to cause lead poisoning (Beattie et al., 1972). Plastic pipes containing lead stearate may also contaminate drinking water (WHO, 1977).

Surface water usually contains lead in concentrations below 100 μg/l (Kopp and Kroner, 1970) and in unpolluted areas in the range of about 1 μg/l (Zukovickaja et al., 1966). A recent survey of the rivers in the Midi-Pyrenees region, France, showed mean dissolved lead concentrations of about 7–10 μg/l (Servant, 1973). Lead concentration in deep ocean water is about 0.01–0.02 μg/l, but in surface ocean water 0.3 μg/l (Chow and Patterson, 1966).

5.1.3 *Soil and plants*

The natural concentration of lead in soil is in the range of 2–200 mg/kg (NAS, 1972) with mean values of about 16 mg/kg, but the variation from one location to another is considerable (Waldron and Stöfen, 1974). The concentration of lead in street dust and surface soil may sometimes be extremely high and represents a hazard to children. For example, the mean lead concentration in street dust from residential and commercial areas in 77 Mid-Western cities in the U.S.A. amounted from about 1600 to 2400 mg/kg (NAS, 1972), and Kennedy (1969) reported that lead in soil near a lead mining area in Idaho reached 20 000 mg/kg.

Grass samples may show high lead concentrations near roads with heavy traffic, the mean values ranging from about 250 mg/kg at the roadside to about 100 mg/kg at a distance of 25 m (NAS, 1972). This is mostly due to external contamination, because the uptake of lead by plants from soil does not seem to be influenced much by the concentration of lead in soil (Ter Haar, 1970).

5.1.4 *Ambient air*

The lead concentrations in ambient air range from about 0.02 μg/m^3 to about 10 μg/m^3 (means of 24-h samples) (Waldron and Stöfen, 1974; Tepper and Levin, 1975; Tsuchiya et al., 1975). These figures do not necessarily indicate the exposure throughout the entire year and the sampling sites were not all at the same distance from the ground. A good picture of lead concentration in ambient air is obtained from the data collected in 1971–1972 in a number of European cities, as shown in Table 1. In contrast, the lead concentrations in air above the north-central Pacific Ocean and south Indian Ocean are on the order of 0.001 μg/m^3 (Chow and Bennet, 1969; Egorov et al., 1970).

5.1.5 *Special exposures*

Concentrations of lead in whiskey illicitly distilled using old car radiators ('Moonshine') may be above 1 mg/l, and there are reports of chronic poisoning from this source (Patterson and Jernigan, 1969; Whitfield et al., 1972). Wine is another possible source of lead intake for some people. In some wines the average concentrations ranged from 130 to 190 μg/l (Boudène et al., 1975).

INTERVIEW FORM

INTERVIEWEE/CODE Mark L. Kamholz /

TITLE - POSITION Manager of Environmental Control

ADDRESS 3875 River Road

CITY Tonawanda STATE NY ZIP 14150

PHONE (716) 876-6222 RESIDENCE PERIOD ____ TO ____

LOCATION Telephone INTERVIEWER S. Powers

DATE/TIME 2/12/86 / 1:30 PM

SUBJECT: INS Equipment Site.

REMARKS: Tonawanda Coke Company owns two ponds and adjacent land within the fenced boundy approximatly ½ mile west of their River Road Plant. Coke fines settle out of the effluent in the ponds and are periodically dredged from the ponds. The coke fines that are removed from the ponds are trucked back to the main plant and are mixed with the coalmix to be recycled. Mr. Kamholz does not know of any coke fines being disposed of on the INS Equipment site.

I agree with the above interview summary:

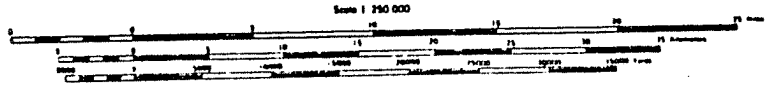
Signature/Title: Mark L. Kamholz Mgr. Environmental Control

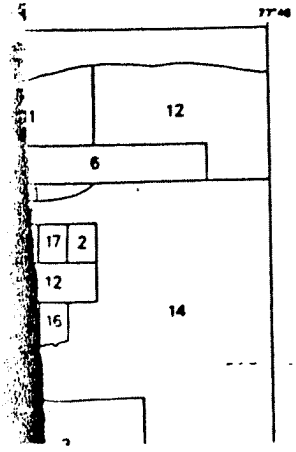
Comments: Coke fines have not been disposed of on the INS site!



QUATERNARY GEOLOGY OF NEW YORK, NIAGARA SHEET

by Ernest H. Muller





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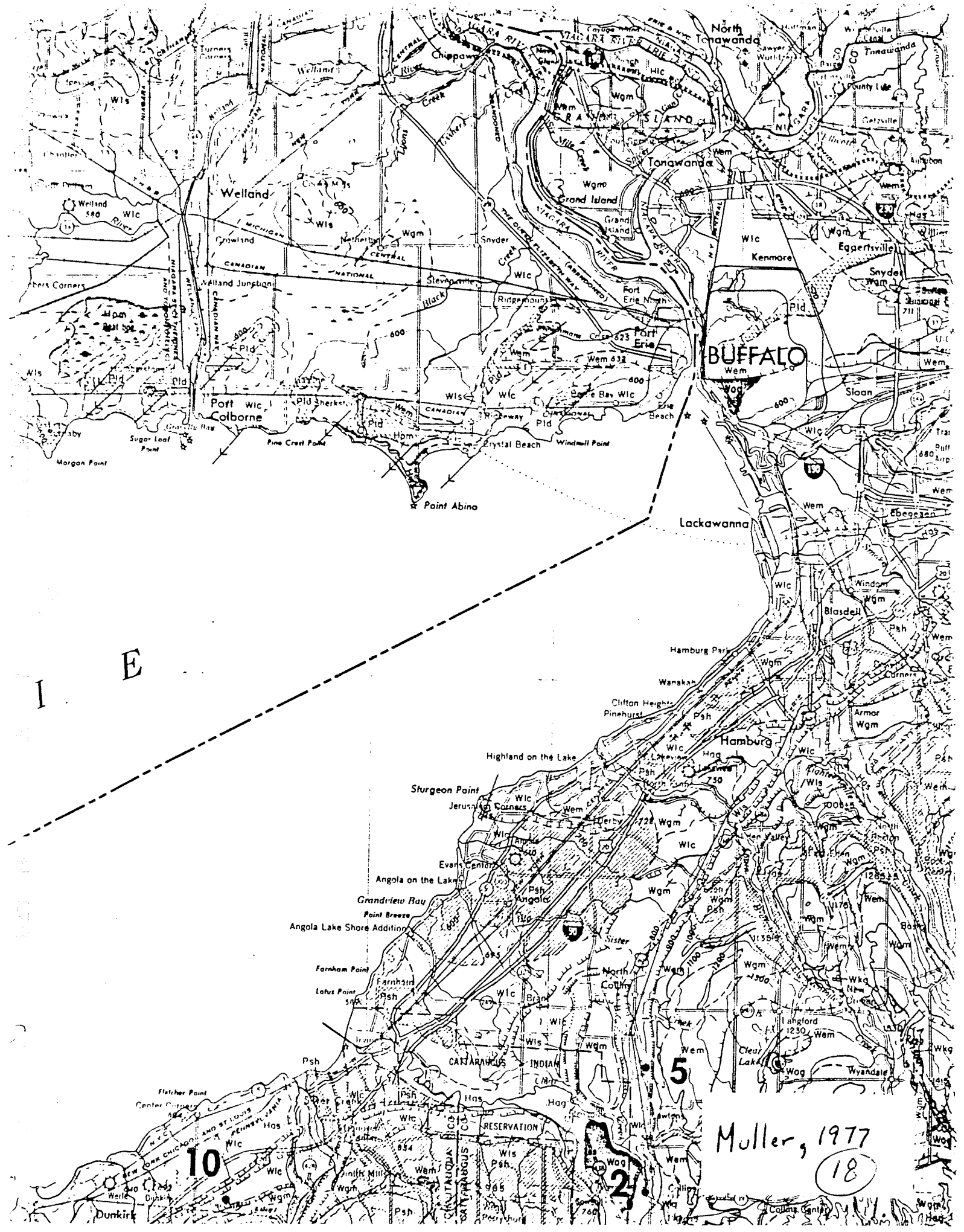
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BUFFALO
Welland
Port Colborne
Point Abino
Crystal Beach
Fort Erie
Tonawanda
North Tonawanda
Grand Island
Kenmore
Eggertsville
Snyder
Lackawanna
Hamburg
Blasdell
Sloan
Eden
Angola
Angola on the Lake
Evans Center
Highland on the Lake
Sturgeon Point
Grandview Bay
Point Breeze
Angola Lake Shore Addition
Farnham Point
Lotus Point
Fletcher Point
Dunkirk
Silver Creek
Irving
Langford
Clear Lake
Wyandale
Collins Center
Derby
Jerusalem Corners
Pinehurst
Clifton Heights
Hamburg Park
Wanakah
Armor
Windom
Ebenezer
Eden Valley
Cattaraugus Indian Reservation
Niagara River
Lake Erie
Welland River
Chippawa
Frenchman Creek
Morgan Point
Sugar Loaf Point
Pine Crest Point
Windmill Point
Erie Beach
Erie Bay
Fort Erie North
Ridgemount
Stevensville
Welland Junction
Crowland
Netherby
Snyder Creek
Black Creek
Lyons Creek
Frenchman Creek
Cayuga Island
Gratwick
Sawyer Woods
Gatzville
Audubon
Tonawanda
Grand Island
Niagara Falls
Niagara Falls Blvd
Sheridan Drive
Transit Road
Main Street
Delaware Avenue
Bailey Avenue
Seneca Street
Abbott Road
Southwestern Blvd
Lake Shore Drive
Canadian National
Canadian Pacific
New York Central
Penn Central
Erie & Niagara
Niagara Junction
Belt Line
Michigan Central
Welland Canal
Welland Canal Parkway
Niagara Peninsula Expressway
Queen Elizabeth Way (Abandoned)
Niagara Thruway
Niagara Falls Blvd
Niagara Falls Boulevard
Niagara Falls Boulevard
Niagara Falls Boulevard

(19)

GROUND WATER CLASSIFICATIONS

QUALITY STANDARDS

AND

EFFLUENT STANDARDS AND/OR LIMITATIONS

(Title 6, Official Compilation of Codes,
Rules and Regulations, Part 703)

NEW YORK STATE

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

(Effective September 1, 1978)

INACTIVE HAZARDOUS WASTE DISPOSAL SITES

IN

NEW YORK STATE

Appendix Volume 3 - List of Sites by County

Alleghany	Chautauqua	Niagara
Cattauraugus	Erie	Wyoming

Prepared by
Division of Solid and Hazardous Waste
New York State Department of Environmental Conservation
with the cooperation of
New York State Department of Health

December 1983
Albany, N.Y.

(47-15-11 (10/83)

(NYSDEC, 1983)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF SOLID AND HAZARDOUS WASTE

INACTIVE HAZARDOUS WASTE DISPOSAL SITE REPORT

(20)

PRIORITY CODE: 2 SITE CODE: 915063

NAME OF SITE: Niagara Mohawk - Cherry Farm REGION: 9

STREET ADDRESS: River Rd. (near 4000 River Rd.)

TOWN/CITY: Tonawanda COUNTY: Erie

NAME OF CURRENT OWNER OF SITE: Niagara Mohawk

ADDRESS OF CURRENT OWNER OF SITE: 55 Washington St., Buffalo, NY 14203

TYPE OF SITE: OPEN DUMP [X] STRUCTURE [ ] LAGOON [ ]
LANDFILL [ ] TREATMENT POND [ ]

ESTIMATED SIZE: 50+ ACRES

SITE DESCRIPTION:

Phase I investigation has been conducted at this site. Niagara Mohawk disposed of fly ash and bottom ash at the site from 1957 to 1970. The property was leased to Seaway Corporation for use as landfill (Seaway Industrial Park). In 1972, Frontier Chemical Waste Process, Inc. replaced Seaway Corporation as the landfill operator. During Frontier Chemical's period of operation, foundry sand and slag from Chevrolet Foundry sand operation and liquid boiler cleaning wastes from Dow Chemical Company were disposed. Hooker-Durez is also rumored to have dumped phenol tars at the site. In March 1981, water samples were collected from drainage ditches around the site. Extensive subsurface soil sampling was performed by U.S.G.S. in Aug, 1982 and in May, 1983.

HAZARDOUS WASTE DISPOSED: CONFIRMED [X] SUSPECTED [ ]

TYPE AND QUANTITY OF HAZARDOUS WASTES DISPOSED:

TYPE	QUANTITY (POUNDS, DRUMS, TONS, GALLONS)
Phenol tars (some may have contained chlorinated benzenes)	625 tons
Foundry Sand and Slag	Unknown

(NYSDEC, 1983)

(20)

TIME PERIOD SITE WAS USED FOR HAZARDOUS WASTE DISPOSAL:

_____, 19 50's TO _____, 19 70's

OWNER(S) DURING PERIOD OF USE: Niagara Mohawk

SITE OPERATOR DURING PERIOD OF USE: Seaway Corp/Frontier Chem/Niagara Mohawk

ADDRESS OF SITE OPERATOR: 55 Washington St., Buffalo, NY 14203

ANALYTICAL DATA AVAILABLE: AIR ☐ SURFACE WATER [X] GROUNDWATER ☐
SOIL [X] SEDIMENT ☐ NONE ☐

CONTRAVENTION OF STANDARDS: GROUNDWATER ☐ DRINKING WATER ☐
SURFACE WATER [X] AIR ☐

SOIL TYPE: Fill material followed by fine sand

DEPTH TO GROUNDWATER TABLE: Unknown

LEGAL ACTION: TYPE: None STATE ☐ FEDERAL ☐
STATUS: IN PROGRESS ☐ COMPLETED ☐
REMEDIAL ACTION: PROPOSED ☐ UNDER DESIGN ☐
IN PROGRESS ☐ COMPLETED ☐

NATURE OF ACTION: None

ASSESSMENT OF ENVIRONMENTAL PROBLEMS:

Soil data indicate concentrations in excess of background levels for some of the heavy metals. Surface water analysis indicated presence of chlorinated organics and heavy metals in the samples. Organic data from U.S.G.S. investigation is pending. Limited data indicates that the site requires more attention

ASSESSMENT OF HEALTH PROBLEMS:

INSUFFICIENT INFORMATION

PERSON(S) COMPLETING THIS FORM:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

NAME Ahmad Tayyebi
TITLE Asst. Sanitary engr.
NAME Peter Buechi
TITLE Assoc. Sanitary Engr.
DATE: 11/19/83

NEW YORK STATE DEPARTMENT OF HEALTH

NAME R. Tramontano
TITLE Bur. Tox. Subst. Assess.
NAME
TITLE
DATE: 12/83

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-0001

(21)

Henry G. Williams
Commissioner

July 24, 1985

MEMORANDUM

TO: Bureau Directors, Regional Water Engineers, Section Chiefs

SUBJECT: Division of Water Technical and Operational Guidance Series (85-W-38)

Ambient Water Quality Standards and Guidance Values
(Originator: John Zambrano)

I. Purpose

The purpose of this document is to provide a compilation of water quality standards and guidance values for toxic and non-conventional pollutants to be used in the Department's regulatory programs, including the SPDES permit program.

II. Discussion

This substantial revision of TOGS 85-W-38 is the result of the promulgation of amendments to 6 NYCRR Part 701-702, effective on August 2, 1985, governing the development and use of surface water quality standards and guidance values. This revision uses a new format in the tabulation and does not include the methodologies for the development of standards and guidance values. The user is referred to the regulations for a description of the methodologies.

III. Guidance

The Quality Evaluation Section will use the attached list in developing SPDES permit water quality-based effluent limits. The Criteria and Standards Section will maintain and revise the list on a regular basis.

for Daniel M. Barolo, P.E.
Director
Division of Water

Attachments
cc: Dr. Banks
Mr. Pagano
Mr. Mt. Pleasant
Regional Engineers for Environmental Quality
Ms. Chrimes

(22)

DEC
PUBLICATION

NYS Department of Environmental Conservation
Superfund and Contract Laboratory Protocol
January 1985

New York State/Department of Environmental Conservation

GEOLOGIC MAI OF NEW YORK

1970

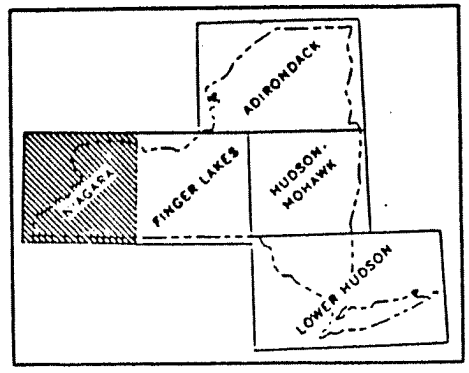
Niagara Sheet

Scale 1:250,000

5 0 5 10 15 Statute Miles 20

5 0 5 10 15 20 25 Kilometers 30

CONTOUR INTERVAL 100 FEET



Topographic Base from AMS Quadrangles 1:250,000 scale.

NEW YORK STATE MUSEUM AND SCIENCE SERVICE

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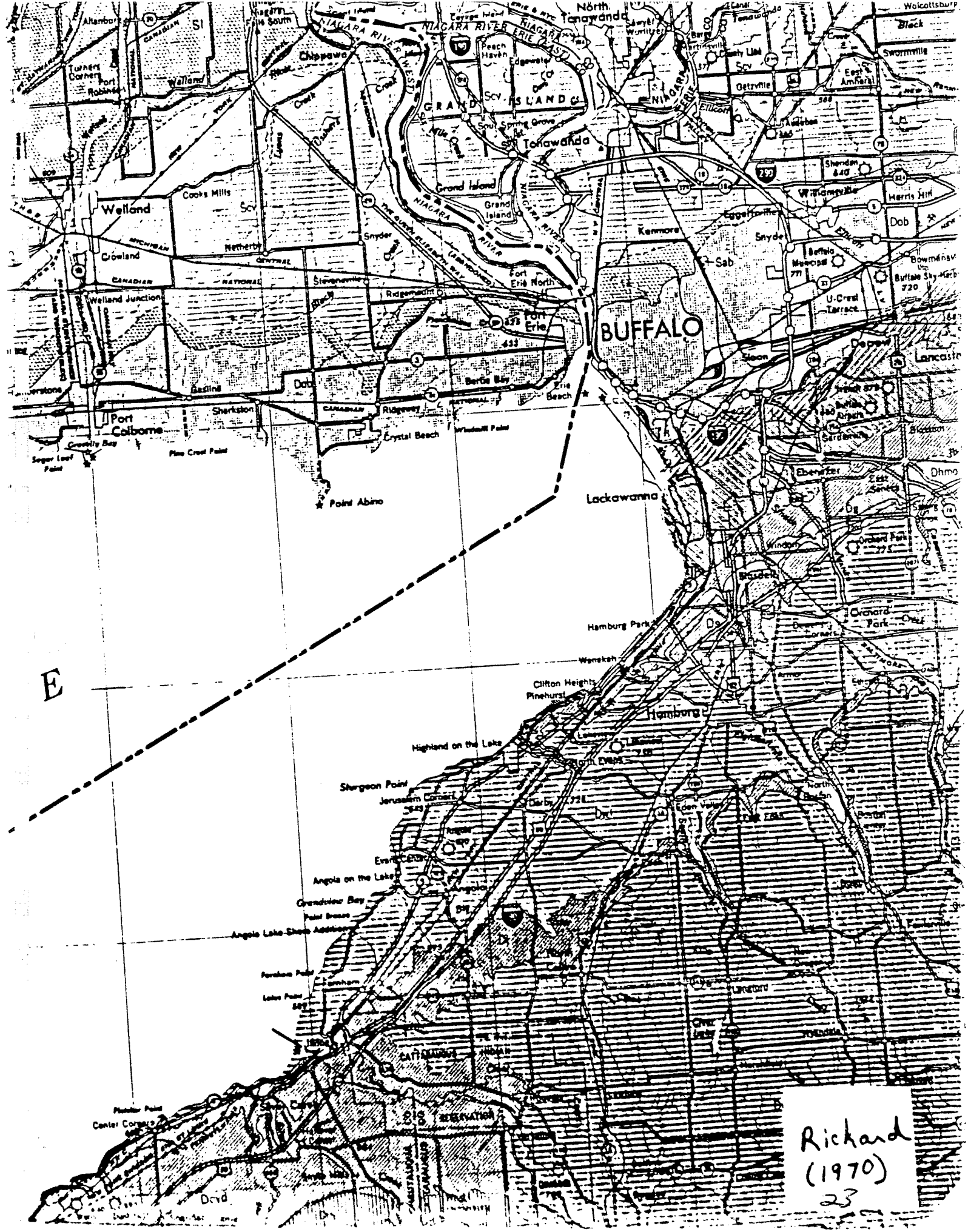
COMPILED AND EDITED BY

Lawrence V. Rickard

Donald W. Fisher

March, 1970

23


BUFFALO
Welland
Port Colborne
Fort Erie
Grand Island
North Tonawanda
Tonawanda
Lackawanna
Hamburg
Orchard Park
Point Abino
Crystal Beach
Erie Beach
Kenmore
Snyder
Cheektowaga
Amherst
Williamsville
Depew
Lancaster
Eggertsville
Getzville
Swormville
Akron
Alden
Attica
Batavia
Rochester
Richard
(1970)
23

24

COSTS OF REMEDIAL RESPONSE ACTIONS AT UNCONTROLLED HAZARDOUS WASTE SITES

By

Howard L. Rishel
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4014 Long Beach Boulevard
Long Beach, California 90807

Contract No. 68-01-4885

Project Officer
Oscar W. Albrecht
Solid and Hazardous Waste Research Division
Municipal Environmental Research Laboratory
Cincinnati, Ohio 45268

Municipal Environmental Research Laboratory
Office of Research and Development
U.S. Environmental Protection Agency
Cincinnati, Ohio 45268

(1981)

Electrical Resistivity Sounding Data

SOUNDING 1 INS EQUIPMENT SITE

p-p1 spacing (feet)	dial reading (ohms)	*scale multiplier	corrected reading (ohms)	*k (feet)	apparent resistivity (ohm-ft)	cumulative resistivity (ohm-ft)
2.00	11.50	1.00	11.50	2499.80	28747.70	28747.70
4.00	18.00	1.00	18.00	1249.50	22491.00	51238.70
6.00	22.00	1.00	22.00	832.60	18317.20	69555.90
8.00	16.50	1.00	16.50	624.00	10296.00	79851.90
10.00	9.50	1.00	9.50	498.80	4738.60	84590.50
12.00	7.50	1.00	7.50	415.20	3114.00	87704.50
14.00	18.50	1.00	18.50	355.40	6574.90	94279.40
16.00	34.50	1.00	34.50	310.50	10712.25	104991.65
18.00	35.50	1.00	35.50	275.50	9780.25	114771.90
20.00	37.00	1.00	37.00	247.50	9157.50	123929.40
22.00	29.50	1.00	29.50	224.50	6622.75	130552.15
24.00	22.00	1.00	22.00	205.30	4516.60	135068.75
26.00	13.00	1.00	13.00	189.10	2458.30	137527.05
28.00	7.50	1.00	7.50	175.10	1313.25	138840.30
30.00	95.00	0.01	0.95	162.90	154.76	138995.06
32.00	130.00	0.01	1.30	152.30	197.99	139193.05
34.00	165.00	0.01	1.65	142.80	235.62	139428.66
36.00	161.00	0.01	1.61	134.40	216.38	139645.05
38.00	170.00	0.01	1.70	126.80	215.56	139860.61
40.00	175.00	0.01	1.75	120.00	210.00	140070.61
42.00	212.00	0.01	2.12	113.80	241.26	140311.86
44.00	196.50	0.01	1.97	108.10	212.42	140524.28
46.00	206.00	0.01	2.06	102.90	211.97	140736.26
48.00	225.00	0.01	2.25	98.20	220.95	140957.21
50.00	241.00	0.01	2.41	93.80	226.06	141183.26
52.00	258.00	0.01	2.58	89.70	231.43	141414.69
54.00	267.00	0.01	2.67	85.80	229.09	141643.78
56.00	279.00	0.01	2.79	82.30	229.62	141873.39
58.00	288.50	0.01	2.89	79.00	227.92	142101.31
60.00	310.00	0.01	3.10	75.80	234.98	142336.29
62.00	332.00	0.01	3.32	72.90	242.03	142578.32
64.00	340.00	0.01	3.40	70.10	238.34	142816.66
66.00	347.00	0.01	3.47	67.50	234.23	143050.88
68.00	352.00	0.01	3.52	65.00	228.80	143279.68
70.00	356.00	0.01	3.56	62.70	223.21	143502.89
72.00	356.00	0.01	3.56	60.40	215.02	143717.92
74.00	397.00	0.01	3.97	58.30	231.45	143949.37
76.00	426.00	0.01	4.26	56.30	239.84	144189.21
78.00	448.00	0.01	4.48	54.40	243.71	144432.92
80.00	480.00	0.01	4.80	52.50	252.00	144684.92
82.00	494.00	0.01	4.94	50.70	250.46	144935.38
84.00	507.00	0.01	5.07	49.00	248.43	145183.81
86.00	530.00	0.01	5.30	47.40	251.22	145435.03
88.00	541.00	0.01	5.41	45.80	247.78	145682.80
90.00	564.00	0.01	5.64	44.30	249.85	145932.66
92.00	600.00	0.01	6.00	42.80	256.80	146189.46
94.00	619.00	0.01	6.19	41.40	256.27	146445.72
96.00	646.00	0.01	6.46	40.10	259.05	146704.77
98.00	670.00	0.01	6.70	38.80	259.96	146964.73
100.00	730.00	0.01	7.30	37.50	273.75	147238.48

*scale multiplier .001 printed as .00

App Res =(2iiiR) [1/1/r1-1/r2-1/r3+1/r4] where k=[]

SOUNDING 2 INS EQUIPMENT SITE

p-p1 spacing (feet)	dial reading (ohms)	*scale multiplier	corrected reading (ohms)	*k (feet)	apparent resistivity (ohm-ft)	cumulative resistivity (ohm-ft)
2.00	33.50	0.01	0.34	899.80	301.43	301.43
4.00	59.00	0.01	0.59	449.50	265.21	566.64
6.00	86.50	0.01	0.87	299.30	258.89	825.53
8.00	116.00	0.01	1.16	224.00	259.84	1085.37
10.00	153.00	0.01	1.53	178.80	273.56	1358.94
12.00	166.00	0.01	1.66	148.50	246.51	1605.45
14.00	199.00	0.01	1.99	126.80	252.33	1857.78
16.00	224.00	0.01	2.24	110.50	247.52	2105.30
18.00	258.00	0.01	2.58	97.80	252.32	2357.62
20.00	286.50	0.01	2.87	87.50	250.69	2608.31
22.00	312.50	0.01	3.13	79.10	247.19	2855.50
24.00	332.50	0.01	3.33	72.00	239.40	3094.90
26.00	252.50	0.01	2.53	70.00	176.75	3271.65
28.00	388.50	0.01	3.89	60.80	236.21	3507.86
30.00	424.50	0.01	4.25	56.30	238.99	3746.85
32.00	451.00	0.01	4.51	52.30	235.87	3982.72
34.00	480.50	0.01	4.81	48.70	234.00	4216.73
36.00	509.00	0.01	5.09	45.50	231.60	4448.32
38.00	545.00	0.01	5.45	42.60	232.17	4680.49
40.00	575.50	0.01	5.76	40.00	230.20	4910.69
42.00	609.00	0.01	6.09	37.60	228.98	5139.67
44.00	647.50	0.01	6.48	35.40	229.22	5368.89
46.00	688.00	0.01	6.88	33.40	229.79	5598.68
48.00	730.00	0.01	7.30	31.50	229.95	5828.63
50.00	774.50	0.01	7.75	29.80	230.80	6059.43
52.00	821.00	0.01	8.21	28.10	230.70	6290.13
54.00	879.50	0.01	8.80	26.60	233.95	6524.08
56.00	932.50	0.01	9.33	25.10	234.06	6758.14
58.00	975.50	0.01	9.76	23.80	232.17	6990.31
60.00	98.50	0.10	9.85	22.50	221.63	7211.93

*scale multiplier .001 printed as .0

SOUNDING 3 INS EQUIPMENT

p-p1 spacing (feet)	dial reading (ohms)	*scale multiplier	corrected reading (ohms)	*k (feet)	apparent resistivity (ohm-ft)	cumulative resistivity (ohm-ft)
2.00	9.00	1.00	9.00	899.80	8098.20	8098.20
4.00	7.50	1.00	7.50	449.50	3371.25	11469.45
6.00	6.00	1.00	6.00	299.30	1795.80	13265.25
8.00	5.50	1.00	5.50	224.00	1232.00	14497.25
10.00	5.00	1.00	5.00	178.80	894.00	15391.25
12.00	4.00	1.00	4.00	148.50	594.00	15985.25
14.00	5.00	1.00	5.00	126.80	634.00	16619.25
16.00	5.00	1.00	5.00	110.50	552.50	17171.75
18.00	4.00	1.00	4.00	97.80	391.20	17562.95
20.00	3.50	1.00	3.50	87.50	306.25	17869.20
22.00	4.50	1.00	4.50	79.10	355.95	18225.15
24.00	3.50	1.00	3.50	72.00	252.00	18477.15
26.00	4.50	1.00	4.50	70.00	315.00	18792.15
28.00	5.00	1.00	5.00	60.80	304.00	19096.15
30.00	5.50	1.00	5.50	56.30	309.65	19405.80
32.00	6.00	1.00	6.00	52.30	313.80	19719.60
34.00	5.00	1.00	5.00	48.70	243.50	19963.10
36.00	3.00	1.00	3.00	45.50	136.50	20099.60
38.00	4.00	1.00	4.00	42.60	170.40	20270.00
40.00	3.50	1.00	3.50	40.00	140.00	20410.00
42.00	3.50	1.00	3.50	37.60	131.60	20541.60
44.00	3.50	1.00	3.50	35.40	123.90	20665.50
46.00	3.00	1.00	3.00	33.40	100.20	20765.70
48.00	4.00	1.00	4.00	31.50	126.00	20891.70
50.00	4.00	1.00	4.00	29.80	119.20	21010.90
52.00	10.50	1.00	10.50	28.10	295.05	21305.95
54.00	8.50	1.00	8.50	26.60	226.10	21532.05
56.00	6.50	1.00	6.50	25.10	163.15	21695.20
58.00	6.50	1.00	6.50	23.80	154.70	21849.90
60.00	7.50	1.00	7.50	22.50	168.75	22018.65

SOUNDING 4 INS EQUIPMENT

p-p1 spacing (feet)	dial reading (ohms)	*scale multiplier	corrected reading (ohms)	*k (feet)	apparent resistivity (ohm-ft)	cumulative resistivity (ohm-ft)
2.00	13.00	1.00	13.00	2499.80	32497.40	32497.40
4.00	13.50	1.00	13.50	1249.50	16868.25	49365.65
6.00	13.00	1.00	13.00	832.60	10823.80	60189.45
8.00	13.00	1.00	13.00	624.00	8112.00	68301.45
10.00	17.00	1.00	17.00	498.80	8479.60	76781.05
12.00	8.50	1.00	8.50	415.20	3529.20	80310.25
14.00	11.00	1.00	11.00	355.40	3909.40	84219.65
16.00	15.00	1.00	15.00	310.50	4657.50	88877.15
18.00	10.00	1.00	10.00	275.50	2755.00	91632.15
20.00	10.00	1.00	10.00	247.50	2475.00	94107.15
22.00	10.50	1.00	10.50	224.50	2357.25	96464.40
24.00	12.50	1.00	12.50	205.30	2566.25	99030.65
26.00	13.00	1.00	13.00	189.10	2458.30	101488.95
28.00	16.00	1.00	16.00	175.10	2801.60	104290.55
30.00	12.00	1.00	12.00	162.90	1954.80	106245.35
32.00	9.00	1.00	9.00	152.30	1370.70	107616.05
34.00	7.00	1.00	7.00	142.80	999.60	108615.65
36.00	11.00	1.00	11.00	134.40	1478.40	110094.05
38.00	11.00	1.00	11.00	126.80	1394.80	111488.85
40.00	12.00	1.00	12.00	120.00	1440.00	112928.85
42.00	12.50	1.00	12.50	113.80	1422.50	114351.35
44.00	10.00	1.00	10.00	108.10	1081.00	115432.35
46.00	10.00	1.00	10.00	102.90	1029.00	116461.35
48.00	9.00	1.00	9.00	98.20	883.80	117345.15
50.00	12.00	1.00	12.00	93.80	1125.60	118470.75
52.00	13.00	1.00	13.00	89.70	1166.10	119636.85
54.00	11.00	1.00	11.00	85.80	943.80	120580.65
56.00	9.00	1.00	9.00	82.30	740.70	121321.35
58.00	9.00	1.00	9.00	79.00	711.00	122032.35
60.00	10.00	1.00	10.00	75.80	758.00	122790.35
62.00	8.00	1.00	8.00	72.90	583.20	123373.55
64.00	10.00	1.00	10.00	70.10	701.00	124074.55
66.00	9.00	1.00	9.00	67.50	607.50	124682.05
68.00	7.00	1.00	7.00	65.00	455.00	125137.05
70.00	11.00	1.00	11.00	62.70	689.70	125826.75
72.00	10.00	1.00	10.00	60.40	604.00	126430.75
74.00	12.00	1.00	12.00	58.30	699.60	127130.35
76.00	10.50	1.00	10.50	56.30	591.15	127721.50
78.00	10.50	1.00	10.50	54.40	571.20	128292.70
80.00	9.50	1.00	9.50	52.50	498.75	128791.45
82.00	9.00	1.00	9.00	50.70	456.30	129247.75
84.00	9.00	1.00	9.00	49.00	441.00	129688.75
86.00	9.50	1.00	9.50	47.40	450.30	130139.05
88.00	10.00	1.00	10.00	45.80	458.00	130597.05
90.00	10.00	1.00	10.00	44.30	443.00	131040.05
92.00	12.00	1.00	12.00	42.80	513.60	131553.65
94.00	11.00	1.00	11.00	41.40	455.40	132009.05
96.00	10.00	1.00	10.00	40.10	401.00	132410.05
98.00	10.00	1.00	10.00	38.80	388.00	132798.05
100.00	9.00	1.00	9.00	37.50	337.50	133135.55

*scale multiplier .001 printed as .00

SOUNDING 5 INS EQUIPMENT

p-p1 spacing (feet)	dial reading (ohms)	*scale multiplier	corrected reading (ohms)	*k (feet)	apparent resistivity (ohm-ft)	cumulative resistivity (ohm-ft)
2.00	72.50	.00	0.07	2499.80	181.24	181.24
4.00	92.50	.00	0.09	1249.50	115.58	296.81
6.00	8.00	0.01	0.08	832.60	66.61	363.42
8.00	9.00	0.01	0.09	624.00	56.16	419.58
10.00	108.00	0.01	1.08	498.80	538.70	958.29
12.00	271.00	0.01	2.71	415.20	1125.19	2083.48
14.00	22.00	0.01	0.22	355.40	78.19	2161.67
16.00	38.00	0.01	0.38	310.50	117.99	2279.66
18.00	46.00	0.01	0.46	275.50	126.73	2406.39
20.00	42.00	0.01	0.42	247.50	103.95	2510.34
22.00	36.00	0.01	0.36	224.50	80.82	2591.16
24.00	40.00	0.01	0.40	205.30	82.12	2673.28
26.00	42.00	0.01	0.42	189.10	79.42	2752.70
28.00	43.00	0.01	0.43	175.10	75.29	2827.99
30.00	53.00	0.01	0.53	162.90	86.34	2914.33
32.00	70.00	0.01	0.70	152.30	106.61	3020.94
34.00	64.50	0.01	0.65	142.80	92.11	3113.04
36.00	70.00	0.01	0.70	134.40	94.08	3207.12
38.00	70.50	0.01	0.71	126.80	89.39	3296.52
40.00	76.00	0.01	0.76	120.00	91.20	3387.72
42.00	73.00	0.01	0.73	113.80	83.07	3470.79
44.00	83.00	0.01	0.83	108.10	89.72	3560.52
46.00	84.50	0.01	0.85	102.90	86.95	3647.47
48.00	92.00	0.01	0.92	98.20	90.34	3737.81
50.00	90.50	0.01	0.91	93.80	84.89	3822.70
52.00	96.50	0.01	0.97	89.70	86.56	3909.26
54.00	82.00	0.01	0.82	85.80	70.36	3979.62
56.00	101.50	0.01	1.02	82.30	83.53	4063.15
58.00	97.00	0.01	0.97	79.00	76.63	4139.78
60.00	97.50	0.01	0.98	75.80	73.91	4213.68
62.00	104.00	0.01	1.04	72.90	75.82	4289.50
64.00	105.00	0.01	1.05	70.10	73.61	4363.11
66.00	117.00	0.01	1.17	67.50	78.98	4442.08
68.00	123.00	0.01	1.23	65.00	79.95	4522.03
70.00	136.00	0.01	1.36	62.70	85.27	4607.30
72.00	150.00	0.01	1.50	60.40	90.60	4697.90
74.00	157.00	0.01	1.57	58.30	91.53	4789.43
76.00	182.00	0.01	1.82	56.30	102.47	4891.90
78.00	186.00	0.01	1.86	54.40	101.18	4993.08
80.00	199.00	0.01	1.99	52.50	104.48	5097.56
82.00	211.00	0.01	2.11	50.70	106.98	5204.54
84.00	221.00	0.01	2.21	49.00	108.29	5312.83
86.00	232.00	0.01	2.32	47.40	109.97	5422.79
88.00	239.00	0.01	2.39	45.80	109.46	5532.26
90.00	252.00	0.01	2.52	44.30	111.64	5643.89
92.00	256.00	0.01	2.56	42.80	109.57	5753.46
94.00	264.00	0.01	2.64	41.40	109.30	5862.76
96.00	269.00	0.01	2.69	40.10	107.87	5970.62
98.00	278.00	0.01	2.78	38.80	107.86	6078.49
100.00	303.00	0.01	3.03	37.50	113.63	6192.11

*scale multiplier .001 printed as .00

Electrical Resistivity Profile Data

ENGINEERING-SCIENCE, INC.
RESISTIVITY PROFILE DATA SHEET

Job No. 46314 Date 10-17-84

Site Name INS Equipment Site Location INS Eq.

