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FINAL REPORT

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

PHASE II INVESTIGATIONS

VOLUME I

Alltift Realty	Site No. 915054
City of Buffalo	Erie County

Prepared for:

New York State
Department of
Environmental Conservation
50 Wolf Road, Albany, New York 12233-0001
Henry G. Williams, *Commissioner*

Division of Solid and Hazardous Waste
Norman H. Nosenchuck, P.E., *Director*

By:
ENGINEERING-SCIENCE
In Association With
DAMES & MOORE

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

VOLUME I

ALLTIFT REALTY
NYS SITE I.D. 915054
CITY OF BUFFALO
ERIE COUNTY
NEW YORK STATE

Prepared For

DIVISION OF SOLID AND HAZARDOUS WASTE
NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 WOLF ROAD
ALBANY, NEW YORK 12233-0001

Prepared By

ENGINEERING-SCIENCE
290 ELWOOD DAVIS ROAD
LIVERPOOL, NEW YORK 13088

In Association With

DAMES & MOORE
2996 BELGIUM ROAD
BALDWINSVILLE, NEW YORK 13027

VOLUME I

ALLTIFT REALTY

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SECTION I

SECTION I

EXECUTIVE SUMMARY

SITE BACKGROUND

The Alltift Realty site (Site I.D. 915054) is located in an industrial area in the southern portion of the City of Buffalo, Erie County, New York (see Figures I-1 and I-2). The landfill is currently owned and operated by Alltift Realty Company of New York. The site has been used as a landfill since the 1930's (RECRA, 1978).

The current landfill is located above a larger chemical landfill, which was used to dispose of metal sludges, naphthalene, monochlorobenzene, dye, oil sludges, and phenolic compounds during the early 1960's (Roetzer, 1968; Rayer, 1978). Allied Chemical Company's Buffalo Dye Plant was the only industry that was known to have disposed of wastes at this site during its use as a chemical landfill. Since the Alltift Company bought the property in 1975, the site has been used for the disposal of solid wastes including shredder waste from an automobile manufacturer, fly ash, sand wastes, and demolition debris (RECRA, 1978). The quantity of solid wastes disposed of at the site was estimated to be 40,000 to 60,000 cubic yards/year (RECRA, 1980).

PHASE II INVESTIGATION

The Phase II investigation was conducted to gather sufficient information to calculate the 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 placement of the monitoring wells. In addition, sediment, surface water, air and groundwater sampling and analysis was conducted to define the extent of potential contamination at the Alltift Realty site.

The geological stratigraphy at this site is complicated by a layered clay/silt aquitard that separates the groundwater into two aquifers under most of the site. It is believed that these aquifers are hydraulically connected at the southern end of the site. In general, the stratigraphy can be summarized as follows:

- Fill
- Silt Fine Sand and Clay
- Layered Clay and Silt
- Till
- Shale
- Limestone Bedrock

SITE ASSESSMENT

Sediment, air, surface water, and groundwater samples have been collected and analyzed as part of the Phase II investigation, and several other studies (RECRA and Wehran, 1978; RECRA, 1982). These studies have revealed contamination of the upper aquifer (iron, benzene, napthalene, arsenic, chromium, and mercury) and the lower aquifer (benzene, xylene, toluene, and iron).

Contamination was also found in the surface water and sediment samples collected from the pond to the south and the swamp to the west of the site. The contaminants found at concentrations in excess of the New York State Department of Environmental Conservation (NYSDEC) surface water quality standards were aluminum, antimony, chromium, iron, magnesium, manganese, zinc, copper, and phenols. The sediment samples were contaminated with benzene compounds, xylene, toluene, acenaphthene, and 3,3 dichlorobenzidine, in addition to the heavy metals present in the surface water. It is unknown if the source of the surface water and sediment contamination is from the Alltift Realty landfill or the Ramco Steel Company, who had a permit to discharge steel pickling liquor into the pond at the southern end of the Alltift Realty site (Bissell, Merrill Associates, 1978).

A survey of the air quality with an HNu meter revealed no organic contamination of the air at the site.

HAZARD RANKING SYSTEM SCORE

The results of this investigation and previous studies were used to calculate the Hazard Ranking System (HRS) score. Three scores were calculated for the site. The S_M score reflects the potential for harm due to migration of hazardous substances away from the facility. It is the composite of a score for groundwater (S_{GW}), surface water (S_{SW}) and air (S_A) transport routes. The S_{FE} score reflects the potential for harm from fires or explosions, and the S_{DC} score reflects the potential harm from direct contact with hazardous substances.

The HRS scores for the Alltift Realty site have been calculated as follows:

$S_M = 13.10$

$S_{GW} = 6.12$
$S_{SW} = 21.82$
$S_A = 0.00$

$S_{DC} = 33.30$
$S_{FE} = 0.00$

RECOMMENDATIONS

It is recommended that a remedial investigation and feasibility study be conducted at this site to determine the most appropriate closure plan.

LONGITUDE: 78°50'22.5"
LATITUDE: 42°50'37.0"

REFERENCE: U.S.G.S. 7.5' TOPOGRAPHIC MAP
BUFFALO SE, NY (1965) QUADRANGLE

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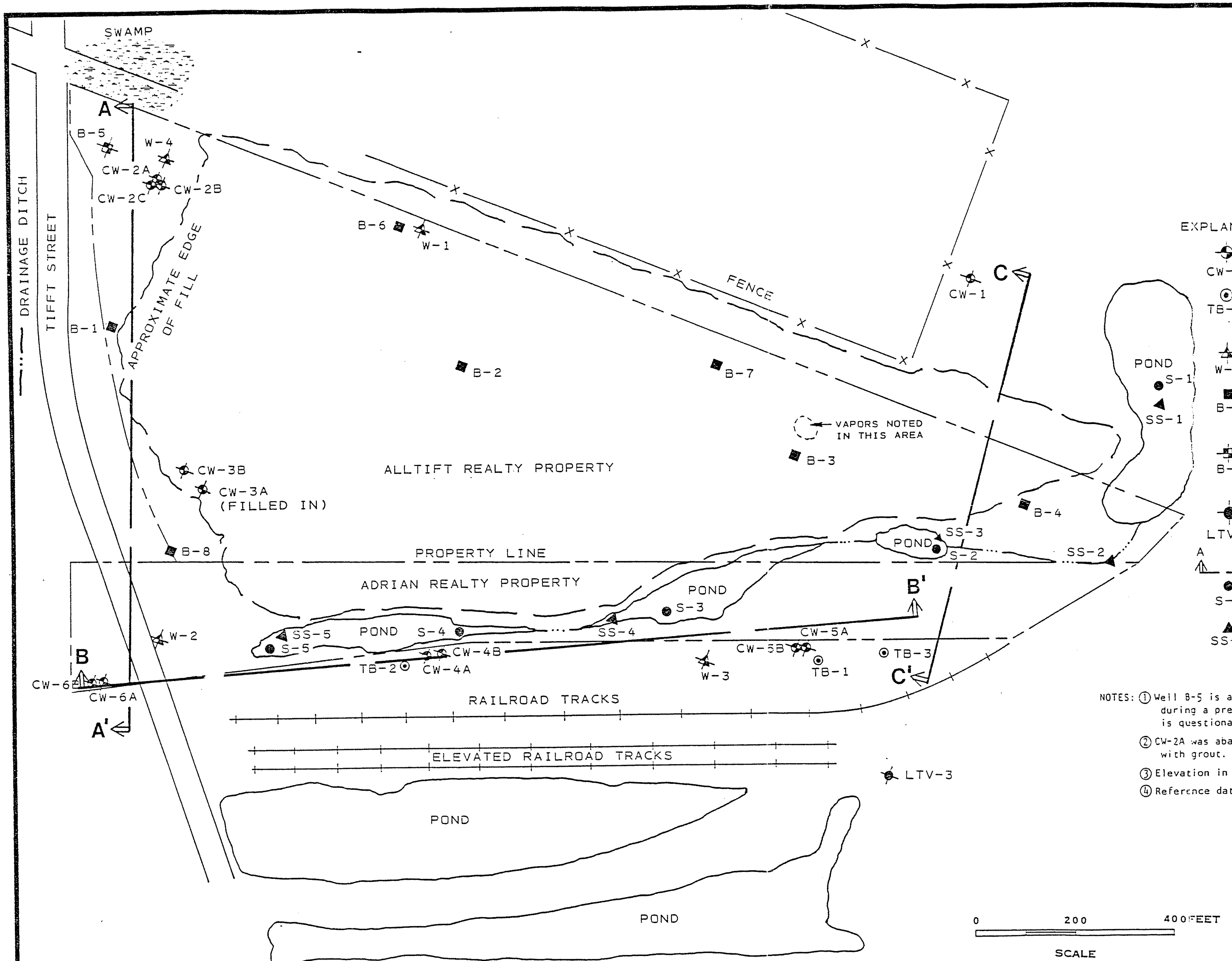
SITE LOCATION MAP
ALLTIFT REALTY

FIGURE I-1



EXPLANATION:

CW-1 MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION

TB-1 TEST BORING DRILLED UNDER RECRA RESEARCH'S SUPERVISION 1982

W-1 NON-EXISTING WELL, RECRA RESEARCH, 1982

B-1 NON-EXISTING WELL, WEHRAN ENGINEERING & RECRA RESEARCH 1978

B-5 EXISTING WELL BY WEHRAN ENGINEERING & RECRA RESEARCH 1978

LTV-3 WELL DRILLED BY MALCOM PIRNIE 1984

A A' CROSS SECTION LOCATION

S-1 ● DAMES & MOORE SURFACE WATER AND SEDIMENT SAMPLE, APRIL 1985

SS-1 ▲ RECRA RESEARCH SURFACE WATER AND SEDIMENT SAMPLE, 1982

NOTES: ① Well B-5 is an existing well installed during a previous phase. Its integrity is questionable and should not be sampled.

② CW-2A was abandoned and was backfilled with grout.

③ Elevation in feet above mean sea level.

④ Reference datum City of Buffalo datum.

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PLOT PLAN
ALLTIFT REALTY

FIGURE I-2

SECTION II

SECTION II
PURPOSE

BACKGROUND INFORMATION

The Alltift Realty site (Site I.D. 915054) is an active landfill located in an industrial area in the southern portion of the City of Buffalo, Erie County, south of Tifft Road. The landfill is currently owned and operated by the Alltift Realty Company of Buffalo. The site is approximately triangular and is bounded on three sides by road and railroad embankments. The site has been used as a landfill since the 1930's.

The current landfill is located above a larger chemical landfill used to dispose of metal sludges, naphthalene, monochlorobenzene, bulk loads of dye, oil sludges, and phenolic compounds from 1960 to 1965 (Roetzer, 1968; Rayer, 1978). Previous site investigations have detected organic chemicals, including phenols and pesticides, and heavy metals such as chromium, arsenic, lead, and mercury in surface water, soil, and groundwater samples (RECRA Research, Wehran Engineering, 1978, RECRA Research, 1982). A complete organic analysis was not conducted on all of these samples. The Phase I investigation and evaluation prepared by Engineering-Science, Inc. in association with Dames & Moore in June of 1983 indicates that no air contamination data existed to complete the Hazard Ranking System (HRS) score. Since submission of the Phase I report, further evaluation indicated that the data was insufficient to complete the HRS score (particularly the interrelationship between the upper and lower aquifers) and prepare a conceptual evaluation of the remedial alternatives. Since the existing data was insufficient, a Phase II project was implemented at the Alltift Realty site to provide additional geophysical, groundwater, surface water, and sediment contamination data.

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 Alltift Realty 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. The Phase II effort focused on defining the relationship between the upper and lower aquifer at the site and the potential for contamination of these aquifers.

SECTION III

SECTION III

SCOPE OF WORK

INTRODUCTION

The Phase II investigation at the Alltift Realty site was begun 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.

The number of monitoring wells installed and groundwater samples collected and analyzed was incresed from six to ten. This change allowed upper and lower aquifer groundwater samples to be collected at each of four locations, with two additional wells into the upper aquifer. This differed from the originally proposed network of five deep wells and one shallow well.

Additional groundwater, surface water and sediment samples were collected in June, 1986. These samples were analyzed for semi-volatile compounds and were reanalyzed because of inadequate QA/QC on the original samples.

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.

SITE INVESTIGATION

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

Geophysical Survey

A geophysical study consisting of an electrical resistivity and a magnetometer survey was conducted. The electrical resistivity survey was performed at various locations within the area of the landfill 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

Ten monitoring wells were installed around the perimeter of the site (see Figure III-1). Four of the wells (CW-2C, CW-4A, CW-5A, and CW-6A) were installed in the deep aquifer at depths ranging from 47.9 feet to 64 feet. The six shallow aquifer wells were drilled to depths ranging from 13 feet to 24.4 feet (see Table III-2). Four of these wells (CW-2B, CW-4B, CW-5B, and CW-6B) were drilled in the same locations as the deep aquifer wells. CW-3A was drilled into the deep aquifer and abandoned due to subsurface conditions. CW-3B was installed in the shallow aquifer. The other shallow aquifer well (CW-1) was drilled to bedrock, so no deep aquifer well was needed at this location.

Soil was drilled and sampled from the ground surface to a maximum depth of 64 feet. PVC wells were installed with filter sand packs, and primary and secondary bentonite seals.

Each well was logged visually during drilling and later with a down hole gamma logging unit. 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. Boring logs, well schematics, gamma logs, and grain size analyses are included in Appendix B.

Groundwater Sampling and Analysis

Groundwater samples were taken from each of the ten wells in August of 1985. These samples were analyzed for metals by inductively coupled plasma emission spectroscopy (ICPES) and organic constituents by a complete gas chromatography and mass spectroscopy scan (GC/MS scan). NUS Corporation in Pittsburgh, PA performed the analytical testing and reported the results in accordance with the NYSDEC Superfund and Laboratory Contract 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

Surface water and sediment samples were collected from the pond at the southern end of the landfill and the swamp that forms the western boundary of the site. One sample was collected from the pond and four samples were collected along the edge of the swamp (see Figure III-1).

These samples were collected in April of 1985 and were analyzed for metals (ICPES) and organic constituents (GC/MS) by NUS Corporation in accordance with NYSDEC protocols. The field procedures are outlined in Appendix A. The chemical analytical results are summarized in Section IV and detailed in Appendix D.

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)
ALLTIFT REALTY

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 to define the subsurface stratigraphy and locate potential plume. A magnetometer survey was conducted to ensure the proper placement of the wells.
II-C Conduct Boring/ Install Monitoring Wells	Installed ten wells, four into the lower aquifer, and six into the upper aquifer. Wells were constructed of PVC and were drilled to bedrock. The depth of the wells ranged from 13 to 24.4 feet for the upper aquifer and from 47.9 to 64 feet in the lower aquifer.
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	Five sediment samples were analyzed for metals (ICPES) and organics using a GC/MS scan.

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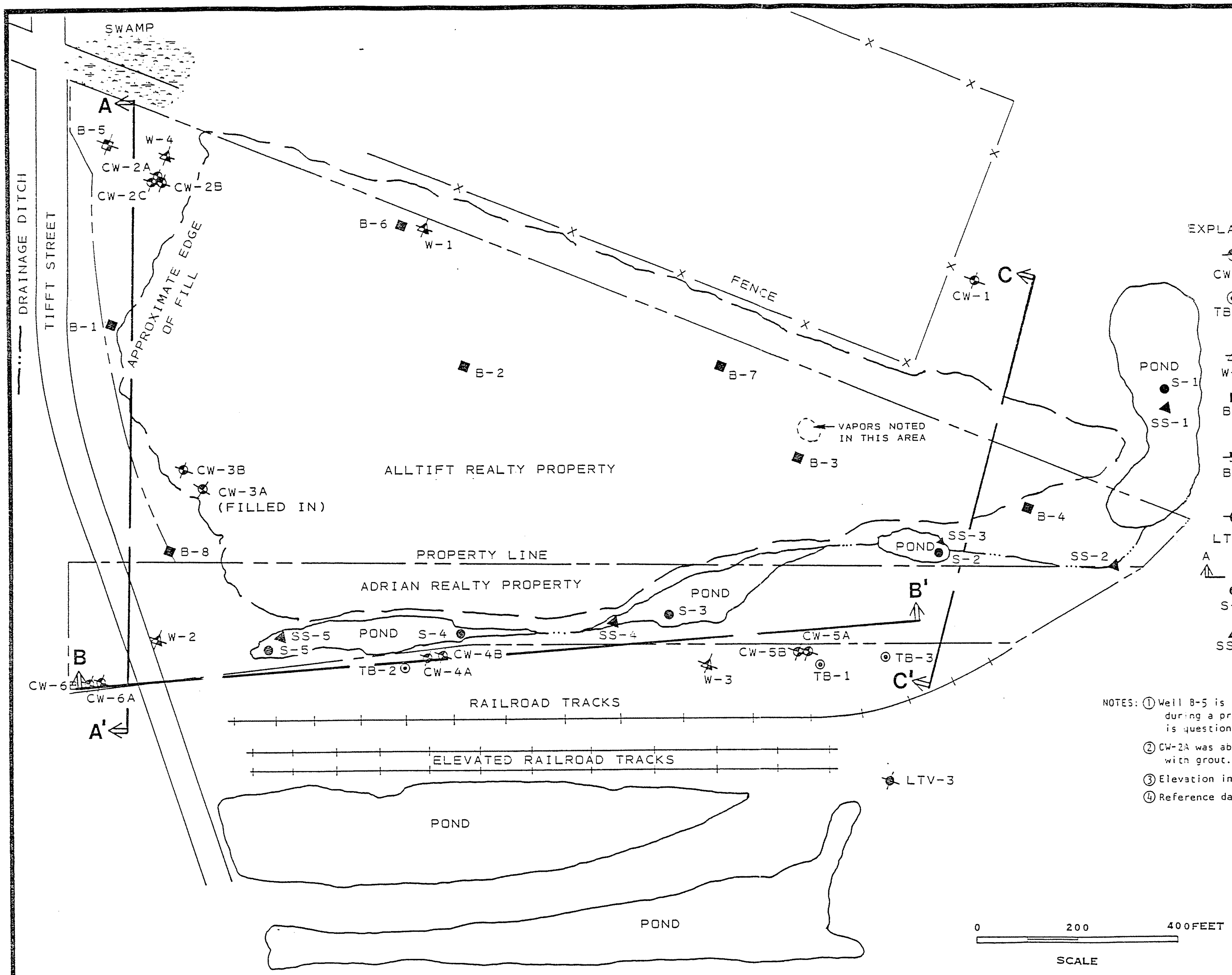
(1) As implemented during the Phase II investigation.

TABLE III-1 (Continued)
WORK PLAN - TASK DESCRIPTION
ALLTIFT REALTY

Tasks	Description of Task
Ground-water samples	Ten groundwater samples were analyzed for metals (ICPES) and organics using a GC/MS scan.
Surface water samples	Five surface water samples were analyzed for metals (ICPES) and organics using a GC/MS scan.
Air samples	Using the HNU, the presence of organic vapors was 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.

TABLE III-2
MONITORING WELL LOCATIONS AND SPECIFICATIONS

Well No.	Upgradient/ Downgradient	Depth (ft)		Depth of Screening (ft)
CW-1	Upgradient	13	(upper aquifer)	6.5 - 11
CW-2B	Downgradient	18	(upper aquifer)	6 - 16
CW-2C	Downgradient	61.1	(lower aquifer)	49 - 59.1
CW-3B	Downgradient	18	(upper aquifer)	6 - 16
CW-4A	Downgradient	64	(lower aquifer)	57.5 - 62
CW-4B	Downgradient	24.4	(upper aquifer)	12.25 - 22.25
CW-5A	Downgradient	47.9	(lower aquifer)	35.8 - 45.8
CW-5B	Downgradient	14	(upper aquifer)	7.5 - 12
CW-6A	Downgradient	61.5	(lower aquifer)	55 - 59.5
CW-6B	Downgradient	21	(upper aquifer)	9 - 19



EXPLANATION:

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TB-1	TEST BORING DRILLED UNDER RECRA RESEARCH'S SUPERVISION 1982
W-1	NON-EXISTING WELL, RECRA RESEARCH, 1982
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B-5	EXISTING WELL BY WEHRAN ENGINEERING & RECRA RESEARCH 1978
LTV-3	WELL DRILLED BY MALCOM PIRNIE 1984
A A'	CROSS SECTION LOCATION
S-1	DAMES & MOORE SURFACE WATER AND SEDIMENT SAMPLE, APRIL 1985
SS-1	RECRA RESEARCH SURFACE WATER AND SEDIMENT SAMPLE, 1982

NOTES: ① Well B-5 is an existing well installed during a previous phase. Its integrity is questionable and should not be sampled.

② CW-2A was abandoned and was backfilled with grout.

③ Elevation in feet above mean sea level.

④ Reference datum City of Buffalo datum.

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PLOT PLAN
ALLTIFT REALTY

FIGURE III-1

SECTION IV

SECTION IV
SITE ASSESSMENT

SITE TOPOGRAPHY

This summary of site topography is based on information from USGS topographic maps, earlier site surveys by RECRA Research, Inc. (1978 and 1982), a recent survey during Phase II field activities, a conversation with R. Koczaja (1985), and air photos (1972) of the site.

The Alltift Realty site is located in the southwestern part of the City of Buffalo, Erie County, New York State (see Figure IV-1). It is a 25-acre, triangular-shaped landfill and generally forms a mound approximately 30 feet above the surrounding ground surface (see Figure IV-2). The site is located in an industrial section of Buffalo. The nearest residential area is one-third mile to the east. Public water supply serves this part of Buffalo. There is no known usage of either the groundwater or surface water within 3 miles of this site at the present time. The nearest well to the site is a deep bedrock well at the closed Donna-Hanna Coke Company, 1 mile north of the site.

The Alltift Realty site is bordered to the east by Skyway Auto Parts (with numerous junk cars), Erie County Industrial Development (c/o Ramco Steel) to the south, by Adrian Realty to the west (a property holding company for the Chessie Railway System), and to the north by Tifft Street. According to the City tax maps, a north-south oriented paper street (planned to be named Abby Street) exists between Alltift Realty and Skyway Auto Parts/Ramco Steel. A municipal water main already follows this proposed street. Also, the diversion of Tifft Street during reconstruction of the Tifft Street Bridge resulted in a small part of the northwest corner of the Alltift property being isolated on the north side of Tifft Street. Landfilling at the site appears to extend across the western boundary of the site onto Adrian Realty property. This is evident in the field as well as on air photos of the site.

The Alltift Realty site is located in a larger, previously swampy region bounded to the south by the Crystal Beach moraine (south of South Park), to the north by the Buffalo River, to the east approximately by the position of South Park Street, and to the west by Lake Erie. This region of the City was considered "less desireable" and consequently was used for junkyards, landfills, dredging disposal areas, heavy industry, and railroad yards. Most of the swamp was filled, although smaller swamps remain between the filled areas. These swamps appear to be hydraulically linked together via streams, ditches, and seepage through permeable fill. Together, they form a large NYS recognized wetland, which provides a habitat for local wildlife and migrating birds (including eagles and ospreys). However, this wetland is not a critical habitat for endangered species (Ozard, 1986).

There is no permanent surface water on the Alltift Realty site. A swamp occurs on the adjacent Adrian Realty property (see Figure IV-1) and drains north.

SITE HYDROLOGY

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 glacier 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. 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

Prior to the Phase II investigation, two major studies of the Alltift Landfill were performed by RECRA Research, Inc. in 1978 (jointly with Wehran Engineering) and 1982. In addition, a recent study by Malcolm Pirnie (1984) of the Marilla Street Landfill provides information regarding the area south of the site. The data from these studies have been combined with the information from the Phase II study and a relatively complete picture of the site geology has been formed.

From all of these studies, a total of 22 sampled borings have been drilled and 23 wells have been installed. (However, only the 10 new Phase II wells are presently useable.)

The following summary of site geology is based on the information from these earlier studies, NYS Museum and Science Service Bedrock Geology Map and Quaternary Geology Map, USGS topographic maps, LaSala (1968) and the Phase II field program.

Figures IV-3 through IV-5 depict the subsurface geology at the Alltift Realty site in cross sectional views. The bedrock surface beneath the site, as shown in map view on Figure IV-6, slopes to the northwest and has a maximum relief of approximately 60 feet. A northeast/southwest-oriented bedrock escarpment (cliff) exists through the center of the site; it accounts for approximately 20 feet of relief.

In the vicinity of the escarpment (center of the site), the bedrock has been identified as black shale (by RECRA Research and Wehran Engineers) and as black siltstone (Phase II investigation). A strong petroleum odor was noted from samples of this rock; it may be natural and consistent with its petroliferous character.

In the southern and northern parts of the site, the bedrock has been identified as grey limestone. (Earlier reports suggested a slightly different bedrock configuration, but they were based on less drilling information). Bedrock samples from the northern part of the site contained seams of black petroliferous material (apparently natural) and had strong petroleum odor.

In earlier studies, (RECRA, 1982) formational names had been identified for the northern limestone, central black "rock", and southern limestone.

The bedrock configuration, as identified from the Phase II investigation is consistent with the formational names as described and published by Buehler (1966).

> Stafford Limestone Member of the Skaneateles Formation (Southern Limestone): "The Stafford is a gray limestone which weathers to chocolate brown. Bedding varies from massive to shaly."
>
> Oatka Creek Member of the Marcellus Formation (Central Black Rock): "A dense, black fissile shale with a petroliferous odor. There are some beds of grey shale and several concretionary layers. Nodules of pyrite occur in the black shale near the base".

Moorehouse Limestone Member of the Onondaga Limestone (Northern Limestone): "Bears a coral-brachiopod-bryozoan fauna. The texture varies from coarse to very finely crystalline and the color from dark gray to tan. Chert, some light buff in color, and disseminated bituminous matter are present."

Overlying the bedrock is a layer of sand/gravel/silt till which occurs intermittently in thicknesses as great as 18 feet. The till was deposited by glacial ice, and may be winnowed, sorted, or stratified in some parts by the action of meltwater near the edge or beneath the glacier. The till is thickest at the base of the bedrock escarpment.

Overlying the till (or directly on bedrock in areas where the till is absent), a thick sequence of lacustrine deposits blankets the site. These fine-grained sediments were probably deposited in Lake Warren, the large predecessor of Lake Erie. Much of the land surface along the eastern shore of Lake Erie is covered with these sediments. They have been mapped by Muller (NYS Quaternary Geology Map, 1977) and their presence on other nearby sites (Malcolm Pirnie, 1984 and Phase II investigation of Allied Chemical - Hopkin Street site) has been confirmed by drilling. On the Alltift site, the total thickness of this lacustrine sequence often exceeds 40 feet.

The lacustrine sediments on the site are believed to be layered in the typical manner of most lake deposits. The lower part of the sequence is predominantly grey clay and silt. Near the base, the color alternates between red and grey layers, indicating a contribution of fine sediment probably originating north of the Niagara Falls area. The sediments grade vertically upward into silt and fine sand and clay layers, indicating the decrease in water depth at the location of the site as Lake Warren drained to form Lake Erie.

These two units, which comprise the lacustrine sequence on this site are depicted on the cross sections. It can be seen that both units are usually, but not always, present in the subsurface. In the northeastern corner of the site, the upper unit (silt, fine sand and clay) is absent. The distribution of the lower clay/silt unit is depicted on an isopach map (Figure IV-7) and is thickest in the northwest part of the site and absent at the southern end of the site. The shape of the upper surface of the clay/silt unit is depicted on Figure IV-8, and appears to form west-east ridges and swales with a maximum relief of approximately 20 feet. This pattern is consistent with possible wave-action direction from the west. Overall, this surface slopes to the west. Based on the data, no enclosed basins are believed to exist.

Overlying the upper silt, fine sand, and clay unit along the west edge of the land, recent swamp-type organic silts were encountered. This is consistent with the present day swamp adjacent to the site. Overlying the upper silt, fine sand and clay unit across most of the site is fill material, reaching thicknesses in excess of 20 feet.

Site Hydrology

Two aquifers have been identified in the subsurface of the Alltift Realty site and are defined as follows:

Upper Aquifer - the upper unit of the lacustrine sediment, hydraulically connected with the overlying fill material, the western surface water bodies and, at the southern end of the site, the lower aquifer.

Lower Aquifer - the upper part of the bedrock and the overlying till, hydraulically connected with the upper aquifer at the southern end of the site and possibly with the large pond south of the site.

In-situ permeability tests were performed on the CW-series wells during the Phase II investigation. Laboratory permeability tests were performed on undisturbed samples taken from wells B-2 and B-5 of the clay/silt unit (RECRA and Wehran, 1978). The results of these tests are presented in Table IV-1.

Generally, the permeability of the lower aquifer ranges from 10^{-2} cm/sec to 10^{-4} cm/sec and the upper aquifer ranges from 10^{-4} cm/sec to 10^{-6} cm/sec. The aquitard permeability is approximately 10^{-8} cm/sec.

Groundwater flow directions can be inferred from the piezometric surfaces presented on Figures IV-9 and IV-10. The upper aquifer forms a mound in the east-center of the site, with radial flow to the west, north, and south. The gradient of this water table ranges from 1.0% to 0.5%. It is this aquifer that is recharged by rainwater percolating downward through the fill, and discharges along the western and southern boundaries as seeps. The Phase II investigation survey data shows the elevation of the ponds along the western boundaries to be equal to the elevation of the upper piezometric surface, thus inferring a hydraulic connection between the upper aquifer and the western surface water bodies. Additionally, survey data suggests a flow direction within these linked-ponds to be northward. Flow rates within these swamp-like ponds is believed to be slow.

The piezometric surface of the lower aquifer shows a flow direction to the northwest with an average gradient of 0.4%. This gradient is slightly less in the northern half of the site and much greater at the northwest corner of the site. (Earlier reports, based upon less well data, suggested a much lower gradient).

In the southern part of the site, the piezometric surfaces of both aquifers appear coincident. This occurrence, coupled with the lack of an aquitard in the subsurface indicates a potential connection between the two aquifers.

Further south of the site, the elevation of the surface water in the large (Ramco Steel) pond is coincident with the inferred lower aquifer piezometric surface in that area. Again, the possible lack of an aquitard beneath the pond suggests a connection between the pond water and the lower aquifer.

The permeabilities of each of the aquifers and of the aquitard layer are summarized in Table IV-1.

SITE CONTAMINATION ASSESSMENT

Potential contamination of the environment within the site boundary was evaluated by a review of the character and quantity of wastes suspected at the site, chemical analysis of the groundwater, surface water, and sediment samples, and a survey of the air quality with an HNu meter. In addition to the results of the Phase II investigation, the results of groundwater and surface water sampling and analysis by RECRA Research in 1978, 1981, and 1982 were considered in this study.

Waste Characteristics

The Alltift Realty site was used for the disposal of industrial wastes from the 1930's through 1975. Allied Chemical Company's Buffalo Dye Plant was the only industry that is known to have disposed of wastes at this site. They employed the F. Downing Trucking Company, owner and operator of the site, to dispose of wastes from 1960 to 1965 (Rayer, 1978). Wastes allegedly disposed include: miscellaneous organic materials, inorganic materials, chrome sludge, copper sulfate, nitrobenzene, monochlorobenzene, and naphthalene (Roetzer, 1968). Since the Alltift Company purchased this property in 1975, this site has been used for the disposal of solid wastes, including shredder waste from an automobile manufacturer, fly ash, sand wastes, and demolition debris (RECRA and Wehran, 1978). The quantity of solid waste disposed of at this site is estimated to be 40,000 to 60,000 cubic yards/year (RECRA, 1980).