Observer(s) Harman, Fenger, Zydorczak Comments (soil conditions, etc.) dry to moderately moist

Equipment Used (name, serial #) Bison #11-8309 Electrode Array Method Used Wenner

Test Mode Dial Reading 320.5 Test Mode Current 27 milliamperes

Station Location	Electrode Spacing (feet)	2πV/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-1	5	697.0	1.0	697	3485
P-1	15	129.0	1.0	129	1935
P-1	30	20.0	1.0	20	600
P-1	50	12.0	1.0	12	600
P-2	5	369.0	1.0	369	1845
P-2	15	70.0	1.0	70	1050
P-2	30	6.0	1.0	6	180

Bison Unit: Apparent Resistivity = Electrode Spacing x (2πV/I x Scale Multiplier) where ( ) = Corrected Reading

8410.116

JNS Eg.
10-12-87

Station Location	Electrode Spacing (feet)	2 π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-2	50	61.5	.1 (Hi Sig.)	6.15	307.5
P-3	5	76	.1	7.6	38
P-3	15	37	.1	3.7	55.5
P-3	30	28.5	.1	2.85	85.5
P-3	50	20	.1	2.0	100
P-4	5	14.0	0.1	1.4	7.0
P-4	15	20.5	0.1	2.05	30.75
P-4	30	36.5	0.1	3.65	109.5
P-4	50	26.5	0.1	2.65	132.5
P-5	5	122.0	0.1	12.22	61.0

INS Eg.
10-17-84

Station Location	Electrode Spacing (feet)	2π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-5	15	19.5	.01	.195	2.925
P-5	30	18.0	.01	.18	5.4
P-5	50	26.5	.01	.265	13.25
P-6	5	169	1	169	845
P-6	15	40.5	.1	4.05	60.75
P-6	30	11	.1	1.1	33
P-6	50	13.5	.1	1.35	67.5
P-7	~~15~~	+1049 -0 16.0	.1	1.6	8.0
P-7	15	19.0	0.1	1.9	28.5
P-7	30	10 5.5	0.1	10.55	316.5

Station Location	Electrode Spacing (feet)	2π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-7	50	86.0	0.1	8.6	430.0
P-8	5	39.5	0.1	3.95	19.75
P-8	15	19.0	0.1	1.9	28.5
P-8	30	26.0	0.1	2.6	78.0
P-8	50	28.0	0.1	2.8	140.0
P-9	5	978.0 HIDHSp	0.1	97.80 HIDHSp	HIDHSp. 489.0
P-9	15	268.5	0.1	26.85	402.75
P-9	30	142	.1	14.2	426.0
P-9	50	41	.1	4.1	205.0
P-10	5	81.0	1.0	81.0	405.0

INS E
10-17-84

Station Location	Electrode Spacing (feet)	2 π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-10	15	25.0	1.0	25	375.0
P-10	30	6.0	1.0	6.0	180.0
P-10	50	~~3.0 H.0~~	~~1.0 0.01~~	~~3 0.11~~	~~1500~~
P-11	5	9.0	1.1	9.1	45
P-11	15	5.5	1.0	5.5	82.5
P-11	30	3.5	1.0	3.5	105
P-11	50	2.0	1.0	2.0	100
P-12	5	43	1.0	43	215
P-12	15	19	1.0	19	285
P-12	30	5	1.0	5	150

INS SF
10-17-84

Station Location	Electrode Spacing (feet)	2π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-12	50	5	1.0	5	250
P-13	5	424.5	1.0	424.5	2122.5
P-13	15	47.5	1.0	47.5	712.5
P-13	30	15.0	1.0	15.0	450.0
P-13	50	6.5	1.0	6.5	325.0
P-14	5	31	1.0	31	155.0
P-14	15	29	1.0	29	435.0
P-14	30	11.5	1.0	11.5	345.0
P-14	50	6.5	1.0	6.5	325.0
P-15	5	68	1.0	68	340.0

INS E
10-17-84

Station Location	Electrode Spacing (feet)	2π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-15	15	15	10	15	225
P-15	30	8	1.0	8	240
P-15	50	6	1.0	6	300
P. 16	5	143.0	1.0	143	715
P-16	15	53.0	1.0	53.0	795
P-16	30	18.0	1.0	18.0	540
P-16	50	9.0	1.0	9.0	450
P-17	5	24.0	1.0	24.0	120
P-17	15	17.5	1.0	17.5	262.5
P-17	30	7.0	1.0	7.0	210.0

INS &
10-17-87

Station Location	Electrode Spacing (feet)	2 π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-17	50	3.5	1.0	3.5	175.0
P-18	5	46.5	1.0	46.5	232.5
P-18	15	12.0	1.0	12.0	180.0
P-18	30	5	1.0	5	150.0
P-18	50	9	.1	.9	45.0
~~P-18~~					
	~~5~~				
	~~10~~				
	~~30~~				
	50				

ENGINEERING-SCIENCE, INC.
RESISTIVITY PROFILE DATA SHEET

Job No. 46314 Date 10-18-84

Site Name INS Eg. Site Location River Rd.

Observer(s) Hamman, Fenzel, Izydorczek Comments (soil conditions, etc.) moist

Equipment Used (name, serial #) Bison II-83409 Electrode Array Method Used Wenner

Test Mode Dial Reading 318.5 Test Mode Current 27 milliamperes

Station Location	Electrode Spacing (feet)	2πV/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-19	5	398.0	1.0	398	1990
	15	68.0	1.0	68	1020
	30	25	1.0	25	750
	50	13	1.0	13	650
P-20	5	196	1.0	196	980
	15	35	1.0	34	525
	30	23.5	1.0	23.5	705

Bison Unit: Apparent Resistivity = Electrode Spacing x (2πV/I x Scale Multiplier) where ( ) = Corrected Reading

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JNS 4.
10-18-84

Station Location	Electrode Spacing (feet)	2π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-20	50	6.0	1.0	6	300
P-21	5	5.3	1.0	6.3	315
	15	14	1.0	14	210
	30	18	1.0	18	540
	50	39	.1	3.9	195
P-22	5	220	1.0	220	1100
	15	9.0	1.0	9.0	135
	30	14.0	1.0	14	420
	50	13.0	1.0	13	650
P-23	5	220	1.0	220	1100

Station Location	Electrode Spacing (feet)	2 π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-23	15	28.0	1.0	28.0	420
	30	12.0	1.0	12.0	360
	50	11.0	0.1	1.1	55
P-24	5	398.5	1.0	398.5	1992.5
	15	22	1.0	22	330
	30	8.5	.1	.85	25.5
	50	11.5	.1	1.15	57.5
P-25	5	47.5	1.0	47.5	237.5
	15	12.0	1.0	12	180.0
	30	29.0	1.0 0.1	2.9	~~87.0~~ 87.0

Station Location	Electrode Spacing (feet)	2π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-25	50	19.5	~~1.0~~ 0.1	1.95	97.5
P-26	5	14.65	0.1	14.65	73.25
	15	103.5	0.1	10.35	155.25
	30	62.5	0.1	6.25	187.5
	50	32.0	0.1	3.2	160.0
P-27	5	31.0	1.0	31	155.0
	15	41.5	0.1	4.15	62.25
	30	19.5	0.1	4.95	148.5
	50	29.0	0.1	2.90	145.0
P-28	5	38.0	1.0	38.0	190.0

INS 5
10-18-84

Station Location	Electrode Spacing (feet)	2π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-28	15	17	1.0	17	255.0
	30	13.5	1.0	13.5	405.0
	50	13.5	1.0	13.5	675.0
P-29	5	48.0	1.0	48	240
	15	14.0	1.0	14	210
	30	9.5	1.0	9.5	285
	50	9.0	1.0	9.0	450.0
P-30	5	14.5	0.01	14.5	2 225
	15	142.5	0.1	19.95	299.25
	30	32.5	0.1	3.25	97.5

INS Eq.
10-13-84

Station Location	Electrode Spacing (feet)	2π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-30	50	12.5	0.1	1.25	62.5
P-31	5	88.5	1.0	88.5	442.5
	15	13.5	1.0	13.5	202.5
	30	26.0	.1	2.6	78.0
	50	11.5	.1	1.15	57.5
P-32	5	170.5	1.0	170.5	852.5
	15	7.0	1.0	7.0	105.0
	30	27.0	0.1	2.7	81.0
	50	8.5	1.0	8.5	425.0
P-33	5	106	1.0	106	530.0

IWS 6.
10-18-84

Station Location	Electrode Spacing (feet)	2π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-33	15	7.0	1.0	7	105
	30	38.0	0.1	3.8	114
	50	12.5	0.1	1.25	62.5
P-34	5	393.5	0.1	39.35	196.75
	15	89.5	0.1	6.95	104.25
	30	33.5	0.1	3.35	100.5
	50	13.5	0.1	1.35	67.5
P-35	5	265.0	1.0	265.0	1325
	15	50.5	1.0	50.5	757.5
	30	6.5	1.0	6.5	195.0

INS Eg.
10-18-84

Station Location	Electrode Spacing (feet)	2π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-35	50	4.0	1.0	4.0	200
P-36	5	49	1.0	49.0	245
	15	7.0	1.0	7.0	105
	30	24.0	0.1	2.4	72
	50	15.5	0.1	1.55	77.5
P-37	5	146	1.0	146	730.0
	15	18.5	1.0	18.5	277.5
	30	6	1.0	6	180.0
	50	4.5	1.0	4.5	225.0
P-38	5	180.0	1.0	182	910.0

INS §.
10-18-84

Station Location	Electrode Spacing (feet)	2π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-38	15	48.5	1.0	48.5	727.5
	30	13.0	1.0	13.0	390.0
	50	16.0	0.1	1.6	80.0
P-39	5	33.5	1.0	33.5	167.5
	15	5.0	1.0	5.0	75.0
	30	3.0	1.0	3.0	90.0
	50	17.5	0.1	1.75	87.5

ENGINEERING-SCIENCE, INC.
RESISTIVITY PROFILE DATA SHEET

Job No. 46314 Date 10-22-84

Site Name INS Equipment Site Location River Road, Buffalo, N.Y.

Observer(s) Haman, Fenzel & Izydorczek Comments (soil conditions, etc.) moist

Equipment Used (name, serial #) Bison Electrode Array Method Used Wenner

Test Mode Dial Reading 318.5 Test Mode Current 27 milliamperes

Station Location	Electrode Spacing (feet)	2πV/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-40	5	932.5	1.0	932.5	4662.5
	15	26.5	1.0	26.5	397.5
	30	32.0	0.1	3.2	96.0
	50	11.5	0.1	1.15	57.5
P-41	5	53.5	1.0	53.5	267.5
	15	38.0	1.0	38.0	570.0
	30	11.0	1.0	11.0	330.0

Bison Unit: Apparent Resistivity = Electrode Spacing x (2πV/I x Scale Multiplier) where ( ) = Corrected Reading

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10-22-87

Station Location	Electrode Spacing (feet)	2 π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-41	50	69.5	0.1	6.95	347.5
P-42	5	99.0	1.0	99.0	495.0
	15	30.5	1.0	30.5	457.5
	30	7.0	1.0	7.0	210.0
	50	4.5	1.0	4.5	225.0
P-43	5	48.5	1.0	48.5	242.5
	15	7.5	1.0	7.5	112.5
	30	28.0	0.1	2.8	84.0
	50	9.5	0.1	.95	47.5
P-44	5	72.0	1.0	72.0	360.0

INS E.
10-22-84

Station Location	Electrode Spacing (feet)	2 π V/I (ohms)	Scale Multiplier	Corrected Reading (ohms)	Apparent Resistivity (ohm - feet)
P-44	15	25.5	1.0	25.5	382.5
	30	4.0	1.0	4.0	120.0
	50	30.0	0.1	3.0	150.0
P-45	5	65.5	1.0	65.5	327.5
	15	13.0	1.0	13.0	195.0
	30	30.0	0.1	3.0	90.0
	50	24.5	0.1	2.45	122.5

APPENDIX A

FIELD PROCEDURES

APPENDIX A
PHASE II FIELD PROCEDURES

The following procedures have been used by Engineering Science/ Dames & Moore field teams during the Phase II field investigations.

These procedures have been developed from the standard practices of the companies and, in some instances, reflect specific procedural requests from the NYSDEC.

GEOPHYSICAL SURVEY PROCEDURES

Electrical Resistivity Survey

The electrical resistivity survey provides a method for shallow subsurface investigations by means of electrical measurements taken at the surface of the earth. Two electrode arrangements were used for the electrical resistivity survey, the standard Wenner and the "Modified" Wenner electrode arrays.

The standard Wenner electrode configuration (Bison, 1975), is one in which four electrodes are spaced at equal intervals along a line. This method is known as electrical resistivity profiling, where electrode spacing is approximately equal to depth below ground surface and used to investigate a particular subsurface zone.

The "Modified" Wenner electrode configuration (Carrington and Watson, 1981) for depth sounding was used to determine the variation in electrical subsurface conditions with depth. The sounding procedure consists of moving the two potential electrodes at one foot increments, along a line, away from the geoelectrical center while the two current

electrodes remain stationary. Successive readings are taken and the apparent resistivity values are plotted against electrode spacing. The potential electrode spacings closely approximate depth below ground surface with this electrode configuration.

Both vertical electrical soundings and horizontal electrical profiles were conducted at selected depths and locations in the immediate vicinity of the site.

Magnetometer Survey

The magnetometer survey was conducted utilizing a Geometrics Model 816/826A magnetometer. The magnetometer obtains readings of the magnetic field intensity, in gammas, of the earth at a single ground surface location. The successful application of the magnetometer is determined by the magnetic intensity of the target and the established background intensity.

Background magnetic values are established by setting up a magnetometer base station in a clean area and recording the values at the beginning and end of each survey. The magnetometer survey is conducted on a large-scale grid pattern using 40-by-40 foot grids as station locations. A tightly spaced grid 10-by-10 foot or 20-by-20 foot may be employed in areas where magnetic anomalies are identified.

SURFACE WATER, SEDIMENT, AND LEACHATE SAMPLING

Surface water, sediment, and leachate sampling bottles were provided by the laboratory. At leachate collection points only liquid samples were taken. At all other points both water and sediment samples were taken, except where otherwise noted. When no preservatives were present in the bottle, the bottle was directly submerged into the surface water and allowed to fill; when preservatives were used, the sample was initially collected in a wide mouth glass jar and decanted into a sampling jar with the appropriate preservative. Care was taken not to overfill the sampling jars, so as to avoid loss of the sample preserva-

tive. The wide-mouth glass jar was washed with hexane followed by methanol and rinsed with distilled water between each sample. Samples were wrapped, packaged on ice and shipped according to the same quality assurance procedures as described in the section on Monitoring Well Sampling.

DRILLING, WELL INSTALLATION AND WELL DEVELOPMENT DRILLING

After an evaluation of geophysical survey results, and existing site conditions, the drilling program was reevaluated, if necessary, and implemented. Drilling was performed by R & R International with CME drill rigs mounted on truck and all-terrain vehicles. A 6-1/4 inch I.D. hollow-stemmed auger was used for all borings except where drilling conditions warranted use of roller bit and 6-inch casing (rotary wash method). All down-hole tools were steam-cleaned between borings to prevent cross-contamination during drilling. An attempt was made to keep tools, rods, etc. as clean as possible during drilling by frequently cleaning the equipment and using plastic tarps to cover the ground.

Soil samples were taken with an open-drive split-spoon sampler. At least one boring, typically the upgradient boring, was sampled continuously. In all other boreholes, the sampling method was standard sampling at 5-foot intervals. Glass sample jars were provided by the drilling subcontractor.

All cuttings and drilling fluids were monitored with an HNu meter to assess potential for air contamination. If volatile organics had been detected in excess of 5 ppm, material would have been containerized.

Well Installation

Well installation took place immediately after drilling. For all wells, except in cases of an extremely thin aquifer, a 10-foot long 2-inch Johnson PVC wound continuous slot (0.010 inch) screen and 2-inch I.D. PVC riser pipe was used. At the base of each well, a 2-foot long

2-inch I.D. pipe was placed to help prevent clogging of the pipe due to infiltration of sediment. All other pipe sections were 10-feet long and flush-jointed; all joints were additionally secured with teflon tape. All screens and pipe sections were cleaned by steaming prior to installation.

Upon completing the PVC emplacement, a No. 1 Q-rok sand filter was tremmied into the annulus to a height of 2 to 4 feet above the tip of the screened interval. An approximately 2-foot thick primary bentonite seal was placed on top of the sand pack. When installing the shallow wells, grout was placed on top of the bentonite seal to the ground surface and a 6-inch O.D. steel protective casing with a locking cap was installed. After placing the primary bentonite seal in the deep wells, the auger was gradually withdrawn while grout was placed in the hole.

Well Development

Each well was developed by pumping with either an airlift system, a positive displacement pump, or a bailer in order to evacuate the well and allow normal inflow of groundwater through the sand pack. Evacuation continued until discharge water was free of fines, typically 4 to 6 hours. If HNu meter readings in excess of 5 ppm had been measured, the discharge water would have been containerized.

Monitoring Well Sampling

The sampling of monitoring wells consists of three parts: well evacuation, well sampling, and analytical field tests. Each of these procedures is described below.

Well Evacuation

Prior to sampling a monitoring well, the static water level was recorded and at least two well volumes of water were removed to assure that the water in the well was truly representative of the groundwater. Evacuation was accomplished by using either a teflon bailer, stainless

steel bailer, centrifugal pump, or an airlift system. The method used was dictated by each well, (i.e., volume of water to evacuate and depth to static water level). If HNu meter readings in excess of 5 ppm had been measured, the discharge water would have been containerized.

Sampling Procedure

Following recovery from final evacuation, groundwater samples were collected according to the procedures summarized on Table A.1. For deep wells, the samples were collected using a positive displacement device with a check valve at its lower end. The advantage of a positive displacement pump is that it limits degassing and volatilization of contamination when a sample is removed from a deep well. For shallow wells, samples were collected using either a stainless steel or a teflon bailer with a bail check valve at its lower end. Incorporation of a check valve onto the bailers assures that a sample is representative of the depth to which the bailer is lowered. All samples were removed from a depth just above the well screen to further assure a representative groundwater sample. After sampling, the sampling apparatus was cleaned with hexane, methanol, and then rinsed with distilled, deionized water.

In addition to water samples collected from the monitoring wells, three types of "blanks" were collected and submitted to the chemical laboratory for analyses:

a. Trip Blank A - One Trip Blank A was prepared by the chemical laboratory. It consisted of distilled, deionized water in a sample bottle which remained capped during the shipment of sample bottles and sampling effort.

   One Trip Blank A accompanied each set of sample bottles to be used in each geographical location. It was a check on the chemical laboratory's analysis.

b. Trip Blank B - One-for-each-geographical location Trip Blank B samples were prepared ahead of time by the laboratory. Each sample consisted of distilled deionized water in a sample bottle, labeled and capped. At each location, a new Trip Blank B sample was used. For each, the procedure was to open the blank when the wells were uncapped, keep Trip Blank B opened until sampling effort was finished at the well, and cap Trip Blank B when groundwater sample bottles were capped. Trip Blank B was a check on the contribution of atmospheric contamination to the water samples.

c. Equipment/Wash Blank - Taken between selected wells. Procedures were as follows:

- o Sampling equipment (pump or bailer) washed with hexane followed by methanol, collecting solvent rinse. Rinsed with distilled water.
- o Sample taken of "clean" distilled deionized water.
- o Sample refrigerated.

The analytical results from the groundwater sampling effort are presented in Section IV and Appendix D.

Analytical Field Tests

Prior to filling the sample bottles, two 250-ml beakers of groundwater were filled. The sample in one beaker was immediately analyzed for temperature (°C), specific conductance (umhos/cm), and pH. The sample in the other beaker was analyzed for dissolved oxygen (ppm). Specific conductance, pH, and dissolved oxygen were measured by electronic probe. Temperature was measured by probe and double-checked with a thermometer. All equipment was cleaned and calibrated between each sample. During the sampling and field testing, sampling records were kept. Results of these analytical field tests are compiled in Appendix D.

AIR QUALITY MONITORING

Air quality monitoring for organic vapors with an HNu photoionization meter was implemented during site investigations before, during, and after sampling, and at the time of drilling. The meter was calibrated in the laboratory before use with a benzene standard. The first reading that was taken was an upwind position. The wand on the meter was held at head height for 30 seconds and the reading was recorded. Readings with the wand at head height were continually taken during site reconnaissance. Organic vapors emanating from surface water and leachate seeps were determined by holding the wand 6" to 12" above the water for 30 seconds. During the drilling procedure, the split-spoon soil samples were held at approximately 1" from the wand to test for organic constituents emanating from the soil samples. The air in the drilled well was also analyzed by dangling the wand at a depth of approximately 1 foot.

GAMMA AND ELECTRIC LOGGING

Each well (or the deeper well of a cluster) at each installation was logged using a Mt. Sopris 1000-C portable logging instrument to record the natural gamma activity of the formations. All logs were run from the bottom of the hole to the surface. The instrument depth meter was initialized with the Probe Electrode at ground surface at each well. The logging probe was cleaned with distilled water between wells. At most wells the surface electrode was connected to the protective surface casing. At a few wells the surface electrode was pushed into adjacent soil. Copies of the resulting logs are shown as figures in Appendix B.

The interpretations of these logs are based on relative changes of all three logs, not necessarily the actual values of displacement. The logs were utilized in conjunction with the drilling logs in formulating a basic understanding of the subsurface strata and in preparing geological cross-sections.

IN-SITU PERMEABILITY TESTS

An in-situ variable head permeability test (slug test) was performed in each well. This test provides estimate of permeability calculated from the rate at which water level inside a well will equilibrate with the hydraulic head in the surrounding aquifer. The test procedure is as follows: the initial change in water level is accomplished inserting or withdrawing a solid "slug" of known volume into or out of the well. The slug test data is analyzed by the Hvorslev (1951) method for data reduction. For the well geometries used at this site, the method calculates horizontal hydraulic conductivity (K_h). K_h has units of a velocity and is an estimate of the capability of a saturated soil to transmit groundwater in a horizontal direction. To use the Hvorslev method, a semi-log plot of recovery data (of normalized to the initial chnge in water level) versus time (arithmetic scale) is prepared. K_h is calculated according to the following equation:

$$K = \frac{r^2 \ln (L/R)}{2 L T_o}$$

Where: K = horizontal hydraulic conductivity

r = radius of the well casing

L = length of the well screen

R = radius of the well intake (well casing plus sand pack)

T_o = basic time lag (=value of t at recovery of 0.37)

In most cases, two tests were done on each well; one where the water level was initially lowered in the well (depeletion mode) and the other where the water level was initially raised in the well. The results of both analyses for each well are summarized in the text.

TABLE A.1
SAMPLING PROCEDURE FOR MONITORING WELLS

1. Well and trip blank were opened; initial static water level recorded with an electric sounder.

2. Sampling device lowered into well.

   - o Positive displacement device lowered by the attached stainless steel guide cable.

   - o Bailer was lowered by a stainless steel cable.

3. Sample taken.

   - o From positive displacement discharge tube.

     - The discharge tube was inserted to the bottom of the sample bottle and withdrawn ahead of the sample so that aeration and turbulence were minimized.

   - o From bailer.

     - Sample was poured slowly from the open end of the bailer and the sample bottle tilted so that aeration and turbulence were minimized.

4. Samples were capped, labeled and placed in ice filled coolers provided by the chemical laboratory.

5. Well and trip blank were capped and locked.

6. Chain-of-Custody forms were completed in triplicate.

   - o The original and a copy were put into a zip-lock bag and placed into the cooler.

   - o A copy was kept for files.

7. Cooler was sealed with strapping tape and custody labels to assure integrity and provide security against tampering.

8. Sampling device washed.

   - o Sampling device was washed with hexane, followed by methanol and finally distilled water.

   - o Solvents and distilled water rinse were collected into a large funnel which emptied into a 5-gallon container.

APPENDIX B

BORING LOGS, WELL SCHEMATICS, GRAIN SIZE ANALYSIS, GAMMA LOGS, AND PERMEABILITY TEST DATA

Boring Logs

RECORD OF TELEPHONE CONVERSATION

DATE 9/18/85 JOB NO.: INS (16)

RECORDED BY: EDG OWNER/CLIENT: Dames & Moore

TALKED WITH: Paul Schmidt, President OF Clarence Materials Corp

NATURE OF CALL: INCOMING ☐ OUTGOING ☐

ROUTE TO: INFORMATION ACTION

MAIN SUBJECT OF CALL: depth of on-site well.

ITEMS DISCUSSED:

There is an on-site well, depth of 30 ft which is used only for truck washing. Approximately 6 to 8 people routinely come in contact with this water.

(Note: This well must be in the lower aquifer. It was originally drilled to 50 ft, then backed up to about 30 ft. Schmidt says that they get very little water from it.)

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: INS EQUIPMENT

BORING NO.: CW-102
SURFACE ELEV: 574.51'

DRILLING METHOD: Hollow stem augers

SAMPLING METHOD: Split spoon

DATE STARTED: 6/21/85
DATE FINISHED: 6/21/85

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
1	9	SS	0	ML	Dark brown, slightly moist silt, some gravel, little sand Hnu=1ppm
			1	CL	Reddish-brown moist clay, little gravel
2a,2b	26	SS	2	GP	Black, wet gravel, some fine sand Hnu=2ppm
			3		
3	13	SS	4	CL	Mottled brown, moist clay, some gravel, little fine sand and silt Hnu=1.5ppm
			5		
4	11	SS	6	SC	Brown, wet gravel, medium to fine sand and clay Hnu=1ppm
			7		
5	35	SS	8	GP	Brownish-black wet gravel and fine sand, trace silt Hnu=1ppm
			9	SW	Brown, wet, medium to coarse sand, little fine gravel
6a,6b	17	SS	10	GP	Gray-brown wet gravel, little fine to coarse sand Hnu=1ppm
			11		
7	70	SS	12	SP	Black-brown wet medium sand, trace gravel Hnu=1ppm
			13		
8	10	SS	14		grading to brown fine sand, some gravel
			15		Dark gray, very moist fine sand and silt, some clay (slight petroleum odor)
9	8	SS	16		Hnu=1ppm slight petroleum odor
			17	ML	Hnu=0.5ppm
10	7	SS	18		
			19		grades to silt, little clay Hnu=0.5ppm
11	8	SS	20		grades to silt and clay

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: INS EQUIPMENT

BORING NO.: CW-102

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			20	ML	Hnu=0.5ppm
			21		
12	8	SS	22	SP	Dark gray, very moist fine sand, little silt and clay Hnu=0.5ppm
			23		
13	15	SS	24	SM	Dark gray, moist fine sand, some silt and clay Hnu=0.5ppm
			25		
14	8	SS	26		grades to no clay Hnu=0.5ppm
			27		
15	14	SS	28		grades to very moist Hnu=0.5ppm
			29		
16	44	SS	30	SW	Gray, wet gravel and coarse sands, little fine sand Hnu=0.5ppm
			31		
17	100/5"	SS	32	GP	Gray, wet gravel, trace fine sand Hnu=0.5ppm
			33		
18	100/6"	SS	34	GW	Gray, wet gravel, some coarse sand Hnu=1ppm
			35		
19	50/6"	SS	36	SP	Bluish-gray, moist fine sand, some gravel, little silt Hnu=0.5ppm
			37		
20	75/3"	SS	38		grades to gray, wet
			39		
			40		

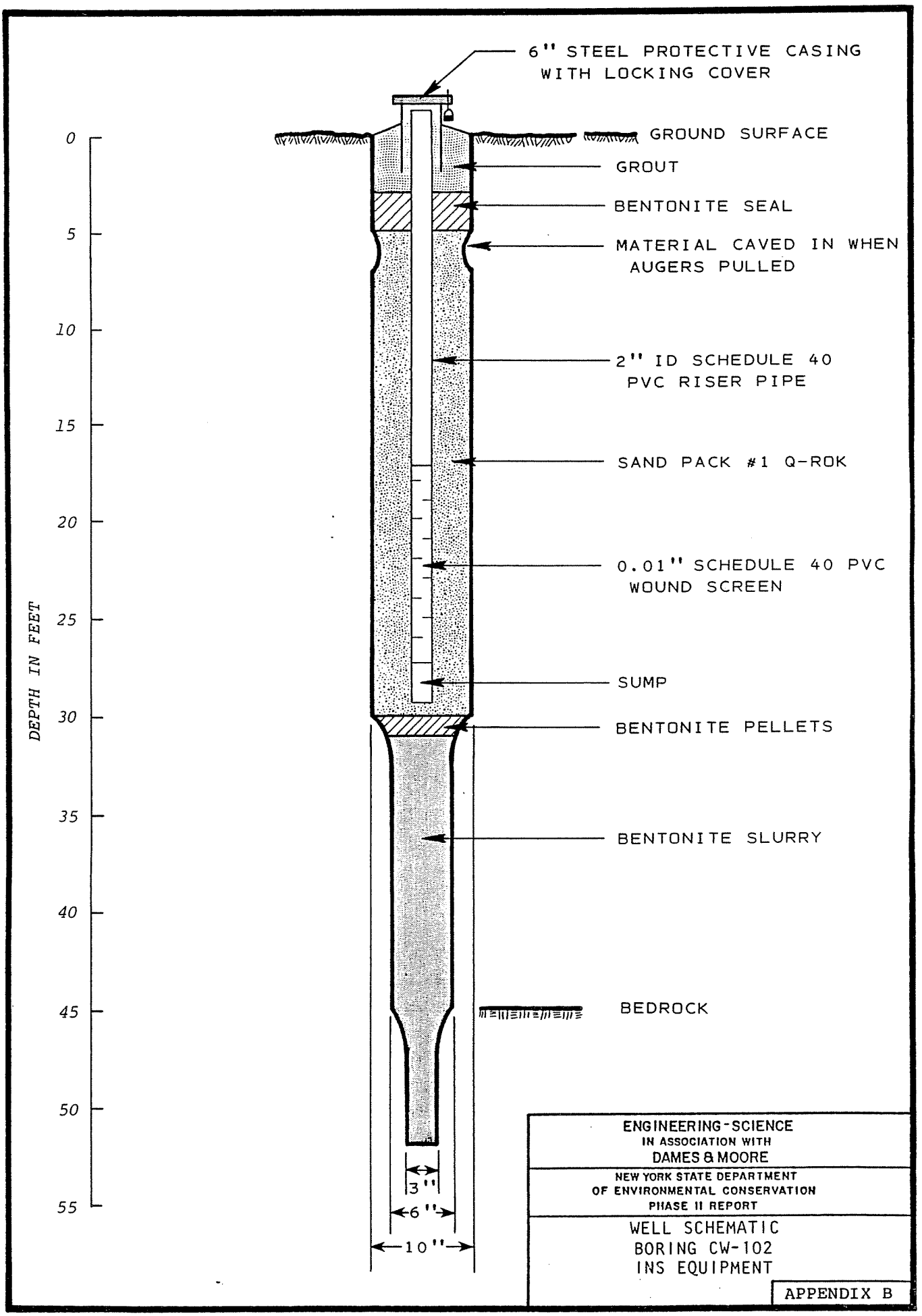
DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: INS EQUIPMENT

BORING NO.: CW-102

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			40		
			41		
			42	SP	
			43		
			44		
20	60/0"	SS	45		Gray non-fossiliferous limestone (Bertie Formation), numerous horizontal fractures with calcite precipitates REC=75%, RQD=0
			46		
			47		
			48		
			49		
			50		
			51		
			52		Boring terminated at a depth of 52.0 feet on 6/21/85

Well Schematics



ENGINEERING-SCIENCE
IN ASSOCIATION WITH
DAMES & MOORE

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION
PHASE II REPORT

WELL SCHEMATIC
BORING CW-102
INS EQUIPMENT

APPENDIX B

In-Situ Permeability Test Results

5?! 205

SLUG TESTS

WELL NUMBER & LOCATION CW-102 INS EQUIP DATE 9/13/85

DEPTH TO STATIC WATER LEVEL 7.88 TIME 1:00 Pm

TOTAL DEPTH OF WELL FROM TOP OF CASING ~~0.0473 ft³~~

VOLUME OF SLUG 0.0473 ft³

NOTE: ALL MEASUREMENTS ARE FROM TOP OF Protective CASING

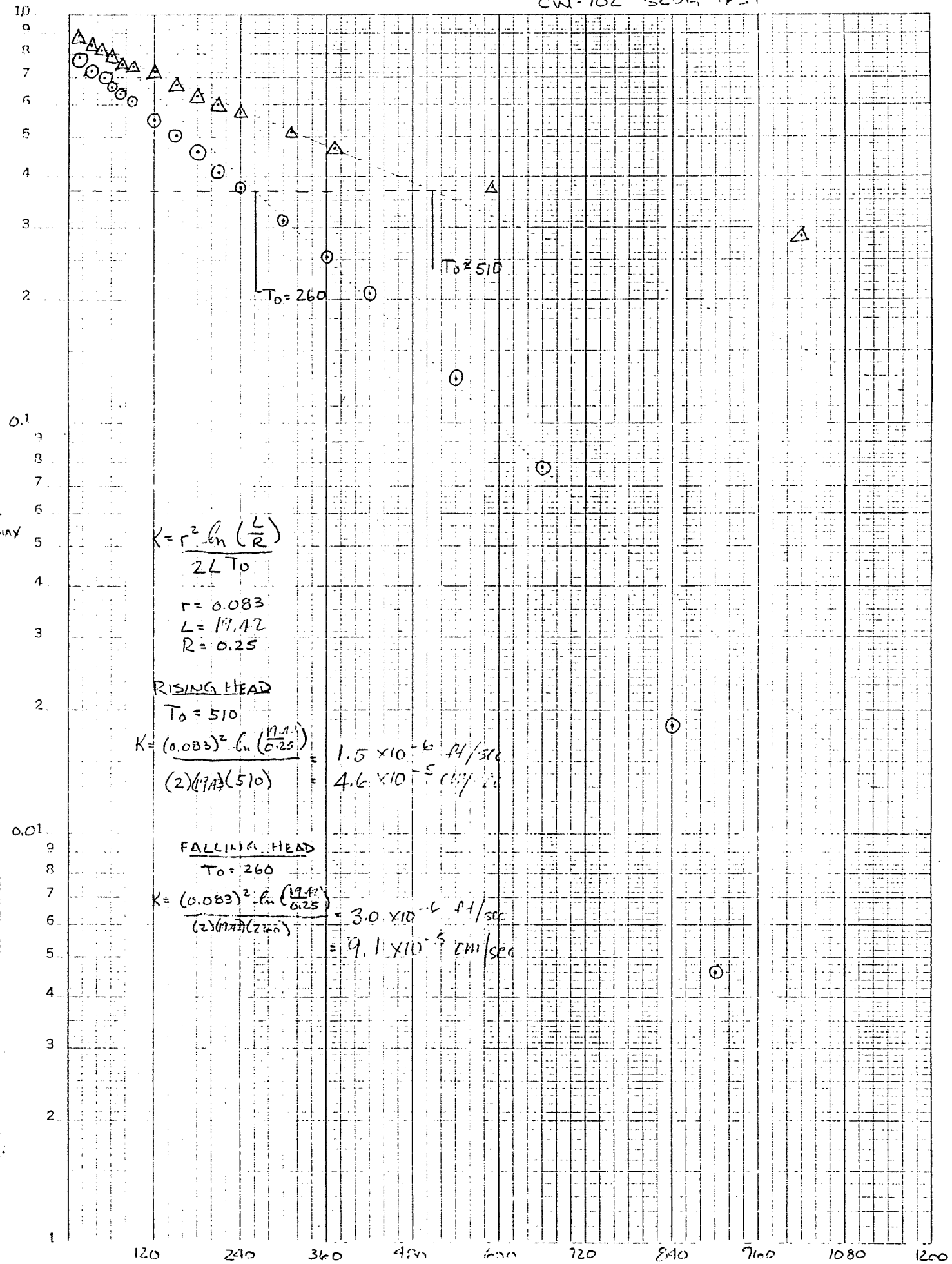
FALLING HEAD		RISING HEAD	
WATER LEVEL	ELAPSED TIME	WATER LEVEL	ELAPSED TIME
6.15	:15 sec	9.82	:15 sec
6.29	:30	9.72	:30
6.36	:50	9.66	:45
6.43	1:00	9.60	1:00
6.49	1:15	9.55	1:15
6.55	1:30	9.50	1:30
6.68	2:00	9.46	1:45
6.79	2:30	9.42	2:00
6.88	3:00	9.34	2:30
6.98	3:30	9.26	3:00
7.06	4:00	9.19	3:30
7.20	5:00	9.13	4:00
7.33	6:00	9.00	5:15
7.43	7:00	8.90	6:10
7.60	9:00	8.70	9:50
7.71	11:00	8.50	17:00
7.84	14:00	8.40	32:00
7.87	15:00		
7.88	15:30		

START 1:12

△ = RISING HEAD
⊙ = FALLING HEAD

INC EQUIP
13305-014-19

CW-102 SLUG TEST



$$K = \frac{r^2 \ln\left(\frac{L}{R}\right)}{2L T_o}$$

$r = 0.083$
$L = 19.42$
$R = 0.25$

RISING HEAD
$T_o = 510$

$$K = \frac{(0.083)^2 \ln\left(\frac{19.42}{0.25}\right)}{(2)(19.42)(510)} = 1.5 \times 10^{-6} \text{ ft/sec}$$
$$= 4.6 \times 10^{-5} \text{ cm/sec}$$

FALLING HEAD
$T_o = 260$

$$K = \frac{(0.083)^2 \ln\left(\frac{19.42}{0.25}\right)}{(2)(19.42)(260)} = 3.0 \times 10^{-6} \text{ ft/sec}$$
$$= 9.1 \times 10^{-5} \text{ cm/sec}$$

CW-102

STATIC HEAD= 7.88

MAX CHANGE= 5.71

T(SEC)	H	H-H	H-H/H-HO
0	5.71	2.17	1
15	6.15	1.73	.79723502304147
30	6.29	1.59	.73271889400921
50	6.36	1.52	.70046082949309
650	6.43	1.45	.66820276497696
60	6.43	1.45	.66820276497696
75	6.49	1.39	.6405529953917
90	6.55	1.33	.61290322580645
120	6.68	1.2	.55299539170507
150	6.79	1.09	.50230414746544
180	6.88	1	.4608294930875 6
210	6.98	.9	.4147465437788
240	7.06	.82	.3778801843318
300	7.2	.68	.31336405529954
360	7.33	.55	.25345622119816
420	7.43	.45	.2073732718894
540	7.6	.28	.12903225806451
660	7.71	.17	.078341013824885
840	7.84	.04	.018433179723502
900	7.87	.01	4.6082949308756E-03
930	7.88	0	0

INS EQUIP CW-102(RISING)

13305-014-19

STATIC HEAD= 7.88

MAX CHANGE= 10.05

T(SEC)	H	H-H	H-H/H-HO
0	10.05	-2.17	1
15	9.82	-1.94	.89400921658986
30	9.72	-1.84	.8479262672811
45	9.66	-1.78	.82027649769585
60	9.6	-1.72	.7926267281106
75	9.55	-1.67	.76958525345622
90	9.5	-1.62	.74654377880184
105	9.46	-1.58	.7281105990783 4
120	9.42	-1.54	.70967741935484
150	9.34	-1.46	.6728110599078 3
180	9.26	-1.38	.63594470046083
210	9.19	-1.31	.6036866359447
240	9.13	-1.25	.57603686635945
315	9	-1.12	.51612903225806
370	8.9	-1.02	.4700460829493
590	8.7	-.82	.3778801843318
1020	8.5	-.62	.28571428571428
1920	8.4	-.52	.23963133640553

SLUG TESTS

WELL NUMBER & LOCATION R3 INS E 40 pt. DATE 9/13/85

DEPTH TO STATIC WATER LEVEL 19.17 TIME 2^40 p

TOTAL DEPTH OF WELL FROM TOP OF CASING _____

VOLUME OF SLUG 0.0473 Ft^3

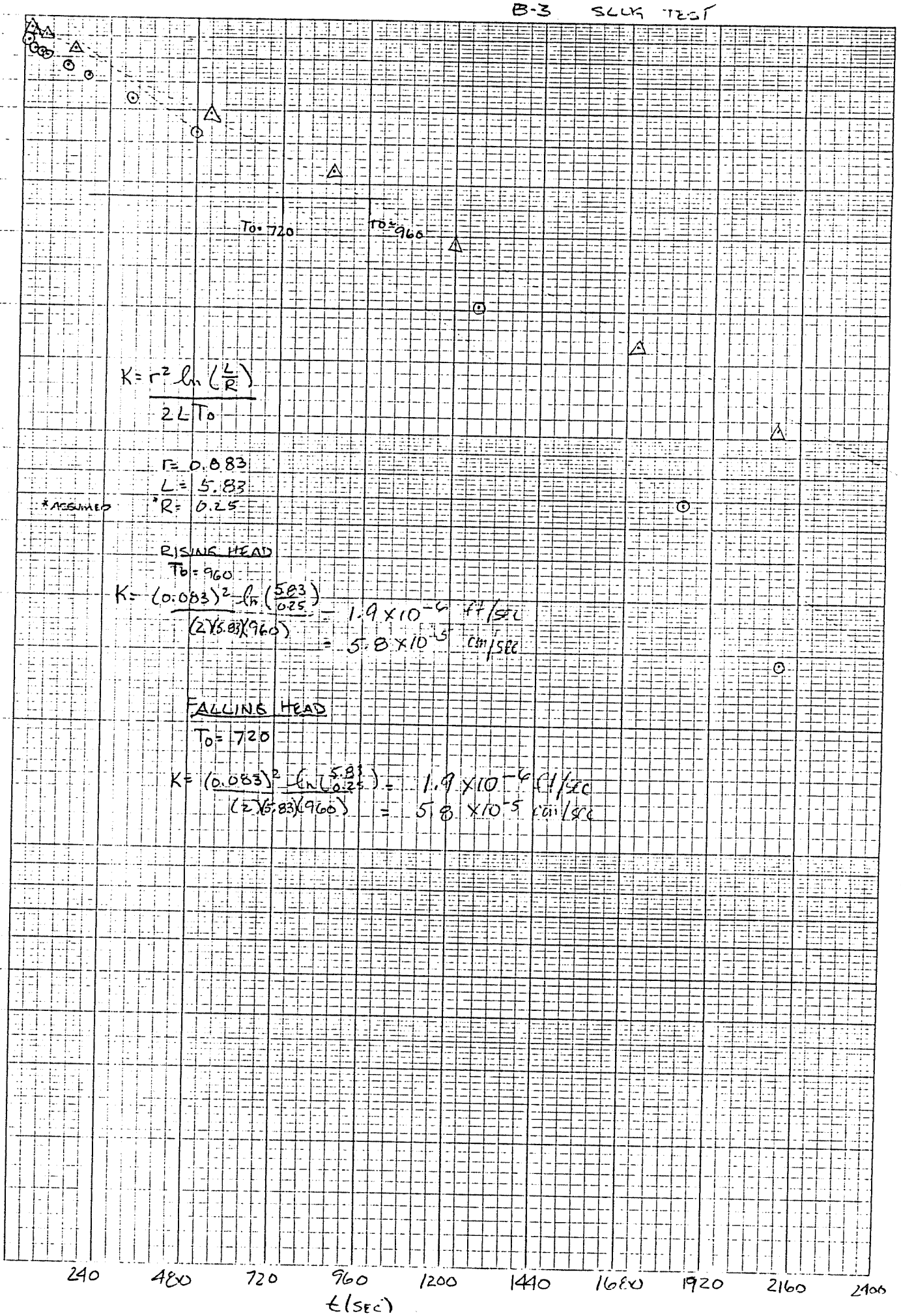
NOTE: ALL MEASUREMENTS ARE FROM TOP OF ~~CASING~~ Protective

FALLING HEAD		RISING HEAD	
WATER LEVEL ~~ft.~~	ELAPSED TIME	WATER LEVEL	ELAPSED TIME
		STARTING STATIC 19.24 ~~Est~~	
17.25	:15 sec	21.28	:20 sec
17.34	:30	21.27	:30
17.37	1:45	21.22	1:00
17.41	~~1~~ 1:00	21.07	2:30
17.51	2:00	20.53	8:40
17.60	3:00	20.17	14:15
17.78	5:00	19.87	20:00
18.02	8:00	19.60	28:30
18.73	21:15	19.47	35:00
19.02	31:00		
19.11	35:10		
19.24	1:04:30		

⊙ = FALLING HEAD

13305-OM-19

B-3 SLUG TEST



$$K = \frac{r^2 \ln\left(\frac{L}{R}\right)}{2LT_o}$$

r = 0.083

L = 5.83

*R = 0.25 *ASSUMED

RISING HEAD

T_o = 960

$$K = \frac{(0.083)^2 \ln\left(\frac{5.83}{0.25}\right)}{(2)(5.83)(960)} = 1.9 \times 10^{-6} \text{ ft/sec}$$

$$= 5.8 \times 10^{-5} \text{ cm/sec}$$

FALLING HEAD

T_o = 720

$$K = \frac{(0.083)^2 \ln\left(\frac{5.83}{0.25}\right)}{(2)(5.83)(960)} = 1.9 \times 10^{-6} \text{ ft/sec}$$

$$= 5.8 \times 10^{-5} \text{ cm/sec}$$

46 5373

SEMI-LOGARITHMIC 3 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO.

TNS EQUIP B-3(FALLING) 13305-014-19

STATIC HEAD= 19.17 MAX CHANGE= 17

T(SEC)	H	H-H	H-H/H-HO
0	17	2.17	1
900	17.25	1.92	.88479262672811
15	17.25	1.92	.88479262672811
30	17.34	1.83	.84331797235023
45	17.37	1.8	.8294930875576
60	17.41	1.76	.8110599078341
120	17.51	1.66	.76497695852534
180	17.6	1.57	.72350230414746
300	17.78	1.39	.6405529953917
480	18.02	1.15	.52995391705069
1275	18.73	.44	.2027649769585
1860	19.02	.15	.06912442396313
2110	19.11	.06	.02764976958525
3870	19.24	-.07	-.0322580645161

INS EQUIP B-3(RISING) 13305-014-19

STATIC HEAD= 19.24 MAX CHANGE= 21.41

T(SEC)	H	H-H	H-H/H-HO
0	0	19.24	-8.866359447004
0	21.41	-2.17	1
20	21.28	-2.04	.9400921658986
30	21.27	-2.03	.935483870967
60	21.22	-1.98	.9124423963133
150	21.07	-1.83	.8433179723502
520	20.53	-1.29	.5944700460829
855	20.17	-.93	.4285714285714
1200	19.87	-.63	.2903225806451
1710	19.6	-.36	.1658986175115
2100	19.47	-.23	.1059907834101

14:00

SLUG TESTS

WELL NUMBER & LOCATION B-4 INS Equip DATE 9/13/85

DEPTH TO STATIC WATER LEVEL 17.62 TIME 2:55 p

TOTAL DEPTH OF WELL FROM TOP OF CASING _____

VOLUME OF SLUG 0.0623 ft^3

START 40 MIN

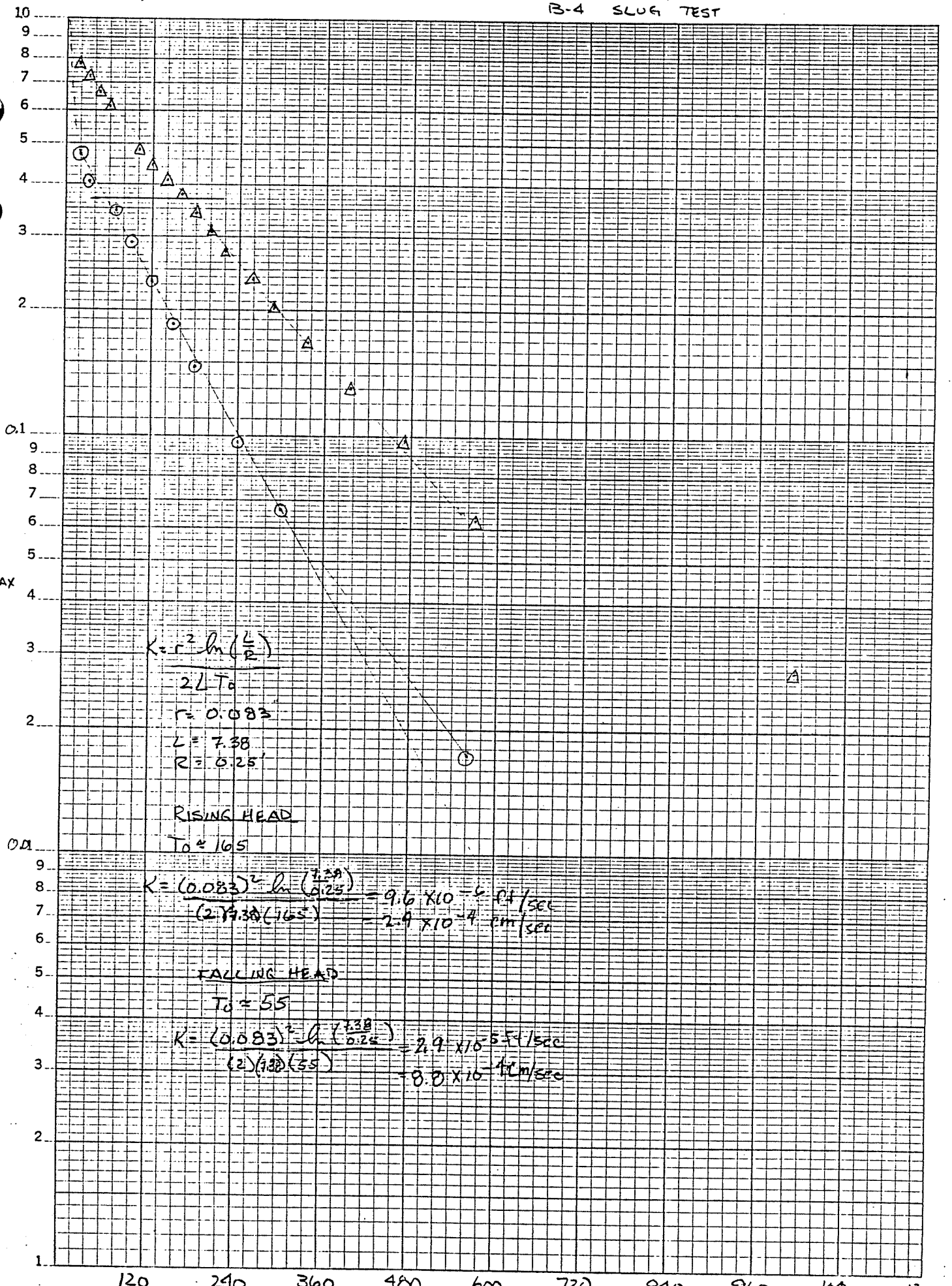
NOTE: ALL MEASUREMENTS ARE FROM TOP OF ~~CASING~~ Protective

FALLING HEAD		RISING HEAD	
WATER LEVEL	ELAPSED TIME	WATER LEVEL ft	ELAPSED TIME
15.98	:19 Sec	19.86	:18 Sec
16.18	:30	19.71	:30
16.62	1:10	19.53	:45
16.78	1:30	19.39	1:00
16.95	2:00	19.00	1:45
17.09	2:30	18.90	2:00
17.20	3:00	18.80	2:20
17.34	4:00	18.70	2:40
17.43	5:00	18.60	3:00
17.57	9:20	18.50	3:22
17.62	14:06	18.40	3:47
		18.30	4:20
		18.20	4:50
		18.10	5:35
		18.00	6:35
		17.90	7:50
		17.80	9:30
		17.70	16:50
		17.67	38:00 3:23 p

⊙ = FALLING HEAD

13305-014-11

B-4 SLUG TEST



$$K = \frac{r^2 \ln\left(\frac{L}{R}\right)}{2L\,T_0}$$

$r = 0.083$

$L = 7.38$

$R = 0.25$

RISING HEAD

$T_0 \approx 165$

$$K = \frac{(0.083)^2 \ln\left(\frac{7.38}{0.25}\right)}{(2)(7.38)(165)} = 9.6 \times 10^{-6}\ \text{ft/sec}$$

$$= 2.9 \times 10^{-4}\ \text{cm/sec}$$

FALLING HEAD

$T_0 \approx 55$

$$K = \frac{(0.083)^2 \ln\left(\frac{7.38}{0.25}\right)}{(2)(7.38)(55)} = 2.9 \times 10^{-5}\ \text{ft/sec}$$

$$= 8.8 \times 10^{-4}\ \text{cm/sec}$$

INS EQUIP B-4(FALLING) 13305-014-19

STATIC HEAD= 17.62 MAX CHANGE= 14.76

T(SEC)	H	H-H	H-H/H-HO
0	14.76	2.86	1
19	15.98	1.64	.57342657342657
30	16.18	1.44	.5034965034965
70	16.62	1	.3496503496503
90	16.78	.84	.29370629370629
120	16.95	.67	.23426573426573
150	17.09	.53	.18531468531468
180	17.2	.42	.14685314685315
240	17.34	.28	.097902097902098
300	17.43	.19	.06643356643356
560	17.57	.05	.017482517482517
840	17.62	0	0

INS EQUIP B-4(RISING) 13305-014-19

STATIC HEAD= 17.62 MAX CHANGE= 20.48

T(SEC)	H	H-H	H-H/H-HO
0	20.48	-2.86	1
18	19.86	-2.24	.78321678321678
30	19.71	-2.09	.73076923076923
45	19.53	-1.91	.66783216783217
60	19.39	-1.77	.61888111888112
105	19	-1.38	.48251748251748
120	18.9	-1.28	.44755244755245
140	18.8	-1.18	.41258741258741
160	18.7	-1.08	.37762237762238
180	18.6	-.98	.34265734265734
202	18.5	-.88	.30769230769231
227	18.4	-.78	.27272727272727
260	18.3	-.68	.23776223776224
290	18.2	-.58	.2027972027972
~~18290~~	~~18.1~~	~~-.48~~	~~.16783216783217~~
335	18.1	-.48	.16783216783217
395	18	-.38	.13286713286713
470	17.9	-.28	.097902097902098
570	17.8	-.18	.062937062937063
1010	17.7	-.08	.027972027972028
1320	17.62	0	0

SLUG TESTS

WELL NUMBER & LOCATION B-5 INS equipt. DATE 9/13/85

DEPTH TO STATIC WATER LEVEL 17.67 TIME 2pm

TOTAL DEPTH OF WELL FROM TOP OF CASING _____

VOLUME OF SLUG 0.0473 ft^3

NOTE: ALL MEASUREMENTS ARE FROM TOP OF Protective CASING

FALLING HEAD

WATER LEVEL	ELAPSED TIME
16.35	:20 sec
16.45	:30
16.55	:45
16.72	1:15
16.80	1:30
16.90	2:00
16.98	2:30
17.05	3:00
17.15	4:00
17.23	5:00
17.30	6:00
17.35	7:00
17.43	9:00
17.50	12:00
17.58	16.00

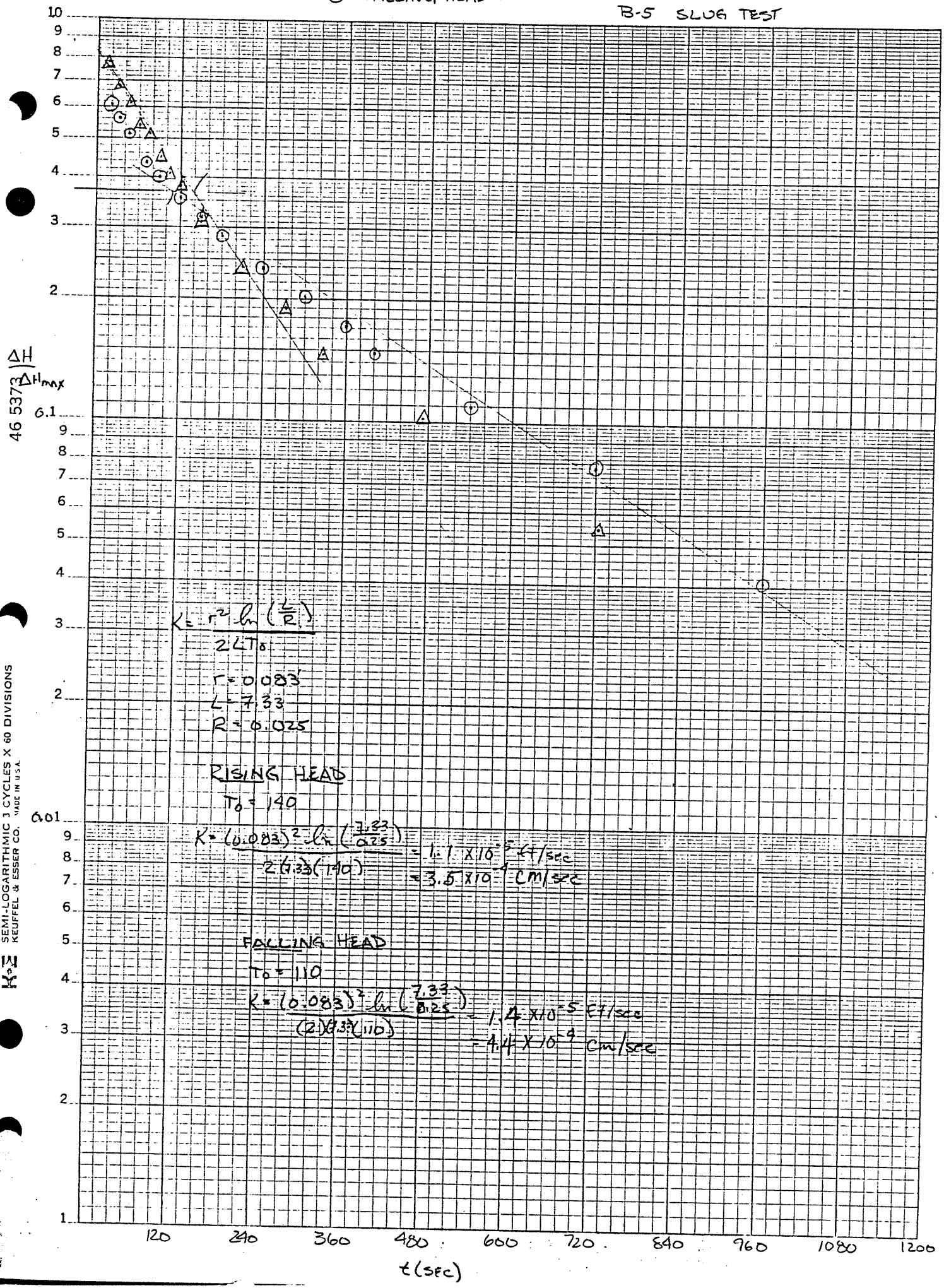
RISING HEAD 2:20

WATER LEVEL Starting Static 17.58 feet	ELAPSED TIME
19.27	:16 sec
19.07	:30
18.92	:45
18.75	1:00
18.70	1:15
18.56	1:30
18.47	1:45
18.41	2:00
18.28	2:30
18.10	3:32
18.00	4:27
17.90	5:33
17.80	7:55
17.70	12:05

⊙ • FALLING HEAD

13605-004-11

B-5 SLUG TEST



$$K = \frac{r^2 \ln\left(\frac{L}{R}\right)}{2LT_0}$$

$r = 0.083'$

$L = 7.33'$

$R = 0.025$

RISING HEAD

$T_0 = 140$

$$K = \frac{(0.083)^2 \ln\left(\frac{7.33}{0.25}\right)}{2(7.33)(140)} = 1.1 \times 10^{-5}\ ft/sec$$

$$= 3.5 \times 10^{-4}\ cm/sec$$

FALLING HEAD

$T_0 = 110$

$$K = \frac{(0.083)^2 \ln\left(\frac{7.33}{0.25}\right)}{(2)(7.33)(110)} = 1.4 \times 10^{-5}\ ft/sec$$

$$= 4.4 \times 10^{-4}\ cm/sec$$

K = 2

SEMI-LOGARITHMIC 3 CYCLES X 60 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 5373

INS EQUIP B-5(FALLING) 13305-014-19

STATIC HEAD= 17.67 MAX CHANGE= 15.5

T(SEC)	H	H-H	H-H/H-HO
0	15.5	2.17	1
20	16.35	1.32	.60829493087557
30	16.45	1.22	.56221198156682
45	16.55	1.12	.51612903225806
75	16.72	.95	.43778801843318
90	16.8	.87	.40092165898617
120	16.9	.77	.35483870967742
150	16.98	.69	.31797235023041
180	17.05	.62	.28571428571428
240	17.15	.52	.23963133640553
300	17.23	.44	.20276497695852
360	17.3	.37	.17050691244239
420	17.35	.32	.14746543778802
540	17.43	.24	.11059907834101
720	17.5	.17	.078341013824885
960	17.58	.09	.04147465437788

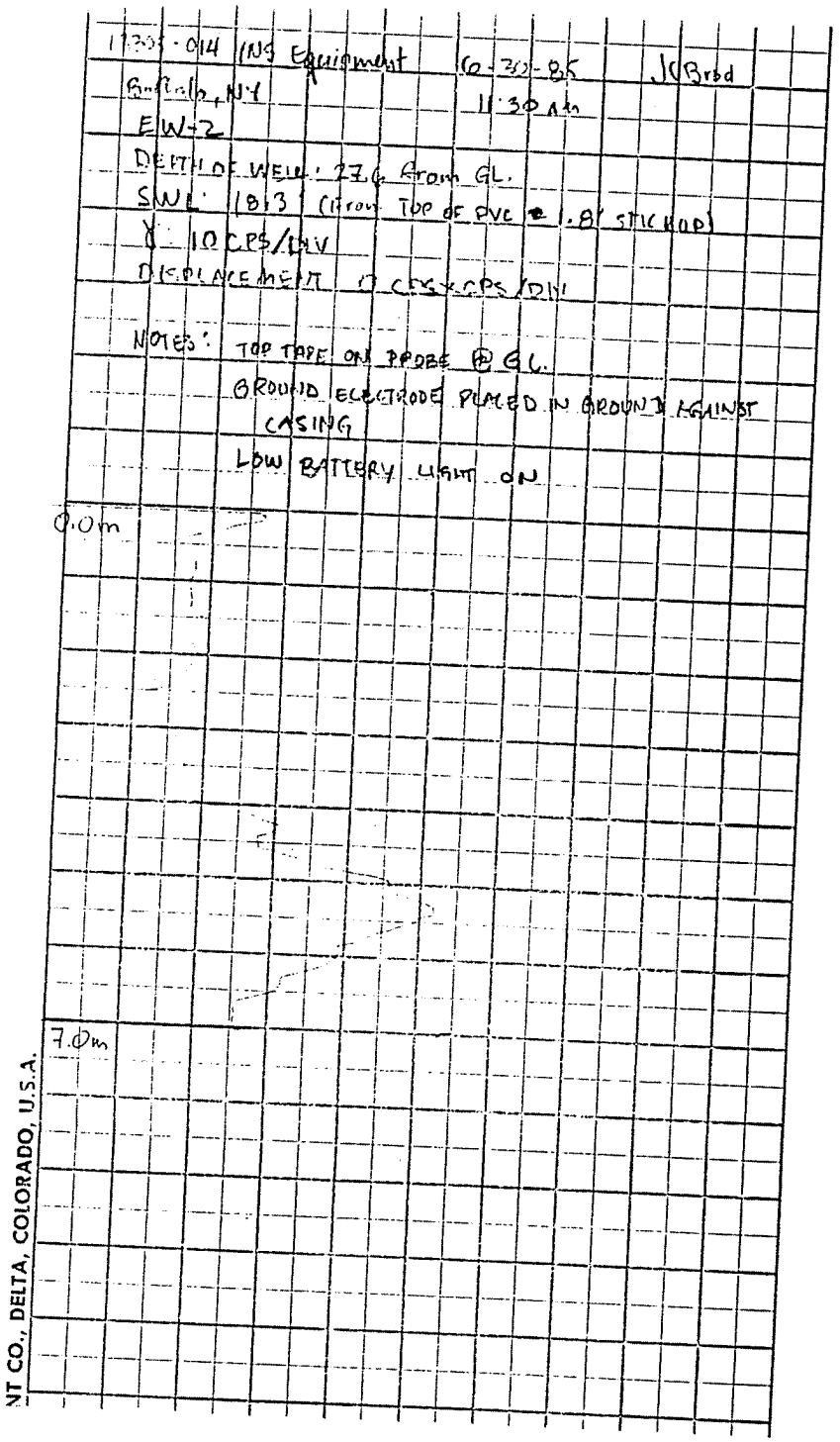
INS EQUIP B-5(RISING) 13305-014-19

STATIC HEAD= 17.58 MAX CHANGE= 19.75

T(SEC)	H	H-H	H-H/H-HO
0	19.75	-2.17	1
16	19.27	-1.69	.77880184331797
30	19.07	-1.49	.68663594470046
45	18.92	-1.34	.61751152073732
60	18.75	-1.17	.53917050691244
75	18.7	-1.12	.51612903225806
90	18.56	-.98	.4516129032258
105	18.47	-.89	.41013824884792
120	18.41	-.83	.38248847926267
150	18.28	-.7	.32258064516129
212	18.1	-.52	.23963133640553
267	18	-.42	.19354838709677
333	17.9	-.32	.14746543778802
475	17.8	-.22	.10138248847926
725	17.7	-.12	.055299539170507

Gamma Logs

Gamma Logs


1733-014 INS Equipment
6-30-85
J.C. Brad
Buffalo, NY
11:30 AM
EW-2
DEPTH OF WELL: 27.6 from GL.
SWL: 18.3 (from TOP OF PVC @ 1.8' STICKUP)
X 10 CPS/DIV
DISPLACEMENT 0 CPS x CPS/DIV
NOTES: TOP TAPE ON PROBE @ GL.
GROUND ELECTRODE PLACED IN GROUND AGAINST CASING
LOW BATTERY LIGHT ON
0.0m
7.0m
NT CO., DELTA, COLORADO, U.S.A.