Groundwater Contamination Assessment

Groundwater samples have been collected and analyzed from the shallow and deep aquifers at the Alltift Realty site. In addition to the samples collected and analyzed as part of the Phase II investigation in 1985 and 1986, the results of shallow aquifer samples collected and analyzed by RECRA Research and Wehran Engineering in 1978, and deep aquifer samples collected by RECRA Research in 1982, were also considered in this assessment of groundwater contamination.

Iron and magnesium were the only metal contaminants detected in the shallow aquifer during the Phase II investigation (see Table IV-2A). Concentrations of iron as high as 13,200 ug/l were detected. This level of contamination is much higher than the regulatory limit of 300 ug/l of iron in groundwater drinking supplies (NYSDEC, 1985). Several organic contaminants including benzene compounds (23 ug/l), xylene (7.7 ug/l), and naphthalene (12 ug/l) were detected in the CW-3 sample, northwest and downgradient of the site. Pentachlorophenol (1,400 ug/l) was detected in well CW-6B which is at the northwest corner and downgradient of the site. The concentrations of benzene, naphthalene, and pentachlorophenol in the groundwater are greater than the NYSDEC Groundwater Standards (NYSDEC, 1985).

Several heavy metals including arsenic (121 ug/l), chromium (546 ug/l), mercury (10.7 ug/l), and iron (5,080 ug/l) (RECRA and Wehran, 1978) were detected in the shallow aquifer at concentrations greater than the NYSDEC groundwater quality standards (NYSDEC, 1985) (see Table IV-2B). The contamination levels found were most significant in the B-2 and B-7 wells in the middle of the landfill area.

RECRA's study (1982) of the deep aquifer showed iron (88,000 ug/l) to be the only contaminant at concentrations greater than the New York State groundwater regulations (see Table IV-2C). The deep aquifer samples collected as part of the Phase II investigation showed no iron contamination, but did show the presence of several organic constituents in the CW-5A sample (see Table IV-2D). The contaminants detected include benzene (85 ug/l), acetone (1,774 ug/l), ethylbenzene (20 ug/l), xylene (110 ug/l), and toluene (140 ug/l).

Surface Water Contamination Assessment

Surface water samples were collected and analyzed by RECRA Research in 1978 and as part of the Phase II investigation (ES/D&M) in April 1985 and June, 1986. The samples collected by ES/D&M were analyzed for metals (ICPES), and organic constituents (GC/MS scan). The analytical results for these samples are presented in Table IV-3A. The NYSDEC water quality standards for Class AA, AA-S, A, A-S for human health and Class AA, AA-S, A, A-S, B, C for aquatic life are also presented in this table for comparison purposes.

The results from the Phase II investigation show high levels of several constituents in the surface water samples. Of particular concern is the southern half of the swamp that is located on the western edge of the site near a leachate seep. Surface water at this location had concentrations of aluminum (800 ug/l), antimony (340 ug/l), chromium (50 ug/l), iron (1,900 ug/l), magnesium (80,000 ug/l), manganese (2,100 ug/l), and zinc (140 ug/l) at levels greater than the NYSDEC Water Quality Standard. 4-chloroanaline (p-aminochlorobenzene) was found at the northern end of this swamp at concentrations as high as 99 ug/l. There is no NYS water quality standard for this compound.

The surface water samples collected and analyzed by RECRA Research and Wehran Engineering in 1978 showed very high contamination levels of several metal constituents and phenols (see Table IV-3B). A complete GC/MS scan for organics was not conducted on these samples. High concentrations of aluminum (27-40 ug/l), chromium (751-874 ug/l), copper (1,000-6,890 ug/l), iron (1,144-2,030 mg/l), and lead (380-510 ug/l) were detected in the SS-1 and SS-2 surface water samples. The level of these contaminants were two or three times greater than the level detected in the Phase II investigation. The concentrations were also significantly higher than the concentrations allowed by the NYSDEC Water Quality Standards. During the field investigation conducted by RECRA Research and Wehran Engineering, discharge from Ramco Steel Company into the pond at the southern end of the landfill was noted. At that time, Ramco Steel, Inc. had a permit to discharge 50,000 gallons per day of sulphuric acid pickling liquor and pickled steel rinse (RECRA, 1978). An analysis of this waste, collected from a lagoon in the rear of the Ramco Steel plant showed high levels of iron, chromium, zinc, and manganese (Bissell, Merrill Associates, 1978).

RECRA Research collected additional surface water samples for the NYSDEC in 1981 (Ploscyca, 1981). Exact locations from which these samples were collected is unclear. The analytical results and a description of the sample locations is presented on Table IV-3C. Chromium (116 ug/l), lead (120 ug/l), and zinc (660 ug/l) were the metal contaminants found in these samples at concentrations greater than the NYSDEC Water Quality Standards with the sample collected from the north pond, east bank having the highest levels of contamination. The sample collected from the south pond had concentrations of the pesticide 4,4'-DDE (0.9 ug/l), 4,4'-DDT (0.06 ug/l), and alpha-Endosulfan (0.09 ug/l) greater than the water quality standards for aquatic life.

Sediment Contamination Assessment

All five of the sediment samples collected in April 1985 as part of the Phase II investigation had elevated levels of metal and organic compounds (see Table IV-4A). The metal constituents that had concentrations higher than the typical concentration in an uncontaminated soil include antimony, arsenic, cadmium, chromium, cobalt, copper, iron, lead, mercury, thallium, and zinc. The S-5 sample, at the northern end of the swamp, west of the site, had the highest levels of metal contamination. This sample also had the highest level of organic contamination, with detectable levels of methylene chloride, acetone, toluene, benzene, chlorobenzene, ethylbenzene, and xylenes. Most of these organic contaminants were also detected in the S-2 sample, west of the site, at the southern end of the swamp. This sample also contained several polycyclic aromatic hydrocarbons (PAH's) at levels greater than typical background levels.

Sediment samples were also collected and analyzed by RECRA Research (Ploscyca, 1981). Several PAH compounds were found in the sample collected from the drainage ditch (see Table IV-4B). The concentrations of these constituents and the total PAH concentration were above the background level of PAH compounds in sediments in Lake Erie. The only other contaminant found was 4,4'-DDE at a concentration of 0.07 mg/kg.

These results generally indicate that the sediments in the swamp that is west of the Alltift site are contaminated.

Air Contamination Assessment

An air quality survey was conducted in October 1984 with an HNU meter. A level of 0.3 ppm was detected both upgradient, downgradient, and on the site. An HNu air quality survey was also conducted in June 1985. No detectable levels of organic contaminants were registered on the meter.

TABLE IV-1
IN-SITU PERMEABILITY TEST RESULTS

Well No.	Aquifer/Aquitard	Permeability (cm/sec)	
CW-1	Upper	1.54×10^{-2}	
CW-2B	Upper	6.37×10^{-5}	F
		3.57×10^{-5}	R
CW-2C	Lower	4.54×10^{-4}	F
		1.56×10^{-4}	R
CW-3B	Fill Material	7.50×10^{-3}	F
		1.02×10^{-2}	R
CW-4A	Lower	3.38×10^{-4}	F
		4.45×10^{-4}	R
CW-4B	Upper	8.6×10^{-6}	R
CW-5A	Lower	1.81×10^{-4}	R
		7.23×10^{-4}	F
CW-5B	Upper	4.77×10^{-4}	F
		1.01×10^{-4}	R
CW-6A	Lower	5.5×10^{-3}	F
		3.47×10^{-3}	R
CW-6B	Upper	1.04×10^{-5}	F
		7.54×10^{-6}	R
B-2	Aquitard	6.4×10^{-8}	L
B-5	Aquitard	5.8×10^{-8}	L

R = In-situ rising head level test.

F = In-situ falling head level test.

L = Laboratory test (RECRA and Wehran, 1978).

TABLE IV-2A
ANALYTICAL RESULTS OF SHALLOW AQUIFER GROUNDWATER SAMPLES(1)

Constituents(2)	CW-1 (ug/l)	CW-2B (ug/l)	CW-3B (ug/l)	CW-4B (ug/l)	CW-5B (ug/l)	CW-6B (ug/l)	NYSDEC Wtr. Qlty Criteria(3) (ug/l)
Arsenic	[1]R	[3]R	[6]R	14sR	[4]R	10uR	25
Barium	200u	2000uD	200u	200u	200u	270	1000
Calcium	78900	227000	167000	76100	282000	78100	NS
Chromium	10u	10u	10	10u	10u	10u	50
Copper	25u	25u	28	28	25u	[23]	1000
Iron	850	13200	5950	1720	100u	[80]	300
Magnesium	18400R	8700R	105000R	31200R	7500R	21000R	35000 (4)
Manganese	289	1880	1049	718	15u	532	300
Nickel	40u	[20]	60	40u	[30]	[20]	NS
Potassium	[2760]R	11700R	122000R	[1690]R	14400R	5140R	NS
Silver	10uR	10R	10uR	10uR	10uR	10uR	50
Sodium	28300	208000	852000	35500	113000	243000	NS
Zinc	20u	20	90	20u	20u	80	5000
Pentachlorophenol	50u	50u	50u	50u	50u	1,400	21
Methylene Chloride	12	8.3	11	14	16	11	50 (4)
Acetone	36B	10u	10u	10u	10u	10u	NS
Benzene	5u	5u	12	5u	5u	5u	ND
Ethylbenzene	5u	5u	11	5u	5u	5u	50 (4)
Total Xylene	5u	5u	7.7	5u	5u	5u	50 (4)
Naphthalene	10u	10u	12	10u	10u	10u	10 (4)

(1) Samples collected in August, 1985 by ES/D&M as part of Phase II investigation. Additional samples from wells CW-4B, CW-5B, and CW-6B were collected in June, 1986 for analysis of semi-volatile compounds.

(2) Only constituents found in one or more samples are listed in this table.

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

(4) Guidance value, not regulatory standard.

ND Not Detectable

NS No Standard

u Concentration less than instrument detection limit.

B Constituent found in blank sample, concentration is corrected: Acetone = 26 ug/l.

D 50 ml/50 ml dilution required.

R Spike sample recovery not within limits of 75% - 125%: Magnesium - 170%; Potassium - 134%; Arsenic - 58%; silver - 50%.

s Determined by method of standard additions.

[ ] Concentration less than contract required detection limit.

TABLE IV-2B
ANALYTICAL RESULTS OF SHALLOW AQUIFER GROUNDWATER SAMPLES(1)

Constituents(2)	Sample Locations B1 (ug/l)	B2 (ug/l)	B4 (ug/l)	B5 (ug/l)	B6 (ug/l)	B7 (ug/l)	B8 (ug/l)	NYSDEC Water Qlty. Standard(3) (ug/l)
Aluminum, Total	260	50	240	60	30u	30u	40	NS
Arsenic, Total	6.3	131	4u	5.1	21.3	15.4	12.2	25
Chromium, Total	14	546	3u	10	6	16	12	NS
Chromium, Hexavalent	10u	40	10u	10u	10u	10	10	50
Copper, Total	3u	26	15	210	5	10	14	1,000
Mercury, Total	1.3u	3.8	1.3u	1.3u	1.3u	10.7	NA	2
Potassium, Total	98,000	908,000	146,000	118,000	128,000	182,000	118,000	NS
Sodium, Total	1,060,000	3,080,000	2,020,000	840,000	1,140,000	1,560,000	1,300,000	NS
Calcium, Total	214,000	54,000	760,000	146,000	190,000	56,000	18,000	NS
Silver, Total	2u	2u	2u	2u	2u	4u	3	50
Iron, Total	280	2,430	5,080	160	30	460	20	300

(1) Samples collected and analyzed by Wehran Engineering and RECRA Research, 1978.

(2) Only those constituents that were detected are presented.

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

u Less than instrument detection limit.

NA Not available.

NS No standard.

TABLE IV-2C
ANALYTICAL RESULTS OF DEEP WELL GROUNDWATER SAMPLES(1)

Constituents(2)	W-1 (ug/l)	W-2 (ug/l)	W-3 (ug/l)	W-4 (ug/l)	NYSDEC Wtr. Qlty. Standard(3) (ug/l)
Aluminum, Total	4,300	7,300	2,000	2,200	NS
Chromium, Total	40	50	64	40	NS
Chromium, Hexavalent	6	12	8	4u	50
Zinc, Total	1,100	803	1,400	109	5,000
Copper, Total	100	38	22	40	1,000
Lead, Total	30	30u	30u	30u	25
Sodium, Total	540,000	150,000	14,000	18,000	NS
Calcium, Total	68,000	46,000	28,000	170,000	NS
Manganese, Total	220	230	200	160	300
Iron, Total	88,000	28,000	35,000	54,000	300

(1) Samples collected and analyzed by RECRA Research (1982).

(2) Only constituents found in one or more samples are listed in this table.

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

u Concentration less than instrument detection limit.

NS No Standard.

TABLE IV-2D
ANALYTICAL RESULTS OF LOWER AQUIFER GROUNDWATER SAMPLES(1)

Constituent(2)	CW-2C (ug/l)	CW-4A (ug/l)	CW-5A (ug/l)	CW-6A (ug/l)	NYSDEC Wtr. Qlty Standard(3) (ug/l)
Aluminum	200u	550	200u	200u	NS
Arsenic	[1]R	12sR	10uR	10uR	25
Calcium	26,300	12,000	16,500	26,400	NS
Chromium	10u	10	10u	10u	50
Iron	[60]	[60]	[80]	120	300
Magnesium	20,900R	[70]R	29,000R	17,700R	35,000 (4)
Manganese	52	15u	22	25	300
Potassium	9,480R	1,380,000R	124,000R	[4,410]R	NS
Sodium	127,000	364,000	185,000	111,000	NS
Zinc	20	80	[10]	20u	5,000
Methylene Chloride	11	13	12	15	50 (4)
Acetone	17B	49B	1,774B	10uB	NS
Benzene	5u	5u	85	5u	ND
Ethylbenzene	5u	5u	20	5u	50 (4)
Total Xylene	5u	5u	110	5u	50 (4)
Toluene	5u	5u	140	5u	50
Di-n-butylphthalate	10u	12	10u	10u	770
bis (2-ethylhexyl)phthalate	10u	19	10u	2J	4,200

(1) Samples collected in August, 1985 by ES/D&M as part of Phase II investigation. Additional samples from wells CW-5A and CW-6A were collected in June 1986 for analysis of semi-volatile compounds.

(2) Only constituents found in one or more samples are listed in this table.

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

(4) Guidance value, not regulatory standard.

ND	Not Detectable
NS	No Standard
u	Concentration less than instrument detection limit.
B	Constituent found in blank sample, concentration is corrected: Acetone = 26 ug/l.
s	Determined by method of standard additions.
[ ]	Concentration less than contract required detection limit.
R	Spike sample recovery not within limits 75% to 125%: Arsenic - 58%; Potassium - 134%; Magnesium - 170%.
J	Estimated value.

TABLE IV-3A
ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES(1)

Constituent(2)	Sample Location S-1 (ug/l)	S-2 (ug/l)	S-3 (ug/l)	S-4 (ug/l)	S-5 (ug/l)	NYSDEC Water Quality Standard(3) (ug/l)
Aluminum	200u	800	200u	200	200u	100 (4)
Antimony	60u	340	74	[47]	[18]	3 (6)
Arsenic	[1]	[1]	[2]	[4]	[3]	50 (5)
Barium	200u	200u	200	200	200u	1,000 (5)
Calcium	150,000	260,000	250,000	230,000	210,000	NS
Chromium	10u	50	20	30	20	11 (4)
Copper	[13]	73	30	37	27	200 (5)
Iron	1,400	1,900	1,600	2,100	690	300 (4,5)
Lead	[2]	9	12	16	28	50 (5)
Magnesium	24,000	80,000	78,000	65,000	32,000	35,000 (5)
Manganese	630	2,100	1,100	970	440	300 (5)
Mercury	0.2u	0.2u	0.2u	0.2	0.2u	0.2 (4)
Nickel	40u	50	40u	40	[30]	(7)
Potassium	10,000	64,000	68,000	67,000	26,000	NS
Sodium	25,000	240,000	280,000	290,000	120,000	NS
Tin	[5]	44	58	45	[13]	NS
Zinc	30	140	90	120	90	30 (4)
Acetone	17	11	10u	10u	10u	NS
4-chloroaniline	10u	20u	10u	99	49	NS

(1) Samples collected by ES/D&M as part of Phase II investigation, April, 1985. Additional samples were collected in June, 1986 for analysis of semi-volatile compounds.

(2) Only constituents that were detected 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.

(6) Class A, A-S, AA, AA-s Guidance criteria for human health.

(7) Nickel standard for aquatic life = exp (0.76 [ln (ppm hardness)] + 1.06).

u Concentration less than listed detection limit.

[ ] Listed concentration less than contract required detection limit.

NS No standard.

J Estimated value.

TABLE IV-3B
ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES(1)

Constituent(2)	SS-1 7/5/78 (ug/l)	SS-1 7/17/78 (ug/l)	SS-2 7/5/78 (ug/l)	SS-2 7/17/78 (ug/l)	SS-3 7/5/78 (ug/l)	SS-3 7/17/78 (ug/l)	SS-4 7/5/78 (ug/l)	SS-4 7/17/78 (ug/l)	SS-5 7/5/78 (ug/l)	SS-5 7/17/78 (ug/l)	NYSDEC Surface Water Quality Standards(3) (ug/l)
Aluminum	2920	4910	2640	4870	270	110	260	150	270	60	100 (4)
Arsenic	89	94	57	34	46	8	74	2	75	5	190 (4)
Calcium	360000	184000	600000	652000	88000	116000	148000	148000	176000	56000	NS
Chromium (Total)	763	834	751	874	39	40	57	42	40	66	50 (5)
Copper	6890	1000	1710	1300	130	17	440	3u	360	10	200 (5)
Iron	1832000	2030000	1144000	1770000	18300	2000	18400	800	12400	1200	300 (4)
Lead	420	510	380	510	2000u	20u	2000u	20u	40	20u	50 (5)
Potassium	26900	3500	20000	4800	182000	286000	331000	289000	256000	246000	NS
Sodium	440000	340000	68000	70000	1360000	1220000	1010000	1100000	1020000	1050000	NS
Phenols	34	40	27	36	39	58	94	43	71	57	1 (5)
Total Halogenated Hydrocarbons	1.83	2.31	1.33	7.25	3.07	1.02	7.32	0.75u	1.76	0.75u	NS

(1) Samples collected and analyzed by RECRA Research and Wehran Engineering (1978).

(2) Only those constituents present in one or more samples are presented.

(3) NYSDEC (1974). "Surface Water Quality Standards", 6 NYCRR 701-702. Amended version in "Ambient Water Quality Standard 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 Less than listed detection limit.

TABLE IV-3C
ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES(1)

Constituent(2)	81-167-01 South Pond East Bank (ug/l)	Sample Location 81-167-02 Drainage Ditch North of Pond (ug/l)	81-167-03 North Pond East Bank (ug/l)	NYSDEC Water(3) Qlty. Standard (ug/l)
Arsenic	3u	3u	12	50 (4)
Chromium	12	16	116	11 (5)
Copper	44	12	52	200 (4)
Lead	60u	60u	120	50 (4)
Zinc	660	28	58	30 (5)
Gamma BHC (Lindane)	0.01	0.02u	0.05u	0.02 (6)
4,4'-DDE	0.09	0.09	0.04u	0.001 (5)
4,4'-DDT	0.06	0.02u	0.02u	0.001 (5)
Alpha Endosulfan	0.09	0.02u	0.02u	0.009 (5)

(1) Results of samples collected and analyzed by RECRA Research. (Ploscyca, 1981.)

(2) Only constituents present in one or more samples 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 for human health.

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

(6) Guidance value for Class A, A-S, AA, AA-S for human health.

u Concentration less than instrument detection limit.

TABLE IV-4A
ANALYTICAL RESULTS FOR SEDIMENT SAMPLES(1)

Constituent(2)	S-1 (mg/kg)	S-2 (mg/kg)	S-3 (mg/kg)	S-4 (mg/kg)	S-5 (mg/kg)	Range of Concentration in Noncontaminated Soils (mg/kg)
	Sample Locations					
Aluminum	2,200	12,000	10,000	8,200	5,200	150,000 - 600,000 (3)
Antimony	[1.8]	78	[52]	[6.8]	76	0.1 - 10 (3)
Arsenic	6.7	16	28	51	21	< 40 (3)
Barium	100	200	670	870	610	1 - 1,000 (3)
Beryllium	1.0u	0.83u	2.2	[0.91]	0.68u	< 1 (3)
Cadmium	2.4	2.6	4.2	5.9	13	< 1 (3)
Cacium	[960]	35,000	27,000	69,000	2,400	NA
Chromium	110R	10,000R	170R	2,000R	20,000R	Trace - 250 (3)
Cobalt	35	35	17	20	310	0.1 - 13
Copper	130R	3,600R	370R	430R	1,600R	2 - 100 (3)
Iron	300,000	140,000	61,000	61,000	94,000	10,000 - 100,000 (4)
Lead	600	370	730	520	8,900	2 - 200 (3)
Magnesium	1,100	3,800	3,100	3,500	4,500	NA
Manganese	2,300R	1,400R	500R	710R	1,100R	20 - 30,000 (4)
Mercury	0.21u	1.4	0.93	1.6	12	< 1 (4)
Nickel	50	200	59	59	760	3 - 1,000 (3)
Potassium	2,900	3,500	1,700	1,400	490	NA
Selenium	1.9	0.8u	1.2	[0.98]	[0.38]	1 - 10 (3)
Silver	2.1	1.7u	1.7	2.3	1.4	15 - 50 (3)
Sodium	2,300	1,500	1,400	2,400	760	NA
Thallium	3.4	1.8u	[0.3]	2.3u	[0.2]	< 2 (4)
Tin	10	14	120	13	67	2 - 300 (3)
Vanadium	41	19	33	68	26	5 - 140 (3)
Zinc	1,300	650	1,200	130	3,800	10 - 300 (3)
Methylene Chloride	0.0563B	0.0363B	0.0393B	0.0453B	0.0443B	NA
Acetone	0.052B	0.025B	0.022B	0.112B	0.102B	NA
Toluene	0.0071J	0.008u	0.009u	0.012u	0.011	NA
Benzene	0.010u	0.033	0.009u	0.012u	0.029	NA
Chlorobenzene	0.010u	0.075	0.015	0.058	0.190	NA

TABLE IV-4A (Continued)
ANALYTICAL RESULTS FOR SEDIMENT SAMPLES(1)

Constituent(2)	Sample Locations S-1 (mg/kg)	S-2 (mg/kg)	S-3 (mg/kg)	S-4 (mg/kg)	S-5 (mg/kg)	Range of Concentration in Noncontaminated Soils (mg/kg)
Ethylbenzene	0.010u	0.008u	0.009u	0.012u	0.012	NA
Total Xylenes	0.010u	0.008u	0.009u	0.012u	0.070	NA
Di-n-butylphthalate	6.93u	2.1J,B	1.9J,B	0.8J,B	29.7u	NA
Fluoranthene	23.76u	4.9J	24.75u	1.2J	29.7u	0.07-0.1 (6)
Pyrene	23.76u	5.3J	24.75u	1.3J	29.7u	0.05-0.1 (6)
Chrysene	23.76u	4.9J	24.75u	5.28u	29.7u	0.03-0.08 (6)
Benzo(b)fluoranthene	23.76u	3.6J	24.75u	5.28u	29.7u	NA
Total PAH's	23.76u	18.7J	24.75u	2.5J	29.7u	1-10 (5)

(1) Samples collected by ES/D&M as part of Phase II investigtion, April, 1985. Additional samples collected in June and September, 1986 for analysis of semi-voltile compounds.

(2) Only constituents present in one or more samples are presented.

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

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

(5) Edwards (1983). "Polycyclic Aromatic Hydrocarbons (PAH's) in the Terrestrial Environment - A Review", *J. Envir. Quality.*

(6) Eadie, B. (1982), "Polycyclic Aromatic Hydrocarbons in Sediments and Associated Bethos in Lake Erie". Chemosphere, VII, No. 2, pp. 188.

u Less than listed detection limit.

[ ] Concentration less than contract required detection limit.

R Spike sample recovery not within limits of 75 - 125%.

Constituent	Recovery
Chromium	15%
Copper	70.4%
Manganese	68%

B Concentration corrected for contamination in method blank: methylene chloride = 0.0097, acetone = 0.052, di-n-butylphthalate = 0.27.

NA Information not available.

J Concentration less than instrument detection limit, listed concentration is an estimated value.

TABLE IV-4B
ANALYTICAL RESULTS FOR SEDIMENT SAMPLES(1)

	Sample Location			
Constituent(2)	81-167-01 South Pond East Bank (mg/kg)	81-167-02 Drainage Ditch North of Pond (mg/kg)	81-167-03 North Pond East Bank (mg/kg)	Range of Concentration in Uncontaminated Soil (mg/kg)
Acenaphthene	20u	20u	41	NA
Benzo(a)anthracene	20u	20	20u	NA
Fluoranthene	20u	41	20u	0.07-0.1 (3)
Pyrene	20u	25	20u	0.05-0.1 (3)
Total PAH's	20u	86	41	1 - 10 (4)
4,4'-DDE	0.04u	0.07	0.10u	NA

(1) Results of sediment sampling and analysis by RECRA Research. (Ploscyca, 1981.)

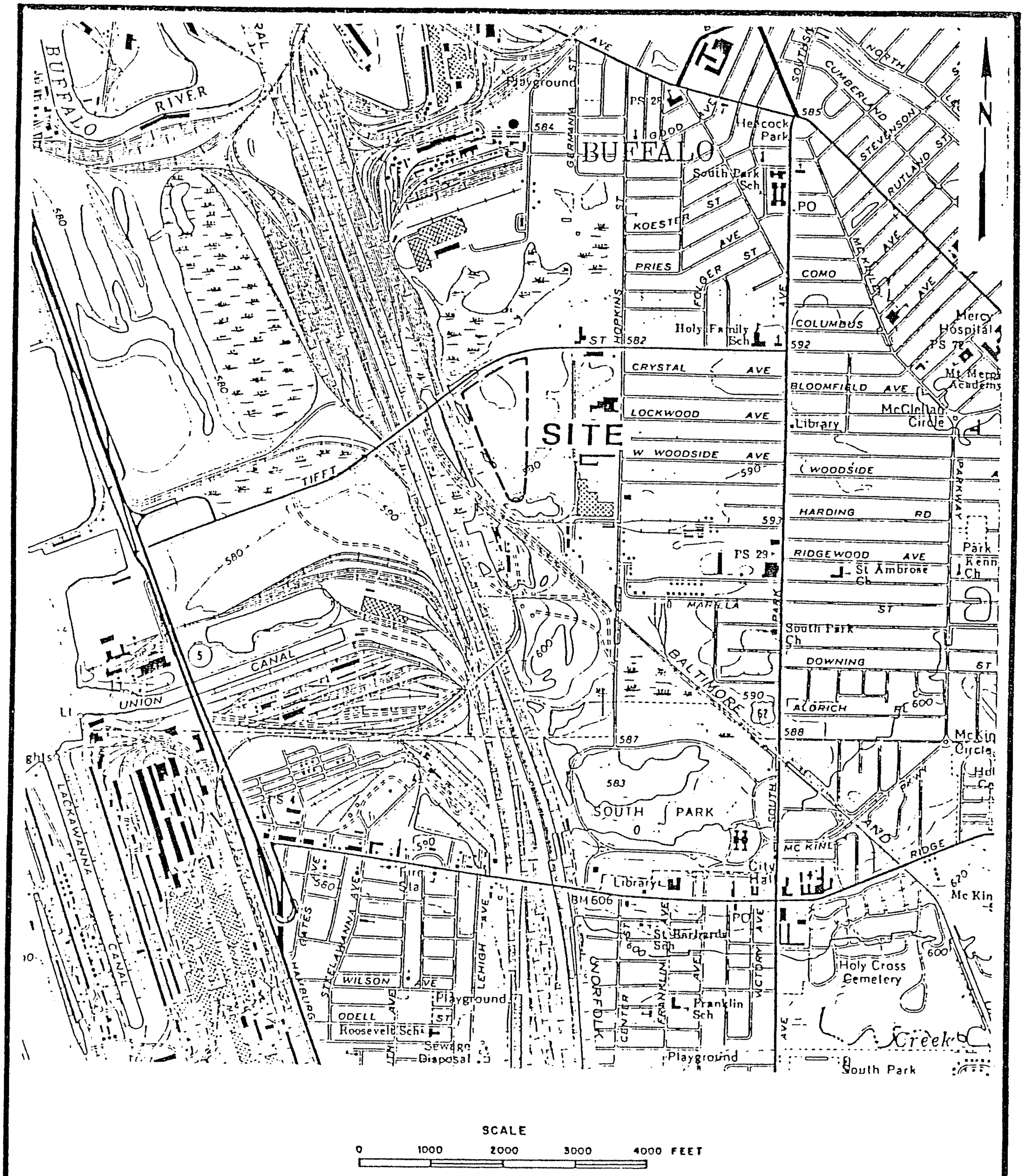
(2) Organic constituents that were detected in or more samples are listed. No information was available for metal analysis at this site.

(3) Eadie, B. (1982). "Polycyclic Aromatic Hydrocarbons in Sediments and Associated Benthos in Lake Erie", *Chemosphere*. V11, n 2, pp 188.

(4) Edwards, N. T. (1983). "Polycyclic Aromatic Hydrocarbons (PAH's) in the Terrestrial Environment - A Review". *Journal of Environmental Quality*. Vol. 12, No. 4.

u Concentration below listed detection limit.

NA Information not available.



LONGITUDE: 78°50'22.5"
LATITUDE: 42°50'37.0"

REFERENCE: U.S.G.S. 7.5' TOPOGRAPHIC MAP
BUFFALO SE, NY (1965) QUADRANGLE

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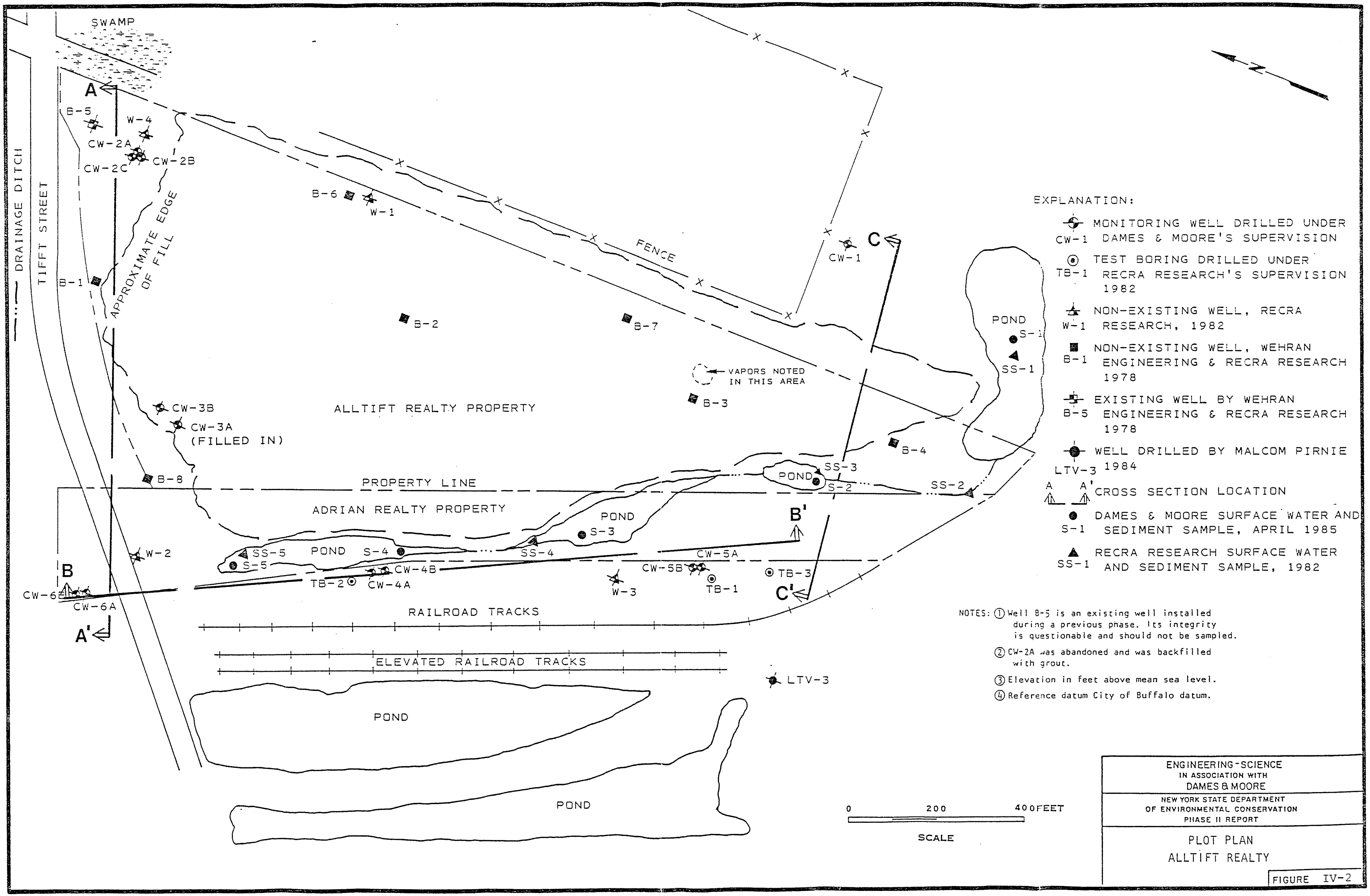
SITE LOCATION MAP
ALLTIFT REALTY

FIGURE IV-1



EXPLANATION:

CW-1 MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION

TB-1 TEST BORING DRILLED UNDER RECRA RESEARCH'S SUPERVISION 1982

W-1 NON-EXISTING WELL, RECRA RESEARCH, 1982

B-1 NON-EXISTING WELL, WEHRAN ENGINEERING & RECRA RESEARCH 1978

B-5 EXISTING WELL BY WEHRAN ENGINEERING & RECRA RESEARCH 1978

LTV-3 WELL DRILLED BY MALCOM PIRNIE 1984

A A' CROSS SECTION LOCATION

S-1 DAMES & MOORE SURFACE WATER AND SEDIMENT SAMPLE, APRIL 1985

SS-1 RECRA RESEARCH SURFACE WATER AND SEDIMENT SAMPLE, 1982

NOTES: ① Well B-5 is an existing well installed during a previous phase. Its integrity is questionable and should not be sampled.

② CW-2A was abandoned and was backfilled with grout.

③ Elevation in feet above mean sea level.

④ Reference datum City of Buffalo datum.

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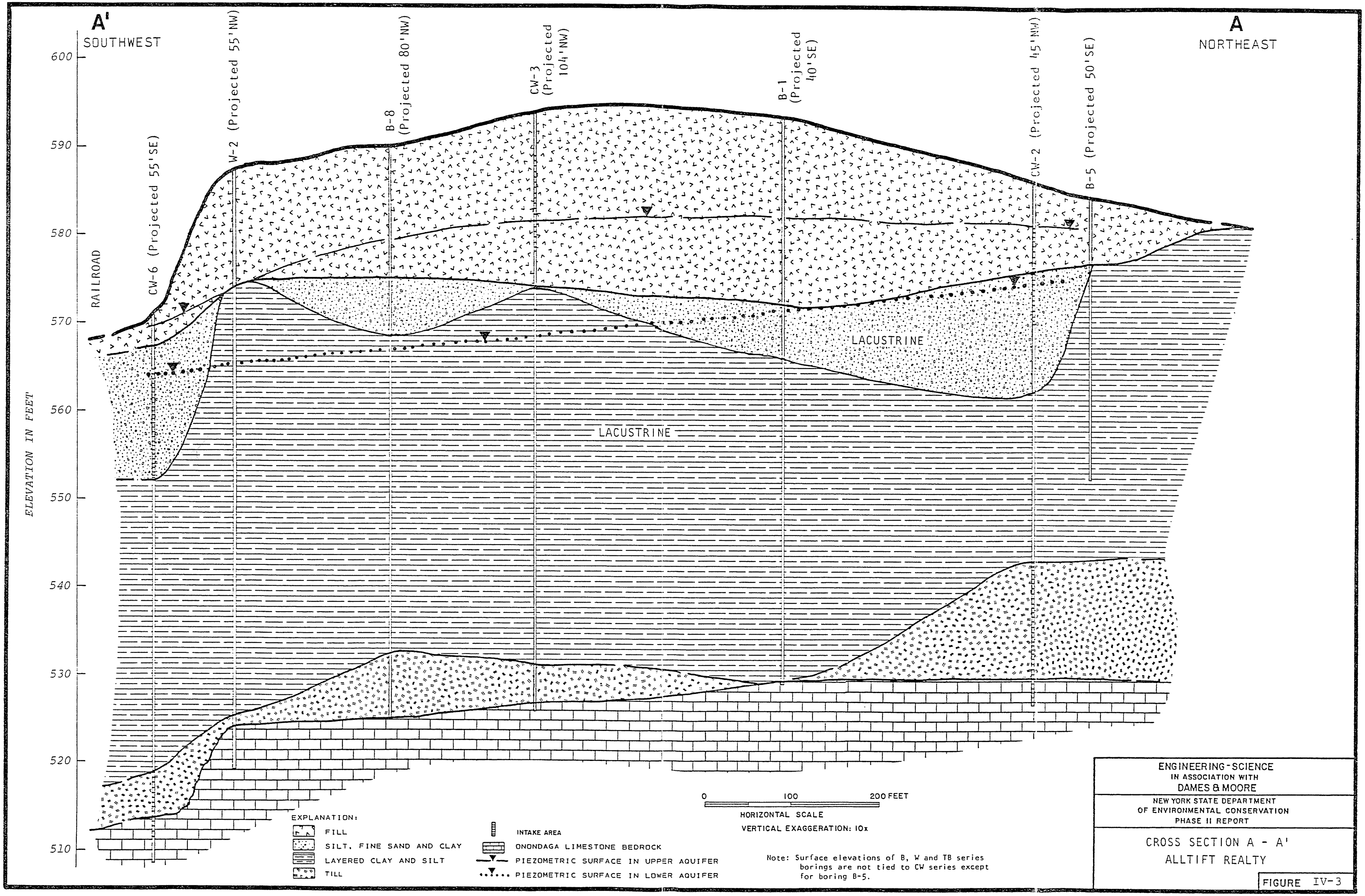
PLOT PLAN
ALLTIFT REALTY

FIGURE IV-2



Note: Surface elevations of B, W and TB series borings are not tied to CW series except for boring B-5.

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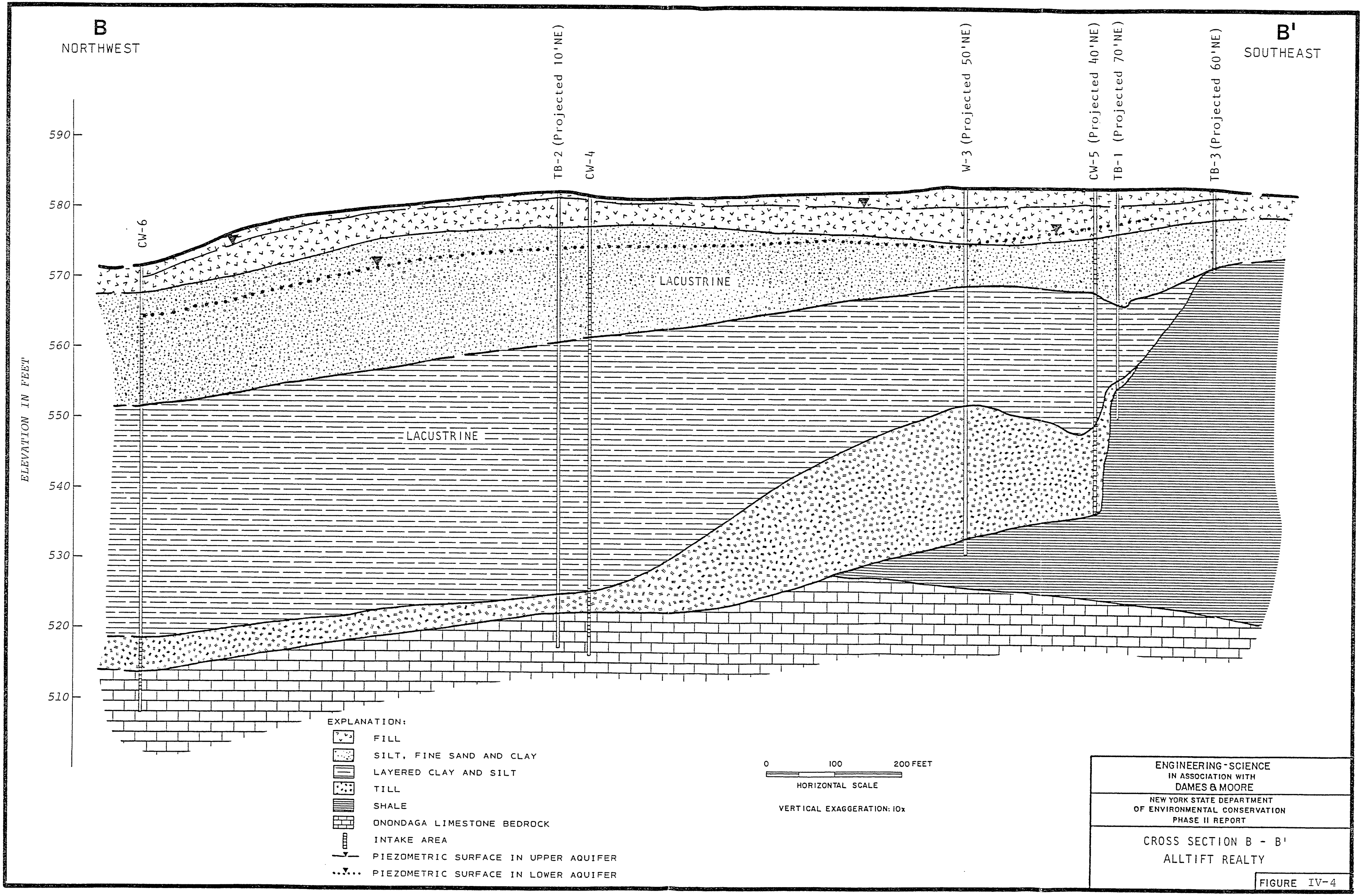
CROSS SECTION A - A'
ALLTIFT REALTY

FIGURE IV-3



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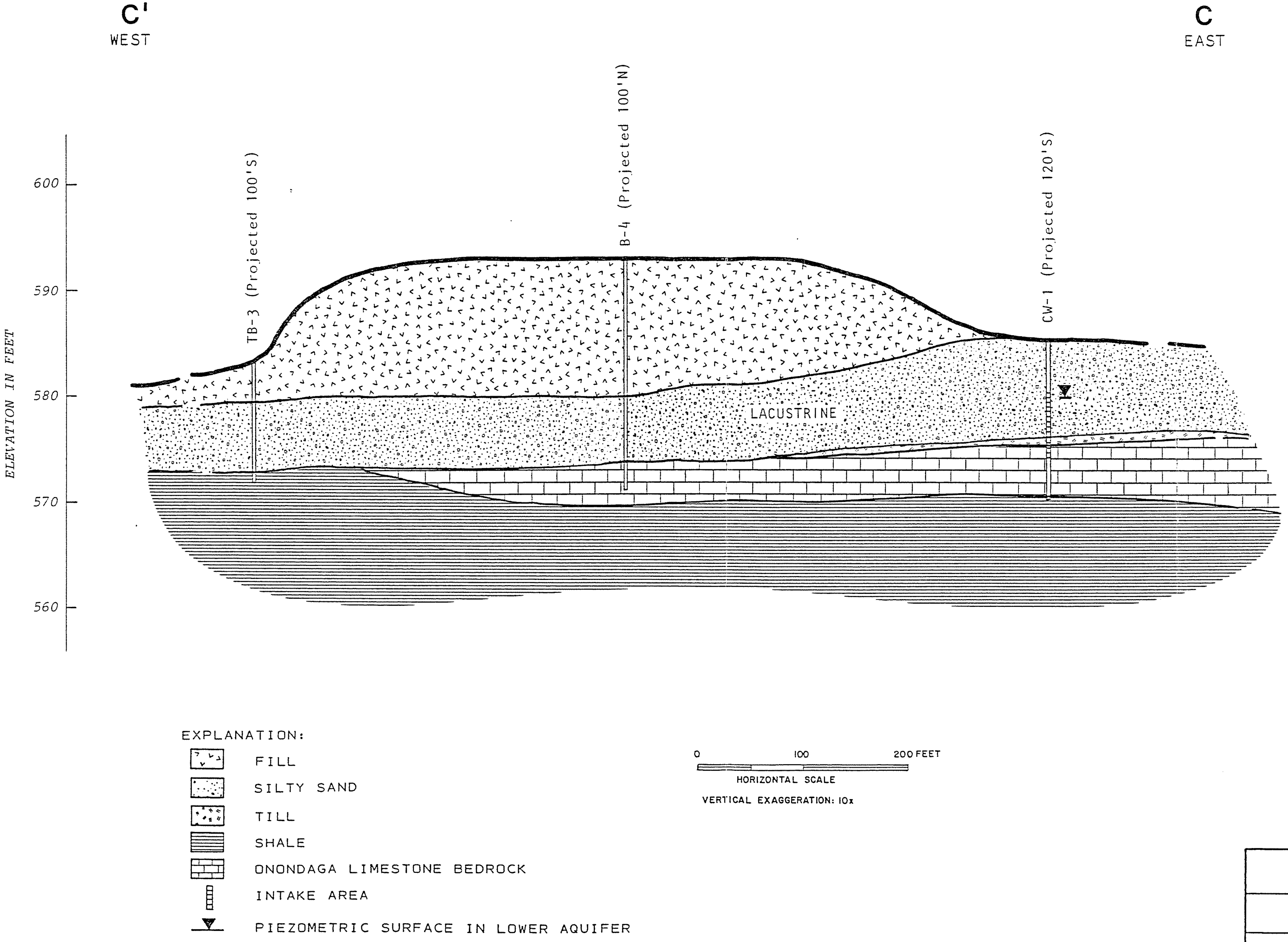
CROSS SECTION B - B'
ALLTIFT REALTY

FIGURE IV-4



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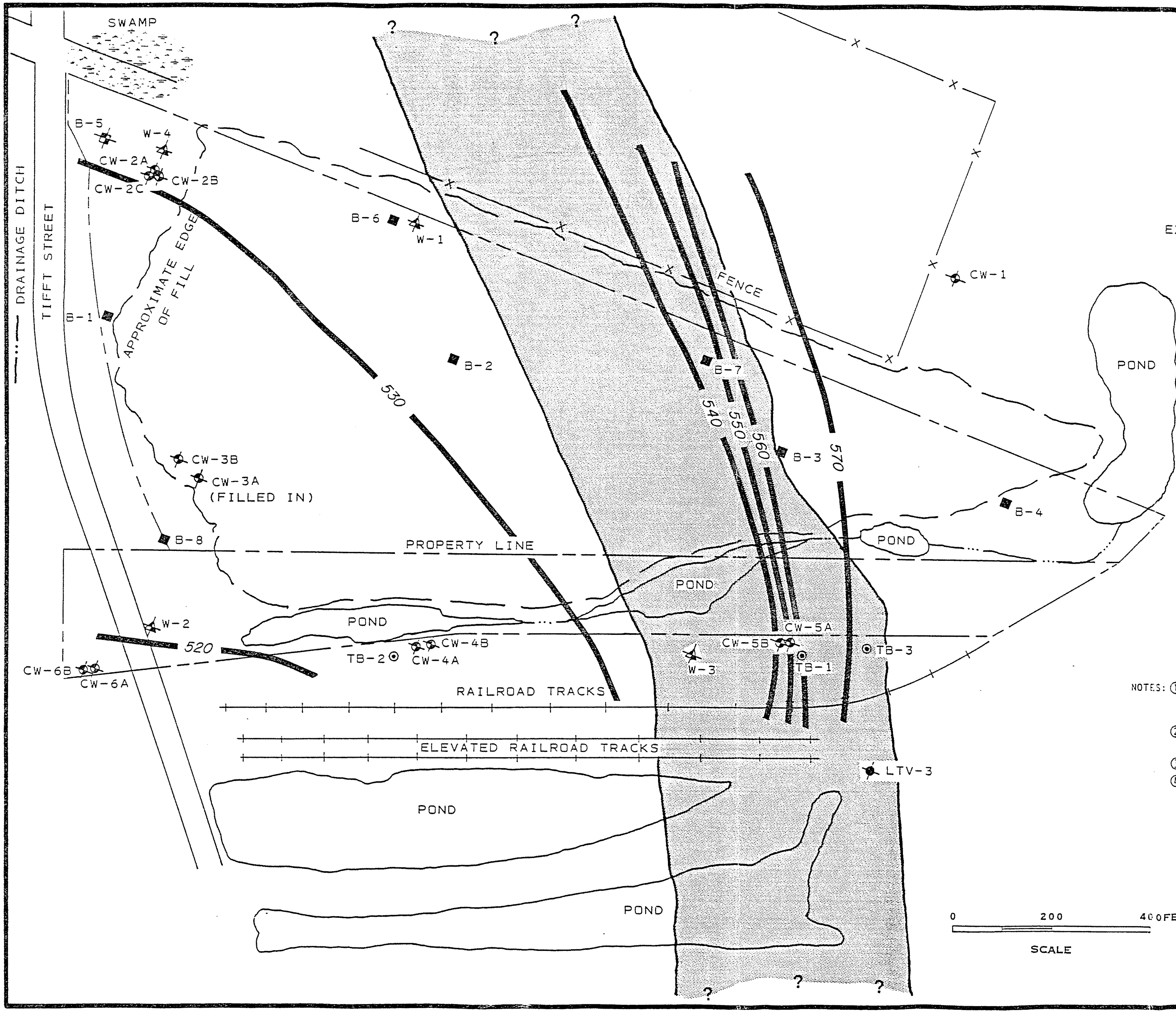
CROSS SECTION C - C'
ALLTIFT REALTY

FIGURE IV-5



EXPLANATION:

- CW-1 MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- TB-1 TEST BORING DRILLED UNDER RECRA RESEARCH'S SUPERVISION 1982
- W-1 NON-EXISTING WELL, RECRA RESEARCH, 1982
- B-1 NON-EXISTING WELL, WEHRAN ENGINEERING & RECRA RESEARCH 1978
- B-5 EXISTING WELL BY WEHRAN ENGINEERING & RECRA RESEARCH 1978
- LTV-3 WELL DRILLED BY MALCOM PIRNIE 1984
- 540 TOP OF BEDROCK
- ▨ BLACK SHALE
- ☐ GRAY TO DARK GRAY LIMESTONE (UNSHADED AREA)

NOTES: ① Well B-5 is an existing well installed during a previous phase. Its integrity is questionable and should not be sampled.

② CW-2A was abandoned and was backfilled with grout.

③ Elevations in feet above mean sea level.

④ Reference datum City of Buffalo datum.

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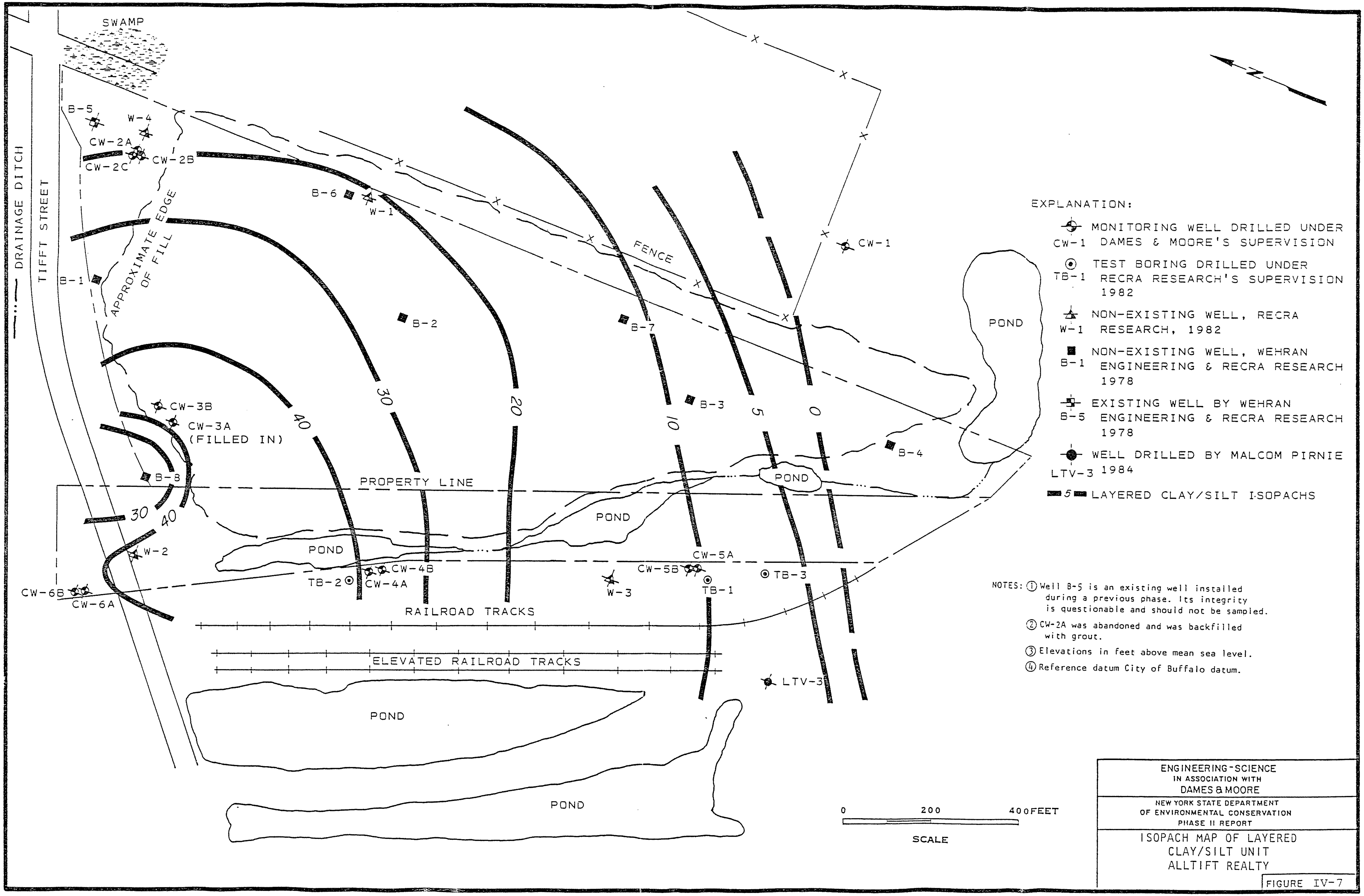
BEDROCK SURFACE MAP
ALLTIFT REALTY

FIGURE IV-6



NOTES:
① Well B-5 is an existing well installed during a previous phase. Its integrity is questionable and should not be sampled.
② CW-2A was abandoned and was backfilled with grout.
③ Elevations in feet above mean sea level.
④ Reference datum City of Buffalo datum.

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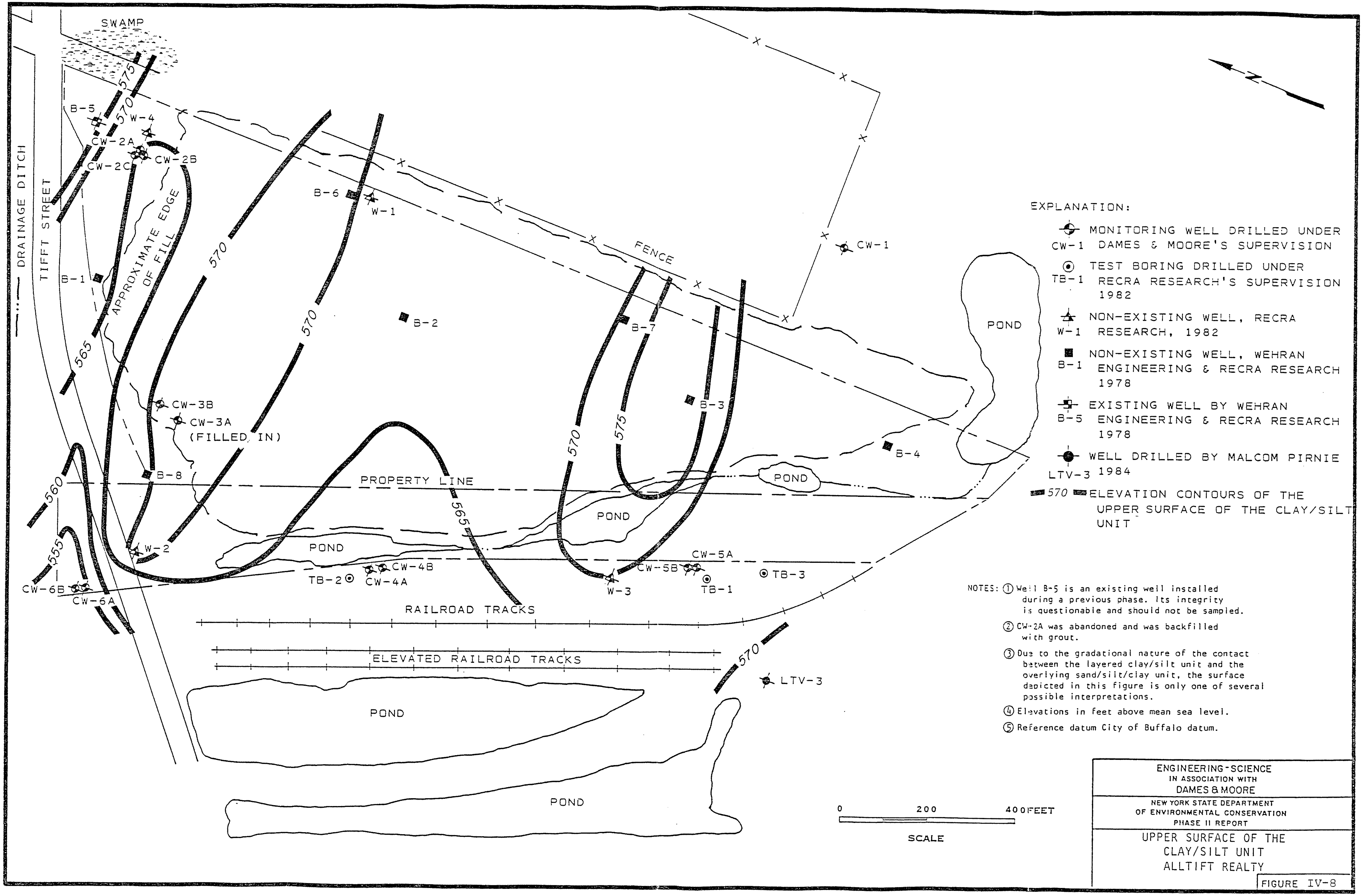
ISOPACH MAP OF LAYERED
CLAY/SILT UNIT
ALLTIFT REALTY

FIGURE IV-7



EXPLANATION:

- CW-1 MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- TB-1 TEST BORING DRILLED UNDER RECRA RESEARCH'S SUPERVISION 1982
- W-1 NON-EXISTING WELL, RECRA RESEARCH, 1982
- B-1 NON-EXISTING WELL, WEHRAN ENGINEERING & RECRA RESEARCH 1978
- B-5 EXISTING WELL BY WEHRAN ENGINEERING & RECRA RESEARCH 1978
- LTV-3 WELL DRILLED BY MALCOM PIRNIE 1984
- 570 ELEVATION CONTOURS OF THE UPPER SURFACE OF THE CLAY/SILT UNIT

NOTES: ① Well B-5 is an existing well installed during a previous phase. Its integrity is questionable and should not be sampled.

② CW-2A was abandoned and was backfilled with grout.

③ Due to the gradational nature of the contact between the layered clay/silt unit and the overlying sand/silt/clay unit, the surface depicted in this figure is only one of several possible interpretations.

④ Elevations in feet above mean sea level.

⑤ Reference datum City of Buffalo datum.

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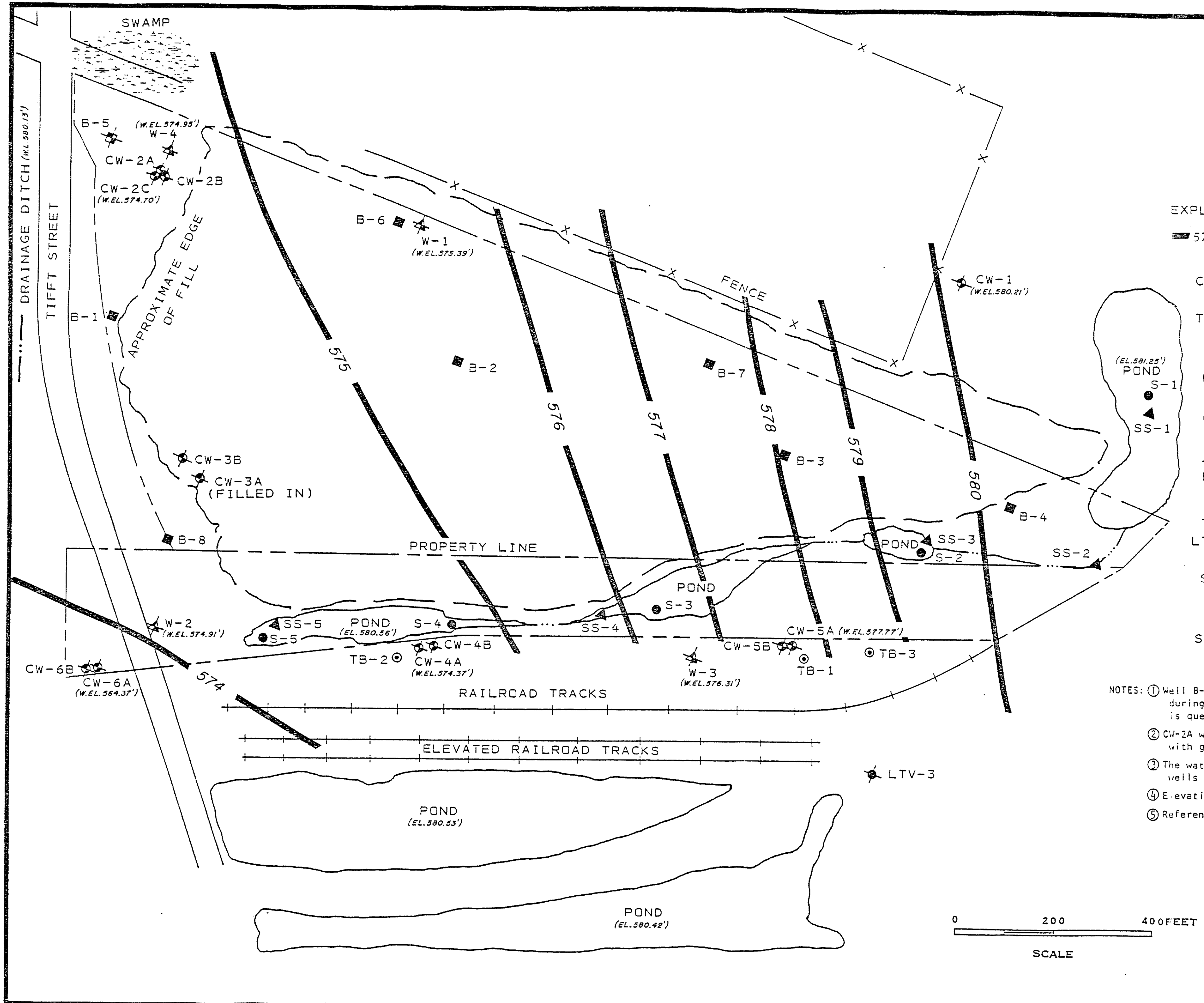
UPPER SURFACE OF THE
CLAY/SILT UNIT
ALLTIFT REALTY

FIGURE IV-8



EXPLANATION:

575 WATER LEVEL IN LOWER AQUIFER

CW-1 MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION

TB-1 TEST BORING DRILLED UNDER RECRA RESEARCH'S SUPERVISION 1982

W-1 NON-EXISTING WELL, RECRA RESEARCH, 1982

B-1 NON-EXISTING WELL, WEHRAN ENGINEERING & RECRA RESEARCH 1978

B-5 EXISTING WELL BY WEHRAN ENGINEERING & RECRA RESEARCH 1978

LTV-3 WELL DRILLED BY MALCOM PIRNIE 1984

S-1 DAMES & MOORE SURFACE WATER AND SEDIMENT SAMPLE, APRIL 1985

SS-1 RECRA RESEARCH SURFACE WATER AND SEDIMENT SAMPLE, 1982

NOTES:
① Well B-5 is an existing well installed during a previous phase. Its integrity is questionable and should not be sampled.
② CW-2A was abandoned and was backfilled with grout.
③ The water levels taken from Dames & Moore wells were recorded on 8/28/85 and 8/29/85.
④ Elevations in feet above mean sea level.
⑤ Reference datum City of Buffalo datum.