13305-014 INS Equipment 6-30-85 JCBrod
Buffalo, NY EW-3 12:15 Am
DEPTH OF WELL: 23.2' (FROM G.L.
SWL 16.2' (Top of PVC 1.4 Stick-up)
X: 20 CPS/DIV
DISPLACEMENT: 0 CPS KCPS/DIV

NOTES: TOP TAPE ON PROBE @ G/L.
GROUND ELECTRODE PLACED IN GROUND
AGAINST CASING
LOW BATTERY LIGHT ON

CHART NO. BP-10

0.0m

5.7 m

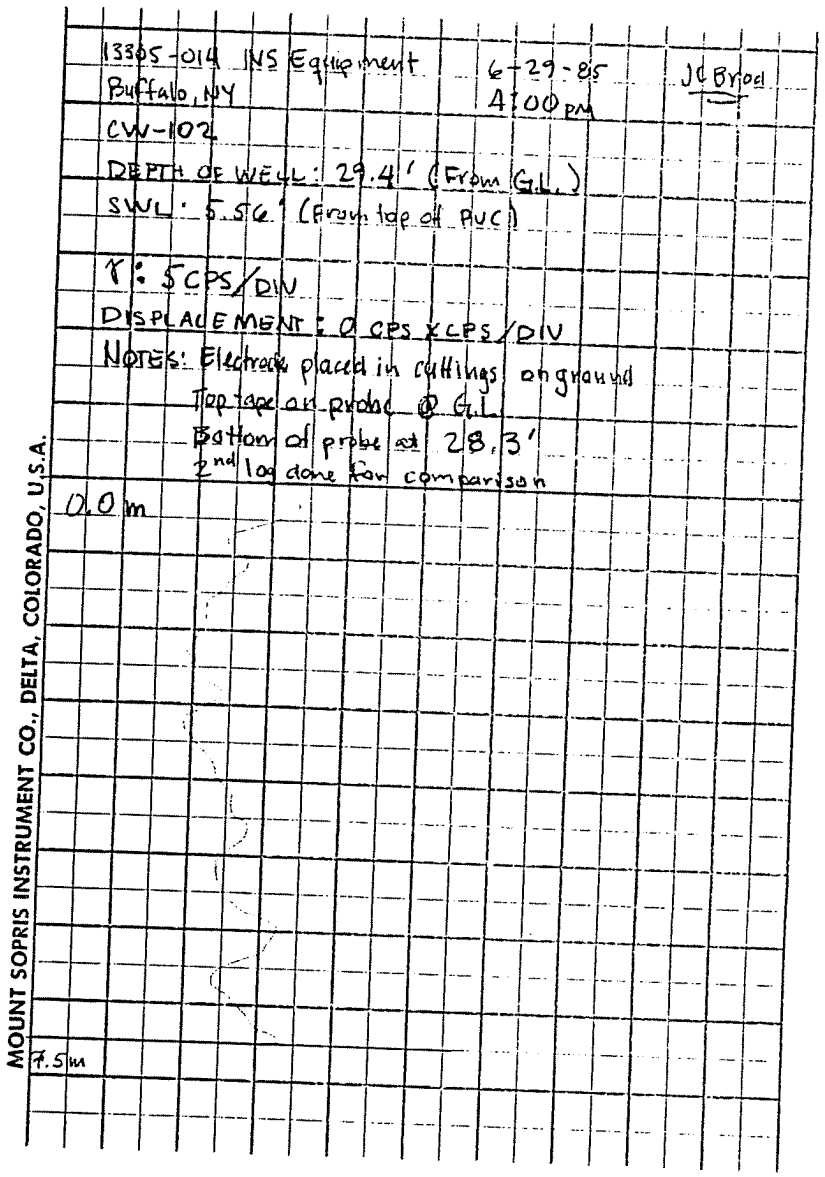

13305-014 NS Equipment
Buffalo, NY
6-29-85
4:00 PM
JC Brjod
CW-102
DEPTH OF WELL: 29.4' (From G.L.)
SWL: 5.56' (From top of PVC)
γ: 5 CPS/DIV
DISPLACEMENT: 0 CPS X CPS/DIV
NOTES: Electrode placed in cuttings on ground
Top tape on probe @ G.L.
Bottom of probe at 28.3'
2nd log done for comparison
0.0 m
7.5 m
MOUNT SOPRIS INSTRUMENT CO., DELTA, COLORADO, U.S.A.

CHART NO. BF

13305-014 INS EQUIPMENT 6-30-85 JCBrod
Buffalo, NY 10:30 AM
EW-1
DEPTH OF WELL: 23.1' (FROM G.L.)
SWL: 16.9' (TOP OF PVC) (2.1' STICK UP)
Y: 5 CPS/DIV
DISPLACEMENT 0 CPS X CPS/DIV

NOTES: TOP TAPE ON PROBE AT G.L.
GROUND ELECTRODE PLACED IN GROUND
AGAINST CASING.
WELL LABLED EW-1 (Existing Well)
FOR ID PURPOSES.

0.0m

5.6m

PRINTED IN U.S.A.

Well: CWI-102 | INS Equipment, Buffalo, NY | 6-25-85 10:40 AM

By: JCBrad.

X: 5 CPS/DIV
Displacement: 0 CPS x CPS/DIV
SWL: 7.2' (From G.L.)
Depth of Well: 14.0 m (From G.L.)

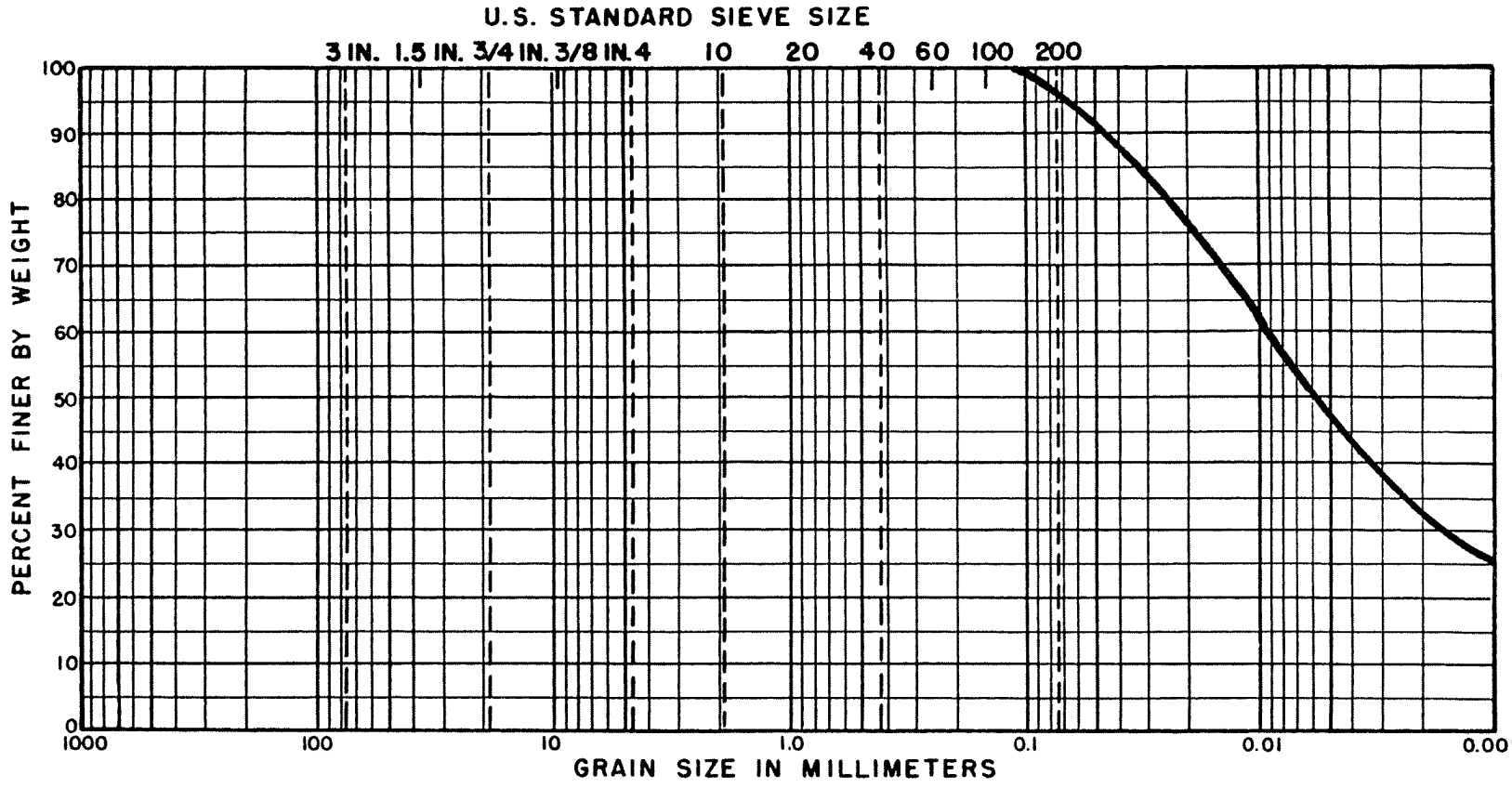
NOTES: Top tape on electrode @ G.L.
Ground electrode placed in cuttings.
Hole logged w/ 50.0' of 3¼" augers in place. Bottom of electrode @ 49.5'

0.0m

14.0m (45.93')

MOUNT SOPRIS INSTRUMENT CO., DELTA, COLORADO, U.S.A.

Grain Size Analysis



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
NO. 11	20-22'	ML	CLAYEY SILT, LUCUSTRINE					

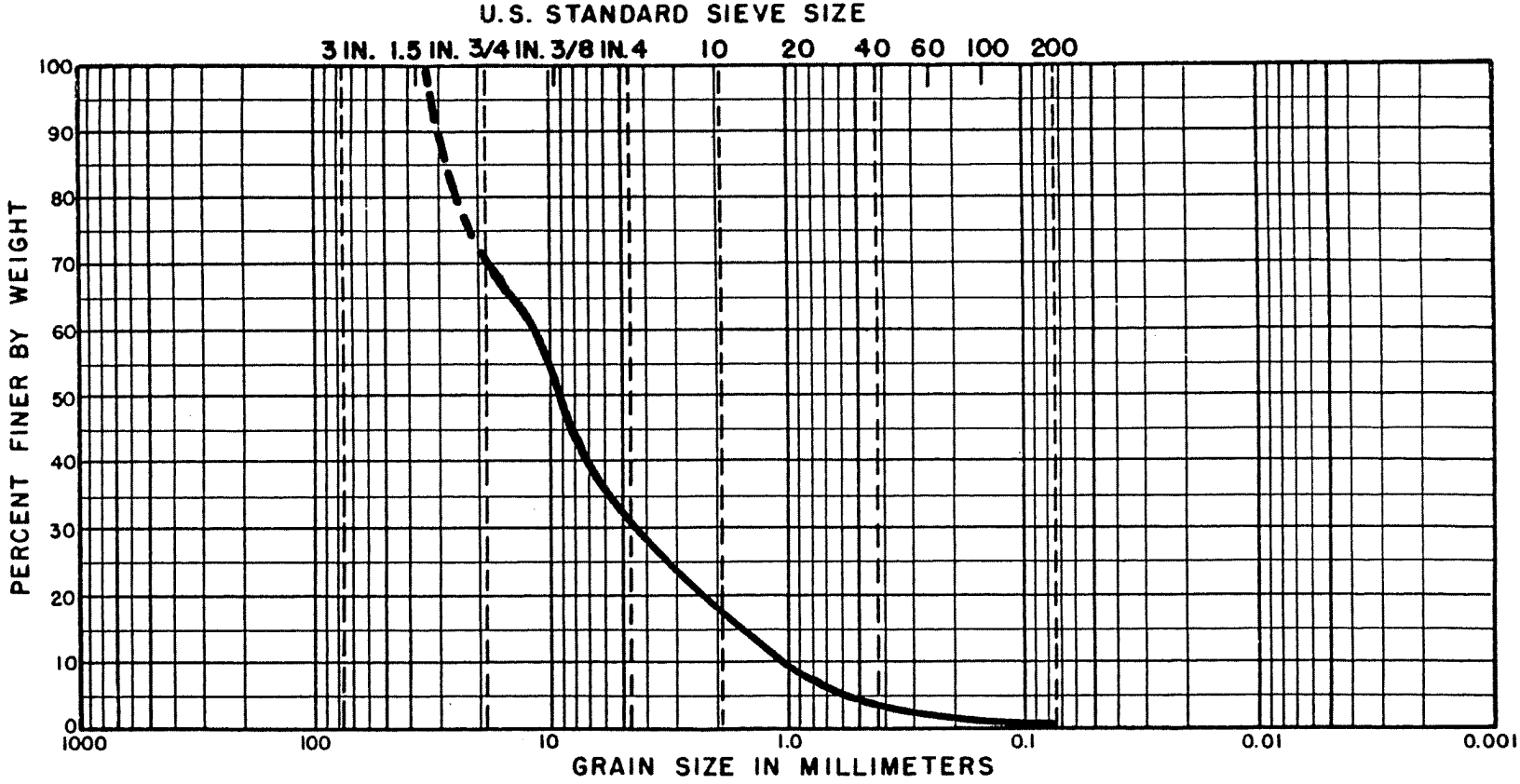
INS EQUIPMENT

GRADATION CURVE

BORING CW-102

DAMES & MOORE

APPENDIX B



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
NO. 18	34-36'	GW	SANDY GRAVEL, GRAY TILL					

INS IQUIPMENT

GRADATION CURVE

BORING CW-102

DAMES & MOORE

APPENDIX B

APPENDIX C

GEOPHYSICAL SURVEY DATA

Geophysical Investigation Analysis

APPENDIX C

GEOPHYSICAL SURVEY DATA

An electrical resistivity and magnetometer survey was conducted to investigate the subsurface conditions present at the INS Equipment site. The electrical resistivity survey consisted of vertical electrical soundings and horizontal electrical profiles to evaluate the continuity of the subsurface geologic units, locate major discontinuities and map a contaminant plume should one exist. A detailed magnetometer survey was performed at the site to identify areas where buried drummed wastes may be located. A random search was conducted near the location of the proposed monitoring wells to identify any buried ferromagnetic objects which might interfere with the drilling program.

ELECTRICAL RESISTIVITY SURVEY

Vertical electrical soundings and horizontal electrical profiles were conducted using a Bison 2350B Earth Resistivity Meter.

The electrical soundings obtained apparent resistivity values of the subsurface at selected depths and locations in the immediate vicinity of the site. The sounding locations are shown in Figure C-1 while the sounding graphs are plotted in Figures C-2 through C-6. Electrode spacing, as shown in Figures C-2 through C-6, is a close approximation of depth below land surface. The "Modified" Wenner Electrode Array was used for the soundings (Carrington and Watson, 1981). Correlations and geologic interpretations of the soundings were difficult due to the absence of nearby wells with detailed geologic logs at the time the geophysical investigation was conducted. Soundings 1, 3, 4, and 5 (Figures C-2, C-4, C-5, and C-6), which were conducted to a depth of 100 feet, suggest the top of the bedrock surface may exist between 24 and 34

feet below land surface. Sounding 2 (Figure C-3) was conducted to a depth of 60 feet. An interpretation of the 60 foot soundings implies the top of the bedrock surface may exist at 28 feet.

Electrical resistivity profiles were conducted using electrode spacings of 5, 15, 30, and 50 feet (electrode spacing is approximately depth below ground). The standard Wenner Electrode Array (Bison, 1975) was used for the profiles.

The profile readings at the 5-foot spacing identified seven anomalous areas at the INS Equipment site. One, located in the southwest corner of the site encompassed profile stations 3, 4, and 5. The apparent resistivity values at these stations ranged between 7 ohm-feet at profile station 4 to 61 ohm-feet at profile station 5. Another anomaly was identified west of the concrete plant at profile stations 7 and 8. The apparent resistivity values at these locations were 8 ohm-feet and 20 ohm-feet, respectively. The third, relatively large anomaly was discovered north of the concrete plant. This anomaly included profile stations 11, 14, 28, and 30. Apparent resistivity values at these stations ranged between 2 ohm-feet at profile station 30 to 190 ohm-feet at profile station 28. The location of a fourth anomaly was identified in the northwest corner of the site at profile station 26. The apparent resistivity value at this station was 73 ohm-feet. In addition to the previously mentioned areas, three small anomalous areas were discovered along the north side of the concrete plant. These anomalies were located at profile stations 17, 34, and 39 with apparent resistivity values of 120 ohm-feet, 197 ohm-feet and 168 ohm-feet, respectively. Background apparent resistivity values at the 5-foot spacing ranged between 215 ohm-feet at profile station 12 to 4,662 ohm-feet at profile station 40. The variability of apparent resistivity values at the 5-foot spacing correspond to observations of the ground surface made during initial visits to the site. Areas containing waste fly ash, concrete, and old drums are spread across the site.

Apparent resistivity values obtained at the 15-foot spacing suggest the aerial extent of the anomalies identified at the 5-foot spacing are larger. The anomalies identified along the southwest boundary of the

site now encompass profile stations 3 through 8. The apparent resistivity values at these locations ranged between 29 ohm-feet at profile stations 7 and 8 to 61 ohm-feet at profile station 6.

Two more apparent resistivity anomalies were identified at the 15-foot spacing along the Niagara River at profile station 22 and profile stations 25 through 27. The apparent resistivity at profile station 22 was 135 ohm-feet while the values at profile stations 25 through 27 ranged between 63 ohm-feet to 180 ohm-feet. These anomalies are interpreted as an indication of groundwater contamination.

Two bands of low apparent resistivity anomalies were shown to exist along the north and northeast boundary of the site. One of these anomalies encompassed profile stations 11, 32 through 34, and 43 with apparent resistivity values ranging between 83 ohm-feet to 113 ohm-feet. The other band included profile stations 18 and 36 located in the northeast corner of the site. The apparent resistivity values at these locations were 180 ohm-feet and 105 ohm-feet, respectively.

Anomalous areas were also identified at locations near the northeast corner of the concrete plant at profile station 39 and the southeast corner of the site at profile station 45. The apparent resistivity values at these stations were 75 ohm-feet and 195 ohm-feet, respectively. Background apparent resistivity values at the 15-foot spacing ranged from 203 ohm-feet at station 31 to 1,935 ohm-feet at profile station 1.

The profile readings obtained at the 30-foot spacing suggest the existence of four large anomalies. One, located along the southwest side of the site, included profile stations 2 through 6, 8, and 40. The apparent resistivity values at these stations ranged between 5 ohm-feet and 180 ohm-feet. Another area, located in the northwest corner of the site, encompasses profile stations 24 through 27. The apparent resistivity values at these locations ranged from 26 ohm-feet to 188 ohm-feet. The third anomaly was shown to exist along the northern boundary of the site. This anomaly included profile stations 10 through 12, 18,

30 through 37, 39, 44, and 45. Apparent resistivity values obtained at these stations ranged between 72 ohm-feet and 195 ohm-feet. The low apparent resistivity values obtained at the 30-foot spacing are interpreted as an indication of groundwater contamination just above the top of bedrock. Background apparent resistivity values at the 30-foot spacing ranged between 210 ohm-feet to 750 ohm-feet.

Apparent resistivity values obtained at the 50-foot spacing suggest the existence of two large anomalies at the site. One anomaly includes nearly all the western and northwestern half of the site. This includes profile stations 3 through 6, 8, 10, 11, 21, 23 through 27, 30, 31, and 43. Apparent resistivity values at these stations ranged between 13 ohm-feet to 195 ohm-feet. The other anomaly encompasses the eastern and northeastern portion of the site including profile stations 17, 18, 33, 34, 36, 38, 39, 44, and 45. The apparent resistivity values at these locations ranged from 45 ohm-feet to 175 ohm-feet. Although the pattern of apparent resistivity values is similar to the 30-foot spacing, the extremely low values represent narrower bands within these anomalies at the 50-foot spacing. Where values are lowest may be an indication of fracturing within the bedrock (northwestern corner and western edge of the site). This is supported by Soundings 3 and 5 which suggest fractured bedrock may exist at approximately 50 feet in these areas. Soundings 2 and 4 suggest little fracturing and the corresponding profile values are high. Background apparent resistivity values at the 50-foot spacing ranged between 200 ohm-feet and 675 ohm-feet.

MAGNETOMETER SURVEY

A magnetometer survey was conducted at the INS Equipment site using a Geometrics Model G816/826A magnetometer. The survey was conducted on a grid pattern using a 40-by-40 foot grid as station locations. The magnetic contour map for the INS Equipment site is shown in Figure C-7. The objective of the magnetometer survey was to identify the location of buried drummed wastes on the site and identify any buried objects which may pose a problem for the drilling program.

Background magnetic values were established by setting up a magnetometer base station in a clean area and recording the values at the beginning and end of each survey. The background values at the INS site were considered to be between 56,344 and 57,493 gammas.

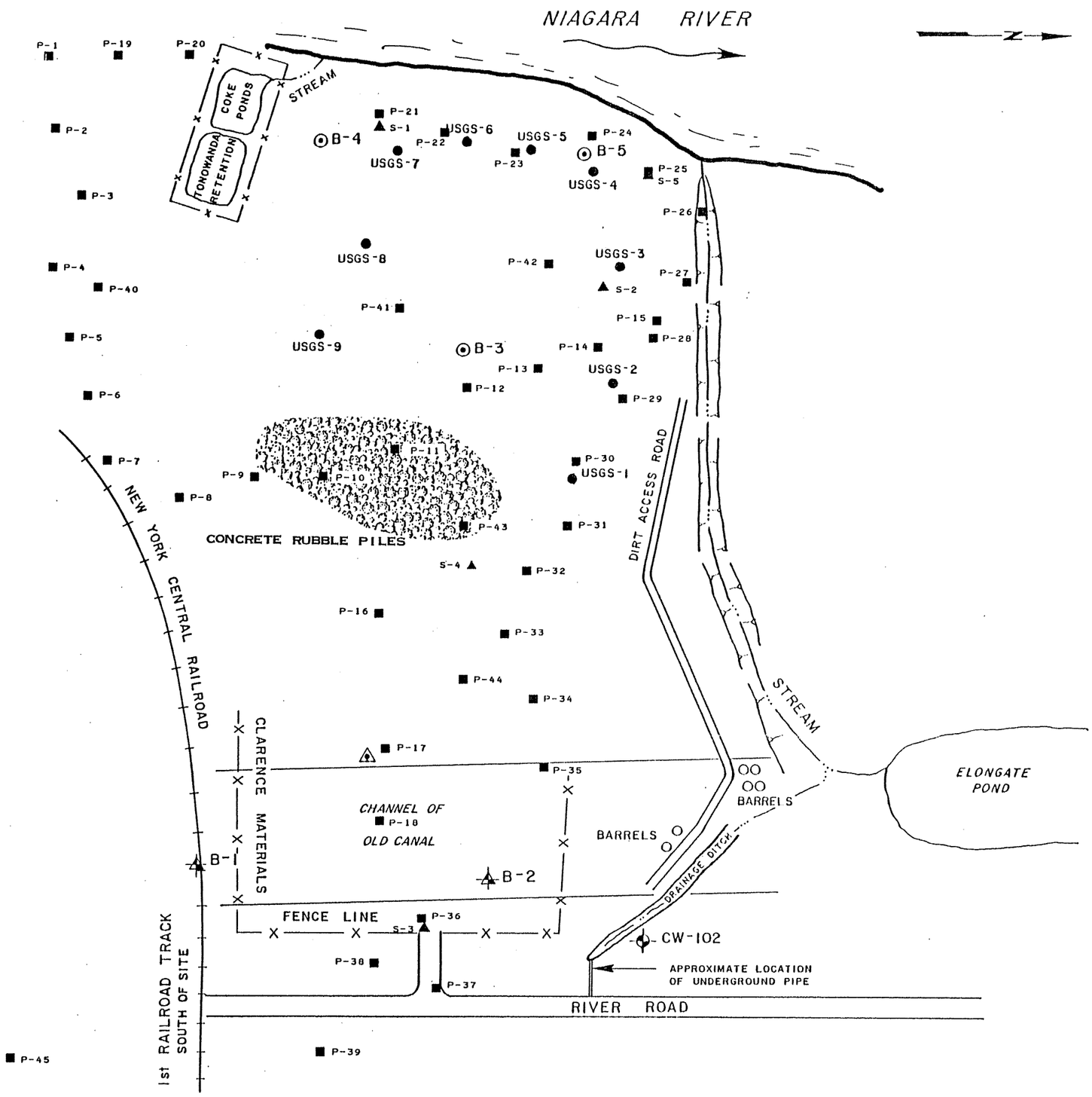
As shown in Figure C-7, four areas of high magnetic values were discovered at the INS Equipment site. A large area was identified west of the Clarence Materials Concrete Plant in the southwest corner of the site. This area may have been used previously as a disposal area for various waste materials including scrap metal, hardfill and drums. Much of the area in the southwest corner of the site, adjacent the Niagara River, was covered with scrap metal and railroad tracks. This anomaly is approximately 200 feet wide and 430 feet long. Another small anomaly was located near the northwest edge of the cooling water pond. This anomaly encompasses an area approximately 160 feet long by 160 feet wide. Buried drums as well as other miscellaneous scrap metal may have been disposed of in this area. A third anomaly was discovered between the cooling water pond and the small pond located in the northwest corner of the site. This anomaly covers an area approximately 100 feet wide and 380 feet long. This area may have been excavated and used as a disposal area for drummed wastes. Low apparent resistivity values detected in the area south of this pond suggest a contaminant plume migrating from this area. Organic odors were noted in the vicinity of the pond. These observations suggest that the pond is acting as a discharge point for the shallow aquifer. The fourth ferromagnetic anomaly was identified north of the concrete plant between the concrete plant and the pond located in the northeast corner of the site. This area covers approximately a 200 foot by 430 foot section between the concrete plant and the pond. Buried drums, scrap metal and other miscellaneous materials may have been disposed of in this area.

The results of the magnetometer survey suggest four areas at the INS Equipment site may have been used for the disposal of drummed wastes and other miscellaneous scrap metal and hardfill. The total depth of these disposal cells are unknown, but estimated depth to the buried metal objects is less than 20 feet.

SUMMARY OF FINDINGS

The electrical resistivity survey conducted at the INS Equipment site suggests a shallow anomaly may exist to a depth of 30 feet (approximately top of glacial till). Fractured bedrock may be present in the western and northwestern sectors of the site at a depth of 50 feet. The top of the till surface varies at the site from 24 feet to 34 feet below land surface. The implied groundwater flow direction of the shallow aquifer at the site is northwest and west toward the Niagara River.

Four relatively large ferromagnetic anomalies were discovered at the INS Equipment site during the magnetometer survey. These areas may have been used to dispose of miscellaneous scrap metal and hardfill. No barrels were found during test borings and well installations at these areas (Trautman, 1980; USGS, 1982). The total depth of these disposal cells is unknown, but estimated depth to the top of the magnetic anomalies is less than 20 feet.



NOTES: ① Elevations in feet above mean sea level.
② Reference datum by Town of Tonowanda.

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GEOPHYSICAL SURVEY, SOUNDING AND PROFILE LOCATIONS INS EQUIPMENT

FIGURE C-1

APP RES (OHM-FT)
0
35
70
105
140
175
210
245
280
315
350
P-P1 SPACING (FT)
0
6
12
18
24
30
36
42
48
54
60
WASTE AND FILL
UNCONSOLIDATED ALLUVIAL AND LACUSTRINE DEPOSITS
DENSE TILL
SOUNDING 2 INS SITE
ANTICIPATED DEPTH TO LIMESTONE BEDROCK

Figure C-2

APP - RESIS - (OHM-FT)
0
1100
2200
3300
4400
5500
6600
7700
8800
9900
11000
P-P1 SPACING (FT)
0
10
20
30
40
50
60
70
80
90
100
WASTE AND FILL
ALLUVIAL AND
LACUSTRINE DEPOSITS
CLAY TILL
ANTICIPATED BEDROCK
FRACTURED BEDROCK ZONE
SOUNDINGS I INS SITE
FRACTURED BEDROCK ZONE

Figure C-3

APPARENT RESISTIVITY (OHM-FT)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
P-P1 SPACING (FT)
0
10
20
30
40
50
60
70
80
90
100
POSSIBLE OLD CANAL CHANNEL
WASTE AND FILL
UNCONSOLIDATED ALLUVIAL AND LACUSTRINE DEPOSITS
DENSE TILL
SOUNDING 3 INS
ANTICIPATED FRACTURED OR WEATHERED BEDROCK
ANTICIPATED COMPETENT BEDROCK

Figure C-4

APPARENT RESISTIVITY (OHM-FT)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
P-P1 SPACING (FT)
0
10
20
30
40
50
60
70
80
100
POSSIBLE OLD CANAL CHANNEL
WASTE AND FILL
UNCONSOLIDATED ALLUVIAL AND LACUSTRINE DEPOSITS
DENSE TILL
SOUNDING 3 INS
ANTICIPATED FRACTURED OR WEATHERED BEDROCK
ANTICIPATED COMPETENT BEDROCK

Figure C-5

APPARENT RESISTIVITY (OHM-FEET)
0
1170
2340
3510
4680
5850
7020
8190
9360
10530
11700
P-P1 SPACING (FT)
0
10
20
30
40
50
60
70
80
90
100
WASTE AND FILL
UNCONSOLIDATED ALLUVIAL AND LACUSTRINE DEPOSITS
DENSE TILL
ANTICIPATED FRACTURED OR WEATHERED BEDROCK
COMPETENT BEDROCK
ANTICIPATED FRACTURED BEDROCK ZONE
BEDROCK
SOUNDING 4 INS SITE

Figure C-6

APP RESIS (OHM-FT)
0
20
40
60
80
100
120
140
160
180
200
P-PI SPACING (FT)
0
10
20
30
40
50
60
70
80
90
100
WASTE AND FILL
UNCONSOLIDATED
ALLUVIAL AND
LACUSTRINE
DEPOSITS
DENSE SILT
TILL
SANDY TILL
DENSE SILT
TILL
SANDY TILL
SOUNDING 5 INS
FRACTURED AND
WEATHERED
BEDROCK
FAULTED
COMPETENT
BEDROCK

Figure C-7

INS EQUIPMENT SITE - MAGNETOMETER SURVEY DATA

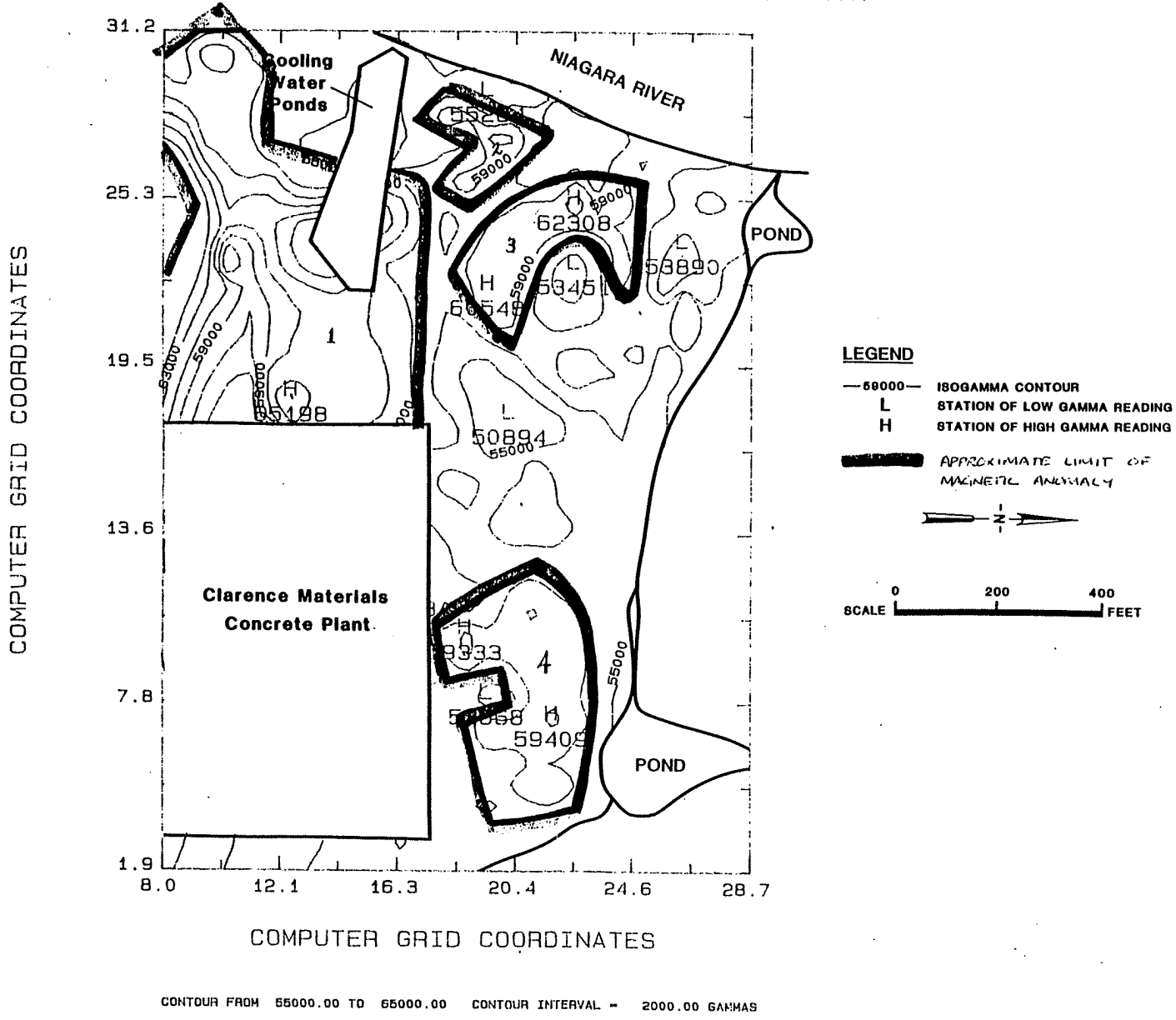
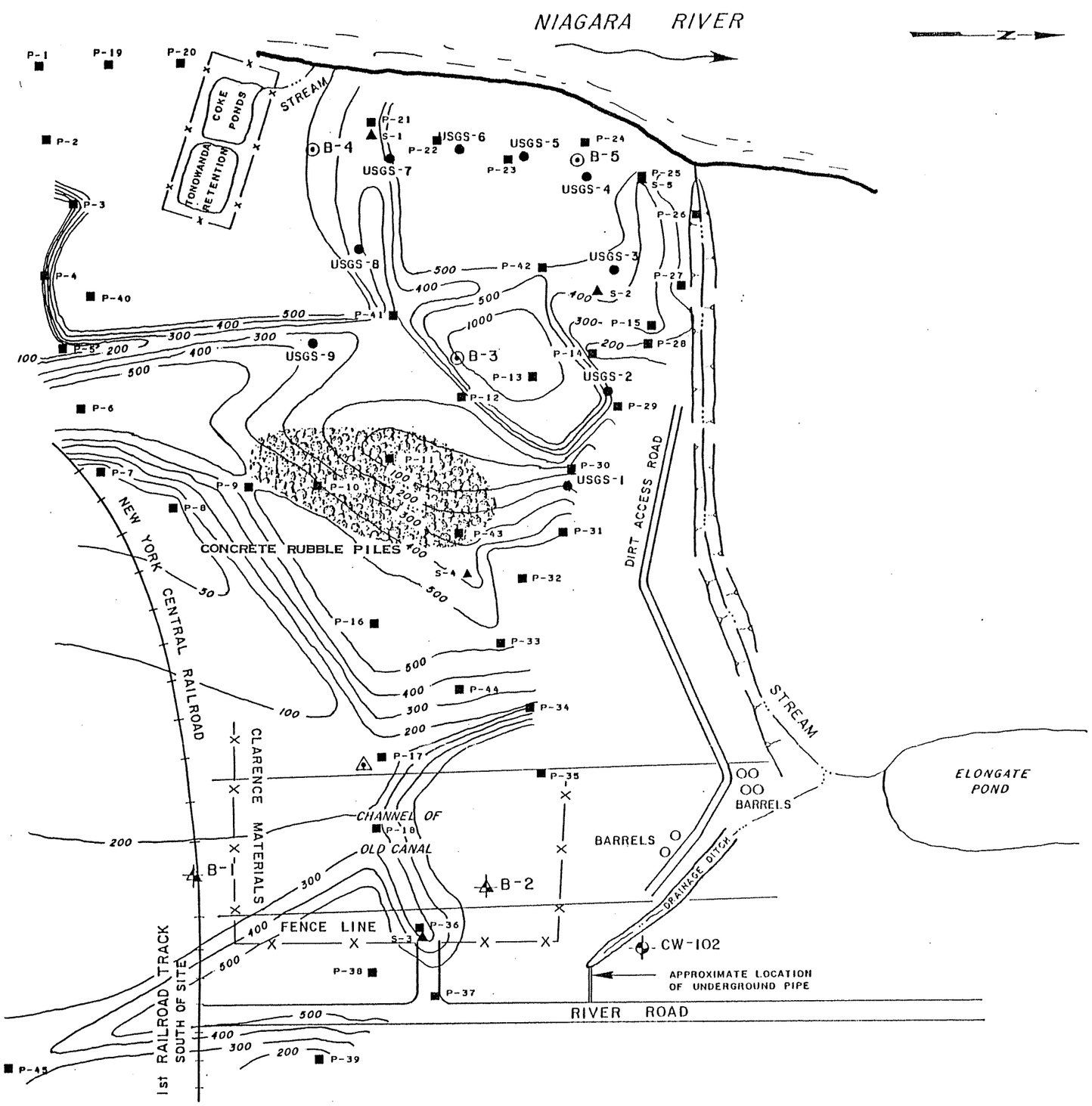


Figure C-8



EXPLANATION:

- USGS TEST BORINGS, 1982 (NIAGARA RIVER TOXICS' STUDY)
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION
- MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- PRIVATE WELL
- PROFILE STATION
- SOUNDING STATION
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION (NO LONGER EXIST)

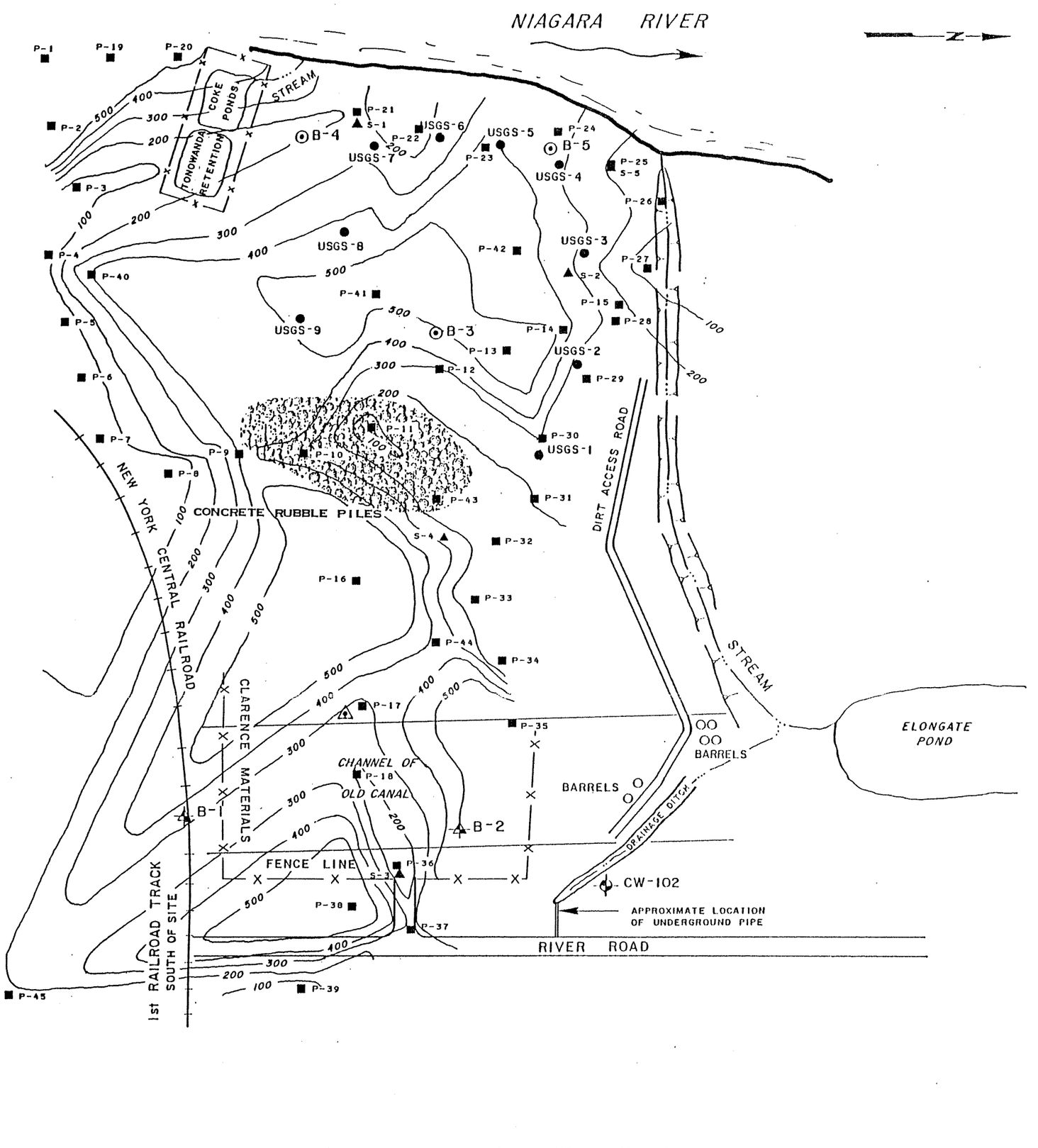
NOTES: ① Elevations in feet above mean sea level.
② Reference datum by Town of Tonowanda.