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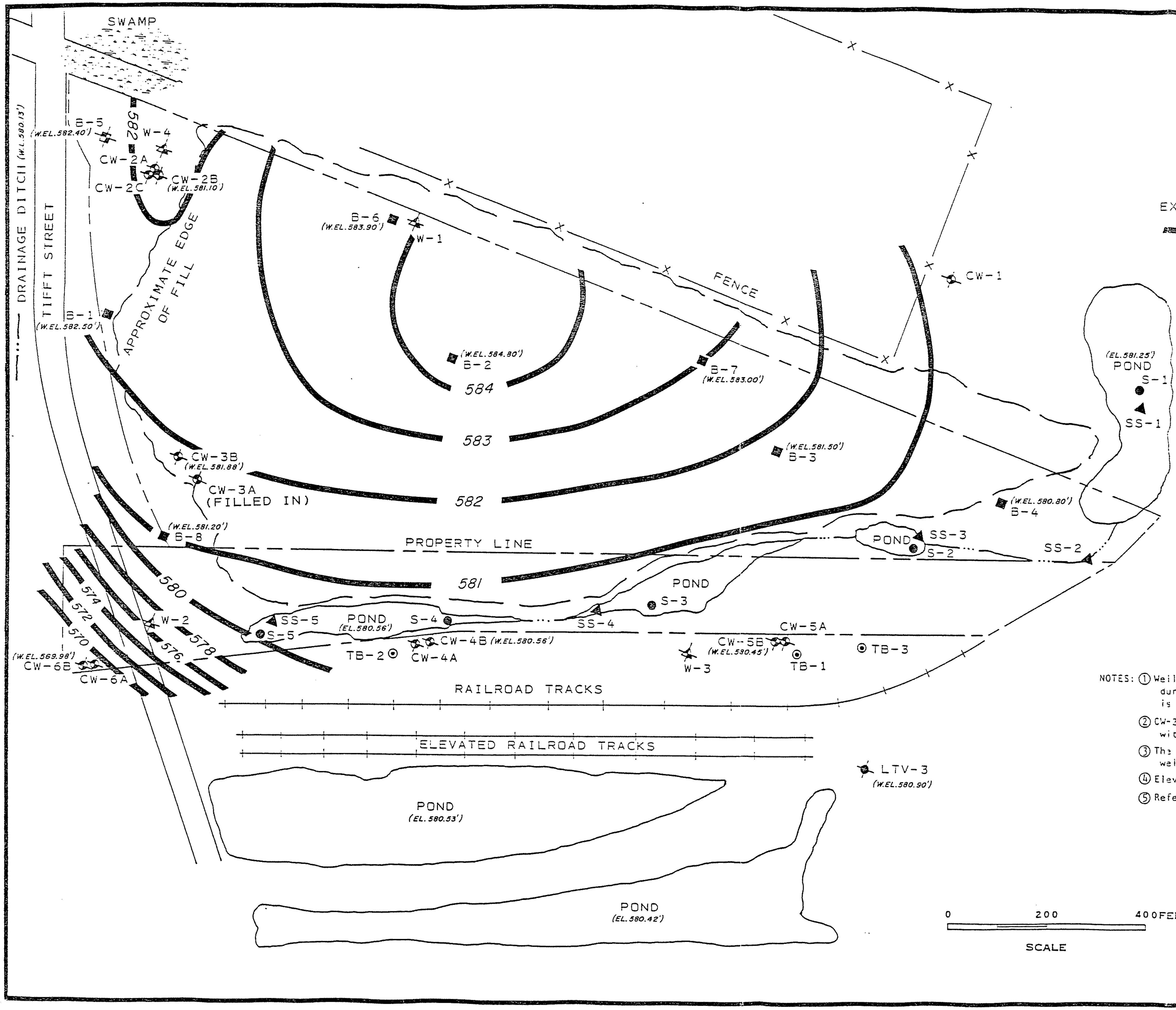
PIEZOMETRIC SURFACE
IN LOWER AQUIFER
ALLTIFT REALTY

FIGURE IV-9



EXPLANATION:

582 WATER LEVEL IN UPPER AQUIFER

CW-1 MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION

TB-1 TEST BORING DRILLED UNDER RECRA RESEARCH'S SUPERVISION 1982

W-1 NON-EXISTING WELL, RECRA RESEARCH, 1982

B-1 NON-EXISTING WELL, WEHRAN ENGINEERING & RECRA RESEARCH 1978

B-5 EXISTING WELL BY WEHRAN ENGINEERING & RECRA RESEARCH 1978

LTV-3 WELL DRILLED BY MALCOM PIRNIE 1984

S-1 DAMES & MOORE SURFACE WATER AND SEDIMENT SAMPLE, APRIL 1985

SS-1 RECRA RESEARCH SURFACE WATER AND SEDIMENT SAMPLE, 1982

NOTES:
① Well B-5 is an existing well installed during a previous phase. Its integrity is questionable and should not be sampled.
② CW-2A was abandoned and was backfilled with grout.
③ The water levels taken from Dames & Moore wells were recorded on 8/28/85 and 8/29/85.
④ Elevations in feet above mean sea level.
⑤ Reference datum City of Buffalo datum.

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PIEZOMETRIC SURFACE
IN UPPER AQUIFER
ALLTIFT REALTY

FIGURE IV-10

SECTION V

NARRATIVE

LOCATION

SCALE

0 1000 2000 3000 4000 FEET

LONGITUDE: 78°50'22.5"
LATITUDE: 42°50'37.0"

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SITE LOCATION MAP
ALLTIFT REALTY

FIGURE V-1

REFERENCE: U.S.G.S. 7.5' TOPOGRAPHIC MAP
BUFFALO SE, NY (1965) QUADRANGLE

HRS WORKSHEETS

HRS COVER SHEET

Facility name: Alltift Realty

Location: Buffalo, NY

EPA Region: II

Person(s) in charge of the facility: Leonard Greenfield (President)

Alltift Realty

Buffalo, NY

Name of Reviewer: Eileen Gilligan

Date: 9/27/85

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.)

Landfill currently used for construction and automobile shredding rubbish. The current landfill was built on top of a previous landfill used for chemical wastes from the Buffalo Dye Division of Allied Chemicals. Contamination by heavy metals and organic compounds was found in surface water, groundwater, and sediment samples.

Scores: $S_M = 13.10$ ($S_{gw} = 6.12$ $S_{sw} = 21.82$ $S_a = 0.0$)

$S_{FE} = 0.0$

$S_{DC} = 33.3$

HRS COVER SHEET

Facility Name: Alltift Realty Date: 9/27/85

Ground Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 [✓ 45]	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 [✓ 3]	2	6	6	
Net Precipitation	0 1 [✓ 2] 3	1	2	3	
Permeability of the Unsaturated Zone	0 1 2 [✓ 3]	1	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: Alltift Realty

Date: 9/27/85

Surface Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 [✓ 45]	1	45	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	2	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			13	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			14,040	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{SW} = 21.82		

SURFACE WATER ROUTE WORK SHEET

Facility Name: Alltift Realty Date: 9/27/85

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:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 [✓ 1] 2 3	1	1	3	
Toxicity	0 [✓ 1] 2 3	3	3	9	
Hazardous Waste	0 1 2 3 4 5 6 7 [✓ 8]	1	8	8	
Total Waste Characteristics Score			12	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	6	6	
Land Use	0 1 2 [✓ 3]	1	3	3	
Total Targets Score			30	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: Alltift Realty   Date: 9/27/85

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	2	3	8.2
3 Containment	0 [✓ 15]	1	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			7200	21,600	
7 Divide line 6 by 21,600 and multiply by 100			S_{DC} = 33.3		

DIRECT CONTACT WORK SHEET

Facility Name: Alltift Realty

Date: 9/27/85

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	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			$S_{FE} = 0$		

NOTE: This site has not been declared a fire or explosion hazard by a U.S. Fire Marshall.

FIRE AND EXPLOSION WORK SHEET

Facility Name: Alltift Realty Date: 9/27/85

Worksheet for Computing S_M

	S	S^2
Groundwater Route Score (S_{gw})	6.12	37.45
Surface Water Route Score (S_{sw})	21.82	476.11
Air Route Score (S_a)	0.0	0.0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		513.56
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		22.66
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		13.10

WORK SHEET FOR COMPUTING S_M

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

FACILITY NAME: Alltift Realty

LOCATION: Tifft Street, Buffalo, New York

GROUNDWATER ROUTE

1. OBSERVED RELEASE

Contaminants detected (5 maximum):

1. <u>Upper Aquifer</u>
   Benzene (Phase II Investigation, 1985)
   Mercury (RECRA and Wehran, 1978)
   Chromium (RECRA and Wehran, 1978)
   Arsenic (RECRA and Wehran, 1978)
   Pentachlorophenol (Phase II Investigation, 1986)

2. <u>Lower Aquifer</u>
   Benzene (Phase II Investigation, 1985)
   Xylene (Phase II Investigation, 1985)
   Toluene (Phase II Investigation, 1985)

Rationale for attributing the contaminants to the facility:

Found in wells on-site.

* * *

2. ROUTE CHARACTERISTICS

<u>Depth to Aquifer of Concern</u>

(Phase II Boring Logs, Dames & Moore, 1985.)

Name/description of aquifer(s) in concern:

1. Upper aquifer in lacustrine sediments - discharges into wetland.
2. Lower aquifer in till and bedrock.

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

1. 0 feet at southern end of the site.
2. 0 feet at southern end of the site.

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

20 feet.

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 40".

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

Mean annual lake evaporation is 27".

Net precipitation (subtract the above figures):

13".

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

No soil material present - granular fill (Phase II boring logs, Dames & Moore, 1985).

Permeability associated with soil type

10^{-2} cm/sec to 10^{-3} cm/sec (Permeability test result from CW-3B well in fill material during Phase II investigation).

Physical State

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

Liquid, solids, sludges (Roetzer, 1968; Rayer, 1978).

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

No liner detected during drilling of B-series wells on landfill (RECRA and Wehran, 1978).

Method with highest score:

Unlined landfill - score = 3.

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Arsenic, benzene, xylene, mercury, chromium (Phase II investigation, 1985; RECRA, 1982; RECRA and Wehran, 1978). (These compounds pertain to both aquifers.)

Compound with highest score:

Arsenic, mercury, chromium - 3, 3 = 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):

16,100 tons [(15,000 lb./mo. organics + 450,000 lb/mo inorganics + 50,000 lb./mo. chrome sludge + 20,000 lb./mo. copper sulfate + 100 lb./mo. nitrobenzene + 600 lb./mo. monochlorobenzene + 1,000 lb./mo. naphthalene) x 12 mo./yr. x 5 yrs. disposal x ton/2,000 lb.]

Basis of estimating and/or computing waste quantity:

Memo concerning dumping practices by Allied and length of time of disposal at the Alltift site (Roetzer, 1968; Rayer, 1978).

5. TARGETS

Groundwater Use

(NYS Atlas of Community Water System Sources, 1982; Conversation with R. Koczaja, 1985).

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

No usage of upper or lower aquifer.

Distance to Nearest Well

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

Not applicable.

Distance to above well or building:

Not applicable.

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 nor industrial wells drawing from either aquifer (Koczaja, 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):

No irrigation wells drawing from either aquifer.

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

0 people.

SURFACE WATER ROUTE

1. OBSERVED RELEASE

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

Antimony, chromium, copper, and zinc (Phase II Investigation, 1985); 4-chloroaniline (Phase II Investigation, 1986).

Rationale for attributing the contaminants to the facility:

Analysis of surface water (pond and swamp) on-site.

2. ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

1.4%.

Name/description of nearest downslope surface water:

Wetland with north flowing stream adjacent to western border of site (USGS Topographic Map; Sneider, 1985).

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

Approximately 30% (Site survey during Phase II investigation, 1985).

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

Possibly. TB-3 (adjacent to swamp) boring log states: fill on top of organic silt suggesting filling into former swamp area (RECRA, 1982).

Is the facility completely surrounded by areas of higher elevation?

No (USGS Topographic Map).

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 (Phase II investigation, 1985).

Physical State of Waste

Solid, sludges, liquid (Roetzer, 1968; Rayer, 1978).

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Uncovered landfill with no diversion system. No cover detected during drilling of B-series wells on landfill (RECRA and Wehran, 1978).

Method with highest score:

Uncovered landfill with no diversion system.

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Lead, mercury, chromium, copper, 4-chloroaniline (Phase II Investigation, 1985; 1986).

Compound with highest score:

Lead, mercury, chromium, copper - 3, 3, = 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):

16,100 tons [(15,000 lb./mo. organics + 450,000 lb/mo inorganics + 50,000 lb./mo. chrome sludge + 20,000 lb./mo. copper sulfate + 100 lb./mo. nitrobenzene + 600 lb./mo. monochlorobenzene + 1,000 lb./mo. naphthalene) x 12 mo./yr. x 5 yrs. disposal x ton/2,000 lb.]

Basis of estimating and/or computing waste quantity:

Memos describing monthly discharges from Allied Chemical and period of disposal (Roetzer, 1968; Rayer, 1978).

* * *

5. TARGETS

Surface Water Use

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

Recreation, transportation. Numerous marinas and commercial shipping facilities are located along the Lake Erie shoreline, 1 to 3 miles west of site (Gilligan, 1985).

Is there tidal influence?

No (Western NYS 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 (Sneider, 1985; NYS Coastal Management Program, 1978; NYSDOT).

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

More than 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:

Not applicable. Distance to nearest water supply intake is 5.2 miles, at the beginning of the Niagara River (USGS Topographic Map; NYS Atlas of Community Water System Sources, 1982).

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

Not applicable.

Total population served:

Not applicable.

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 organic contamination detected during Phase II investigation with an HNu meter (Harmon, 1984; Brod, 1985).

Date and location of detection of contaminants:

See above.

Methods used to detect the contaminants:

See above.

Rationale for attributing the contaminants to the site:

See above.

* * *

2. WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Nitrobenzene, xylene - score = 1.

Most incompatible pair of compounds:

Mercury with other metals (Sax, 1984) - Score = 1.

Toxicity

Most toxic compound:

Benzene - score = 3.

Hazardous Waste Quantity

Total quantity of hazardous waste:

16,100 tons [(15,000 lb./mo. organics + 45,000 lb/mo inorganics + 50,000 lb./mo. chrome sludge + 20,000 lb./mo. copper sulfate + 100 lb./mo. nitrobenzene + 600 lb./mo. monochlorobenzene + 1,000 lb./mo. naphthalene) x 12 mo./yr. x 5 yrs. disposal x ton/2,000 lb.]

Basis of estimating and/or computing waste quantity:

Memos regarding quantity of waste and period of disposal (Roetzer, 1968; Rayer, 1978).

* * *

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

5,461 (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, adjacent (Sneider, 1985; NYSDOT).

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

None within 1 mile (Sneider, 1985).

Land Use

(Site Visit, 1985)

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

0.0 mile.

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

0.8 miles - Tifft Farms Nature Preserve.

Distance to residential area, if 2 miles or less:

0.3 miles (air photos of area from City of Buffalo).

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

More than 1 mile.

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

More than 2 miles.

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

No.

DIRECT CONTACT

1. OBSERVED INCIDENT

Date, location, and pertinent details of incident:

No known observed incidents.

2. ACCESSIBILITY

Describe type of barrier(s):

Fence and/or water around site.

3. CONTAINMENT

Type of containment, if applicable:

Fill material within two feet of ground surface (Phase II Boring Logs, Dames & Moore, 1985).

4. WASTE CHARACTERISTICS

Toxicity

Compounds evaluated:

Arsenic, benzene, mercury, and chromium (Phase II Sampling and Analysis, 1985; RECRA, 1982; RECRA and Wehran, 1978).

Compound with highest score:

All compounds evaluated have a score of 3.

5. TARGETS

Population within one-mile radius

5,461 people (US Census Data, 1980).

Distance to critical habitat (of endangered species)

Greater than 1 mile (Sneider, 1985).

FIRE AND EXPLOSION

NOTE: This site has not been declared a Fire and/or Explosion hazard by a Fire Marshal.

1. CONTAINMENT

Hazardous substances present:

Benzene, mercury, chromium, arsenic, xylene, toluene, antimony, nitrobenzene, copper, and zinc (Phase II Investigation, 1985; RECRA and Wehran, 1978).

Type of containment, if applicable:

Unlined landfill.

* * *

2. WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

Not applicable.

Ignitability

Compound used:

No known ignitable compounds present.

Reactivity

Most reactive compound:

Nitrobenzene and xylene (Phase II Investigation, 1985; RECRA and Wehran, 1978; Sax, 1984).

Incompatibility

Most incompatible pair of compounds:

Mercury with other metals (Sax, 1984).

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:

16,100 tons [(15,000 lb./mo. organics + 450,000 lb/mo inorganics + 50,000 lb./mo. chrome sludge + 20,000 lb./mo. copper sulfate + 100 lb./mo. nitrobenzene + 600 lb./mo. monochlorobenzene + 1,000 lb./mo. naphthalene) x 12 mo./yr. x 5 yrs. disposal x ton/2,000 lb.]

Basis of estimating and/or computing waste quantity:

Memo concerning dumping practices by Allied and length of time of disposal at Alltift site (Roetzer, 1968; Rayer, 1978).

* * *

3. TARGETS

Distance to Nearest Population

0.3 mile (Phase II Investigation Site Visit, 1985).

Distance to Nearest Building

1,200 feet (Phase II Investigation Site Visit, 1985).

Distance to Sensitive Environment

Distance to wetlands:

0.0 mile (Sneider, 1985; NYS Coastal Management Program, 1978; NYSDOT).

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 (Phase II Investigation Site Visit, 1985).

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

0.8 mile - Tifft Farms Nature Preserve (Phase II Investigation Site Visit, 1985).

Distance to residential area, if 2 miles or less:

0.3 mile (Air Photos, 1972).

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

More than 1 mile.

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

More than 2 miles.

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

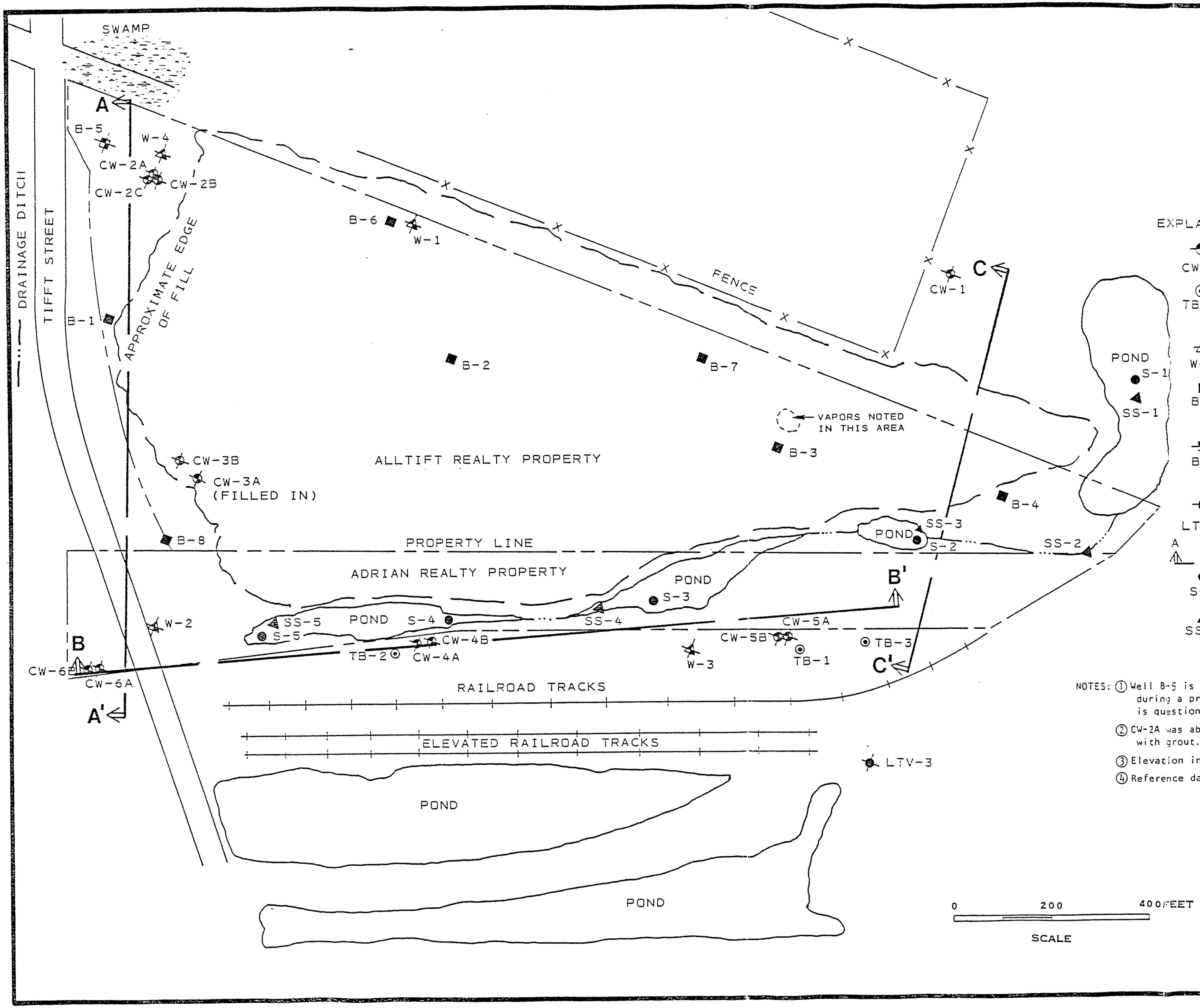
No.

Population with 2-Mile Radius

35,951 (US Census data).

Buildings Within 2-Mile Radius

3,500



EXPLANATION:

- CW-1 MONITORING WELL DRILLED UNDER DAMES & MOORE'S SUPERVISION
- ⊙ TB-1 TEST BORING DRILLED UNDER RECRA RESEARCH'S SUPERVISION 1982
- W-1 NON-EXISTING WELL, RECRA RESEARCH, 1982
- ■ B-1 NON-EXISTING WELL, WEHRAN ENGINEERING & RECRA RESEARCH 1978
- B-5 EXISTING WELL BY WEHRAN ENGINEERING & RECRA RESEARCH 1978
- LTV-3 WELL DRILLED BY MALCOM PIRNIE 1984
- A A' CROSS SECTION LOCATION
- ● S-1 DAMES & MOORE SURFACE WATER AND SEDIMENT SAMPLE, APRIL 1985
- ▲ SS-1 RECRA RESEARCH SURFACE WATER AND SEDIMENT SAMPLE, 1982

NOTES: ① Well B-5 is an existing well installed during a previous phase. Its integrity is questionable and should not be sampled.

② CW-2A was abandoned and was backfilled with grout.

③ Elevation in feet above mean sea level.

④ Reference datum City of Buffalo datum.

ENGINEERING-SCIENCE
IN ASSOCIATION WITH
DAMES & MOORE

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION
PHASE II REPORT

PLOT PLAN
ALLTIFT REALTY

FIGURE V-2

HRS DOCUMENTATION REFERENCES
ALLTIFT REALTY

1. Brod, J. (1985). Dames & Moore. Field Memo. June 20, 1985.

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

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

4. Engineering-Science (1985). Analytical Results of Groundwater and Surface Water Samples.

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

7. Harmon, D. (1984). Engineering-Science. Field Memo. October 6, 1984.

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

9. NYS Coastal Management Program (1978). Map of Existing Land and Water Use.

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

11. NYSDOT. Map of State Recognized Wetlands.

12. Rayer, G. R. (1978). Allied Chemical. Memo and Questionnaire sent to P. Miller, Interagency Task Force on Hazardous Wastes. November 14, 1978.

13. RECRA Research and Wehran Engineering (1978). "Hydrogeologic Investigation - Alltift Landfill, Erie County, New York." Prepared for Alltift Realty, Inc.

14. RECRA Research (1982). "Supplemental Hydrogeologic Investigations." Prepared for Alltift Realty, Inc.

15. Roetzer, A. (1968). Memo to C. Infantino. March 20, 1968.

16. Sax, N. I. (1984). Dangerous Properties of Industrial Materials. 6th Edition. VanNostrand Reinhold Company, New York.

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

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

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

20. United States Geological Survey (1965). Buffalo, Southeast Quadrant Topographic Map.

1.

FIELD MEMORANDUM

ACTION	INFO	
To:	EDG	File: 13305-009-019 Alltift Realty
		X-Ref:
		Date:

From: JeBrod Reply Required By:

Subject: Air quality monitoring at Alltift Realty site.

Reference(s):

Upwind and downwind air quality monitoring was done on-site on 6-20-85 with an HNu photoionization meter. No detectable concentrations were registered on the meter. Plumes of white smoke approximately 3-5 feet high were observed on the landfill area. HNu readings were taken from several of these plumes, however, no detectable concentrations were registered.

JeBrod

ROUTING

City of Buffalo ②
Air Photograph

DAMES & MOORE BORING LOGS

One boring log for each drilling location has been submitted. The log is representative of the subsurface conditions found in the deep well at that drilling location. The dates shown on the logs represent the total amount of time needed to complete all drilling activities at that drilling location. Further details regarding the drilling operations are given in Appendix A.

DAMES & MOORE
BORING LOG

Page 1 of 1

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-1
SURFACE ELEV: 585.47'

DRILLING METHOD: Hollow stem auger

SAMPLING METHOD: Split spoon

DATE STARTED: 7/16/85

DATE FINISHED: 7/16/85

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			0		Black organic silty topsoil
1	4	SS	1		Tan fine sand with some black organic silt Hnu=0
			2		
			3		grading moist
			4		grading some clay and gravel
			5	SM	
2	11	SS	6		
			7		
			8		grading with cobbles
			9		
3	60/2.5"	SS	10	GM	Brown gravel with brown wet sand and some clay (Till) Hnu=1ppm
			11		Black stained limestone (Onondaga Limestone)
			12		
			13		
			14		
			15		Boring terminated at a depth of 15.0 feet on 7/16/85.

APPENDIX B

DAMES & MOORE
BORING LOG

Page 1 of 3

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-2
SURFACE ELEV: 586.04'

DRILLING METHOD: Hollow stem augers

SAMPLING METHOD: Split spoon

DATE STARTED: 7/8/85

DATE FINISHED: 7/17/85

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
1	14	SS	0	Fill	Brown with zones of black fill made up of fine sand and gravel
			1		Hnu=0.3ppm
2	12	SS	2		Hnu=4ppm
			3		
3	5	SS	4		Hnu=1ppm
			5		
4	2	SS	6		
			7	ML	Gray moist silt with a little fine sand
5	7	SS	8		
			9		
6	12	SS	10		grading yellowish gray
			11		
7	16	SS	12	GM	Gray/black wet gravel with a little silt yellowish brown moist wilt
			13	ML	
8	27	SS	14		grading with reddish tint
			15		
	23	SS	16		
			17		grading with some clay
9	13	SS	18		
			19		grading trace clay
			20		

DAMES & MOORE
BORING LOG

Page 2 of 3

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-2

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
10	5	SS	20		grading little clay Hnu=5ppm
			21	SM	Gray moist fine sand and silt Hnu=4ppm
11	8	SS	22	CL	Gray moist clay with some silt, trace fine sand Hnu=11.5ppm
			23	SP	Gray/black moist fine sand Hnu=12ppm
12	6	SS	24		Gray moist clay with little silt Hnu=8.5ppm
			25		
13	8	SS	26		grading trace silt Hnu=6.5ppm
			27		
14	13	SS	28		Hnu=5ppm
			29		
15	0	SS	30		grading some silt Hnu=5.5ppm
			31		
16	6	SS	32		Hnu=3.5ppm
			33		
17	4	SS	34	CL	grading reddish
			35		down-hole Hnu=35ppm
18	4	SS	36		Hnu=5ppm Hnu=4ppm
			37		
19	4	SS	38		
			39		grading gray/red Hnu=4.5ppm
			40		

3

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-2

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
20	4	SS	40		
			41		grading very moist
			42		
			43	SM	Gray moist fine sand, little gravel, silt and clay (Till)
			44	CL	Gray moist clayey silt fine sand and gravel (Till)
			45		
			46		Gray moist fine sand and gravel, little to some clay (Till)
			47	SM	grading trace of gravel
			48		
			49		
			50		
			51		
			52		Grey very moist fine sand with little gravel (Till)
			53	SP	
			54		
			55		
Run 1			56		Grey Onondaga Limestone, some fossil hash visible, black staining and strong kerosene odor noted at 56.6 feet.
			57		
			58		
			59		
			60		
			61		Boring terminated at a depth of 61.1 feet on 7/17/85

3

DAMES & MOORE
BORING LOG

Page 1 of 4

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-3
SURFACE ELEV: 593.93'

DRILLING METHOD: Hollow stem augers

SAMPLING METHOD: Split spoon

DATE STARTED: 7/9/85

DATE FINISHED: 7/13/85

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
1	17	SS	0		Organic silt, some gravel misc. fill (Fill) Hnu=0ppm
			1		
			2		
			3		
			4		
2	4	SS	5		
			6		
			7		
			8		
			9		
3	16	SS	10	Fill	grading with wood and tarry substance
			11		
			12		
			13		grading looser
			14		
4	5	SS	15		grading with black tarry substance (strong petroleum chemical odor) Hnu=4ppm
			16		
			17		
			18		
			19		
5	10	SS	20	CL	

③

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-3

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			20		Gray, moist clay with some silt, trace fine sand
			21		Hnu=0.2ppm
			22		
			23		
			24		
6	6	SS	25		
			26		
			27		
			28		
			29		
7	4	SS	30		Hnu=0.1ppm
			31		
			32		
			33		
			34		
8	Rod wt.	SS	35		
			36		Hnu=0ppm
			37		
			38		
			39		
9	Rod wt.	SS	40		

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-3

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			40		
			41		grading with fine sand lenses Hnu=0.2ppm
			42		
			43		
			44		
10	4	SS	45		
			46		
			47		grading wet Hnu=1ppm
			48		
			49		
11	Rod wt.	SS	50	CL	grading with little to some red clay Hnu=0ppm
			51		
			52		petroleum odor in cuttings between 50.0 - 60.0'
			53		
			54		
			55		
			56		
			57		
			58		
			59		
			60		

③

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-3

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
12	Rod wt.	SS	60		
			61	CL	red moist clay, some gray clay Hnu=0.4ppm
			62		
			63		Gray, moist clay, some fine sand, trace gravel, pieces of broken gray shale (Till)
			64	GM -- ML	
			65		
			66		
			67		Hole abandoned and grouted at a depth of 68.0 feet on 7/13/85
			68		

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-4
SURFACE ELEV: 581.51'

DRILLING METHOD: Hollow stem auger

SAMPLING METHOD: Split spoon

DATE STARTED: 7/17/85

DATE FINISHED: 7/18/85

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
1	10	SS	0	Fill	0-3" grass/weeds, topsoil 3"=1.5' black wet gravel/slag and sand Hnu=0ppm cobbles encounterd at 2' (railroad stones) railroad fill to 5'
			1		
			2		
			3		
			4		
2	11	SS	5	SC	Gray, moist fine sand, some clay Hnu=0ppm
			6		
			7		
			8	ML	Gray, moist silt with trace of tan and gray fine sand Hnu=0.2ppm
			9		
3	18	SS	10		
			11		
			12		
			13		
			14	SP	Gray, wet fine sand
4	10	SS	15		
			16		
			17		
			18		
			19	CL	Gray, moist clay, trace of sand and silt
5	3	SS	20		

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-4

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			20	CL	
			21		
			22		
			23		
			24		grading less sand
6	2	SS	25		
			26		
			27		
			28		
			29		
7	1	SS	30		
			31		
			32		
			33		
			34		
8	2	SS	35		
			36		
			37		
			38		
			39		
9	2	SS	40		grading with red streaks

3

DAMES & MOORE
BORING LOG

Page 3 of 4

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-4

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			40		Hnu=1ppm
			41		
			42		
			43		
			44		
10	2	SS	45		
			45		
			47		grading with little red clay Hnu=0ppm
			48	CL	
			49		
11	2	SS	50		Hnu=0ppm
			51		
			52		
			53		
			54		
12	2	SS	55		
			56		Hnu=0ppm
13	60/2"	SS	57	GM	Moist, gray gravel with silt and clay little sand (Till)
			58		
			59		Top of rock Cored from 60-65' REC:4.8' RQD: 4.4
			60		

③

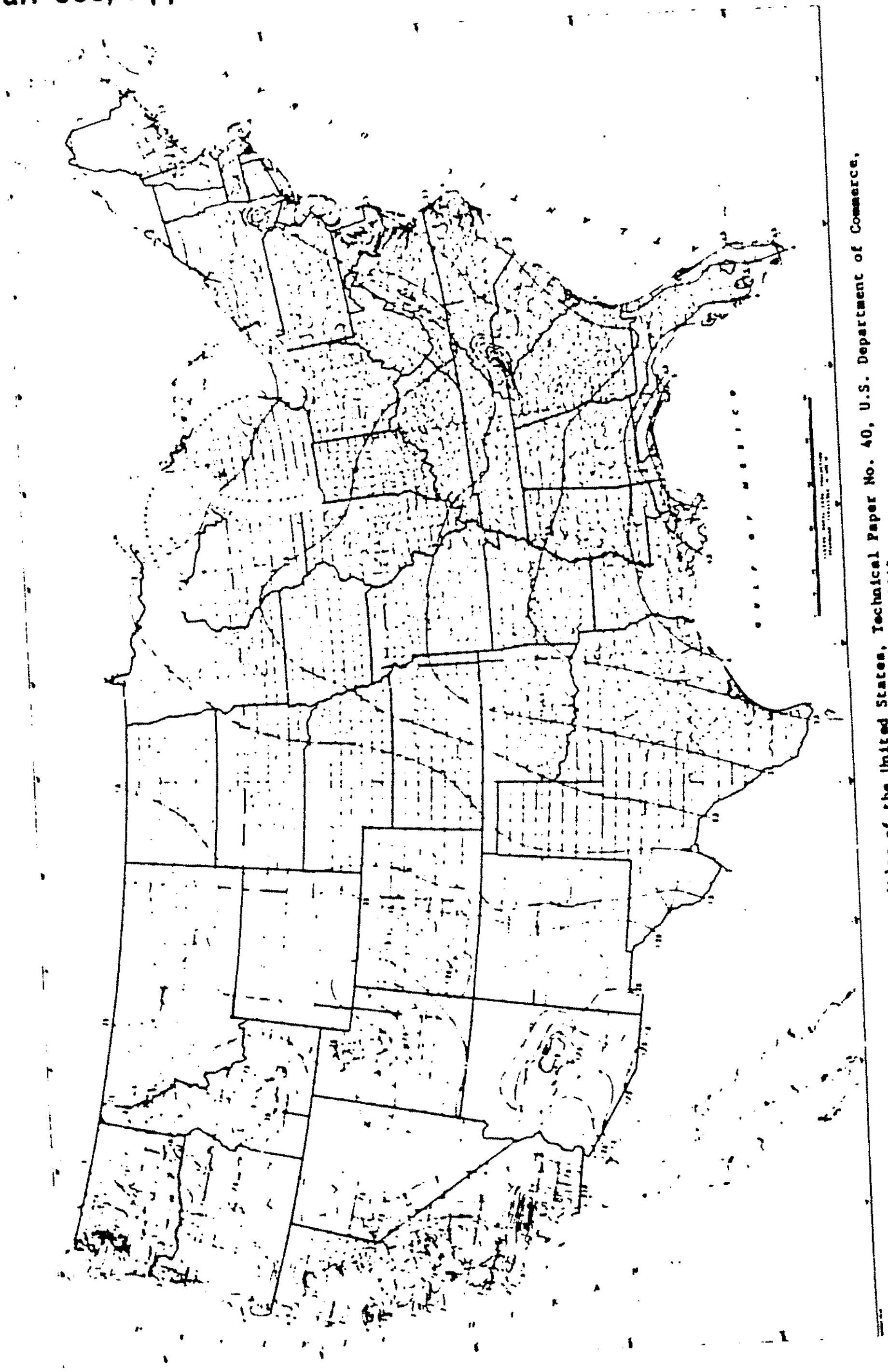
DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-4

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			60		Gray limestone (Onondaga Limestone), some fossil hash visible, strong kerosene odor, 1" seam of black lithified organic matter
			61		
			62		
			63		
			64		
			65		Boring terminated at a depth of 65.0 feet on 7/18/85

13



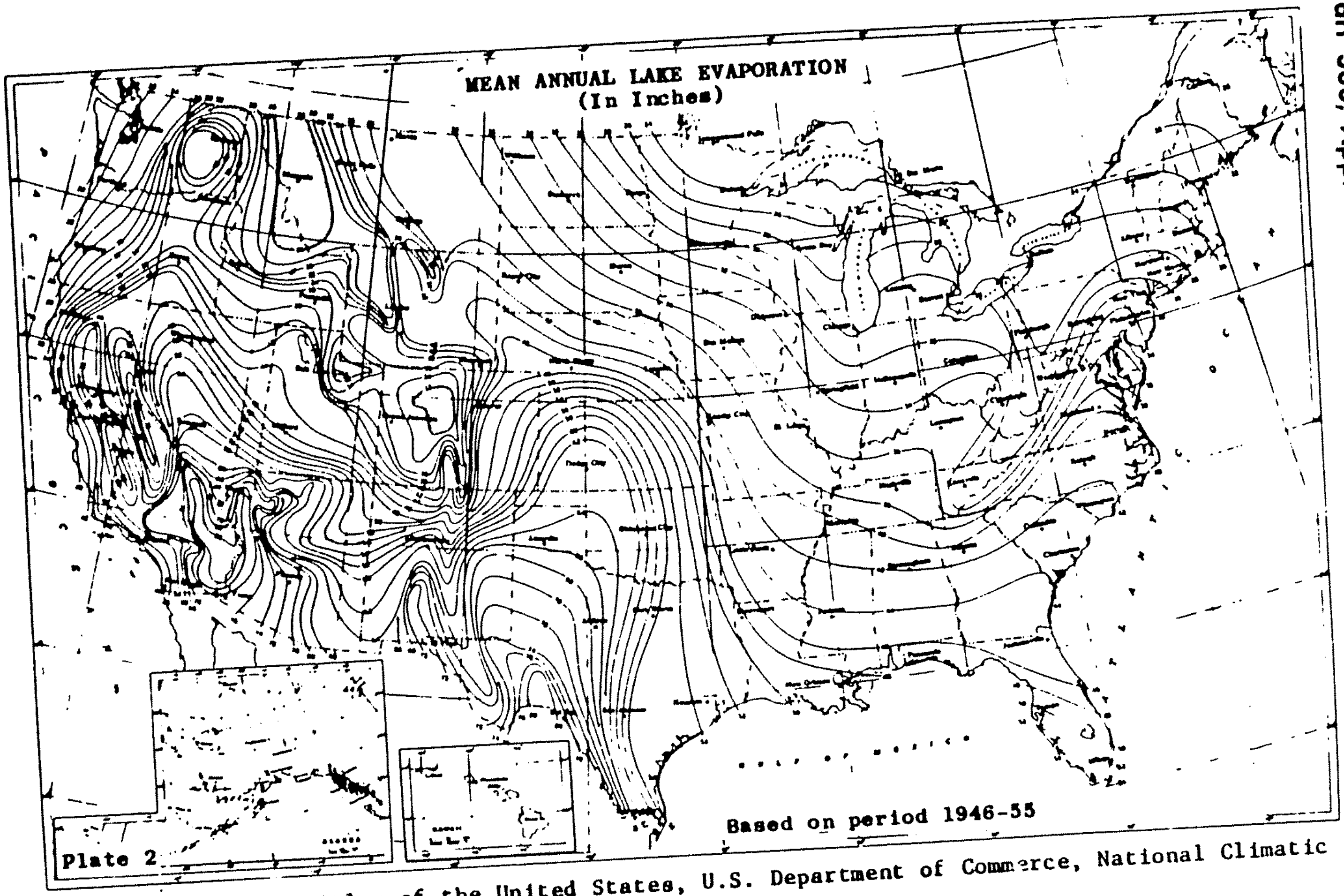
Source: **Rainfall Frequency Atlas of the United States, Technical Paper No. 40, U.S. Department of Commerce,** U.S. Government Printing Office, Washington, D.C., 1963.

Figure 8

1-Year 24-Hour Rainfall (Inches)

(USDOC, 1963)

(19)



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

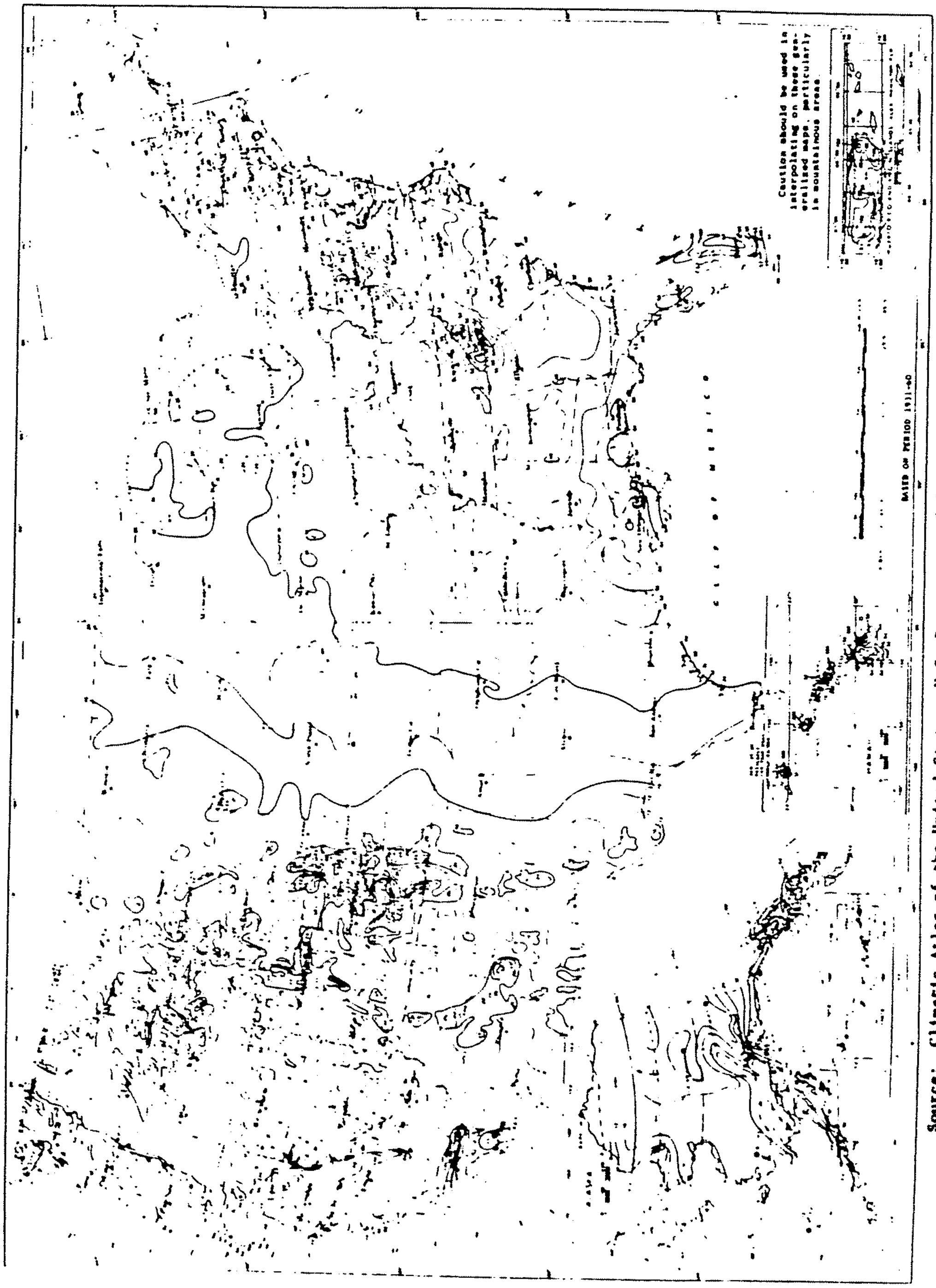
Figure 4

Mean Annual Lake Evaporation (In Inches)

(USDOC, 1979)

Figure 4

Mean Annual Lake Evaporation (In Inches)



Caution should be used in interpolating on these generalized maps, particularly in mountainous areas.

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

Figure 5

Normal Annual Total Precipitation (Inches)

(USDOC, 1979)

LONGITUDE: 78°50'22.5"
LATITUDE: 42°50'37.0"

ENGINEERING-SCIENCE
IN ASSOCIATION WITH
DAMES & MOORE

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION
PHASE II REPORT

SITE LOCATION MAP
ALLTIFT REALTY

FIGURE IV-1

REFERENCE: U.S.G.S. 7.5' TOPOGRAPHIC MAP
BUFFALO SE, NY (1965) QUADRANGLE

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-5
SURFACE ELEV: 582.06'

DRILLING METHOD: Augers

SAMPLING METHOD: Split spoon

DATE STARTED: 7/24/85

DATE FINISHED: 7/25/85

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
1	10	SS	0		Black, moist, loose topsoil, fine sand, little gravel Hnu=0.4ppm
			1		
			2		Black, wet, fine sand and silt Hnu=0.4ppm
			3		
			4		
2	7	SS	5		
			6	SP	
			7		
			8		
			9		
3	13	SS	10		Gray/tan moist silt, some fine, trace clay (layered) Hnu=0.4ppm
			11	ML	
			12		
			13		Gray, moist clay with little silt Hnu=0.4ppm
			14		
4	2	SS	15		
			16	CL	
			17		
			18		
			19		
5	3	SS	20		

③

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-5

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			20		grading with silt lenses Hnu=0.4ppm
			21		grading with reddish color
			22		
			23		grading grayish red to pink
			24		
6	2	SS	25	CL	
			26		
			27		
			28		
			29		
7	7	SS	30		Hnu=0.3ppm
			31		
			32		Gray, wet gravel, some silt and clay, trace sand (Till) Hnu=0.3ppm
			33		
			34		
8	55	SS	35		
			36	GM	
			37		
			38		
			39		
			40		

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-5

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
9	22	SS	40		Gray, very moist sand, some gravel grading to fine sand, little gravel (Till)
			41	SW -- SP	
			42		
			43		
			44		
			45		Boring terminated at a depth of 45.0 feet on 7/25/85. Boring grouted to 17.0 feet to set shallow well

DAMES & MOORE
BORING LOG

Page 1 of 4

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-6
SURFACE ELEV: 571.57'

DRILLING METHOD: Augers

SAMPLING METHOD: Split spoon

DATE STARTED: 8/6/85

DATE FINISHED: 8/6/85

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
1	13	SS	0	Fill	Black, dry, clumpy coal dust, little brown silt and gravel (Fill)
			1		
			2		
			3		
			4	ML	Dark gray, moist silt, some fine sand, little clay
2	5	SS	5		
			6		
			7		
			8		
			9		grading less sand
3	10	SS	10		
			11		
			12		
			13		
			14	SM	Dark brown, wet, fine running sands with some silt and clay
4	13	SS	15	ML	Dark, moist silt
			16		
			17		
			18		
			19		Gray, moist clay, some silt
5	8	SS	20		

DAMES & MOORE
BORING LOG

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-6

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			20		
			21		
			22		
			23		
			24		grading increase in silt
6	6	SS	25		
			26		
			27		
			28		
			29		
7	Rod wt.	SS	30	CL --	grading increase in clay content
			31	ML	
			32		
			33		
			34		
8	Rod wt.	SS	35		
			36		
			37		
			38		
			39		
9	Rod wt.	SS	40		

③

DAMES & MOORE
BORING LOG

Page 3 of 4

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

BORING NO.: CW-6

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			40		grading with reddish color
			41		
			42		
			43		
			44		
10	Rod wt.	SS	45	CL -- ML	grading reddish gray, oily sheen on cuttings
			46		
			47		
			48		
			49		
11	Rod wt.	SS	50		
			51		grading with gravel
			52		
			53		Gray, moist silt, little gravel, fine sand and clay (Till)
			54		
12	4	SS	55	ML	
			56		
			57	-----	Start coring at 57.8 feet
			58		
			59		
			60		

③

DAMES & MOORE
BORING LOG

BORING NO.: CW-6

CLIENT: NYSDEC
LOCATION: ALLTIFT REALTY

SAMPLE NO.	BLOWS/FT	SAMPLE TYPE	DEPTH IN FT.	SOIL GRAPH	MATERIAL DESCRIPTION
			60		
			61		
			62	------	Boring terminated at a depth of 62.8 feet on 8/6/85. Boring grouted to a depth of
			63		

Engineering Science
1985

④

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, Alltift Realty Site project are in accordance with USEPA Guidelines 44CFR46964, 40CFR136, or the NYSDEC Superfund and Contract Laboratory Protocol, January 1985.

Inorganic Laboratory Supervisor

6-26-85
Date

Organic Laboratory Supervisor

6-26-85
Date

A Halliburton Company

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1985

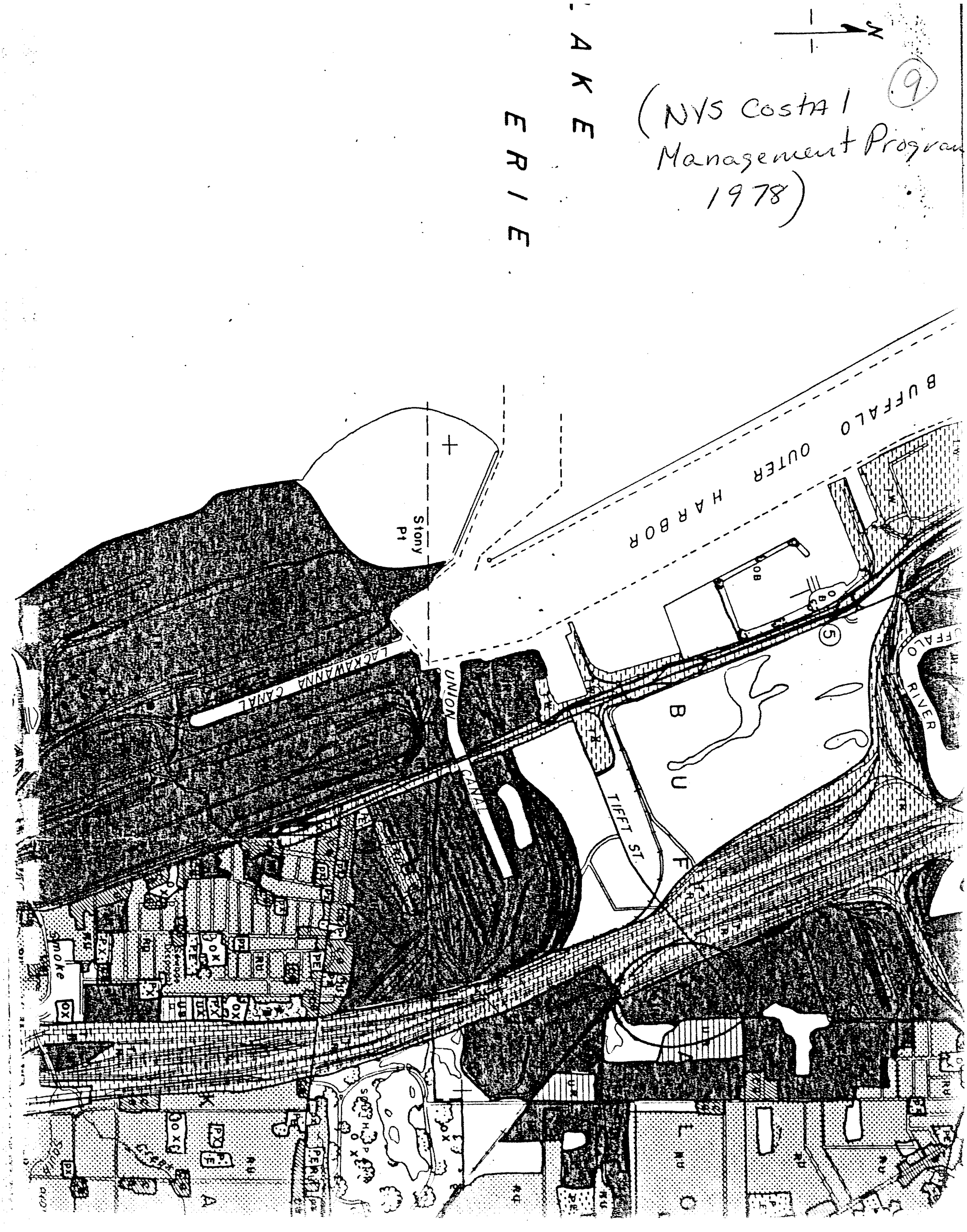
(4)

SAMPLE IDENTIFICATION

ENGINEERING-SCIENCE IDENTIFICATION	NUS SAMPLE NUMBER
Alltift Realty S-1 sediment	15040812
Alltift Realty S-2 sediment	15040813
Alltift Realty S-3 sediment	15040814
Alltift Realty S-4 sediment	15040815
Alltift Realty S-5 sediment	15040816
Alltift Realty S-1 surface water	15040817
Alltift Realty S-2 surface water	15040818
Alltift Realty S-3 surface water	15040819
Alltift Realty S-4 surface water	15040820
Alltift Realty S-5 surface water	15040821

⑨

(NYS Costal
Management Program
1978)



Allied Chemical

Specialty Chemicals Division
P O Box 1087R
Morristown New Jersey 07960

(Rayer, 1978)

(12)

November 14, 1978

Mr. Peter Miller, Director
Interagency Task Force on Hazardous Wastes
M.P.O. Box 561
Niagara Falls, New York 14302

Dear Mr. Miller:

Attached is the questionnaire which John Iannotti sent to Buffalo Color Corporation and which Buffalo Color Corporation sent to Allied Chemical Corporation at Mr. Iannotti's request. We have attempted to aid you in your survey by completing the questionnaire with the assistance of Buffalo Color Corporation Personnel.

The data on waste disposal are based, in substantial part, on information developed by Buffalo Color Corporation through a search of their files and based on the best recollection of personnel familiar with the facility. Files at the Buffalo Dye Plant were part of the sale of the plant to Buffalo Color Corporation. We are in the process of reviewing some additional files at our home office. If any additional pertinent information is found, we will send it to you.

We hope this information is helpful to you in your survey.

Very truly yours,

ALLIED CHEMICAL CORPORATION

G. R. Rayer, Manager
Environmental Services

GRR/jp
Attachments
cc: J. Iannotti

NOV 17 1978

le Number
-5A

Engineering Science, 19
CW-5A
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	85	
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	140	
108-90-7	Chlorobenzene		5 u
100-41-4	Ethylbenzene	20	
100-42-5	Styrene		5 u
	Total Xylenes	110	

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

[illegible]

Engineering Science
1985

CW-3

4

Organics Analysis Data Sheet
(Page 3)

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	5	u
108-90-7	Chlorobenzene	5	u
100-41-4	Ethylbenzene	11	
100-42-5	Styrene	5	u
	Total Xylenes	7 7	

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

Engineering Science
1985

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 Surface Water
Alltift Realty ①

Date June 11, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation

CASE NO. Engineering-Science

SOW NO. 784

LAB SAMPLE ID. NO. 15040818

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	800	(P)	13.	Magnesium	80000	(P)
2.	Antimony	340	(F)	14.	Manganese	2100	(P)
3.	Arsenic	[1]	(F)	15.	Mercury	0.2 U	(C)
4.	Barium	200 U	(P)	16.	Nickel	50	(P)
5.	Beryllium	5 U	(P)	17.	Potassium	64000	(P)
6.	Cadmium	5 U	(F)	18.	Selenium	5 U	(F)
7.	Calcium	260000	(P)	19.	Silver	10 U	(P)
8.	Chromium	50	(P)	20.	Sodium	240000	(P)
9.	Cobalt	50 U	(P)	21.	Thallium	10	(F)
10.	Copper	73	(P)	22.	Tin	44	(F)
11.	Iron	1900	(P)	23.	Vanadium	[4]	(F)
12.	Lead	9	(F)	24.	Zinc	140	(P)

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

SAMPLE NUMBER
S-2

Engineering Science
1985

④

Organics Analysis Data Sheet
(Page 3)

Semivolatile Compounds

Concentration: Low
Date Extracted/Prepared: 04/15/85
Date Analyzed: 06/04/85
Conc/Dil Factor: 1

CAS Number		ug/l
		****************
62-75-9	N-Nitrosodimethylamine	10 u
108-95-2	Phenol	10 u
62-53-3	Aniline	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	15
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

Engineering Science
1985

④

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.
53 Surface Water ①
Alltift Realty

Date June 11, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation
CASE NO. Engineering-Science
SOW NO. 784
LAB SAMPLE ID. NO. 15040819
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	200 U	(P)	13.	Magnesium	78000	(P)
2.	Antimony	74	(F)	14.	Manganese	1100	(P)
3.	Arsenic	[2]	(F)	15.	Mercury	0.2 U	(C)
4.	Barium	200	(P)	16.	Nickel	40 U	(P)
5.	Beryllium	5 U	(P)	17.	Potassium	68000	(P)
6.	Cadmium	5 U	(F)	18.	Selenium	5 U	(F)
7.	Calcium	250000	(P)	19.	Silver	10 U	(P)
8.	Chromium	20	(P)	20.	Sodium	280000	(P)
9.	Cobalt	[30]	(P)	21.	Thallium	[9]	(F)
10.	Copper	30	(P)	22.	Tin	58	(F)
11.	Iron	1600	(P)	23.	Vanadium	[6]	(F)
12.	Lead	12	(F)	24.	Zinc	90	(P)
	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. Merple

Engineering Science
1985

④

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-4 Surface Water
Alltift Realty ①

Date June 11, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation

CASE NO. Engineering-Science

SOW NO. 784

LAB SAMPLE ID. NO. 15040820

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	200	(P)	13.	Magnesium	65000	(P)
2.	Antimony	[47]	(F)	14.	Manganese	970	(P)
3.	Arsenic	[4]	(F)	15.	Mercury	0.2	(C)
4.	Barium	200	(P)	16.	Nickel	40	(P)
5.	Beryllium	5 U	(P)	17.	Potassium	67000	(P)
6.	Cadmium	5 U	(F)	18.	Selenium	5 U	(F)
7.	Calcium	230000	(P)	19.	Silver	10 U	(P)
8.	Chromium	30	(P)	20.	Sodium	290000	(P)
9.	Cobalt	[30]	(P)	21.	Thallium	[9]	(F)
10.	Copper	37	(P)	22.	Tin	45	(F)
11.	Iron	2100	(P)	23.	Vanadium	[5]	(F)
12.	Lead	16	(F)	24.	Zinc	120	(P)
	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

Engineering Science
1985

④

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.
5-5 Surface Water ①
Alltift Realty

Date June 11, 1985

INORGANIC ANALYSIS DATA SHEET

LAB NAME NUS Corporation

CASE NO. Engineering-Science

SOW NO. 784

LAB SAMPLE ID. NO. 15040821

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	200 U	(P)	13.	Magnesium	32000	(P)
2.	Antimony	[18]	(F)	14.	Manganese	440	(P)
3.	Arsenic	[3]	(F)	15.	Mercury	0.2 U	(C)
4.	Barium	200 U	(P)	16.	Nickel	[30]	(P)
5.	Beryllium	5 U	(P)	17.	Potassium	26000	(P)
6.	Cadmium	5 U	(F)	18.	Selenium	5 U	(F)
7.	Calcium	210000	(P)	19.	Silver	10 U	(P)
8.	Chromium	20	(P)	20.	Sodium	120000	(P)
9.	Cobalt	50 U	(P)	21.	Thallium	[4]	(F)
10.	Copper	27	(P)	22.	Tin	[13]	(F)
11.	Iron	690	(P)	23.	Vanadium	[3]	(F)
12.	Lead	28	(F)	24.	Zinc	90	(P)
	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

Laboratory Name: NUS CORPORATION
Case No: ENG. SCIENCE

Sample Number
CV-6B

⑤

Organics Analysis Data Sheet
(Page 2)

Semivolatile Compounds

Concentration: Low
Date Extracted/Prepared: 06/24/86
Date Analyzed: 07/31/86
Conc/Dil Factor: 1
Percent Moisture (Decanted): NR

GPC Cleanup: NO
Separatory Funnel Extraction: YES
Continuous Liquid-Liquid Extraction: NO