ELECTRICAL RESISTIVITY CONTOUR MAP
10 FOOT, A-SPACING
INS EQUIPMENT

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FIGURE C-9



EXPLANATION:

- USGS TEST BORINGS, 1982 (NIAGARA RIVER TOXICS' STUDY)
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION
- MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- PRIVATE WELL
- PROFILE STATION
- SOUNDING STATION
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION (NO LONGER EXIST)

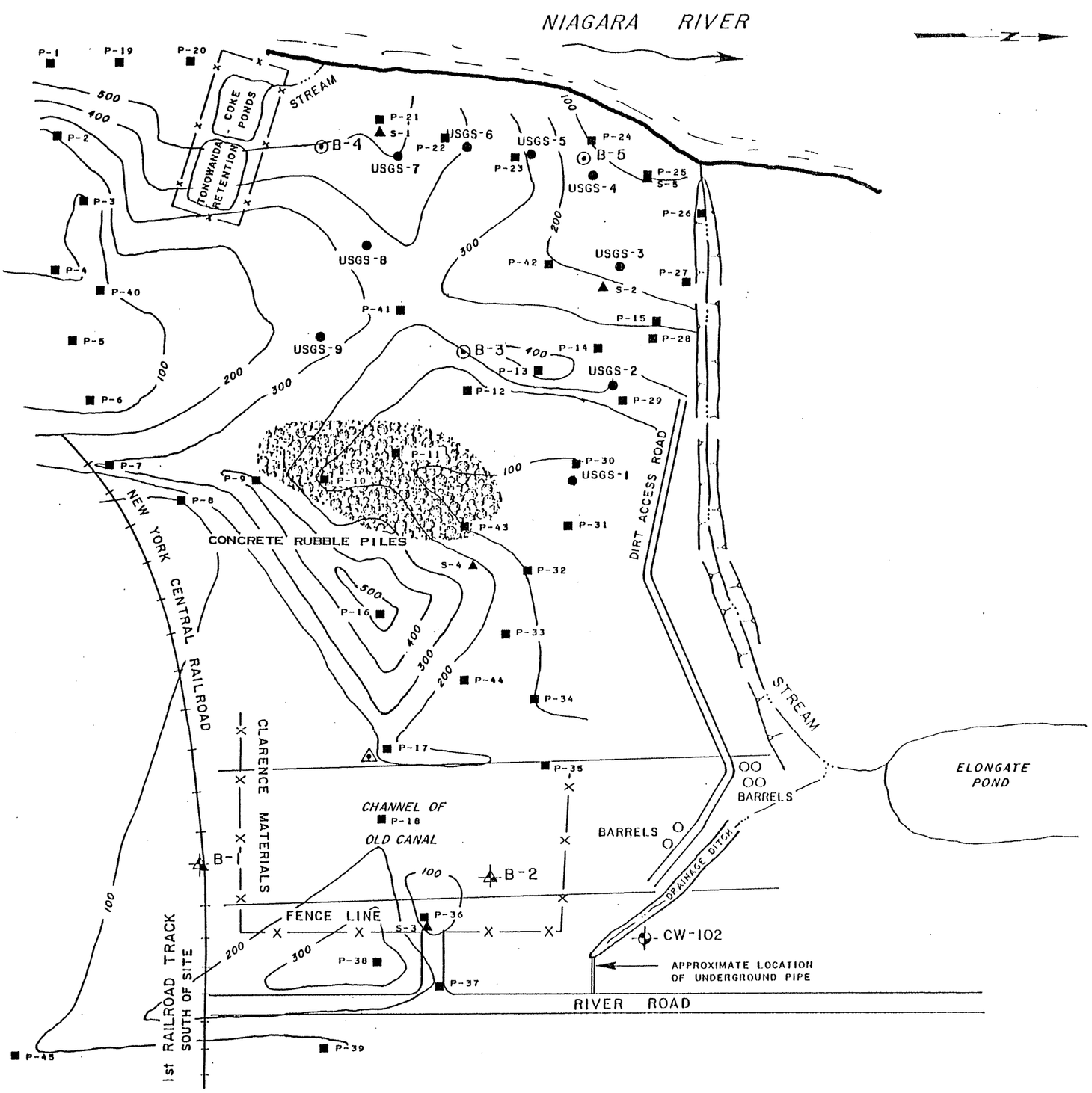
NOTES: ① Elevations in feet above mean sea level.
② Reference datum by Town of Tonowanda.

ELECTRICAL RESISTIVITY CONTOUR MAP
15 FOOT, A-SPACING
INS EQUIPMENT

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FIGURE C-10



EXPLANATION:

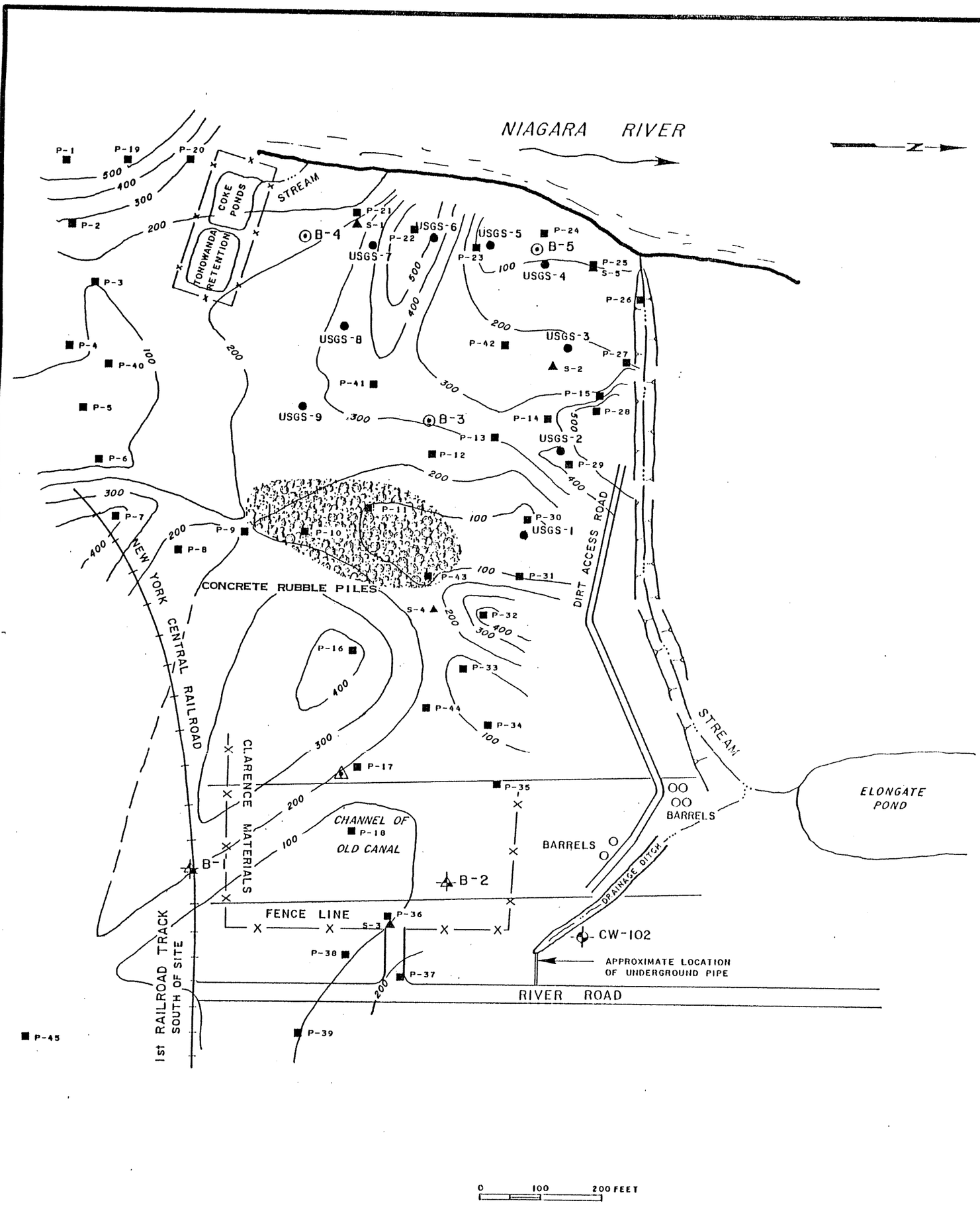
- USGS TEST BORINGS, 1982 (NIAGARA RIVER TOXICS' STUDY)
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION
- MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- PRIVATE WELL
- PROFILE STATION
- SOUNDING STATION
- MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION (NO LONGER EXIST)

NOTES: ① Elevations in feet above mean sea level.
② Reference datum by Town of Tonowanda.

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ELECTRICAL RESISTIVITY CONTOUR MAP
30 FOOT, A-SPACING
INS EQUIPMENT

FIGURE C-11



EXPLANATION:

- ● USGS TEST BORINGS, 1982 (NIAGARA RIVER TOXICS' STUDY)
- ⊙ MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION
- ⊕ MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- △ PRIVATE WELL
- ■ PROFILE STATION
- ▲ SOUNDING STATION
- ⊕ MONITORING WELL DRILLED UNDER TRAUTMAN ASSOCIATION'S SUPERVISION (NO LONGER EXIST)

NOTES: ① Elevations in feet above mean sea level.
② Reference datum by Town of Tonowanda.

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ELECTRICAL RESISTIVITY CONTOUR MAP
50 FOOT, A-SPACING
INS EQUIPMENT

FIGURE C-12

Magnetometer Survey Data

ENGINEERING-SCIENCE
MAGNETOMETER DATA SHEET

Job No. 46314 Date 10-19-84

Site Name and Location INS Equipment

Observer(s) Hauman, Fengel + IzydorczeR

Base Station Location SW corner of site adjacent to road

Battery Signal Blinks 10

Equipment Used (name, serial #) Geometrics 816/826 # 811

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	N	Base	0917	65511	metal?
	S			65511	
	E			65510	
	W			65512	
Beginning Pt.	N45°E		0930	55764	SE corner of site
	20'			56193	
	20'			56202	
	20'			55183	
	20'			61424	metal on ground
	20'			57420	
	20'			55109	
	20'			55307	
	20'			55752	at P.19 HCN/jn
	20'			56285	
	20'			56372	

Form A-6

Date 10-19-94

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	20'			56321	
	20'			56540	
	20'			56090	
	20'			55930	
	20'			55659	
	20'			55300	
	20'			55556	
	20'			57012	at corner of fence
		P-20		56539	P-20
		P-2		56697	P-2 at fence
	S85°E 20'	P-3		58444	P-3 "
	S85°E 20'			57645	
	20'			56895	
	20'			57448	
	20'			57116	
	N20°E 20'			57803	
	20'			58578	
	20'			56189	
	20'			62290	
	20'			58087	

Form A-6

Date 10-19-87

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	20'			62156	
	20'			56949	
	18'			65511	fence gate
	back 38'				
	N 80° W 20'			59923	
	20'			58425	
	20'			65511	old RR tracks
	20'			60607	
	20'			57549	
	20'			55110	
	20'			56000	
	20'			55483	
	20'			56525	
	back 75'				
	S 55° W 20'			55611	N on left boundary line on right
	20'			54411	
	20'			55582	
	20'			61790	RR tracks
	20'			56648	
	20'			58085	

Form A-6

Date 10-19-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	20'			56772	
	20'			58372	
		P-4		61742	
	N 70° = 20'			65542	
	20'			55714	
	20'			55863	
	20'			57802	
	20'	P-5		55322	
	20'			56747	
	20'			56958	
	20'			55958	
	20'			55933	
	20'	P-6		56046	
	20'			56069	
	20'			56656	
	20'			56462	
	20'			56484	
	20'	P-7		56748	
	20'			57959	
	20'			57607	

Form A-6

Page 5 of 17

Date 10-19-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	20'			59126	
	N5°E 20'			61486	
	~~N0W~~ S55 20'			65511	2nd RR tracks
	S85°W 20'			65511	"
	20'			62231	"
	20'			65511	"
	20'			65511	waste piles on right
	20'			56208	~~N0W~~
	20			58333	tar-like waste
	S5°E 20'			58275	
	20'			59237	
	20'			57505	
		P-8		60189	RR tracks
	N10°W 20'			59490	
	20'			65511	"
	20'			65511	"
	20'			65510	"
	20'		P-9	61359	"
	20'			56537	
	20'			54377	

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Form A-6

Page 6 of 17

Date 10-19-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	20'			56144	walk upwind
	20'			61154	walk
	20'	P-10		61551	walk
N 72°W	~~S N 72° W~~ 20'			60467	" "
	20'			57145	"
	20'			59806	"
	20'			58386	"
	20'			59219	"
	20'			58779	
	20'			59746	"
	20'			62271	"
	20'			60419	"
	20'			59681	"
	20'			60210	"
	20'			59034	"
	20'			65571	
	20'			58675	"
	20'			57336	"
	~~S 60° W~~ N 72° W 20'			55497	"
	20'			58336	"

8410J16

Form A-6

Date 10-19-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	20'			57559	Metal
	20'			56779	rock 20'
	20'			55961	"
	20'			57724	"
	20'			56285	
	20'			57253	bank of water discharge
	back 20'				
	N30°E 20			56212	
	20'			56691	
	20'			56936	
	20'			57333	
	20'			55725	
	20'	P-21-S+1		55809	
				57412	depression near S-1
from S-1	N 20'			56668	
	20'			56193	
	20'			56517	
	20'			56811	
	20'			56674	
	20'			57032	

Form A-6

Date 10-19-24

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	N 20'			57605	
	20			57177	River bank
	E 20'			57457	
	S 20'			57981	
	20'			57429	
	20	0-22		56628	
	20'			56672	Old road
	20'			58076	
	20'			55833	
	20'			55702	Fence
	20'			56394	Old road
	20'			57025	
	20'			57789	Depression
	20'			56728	
	20'			55595	
	20'			58849	Metal
	E' 20			59342	Metal
	N' 20'			55842	
	20'			56804	
	20'			56945	

Form A-6

Date 10-19-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	N 20'			60950	
	20'			57142	fill
	20'			57097	"
	20'			57966	"
	20'			57149	
	20'			56663	fill road
	20'			56582	"
	20'			56888	"
	20'			57286	"
	20'			57648	"
	20'			58071	"
	20'			58158	
	20'			58877	at River Bank
	E 20'			58230	
	NW 45 20'			57297	
	20'			56602	
	20'			57142	road fill
	20'			56955	
	20'			56586	fill
	20'			56987	

Form A-6

Date 10-14-82

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	S 20'			55834	
	20'			55870	rock fill
	20'			58846	"
	20'			57785	sand fill
	20'			58348	metal
	20'			57178	"
	20'			61957	ash + cinders
	20'			61089	"
	20'			57352	"
	20'			60120	"
	20'			62426	"
	20'			62575	"
	20'			60703	"
	20'			65511	"
	20'			65511	"
	20'			60337	
	20'			56106	"
	N			62412	62407
	S			65511	
	E			65511	
	W			65511	

Form A-6

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Date 10-19-82

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	N			65511	new base St
	S			65511	"
	E			65511	"
	W			65511	"
	N		1335	65511	" 17 blocks
	S			65511	"
	E			65511	"
	W			65511	"
Resuming N-S traverses					
	E 20'			56175	
	N 20'			65511	ash + cinders
	20'			60199	"
	20'			59230	"
	20'			59616	"
	20'			61092	"
	20'			57650	"
	20'			54374	"
	20'			54870	"
	20'			59833	" + rock bed
	20'			62315	" " + Metal

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Form A-6

Date 10-19-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	N 20'			62265	as above
	20'			55752	"
	20'			56193	sand hill
	20'			56298	rock hill
	20'			56963	"
	20'			57357	
	20'			57209	sand hill + metal
	20'			56074	
	20'			56219	
	20'			57010	
	20'			57069	
	20'			57419	
	20'			57613	
	20'			57616	sand hill
	20'			56514	near well
	20'			57092	
	20'			56436	
	20'			56972	
	20'			57627	
	20'			57764	

Form A-6

Date 10-19-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	N 20'			56878	sand bar
	20'			57055	
	20'			57038	River bank
	E 20'			57280	
	S 20'			57112	
	20'			57168	
	20'	P-25		55610	
				57339	in depression near P-25
	20'			57554	sand & silt
	20'			55306	
	20'			54730	sand & rock fill
	20'			56336	"
	20'			58678	"
	20'			58406	
	20'			56910	
	20'			56512	
	20'			56573	
	20'			56208	
	20'			55842	
	20'			55357	

Form A-6

Date 10-19-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	S 20'			55289	
	20'			55371	
	20'			55319	
	20'			55729	Metal
	20'			55303	"
	20'			56260	
	20'			60730	rock fill + metal
	20'			58753	" " "
	20'			55308	" " "
	20'			57224	REJ
	20'			56617	ash + cinders
	20'			57863	"
	20'			58879	"
	20'			62995	"
	20'			59975	"
	20'			57585	"
	E 20'			57359	"
	N 20'			62415	"
	20'			60240	"
	20'			56993	"

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Date 10-14-86

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	N 20'			56653	ash + cinders
(paved around ~20' of rock + metal)					
	N			59370	
	N 20'			55549	rock fill
	20'			57021	
	20'			56765	
	20'			56233	
	20'			56529	
	20'			57063	sand fill
	20'			55685	
	20'			55904	fill
	20'			56208	
	20'			56363	
	20'			56963	
	20'			57552	fill
	20'			58949	"
	20'			56538	
	20'			55223	metal + fill
	20'			54956	
	20'			55412	sand fill

Form A-6

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Date 10-19-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	N 20'			55283	road fill
	20'			55244	
	20'			57001	
	20'			57121	fill
30'	move 4	pond			
	E 20'			56688	
	S 20'			57355	
	20'			55174	
	20'			56045	Railroad track fill
	20'			58116	"
	20'			57167	"
	20'			56343	"
	20'			59294	"
	20'			58037	"
	20'			56346	
	20'			55350	
	20'			55863	
	20'			61717	
	20'			57816	
	20'			56554	

Form A-6

Date 12-19-85

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	S 20'			60713	
	20'			62143	
	20'			57970	
	20'			58507	
	20'			59707	rock ledge
	20			58474	"
	20'			57212	"
	20'			56217	"
	20'			60204	"
	20'			58189	"
	20'			55798	ash + cinders
	20'			58559	"
	20'			59993	"
	20'			57208	"
	20'			58072	"
	20'			57570	"
	20'			61743	" + metal
	N		1525	65511	Base
	S			65511	
	E			65512	

W 65511

ENGINEERING-SCIENCE
MAGNETOMETER DATA SHEET

Page 1 of 1

Job No. 46314 Date 10-22-84

Site Name and Location INS Equipment

Observer(s) Harman, Fenzel + Izydorczek

Base Station Location SW corner of site adjacent to river

Battery Signal Blinks 10

Equipment Used (name, serial #) Geometrics 816/826A # 811

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	N		0945	56992 / 56489	
	S			56840 / 56799	
	E			56565 / 57468	
	W			57109 / 56733	
	N		1155	56780	
	S			56941	
	E			56256	
	W			56774	

8410J16

ENGINEERING-SCIENCE
MAGNETOMETER DATA SHEET

Page 1 of 1

Job No. 46314 Date 10-23-84

Site Name and Location INS Equipment River Rd. Buffalo, N.Y.

Observer(s) Hauman, Izydorczek + Fengel

Base Station Location SW corner of site adjacent to river

Battery Signal Blinks 10

Equipment Used (name, serial #) Geometrics 816/826A # 811

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
2nd Base	N		0815	57443/56478	
	S			56419	
	E			57701	
	W			56310	
1st Base	N		0820	55533	
	S			55412	
	E			56409	
	W			56017	

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ENGINEERING-SCIENCE
MAGNETOMETER DATA SHEET

Page 1 of 1

Job No. 46314 Date 10-24-84

Site Name and Location INS Equipment

Observer(s) Harman, Fenzel & Izydorczek

Base Station Location SW Corner of site adjacent to River

Battery Signal Blinks 10

Equipment Used (name, serial #) Geometrics 816/826A #811

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
2nd Base	N		0815	56243	
	S			56373	
	E			57179	
	W			57288	
1st Base	N		0820	55195	
	S			55531	
	E			55414	
	W			55428	

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ENGINEERING-SCIENCE
MAGNETOMETER DATA SHEET

Page 1 of 9

Job No. 46314 Date 10-26-84

Site Name and Location INS Eg.

Observer(s) Harman + Fenzel

Base Station Location SW corner of site adjacent to River

Battery Signal Blinks 10

Equipment Used (name, serial #) Geometrics 816/8264 #811

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
2nd Base	N		0810	56344	
	S			56481	
	E			56770	
	W			57175	
1st Base	N		0815	55614 / 55300 / 55466	
	S			55530 / 55143 / 55346	
	E			55486 / 55159 / 55312	
	W			55503 / 55206 / 55428	
1st Base	N #204,9		0820	55396 / 55466 / 55406	
	S			55219 / 55467 / 55303	
	E			55343 / 55415 / 55298	
	W			55207 / 55375 / 55302	

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Form A-6

Date 10-26-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
1st Bare	N		0825	55381 / 55433	
	S			55177 / 55273	
	E			55301 / 55497	
	W			55284 / 55257	
at	previous	point	on last	traverse	
				57483	
	(N80°E) 40'			57341	Ash + cinders
	(N) 40'			59998	Ash + "
	40'			56985 ✓	"
	40'			56049	"
	40'			59119 ✓	
	40'			60411	
	40'			60110 ✓	
	40'			55594	
	40'			59638 ✓	
	40'			58964	
	40'			57940 ✓	
	40'			57333	
	40'			55832 ✓	
	40'			56676	

Form A-6

Date 10-26-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	40'			56331	✓
	(S 80 E) 40'			56099	
	S 40'			54117	✓ (20' to S-2)
	40'			60033	
	40'			59829	✓
	40'			56262	
	40'			53419	✓
	40'			57572	
	40'			58926	✓
	40'			55962	at well
	40'			60097	edge of A+C cinders
	40'			57290	Ash + Cinders
	40'			57086	✓ "
	40'			56001	"
	40'			55746	✓ at P-10
	East 40'			54562	from P-11 (A+C)
	N 40'			57102	✓ A+C.
	40'			53360	
	40'			60373	✓
	40'			58950	

Form A-6

Date 10-26-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	~~40'~~			56348	✓
	40'			55682	
	40'			56163	20' to P-14
	40'			59466	10' to P-15
	40'			58963	
	40'			54862	
	(S 75°E) 40'			58977	
	S 40'			59385	
	40'			59840	
	40'			55888	
	40'			57150	
	40'			57088	
	40'			54576	
	40'			57210	corner of Clarence fill
	E 40'			57082	across fill
	N 40'			56661	
	40'			52025	
	40'			58767	
	40'			54545	metal + brick
	40'			57329	

Form A-6

Date 10-26-87

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	40'			55827	
	E 40'			56853	
	~~W~~ A S 40'			56067	
	40'			57983	
	40'			57402	
	40'			57240	edge of fill near tar
	40'			55253	edge of Cl. fill
	E 40'			53270	"
	N 40'			58591	
	40'			57175	20' to P.43
	40'			57705	
	40'			56487	
	40'			56550	
	E 40'			56477	
	S 40'			56853	
	40'			57296	
	40'			56639	
	40'			56446	
	40'			56118	
	E 40'			55894	

Form A-6

Date 10-26-87

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	N 40'			56532	
	40'			57014	
	40'			56615	20' to P-32
	40'			56903	
	E 40'			56957	
	S 40'			56689	
	40'			59132	
	40'			59207	
	40'			55030	empty drum on surface
	40'			59254	
	40'			54778	
	E 40'			55857	
	N 40'			60141	
	40'			55425	4 empty drums on surface
	40'			57557	2 "
	40'			58093	20' to P-44
	40'			58181	
	40'			59738	
	E 40'			58336	
	S 40'			59335	

Form A-6

Date 10-26-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	S 40'			57816	
	40'			60037	59975
	40'			56356	drum full of tar like waste
	40'			56330	metal
	40'			54481	2 em. drums
	40'			60544	
	E 40'			55580	
	N 40'			56167	
	40'			56455	sand fill
	40'			56378	"
	40'			53903	
	40'			58427	58427
	40'			58617	3 empty drums
	40'			56083	
	40'			55644	
	N60°E 40'			58826	
	S 40'			57243	
	40'			59891	
	40'			59020	half buried drum
	40'			57109	sand fill

Form A-6

Date 10-26-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	S 40'			57632	
	40'			56792	
	40'			56392	
	40'			54886	metal (Closure mag)
	40'			56013	
	E 40'			56195	
	N 40'			56083	
	40'			56572	
	40'			56454	
	40'			56232	
	40'			56634	
	40'			57173	road fill
	40'			56643	"
	40'			58090	"
	40'			55603	
	40'			57105	edge of pond
	S50E 40'			56591	empty drum
	S 40'			56637	
	40'			57196	
	—			—	

Form A-6

Date 10-26-84

Traverse Identification	Orientation (Compass Heading)	Station I.D.	Time (24-hr. Clock)	Reading (Gamma)	Comments
	S 40'			57927	
	40'			56449	20' E of P-37
	40'	P-37		56566	
	40'			56636	
		P-38		57010	
	40'			56512	
	E 40'			56361	
	E 40'			56608	
	E 40'			56590	ck. entrance
		P-39		56463	
	S 40'			56154	
	S 40'			56215	
	W 40'			57199	
	Cont profile		1005	56003	
	N		1010	54876	
	S			54836	
	E			54881	
	W			54807	

APPENDIX D

CHEMICAL DATA

Analytical Results for Groundwater Samples

NUS CORPORATION

5350 CAMPBELLS RUN ROAD • PITTSBURGH, PA 15205
412 788 1080

LABORATORY SERVICES DIVISION

I certify that the analytical procedures used in the Engineering-Science, INS Equipment Site project are in accordance with USEPA Guidelines 44CFR46964, 40CFR136. or the NYSDEC Superfund and Contract Laboratory Protocol, January 1985.

Kathy D. Lyons
Inorganic Laboratory Supervisor

10/21/85
Date

David A. Damm
Organic Laboratory Supervisor

10/24/85
Date

Form I - A

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
CW-102-Water

Date October 15, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation CASE NO. Engineering-Science/INS Equipmer

SOW NO. 784

LAB SAMPLE ID. NO. 15081914 QC REPORT NO. _____

Elements Identified and Measured

Concentration: Low _____ Medium _____

Matrix: Water X Soil _____ Sludge _____ Other _____

(ug/L) or mg/kg dry weight (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic		15.	Mercury	0.2 U (C)
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	5 U (P)	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium	10 U (P)	20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	5 U (F)	24.	Zinc	
	Cyanide			Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager: Kathy Del Signor

Environmental Protection Agency
CLP Sample Management Office
P O Box 818
Alexandria, Virginia 22313 703/557-2490

CW-102

Sample Number

CW-102

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: NUS CORPORATION
Lab Sample ID No: 15081914
Sample Matrix: Water
Data Release Authorized By:
****

Case No: ES-INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 08/29/85

Volatile Compounds

Concentration: Low
Date Extracted/Prepared: 08/30/85
Date Analyzed: 08/30/85
Conc/Dil Factor: 1 pH NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

CAS Number		ug/l	
		**********	
74-87-3	Chloromethane	10	u
74-83-9	Bromomethane	10	u
75-01-4	Vinyl chloride	10	u
75-00-3	Chloroethane	10	u
75-09-2	Methylene Chloride	4.9 J,B	
67-64-1	Acetone	10	u
75-15-0	Carbon Disulfide	5	u
75-35-4	1,1-Dichloroethene	5	u
75-34-3	1,1-Dichloroethane	5	u
156-60-5	Trans-1,2-Dichloroethene	5	u
67-66-3	Chloroform	5	u
107-06-2	1,2-Dichloroethane	5	u
78-93-3	2-Butanone	10	u
71-55-6	1,1,1-Trichloroethane	5	u
56-23-5	Carbon Tetrachloride	5	u
108-05-4	Vinyl Acetate	10	u
75-27-4	Bromodichloromethane	5	u

Data reporting qualifiers are explained on Page 2.
****

Sample Number
CW-102

CW-102

Organics Analysis Data Sheet
(Page 2)

Volatile Compounds (continued)

Case Number		ug/l
		**********
79-34-5	1,1,2,2-Tetrachloroethane	5 u
78-87-5	1,2-Dichloropropane	5 u
10061-02-6	Trans-1,3-Dichloropropene	5 u
79-01-6	Trichloroethene	5 u
124-48-1	Dibromochloromethane	5 u
79-00-5	1,1,2-Trichloroethane	5 u
71-43-2	Benzene	5.3
10061-01-5	cis-1,3-Dichloropropene	5 u
110-75-8	2-Chloroethylvinylether	10 u
75-25-2	Bromoform	5 u
591-78-6	2-Hexanone	10 u
108-10-1	4-Methyl-2-Pentanone	10 u
127-18-4	Tetrachlorethene	5 u
108-88-3	Toluene	5 u
108-90-7	Chlorobenzene	5 u
100-41-4	Ethylbenzene	5 u
100-42-5	Styrene	5 u
	Total Xylenes	5 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 explained.

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 indicated detection limit but greater than zero (e.g. 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides>=10ng/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.

- Spiked compound.

NR - No value required.

Sample Number
CW-102

CW-102

Organics Analysis Data Sheet
(Page 5)

Pesticide/PCBs

Concentration: Low
Date Extracted/Prepared: 08/30/85
Date Analyzed: 09/03/85
Conc/Dil Factor: 1

CAS Number		ug/l	
		**********	
319-84-6	Alpha-BHC	0.05	u
319-85-7	Beta-BHC	0.05	u
319-86-8	Delta-BHC	0.05	u
58-89-9	Gamma-BHC(lindane)	0.05	u
76-44-8	Heptachlor	0.05	u
309-00-2	Aldrin	0.05	u
1024-57-3	Heptachlor Epoxide	0.05	u
959-98-8	Endosulfan I	0.05	u
60-57-1	Dieldrin	0.10	u
72-55-9	4,4'-DDE	0.10	u
72-20-8	Endrin	0.10	u
33213-65-9	Endosulfan II	0.10	u
72-54-8	4,4'-DDD	0.10	u
7421-93-4	Endrin Aldehyde	0.10	u
1031-07-8	Endosulfan Sulfate	0.10	u
50-29-3	4,4'-DDT	0.10	u
72-43-5	Methoxychlor	0.50	u
53494-70-5	Endrin Ketone	0.10	u
57-74-9	Chlordane	0.50	u
8001-35-2	Toxaphene	1.00	u
12674-11-2	Aroclor-1016	0.50	u
11104-28-2	Aroclor-1221	0.50	u
11141-16-5	Aroclor-1232	0.50	u
53469-21-9	Aroclor-1242	0.50	u
12672-29-6	Aroclor-1248	0.50	u
11097-69-1	Aroclor-1254	1.00	u
11096-82-5	Aroclor-1260	1.00	u

Vi = Volume of extract injected (ul)
Vs = Volume of water extracted (ml)
Ws = Weight of sample extracted (g)
Vt = Volume of total extract (ul)

Vs 1000 or Ws Vt 10000 Vi 4

Sample Number
CW-102

Organics Analysis Data Sheet
(Page 6)

CW-102

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated concentration ug/l	
**********	**********	****	****	******	
	NO VOA COMPOUND FOUND				
10544-50-0	SULFUR,MOL (S8)	BNA	1130	30	J

Sample Number
CW-102

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: NUS CORPORATION
Lab Sample ID No: 16060521
Sample Matrix: Water
Data Release Authorized By:

Case No: ES/INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 06/12/86

****

pH: NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

****

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 - Indicated 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 indicated detection limit but greater than zero (e.g. 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides>=10ng/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.

S - Spiked compound.

NR - No value required.

Laboratory Name: NUS CORPORATION Sample Number
Case No: ES/INS EQUIPMENT CW-102

Organics Analysis Data Sheet
(Page 3)

Semivolatile Compounds

oncentration: Low GPC Cleanup: NO
ate Extracted/Prepared: 06/16/86 Separatory Funnel Extraction: YES
Date Analyzed: 07/22/86 Continuous Liquid-Liquid Extraction: NO
onc/Dil Factor: 2

CAS Number		ug/l	
		**********	
108-95-2	Phenol	20	u
111-44-4	bis(2-Chloroethyl)Ether	20	u
95-57-8	2-Chlorophenol	20	u
541-73-1	1,3-Dichlorobenzene	20	u
106-46-7	1,4-Dichlorobenzene	20	u
100-51-6	Benzyl Alcohol	20	u
95-50-1	1,2-Dichlorobenzene	20	u
95-48-7	2-Methylphenol	20	u
39638-32-9	bis(2-chloroisopropyl)Ether	20	u
106-44-5	4-Methylphenol	20	u
621-64-7	N-Nitroso-Di-n-Propylamine	20	u
67-72-1	Hexachloroethane	20	u
98-95-3	Nitrobenzene	20	u
78-59-1	Isophorone	20	u
88-75-5	2-Nitrophenol	20	u
105-67-9	2,4-Dimethylphenol	20	u
65-85-0	Benzoic Acid	100	u
111-91-1	bis(2-Chloroethoxy)Methane	20	u
120-83-2	2,4-Dichlorophenol	20	u
120-82-1	1,2,4-Trichlorobenzene	20	u
91-20-3	Naphthalene	20	u
106-47-8	4-Chloroaniline	20	u
87-68-3	Hexachlorobutadiene	20	u
59-50-7	4-Chloro-3-Methylphenol	20	u
91-57-6	2-Methylnaphthalene	20	u
77-47-4	Hexachlorocyclopentadiene	20	u
88-06-2	2,4,6-Trichlorophenol	20	u
95-95-4	2,4,5-Trichlorophenol	100	u
91-58-7	2-Chloronaphthalene	20	u
88-74-4	2-Nitroaniline	100	u
131-11-3	Dimethyl Phthalate	20	u
208-96-8	Acenaphthylene	20	u
99-09-2	3-Nitroaniline	100	u

Laboratory Name: NUS CORPORATION Sample Number
Case No: ES/INS EQUIPMENT CW-102

Organics Analysis Data Sheet
(Page 4)

Semivolatile Compounds (continued)

CAS Number		ug/l	
		**********	
83-32-9	Acenaphthene	20	u
51-28-5	2,4-Dinitrophenol	100	u
100-02-7	4-Nitrophenol	100	u
132-64-9	Dibenzofuran	20	u
121-14-2	2,4-Dinitrotoluene	20	u
606-20-2	2,6-Dinitrotoluene	20	u
84-66-2	Diethylphthalate	20	u
7005-72-3	4-Chlorophenyl-phenylether	20	u
86-73-7	Fluorene	20	u
100-01-6	4-Nitroaniline	100	u
534-52-1	4,6-Dinitro-2-Methylphenol	100	u
86-30-6	N-Nitrosodiphenylamine(1)	20	u
101-55-3	4-Bromophenyl-phenylether	20	u
118-74-1	Hexachlorobenzene	20	u
87-86-5	Pentachlorophenol	100	u
85-01-8	Phenanthrene	20	u
120-12-7	Anthracene	20	u
84-74-2	Di-n-Butylphthalate	20	u
206-44-0	Fluoranthene	20	u
129-00-0	Pyrene	20	u
85-68-7	Butylbenzylphthalate	20	u
91-94-1	3,3`-Dichlorobenzidine	40	u
56-55-3	Benzo(a)Anthracene	20	u
117-81-7	bis(2-Ethylhexyl)Phthalate	20	u
218-01-9	Chrysene	20	u
117-84-0	Di-n-Octyl Phthalate	20	u
205-99-2	Benzo(b)Fluoranthene	20	u
207-08-9	Benzo(k)Fluoranthene	20	u
50-32-8	Benzo(a)Pyrene	20	u
193-39-5	Indeno(1,2,3-cd)Pyrene	20	u
53-70-3	Dibenzo(a,h)Anthracene	20	u
191-24-2	Benzo(g,h,i)Perylene	20	u

(1)-Cannot be separated from diphenylamine

Form I - B

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
B-3-Water

Date October 15, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation CASE NO. Engineering-Science/INS Equipmen

SOW NO. 784

LAB SAMPLE ID. NO. 15081915 QC REPORT NO. _____

Elements Identified and Measured

Concentration: Low _____ Medium _____

Matrix: Water X Soil _____ Sludge _____ Other _____

(ug/L) or mg/kg dry weight (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic		15.	Mercury	0.2 U (C)
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	5 U (P)	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium	10 U (P)	20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	5 U (F)	24.	Zinc	
	Cyanide			Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager: Kelly Del Signore

Environmental Protection Agency
CLP Sample Management Office
P.O Box 818
Alexandria, Virginia 22313 703/557-2490

B-3

Sample Number

B-3

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: NUS CORPORATION
Lab Sample ID No: 15081915
Sample Matrix: Water
Data Release Authorized By:
****

Case No: ES-INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 08/29/85

Volatile Compounds

Concentration: Low
Date Extracted/Prepared: 08/30/85
Date Analyzed: 08/30/85
Conc/Dil Factor: 1 pH NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

CAS Number		ug/l	
		**********	
74-87-3	Chloromethane		10 u
74-83-9	Bromomethane		10 u
75-01-4	Vinyl chloride		10 u
75-00-3	Chloroethane		10 u
75-09-2	Methylene Chloride	3.2 B,J	
67-64-1	Acetone		10 u
75-15-0	Carbon Disulfide		5 u
75-35-4	1,1-Dichloroethene		5 u
75-34-3	1,1-Dichloroethane		5 u
156-60-5	Trans-1,2-Dichloroethene		5 u
67-66-3	Chloroform		5 u
107-06-2	1,2-Dichloroethane		5 u
78-93-3	2-Butanone	84	
71-55-6	1,1,1-Trichloroethane		5 u
56-23-5	Carbon Tetrachloride		5 u
108-05-4	Vinyl Acetate		10 u
75-27-4	Bromodichloromethane		5 u

Data reporting qualifiers are explained on Page 2.
****

Sample Number
B-3.

B-3

Organics Analysis Data Sheet
(Page 2)

Volatile Compounds (continued)

Case Number		ug/l
		**********
79-34-5	1,1,2,2-Tetrachloroethane	5 u
78-87-5	1,2-Dichloropropane	5 u
10061-02-6	Trans-1,3-Dichloropropene	5 u
79-01-6	Trichloroethene	5 u
124-48-1	Dibromochloromethane	5 u
79-00-5	1,1,2-Trichloroethane	5 u
71-43-2	Benzene	96
10061-01-5	cis-1,3-Dichloropropene	5 u
110-75-8	2-Chloroethylvinylether	10 u
75-25-2	Bromoform	5 u
591-78-6	2-Hexanone	10 u
108-10-1	4-Methyl-2-Pentanone	10 u
127-18-4	Tetrachlorethene	5 u
108-88-3	Toluene	21
108-90-7	Chlorobenzene	5 u
100-41-4	Ethylbenzene	5 u
100-42-5	Styrene	5 u
	Total Xylenes	15

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 explained.

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 indicated detection limit but greater than zero (e.g. 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides)=10ng/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.

- Spiked compound

NR - No value required

B-3

Organics Analysis Data Sheet
(Page 3)

Semivolatile Compounds

Concentration Low
Date Extracted/Prepared 08/30/85
Date Analyzed 10/23/85
Conc/Dil Factor: 10

CAS Number		ug/l	
		**********	
62-75-9	N-Nitrosodimethylamine	100	u
108-95-2	Phenol	100	u
62-53-3	Aniline	100	u
111-44-4	bis(2-Chloroethyl)Ether	100	u
95-57-8	2-Chlorophenol	100	u
541-73-1	1,3-Dichlorobenzene	100	u
106-46-7	1,4-Dichlorobenzene	100	u
100-51-6	Benzyl Alcohol	100	u
95-50-1	1,2-Dichlorobenzene	100	u
95-48-7	2-Methylphenol	100	u
39638-32-9	bis(2-chloroisopropyl)Ether	100	u
106-44-5	4-Methylphenol	100	u
621-64-7	N-Nitroso-Di-n-Propylamine	100	u
67-72-1	Hexachloroethane	100	u
98-95-3	Nitrobenzene	100	u
78-59-1	Isophorone	100	u
88-75-5	2-Nitrophenol	100	u
105-67-9	2,4-Dimethylphenol	100	u
65-85-0	Benzoic Acid	500	u
111-91-1	bis(2-Chloroethoxy)Methane	100	u
120-83-2	2,4-Dichlorophenol	100	u
120-82-1	1,2,4-Trichlorobenzene	100	u
91-20-3	Naphthalene	860	
106-47-8	4-Chloroaniline	100	u
87-68-3	Hexachlorobutadiene	100	u
59-50-7	4-Chloro-3-Methylphenol	100	u
91-57-6	2-Methylnaphthalene	100	u
77-47-4	Hexachlorocyclopentadiene	100	u
88-06-2	2,4,6-Trichlorophenol	100	u
95-95-4	2,4,5-Trichlorophenol	500	u
91-58-7	2-Chloronaphthalene	100	u
88-74-4	2-Nitroaniline	500	u
131-11-3	Dimethyl Phthalate	100	u
208-96-8	Acenaphthylene	100	u
99-09-2	3-Nitroaniline	100	u

Organics Analysis Data Sheet
(Page 4)

Semivolatile Compounds (continued)

Case Number:		ug/l
		**********
83-32-9	Acenaphthene	100 u
51-28-5	2,4-Dinitrophenol	500 u
100-02-7	4-Nitrophenol	500 u
132-64-9	Dibenzofuran	100 u
121-14-2	2,4-Dinitrotoluene	100 u
606-20-2	2,6-Dinitrotoluene	100 u
84-66-2	Diethylphthalate	100 u
7005-72-3	4-Chlorophenyl-phenylether	100 u
86-73-7	Fluorene	100 u
100-01-6	4-Nitroaniline	500 u
534-52-1	4,6-Dinitro-2-Methylphenol	500 u
86-30-6	N-Nitrosodiphenylamine(1)	100 u
101-55-3	4-Bromophenyl-phenylether	100 u
118-74-1	Hexachlorobenzene	100 u
87-86-5	Pentachlorophenol	500 u
85-01-8	Phenanthrene	100 u
120-12-7	Anthracene	100 u
84-74-2	Di-n-Butylphthalate	100 u
206-44-0	Fluoranthene	100 u
92-87-5	Benzidine	500 u
129-00-0	Pyrene	100 u
85-68-7	Butylbenzylphthalate	100 u
91-94-1	3,3'-Dichlorobenzidine	200 u
56-55-3	Benzo(a)Anthracene	100 u
117-81-7	bis(2-Ethylhexyl)Phthalate	100 u
218-01-9	Chrysene	100 u
117-84-0	Di-n-Octyl Phthalate	100 u
205-99-2	Benzo(b)Fluoranthene	100 u
207-08-9	Benzo(k)Fluoranthene	100 u
50-32-8	Benzo(a)Pyrene	100 u
193-39-5	Indeno(1,2,3-cd)Pyrene	100 u
53-70-3	Dibenzo(a,h)Anthracene	100 u
191-24-2	Benzo(g,h,i)Perylene	100 u

(1)-Cannot be separated from diphenylamine

Sample Number
E-3

B-3

Organics Analysis Data Sheet
(Page 5)

Pesticide/PCBs

Concentration: Low
Date Extracted/Prepared 08/30/85
Date Analyzed: 09/03/85
Conc/Dil Factor: 1

CAS Number		ug/l **********	
319-84-6	Alpha-BHC	0.05	u
319-85-7	Beta-BHC	0.05	u
319-86-8	Delta-BHC	0.05	u
58-89-9	Gamma-BHC(Lindane)	0.05	u
76-44-8	Heptachlor	0.05	u
309-00-2	Aldrin	0.05	u
1024-57-3	Heptachlor Epoxide	0.05	u
959-98-8	Endosulfan I	0.05	u
60-57-1	Dieldrin	0.10	u
72-55-9	4,4'-DDE	0.10	u
72-20-8	Endrin	0.10	u
33213-65-9	Endosulfan II	0.10	u
72-54-8	4,4'-DDD	0.10	u
7421-93-4	Endrin Aldehyde	0.10	u
1031-07-8	Endosulfan Sulfate	0.10	u
50-29-3	4,4'-DDT	0.10	u
72-43-5	Methoxychlor	0.50	u
53494-70-5	Endrin Ketone	0.10	u
57-74-9	Chlordane	0.50	u
8001-35-2	Toxaphene	1.00	u
12674-11-2	Aroclor-1016	0.50	u
11104-28-2	Aroclor-1221	0.50	u
11141-16-5	Aroclor-1232	0.50	u
53469-21-9	Aroclor-1242	0.50	u
12672-29-6	Aroclor-1248	0.50	u
11097-69-1	Aroclor-1254	1.00	u
11096-82-5	Aroclor-1260	1.00	u

Vi = Volume of extract injected (ul)
Vs = Volume of water extracted (ml)
Ws = Weight of sample extracted (g)
Vt = Volume of total extract (ul)

Vs 1000 or Ws 10000 Vt 4 Vi

Sample Number
B-3

B-3

Organics Analysis Data Sheet
(Page 6)

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated concentration ug/l
**********	**********	****	****	*******
109-99-9	FURAN,TETRAHYDRO-	VOA	211	100 J
2415-72-7	CYCLOPROPANE,PROPYL-	VOA	237	20 J
96-14-0	PENTANE, 3-METHYL-	VOA	324	20 J
110-54-3	HEXANE	VOA	362	40 J
10544-50-0	SULFUR,MOL (S8)	BNA	1129	100 J

Form I - C

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
B-4-Water

Date October 15, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation CASE NO. Engineering-Science/INS Equipment

SOW NO. 784

LAB SAMPLE ID. NO. 15081916 QC REPORT NO. _____

Elements Identified and Measured

Concentration: Low _____ Medium _____

Matrix: Water X Soil _____ Sludge _____ Other _____

(ug/L) or mg/kg dry weight (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic		15.	Mercury	0.2 U (C)
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	5 U (P)	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium	10 U (P)	20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	5 U (F)	24.	Zinc	
Cyanide			Percent Solids (%)		

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager Kathy DeLegge

Environmental Protection Agency
CLP Sample Management Office
P O Box 818
Alexandria, Virginia 22313 (703-557-2490)

B-4

Sample Number

E-4

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: NUS CORPORATION
Lab Sample ID No: 15081916
Sample Matrix Water
Data Release Authorized By:
****

Case No: ES-INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 08/29/85

Volatile Compounds

Concentration: Low
Date Extracted/Prepared: 08/30/85
Date Analyzed: 08/30/85
Conc/Dil Factor: 1 pH NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

CAS Number		ug/l
		**********
74-87-3	Chloromethane	10 u
74-83-9	Bromomethane	10 u
75-01-4	Vinyl chloride	10 u
75-00-3	Chloroethane	10 u
75-09-2	Methylene Chloride	4.0 J,B
67-64-1	Acetone	10 u
75-15-0	Carbon Disulfide	5 u
75-35-4	1,1-Dichloroethene	5 u
75-34-3	1,1-Dichloroethane	5 u
156-60-5	Trans-1,2-Dichloroethene	5 u
67-66-3	Chloroform	5 u
107-06-2	1,2-Dichloroethane	5 u
78-93-3	2-Butanone	10 u
71-55-6	1,1,1-Trichloroethane	5 u
56-23-5	Carbon Tetrachloride	5 u
108-05-4	Vinyl Acetate	10 u
75-27-4	Bromodichloromethane	5 u

Data reporting qualifiers are explained on Page 2.
****

Sample Number
B-4

B-4

Organics Analysis Data Sheet
(Page 2)

Volatile Compounds (continued)

Case Number		ug/l **********	
79-34-5	1,1,2,2-Tetrachloroethane	5	u
78-87-5	1,2-Dichloropropane	5	u
10061-02-6	Trans-1,3-Dichloropropene	5	u
79-01-6	Trichloroethene	5	u
124-48-1	Dibromochloromethane	5	u
79-00-5	1,1,2-Trichloroethane	5	u
71-43-2	Benzene	5	u
10061-01-5	cis-1,3-Dichloropropene	5	u
110-75-8	2-Chloroethylvinylether	10	u
75-25-2	Bromoform	5	u
591-78-6	2-Hexanone	10	u
108-10-1	4-Methyl-2-Pentanone	10	u
127-18-4	Tetrachloroethene	5	u
108-88-3	Toluene	5	u
108-90-7	Chlorobenzene	5	u
100-41-4	Ethylbenzene	5	u
100-42-5	Styrene	5	u
	Total Xylenes	5	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 explained

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 indicated detection limit but greater than zero (e.g. 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides>=10ng/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.

- Spiked compound.

. - No value required.

Sample Number
B-4

B-4

Organics Analysis Data Sheet
(Page 5)

Pesticide/PCBs

Concentration: Low
Date Extracted/Prepared 08/30/85
Date Analyzed: 09/03/85
Conc/Dil Factor: 1

CAS Number		ug/l	
		**********	
319-84-6	Alpha-BHC	0.05	u
319-85-7	Beta-BHC	0.05	u
319-86-8	Delta-BHC	0.05	u
58-89-9	Gamma-BHC(Lindane)	0.05	u
76-44-8	Heptachlor	0.05	u
309-00-2	Aldrin	0.05	u
1024-57-3	Heptachlor Epoxide	0.05	u
959-98-8	Endosulfan I	0.05	u
60-57-1	Dieldrin	0.10	u
72-55-9	4,4'-DDE	0.10	u
72-20-8	Endrin	0.10	u
33213-65-9	Endosulfan II	0.10	u
72-54-8	4,4'-DDD	0.10	u
7421-93-4	Endrin Aldehyde	0.10	u
1031-07-8	Endosulfan Sulfate	0.10	u
50-29-3	4,4'-DDT	0.10	u
72-43-5	Methoxychlor	0.50	u
53494-70-5	Endrin Ketone	0.10	u
57-74-9	Chlordane	0.50	u
8001-35-2	Toxaphene	1.00	u
12674-11-2	Aroclor-1016	0.50	u
11104-28-2	Aroclor-1221	0.50	u
11141-16-5	Aroclor-1232	0.50	u
53469-21-9	Aroclor-1242	0.50	u
12672-29-6	Aroclor-1248	0.50	u
11097-69-1	Aroclor-1254	1.00	u
11096-82-5	Aroclor-1260	1.00	u

Vi = Volume of extract injected (ul)
Vs = Volume of water extracted (ml)
Ws = Weight of sample extracted (g)
Vt = Volume of total extract (ul)

Vs 1000 or Ws Vt 10000 Vi 4

Sample Number
B-4

B-4

Organics Analysis Data Sheet
(Page 6)

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated concentration ug/l	
**********	**********	****	****	******	
2415-72-7	CYCLOPROPANE, PROPYL-	VOA	283	10	J
96-14-0	PENTANE, 3-METHYL-	VOA	320	10	J
107-83-5	PENTANE, 2-METHYL-	VOA	327	10	J
110-54-3	HEXANE	VOA	358	20	J
10544-50-0	SULFUR, MOL. (S8)	BNA	1128	20	J

M E M O R A N D U M

September 12, 1986

TO: INS Equipment Final Report File

FROM: Elizabeth M. Dobson - Engineering-Science

SUBJECT: INS Equipment Sample B-3

The sample marked B-3 for INS Equipment, which was sampled on 6/11/86, was labeled improperly in the field. This sample was taken from well B-4 and is noted as such on the Chain-of-Custody form. This fact is verified from field note observations which note it was not possible to obtain a water sample from Well B-3 due to kinks in the well casing which could not be passed with the sampling bailer.

EMD/sas

Sample Number
B-3

Organics Analysis Data Sheet
(Page 1)

aboratory Name: NUS CORPORATION
Lab Sample ID No: 16060527
Sample Matrix: Water
ata Release Authorized By:

Case No: ES/INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 06/12/86

****

pH: NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

****

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.

alue - 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 - Indicated 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 indicated detection limit but greater than zero (e.g. 10J).

- This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides>=10ng/ul in the final extract should be confirmed by GC/MS.

- 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.

- Spiked compound.

'R - No value required.

Environmental Protection Agency
CLP Sample Management Office
P.O. Box 818
Alexandria, Virginia 22313 703/557-2490

B-5

Sample Number

B-5

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: NUS CORPORATION
Lab Sample ID No: 15081917
Sample Matrix: Water
Data Release Authorized By:
****

Case No: ES-INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 08/29/85

Volatile Compounds

Concentration: Low
Date Extracted/Prepared: 08/30/85
Date Analyzed: 08/30/85
Conc/Dil Factor: 1 pH NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

CAS Number		ug/l
		**********
74-87-3	Chloromethane	10 u
74-83-9	Bromomethane	10 u
75-01-4	Vinyl chloride	10 u
75-00-3	Chloroethane	10 u
75-09-2	Methylene Chloride	5.8 J
67-64-1	Acetone	10 u
75-15-0	Carbon Disulfide	5 u
75-35-4	1,1-Dichloroethene	5 u
75-34-3	1,1-Dichloroethane	28
156-60-5	Trans-1,2-Dichloroethene	5 u
67-66-3	Chloroform	5 u
107-06-2	1,2-Dichloroethane	5 u
78-93-3	2-Butanone	10 u
71-55-6	1,1,1-Trichloroethane	5 u
56-23-5	Carbon Tetrachloride	5 u
108-05-4	Vinyl Acetate	10 u
75-27-4	Bromodichloromethane	5 u

Data reporting qualifiers are explained on Page 2.
****

Sample Number
B-5

B-5

Organics Analysis Data Sheet
(Page 2)

Volatile Compounds (continued)

Case Number		ug/l	
		**********	
79-34-5	1,1,2,2-Tetrachloroethane		5 u
78-87-5	1,2-Dichloropropane		5 u
10061-02-6	Trans-1,3-Dichloropropene		5 u
79-01-6	Trichloroethene		5 u
124-48-1	Dibromochloromethane		5 u
79-00-5	1,1,2-Trichloroethane		5 u
71-43-2	Benzene	12	
10061-01-5	cis-1,3-Dichloropropene		5 u
110-75-8	2-Chloroethylvinylether		10 u
75-25-2	Bromoform		5 u
591-78-6	2-Hexanone		10 u
108-10-1	4-Methyl-2-Pentanone		10 u
127-18-4	Tetrachloroethene		5 u
108-88-3	Toluene	1 5 J	
108-90-7	Chlorobenzene		5 u
100-41-4	Ethylbenzene	5.1	
100-42-5	Styrene		5 u
	Total Xylenes	20	

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 explained.

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 indicated detection limit but greater than zero (e.g. 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides)=10ng/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.

S - Spiked compound

l - No value required

Sample Number
B-5

B-5

Organics Analysis Data Sheet
(Page 5)

Pesticide/PCBs

Concentration: Low
Date Extracted/Prepared: 08/30/85
Date Analyzed: 09/03/85
Conc/Dil Factor: 1

CAS Number		ug/l **********	
319-84-6	Alpha-BHC	0.05	u
319-85-7	Beta-BHC	0.05	u
319-86-8	Delta-BHC	0.05	u
58-89-9	Gamma-BHC(Lindane)	0.05	u
76-44-8	Heptachlor	0.05	u
309-00-2	Aldrin	0.05	u
1024-57-3	Heptachlor Epoxide	0.05	u
959-98-8	Endosulfan I	0.05	u
60-57-1	Dieldrin	0.10	u
72-55-9	4,4'-DDE	0.10	u
72-20-8	Endrin	0.10	u
33213-65-9	Endosulfan II	0.10	u
72-54-8	4,4'-DDD	0.10	u
7421-93-4	Endrin Aldehyde	0.10	u
1031-07-8	Endosulfan Sulfate	0.10	u
50-29-3	4,4'-DDT	0.10	u
72-43-5	Methoxychlor	0.50	u
53494-70-5	Endrin Ketone	0.10	u
57-74-9	Chlordane	0.50	u
8001-35-2	Toxaphene	1.00	u
12674-11-2	Aroclor-1016	0.50	u
11104-28-2	Aroclor-1221	0.50	u
11141-16-5	Aroclor-1232	0.50	u
53469-21-9	Aroclor-1242	0.50	u
12672-29-6	Aroclor-1248	0.50	u
11097-69-1	Aroclor-1254	1.00	u
11096-82-5	Aroclor-1260	1.00	u

Vi = Volume of extract injected (ul)
Vs = Volume of water extracted (ml)
Ws = Weight of sample extracted (g)
Vt = Volume of total extract (ul)

Vs 1000 or Ws Vt 10000 Vi 4

Sample Number
B-5

B-5

Organics Analysis Data Sheet
(Page 6)

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated concentration ug/l
**********	**********	****	****	******
763-29-1	1-PENTENE,2-METHYL-	VOA	266	6 J
96-37-7	CYCLOPENTANE,METHYL-	VOA	290	30 J
96-14-0	PENTANE, 3-METHYL-	VOA	318	30 J
107-83-5	PENTANE,2-METHYL-	VOA	325	50 J
110-54-3	HEXANE	VOA	358	40 J
95-49-8	BENZENE,1-CHLORO-2-METHYL-	BNA	276	500 J
99-89-8	PHENOL,4-(1-METHYLETHYL)-	BNA	515	50 J
61141-72-8	DODECANE,4,6-DIMETHYL-	BNA	914	90 J
10544-50-0	SULFUR,MOL. (S8)	BNA	1127	400 J

Sample Number
B-5

Organics Analysis Data Sheet
(Page 1)

aboratory Name: NUS CORPORATION
Lab Sample ID No: 16060526
Sample Matrix: Water
ata Release Authorized By:
****

Case No: ES/INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 06/12/86

pH: NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

****

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.

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

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J - Indicated 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 indicated detection limit but greater than zero (e.g. 10J).

- This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides)=10ng/ul in the final extract should be confirmed by GC/MS.

- 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.

- Spiked compound.

..R - No value required.

aboratory Name: NUS CORPORATION Sample Number
Case No: ES/INS EQUIPMENT B-5

Organics Analysis Data Sheet
(Page 3)

Semivolatile Compounds

ncentration: Low GPC Cleanup: NO
Date Extracted/Prepared: 06/16/86 Separatory Funnel Extraction: YES
Date Analyzed: 07/23/86 Continuous Liquid-Liquid Extraction: NO
nc/Dil Factor: 2

CAS Number		ug/l	
		**********	
108-95-2	Phenol	20	u
111-44-4	bis(2-Chloroethyl)Ether	20	u
95-57-8	2-Chlorophenol	20	u
541-73-1	1,3-Dichlorobenzene	20	u
106-46-7	1,4-Dichlorobenzene	20	u
100-51-6	Benzyl Alcohol	20	u
95-50-1	1,2-Dichlorobenzene	20	u
95-48-7	2-Methylphenol	20	u
39638-32-9	bis(2-chloroisopropyl)Ether	20	u
106-44-5	4-Methylphenol	20	u
621-64-7	N-Nitroso-Di-n-Propylamine	20	u
67-72-1	Hexachloroethane	20	u
98-95-3	Nitrobenzene	20	u
78-59-1	Isophorone	20	u
88-75-5	2-Nitrophenol	20	u
105-67-9	2,4-Dimethylphenol	20	u
65-85-0	Benzoic Acid	100	u
111-91-1	bis(2-Chloroethoxy)Methane	20	u
120-83-2	2,4-Dichlorophenol	20	u
120-82-1	1,2,4-Trichlorobenzene	20	u
91-20-3	Naphthalene	20	u
106-47-8	4-Chloroaniline	20	u
87-68-3	Hexachlorobutadiene	20	u
59-50-7	4-Chloro-3-Methylphenol	20	u
91-57-6	2-Methylnaphthalene	20	u
77-47-4	Hexachlorocyclopentadiene	20	u
88-06-2	2,4,6-Trichlorophenol	20	u
95-95-4	2,4,5-Trichlorophenol	100	u
91-58-7	2-Chloronaphthalene	20	u
88-74-4	2-Nitroaniline	100	u
131-11-3	Dimethyl Phthalate	20	u
208-96-8	Acenaphthylene	20	u
99-09-2	3-Nitroaniline	100	u

Laboratory Name: NUS CORPORATION Sample Number
Case No: ES/INS EQUIPMENT B-5

Organics Analysis Data Sheet
(Page 4)

Semivolatile Compounds (continued)

CAS Number		ug/I
		**********
83-32-9	Acenaphthene	20 u
51-28-5	2,4-Dinitrophenol	100 u
100-02-7	4-Nitrophenol	100 u
132-64-9	Dibenzofuran	20 u
121-14-2	2,4-Dinitrotoluene	20 u
606-20-2	2,6-Dinitrotoluene	20 u
84-66-2	Diethylphthalate	20 u
7005-72-3	4-Chlorophenyl-phenylether	20 u
86-73-7	Fluorene	20 u
100-01-6	4-Nitroaniline	100 u
534-52-1	4,6-Dinitro-2-Methylphenol	100 u
86-30-6	N-Nitrosodiphenylamine(1)	20 u
101-55-3	4-Bromophenyl-phenylether	20 u
118-74-1	Hexachlorobenzene	20 u
87-86-5	Pentachlorophenol	100 u
85-01-8	Phenanthrene	20 u
120-12-7	Anthracene	20 u
84-74-2	Di-n-Butylphthalate	20 u
206-44-0	Fluoranthene	20 u
129-00-0	Pyrene	20 u
85-68-7	Butylbenzylphthalate	20 u
91-94-1	3,3`-Dichlorobenzidine	40 u
56-55-3	Benzo(a)Anthracene	20 u
117-81-7	bis(2-Ethylhexyl)Phthalate	20 u
218-01-9	Chrysene	20 u
117-84-0	Di-n-Octyl Phthalate	20 u
205-99-2	Benzo(b)Fluoranthene	20 u
207-08-9	Benzo(k)Fluoranthene	20 u
50-32-8	Benzo(a)Pyrene	20 u
193-39-5	Indeno(1,2,3-cd)Pyrene	20 u
53-70-3	Dibenzo(a,h)Anthracene	20 u
191-24-2	Benzo(g,h,i)Perylene	20 u

(1)-Cannot be separated from diphenylamine

ANALYST: 0223 Kapetanovich,D
DATE DUE: 09/04/85

PAGE NO: CP -13-073
DATE REC'D: 08/29/85
DATE SAMP.: 08/28/85

~~SPECIAL INSTRUCTIONS:~~

Q.C. one. 9/10 OK

TEST CODE: W500 Phenolics FACTOR: 1.98 INSTR: ~~spec21~~ WAVE: ~~500~~

CLIENT NO	SAMPLE NO	RESULT mg/l	P BOT	DIST ALIQ	DIL	COLOR ALIQ	CELL	ABS	NET ABS
	BLANK: 0.007								
	STANDARD:								
~~E IGINEERING-SCIENCE NYSDEC PROTOCOL~~						INS EQUIPMENT-CW-102-WATER			
90650189	15081914	(0.02)	Y	500	100	5cm	0.009	0.002	
ENGINEERING-SCIENCE ~~NYSDEC PROTOCOL~~						INS EQUIPMENT-B-3-WATER			
90650190	15081915	(0.23)	Y	500	100	5cm	0.134 ~~0.007~~ OK		0.127
~~E IGINEERING-SCIENCE NYSDEC PROTOCOL~~						INS EQUIPMENT-B-4-WATER			
90650191	15081916	(<0.02)	Y	500	100	5cm	0.008 ~~0.006~~ OK		0.00
ENGINEERING-SCIENCE ~~NYSDEC PROTOCOL~~						INS EQUIPMENT-B-5-WATER			
90650192	15081917 (D)	(0.13)	Y	500	100	5cm	0.082 ~~0.013~~ OK		0.07

RC// all below. QC=0.134

QC 15081917 W500-000-192

DUP 100ml/ 100ml/ 5cm 0.021 ~~0.008~~ OK 0.014 0.125

$\rho = 1.00 \times \sigma$.

CHECKED BY: [illegible]
DATE: 9/11

9/11

Analytical Results for Surface Water Samples

NUS CORPORATION

5350 CAMPBELLS RUN ROAD • PITTSBURGH, PA. 15205
412-788-1080

LABORATORY SERVICES DIVISION

I certify that the analytical procedures used in the Engineering-Science, INS Equipment Site project are in accordance with USEPA Guidelines 44CFR46964, 40CFR136, or the NYSDEC Superfund and Contract Laboratory Protocol, January 1985.

Kathy A Delvigne
Inorganic Laboratory Supervisor

7-2-85
Date

David A Damm
Organic Laboratory Supervisor

7/2/85
Date

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
S-1 Surface Water (1)
INS Equipment

Date June 11, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation CASE NO. Engineering-Science

SOW NO. 784

LAB SAMPLE ID. NO. 15040824 QC REPORT NO. _____

Elements Identified and Measured

Concentration: Low _____ Medium _____

Matrix: Water X Soil _____ Sludge _____ Other _____

(ug/L) or mg/kg dry weight (Circle One)

1.	Aluminum	13.	Magnesium
2.	Antimony	14.	Manganese
3.	Arsenic	15.	Mercury 0.2 U (C)
4.	Barium	16.	Nickel
5.	Beryllium	17.	Potassium
6.	Cadmium 5 U (F)	18.	Selenium
7.	Calcium	19.	Silver
8.	Chromium 10 U (P)	20.	Sodium
9.	Cobalt	21.	Thallium
10.	Copper	22.	Tin
11.	Iron	23.	Vanadium
12.	Lead [4] (F)	24.	Zinc
	Cyanide		Percent Solids (%)

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: (1) ref. Identification immediately following the Cover Page.