CAS Number		ug/l	CAS Number		ug/l
108-95-2	Phenol	10 u	83-32-9	Acenaphthene	10 u
111-44-4	bis(2-Chloroethyl)Ether	10 u	51-28-5	2,4-Dinitrophenol	50 u
95-57-8	2-Chlorophenol	10 u	100-02-7	4-Nitrophenol	50 u
541-73-1	1,3-Dichlorobenzene	10 u	132-64-9	Dibenzofuran	10 u
106-46-7	1,4-Dichlorobenzene	10 u	121-14-2	2,4-Dinitrotoluene	10 u
100-51-6	Benzyl Alcohol	10 u	606-20-2	2,6-Dinitrotoluene	10 u
95-50-1	1,2-Dichlorobenzene	10 u	84-66-2	Diethylphthalate	10 u
95-48-7	2-Methylphenol	10 u	7005-72-3	4-Chlorophenyl-phenylether	10 u
39638-32-9	bis(2-chloroisopropyl)Ether	10 u	86-73-7	Fluorene	10 u
106-44-5	4-Methylphenol	10 u	100-01-6	4-Nitroaniline	50 u
621-64-7	N-Nitroso-Di-n-Propylamine	10 u	534-52-1	4,6-Dinitro-2-Methylphenol	50 u
67-72-1	Hexachloroethane	10 u	86-30-6	N-Nitrosodiphenylamine(1)	10 u
98-95-3	Nitrobenzene	10 u	101-55-3	4-Bromophenyl-phenylether	10 u
78-59-1	Isophorone	10 u	118-74-1	Hexachlorobenzene	10 u
88-75-5	2-Nitrophenol	10 u	87-86-5	Pentachlorophenol	1400
105-67-9	2,4-Dimethylphenol	10 u	85-01-8	Phenanthrene	10 u
65-85-0	Benzoic Acid	50 u	120-12-7	Anthracene	10 u
111-91-1	bis(2-Chloroethoxy)Methane	10 u	84-74-2	Di-n-Butylphthalate	10 u
120-83-2	2,4-Dichlorophenol	10 u	206-44-0	Fluoranthene	10 u
120-82-1	1,2,4-Trichlorobenzene	10 u	129-00-0	Pyrene	10 u
91-20-3	Naphthalene	10 u	85-68-7	Butylbenzylphthalate	10 u
106-47-8	4-Chloroaniline	10 u	91-94-1	3,3'-Dichlorobenzidine	20 u
87-68-3	Hexachlorobutadiene	10 u	56-55-3	Benzo (a)Anthracene	10 u
59-50-7	4-Chloro-3-Methylphenol	10 u	117-81-7	bis(2-Ethylhexyl)Phthalate	~~2.7 J~~ 3J 8-21
91-57-6	2-Methylnaphthalene	10 u	218-01-9	Chrysene	10 u
77-47-4	Hexachlorocyclopentadiene	10 u	117-84-0	Di-n-Octyl Phthalate	10 u
88-06-2	2,4,6-Trichlorophenol	10 u	205-99-2	Benzo(b)Fluoranthene	10 u
95-95-4	2,4,5-Trichlorophenol	50 u	207-08-9	Benzo(k)Fluoranthene	10 u
91-58-7	2-Chloronaphthalene	10 u	50-32-8	Benzo(a)Pyrene	10 u
88-74-4	2-Nitroaniline	50 u	193-39-5	Indeno(1,2,3-cd)Pyrene	10 u
131-11-3	Dimethyl Phthalate	10 u	53-70-3	Dibenz(a,h)Anthracene	10 u
208-96-8	Acenaphthylene	10 u	191-24-2	Benzo(g,h,i)Perylene	10 u
99-09-2	3-Nitroaniline	50 u			

(1)-Cannot be separated from diphenylamine

Laboratory Name: NUS CORPORATION
Case No: ES/ALLTIFT RLTY

Sample Number
S-4

5

Organics Analysis Data Sheet
(Page 2)

Semivolatile Compounds

Concentration: Low
Date Extracted/Prepared: 06/18/86
Date Analyzed: 07/28/86
Conc/Dil Factor: 1
Percent Moisture (Decanted): 0

GPC Cleanup: NO
Separatory Funnel Extraction: YES
Continuous Liquid-Liquid Extraction: NO

CAS Number		ug/l	CAS Number		ug/l
108-95-2	Phenol	10 U	83-32-9	Acenaphthene	10 U
111-44-4	bis(2-Chloroethyl)Ether	10 U	51-28-5	2,4-Dinitrophenol	50 U
95-57-8	2-Chlorophenol	10 U	100-02-7	4-Nitrophenol	50 U
541-73-1	1,3-Dichlorobenzene	10 U	132-64-9	Dibenzofuran	10 U
106-46-7	1,4-Dichlorobenzene	10 U	121-14-2	2,4-Dinitrotoluene	10 U
100-51-6	Benzyl Alcohol	10 U	606-20-2	2,6-Dinitrotoluene	10 U
95-50-1	1,2-Dichlorobenzene	10 U	84-66-2	Diethylphthalate	10 U
95-48-7	2-Methylphenol	10 U	7005-72-3	4-Chlorophenyl-phenylether	10 U
39638-32-9	bis(2-chloroisopropyl)Ether	10 U	86-73-7	Fluorene	10 U
106-44-5	4-Methylphenol	10 U	100-01-6	4-Nitroaniline	50 U
621-64-7	N-Nitroso-Di-n-Propylamine	10 U	534-52-1	4,6-Dinitro-2-Methylphenol	50 U
67-72-1	Hexachloroethane	10 U	86-30-6	N-Nitrosodiphenylamine(1)	10 U
98-95-3	Nitrobenzene	10 U	101-55-3	4-Bromophenyl-phenylether	10 U
78-59-1	Isophorone	10 U	118-74-1	Hexachlorobenzene	10 U
88-75-5	2-Nitrophenol	10 U	87-86-5	Pentachlorophenol	50 U
105-67-9	2,4-Dimethylphenol	10 U	85-01-8	Phenanthrene	10 U
65-85-0	Benzoic Acid	50 U	120-12-7	Anthracene	10 U
111-91-1	bis(2-Chloroethoxy)Methane	10 U	84-74-2	Di-n-Butylphthalate	10 U
120-83-2	2,4-Dichlorophenol	10 U	206-44-0	Fluoranthene	10 U
120-82-1	1,2,4-Trichlorobenzene	10 U	129-00-0	Pyrene	10 U
91-20-3	Naphthalene	7 J	85-68-7	Butylbenzylphthalate	10 U
106-47-8	4-Chloroaniline	99	91-94-1	3,3'-Dichlorobenzidine	20 U
87-68-3	Hexachlorobutadiene	10 U	56-55-3	Benzo (a)Anthracene	10 U
59-50-7	4-Chloro-3-Methylphenol	10 U	117-81-7	bis(2-Ethylhexyl)Phthalate	10 U
91-57-6	2-Methylnaphthalene	10 U	218-01-9	Chrysene	10 U
77-47-4	Hexachlorocyclopentadiene	10 U	117-84-0	Di-n-Octyl Phthalate	10 U
88-06-2	2,4,6-Trichlorophenol	10 U	205-99-2	Benzo(b)Fluoranthene	10 U
95-95-4	2,4,5-Trichlorophenol	50 U	207-08-9	Benzo(k)Fluoranthene	10 U
91-58-7	2-Chloronaphthalene	10 U	50-32-8	Benzo(a)Pyrene	10 U
88-74-4	2-Nitroaniline	50 U	193-39-5	Indeno(1,2,3-cd)Pyrene	10 U
131-11-3	Dimethyl Phthalate	10 U	53-70-3	Dibenz(a,h)Anthracene	10 U
208-96-8	Acenaphthylene	10 U	191-24-2	Benzo(g,h,i)Perylene	10 U
99-09-2	3-Nitroaniline	50 U			

(1)-Cannot be separated from diphenylamine

⑥

September 20, 1985

FIELD MEMO

ACTION	INFO	FILE:
		13305-009 13305-010

FROM: Eileen D. Gilligan - SR

SUBJ: Observations of Allied Chemical-Hopkins Street and Alltift Sites During Phase II Field Activities

Between 6/28/85 and 7/20/85, I visited the Allied Chemical-Hopkins Street Site and Alltift Site numerous times to gather field data and observe progress of drilling activities. The following observations, which provide answers or estimates to HRS questions, were made during these visits.

1) The pond in the southeast corner of the Allied Chemical-Hopkins Site appears to be a flooded woodland (numerous trees (dead and alive) standing in the open water). Judging by these trees and the gentle slope of the pond bottom near the shoreline, the maximum depth of the pond is estimated to be approximately 10 feet.

2) Surface water usage by the public in this area of Buffalo is primarily for recreation and commercial shipping on Lake Erie. Numerous marinas and docking facilities are located on the lake shoreline; these facilities also are visible in the air photos.

3) Land usage in the vicinity of these two sites is primarily industrial and commercial. These sites are located in an area of railroad switchyards, landfills, and scrap yards. The Allied Chemical-Hopkins Site borders the western edge of a residential area, no farming occurs near the sites. No historic or landmark sites can be seen from the sites. No State or National Parks or Forest are nearby. However, South Park (a city park) is located at the south end of Hopkins Street. Tifft Farms Nature Preserve is located north of these sites.

Eileen

Buffalo Area Sites
job # 46314

(HARMON, 1984)
page 1 of 19
H. Dan Harman Jr.
10-15-84

7

Alltift Realty

1349 HNu survey
0.3 ppm background.
1352 on site 0.3 ppm
(northern end)
1357 middle of site 0.3 ppm
1402 southern end 0.3 ppm
Wind from south - southwest.
1409 Background 0.3 ppm
Survey complete.

Allied Chemical Site

1415 Background 0.4 ppm.
1420 on site - west of pond
0.6 ppm
1421 on site - near burn pit
area 0.5 ppm
1424 Background 0.4 ppm
Survey complete

Above surveys conducted by
Gary Christopher and Dan Harman.

(Koczaja, 198

RECORD OF TELEPHONE CONVERSATION

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

RECORDED BY: E D Gilligan OWNER/CLIENT: NYSDEC

3

TALKED WITH: Ron Koczaja OF Erie Co DOH

NATURE OF CALL: INCOMING ☐ OUTGOING ☒

ROUTE TO: INFORMATION ACTION

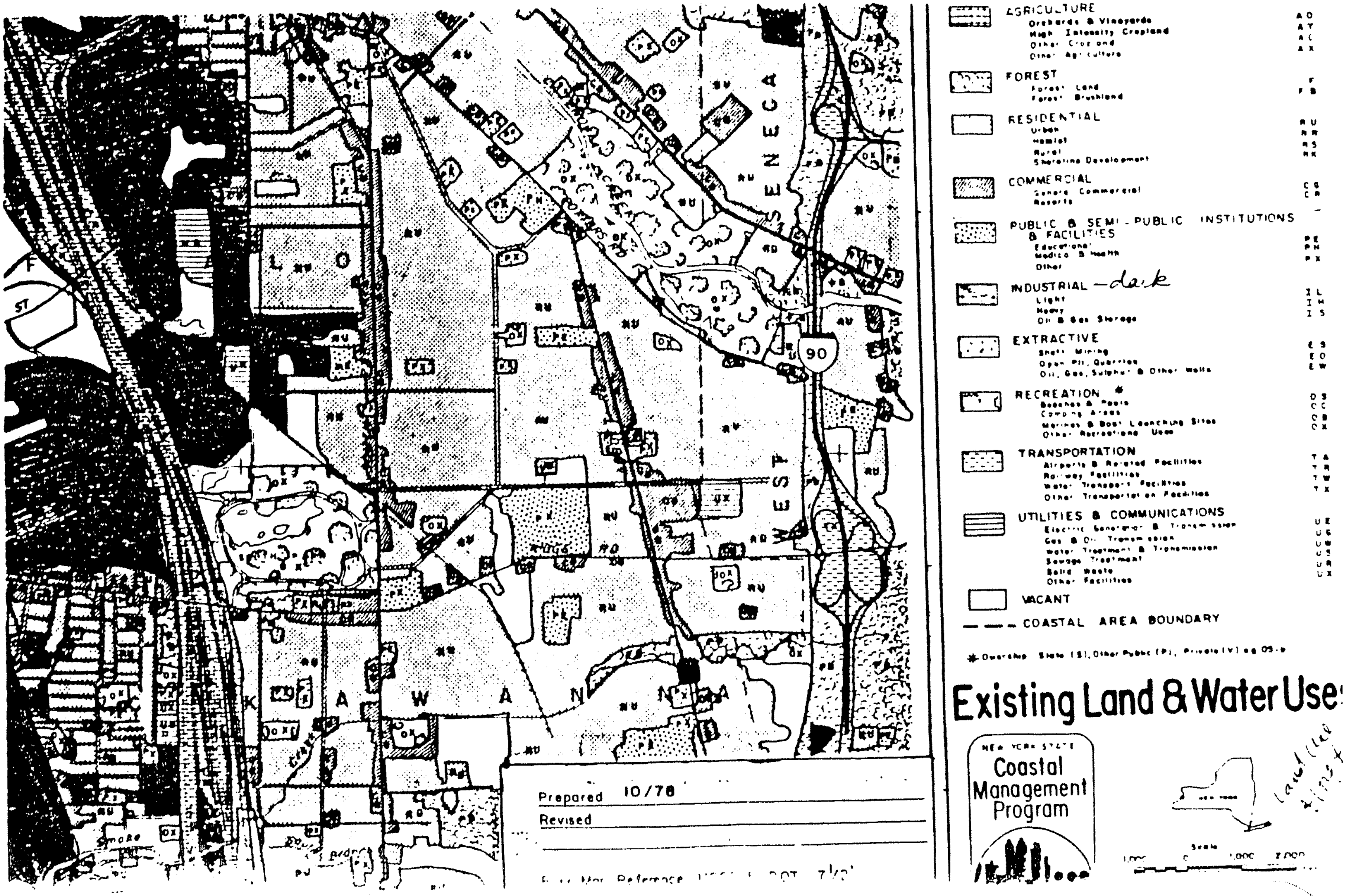
MAIN SUBJECT OF CALL: groundwtr use at INS, Allied-Hopkins and Alltift sites

ITEMS DISCUSSED:

Koczaja gave me the following information

INS - no known usage 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 its in
use, no one theoretically should
come in contact with it, but,
conservatively speaking, a range
may be 0-20 people

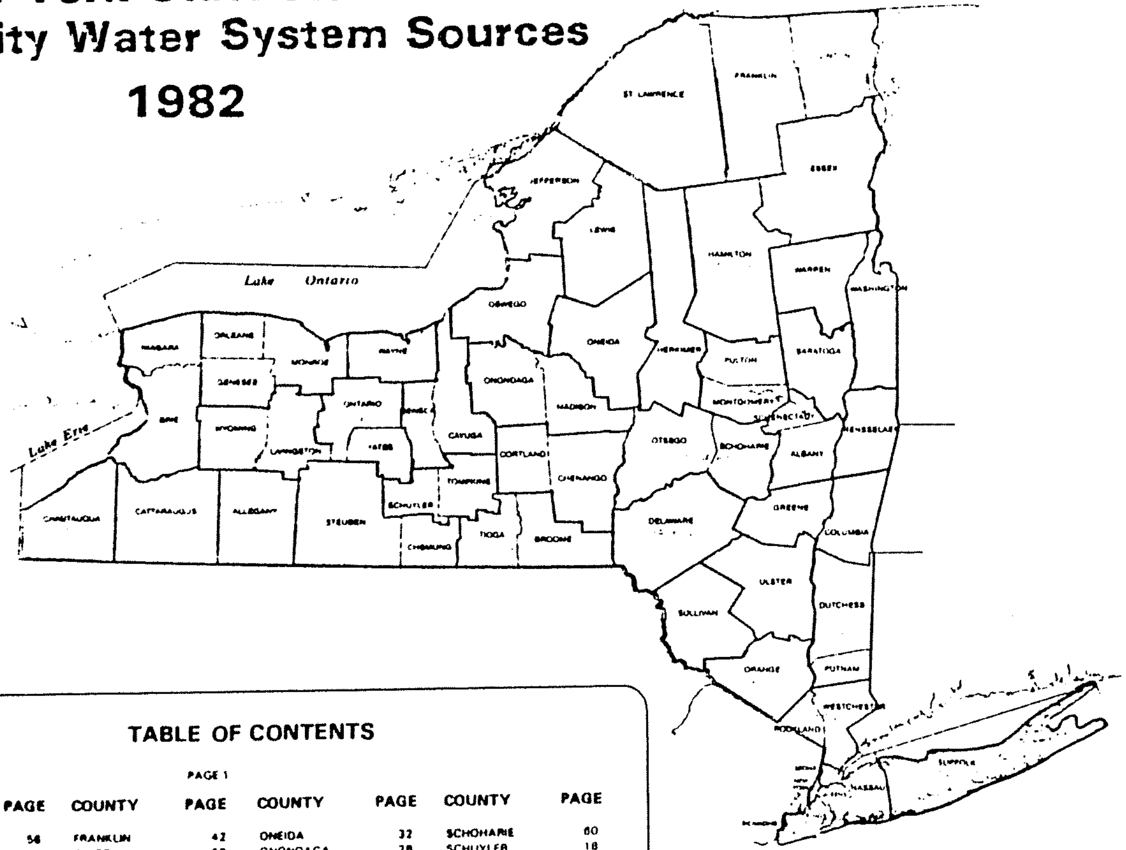
Allied Chem - Hopkins St | No use for either
Alltift | shallow or deep aquifers
within 2 or 3 miles of site
Donna Hanna Coke Company had an
industrial well, but the factory
is closed down now.



(NYS Costal Management Program, 1978)

New York State Atlas of Community Water System Sources
1982

NEW YORK STATE
DEPARTMENT OF HEALTH



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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	66	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
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LEGEND

BOUNDARIES AND PLACES

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

CLASSIFICATION OF POPULATED PLACES

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

TRANSPORTATION

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

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

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

Rest Areas
Food Gas Rest Rooms Rest Rooms
Gas Rest Rooms Parking Only

RECREATION FACILITIES

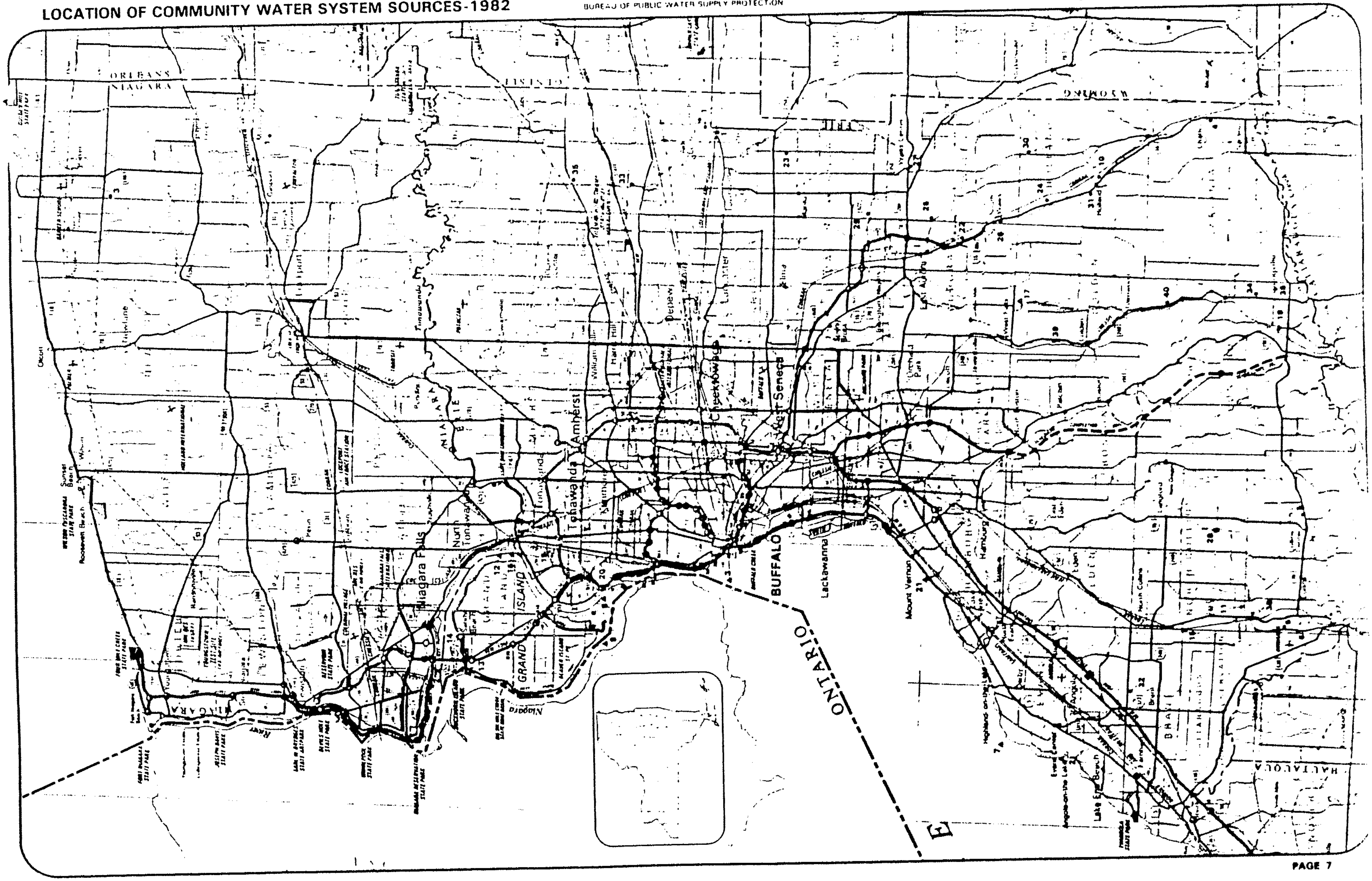
State or National Recreation Area
State Campground
State Boat Launching Site
State Canal Park
State Fish Hatchery
Other State Recreation Site

NYSDC
1982
10

LOCATION OF COMMUNITY WATER SYSTEM SOURCES-1982

NEW YORK STATE DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF PUBLIC WATER SUPPLY PROTECTION

ERIE and NIAGARA COUNTIES



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

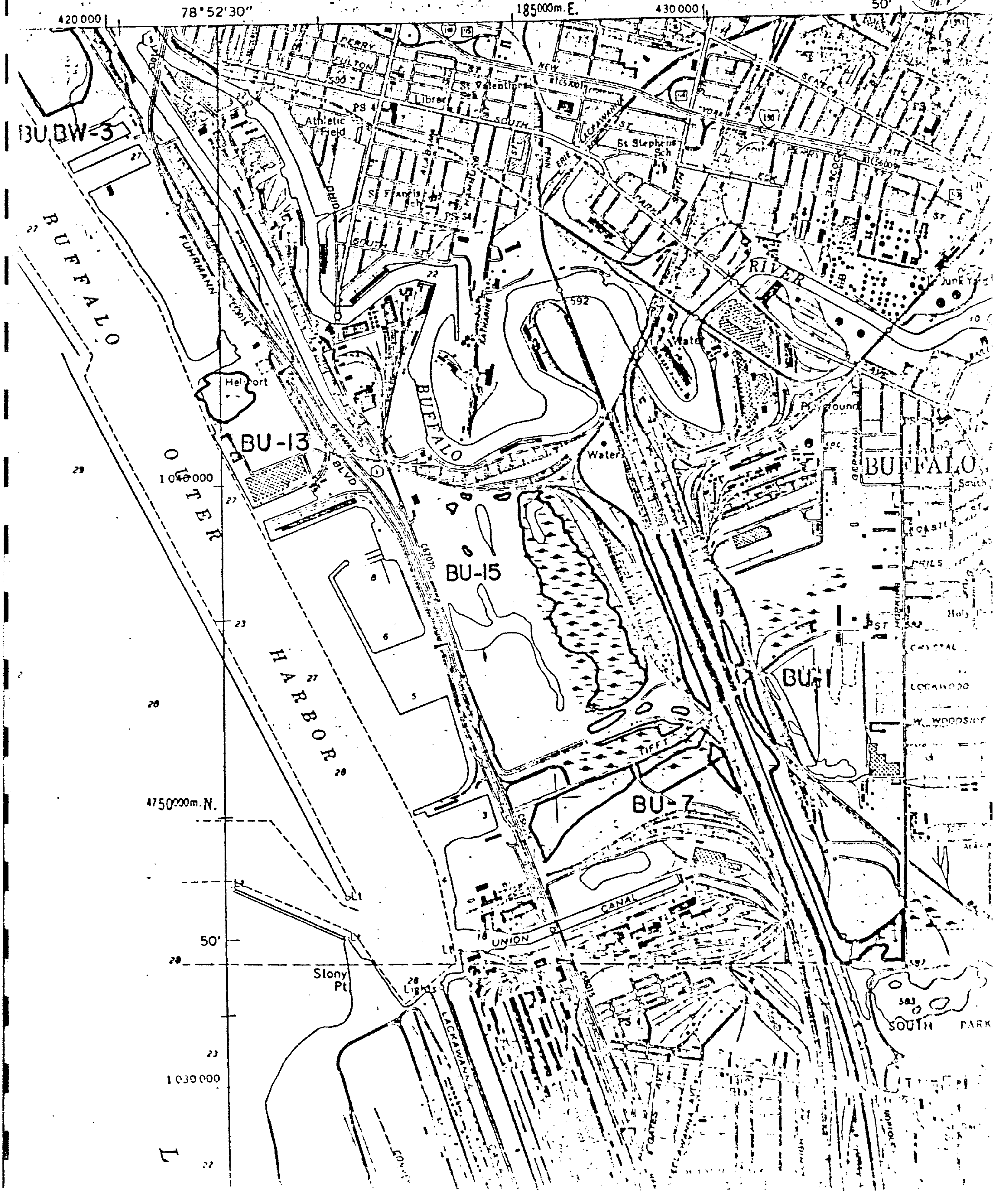
ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
	Municipal Community		
	Lockport City (See No 12, Erie Co)	25000	
1	Middleport Village	2000	Wells (Springs)
	Niagara County Water District (See No 13, Erie Co)	48	
2	Niagara Falls City (See also No 14 Erie Co)	77384	Niagara River - East Branch
	North Tonawanda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

(NYSDOH, 1982)

10

DEPARTMENT OF TRANSPORTATION

Map of state recog. wetlands



Rayer, 1978

⑫

INTERAGENCY TASK FORCE ON HAZARDOUS WASTES
M.P.O. Box 561
Niagara Falls, New York 14302
(716) 285-3057

I. General Information

1. Company Name Buffalo Color Corporation

Mailing Address 1 Garret Mountain Plaza, West Paterson, NJ 07424
Street City State Zip

Present Plant Location ☐ Same as Above

P. O. Box 7027 Buffalo NY 14240
Street City State Zip

2. If Subsidiary or Division, Name of Parent Company N/A

3. Person Responsible for Present Plant Operations William Kitto
Name

Vice President, Manufacturing (716) 827-4500
Title Telephone

4. Person Answering this Questionnaire G. R. Rayer
Name
Manager, Environmental Services
Allied Chemical Corporation (201)-455-4550
Title Telephone

II. Company History

1. Date Company Founded Buffalo Color Corporation - 10/28/76

Date and State of Incorporation 10/28/76 - Delaware

Date Company Began Operations in Erie or Niagara County 6/30/77

2. Other Company Names since 1930 (specify time periods) Appendix G.

3. Other Plant Locations in Erie or Niagara County since 1930 (specify locations and time periods) Appendix H.

4. Names of Companies Acquired which have Operated Plants in Erie or Niagara County since 1930 (specify name of company, date of acquisition, location of plant, and periods of operation). None.

Rayer, 1978

(12)

5. Identify all Treatment or Disposal Sites in Erie or Niagara County used since 1930 (use separate sheet for each site).

a. Name of Site F. Downing Trucking

b. Location Tifft Street, Buffalo NY

c. Owner or Operator F. Downing Trucking

d. Time Period Site was Used ca 1960 - 1965

e.

	Describe Waste Types Treated or Disposed at this Site	Physical State	Total Quantity	Type of Container, If Any
(1)	Trash	Solid	Unknown	Unknown
(2)	Sludges	Sludge	"	"
(3)				
(4)				
(5)				

f. Wastes Were ☒ land disposed ☐ incinerated ☐ reclaimed ☐ treated ☐ other (specify)

g. Names of waste haulers including your company transporting such wastes to this site, if a disposal site.

F. Downing Trucking
Name Telephone

Tifft Street Buffalo NY
Street City State

Time Periods such Hauler Transported to this Site ca 1960 - 1965

Name Telephone

Street City State

Time Periods such Hauler Transported to this Site

h. List Names and Addresses of other Companies using this Site, if a disposal site.

Insufficient information to answer.
Name of Company

Street City State

Time Periods such Other Company Used this Site

RAYER, 1978

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APPENDIX F

Section IV-4 Waste Haulers

Name, Address, Telephone

a) Chem-trol Pollution Services
Model City, Sanford, NJ

b) F. Downing Trucking (out of business ca. late 1960's)
Tifft Street, Buffalo, NY

c) Frontier Chemical
4626 Royal Avenue, Niagara Falls, NY
693-3041

d) Rapid Disposal
22 Metcalf Street, Buffalo, NY
852-6622

e) Niagara Sanitation
262 Pullman Avenue, Buffalo, NY
693-5185

f) Buffalo Sanitation (out of business, incorporated into Niagara Sanitation)

g) TLC Disposal (out of business ca. 1972, incorporated into Niagara Sanitation)
85 Michigan Avenue, Buffalo, NY

(Recra/Wehran, 1978)
(13)

HYDROGEOLOGIC INVESTIGATION
ALLTIFT LANDFILL
ERIE COUNTY, BUFFALO, NEW YORK

Prepared for

Alltift, Inc.
P.O. Box 246
Buffalo, New York 14240

Prepared by

A Joint Venture of

WEHRAN ENGINEERING CORPORATION
and RECRA RESEARCH, INC.

[illegible] INC. LANDFILL SITE
GROUND WATER SAMPLES

(Recra & Wehran, 1978)

13

TABLE 6

Sampling Date: 7/31/78
Report Date: 9/26/78

PARAMETER	UNITS OF MEASURE	SAMPLING LOCATION				
		B1	B2	B4	B5	B6
pH	Standard Units	7.28	7.47	6.43	7.10	7.34
Conductivity	µmhos/cm	6,000	21,000	11,000	4.000	5,400
Dissolved Oxygen	mg/l	5.8	4.3	7.2	4.2	6.2
BOD5	mg/l	359	7,020	96.5	242	605
COD	mg/l	489	2,580	593	291	379
Total Coliform	MPN/100ml	130	24,000	230	130	24,000
Ammonia	mg N/l	77.6	1,930	73.9	61.2	107
Nitrate	mg N/l	<0.1	<0.5	<0.5	0.12	<0.1
Nitrite	mg N/l	0.05	<0.05	<0.05	0.08	0.05
TKN	mg N/l	91.9	1490	106	69.2	125
Phosphate (total)	mg P/l	0.556	1.29	0.044	0.086	0.130
Sulfate	mg/l	86.3	441	2,660	387	240
Detergent	MBAS mg/l	0.16	0.05	0.19	0.15	0.03
Phenols	mg/l	0.037	0.696	0.050	0.020	0.030
Alkalinity	mg/l as $CaCO_3$	2,280	8,270	915	1,530	1,760
Total Solids	mg/l	4,410	30,000	9,590	2,990	4,950
Color	True Pt-Co Units	500	-	200	150	200
Hardness (total)	mg/l	665	1,250	2,260	665	594
Chlorides	mg/l	3,630	8,450	3,880	730	1,010
Total Organic Carbon	mg/l	950	1,400	313	110	488
Total Halogenated Hydrocarbons	µg/l as Cl, Lindane Standard	8.42	38.4	1.32	1.24	3.33
PCB's	µg/l as 1254	<1.0	<1.0	<1.0	<1.0	<1.0
Total Aluminum	mg/l	0.26	0.05	0.24	0.06	<0.03
Total Arsenic	µg/l	6.3	131	<4	5.1	21.3
Total Chromium	mg/l	0.014	0.546	<0.003	0.010	0.006
Hexavalent Chromium	mg/l	<0.01	0.04	<0.01	<0.01	<0.01
Total Copper	mg/l	<0.003	0.026	0.015	0.21	0.005
Total Lead	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03
Total Mercury	µg/l	<1.3	3.8	<1.3	<1.3	<1.3
Total Potassium	mg/l	98	908	146	118	128
Total Sodmium	mg/l	1,060	3,080	2,020	840	1,140
Total Calcium	mg/l	214	54	760	146	190
Total Silver	mg/l	<0.002	<0.002	<0.002	<0.002	<0.002
Total Iron	mg/l	0.28	2.43	5.08	0.16	0.03

COMMENTS: Samples were collected by Recra personnel and received on 7/31/78. Data not provided in these tables are a consequence of insufficient sample volume for completion of the required analyses. The determination of true color of samples from B2 and B7 were turbid after centrifugation and could not be matched with any standard Pt-Co Color Unit. Sample B2 exhibited higher NH_3-N than Total Kjeldahl Nitrogen (TKN). These results are believed to be due to the positive interferences in the NH_3-N analyses from amines and other nitroso compounds that would not effect the TKN results. This conclusion is supported by the presense of numerous nitrogen compounds as seen in the chromatographs for the total halogenated organics analyses.

FOR RECRA RESEARCH, INC.

DATE 9/26/78

RECRA RESEARCH, INC.
CHEMICAL WASTE MANAGEMENT THROUGH APPLIED RESEARCH
111 Wales Avenue/Tonawanda, New York 14150/(716) 692-7620

(Recra & Wehran, 1978)

13

[illegible] COMPANY, INC. LANDFILL SITE
GROUND WATER SAMPLES

Sampling Date: 7/31/78
Report Date: 9/26/78

TABLE 6

PARAMETER	UNITS OF MEASURE	SAMPLING LOCATION				
		B7	B8	-	-	-
H	Standard Units	8.00	7.70	-	-	-
onductivity	umhos/cm	7,900	6,000	-	-	-
Dissolved Oxygen	mg/1	-	-	-	-	-
BOD_5	mg/1	-	-	-	-	-
COD	mg/1	780	499	-	-	-
Total Coliform	MPN/100ml	-	-	-	-	-
Ammonia	mg N/1	259	113	-	-	-
Nitrate	mg N/1	<0.1	<1.0	-	-	-
Nitrite	mg N/1	0.07	0.12	-	-	-
TKN	mg N/1	-	-	-	-	-
Phosphate (total)	mg P/1	-	0.044	-	-	-
Sulfate	mg/1	-	299	-	-	-
Detergent	MBAS mg/1	-	0.03	-	-	-
Phenols	mg/1	0.089	0.071	-	-	-
Alkalinity	mg/1 as $CaCO_3$	2,250	2,390	-	-	-
Total Solids	mg/1	6,100	6,100	-	-	-
Color	True Pt-Co Units	-	700	-	-	-
Hardness (total)	mg/1	-	536	-	-	-
Chlorides	mg/1	2,070	1,430	-	-	-
Total Organic Carbon	mg/1	-	538	-	-	-
Total Halogenated Hydrocarbons	µg/1 as Cl, Lindane Standard	-	-	-	-	-
PCB's	µg/1 as 1254	-	-	-	-	-
Total Aluminum	mg/1	<0.03	0.24	-	-	-
Total Arsenic	µg/1	15.4	12.2	-	-	-
Total Chromium	mg/1	0.016	0.012	-	-	-
Hexavalent Chromium	mg/1	0.01	0.01	-	-	-
Total Copper	mg/1	0.01	0.014	-	-	-
Total Lead	mg/1	<0.03	<0.03	-	-	-
Total Mercury	µg/1	10.7	-	-	-	-
Total Potassium	mg/1	182	118	-	-	-
Total Sodium	mg/1	1,560	1,300	-	-	-
Total Calcium	mg/1	56	18	-	-	-
Total Silver	mg/1	0.004	0.003	-	-	-
Total Iron	mg/1	0.46	0.02	-	-	-

COMMENTS: The analyses of PCB's included Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, and 1268. None of these Aroclors were found in detectable concentrations. For reporting purposes Aroclor 1254 was arbitrarily chosen for presentation of a working detection limit. The other Aroclors exhibit similar detection limits.

FOR RECRA RESEARCH, INC. Robert K. Wyeth

DATE 9/26/78

RECRA RESEARCH, INC.
TOTAL CHEMICAL WASTE MANAGEMENT THROUGH APPLIED RESEARCH
111 Wales Avenue / Tonawanda, New York 14150 / (716) 692-7620

(Recra & Wehran, 1978

(13)

[illegible]

[illegible] COMPANY, INC. LANDFILL SITE

SURFACE WATER SAMPLES

TABLE 7

Sampling Date: 7/17/78
Report Date: 9/26/78

PARAMETER	UNITS OF MEASURE	SAMPLING LOCATION SS1	SS2	SS3	SS4	SS5
pH	Standard Units	2.38	2.36	7.95	8.01	7.51
Conductivity	umhos/cm	9400	9400	6600	7400	5500
Dissolved Oxygen	mg/l	0.5	0.5	3.20	5.06	5.16
BOD5	mg/l	36.7	12.3	193	339	169
COD	mg/l	60.6	70.7	495	495	404
Total Coliform	MPN/100ml	≤200	≤200	1700	4900	35,000
Ammonia	mg N/l	1.42	2.10	31.8	72.9	40.1
Nitrate	mg N/l	18	18	0.16	<0.10	<0.10
Nitrite	mg N/l	-	-	-	-	-
TKN	mg N/l	5.22	3.99	59.4	86.5	40.7
Phosphate (Total)	mg P/l	0.05	0.05	1.17	7.40	0.15
Sulfate	mg/l	6050	5930	696	589	956
Detergent	MBAS mg/l	<0.02	<0.02	0.14	0.14	0.10
Phenols	mg/l	0.040	0.036	0.058	0.043	0.057
Acidity	mg/l as $CaCO_3$	6210	6480	-	-	-
Alkalinity	mg/l as $CaCO_3$	-	-	1880	2250	1140
Total Solids	mg/l	9970	10,400	4890	5540	4200
Color	True Pt-Co Units	1500	1500	1670	3500	1000
Hardness (Total)	mg/l	600	650	860	765	750
Chlorides	mg/l	11.6	13.1	1270	1570	1050
Total Organic Carbon	mg/l	30.0	30.5	785	805	505
Total Halogenated Hydrocarbons	ug/l as Cl, Lindane Standard	2.31	7.25	1.02	<0.75	<0.75
PCB's	ug/l as 1254	<2.50	<2.00	≤2.50	<1.0	<1.0
Total Aluminum	mg/l	4.91	4.87	0.11	0.15	0.06
Total Arsenic	ug/l	94	34	8	2	5
Total Chromium	mg/l	0.834	0.874	0.040	0.042	0.066
Hexavalent Chromium	mg/l	0.80	0.82	0.03	0.04	0.05
Total Copper	mg/l	1.0	1.3	0.017	<0.003	0.010
Total Lead	mg/l	0.51	0.51	<0.02	<0.02	<0.02
Total Mercury	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Total Potassium	mg/l	3.5	4.8	286	289	246
Total Sodium	mg/l	340	70	1220	1100	1050
Total Calcium	mg/l	184	652	116	148	56
Total Silver	mg/l	0.008	0.008	<0.003	<0.003	<0.003
Total Iron	mg/l	2030	1770	2.00	0.80	1.20

COMMENTS: Samples were collected by Recra personnel and received on 7/17/78. Nitrite nitrogen analyses could not be completed due to interferences present in the samples. Differences in detectabilities for PCB's is a result of different final volumes of the sample extracts. Sample SS3 was believed to contain PCB's but due to the low levels in the extract (<0.5 mg/µl) the exact amount in the original sample was not quantifiable. Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260 and 1268 were used for quantification purposes. Aroclor 1254 was arbitrarily selected for reporting purposes. These data are reported as less than the detection limit of 1254. The detection limits of the other Aroclors are approximately the same as for 1254.

FOR RECRA RESEARCH, INC. Robert K. Wyeth DATE 9/26/78

RECRA RESEARCH, INC. 111 Wales Avenue/Tonawanda, New York 14150/(716) 692-7620
TOTAL CHEMICAL WASTE MANAGEMENT THROUGH APPLIED RESEARCH

(Recra, 1982) (13)

RECRA RESEARCH, INC.
Hazardous Waste And Toxic Substance Control

RECRA RESEARCH, INC.
4248 Ridge Lea Road
Amherst New York 14226

SUPPLEMENTAL HYDROGEOLOGIC INVESTIGATION

ALLTIFT - 1982

(Recra, 1982)

⑬

ANALYTICAL RESULTS

ALLTIFT, INC.
DEEP WELLS

Report Date: 6/4/82
Date Received: 5/6/82

PARAMETER	UNITS OF MEASURE	SAMPLE IDENTIFICATION (DATE) W-1 (5/6/82)	W-2 (5/6/82)	W-3 (5/6/82)	W-4 (5/6/82)
Total Aluminum	mg/l	4.3	7.3	2.0	2.2
Total Arsenic	µg/l	<4	<4	<4	<4
Total Chromium	mg/l	0.040	0.050	0.064	0.040
Hexavalent Chromium	mg/l	0.006	0.012	0.008	<0.004
Total Cadmium	mg/l	<0.004	<0.004	<0.004	0.004
Total Zinc	mg/l	1.1	0.803	1.4	0.109
Total Selenium	µg/l	<5	<5	<5	<5
Total Copper	mg/l	0.100	0.038	0.022	0.040
Total Lead	mg/l	0.03	<0.03	<0.03	<0.03
Total Mercury	µg/l	<1	<1	<1	<1
Total Sodium	mg/l	540	150	14	18
Total Calcium	mg/l	68	46	28	170
Total Silver	mg/l	<0.01	<0.01	<0.01	<0.01
Total Manganese	mg/l	0.22	0.23	0.20	0.16
Total Iron	mg/l	88	28	35	54
Nitrogen-Phosphorus Scan	µg/l as Nitrogen; N,N'-Dimethylaniline Standard	<1	<1	<1	<1

COMMENTS: The Nitrogen-Phosphorus Scan is used for screening purposes only and is not designed for qualification or quantification of any specific compounds. Ths results are calculated based upon the response factor and nitrogen content of N,N'-Dimethylaniline but do not imply either the presence or absence of the compound itself. Nitrogen-Phosphorus scan results generally do not include volatile organic constituents.

FOR RECRA RESEARCH, INC. ______________________

DATE 6/4/82

RECRA RESEARCH INC

I.D. #82-480

15

(Roetzer, 1968)

3/20/68

Chas. Infantino

A. Roetzer - South Buffalo District Office

Tifft Street Dump - dumping of toxic matter from National Aniline, Div. of Allied Chemical Co.

Approximate weights and types of chemicals being disposed of at the Tifft Street Dump by the National Aniline Division of Allied Chemical Co. as reported to Mr. Roetzer by Mr. Ferber - National Aniline.

Approximate weights per month

200,000 lbs. - water.

15,000 lbs. - miscellaneous organic materials.

450,000 lbs. - inorganic materials (including filtering materials).

50,000 lbs. - chrome sludge.

20,000 lbs. - copper sulfate.

100 lbs. - nitro benzene.

600 lbs. - mono chloro. benzene.

1,000 lbs. - napthalene.

1 - 3500 gallon tank disposed of daily.

For any further information regarding this matter contact Mr. Ferber - National Aniline, Division of Allied Chemical Co.

(16)

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)

⑯

Mercury

145,165,167, VOL 4 S199*, VOL 5 175#. Reported in EPA TSCA Inventory, 1980.

THR: A hmn GIT, CNS. An exper ETA. HIGH ihl. See also mercury compounds. Reacts violently with acetylene, NH_3, BPI_2, Cl_2, ClO_2, CH_3N_3, Na_2C_2, nitromethane, (butyne diol + acid).

Incomp: Acetylenic compounds; ~~ammonia~~; boron diiodophosphide; ethylene oxide; metals; methyl azide; methylsilane, oxygen; ~~oxidants;~~ tetracarbonylnickel, oxygen.

For further information see Vol. 1, No. 3 of *DPIM Report.*

MERCURY AMIDE CHLORIDE

CAS RN: 10124488 NIOSH #: OV 7020000
mf: ClH_2HgN; mw: 252.07

White pulverulent lumps or powder.

SYNS:
AMINOMERCURIC CHLORIDE
MERCURIC AMMONIUM CHLORIDE, SOLID
MERCURIC CHLORIDE, AMMONIATED
MERCURY AMINE CHLORIDE
MERCURY AMMONIATED
WHITE MERCURY PRECIPITATED
WHITE PRECIPITATE

TOXICITY DATA:
Aquatic Toxicity Rating: TLm96:under 1 ppm WQCHM* 3,-,74. *Toxicology Review:* SDGTB3 1(2),177,71; 27ZTAP 3,15,69. DOT: Poison B, Label: Poison FEREAC 41,57018,76. Occupational Exposure to Inorganic Mercury recm std: Air: TWA 0.05 mg(Hg)/m3 NTIS**. Reported in EPA TSCA Inventory, 1980.

THR: A poison. See also mercury compounds.

Disaster Hazard: When heated to decomp it emits very tox fumes of Cl^-, NO_x and Hg.

MERCURY(II)-o-ARSENATE

CAS RN: 7784374 NIOSH #: OV 7040000
mf: $AsHO_4 \cdot Hg$; mw: 340.52

Yellow powder; mp: decomp. Insol in H_2O, sol in HCl or HNO_3.

SYN: MERCURIC ARSENATE

TOXICITY DATA: 3
Aquatic Toxicity Rating: TLm96:under 1 ppm WQCHM* 3,-,74. Occupational Exposure to Inorganic Mercury recm std: Air: TWA 0.05 mg(Hg)/m3 NTIS**. Occupational Exposure to Inorganic Arsenic recm std: Air: CL 2 ug/m3/15M NTIS**.

THR: A poison. See also mercury and arsenic compounds.

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

MERCURY(I) AZIDE

mf: Hg_2N_6; mw: 485.22

THR: Explodes on heating in air. HIGH tox. See also azides, mercury compounds.

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

MERCURY(II) AZIDE

mf: HgN_6; mw: 284.65

THR: High friction sensitivity; brisance on [illegible] HIGH tox. See also mercury compounds, [illegible]

Disaster Hazard: When heated to decomp it [illegible] tox fumes of Hg and NO_x.

MERCURY(II) BENZOATE

CAS RN: 583153 NIOSH #: OV [illegible]
mf: $C_{14}H_{10}O_4 \cdot Hg$; mw: 442.83

White crystalline powder; odorless. mp: 165°. [illegible] in NaCl soln; slightly sol in alc. Protect from light.

SYNS:
MERCURIC BENZOATE
MERCURIC BENZOATE, [illegible] (DOT)

TOXICITY DATA: 3
Aquatic Toxicity Rating: TLm96:under 1 [illegible] WQCHM* 3,-,74. DOT: Poison B, Label: [illegible] FEREAC 41,57018,76. Occupational Exposure to [illegible] organic Mercury recm std: Air: TWA 0.05 [illegible] m3 NTIS**.

THR: A poison. See also mercury compounds.

Disaster Hazard: When heated to decomp it [illegible] fumes of Hg.

MERCURY(I) BROMIDE (1:1)

CAS RN: 10031182 NIOSH #: OV [illegible]
mf: BrHg; mw: 280.50

White-yellow tetrg cryst or powder; odorless [illegible] vap d: 19.3. Darkens on exposure to light. [illegible] approx 390° (decomp); Insol in H_2O, alc, ether, [illegible] by hot HCl or alkali bromides. Protect from light.

SYN: MERCUROUS BROMIDE, SOLID (DOT)

TOXICITY DATA: 3
Aquatic Toxicity Rating: TLm96:under [illegible] WQCHM* 3,-,74. DOT: Poison B, Label: [illegible] FEREAC 41,57018,76. Occupational Exposure [illegible] organic Mercury recm std: Air: TWA 0.05 [illegible] m3 NTIS**

THR: A poison. See also mercury compounds [illegible] mides.

Disaster Hazard: When heated to decomp it [illegible] tox fumes of Br^- and Hg.

MERCURY(II) BROMIDE (1:2)

CAS RN: 7789471 NIOSH #: OV [illegible]
mf: Br_2Hg; mw: 360.41

White crystals or cryst powder. Sensitive to [illegible] 237°; bp: 322° (sublimes); d: 6.109 @ 25°; [illegible] mm @ 136.5°; sublimes @ higher temp; very [illegible] alc, methanol, HCl, HBr, alkali bromide solns [illegible] sol in chloroform.

SYNS:
MERCURIC BROMIDE
MERCURIC BROMIDE, [illegible] (DOT)

RECORD OF TELEPHONE CONVERSATION

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

RECORDED BY: E D Gilligan OWNER/CLIENT: D+M

TALKED WITH: Jim Sneider OF DEC Fish + Wildlife
Reg 9

NATURE OF CALL: INCOMING ■ OUTGOING ☒

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 Alltuft) 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, ~~feasts~~ feasants, muskrats.

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

Site Inspection Report

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NYS	915054

II. SITE NAME AND LOCATION

01 SITE NAME *(Legal, common, or descriptive name of site)* Alltift Realty		02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER Tifft Street				
03 CITY Buffalo		04 STATE NY	05 ZIP CODE 14220	06 COUNTY Erie	07 COUNTY CODE 063	08 CONG DIST 36

09 COORDINATES: LATITUDE 42° 50' 37.0" LONGITUDE 78° 50' 22.5"

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 8/26/85 MONTH DAY YEAR	02 SITE STATUS ☒ ACTIVE ☐ INACTIVE	03 YEARS OF OPERATION 1960 / 1965 BEGINNING YEAR / ENDING YEAR ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION *(Check all that apply)*
☐ A. EPA ☐ B. EPA CONTRACTOR Dames & Moore *(Name of firm)* ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR *(Name of firm)*
☐ E. STATE ☒ F. STATE CONTRACTOR Engineering-Science *(Name of firm)* ☐ G. OTHER *(Specify)*

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
E. D. 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
Chuck Coven	--	Alltift Realty	(716) 823-9900
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY *(Check one)*	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT	11:36	Hazy

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	8/26/85 MONTH DAY YEAR

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NYS	915054

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 16,100
CUBIC YARDS ____
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	50,000	lbs/mo.	Chrome sludge
OLW	OILY WASTE			
SOL	SOLVENTS	700	lbs/mo.	Monochlorobenzene, nitrobenzene
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	160,000	lbs/mo.	Naphthalene and misc. organics
IOC	INORGANIC CHEMICALS	470,000	lbs/mo.	Copper sulfate and misc. inorganics
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
OCC	Phenols	108-95-2	LF	.04 - .69	ppm
MES	Mercury	743997-6	LF	4 - 10	ppb
MES	Chromium	7440-47-3	LF	0.116	ppm
MES	Lead	999	LF	0.12 - 0.40	ppm
MES	Arsenic	7440-38-2	LF	12-89	ppb
OCC	Benzene	71432	LF	85	ppb
OCC	xylene	1330207	LF	110	ppb
MES	Antimony	7440360	LF	18-340	ppb
MES	Copper	7440508	LF	17-6890	ppb

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)

Roetzer, 1968; Rayer, 1978; RECRA and Wehran, 1978; Phase II investigation, 1985; 1986.

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NYS	915054

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☑ A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: 0
02 ☑ OBSERVED (DATE: 7/31/79) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION 7/16/81, 8/26/85

Chromium, copper, lead, phenols, mercury, benzene, toluene, xylene, detected in upper and lower aquifers.

01 ☑ B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: 0
02 ☑ OBSERVED (DATE: 7/31/79) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION 7/10/81, 1985

Phenols, chromium, lead, mercury, copper, and organics detected.

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

No apparent odor, no organic vapors detected with HNu meter.

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

Unknown potential.

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

No workers permanently on-site.

01 ☑ F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED: less than 1 (Acres)
02 ☑ OBSERVED (DATE: 6/85) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Sediment from standing water contained organics and heavy metals. No soil samples analyzed.

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

Surface water and groundwater not used for drinking purposes within 3 mile radius.

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

None known.

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

None known.

EPA

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

I. IDENTIFICATION

01 STATE: NYS
02 SITE NUMBER: 915054

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

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

Due to seeps of contaminated groundwater along edge of fill into wetland.

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

Due to seeps of contaminated groundwater along edge of fill into wetland.

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

Due to seeps of contaminated groundwater along edge of fill into wetland.

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

Leaching to ground/surface water.

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

Fill area extends onto east and west neighbor's properties.

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

Not likely.

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

Not known.

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

Not applicable.

III. TOTAL POPULATION POTENTIALLY AFFECTED: 0

IV. COMMENTS

Surface water may be interconnected at times with nearby wetlands and Tifft Farms Nature Preserve.

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

Phase II investigation results.

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NYS	915054

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☒ G. STATE (Specify)	360-915-01-0239	--	--	Applied 8/5/81
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☐ A. SURFACE IMPOUNDMENT		
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☒ F. LANDFILL	16,100	tons
☐ 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

25 (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.

One 50 ft^2 area is fenced in, appears to be a dried pond, seeps of contaminated leachate along western boundary.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☒ YES ☐ NO

02 COMMENTS

Site fenced in but accessible along sides and through locked gate.

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

Phase II 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
NYS	915054

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. 5.2 (mi)
B. More than 3 (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY *(Check one)*

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

02 POPULATION SERVED BY GROUND WATER 0

03 DISTANCE TO NEAREST DRINKING WATER WELL More than 3 (mi)

04 DEPTH TO GROUNDWATER Approx. 9 (ft)

05 DIRECTION OF GROUNDWATER FLOW Radial

06 DEPTH TO AQUIFER OF CONCERN Approx. 9 (ft)

07 POTENTIAL YIELD OF AQUIFER Unknown (gpd)

08 SOLE SOURCE AQUIFER ☐ YES ☒ NO

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

10 monitoring wells installed on-site during Phase II investigation.

10 RECHARGE AREA ☒ YES ☐ NO
COMMENTS In east-central part of site.

11 DISCHARGE AREA ☒ YES ☐ NO
COMMENTS Into swamp on western edge 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
Buffalo River	☐	1.1 (mi)
Lake Erie	☐	1.2 (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. 5,641 NO. OF PERSONS	B. 39,951 NO. OF PERSONS	C. 82,218 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION 0.3 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE 3500

04 DISTANCE TO NEAREST OFF-SITE BUILDING 1,200' (mi)

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

Site is in industrial area of Buffalo. Neares Population (older residential area) 0.3 miles east of site.

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NYS	915054

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: 10' - 60' (ft)

04 DEPTH OF CONTAMINATED SOIL ZONE: Unknown (ft)

05 SOIL pH: Unknown

06 NET PRECIPITATION: 40-27 = 13 (in)

07 ONE YEAR 24 HOUR RAINFALL: 2.1 (in)

08 SLOPE
SITE SLOPE: 1.4 %
DIRECTION OF SITE SLOPE: N, S, W
TERRAIN AVERAGE SLOPE: 30 %

09 FLOOD POTENTIAL
SITE IS IN More than 500 YEAR FLOODPLAIN

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

11 DISTANCE TO WETLANDS *(5 acre minimum)*
ESTUARINE A. ______ (mi)
OTHER B. 0.0 (mi)

12 DISTANCE TO CRITICAL HABITAT *(of endangered species)*: More than 1 (mi)
ENDANGERED SPECIES: ______

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL
A. 0.0 (mi)

RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES
B. 0.8 (mi)

AGRICULTURAL LANDS
PRIME AG LAND
C. More than 3 (mi)
AG LAND
D. More than 3 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The landfill forms a mound approximately 30' above the surrounding natural ground surface. West and south of the site are swampy ponds which drain north.

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

Phase II investigation, 1985; USDOC, Climatic Atlas, 1979; USDOC, Rainfall Frequency Atlas, 1963; Sneider, 1985.

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NYS	915054

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	10	NUS	10/85
SURFACE WATER	5	NUS	10/85
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER Sediment	5	NUS	10/85

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
HNu Meter	Air survey with HNu photoionization meter

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 and Moore - Syracuse office

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

Gamma logs of deep CW-series wells. Geophysical surveys along perimeter of site.

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: NYS
02 SITE NUMBER: 915054

II. CURRENT OWNER(S)

01 NAME: Alltift Company
02 D+B NUMBER:
03 STREET ADDRESS (P.O. Box, RFD #, etc.): 105 Dorothy Street
04 SIC CODE:
05 CITY: Buffalo
06 STATE: NY
07 ZIP CODE: 14206

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

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

PARENT COMPANY (If applicable)

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

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

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

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

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

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

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

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

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

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

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

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

Allied Chemical Letter, 1/12/79
John Tygert, NYSDEC, May 1983.

EPA

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

I. IDENTIFICATION

01 STATE: NYS
02 SITE NUMBER: 915054

II. CURRENT OPERATOR *(Provide if different from owner)*

01 NAME: Alltift Realty
02 D+B NUMBER:
03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*: 105 Dorothy Street
04 SIC CODE:
05 CITY: Buffalo
06 STATE: NY
07 ZIP CODE: 14206
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: F. Dowing Trucking
02 D+B NUMBER:
03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*: Tifft Street
04 SIC CODE:
05 CITY: Buffalo
06 STATE: NY
07 ZIP CODE:
08 YEARS OF OPERATION:
09 NAME OF OWNER DURING THIS PERIOD:

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:

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:

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:

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

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)*

Allied Chemical Memo to J. Iannotti, NYSDEC, January, 1979, November, 1979
Mr. J. Tygert, NYSDEC

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EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NYS	915054

II. ON-SITE GENERATOR

01 NAME None	02 D+B NUMBER
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 Allied Chemical	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.) National Aniline	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY Buffalo	06 STATE NY / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME F. Dowing Trucking	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.) Tifft St.	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY Buffalo	06 STATE NY / 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)

Same

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NYS	915054

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
NYS	915054

II PAST RESPONSE ACTIVITIES *(Continued)*

01 ☐ R. BARRIER WALLS CONSTRUCTED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
No

01 ☐ S. CAPPING/COVERING 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
No

01 ☐ T. BULK TANKAGE REPAIRED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
No

01 ☐ U. GROUT CURTAIN CONSTRUCTED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
No

01 ☐ V. BOTTOM SEALED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
No

01 ☐ W. GAS CONTROL 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
No

01 ☐ X. FIRE CONTROL 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
No

01 ☐ Y. LEACHATE TREATMENT 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
No

01 ☐ Z. AREA EVACUATED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
No

01 ☐ 1. ACCESS TO SITE RESTRICTED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
Front gate is locked, but alternate access via western border.

01 ☐ 2. POPULATION RELOCATED 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
No

01 ☐ 3. OTHER REMEDIAL ACTIVITIES 02 DATE ________ 03 AGENCY ________
04 DESCRIPTION
None

III. 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 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NYS	915054

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 analysis, reports)*

SECTION VI

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 Alltift Realty Landfill. Since the Phase II investigation is a preliminary site assessment, likewise the remedial alternative evauation must be considered preliminary. A more detailed remedial investigation and feasibility study would be required to better define the extent of groundwater and sediment contamination and determine the extent of the hydraulic connection between the aquifers, in order to determine the design criteria and costs for remedial alternatives.

IDENTIFICATION OF REMEDIAL METHODS (FIRST SCREENING)

The conceptual remedial alternatives considered for the Alltift Realty Landfill 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 (EPA 40 CFR 300, 1980). 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. The initial 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, excavation and removal, and treatment technologies 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, revegetation, a perimeter fence, and monitoring of the Alltift Realty Landfill 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 and would reduce the discharge of contaminated groundwater into the wetland on the western edge of the landfill. The cap would also cover exposed refuse and hence would protect human health by minimizing direct contact with the landfill.

Groundwater Controls

The groundwater controls that were considered to be applicable in addition to the cap, grading, revegetation and perimeter fence include a grout curtain or slurry wall. The slurry wall should prevent any migration of contaminants through the shallow aquifer with the groundwater flow.

All other groundwater controls for remediation of the shallow aquifer were rejected at this point because of potential difficulty in implementing these technologies. Pumping, a diversion drain, or collection trench, would all involve redirecting the groundwater flow and hence, would be very difficult to install and maintain without draining the wetland.

The contamination in the deep aquifer could be mitigated by pumping and treating the groundwater. The extraction wells would be located at the southern end of the site where the contamination levels were the highest. Pumping of the groundwater in this aquifer would be difficult because of the proximity of the wetland and the hydraulic connection between the aquifers.

Treatment Technologies

The deep aquifer is contaminated with benzene, xylene, toluene, and other volatile organics. The treatment technologies retained after the secondary screening to reduce these contaminant levels include physical and biological treatment.

Excavation and Removal

Because of the high concentrations of benzene compounds, halogenated organics, and mercury in the sediments, excavation of the sediments from the wetland along the western edge of the Alltift Realty Landfill was retained as a remedial action after the secondary screening process. Excavation of an area of highly contaminated soil was also retained as an option. Further studies would be necessary to determine if there are any highly contaminated areas at this site.

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 Alltift Realty Landfill, ranging from monitoring alone, to containment and removal by capping, grading, revegetation, a slurry wall, and dredging the contaminated sediments. 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 Feasibility

The technical applicability of a remedial action refers to its ability to achieve performance standards (i.e., containment, meet air or water discharge requirements, etc.), constructability and ease of implementation. 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 mitigate 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 groundwater 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 primary regulatory agencies which oversee potential remedial actions and their areas of responsibility are as follows:

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

Preferred 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 at the Alltift Realty Landfill. This alternative will not control the present contamination or prevent further contamination.

The second alternative considered included capping, grading, and revegetating the landfill to reduce groundwater contamination by rain water infiltration; dredging of the contaminated sediments from the wetland; and installing a fence around the perimeter of the landfill to decrease public health risk by direct contamination. This alternative does not prevent continued contamination of the groundwater and wetland by lateral movement of groundwater through the waste material.

Installing a slurry wall at this site in addition to the clay cap, revegetation and dredging of the swamp sediments, could effectively contain the contamination in the upper aquifer and remove the contaminated sediment. This slurry wall would be keyed into the layered clay and silt aquitard, and would encircle the northern portion of the site. The actual area of the site that could be contained by this wall is dependent on the horizontal extent of the aquitard. It is believed that there is a hydraulic connection between the upper and lower aquifers near the southern end of the site. The slurry wall can only extend south to a point where the aquitard is of sufficient thickness to truly act as an aquitard. We have assumed an area of 21 acres. The slurry wall should successfully contain most of the upper aquifer groundwater contamination. The contamination in the lower aquifer could be monitored for further contamination.

The treatment action was not included in any of the remedial alternatives. Although treatment was considered to be a feasible technology, insufficient remedial investigation data is available to estimate a cost for recovery and treating lower aquifer groundwater.

Excavation of soil was not included in any remedial alternative. The areal extent of soil contamination is not known at this preliminary level of investigation.

A RI/FS needs to be conducted to determine the quantity of soil that would need to be removed and to better evaluate the remedial options discussed.

CONCEPTUAL COST ANALYSIS

The conceptual costs were determined for the alternative remedial actions developed. It should be recognized that these costs are very preliminary and can be more precisely estimated once a feasibility study is conducted at the Alltift Realty site. The costs presented herein include an allowance of 20 percent for engineering and 30 percent contingency. An example of the conceptual cost analysis for one of the most likely alternatives is presented in Table VI-4.

The most inexpensive alternative is monitoring the surface and groundwater. The total cost for semi-annual sampling and analysis for a five-year period (minimum time period) of six groundwater samples and two surface water samples is estimated to be $120,000 in 1985 dollars. Because monitoring is not a capital cost, no allowance of contingency and engineering was included in this cost.

The Alltift Realty site is 25 acres in size. The area would have to be graded prior to capping. The capping and revegetation activities (Alternative 2) would consist of a 30 inch compacted clay cap covered by 6 inches of top soil and seeded with native grasses. A fence 6 feet high would be installed around the perimeter of the site. Also included in this alternative would be the removal of contaminated sediments from the wetland by dredging. It was estimated that 5,500 cubic yards of sediments would have to be removed and transported to a secure landfill. The total capital cost for this alternative is $4.8 million.