Lab Manager M. J. Marple

INS
S-1 Surface Water

Environmental Protection Agency
CLP Sample Management Office.
P.O.Box 818
Alexandria, Virginia 22313 703/557-2490

Sample Number

S-1

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: NUS CORPORATION
Lab Sample ID No: 15040824
Sample Matrix: Water
Data Release Authorized By:
****

Case No: ES-INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 04/12/85

Volatile Compounds

Concentration: Low
Date Extracted/Prepared: 04/19/85
Date Analyzed: 04/19/85
Conc/Dil Factor: 1 pH NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

CAS Number		ug/l
		**********
74-87-3	Chloromethane	10 u
74-83-9	Bromomethane	10 u
75-01-4	Vinyl chloride	10 u
75-00-3	Chloroethane	10 u
75-09-2	Methylene Chloride	5 u
67-64-1	Acetone	10 u
75-15-0	Carbon Disulfide	5 u
75-35-4	1,1-Dichloroethene	5 u
75-34-3	1,1-Dichloroethane	5 u
156-60-5	Trans-1,2-Dichloroethene	5 u
67-66-3	Chloroform	5 u
107-06-2	1,2-Dichloroethane	5 u
78-93-3	2-Butanone	10 u
71-55-6	1,1,1-Trichloroethane	5 u
56-23-5	Carbon Tetrachloride	5 u
108-05-4	Vinyl Acetate	10 u
75-27-4	Bromodichloromethane	5 u

Data reporting qualifiers are explained on Page 2.
****

Sample Number
S-1

INS
S-1 Surface Water

Organics Analysis Data Sheet
(Page 2)

Volatile Compounds (continued)

Case Number		ug/l
		**********
79-34-5	1,1,2,2-Tetrachloroethane	5 u
78-87-5	1,2-Dichloropropane	5 u
10061-02-6	Trans-1,3-Dichloropropene	5 u
79-01-6	Trichloroethene	5 u
124-48-1	Dibromochloromethane	5 u
79-00-5	1,1,2-Trichloroethane	5 u
71-43-2	Benzene	5 u
10061-01-5	cis-1,3-Dichloropropene	5 u
110-75-8	2-Chloroethylvinylether	10 u
75-25-2	Bromoform	5 u
591-78-6	2-Hexanone	10 u
108-10-1	4-Methyl-2-Pentanone	10 u
127-18-4	Tetrachlorethene	5 u
108-88-3	Toluene	5 u
108-90-7	Chlorobenzene	5 u
100-41-4	Ethylbenzene	5 u
100-42-5	Styrene	5 u
	Total Xylenes	5 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 explained.

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 indicated detection limit but greater than zero (e.g. 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides)=10ng/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.

S - Spiked compound.

NR - No value required.

Sample Number
S-1

INS
S-1 surface Water

Organics Analysis Data Sheet
(Page 5)

Pesticide/PCBs

Concentration: Low
Date Extracted/Prepared: 04/15/85
Date Analyzed: ~~04/30/85 LH~~ 05/01/85
Conc/Dil Factor: 1

CAS Number		ug/l **********
319-84-6	Alpha-BHC	0.05 u
319-85-7	Beta-BHC	0.05 u
319-86-8	Delta-BHC	0.05 u
58-89-9	Gamma-BHC(lindane)	0.05 u
76-44-8	Heptachlor	0.05 u
309-00-2	Aldrin	0.05 u
1024-57-3	Heptachlor Epoxide	0.05 u
959-98-8	Endosulfan I	0.05 u
60-57-1	Dieldrin	0.10 u
72-55-9	4,4'-DDE	0.10 u
72-20-8	Endrin	0.10 u
33213-65-9	Endosulfan II	0.10 u
72-54-8	4,4'-DDD	0.10 u
7421-93-4	Endrin Aldehyde	0.10 u
1031-07-8	Endosulfan Sulfate	0.10 u
50-29-3	4,4'-DDT	0.10 u
72-43-5	Methoxychlor	0.50 u
53494-70-5	Endrin Ketone	0.10 u
57-74-9	Chlordane	0.50 u
8001-35-2	Toxaphene	1.00 u
12674-11-2	Aroclor-1016	0.50 u
11104-28-2	Aroclor-1221	0.50 u
11141-16-5	Aroclor-1232	0.50 u
53469-21-9	Aroclor-1242	0.50 u
12672-29-6	Aroclor-1248	0.50 u
11097-69-1	Aroclor-1254	1.00 u
11096-82-5	Aroclor-1260	1.00 u

Vi = Volume of extract injected (ul)
Vs = Volume of water extracted (ml)
Ws = Weight of sample extracted (g)
Vt = Volume of total extract (ul)

Vs 1000 or Ws Vt 10000 Vi 1

Sample Number
S-1

INS
S-1 Surface Water

Organics Analysis Data Sheet
(Page 6)

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated concentration ug/l
**********	**********	****	****	******
	NO VOA COMPOUND FOUND			
123-79-5	HEXANEDIOICACID, DIOCTYLESTER Note1	BNA	1395	700 J,B
27554-26-3	1,2-BENZENEDICARBOXYLICACID,DIISOOCTYLESTER	BNA	1516	20 J
27554-26-3	1,2-BENZENEDICARBOXYLICACID,DIISOOCTYLESTER	BNA	1652	20 J

Note1: possible lab contamination
ckd 7/2/87

Sample Number
S-1

Organics Analysis Data Sheet
(Page 1)

aboratory Name: NUS CORPORATION
ab Sample ID No: 16060524
Sample Matrix: Water
ata Release Authorized By:

Case No: ES/INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 06/12/86

****

pH: NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

****

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.

alue - 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.

- Indicated 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 indicated detection limit but greater than zero (e.g. 10J).

- This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides)=10ng/ul in the final extract should be confirmed by GC/MS.

- 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.

~ - Spiked compound.

R - No value required.

Laboratory Name: NUS CORPORATION Sample Number
Case No: ES/INS EQUIPMENT S-1

Organics Analysis Data Sheet
(Page 3)

Semivolatile Compounds

Concentration: Low GPC Cleanup: NO
Date Extracted/Prepared: 06/16/86 Separatory Funnel Extraction: YES
Date Analyzed: 07/22/86 Continuous Liquid-Liquid Extraction: NO
Conc/Dil Factor: 1

CAS Number		ug/l
		**********
108-95-2	Phenol	10 u
111-44-4	bis(2-Chloroethyl)Ether	10 u
95-57-8	2-Chlorophenol	10 u
541-73-1	1,3-Dichlorobenzene	10 u
106-46-7	1,4-Dichlorobenzene	10 u
100-51-6	Benzyl Alcohol	10 u
95-50-1	1,2-Dichlorobenzene	10 u
95-48-7	2-Methylphenol	10 u
39638-32-9	bis(2-chloroisopropyl)Ether	10 u
106-44-5	4-Methylphenol	10 u
621-64-7	N-Nitroso-Di-n-Propylamine	10 u
67-72-1	Hexachloroethane	10 u
98-95-3	Nitrobenzene	10 u
78-59-1	Isophorone	10 u
88-75-5	2-Nitrophenol	10 u
105-67-9	2,4-Dimethylphenol	10 u
65-85-0	Benzoic Acid	50 u
111-91-1	bis(2-Chloroethoxy)Methane	10 u
120-83-2	2,4-Dichlorophenol	10 u
120-82-1	1,2,4-Trichlorobenzene	10 u
91-20-3	Naphthalene	10 u
106-47-8	4-Chloroaniline	10 u
87-68-3	Hexachlorobutadiene	10 u
59-50-7	4-Chloro-3-Methylphenol	10 u
91-57-6	2-Methylnaphthalene	10 u
77-47-4	Hexachlorocyclopentadiene	10 u
88-06-2	2,4,6-Trichlorophenol	10 u
95-95-4	2,4,5-Trichlorophenol	50 u
91-58-7	2-Chloronaphthalene	10 u
88-74-4	2-Nitroaniline	50 u
131-11-3	Dimethyl Phthalate	10 u
208-96-8	Acenaphthylene	10 u
99-09-2	3-Nitroaniline	50 u

Laboratory Name: NUS CORPORATION Sample Number
Case No: ES/INS EQUIPMENT S-1

Organics Analysis Data Sheet
(Page 4)

Semivolatile Compounds (continued)

CAS Number		ug/l	
		**********	
83-32-9	Acenaphthene	10	u
51-28-5	2,4-Dinitrophenol	50	u
100-02-7	4-Nitrophenol	50	u
132-64-9	Dibenzofuran	10	u
121-14-2	2,4-Dinitrotoluene	10	u
606-20-2	2,6-Dinitrotoluene	10	u
84-66-2	Diethylphthalate	10	u
7005-72-3	4-Chlorophenyl-phenylether	10	u
86-73-7	Fluorene	10	u
100-01-6	4-Nitroaniline	50	u
534-52-1	4,6-Dinitro-2-Methylphenol	50	u
86-30-6	N-Nitrosodiphenylamine(1)	10	u
101-55-3	4-Bromophenyl-phenylether	10	u
118-74-1	Hexachlorobenzene	10	u
87-86-5	Pentachlorophenol	50	u
85-01-8	Phenanthrene	10	u
120-12-7	Anthracene	10	u
84-74-2	Di-n-Butylphthalate	3 J	
206-44-0	Fluoranthene	10	u
129-00-0	Pyrene	10	u
85-68-7	Butylbenzylphthalate	10	u
91-94-1	3,3`-Dichlorobenzidine	20	u
56-55-3	Benzo(a)Anthracene	10	u
117-81-7	bis(2-Ethylhexyl)Phthalate	10	u
218-01-9	Chrysene	10	u
117-84-0	Di-n-Octyl Phthalate	10	u
205-99-2	Benzo(b)Fluoranthene	10	u
207-08-9	Benzo(k)Fluoranthene	10	u
50-32-8	Benzo(a)Pyrene	10	u
193-39-5	Indeno(1,2,3-cd)Pyrene	10	u
53-70-3	Dibenzo(a,h)Anthracene	10	u
191-24-2	Benzo(g,h,i)Perylene	10	u

(1)-Cannot be separated from diphenylamine

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
5-2 SurfaceWater (1)
INS Equipment

Date June 11, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation CASE NO. Engineering-Science

SOW NO. 784

LAB SAMPLE ID. NO. 15040825 QC REPORT NO. _____

Elements Identified and Measured

Concentration: Low _____ Medium _____

Matrix: Water X Soil _____ Sludge _____ Other _____

(ug/L) or mg/kg dry weight (Circle One)

1.	Aluminum	13.	Magnesium
2.	Antimony	14.	Manganese
3.	Arsenic	15.	Mercury 0.2 U (C)
4.	Barium	16.	Nickel
5.	Beryllium	17.	Potassium
6.	Cadmium 5 U (F)	18.	Selenium
7.	Calcium	19.	Silver
8.	Chromium 10 U (P)	20.	Sodium
9.	Cobalt	21.	Thallium
10.	Copper	22.	Tin
11.	Iron	23.	Vanadium
12.	Lead [4] (F)	24.	Zinc
	Cyanide		Percent Solids (%)

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: (1) ref: Identification immediately following the Cover Page

Lab Manager M. J. Marple

Environmental Protection Agency
CLP Sample Management Office.
P.O.Box 818
Alexandria, Virginia 22313 703/557-2490

INS
S-2 Surface Water

ample Number

S-2

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: NUS CORPORATION
Lab Sample ID No: 15040825
Sample Matrix: Water
Data Release Authorized By:
****

Case No: ES-INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 04/12/85

Volatile Compounds

Concentration: Low
Date Extracted/Prepared: 04/19/85
Date Analyzed: 04/19/85
Conc/Dil Factor: NR pH NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

CAS Number		ug/l
		**********
74-87-3	Chloromethane	10 u
74-83-9	Bromomethane	10 u
75-01-4	Vinyl chloride	10 u
75-00-3	Chloroethane	10 u
75-09-2	Methylene Chloride	5 u
67-64-1	Acetone	10 u
75-15-0	Carbon Disulfide	5 u
75-35-4	1,1-Dichloroethene	5 u
75-34-3	1,1-Dichloroethane	5 u
156-60-5	Trans-1,2-Dichloroethene	5 u
67-66-3	Chloroform	5 u
107-06-2	1,2-Dichloroethane	5 u
78-93-3	2-Butanone	10 u
71-55-6	1,1,1-Trichloroethane	5 u
56-23-5	Carbon Tetrachloride	5 u
108-05-4	Vinyl Acetate	10 u
75-27-4	Bromodichloromethane	5 u

Data reporting qualifiers are explained on Page 2.
****

Sample Number
S-2

INS
S-2 Surface Water

Organics Analysis Data Sheet
(Page 2)

Volatile Compounds (continued)

Case Number		ug/l
		**********
79-34-5	1,1,2,2-Tetrachloroethane	5 u
78-87-5	1,2-Dichloropropane	5 u
10061-02-6	Trans-1,3-Dichloropropene	5 u
79-01-6	Trichloroethene	5 u
124-48-1	Dibromochloromethane	5 u
79-00-5	1,1,2-Trichloroethane	5 u
71-43-2	Benzene	5 u
10061-01-5	cis-1,3-Dichloropropene	5 u
110-75-8	2-Chloroethylvinylether	10 u
75-25-2	Bromoform	5 u
591-78-6	2-Hexanone	10 u
108-10-1	4-Methyl-2-Pentanone	10 u
127-18-4	Tetrachlorethene	5 u
108-88-3	Toluene	5 u
108-90-7	Chlorobenzene	5 u
100-41-4	Ethylbenzene	5 u
100-42-5	Styrene	5 u
	Total Xylenes	5 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 explained.

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 indicated detection limit but greater than zero (e.g. 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides)=10ng/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.

S - Spiked compound.

NR - No value required.

Sample Number
S-2

INS
S-2 Surface Water

Organics Analysis Data Sheet
(Page 5)

Pesticide/PCBs

Concentration: Low
Date Extracted/Prepared: 04/15/85
Date Analyzed: ~~04/30/85~~ 05/01/85
Conc/Dil Factor: 1

CAS Number		ug/l	
		**********	
319-84-6	Alpha-BHC	0.05	u
319-85-7	Beta-BHC	0.05	u
319-86-8	Delta-BHC	0.05	u
58-89-9	Gamma-BHC(lindane)	0.05	u
76-44-8	Heptachlor	0.05	u
309-00-2	Aldrin	0.05	u
1024-57-3	Heptachlor Epoxide	0.05	u
959-98-8	Endosulfan I	0.05	u
60-57-1	Dieldrin	0.10	u
72-55-9	4,4'-DDE	0.10	u
72-20-8	Endrin	0.10	u
33213-65-9	Endosulfan II	0.10	u
72-54-8	4,4'-DDD	0.10	u
7421-93-4	Endrin Aldehyde	0.10	u
1031-07-8	Endosulfan Sulfate	0.10	u
50-29-3	4,4'-DDT	0.10	u
72-43-5	Methoxychlor	0.50	u
53494-70-5	Endrin Ketone	0.10	u
57-74-9	Chlordane	0.50	u
8001-35-2	Toxaphene	1.00	u
12674-11-2	Aroclor-1016	0.50	u
11104-28-2	Aroclor-1221	0.50	u
11141-16-5	Aroclor-1232	0.50	u
53469-21-9	Aroclor-1242	0.50	u
12672-29-6	Aroclor-1248	0.50	u
11097-69-1	Aroclor-1254	1.00	u
11096-82-5	Aroclor-1260	1.00	u

Vi = Volume of extract injected (ul)
Vs = Volume of water extracted (ml)
Ws = Weight of sample extracted (g)
Vt = Volume of total extract (ul)

Vs 1000 or Ws Vt 10000 Vi 1

Sample Number
S-2

INS
S-2 Surface Water

Organics Analysis Data Sheet
(Page 6)

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated concentration ug/l
**********	**********	****	****	******
	NO VOA COMPOUND FOUND			
88-69-7	PHENOL,2-(1-METHYLETHYL)-	BNA	562	60 J
99-89-8	PHENOL,4-(1-METHYLETHYL)-	BNA	586	40 J
2934-05-6	PHENOL,2,4-BIS(1-METHYLETHYL)-	BNA	741	9 J

Sample Number
S-2

Organics Analysis Data Sheet
(Page 1)

aboratory Name: NUS CORPORATION
Lab Sample ID No: 16060525
Sample Matrix: Water
ata Release Authorized By:

Case No: ES/INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 06/14/86

****

pH: NR
Percent Moisture: NR
Percent Moisture (Decanted): NR

****

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.

alue - 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 - Indicated 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 indicated detection limit but greater than zero (e.g. 10J).

- This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides)=10ng/ul in the final extract should be confirmed by GC/MS.

- 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.

- Spiked compound.

..R - No value required.

Laboratory Name: NUS CORPORATION Sample Number
Case No: ES/INS EQUIPMENT S-2

Organics Analysis Data Sheet
(Page 3)

Semivolatile Compounds

oncentration: Low GPC Cleanup: NO
Date Extracted/Prepared: 06/16/86 Separatory Funnel Extraction: YES
Date Analyzed: 07/23/86 Continuous Liquid-Liquid Extraction: NO
onc/Dil Factor: 1

CAS Number		ug/l	
		**********	
108-95-2	Phenol	10	u
111-44-4	bis(2-Chloroethyl)Ether	10	u
95-57-8	2-Chlorophenol	10	u
541-73-1	1,3-Dichlorobenzene	10	u
106-46-7	1,4-Dichlorobenzene	10	u
100-51-6	Benzyl Alcohol	10	u
95-50-1	1,2-Dichlorobenzene	10	u
95-48-7	2-Methylphenol	32	
39638-32-9	bis(2-chloroisopropyl)Ether	10	u
106-44-5	4-Methylphenol	70	
621-64-7	N-Nitroso-Di-n-Propylamine	10	u
67-72-1	Hexachloroethane	10	u
98-95-3	Nitrobenzene	10	u
78-59-1	Isophorone	10	u
88-75-5	2-Nitrophenol	10	u
105-67-9	2,4-Dimethylphenol	62	
65-85-0	Benzoic Acid	50	u
111-91-1	bis(2-Chloroethoxy)Methane	10	u
120-83-2	2,4-Dichlorophenol	10	u
120-82-1	1,2,4-Trichlorobenzene	10	u
91-20-3	Naphthalene	10	u
106-47-8	4-Chloroaniline	10	u
87-68-3	Hexachlorobutadiene	10	u
59-50-7	4-Chloro-3-Methylphenol	10	u
91-57-6	2-Methylnaphthalene	10	u
77-47-4	Hexachlorocyclopentadiene	10	u
88-06-2	2,4,6-Trichlorophenol	10	u
95-95-4	2,4,5-Trichlorophenol	50	u
91-58-7	2-Chloronaphthalene	10	u
88-74-4	2-Nitroaniline	50	u
131-11-3	Dimethyl Phthalate	10	u
208-96-8	Acenaphthylene	10	u
99-09-2	3-Nitroaniline	50	u

Laboratory Name: NUS CORPORATION Sample Number
Case No: ES/INS EQUIPMENT S-2

Organics Analysis Data Sheet
(Page 4)

Semivolatile Compounds (continued)

CAS Number		ug/l	
		**********	
83-32-9	Acenaphthene	10	u
51-28-5	2,4-Dinitrophenol	50	u
100-02-7	4-Nitrophenol	50	u
132-64-9	Dibenzofuran	10	u
121-14-2	2,4-Dinitrotoluene	10	u
606-20-2	2,6-Dinitrotoluene	10	u
84-66-2	Diethylphthalate	10	u
7005-72-3	4-Chlorophenyl-phenylether	10	u
86-73-7	Fluorene	10	u
100-01-6	4-Nitroaniline	50	u
534-52-1	4,6-Dinitro-2-Methylphenol	50	u
86-30-6	N-Nitrosodiphenylamine(1)	10	u
101-55-3	4-Bromophenyl-phenylether	10	u
118-74-1	Hexachlorobenzene	10	u
87-86-5	Pentachlorophenol	50	u
85-01-8	Phenanthrene	10	u
120-12-7	Anthracene	10	u
84-74-2	Di-n-Butylphthalate	10	u
206-44-0	Fluoranthene	10	u
129-00-0	Pyrene	10	u
85-68-7	Butylbenzylphthalate	10	u
91-94-1	3,3`-Dichlorobenzidine	20	u
56-55-3	Benzo(a)Anthracene	10	u
117-81-7	bis(2-Ethylhexyl)Phthalate	10	u
218-01-9	Chrysene	10	u
117-84-0	Di-n-Octyl Phthalate	10	u
205-99-2	Benzo(b)Fluoranthene	10	u
207-08-9	Benzo(k)Fluoranthene	10	u
50-32-8	Benzo(a)Pyrene	10	u
193-39-5	Indeno(1,2,3-cd)Pyrene	10	u
53-70-3	Dibenzo(a,h)Anthracene	10	u
191-24-2	Benzo(g,h,i)Perylene	10	u

(1)-Cannot be separated from diphenylamine

PHENOLICS
TEST NUMBER W500 INSTRUMENT NUMBER 0
PAGE NUMBER 6 DATE 05.01.85

Surface water phenolics

DATA # / SAMPLE #	ANALYST / DATE	ORIGINAL ALIQUOT	ORIGINAL VOLUME	DUPLICATE ALIQUOT XI	DUPLICATE VOLUME RESULT	TRIPLICATE ALIQUOT XJ	TRIPLICATE VOLUME RESULT	SPIKE CONCENTRATION THEORETICAL	SPIKE CONCENTRATION RESULT	STANDARD THEORETICAL / ACTUAL	USED IN STAT OLD QC DATA #
W500-000-161	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l	10mg/l	
15031850	04.01.85	<0.02 mg/l		0.0000	<0.04 mg/l	0.0000	0mg/l		0mg/l	10.71mg/l	
W500-000-162	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l	10mg/l	
15031854	04.01.85	<0.02 mg/l		0.0000	<0.1 mg/l	0.0000	0mg/l		0mg/l	10.71mg/l	
W500-000-163	DK	500ml	500ml	100ml	500ml	100ml	500ml	10ml	10mg/l	10mg/l	XJ
15031859	04.04.85	<0.02 mg/l		0.0000	<0.1 mg/l	0.0196	1.04mg/l		1mg/l	11.05mg/l	
W500-000-164	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l	10mg/l	
15031869	04.04.85	<0.02 mg/l		0.0000	<0.1 mg/l	0.0000	0mg/l		0mg/l	11.05mg/l	
W500-000-165	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l	10mg/l	
15031873	04.04.85	<0.02 mg/l		0.0000	<0.1 mg/l	0.0000	0mg/l		0mg/l	11.05mg/l	
W500-000-166	DK	500ml	500ml	100ml	500ml	100ml	500ml	10ml	10mg/l	10mg/l	XJ
5040444	04.10.85	<0.02 mg/l		0.0000	<1 mg/l	0.0431	1.09mg/l		1mg/l	11.75mg/l	
W500-000-167	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l	10mg/l	
5040270	04.10.85	0.013mg/l		0.1875	0.019mg/l	0.0000	0mg/l		0mg/l	11.75mg/l	
W500-000-168	DK	500ml	500ml	100ml	500ml	0ml	0ml	0ml	0mg/l	10mg/l	
270	04.10.85	<0.02 mg/l		0.0000	<0.1 mg/l	0.0000	0mg/l		0mg/l	11.75mg/l	W500-000-167
W500-000-169	DK	500ml	500ml	100ml (2)	500ml	100ml (2)	500ml	10ml	5mg/l	100mg/l	XJ
5040825	04.17.85	0.326mg/l		~~0.8961~~	0.035mg/l	~~0.7256~~	0.084mg/l		0.535mg/l	106mg/l	
W500-000-170	DK	~~500ml~~	~~500ml~~	100ml	500ml	100ml	500ml	10ml	5mg/l	100mg/l	XI XJ
5040825 (1)	04.17.85	0.326mg/l		0.0219	0.312mg/l	0.0410	0.748mg/l		0.812mg/l	106mg/l	W500-000-169
W500-000-171	DK	500ml	500ml	100ml	500ml	100ml	500ml	10ml	10mg/l	10mg/l	XI XJ
15041330	04.22.85	0.3133mg/l		0.0997	0.3827mg/l	0.0345	1.2905mg/l		1.3827mg/l	10.8mg/l	
W500-000-172	DK	500ml	500ml	100ml	500ml	100ml	500ml	10ml	10mg/l	10mg/l	
15040539	04.23.85	2.8mg/l		1.0000	<1 mg/l	0.0099	1.02mg/l		1mg/l	11.2mg/l	

(1) Engineering Science (S-2 surface water)

(2) Information was entered into the computer incorrectly; disregard the data.

Analytical Results for Sediment Samples

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
S-1 Sediment
INS Equipment ①

Date June 11, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation CASE NO. Engineering-Science

SOW NO. 784

LAB SAMPLE ID. NO. 15040822 QC REPORT NO. _____

Elements Identified and Measured

Concentration: Low _____ Medium _____

Matrix: Water _____ Soil X Sludge _____ Other _____

ug/L or (mg/kg dry weight) (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic		15.	Mercury	0.16 U (C)
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	[0.5] (F)	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium	22 R (P)	20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	52 (P)	24.	Zinc	
	Cyanide			Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ① ref: Identification immediately following the Cover Page.

Lab Manager M.J. Marple

Environmental Protection Agency
CLP Sample Management Office
P.O.Box 818
Alexandria, Virginia 22313 703/557-2490

Sample Number

INS EQUIPMENT S-1
Sediment

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: NUS CORPORATION
Lab Sample ID No: 15040822
Sample Matrix: Soil
Data Release Authorized By: David B. Dawson
****

Case No: ES-INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 04/12/85

Volatile Compounds

Concentration: Low
Date Extracted/Prepared: 04/17/85
Date Analyzed: 04/17/85
Conc/Dil Factor: 5 pH 7
Percent Moisture: 36
Percent Moisture (Decanted): NR

CAS Number		ug/kg
		**********
74-87-3	Chloromethane	78 u
74-83-9	Bromomethane	78 u
75-01-4	Vinyl chloride	78 u
75-00-3	Chloroethane	78 u
75-09-2	Methylene Chloride	170 B
67-64-1	Acetone	600 B
75-15-0	Carbon Disulfide	39 u
75-35-4	1,1-Dichloroethene	39 u
75-34-3	1,1-Dichloroethane	39 u
156-60-5	Trans-1,2-Dichloroethene	39 u
67-66-3	Chloroform	39 u
107-06-2	1,2-Dichloroethane	39 u
78-93-3	2-Butanone	78 u
71-55-6	1,1,1-Trichloroethane	39 u
56-23-5	Carbon Tetrachloride	39 u
108-05-4	Vinyl Acetate	78 u
75-27-4	Bromodichloromethane	39 u

Data reporting qualifiers are explained on Page 2.
****

Sample Number
INS EQUIPMENT S-1
Sediment

Organics Analysis Data Sheet
(Page 2)

Volatile Compounds (continued)

Case Number		ug/kg
		**********
79-34-5	1,1,2,2-Tetrachloroethane	39 u
78-87-5	1,2-Dichloropropane	39 u
10061-02-6	Trans-1,3-Dichloropropene	39 u
79-01-6	Trichloroethene	39 u
124-48-1	Dibromochloromethane	39 u
79-00-5	1,1,2-Trichloroethane	39 u
71-43-2	Benzene	39 u
10061-01-5	cis-1,3-Dichloropropene	39 u
110-75-8	2-Chloroethylvinylether	78 u
75-25-2	Bromoform	39 u
591-78-6	2-Hexanone	78 u
108-10-1	4-Methyl-2-Pentanone	78 u
127-18-4	Tetrachlorethene	39 u
108-88-3	Toluene	39 u
108-90-7	Chlorobenzene	39 u
100-41-4	Ethylbenzene	39 u
100-42-5	Styrene	39 u
	Total Xylenes	39 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 explained.

/alue - 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 indicated detection limit but greater than zero (e.g. 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides)=10ng/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.

S - Spiked compound.

NR - No value required.

Sample Number
SED-1

Organics Analysis Data Sheet
(Page 1)

aboratory Name: NUS CORPORATION
Lab Sample ID No: 16060530
ample Matrix: Soil
ata Release Authorized By:

Case No: ES/INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 06/12/86

****

pH: NR
Percent Moisture: 17
Percent Moisture (Decanted): NR

****

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.

alue - 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 - Indicated 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 indicated detection limit but greater than zero (e.g. 10J).

- This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides)=10ng/ul in the final extract should be confirmed by GC/MS.

- 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.

- Spiked compound.

NR - No value required.

Laboratory Name: NUS CORPORATION
Case No: ES/INS EQUIPMENT

Sample Number
SED-1

Organics Analysis Data Sheet
(Page 3)

Semivolatile Compounds

Concentration: Low
Date Extracted/Prepared: 06/16/86
Date Analyzed: 07/24/86
Conc/Dil Factor: 4.0

GPC Cleanup: NO
Separatory Funnel Extraction: NO
Continuous Liquid-Liquid Extraction: NO

CAS Number		ug/kg
		**********
108-95-2	Phenol	1584 u
111-44-4	bis(2-Chloroethyl)Ether	1584 u
95-57-8	2-Chlorophenol	1584 u
541-73-1	1,3-Dichlorobenzene	1584 u
106-46-7	1,4-Dichlorobenzene	1584 u
100-51-6	Benzyl Alcohol	1584 u
95-50-1	1,2-Dichlorobenzene	1584 u
95-48-7	2-Methylphenol	1584 u
39638-32-9	bis(2-chloroisopropyl)Ether	1584 u
106-44-5	4-Methylphenol	1584 u
621-64-7	N-Nitroso-Di-n-Propylamine	1584 u
67-72-1	Hexachloroethane	1584 u
98-95-3	Nitrobenzene	1584 u
78-59-1	Isophorone	1584 u
88-75-5	2-Nitrophenol	1584 u
105-67-9	2,4-Dimethylphenol	1584 u
65-85-0	Benzoic Acid	7680 u
111-91-1	bis(2-Chloroethoxy)Methane	1584 u
120-83-2	2,4-Dichlorophenol	1584 u
120-82-1	1,2,4-Trichlorobenzene	1584 u
91-20-3	Naphthalene	1584 u
106-47-8	4-Chloroaniline	1584 u
87-68-3	Hexachlorobutadiene	1584 u
59-50-7	4-Chloro-3-Methylphenol	1584 u
91-57-6	2-Methylnaphthalene	1584 u
77-47-4	Hexachlorocyclopentadiene	1584 u
88-06-2	2,4,6-Trichlorophenol	1584 u
95-95-4	2,4,5-Trichlorophenol	7680 u
91-58-7	2-Chloronaphthalene	1584 u
88-74-4	2-Nitroaniline	7680 u
131-11-3	Dimethyl Phthalate	1584 u
208-96-8	Acenaphthylene	1584 u
99-09-2	3-Nitroaniline	7680 u

Laboratory Name: NUS CORPORATION Sample Number
Case No: ES/INS EQUIPMENT SED-1

Organics Analysis Data Sheet
(Page 4)

Semivolatile Compounds (continued)

CAS Number		ug/kg	
		**********	
83-32-9	Acenaphthene	1584	u
51-28-5	2,4-Dinitrophenol	7680	u
100-02-7	4-Nitrophenol	7680	u
132-64-9	Dibenzofuran	1584	u
121-14-2	2,4-Dinitrotoluene	1584	u
606-20-2	2,6-Dinitrotoluene	1584	u
84-66-2	Diethylphthalate	1584	u
7005-72-3	4-Chlorophenyl-phenylether	1584	u
86-73-7	Fluorene	1584	u
100-01-6	4-Nitroaniline	7680	u
534-52-1	4,6-Dinitro-2-Methylphenol	7680	u
86-30-6	N-Nitrosodiphenylamine(1)	1584	u
101-55-3	4-Bromophenyl-phenylether	1584	u
118-74-1	Hexachlorobenzene	1584	u
87-86-5	Pentachlorophenol	7680	u
85-01-8	Phenanthrene	1584	u
120-12-7	Anthracene	1584	u
84-74-2	Di-n-Butylphthalate	340	J
206-44-0	Fluoranthene	1584	u
129-00-0	Pyrene	1584	u
85-68-7	Butylbenzylphthalate	1584	u
91-94-1	3,3`-Dichlorobenzidine	3168	u
56-55-3	Benzo(a)Anthracene	1584	u
117-81-7	bis(2-Ethylhexyl)Phthalate	1584	u
218-01-9	Chrysene	1584	u
117-84-0	Di-n-Octyl Phthalate	1584	u
205-99-2	Benzo(b)Fluoranthene	1584	u
207-08-9	Benzo(k)Fluoranthene	1584	u
50-32-8	Benzo(a)Pyrene	1584	u
193-39-5	Indeno(1,2,3-cd)Pyrene	1584	u
53-70-3	Dibenzo(a,h)Anthracene	1584	u
191-24-2	Benzo(g,h,i)Perylene	1584	u

(1)-Cannot be separated from diphenylamine

Sample Number
INS EQUIPMENT S-1
Sediment

Organics Analysis Data Sheet
(Page 5)

Pesticide/PCBs

Concentration: Low
Date Extracted/Prepared: 04/18/85
Date Analyzed: ~~05/28/85~~ 05/29/85
Conc/Dil Factor: 10

CAS Number		ug/kg
		**********
319-84-6	Alpha-BHC	128.0 u
319-85-7	Beta-BHC	128.0 u
319-86-8	Delta-BHC	128.0 u
58-89-9	Gamma-BHC(lindane)	128.0 u
76-44-8	Heptachlor	128.0 u
309-00-2	Aldrin	128.0 u
1024-57-3	Heptachlor Epoxide	128.0 u
959-98-8	Endosulfan I	128.0 u
60-57-1	Dieldrin	256.0 u
72-55-9	4,4'-DDE	256.0 u
72-20-8	Endrin	256.0 u
33213-65-9	Endosulfan II	256.0 u
72-54-8	4,4'-DDD	256.0 u
7421-93-4	Endrin Aldehyde	256.0 u
1031-07-8	Endosulfan Sulfate	256.0 u
50-29-3	4,4'-DDT	256.0 u
72-43-5	Methoxychlor	1280.0 u
53494-70-5	Endrin Ketone	256.0 u
57-74-9	Chlordane	1280.0 u
8001-35-2	Toxaphene	2560.0 u
12674-11-2	Aroclor-1016	1280.0 u
11104-28-2	Aroclor-1221	1280.0 u
11141-16-5	Aroclor-1232	1280.0 u
53469-21-9	Aroclor-1242	1280.0 u
12672-29-6	Aroclor-1248	1280.0 u
11097-69-1	Aroclor-1254	2560.0 u
11096-82-5	Aroclor-1260	2560.0 u

Vi = Volume of extract injected (ul)
Vs = Volume of water extracted (ml)
Ws = Weight of sample extracted (g)
Vt = Volume of total extract (ul)

Vs or Ws 19.2 Vt 20000 Vi 4

Sample Number
AS EQUIPMENT S-1

Organics Analysis Data Sheet
(Page 6)

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated concentration ug/kg	
**********	**********	****	****	******	
76-13-1	ETHANE,1,1,2-TRICHLORO-1,2,2-TRIFLUORO-	VOA	241	60	J,B
110-54-3	HEXANE	VOA	365	10	J,B
1186-53-4	PENTANE,2,2,3,4-TETRAMETHYL-	VOA	445	10	J
10544-50-0	SULFUR,MOL. (S8)	BNA	1152	2000	J

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
S-2 Sediment
INS Equipment (1)

Date June 11, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation CASE NO. Engineering-Science

SOW NO. 784

LAB SAMPLE ID. NO. 15040823 QC REPORT NO. _____

Elements Identified and Measured

Concentration: Low _____ Medium _____

Matrix: Water _____ Soil X Sludge _____ Other _____

ug/L or (mg/kg dry weight) (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic		15.	Mercury	0.17 U (C)
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	4.5 (F)	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium	3300 R (P)	20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	236 (P)	24.	Zinc	
	Cyanide			Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: (1) ref: Identification immediately following the Cover Page.

Lab Manager M. J. Marple

Environmental Protection Agency
CLP Sample Management Office.
P.O.Box 818
Alexandria, Virginia 22313 703/557-2490

Sample Number

INS EQUIPMENT S-2
SEDIMENT

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: NUS CORPORATION
Lab Sample ID No: 15040823
Sample Matrix: Soil
Data Release Authorized By:
****

Case No: ES-INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 04/12/85

Volatile Compounds

Concentration: Low
Date Extracted/Prepared: 04/17/85
Date Analyzed: 04/17/85
Conc/Dil Factor: 1 pH 7
Percent Moisture: 48
Percent Moisture (Decanted): NR

CAS Number		ug/kg
		**********
74-87-3	Chloromethane	19 u
74-83-9	Bromomethane	19 u
75-01-4	Vinyl chloride	19 u
75-00-3	Chloroethane	19 u
75-09-2	Methylene Chloride	72 B
67-64-1	Acetone	390 B
75-15-0	Carbon Disulfide	9 u
75-35-4	1,1-Dichloroethene	9 u
75-34-3	1,1-Dichloroethane	9.5 J
156-60-5	Trans-1,2-Dichloroethene	9 u
67-66-3	Chloroform	9 u
107-06-2	1,2-Dichloroethane	9 u
78-93-3	2-Butanone	50
71-55-6	1,1,1-Trichloroethane	9 u
56-23-5	Carbon Tetrachloride	9 u
108-05-4	Vinyl Acetate	19 u
75-27-4	Bromodichloromethane	9 u

Data reporting qualifiers are explained on Page 2.
****

Sample Number
INS EQUIPMENT S-2
SEDIMENT

Organics Analysis Data Sheet
(Page 2)

Volatile Compounds (continued)

Case Number		ug/kg	
		**********	
79-34-5	1,1,2,2-Tetrachloroethane	9	u
78-87-5	1,2-Dichloropropane	9	u
10061-02-6	Trans-1,3-Dichloropropene	9	u
79-01-6	Trichloroethene	9	u
124-48-1	Dibromochloromethane	9	u
79-00-5	1,1,2-Trichloroethane	9	u
71-43-2	Benzene	9	u
10061-01-5	cis-1,3-Dichloropropene	9	u
110-75-8	2-Chloroethylvinylether	19	u
75-25-2	Bromoform	9	u
591-78-6	2-Hexanone	19	u
108-10-1	4-Methyl-2-Pentanone	19	u
127-18-4	Tetrachlorethene	9	u
108-88-3	Toluene	4.9 J	
108-90-7	Chlorobenzene	9	u
100-41-4	Ethylbenzene	9	u
100-42-5	Styrene	9	u
	Total Xylenes	11	

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 explained.

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 indicated detection limit but greater than zero (e.g. 10J).

C - This flag applies to pesticide parameters where the identification has been comfirmed by GC/MS. Single component pesticides>=10ng/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.

S - Spiked compound.

NR - No value required.

Sample Number
INS EQUIPMENT S-2
SEDIMENT

Organics Analysis Data Sheet
(Page 5)

Pesticide/PCBs

Concentration: Low
Date Extracted/Prepared: 04/18/85
Date Analyzed: ~~05/20/85~~ LM 05/29/85
Conc/Dil Factor: 100

CAS Number		ug/kg **********	
319-84-6	Alpha-BHC	1520.0	u
319-85-7	Beta-BHC	1520.0	u
319-86-8	Delta-BHC	1520.0	u
58-89-9	Gamma-BHC(lindane)	1520.0	u
76-44-8	Heptachlor	1520.0	u
309-00-2	Aldrin	1520.0	u
1024-57-3	Heptachlor Epoxide	1520.0	u
959-98-8	Endosulfan I	1520.0	u
60-57-1	Dieldrin	3040.0	u
72-55-9	4,4'-DDE	3040.0	u
72-20-8	Endrin	3040.0	u
33213-65-9	Endosulfan II	3040.0	u
72-54-8	4,4'-DDD	3040.0	u
7421-93-4	Endrin Aldehyde	3040.0	u
1031-07-8	Endosulfan Sulfate	3040.0	u
50-29-3	4,4'-DDT	3040.0	u
72-43-5	Methoxychlor	15200.0	u
53494-70-5	Endrin Ketone	3040.0	u
57-74-9	Chlordane	15200.0	u
8001-35-2	Toxaphene	30400.0	u
12674-11-2	Aroclor-1016	15200.0	u
11104-28-2	Aroclor-1221	15200.0	u
11141-16-5	Aroclor-1232	15200.0	u
53469-21-9	Aroclor-1242	15200.0	u
12672-29-6	Aroclor-1248	15200.0	u
11097-69-1	Aroclor-1254	30400.0	u
11096-82-5	Aroclor-1260	30400.0	u

Vi = Volume of extract injected (ul)
Vs = Volume of water extracted (ml)
Ws = Weight of sample extracted (g)
Vt = Volume of total extract (ul)

Vs or Ws 15.6 Vt 20000 Vi 4

Sample Number
INS EQUIPMENT S-2
SEDIMENT

Organics Analysis Data Sheet
(Page 6)

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated concentration ug/kg
**********	**********	****	****	******
76-13-1	ETHANE,1,1,2-TRICHLORO-1,2,2-TRIFLUORO-	VOA	243	100 J,B
110-54-3	HEXANE	VOA	368	20 J,B
1921-70-6	PENTADECANE,2,6,10,14-TETRAMETHYL-	BNA	972	20000 J
629-78-7	HEPTADECANE	BNA	1043	10000 J
10544-50-0	SULFUR,MOL. (S8)	BNA	1193	10000 J
5961-33-1	AZETIDINE,3-METHYL-3-PHENYL-	BNA	1531	20000 J
7524-63-2	NAPHTHALENE,1,2,3,4-TETRAHYDRO-	BNA	1670	10000 J
54832-82-5	TRICYCLO[4.3.0.07.,9]NONANE,2,2	BNA	1734	8000 J
54832-82-5	TRICYCLO[4.3.0.07.,9]NONANE,2,2	BNA	1788	8000 J

Sample Number

SED-2

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: NUS CORPORATION
Lab Sample ID No: 16060717
Sample Matrix: Soil
Data Release Authorized By:

Case No: ES/INS EQUIPMENT
QC Report No:
Contract No:
Date Sample Received: 06/14/86

Volatile Compounds
Concentration: Low
Date Extracted/Prepared: NR
Date Analyzed: NR
Conc/Dil Factor: NR pH 10
Percent Moisture: 33
Percent Moisture (Not Decanted): NR

CAS Number		ug/kg
74-87-3	Chloromethane	
74-83-9	Bromomethane	
75-01-4	Vinyl Chloride	
75-00-3	Chloroethane	
75-09-2	Methylene Chloride	
67-64-1	Acetone	
75-15-0	Carbon Disulfide	
75-35-4	1,1-Dichloroethene	
75-34-3	1,1-Dichloroethane	
156-60-5	Trans-1,2-Dichloroethene	
67-66-3	Chloroform	
107-06-2	1,2-Dichloroethane	
78-93-3	2-Butanone	
71-55-6	1,1,1-Trichloroethane	
56-23-5	Carbon Tetrachloride	
108-05-4	Vinyl Acetate	
75-27-4	Bromodichloromethane	

CAS Number		ug/kg
78-87-5	1,2-Dichloropropane	
10061-02-6	Trans-1,3-Dichloropropene	
79-01-6	Trichloroethene	
124-48-1	Dibromochloromethane	
79-00-5	1,1,2-Trichloroethane	
71-43-2	Benzene	
10061-01-5	cis-1,3-Dichloropropene	
110-75-8	2-Chloroethylvinylether	
75-25-2	Bromoform	
108-10-1	4-Methyl-2-Pentanone	
591-78-6	2-Hexanone	
127-18-4	Tetrachloroethene	
79-34-5	1,1,2,2-Tetrachloroethane	
108-88-3	Toluene	
108-90-7	Chlorobenzene	
100-41-4	Ethylbenzene	
100-42-5	Styrene	
	Total Xylenes	

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.

lue 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 action. (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 indicated 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). If limit of detection is 10ug/l and a concentration of 3ug/l is calculated, report as 3J.

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides)=10ng/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 the 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.

S Spiked Compound

NR No value required.

Laboratory Name: NUS CORPORATION
Case No: ES/IMS EQUIPMENT

Sample Number
SED-2

Organics Analysis Data Sheet
(Page 2)

Semivolatile Compounds

Concentration: Low
Date Extracted/Prepared: 06/20/86
Date Analysed: 07/23/86
Conc/Dil Factor: 20
Percent Moisture (Decanted): 33

GPC Cleanup: NO
Separatory Funnel Extraction: NO
Continuous Liquid-Liquid Extraction: NO

CAS Number		ug/kg
108-95-2	Phenol	9900 U
111-44-4	bis(2-Chloroethyl)Ether	9900 U
95-57-8	2-Chlorophenol	9900 U
541-73-1	1,3-Dichlorobenzene	9900 U
106-46-7	1,4-Dichlorobenzene	9900 U
100-51-6	Benzyl Alcohol	9900 U
95-50-1	1,2-Dichlorobenzene	9900 U
95-48-7	2-Methylphenol	9900 U
39638-32-9	bis(2-chloroisopropyl)Ether	9900 U
106-44-5	4-Methylphenol	9900 U
621-64-7	N-Nitroso-Di-n-Propylamine	9900 U
67-72-1	Hexachloroethane	9900 U
98-95-3	Nitrobenzene	9900 U
78-59-1	Isophorone	9900 U
88-75-5	2-Nitrophenol	9900 U
105-67-9	2,4-Dimethylphenol	9900 U
65-85-0	Benzoic Acid	48000 U
111-91-1	bis(2-Chloroethoxy)Methane	9900 U
120-83-2	2,4-Dichlorophenol	9900 U
120-82-1	1,2,4-Trichlorobenzene	9900 U
91-20-3	Naphthalene	9900 U
106-47-8	4-Chloroaniline	9900 U
87-68-3	Hexachlorobutadiene	9900 U
59-50-7	4-Chloro-3-Methylphenol	9900 U
91-57-6	2-Methylnaphthalene	9900 U
77-47-4	Hexachlorocyclopentadiene	9900 U
88-06-2	2,4,6-Trichlorophenol	9900 U
95-95-4	2,4,5-Trichlorophenol	48000 U
91-58-7	2-Chloronaphthalene	9900 U
88-74-4	2-Nitroaniline	48000 U
131-11-3	Dimethyl Phthalate	9900 U
208-96-8	Acenaphthylene	9900 U
99-09-2	3-Nitroaniline	48000 U

CAS Number		ug/kg
83-32-9	Acenaphthene	9900 U
51-28-5	2,4-Dinitrophenol	48000 U
100-02-7	4-Nitrophenol	48000 U
132-64-9	Dibenzofuran	9900 U
121-14-2	2,4-Dinitrotoluene	9900 U
606-20-2	2,6-Dinitrotoluene	9900 U
84-66-2	Diethylphthalate	9900 U
7005-72-3	4-Chlorophenyl-phenylether	9900 U
86-73-7	Fluorene	9900 U
100-01-6	4-Nitroaniline	48000 U
534-52-1	4,6-Dinitro-2-Methylphenol	48000 U
86-30-6	N-Nitrosodiphenylamine(1)	9900 U
101-55-3	4-Bromophenyl-phenylether	9900 U
118-74-1	Hexachlorobenzene	9900 U
87-86-5	Pentachlorophenol	48000 U
85-01-8	Phenanthrene	6600 J
120-12-7	Anthracene	3100 J
84-74-2	Di-n-Butylphthalate	890 J,B
206-44-0	Fluoranthene	8800 J
129-00-0	Pyrene	6800 J
85-68-7	Butylbenzylphthalate	9900 U
91-94-1	3,3'-Dichlorobenzidine	19800 U
56-55-3	Benzo (a)Anthracene	2200 J
117-81-7	bis(2-Ethylhexyl)Phthalate	9900 U
218-01-9	Chrysene	4100 J
117-84-0	Di-n-Octyl Phthalate	9900 U
205-99-2	Benzo(b)Fluoranthene	2900 J
207-08-9	Benzo(k)Fluoranthene	9900 U
50-32-8	Benzo(a)Pyrene	9900 U
193-39-5	Indeno(1,2,3-cd)Pyrene	9900 U
53-70-3	Dibenz(a,h)Anthracene	9900 U
191-24-2	Benzo(g,h,i)Perylene	9900 U

(1)-Cannot be separated from diphenylamine

Laboratory Name: NUS CORPORATION Sample Number
Case No: ES/INS EQUIPMENT B-3

Organics Analysis Data Sheet
(Page 3)

Semivolatile Compounds

oncentration: Low GPC Cleanup: NO
ate Extracted/Prepared: 06/16/86 Separatory Funnel Extraction: YES
Date Analyzed: 07/23/86 Continuous Liquid-Liquid Extraction: NO
onc/Dil Factor: 1

CAS Number		ug/l
		**********
108-95-2	Phenol	10 u
111-44-4	bis(2-Chloroethyl)Ether	10 u
95-57-8	2-Chlorophenol	10 u
541-73-1	1,3-Dichlorobenzene	10 u
106-46-7	1,4-Dichlorobenzene	10 u
100-51-6	Benzyl Alcohol	10 u
95-50-1	1,2-Dichlorobenzene	10 u
95-48-7	2-Methylphenol	10 u
39638-32-9	bis(2-chloroisopropyl)Ether	10 u
106-44-5	4-Methylphenol	10 u
621-64-7	N-Nitroso-Di-n-Propylamine	10 u
67-72-1	Hexachloroethane	10 u
98-95-3	Nitrobenzene	10 u
78-59-1	Isophorone	10 u
88-75-5	2-Nitrophenol	10 u
105-67-9	2,4-Dimethylphenol	10 u
65-85-0	Benzoic Acid	50 u
111-91-1	bis(2-Chloroethoxy)Methane	10 u
120-83-2	2,4-Dichlorophenol	10 u
120-82-1	1,2,4-Trichlorobenzene	10 u
91-20-3	Naphthalene	10 u
106-47-8	4-Chloroaniline	10 u
87-68-3	Hexachlorobutadiene	10 u
59-50-7	4-Chloro-3-Methylphenol	10 u
91-57-6	2-Methylnaphthalene	10 u
77-47-4	Hexachlorocyclopentadiene	10 u
88-06-2	2,4,6-Trichlorophenol	10 u
95-95-4	2,4,5-Trichlorophenol	50 u
91-58-7	2-Chloronaphthalene	10 u
88-74-4	2-Nitroaniline	50 u
131-11-3	Dimethyl Phthalate	10 u
208-96-8	Acenaphthylene	10 u
99-09-2	3-Nitroaniline	50 u

Laboratory Name: NUS CORPORATION Sample Number
Case No: ES/INS EQUIPMENT B-3

Organics Analysis Data Sheet
(Page 4)

Semivolatile Compounds (continued)

CAS Number		ug/l	
		**********	
83-32-9	Acenaphthene		10 u
51-28-5	2,4-Dinitrophenol		50 u
100-02-7	4-Nitrophenol		50 u
132-64-9	Dibenzofuran		10 u
121-14-2	2,4-Dinitrotoluene		10 u
606-20-2	2,6-Dinitrotoluene		10 u
84-66-2	Diethylphthalate		10 u
7005-72-3	4-Chlorophenyl-phenylether		10 u
86-73-7	Fluorene		10 u
100-01-6	4-Nitroaniline		50 u
534-52-1	4,6-Dinitro-2-Methylphenol		50 u
86-30-6	N-Nitrosodiphenylamine(1)		10 u
101-55-3	4-Bromophenyl-phenylether		10 u
118-74-1	Hexachlorobenzene		10 u
87-86-5	Pentachlorophenol		50 u
85-01-8	Phenanthrene		10 u
120-12-7	Anthracene		10 u
84-74-2	Di-n-Butylphthalate		10 u
206-44-0	Fluoranthene		10 u
129-00-0	Pyrene		10 u
85-68-7	Butylbenzylphthalate		10 u
91-94-1	3,3`-Dichlorobenzidine		20 u
56-55-3	Benzo(a)Anthracene		10 u
117-81-7	bis(2-Ethylhexyl)Phthalate	3 J	
218-01-9	Chrysene		10 u
117-84-0	Di-n-Octyl Phthalate	3 J	
205-99-2	Benzo(b)Fluoranthene		10 u
207-08-9	Benzo(k)Fluoranthene		10 u
50-32-8	Benzo(a)Pyrene		10 u
193-39-5	Indeno(1,2,3-cd)Pyrene		10 u
53-70-3	Dibenzo(a,h)Anthracene		10 u
191-24-2	Benzo(g,h,i)Perylene		10 u

(1)-Cannot be separated from diphenylamine

Form I - D

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
B-5-Water

Date October 15, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation CASE NO. Engineering-Science/INS Equipment

SOW NO. 784

LAB SAMPLE ID. NO. 15081917 QC REPORT NO. _____

Elements Identified and Measured

Concentration: Low _____ Medium _____

Matrix: Water X Soil _____ Sludge _____ Other _____

(ug/L) or mg/kg dry weight (Circle One)

1.	Aluminum		13.	Magnesium	
2.	Antimony		14.	Manganese	
3.	Arsenic		15.	Mercury	0.2 U (C)
4.	Barium		16.	Nickel	
5.	Beryllium		17.	Potassium	
6.	Cadmium	5 U (P)	18.	Selenium	
7.	Calcium		19.	Silver	
8.	Chromium	10 U (P)	20.	Sodium	
9.	Cobalt		21.	Thallium	
10.	Copper		22.	Tin	
11.	Iron		23.	Vanadium	
12.	Lead	5 U (F)	24.	Zinc	
	Cyanide			Percent Solids (%)	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager [signature]

Field Sampling Records

FIELD MEMORANDUM

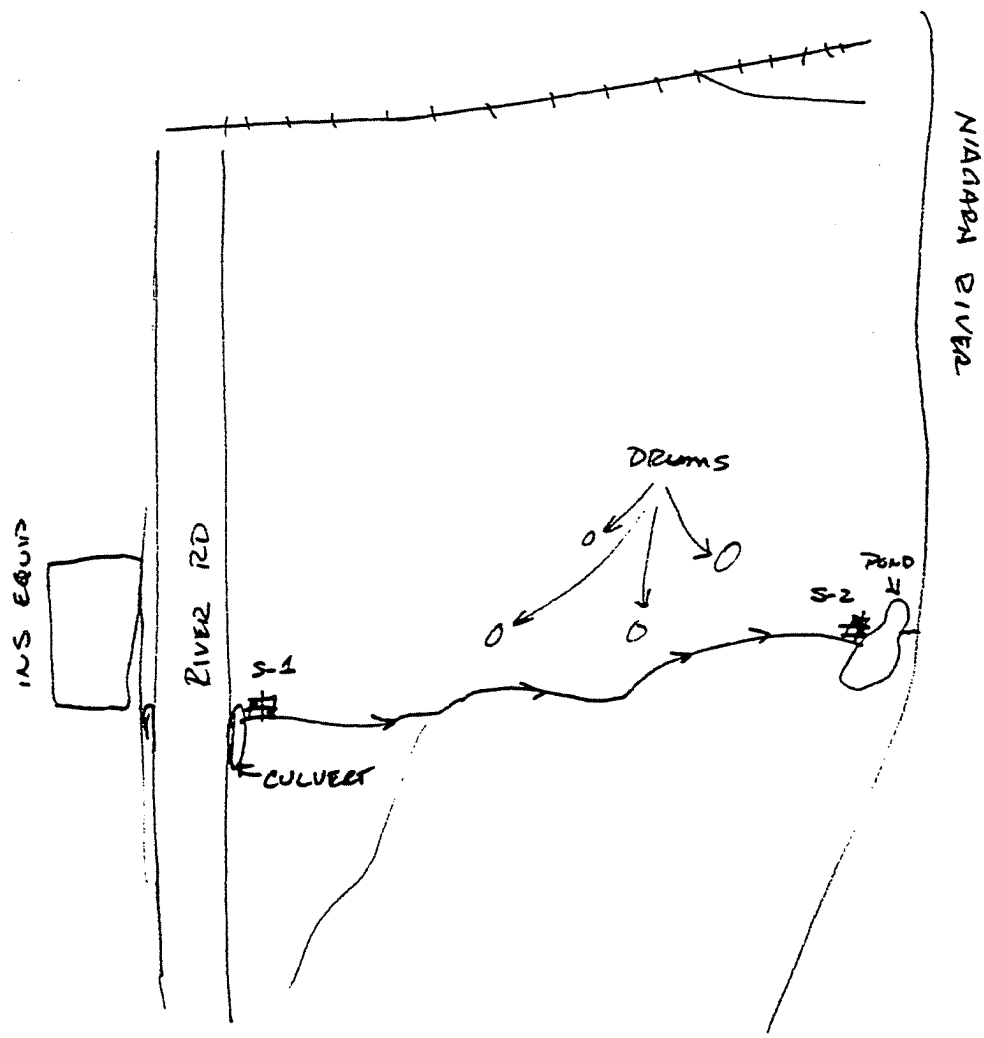
1.7
7.7.4

ACTION	INFO	
To:	ART	File: 13305-014-19
	EILEEN	
		X-Ref:
		—
		Date: 4/10/85

From: LARRY KERFE — Reply Required By:

Subject: SURFACE WATER SAMPLING - INS EQUIP.

Reference(s): ARRIVED AT SITE @ 8:00 AM WITH JOHN MCAULIFFE (ES). SAMPLED FOR SURFACE WATER / SEDIMENT AT POINTS S-1 & S-2.



LEFT SITE @ 9:30 AM.

SAMPLING RECORDS ON FILE

ROUTING

Dames & Moore

FIELD MEMORANDUM

File # 1.7
~~# 7.7.4~~

ACTION	INFO	
To:	ART	File: 13305-016-19 INS EQUIP
		X-Ref:
		Date: 8/28/96

From: L. KEEFE

Reply Required By:

Subject: DAILY ACTIVITIES - SAMPLING

Reference(s):

7:00 ON SITE AT INS EQUIP

8:30 SAMPLED CWI-102 USING TEFLON BAILER - FIELD BLANK FB-2 OPENED. FILTERED FOR METALS

10:00 SAMPLED B-3 USING TEFLON BAILER - FIELD BLANK FB-2 OPENED. FILTERED FOR METALS.

11:00 SAMPLED B-4 USING TEFLON BAILER - FIELD BLANK FB-2 OPENED FILTERED FOR METALS

12:00 SAMPLED B-5 USING TEFLON BAILER - FIELD BLANK FB-2 OPENED. FILTERED FOR METALS.

12:15 WASH BLANK WB-2 TAKEN FROM BAILER.

2:00 COOLERS SENT OUT VIA FED EX TO NUS

2

ROUTING

FIELD SAMPLING RECORD

JOB NYS DEC INS EQUIP JOB NO. 13305-014-19 DATE 8/28/85
WELL B-5

SAMPLERS: L. KEEFE OF DEM
J. BROD OF DEM

INITIAL STATIC WATER LEVEL. . . . . _____
(from top of well casing)

PUMPING:
USING: SUBMERSIBLE ___ CENTRIFUGAL ___
NITROGEN ___ POSITIVE DISPLACEMENT ___
BAILED X _____ times

DEPTH TO INTAKE FROM TOP OF WELL CASING _____
PUMPED _____ MINUTES AT _____ GPM (> 2 EXCHANGES)

SAMPLING: ___ a.m. TIME 12:00 X p.m.

BAILER TYPE: KEMMERER ___
STAINLESS STEEL BUCKET BAILER ___
FROM POS. DIS. PUMP DISCHARGE TUBE ___
OTHER TEFLON BAILER X

TRIP BLANK I.D. TB-1
NO. CONTAINERS FILLED (PRIMARY LAB) 6
NO. CONTAINERS FILLED (REPLICATE SAMPLES) . . . . . _____

PHYSICAL APPEARANCE AND ODOR _____

REFRIGERATED: DATE 8/28/85 TIME 12:00 P

FIELD TESTS:	BEFORE PUMPING ___	AFTER PUMPING X
TEMPERATURE (C°/°F)	_____	15 C°
pH	_____	7.47
SPEC. CONDUC (umhos/cm)	_____	1133
DISSOLVED OXYGEN (mg/l)	_____	4.35

WEATHER OVERCAST - 70°F

COMMENTS LAB BOTTLES MARKED #4

WASH BLANK WB-2 TAKEN AFTER B-5

FIELD SAMPLING RECORD

JOB NYSDEC INVESTIGATION JOB NO. 13305-014-19 DATE 8/28/85
WELL ~~EW~~ B-4

SAMPLERS: L. KEEFE OF D&M
T. BROD OF D&M

INITIAL STATIC WATER LEVEL. 16.03
(from top of well casing)

PUMPING:
USING: SUBMERSIBLE ___ CENTRIFUGAL ___
NITROGEN ___ POSITIVE DISPLACEMENT ___
BAILED X _____ times

DEPTH TO INTAKE FROM TOP OF WELL CASING _____ TOTAL = 25.0'
PUMPED _____ MINUTES AT _____ GPM (> 2 EXCHANGES)

SAMPLING: TIME 11:00 X a.m. ___ p.m.

BAILER TYPE: KEMMERER ___
STAINLESS STEEL BUCKET BAILER ___
FROM POS. DIS. PUMP DISCHARGE TUBE ___
OTHER _____ ___

TRIP BLANK I.D. TB-1
NO. CONTAINERS FILLED (PRIMARY LAB) 6
NO. CONTAINERS FILLED (REPLICATE SAMPLES) . . . . . _____
FIELD BLANK - FB-2

PHYSICAL APPEARANCE AND ODOR CLEAR TO SLIGHTLY GREY - SULFUR ODOR

REFRIGERATED: DATE 8/28/85 TIME 11:00 AM

FIELD TESTS:	BEFORE PUMPING ___	AFTER PUMPING X
TEMPERATURE (C°/°F)	_____	18 C°
pH	_____	7.49
SPEC. CONDUC (umhos/cm)	_____	770
DISSOLVED OXYGEN (mg/l)	_____	4.47

WEATHER OVERCAST - 70°F

COMMENTS LAB BOTTLES MARKED #3

FIELD SAMPLING RECORD

JOB NYS DEC INSERVP JOB NO. 13305-014-19 DATE 8/28/85
WELL B-3

SAMPLERS: C. KEEFE OF D&M
T. BROD OF D&M

INITIAL STATIC WATER LEVEL. . . . . 18.65'
(from top of well casing)

PUMPING:
USING: SUBMERSIBLE ___ CENTRIFUGAL ___
NITROGEN ___ POSITIVE DISPLACEMENT ___
BAILED X 3 gal ~~times~~

DEPTH TO INTAKE FROM TOP OF WELL CASING ___ TOTAL = 25.
PUMPED ___ MINUTES AT ___ GPM (> 2 EXCHANGES)

SAMPLING: TIME 10:00 X a.m. ___ p.m.

BAILER TYPE: KEMMERER ___
STAINLESS STEEL BUCKET BAILER ___
FROM POS. DIS. PUMP DISCHARGE TUBE ___
OTHER TEFLON BAILER X

TRIP BLANK I.D. TB-1
NO. CONTAINERS FILLED (PRIMARY LAB) 6
NO. CONTAINERS FILLED (REPLICATE SAMPLES) . . . . . ___
FIELD BLANK - FB-2
PHYSICAL APPEARANCE AND ODOR BLACK w/ SILT - PETROLEUM ODOR

REFRIGERATED: DATE 8/28/85 TIME 10:00 Am

FIELD TESTS: BEFORE PUMPING ___ AFTER PUMPING ___

TEMPERATURE (C°/°F)	___	16 C°
pH	___	11.70
SPEC. CONDUC (umhos/cm)	___	1757
DISSOLVED OXYGEN (mg/l)	___	~~1757~~ 9.45

WEATHER CLEAR 70°F

COMMENTS LAB BOTTLES MARKED #2

FIELD SAMPLING RECORD

JOB NYS DEC INVS EDUC. JOB NO. 13305-014-19 DATE 8/28/85
WELL GW-102

SAMPLERS: L. KEEFE OF DEM
S. BROB OF DEM

INITIAL STATIC WATER LEVEL. . . . . 7.27'
(from top of well casing)

PUMPING:
USING: SUBMERSIBLE ___ CENTRIFUGAL ___
NITROGEN ___ POSITIVE DISPLACEMENT ___
BAILED X 5 gal ~~times~~

DEPTH TO INTAKE FROM TOP OF WELL CASING 18.7 (TOTAL = 30.8)
PUMPED _____ MINUTES AT _____ GPM (> 2 EXCHANGES)

SAMPLING: TIME 8:30 X a.m. ___ p.m.

BAILER TYPE: KEMMERER ___
STAINLESS STEEL BUCKET BAILER ___
FROM POS. DIS. PUMP DISCHARGE TUBE ___
OTHER TEFLON BAILER X

TRIP BLANK I.D. TB-1
NO. CONTAINERS FILLED (PRIMARY LAB) 6
NO. CONTAINERS FILLED (REPLICATE SAMPLES) . . . . . _____
FIELD BLANK FB-2
PHYSICAL APPEARANCE AND ODOR CLEAR, SLIGHT GREY TINT, SLIGHT SULFUR ODOR

REFRIGERATED: DATE 8/28/85 TIME 8:30 AM

FIELD TESTS: BEFORE PUMPING ___ AFTER PUMPING X

TEMPERATURE (C°/°F)	_____	13.8 C°
pH	_____	7.75
SPEC. CONDUC (umhos/cm)	_____	740
DISSOLVED OXYGEN (mg/l)	_____	4.17

WEATHER OVERCAST - 68°F

COMMENTS LAB BOTTLES MARKED #1

FIGURE 6.2

Ground ~~FIELD SURFACE~~ WATER SAMPLING RECORD

JOB INS - Equip. JOB NUMBER _____ DATE 6/11/86

SAMPLING POINT C-W102

SAMPLERS: E. Dobson OF Engineering Science

J. Short OF Engineering Science

SAMPLING: TIME 1545 ___a.m. ___p.m.

SAMPLER TYPE Well 1.84 above H_2O, 7.21 below top of well H_2O level below ground = 5.37'

SAMPLE DEPTH _____

DEPTH OF WATER BODY _____

DESCRIPTION OF SAMPLING POINT:

DRAINAGE DIRECTION 52 bails of ES stainless to bail dry.

UPSTREAM FROM: _____

DOWNSTREAM FROM: _____

PHYSICAL APPEARANCE/ODOR _____

WILDLIFE OBSERVED _____

SAMPLE DESCRIPTION:

SUSPENDED MATTER: _____

COLOR/STAIN _____

ODOR _____

OTHER _____

ANALYZE FOR: _____

REFRIGERATED: DATE: __/__/__ TIME ___a.m. ___p.m.

FIELD TESTS:

TEMPERATURE (C°/°F) _____ WEATHER _____

pH _____ _____

(SEE BELOW)

1st 5 bails clear, Next 20 - dark grey w/ oily smell - remaining clear (52 total bailed)

sampled S1, SED1 @ map location - clear H_2O sandy sediment - located in drainage ditch

FIGURE 6.2

Ground ~~FIELD SURFACE~~ WATER SAMPLING RECORD

JOB NY STATE DEC - INS EQUIP JOB NUMBER _____ DATE 6/11/86

SAMPLING POINT B-3

SAMPLERS: E. Dobson OF Engineering Science

J. Short OF Engineering Science

SAMPLING: TIME 18:00 ___a.m. ___p.m.

SAMPLER TYPE Bailer -

SAMPLE DEPTH _____

~~DEPTH OF WATER~~ BODY 18.33 H_2O from Top of Well, 2.49' Well above ground

DESCRIPTION OF SAMPLING POINT: H_2O level 15.84 FT below ground

DRAINAGE DIRECTION 19 bails to bail 4 volumes

UPSTREAM FROM: _____

DOWNSTREAM FROM: _____

PHYSICAL APPEARANCE/ODOR _____

WILDLIFE OBSERVED _____

SAMPLE DESCRIPTION:

SUSPENDED MATTER: Sample Not collected

COLOR/STAIN _____

ODOR _____

OTHER _____

ANALYZE FOR: _____

REFRIGERATED: _____ DATE: ___/___/___ TIME ___a.m. ___p.m.

FIELD TESTS:

TEMPERATURE (C°/°F) _____ WEATHER _____

pH _____ _____

OTHER (SPECIFY BELOW)

_____ _____

COMMENTS * Could not bail w/ bailer or ½ bailer

2 kinks in casing above water level.

Kink approx 15' down from Top of Well

Bailer almost became stuck in Well

FIGURE 6.2

FIELD ~~SURFACE~~ Ground WATER SAMPLING RECORD

JOB INS - EQUIP JOB NUMBER _____ DATE 6/11/86

SAMPLING POINT B-4

SAMPLERS: E. Dobson OF Engineering Science

J. Short OF Engineering Science

SAMPLING: TIME 1745 ___a.m. ___p.m.

SAMPLER TYPE Bailer - Stainless Steel

SAMPLE DEPTH _____

~~DEPTH OF WATER~~ STATIC WATER LEVEL BODY 16.92, 2.74 above ground = Water level 14.18 Ft below ground level

DESCRIPTION OF SAMPLING POINT:

DRAINAGE DIRECTION Bail 22 times to remove 4 volumes of water

UPSTREAM FROM: _____

DOWNSTREAM FROM: _____

PHYSICAL APPEARANCE/ODOR _____

WILDLIFE OBSERVED _____

SAMPLE DESCRIPTION:

SUSPENDED MATTER: _____

COLOR/STAIN _____

ODOR _____

OTHER _____

ANALYZE FOR: _____

REFRIGERATED: DATE: __/__/__ TIME ___a.m. ___p.m.

FIELD TESTS:

TEMPERATURE (C°/°F) _____ WEATHER _____

pH _____ _____

OTHER (SPECIFY BELOW)

_____ _____

COMMENTS Kink in casing Approx 5' down from Top of Well (outside)
* bailed w/ half a bailer. Water turned gray after 5 bails.

FIGURE 6.2
GROUND
FIELD ~~SURFACE~~ WATER SAMPLING RECORD

OB INS EQUIP. JOB NUMBER _____ DATE 6/11/86

SAMPLING POINT B-5

SAMPLERS: E. Dobson OF Engineering Science

J. Short OF Engineering Science

SAMPLING: TIME 1700 ___a.m. ___p.m.

Static Water Level

~~SAMPLER TYPE~~ 14.55 H_2O depth from T.O.W. Well 2.7' above ground

SAMPLE DEPTH _____

DEPTH OF WATER BODY _____

H_2O level from ground surface = 14.15'

DESCRIPTION OF SAMPLING POINT:

DRAINAGE DIRECTION 22 bails = 4 volumes of H_2O removed

UPSTREAM FROM: 22 bailed bails

DOWNSTREAM FROM: _____

PHYSICAL APPEARANCE/ODOR _____

WILDLIFE OBSERVED _____

SAMPLE DESCRIPTION:

SUSPENDED MATTER: _____

COLOR/STAIN _____

ODOR _____

OTHER _____

ANALYZE FOR: _____

REFRIGERATED: DATE: ___/___/___ TIME ___a.m. ___p.m.

FIELD TESTS:

TEMPERATURE (C°/°F) _____ WEATHER _____

pH _____ _____

OTHER (SPECIFY BELOW)

_____ _____

COMMENTS clear few bails = dark grey - slight oily smell

S-2 SED-2 collected near Niagra River → stream

? 1700 outlet (flows West) gravelly soil

S-22

HNu Air Quality Survey

FIELD MEMORANDUM

ACTION	INFO	
To:	EDG	File: 13305-014-019 INS Equipment
		X-Ref:
		Date:

From: JCBrod

Reply Required By:

Subject: Air quality monitoring @ INS Equipment.

Reference(s):

Upwind and downwind air quality monitoring was done at the site with an HNu photoionization meter on 6-21-85.

The readings ranged from 1.0 to 2.0 ppm above background.

JCBrod

ROUTING