The third alternative would include a slurry wall to the clay layer (10 to 20 feet deep) around the upper three-quarters of the site. The area that would be encompassed by the slurry wall needs to be determined in a detailed RI/FS study. The preliminary conceptual cost for this alternative is $5.4 million. The itemized costs for this alternative are presented in Table IV-4. The third alternative also includes monitoring of the deep aquifer groundwater. The costs for monitoring are not capital costs and are therefore, not included in total cost calculated.

TABLE VI-1

IDENTIFICATION OF REMEDIAL ACTION METHODS (FIRST SCREENING)

Method	Applicable	Non-Applicable	Comments
No Action		X	Contamination found in groundwater, surface water, and sediments.
Air Emission Controls		X	No air contamination found.
Surface Water Controls	X		Surface water contaminated and surface seepage found at various locations.
Groundwater Controls	X		Upper aquifer contaminated with heavy metals and organics. Aquifer discharging into wetland on western edge leading to contaminated surface water. Lower aquifer contaminated with several volatile organic compounds.
Contaminated Sewer and Water Lines		X	No known sewer or water lines affected.
Excavation and Removal	X		Partial excavation and disposal in secure landfill off-site for highly contaminated areas or drums. Dredging of contaminated sediments necessary in western wetland.
Treatment	X		Treatment of surface and groundwater for heavy metals and organics may be warranted.

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

Action	Applicable	Non-Applicable	Comments
Surface Water Controls			
Monitoring	X		Continued surface water monitoring required to confirm extent of contamination and effectiveness of remedial action.
Capping	X		Presently insufficient cover. Capping would minimize infiltration of rain water, prevent direct runoff of contamination into surface water, and minimize public health risk by direct contact.
Grading	X		The site should be graded to prevent ponding and to direct surface runoff to drainage ditch.
Surface Water Diversion and Collection		X	Surface water does not run onto the site so does not need to be diverted.
Revegetation	X		Vegetation will help to maintain the integrity of the clay cap by preventing it from drying out and minimizing erosion.
Perimeter Fencing	X		Fence necessary to protect public health from direct contact with the waste material.
Groundwater Controls			
Monitoring	X		Monitoring of surface water and deep aquifer groundwater is necessary to determine movement of contaminant plume and to confirm effectiveness of remedial actions.

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

Action	Applicable	Non-Applicable	Comments
Groundwater Controls (Continued)			
Capping (including grading and revegetation)	X		Capping will prevent infiltration of rain water through waste material.
Impermeable Barriers			
Slurry Walls	X		Slurry wall or grout curtain to clay layer would confine groundwater contamination in upper aquifer.
Grout Curtain	X		
Groundwater Collection and Diversion		X	Groundwater diversion or collection at this site would be very difficult and costly because of the proximity of the wetland.
Leachate Controls			
Subsurface Drains		X	Shallow aquifer is in contact with waste material. This would prevent separation of leachate from groundwater. Subsurface drains would have same effect as discussed above.
Liners		X	Extensive excavation would be required to install liner.
Permeable Treatment Bed		X	Capital costs extremely high. No means to divert groundwater to treatment bed. Treatment of heavy metals by ion exchange would require several changes of ion exchange material.

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

Action	Applicable	Non-Applicable	Comments
<u>Treatment</u>			
Insitu Treatment		X	Immobilization of heavy metals possible with injection of alkali or sulfide. Method is unreliable because of strong dependence of treatment on pH. This insitu treatment process is also very expensive and would not remove organic contamination.
Direct Waste Treatment		X	Waste material not separable from other landfill contents, so cannot be treated independently.
Incineration		X	
Gaseous Waste Treatment		X	
Liquid Waste Treatment		X	
Groundwater and Leachate Treatment	X		Collected groundwater and/or leachate can be treated for heavy metal contamination by precipitation with a sulfide followed by coagulation and sedimentation. The phenols, benzene compounds, and halogenated organics can then be removed by carbon adsorption.
Chemical Treatment	X		
Physical Treatment	X		
Biological Treatment		X	Halogenated organics of concern not readily biodegradable.
Contaminated Sediment and Soil Treatment		X	Sediments in the swamp on western edge of landfill are highly contaminated. Sediments should be dredged and removed rather than being treated.

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

Action	Applicable	Non-Applicable	Comments
<u>Excavation and Removal</u>			
Contaminated Soil Removal	X		If an area with a high concentration of soil contamination is found during a more intensive study, excavation of soil from that area will remove the source of future contamination.
Contaminated Sediment Removal	X		Sediments in the swamp should be removed to prevent recontamination of surface water by a release of contamination from the sediments.

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

No.	Alternative Description	Technical Feasibility	Environmental Impact	Public Health Risk	Regulatory Compliance/ Acceptance	Comments
1	Monitoring	2*	2	2	2	Aquifer will continue to be contaminated leading to increased contamination of wetland, Buffalo River, and Lake Erie.
2	Capping, Grading, Revegetation, Perimeter Fencing, Dredging and Monitoring	3	2	2	2	Capping will prevent infiltration of rain water through landfill, but lateral migration of contaminants will continue. Recontamination by release of contaminants from sediments will be prevented. Public health risk by direct contact will be minimized.
3	Slurry Wall, Capping, Grading, Revegetation, Perimeter Fencing, Dredging, and Monitoring of the Deep Aquifer Groundwater.	3	3	3	3	A cap over and slurry wall around the upper three quarters of the site, keyed into the clay layer will prevent any further contamination of the groundwater. Dredging of the contaminated sediments will prevent further migration of contaminants released from the sediments. Contamination in the deep aquifer should be monitored to trace contaminant plume migration.

LEGEND:

1 = Unfavorable (i.e., severe environmental impact, high health risk, poor regulatory compliance or unproven or difficult technology)

2 = Fair

3 = Favorable

* = Favorable from an ease of implementation standpoint, but not adequate for reducing aquifer contamination.

TABLE VI-4
SUMMARY OF CONCEPTUAL REMEDIAL COST ESTIMATE FOR ALTERNATIVE 3 AT THE ALLTIFT REALTY SITE

Item No.	Description	Approximate Cost(1)(2)
I	Preliminary Site Work (Grubbing, Grading)	$ 192,500 (3)
II	Surface Sealing (3' Thick Clay Cap)	1,100,000 (4)
III	Revegetation (6" Topsoil, Hydroseeding and Mulch)	800,000 (4)
IV	Perimeter Fence	62,400 (3)
V	Slurry Wall (3,600' x 3' x 12', Soil-bentonite)	345,600 (4,5)
VI	Dredging (Includes: Excavation [50' x 1000' x 3'],Transportation and Disposal)	1,100,000 (4)
Subtotal		$3,600,500
Contingency (30%)		1,080,150
Engineering (20%)		720,100
TOTAL CAPITAL COSTS		$5,400,750

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(1) Costs in 1985 $.

(2) These costs are considered to be preliminary conceptual costs.

(3) Rishel, et.al. (1981).

(4) Environmental Law Institute (1984).

(5) DeWolf, et.al. (1984).

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REFERENCES

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Jim Baker ①

INSTRUCTION MANUAL

BISON INSTRUMENTS EARTH RESISTIVITY SYSTEMS

MODEL 2350 B

Ser No 4-84430

RECEIVED
MAR 23 1978
DIV. [illegible] WATERS
BUREAU OF INDUSTRIAL PROGRAMS

②

RAMCO STEEL COMPANY
110 Hopkins Street
Buffalo, New York

New York State Department of Environmental Conservation
Division of Pure Waters
Bureau of Industrial Programs
Ramco Steel Inc
Buffalo (c) Erie Co.
Approved by: Lawrence J. Nadler E., MAR 24 1978
Recommended by: James M. Harrington PE

WILLIAM H. MERRILL JR.
P.E. #41270

BISSELL, MERRILL ASSOCIATES
Consulting Engineers
5757 Main Street
Williamsville, New York 14221
(716) 632-7000

(Bissell, Merril Associates, 1978

PURPOSE

The purpose of this report is to present a feasability study of the chemcial treatment of waste waters at Ramco Steel Company. In addition a recommended method of treatment in schematic form is proposed.

RAMCO STEEL COMPANY

Ramco Steel Company is the former Bliss and Laughlin Inc., of 110 Hopkins Street, Buffalo, New York. The principal business is the cold finishing of steel bars and coil from purchased steel stock. About 200 tons per day of steel products are processed.

The company presently is operating two shifts per day for a five day week. A total of about 180 people are employed here, including 30 in the office, 100 for the first shift, and 50 for the second shift.

Ramco Steel Company purchases unfinished steel bar stock and cold finishes this material into steel bars and coils. This is accomplished by cold drawing of the material to a size, turning it to size in a lathe, grinding and cutting. The material is also pickled by submerging in a 10% hot sulfuric acid bath for about 90 minutes, rinsing, then for a short period in a similar lime bath.

The pickling process involves 2 tanks of 7000 gallon capacity for coils, and 3 tanks of 5000 gallons each for bars. These tanks are dumped every 6 weeks, (one tank per week) and recharged with a new solution. The lime tanks are dumped semi-annually as they can have solution added as needed when the concentration gets low.

Other processes include cold drawing, furnace treatment, straightening, turning to exact size, grinding and cutting. Products are then shipped to various customers throughout the area.

PRESENT DAY WASTE WATER DISPOSAL

Presently, sanitary wastes are disposed of via a sanitary sewer system to the facilities of the Buffalo Sewer Authority in Hopkins Street. No industrial waste disposals are known to be discharged through this system.

Industrial waste waters and cooling waters presently are collected in a subsurface retention pit from which they are discharged to an oxidation pond, (having a capacity of about 1 - 2 million gallons) in the rear. In the pit, the waters are mixed, and the concentrations of wastes diluted with the cooling waters. From the pond, the waters are sent to Lake Erie via a drainage ditch.

Analysis of the waste waters indicate they cannot be discharged to Lake Erie in their present state, nor can they be discharged as such to the Buffalo Sewer Authority. A treatment system must be devised, or pre-treatment in order that they can be processed by the city.

All waters consumed is supplied by the City of Buffalo. Last year's water consumption amounted to 3,070.00 cubic feet, or about 89,000 gallons per day over a 258 working day year.

(Bissell Merrill Assoc, 1978)

②

TABLE I

SAMPLES REMOVED SEPTEMBER 12, 1977

SAMPLE	LOCATION
Coil 1	Left coil acid pickling bath
Coil 2	Right coil acid pickling bath
Coil R	Coil rinse bath
Coil L	Coil lime bath
Sump	Sump tank, rear of building
Lag	Lagoon, rear of building
Comp	Compressor water flowing into sump tank
Bar 1	Right bar acid pickling bath
Bar 2	Middle bar acid pickling bath
Bar 3	Left bar acid pickling bath

(Bissell Merrill Associates, 1978)

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TABLE II

ANALYSIS OF TEN SAMPLES

SAMPLE	pH	Fe*	Cr*	Zn*	Mn*
Coil 1	0.1	50,000	17.7	4.8	1041
Coil 2	0.1	50,000	14.6	5.5	875
Coil R	4.3	200	LT 0.08	LT 0.04	1.0
Coil L	12.8	> LT 2	LT 0.004	LT 0.04	
Sump	2.4	318	0.4	0.1	6.0
Lag	2.4	500	0.7	0.2	10.4
Comp	7.5	> LT 1	LT 0.04	LT 0.04	LT 0.02
Bar 1	0	75,000	13.7	3.2	541
Bar 2	0	17,700	7.5	1.6	333
Bar 3	0	26,600	8.3	2.2	438

LT = less than

* Results reported in mg/l (ppm)

③

NEW YORK STATE GEOLOGICAL ASSOCIATION

38th Annual Meeting

April 29 - May 1, 1966

GUIDEBOOK

Geology of Western New York

Edward J. Buehler, Editor

Department of Geological Sciences
State University of New York at Buffalo

Additional copies are available from the permanent secretary of the New York State Geological Association: Dr. Kurt E. Lowe, Department of Geology, City College of the City University of New York, 139th St. at Convent Ave., New York, N. Y.

(CARRINGTON, 1981)

④

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

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

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

Discussion open until July 1, 1981.

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Applied Soil Trace Elements

Edited by

Brian E. Davies

Department of Geography, University College of Wales, Aberystwyth, Wales

A Wiley–Interscience Publication

1980

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Chichester · New York · Brisbane · Toronto

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Applied Soil Trace Elements
Edited by B. E. Davies

CHAPTER 8

Essential Micronutrients IV: Copper, Iron, Manganese, and Zinc

BERNARD D. KNEZEK AND BOYD G. ELLIS

I. INTRODUCTION

The addition of 4 kg/ha zinc (Zn) to pea beans (*Phaseolus vulgaris*) increased the yield from 590 to 2230 kg/ha. (Judy *et al.*, 1964). Such spectacular increases are also common with the micronutrients manganese (Mn), iron (Fe), and copper (Cu). The concentrations in soils vary from a few ppm Cu or Zn to very large quantities of Fe (see Table 8.1). In general the Cu content of soils varies from 10 to 80 ppm, Zn from 10 to 300 ppm, Mn from 20 to 3000 ppm, and Fe from 10,000 to 100,000 ppm (Mitchell, 1964). Thus, from the soil content view only Zn and Cu would be considered micronutrients. But the low solubility and availability and the small requirement of most plants for these four elements places them in the category of micronutrients (Table 8.1).

The soil chemistry of micronutrients is complex. Few 'pure' compounds exist

Table 8.1. Concentration Range of Mn, Fe, Cu, and Zn in Soils and Plants

Element	Soil content	Plant content
	Range (mg/kg)	Range (mg/kg)
Mn	20–3000	31–100
Fe	10,000–100,000	25–500
Cu	10–80	7–30
Zn	10–300	21–70

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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

(Edwards, 1983)

⑦

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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 × 10^6 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/m^3; concentrations in urban areas ranged from 0.1 to 61.0 μg/m^3. 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

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[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.

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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 $\approx$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 $\approx$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-

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PHASE II WORK PLAN

ENGINEERING INVESTIGATIONS AND EVALUATIONS AT INACTIVE HAZARDOUS WASTE DISPOSAL SITES

ALLTIFT LANDFILL
ERIE COUNTY
NEW YORK

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

SUBMITTED BY
ENGINEERING-SCIENCE, INC.
in association with
DAMES & MOORE

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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

(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

[Sec. 300.3 (b)(1)]

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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 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.

⑪

Handbook on the Toxicology of Metals

edited by
LARS FRIBERG, GUNNAR F. NORDBERG
and VELIMIR B. VOUK

1979

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aging material. About one-third of the world production of aluminum is now used in the transport industry, and about half that amount in electrical engineering. The building industry in various industrialized countries utilizes from 10 to 20% of the world production; from 10 to 15% is utilized in packaging (Baudart, 1975). Aluminum compounds are utilized in the processing, packaging and preservation of food and as food additives for various purposes. Aluminum sulfate is widely utilized for sedimenting particles in the treatment of drinking water. Aluminum and aluminum compounds are used therapeutically to prevent hyperphosphatemia in renal disease, and in the prevention of silicosis. Other therapeutic uses of aluminum compounds are as antacid, as antidote, as antiperspirant and as adjuvant for vaccines, toxoids and for aluminum penicillin.

5 Environmental levels and exposures

5.1 *General environment*

Al

5.1.1 *Food and daily intake*

Most unprocessed food items contain less than 10 mg Al/kg. Use of aluminum in the processing and storing of food increases the aluminum content, but not to a toxicologically significant extent. Some vegetables and fruits may contain up to about 150 mg Al/kg. The daily intake of aluminum from food may thus show a considerable variation dependent on the diet (Schlettwein-Gsell and Mommsen-Straub, 1973; Sorensen et al., 1974). Total daily intake of aluminum may amount to about 80 mg/day, as reviewed by Sorensen et al. (1974).

5.1.2 *Water, soil and ambient air*

Aluminum in ocean water generally is reported up to about 1 mg/l, this value being one-tenth of the concentration reported in rivers and lakes. The activities of man increase the aluminum content in surface water, but aluminum is generally not regarded as a water pollution problem. Concentrations of aluminum as high as 150–600 g/kg have been reported in soil. Aluminum content in urban air is reported up to about 10 $\mu g/m^3$; in non-urban areas values lower than 0.5 $\mu g/m^3$ are usually reported (Sorensen et al., 1974).

5.2 *Working environment*

Occupational exposure to aluminum and aluminum compounds is widespread, but the exposure has only to a limited degree turned out to be of toxicological importance. Exposure to aluminum oxide-containing dust in the production of abrasives from bauxite has been described as a hazard (Shaver and Riddell, 1947), but exposure levels have not been reported.

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mal German diets (Schleutz, 1977, neutron activation) to 250–1250 μg in a U.S.A. study on institutional diets for children, using atomic absorption spectrophotometry without extraction (Murthy et al., 1971). There is reason to believe that the AAS method may have given too high values. In freshwater fish antimony concentrations have been reported to be in the order of 3 μg/kg wet weight (Uthe and Bligh, 1971). Levels of 3 and 8 μg/kg have been found in milk and potato powder (Schleutz, 1977).

Antimony

5.1.2 *Water, soil and ambient air*

In the Rhine River, antimony averages 0.1 μg/l; 0.2 μg/l has been reported from the northeastern Pacific Ocean (Schmidt, 1968; Spencer et al., 1970).

In soil antimony usually ranges from 0.1 to 10 mg/kg dry weight (Bowen, 1966; Khatamov et al., 1967).

Brar et al. (1970) and Dams et al. (1970) using neutron activation reported concentrations of antimony in Chicago air ranging from 1.4 to 55 ng/m^3 and an average of 32 ng/m^3, respectively.

5.1.3 *Tobacco*

Antimony in cigarettes has been studied by means of neutron activation by Nadkarni and Ehman (1970). The tobacco, on the average, contained 0.1 mg Sb/kg dry weight. The amount of inhaled antimony was estimated to 20%.

5.2 *Working environment*

Air concentrations of antimony in the order of 1–10 mg/m^3 have been reported from different smelter operations. Renes (1953) found average working zone concentrations of antimony ranging from 4.7 to 10.2 mg/m^3 in smelting works. In an abrasives plant studied by Brieger et al. (1954), the average air concentration was 3.0 mg/m^3.

Stibine (SbH_3) was found to have evolved during charging of lead storage batteries in which antimony was a compound of the negative grid (Haring and Compton, 1935).

6 Metabolism

Antimony is considered a non-essential metal.

6.1 *Absorption*

6.1.1 *Inhalation*

Data on respiratory absorption of antimony are lacking.

6.1.2 *Ingestion*

About 15% of a single oral dose of labelled antimony potassium tartrate to mice is absorbed, i.e. recovered in urine and tissues (Waitz et al., 1965). The absorption might, however, be higher since simultaneous gastrointestinal excretion takes place. Thus, Gellhorn et al. (1946), following intraperitoneal administration of antimony potassium tartrate to hamsters, observed a fecal excretion of 50% of the given dose (0.43 mg) in 24 h.

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The amount of arsenic ingested daily by humans via food is greatly influenced by the content of seafood in the diet. In a study in the U.S.A., a special diet excluding seafood gave an average intake of 0.04 mg arsenic per person and day, while a more typical diet gave 0.19 mg per person and day (Schroeder and Balassa, 1966). Jelinek and Corneliussen (1977) noted that foods belonging to the meat, fish and poultry group contributed most of the arsenic ingested. They estimated the average daily intake of arsenic from food in the U.S.A. in the early seventies to be 0.01–0.02 mg. This seems to be somewhat low when compared with the excretion of arsenic (see Section 7.2). The daily intake of total arsenic in Japan is reported to be 0.07–0.37 mg per person (Nakao, 1960; Ishinishi et al., 1974).

Arsenic

5.1.2 *Water and soil*

The arsenic content of the earth's crust is generally less than 2 mg/kg (NAS, 1977). Some minerals, e.g. pyrite, may contain as much as 5% arsenic. Uncontaminated soil generally contains less than 40 mg As/kg, whereas contaminated soil may contain several hundreds of milligrams per kilogram (Walsh et al., 1977).

Sea water generally contains 0.001–0.005 mg As/l (Kappanna et al., 1967; Ferguson and Gavis, 1972). The arsenic concentrations of rivers and lakes vary considerably. Most levels are well below 0.01 mg/l, but in some instances they may even be as high as about 1 mg/l (Durum et al., 1971; Sagner, 1973; Andreae, 1978).

Braman and Foreback (1973) and Crecelius (1974) noted several different forms of arsenic in natural waters: arsenate, arsenite, methylarsonic acid and dimethylarsinic acid, the methylated forms generally in lower concentrations than the inorganic ones. Andreae (1978) reported that arsenate is generally the dominant form in sea water.

Clement and Faust (1973) found that about 8% of the total arsenic in well aerated stream water was in the form of As(III), while all of the arsenic in anaerobic reservoirs appeared to be in the form of As(III).

The natural concentration of total arsenic in ground water is dependent on the arsenic content of the bed rock. About 13% of ground water samples from 800 wells in an area in Nova Scotia, Canada, where the arsenic content in the bed rock is high, had concentrations exceeding 0.05 mg As/l (Grantham and Jones, 1977). High carbonate spring waters in California, Romania, Kamchatka in the U.S.S.R., and New Zealand have been stated to contain 0.4–1.3 mg As/l (Schroeder and Balassa, 1966). In Japan concentrations of up to 1.7 mg As/l have been recorded in hot-spring water (Kawakami, 1967). In Cordoba, Argentina, ground water levels of up to 3.4 mg/l arsenic have been reported (Arguello et al., 1938), and in Taiwan, artesian well water has been shown to contain up to 1.8 mg/l (Kuo, 1968).

The chemical form of arsenic in different ground waters is largely unknown. Clement and Faust (1973) found that 25–50% of the total arsenic in a few ground waters was in the form of As(III).

The average daily intake of arsenic via drinking water can probably vary widely depending on the source of the water. McCabe et al. (1970) reported that less than 1% of more than 18 000 community water supplies in the U.S.A. had concentrations exceeding 0.01 mg/l arsenic. With an assumed daily intake of 1.5 l drinking water, a concentration

(Friberg, 1979)

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5 Environmental levels and exposures

5.1 *General environment*

5.1.1 *Food and daily intake*

Barium content in edible crops ranges from about 10 mg/kg in wheat and corn grain to several grams per kg in brazil nuts (Beeson, 1941). Generally, barium content of food parallels calcium content, in a ratio of 1 : 10^2–10^5. Expressed as mg Ba/kg Ca, typical values in milk were 45–136; in wheat flour, 1300; and in oatmeal, 2320–8290 (Henderson et al., 1962).

In an American hospital diet the daily intake of barium was estimated at 0.375 mg while in the diet of the general population it may be as high as 1.33 mg (Schroeder et al., 1972). Grummitt (1961) estimated that average dietary barium intake originated 25% from milk, 25% from flour, 25% from potatoes and 25% from miscellaneous high-barium foods consumed in minor quantities, especially nuts.

Barium

5.1.2 *Water, soil, plants and ambient air*

Barium constitutes about 0.04% of the earth's crust, mostly confined to certain rock types. Agricultural soils contain Ba^{2+} in the mg/kg range. Concentration of the element in sea water is 0.006 mg/l and in fresh waters, 0.007–15.0 (average 0.05) mg/l (Schroeder et al., 1972). Municipal waters of the United States ranged 0.0017–0.38 (average 0.043) mg/l and of Sweden, 0.001–0.02 mg/l (Boström and Wester, 1967). In urban air, the average concentration was 5 (range 0–1500) ng per m^3 in 18 U.S. cities (Schroeder et al., 1972).

Barium has been found in all biological material where assayed. Marine animals concentrate the element 7–100 times and marine plants 1000 times from sea water. Among land plants, oak, ash, Douglas fir, walnut and particularly brazil nuts are the strongest accumulators of soil barium. Soybeans and tomatoes also accumulate soil barium 2–20 times (Robinson et al., 1950).

5.1.3 *Tobacco*

Barium content of dry tobacco leaves was found as 88–293 mg/kg by McHargue (1913); more recent measurements yielded 24–170 (average 105) mg/kg (Voss and Nicol, 1960). Most of this barium content is likely to remain in the ash during burning. There are no values reported on smoke.

5.2 *Working environment*

The industrial uses of soluble barium are such that hazardous conditions from atmospheric contamination are uncommon. Hyatt (1971) has applied a limit of 0.5 mg Ba/m^3 for a number of years at the Los Alamos Laboratories with satisfactory results for the control of exposure to barium nitrate. It is not known what degree of added safety this limit incorporates.

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5 Environmental levels and exposures

5.1 *General environment*

5.1.1 *Food and daily intake*

Petzow and Zorn (1974) have recently measured beryllium concentrations in food in Western Germany. They found in polished rice 0.08, in toasted bread 0.12, in potatoes 0.17, in tomatoes 0.24 and in head lettuce 0.33 mg Be/kg substance (dry weight basis). Total intake figures for beryllium have not been published, but may be estimated as around 20 μg/day of which only a minor fraction is intake by inhalation.

5.1.2 *Water, soil, plants and ambient air*

Beryllium

Beryllium occupies the 35th place in the terrestrial abundance list of elements and its overall concentration in the lithosphere is estimated at 5 mg/kg.

Ordinary agricultural soils and natural waters contain beryllium in the μg/kg or μg/l range. In birch, aspen and willow, beryllium content may rise as high as 3 mg/kg (Nikonova, 1967).

Early reports on 'neighborhood cases' of pulmonary berylliosis at a frequency of 1–3% in the general population living within about a mile of the plant (Eisenbud et al., 1949) led to investigations disclosing that beryllium was emitted in the stack gases resulting in ambient concentrations of about 100 ng/m^3 around the plant. Average beryllium content of general urban air was reported by Sterner and Eisenbud (1951) as follows: Boston 0.3, New York 0.5, Brookhaven 0.7, Cleveland 1.3, and Pittsburgh 3.0 ng Be/m^3. Much of this probably originated from the burning of bitmunious coal, which contains 0.1–3.0 mg/kg of beryllium.

5.1.3 *Tobacco*

In three brands of West German cigarettes, beryllium levels were 0.47, 0.68 and 0.74 μg/cigarette, with 4.5, 1.6 and 10.0% of the beryllium content, respectively, escaping into the smoke during smoking (Petzow and Zorn, 1974).

5.2 *Working environment*

Beryllium production in quantity commenced in the 1930's, and because of the early ignorance regarding its toxicity, no environmental controls were practiced until the late 1940's. Few measurements exist regarding the pre-1950 in-plant levels of beryllium to which workers were exposed, but they are retrospectively estimated as very high. Breslin and Harris (1959) reviewed early reports and concluded that inhalable beryllium in ore treatment rooms, around baking furnaces, in the neighborhood of lathes, or at the sites of fluorescent phosphor blending, milling, and salvaging, must have been around 1 mg/m^3.

In 1949, the U.S. Atomic Energy Commission, a major consumer of beryllium products, adopted the first occupational exposure standard at 2 μg Be/m^3 which in 1955 was adopted as the ACGIH threshold limit value. This resulted in substantial and widespread improvement of conditions, with average air concentrations in well-monitored plants dropping to below 2 and sometimes to as low as 0.1 μg Be/m^3 (Mitchell and Hyatt, 1957). In less well-monitored plants, breathing zone concentrations sometimes were

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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).

Cadmium

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 rice-field 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-

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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

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intake of cobalt is 5–45 μg (Harp and Scouler, 1952; Ripak, 1961; Hubbard et al., 1966; Wester, 1974a; Schleutz, 1977). Whilst there is reason to believe that these values represent an average normal daily intake, some contradictory data, showing considerably higher values, have emerged in some studies employing emission spectroscopy and AAS (Tipton et al., 1966; Schroeder et al., 1967). Certain seafoods contain higher than average concentrations of cobalt (Schroeder et al., 1967).

In 15 commercial beers analyzed by Stone (1965) using a colorimetric method, cobalt usually measured well below 0.1 mg/l unless the metal had been added in processing, up to 1.1 mg/l being recorded in such cases.

5.1.2 *Water, soil and ambient air*

Drinking water has shown low concentrations of cobalt, usually between 0.1–5 μg/l (Schroeder et al., 1967; Punsar et al., 1975). In inland waters, about the same concentrations will be found (Nix and Goodwin, 1970; Paus, 1971). Sea water has been shown to contain less cobalt than fresh water (Vinogradova and Prokhorova, 1968; Piper and Goles, 1969).

In U.S. soil, cobalt ranges from 0.1 to 13 mg/kg (Schroeder et al., 1967).

In ambient air the concentration of cobalt is usually low. Tabor and Warren (1958) found detectable amounts of cobalt (>0.3 ng/m^3) in only 90 out of 750 air samples taken from 28 sampling stations in the U.S., using a semiquantitative spectrographic method. Using neutron activation, Brar et al. (1970) found cobalt in Chicago air ranging from 0.3 to 23 ng/m^3.

5.1.3 *Tobacco*

Cobalt in cigarettes has been studied by means of neutron activation by Nadkarni and Ehmann (1970). The tobacco, on an average, contained 0.5 mg Co/kg dry weight. When the cigarettes were smoked in a standard smoking machine, 0.5% was found in the mainstream.

5.2 *Working environment*

Cobalt may be released into the air during the production of cobalt oxide and in the processing of hard metals. From the U.S.S.R., Kaplun (1963) reported occupational air concentrations reaching 10 and even 100 mg/m^3 in a cobalt oxide plant. The highest average in a tungsten carbide industry studied by Fairhall et al. (1949) was 1.7 mg/m^3.

6 Metabolism

Cyanocobalamin or vitamin B$_{12}$, a cobalt-containing tetrapyrrolic ring, is essential in mammalian nutrition. The recommended daily intake of B$_{12}$ for an adult is 3 μg, corresponding to 0.12 μg of cobalt (Food and Nutrition Board, 1974). Ruminant animals in contrast to man and some other monogastric mammals have intestinal microflora which utilize cobalt in the formation of vitamin B$_{12}$. Deficiency states among ruminants have

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(Friberg, 1977)

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5 Environmental levels and exposures

5.1 *Food and daily intake*

The daily intake of copper from food generally varies from about 1 to about 3 mg, corresponding to about 15–45 μg/kg b.w. in adults (Adelstein and Vallee, 1961; Schroeder et al., 1966; Tipton et al., 1966, 1969; Robinson et al., 1973; Alexander et al., 1974; Klevay, 1975). Some low-protein and low-calorie diets may give less than 1 mg (Klevay, 1975). The daily requirements have been estimated to be about 30 μg/kg b.w. for adults, 40 μg/kg b.w. for older children and 80 μg/kg b.w. for infants (WHO, 1973). Meat, internal organs, fish and green vegetables are good sources of copper.

Cereals contain less copper and milk is relatively poor in copper (WHO, 1973). Concentrations in food are generally around 1 mg/kg. Copper-poor items such as milk usually contain less than 0.1 mg/kg.

5.2 *Water, soil and ambient air*

In seawater, most reports have indicated concentrations from 1–5 μg/l (Abdullah et al., 1972; Rojahn, 1972; Preston et al., 1972). In American rivers concentrations ranging from 0.83 to 105 μg/l (median 5.3) have been reported (Durum et al., 1971). In drinking water very large variations may occur depending on type of water, e.g. hardness and pH, and types of pipes and taps. Concentrations from a few μg to more than 1 mg/l have been reported (Schroeder et al., 1966; Stegavik, 1975), meaning that drinking water may sometimes add a considerable amount of copper to the daily intake obtained via food. Natural copper concentrations in soil vary from 2 to 100 mg/kg dry weight (Bowen, 1966). Air levels of copper in the U.S. have been reported to vary from 10–570 ng/m^3, the highest values being found in urban areas (Schroeder, 1970; Kneip et al., 1970). At the South Pole the average copper concentration in air was 0.036 ng/m^3 (Zoller et al., 1974).

6 Metabolism

6.1 *Absorption*

6.1.1 *Inhalation*

There are no data on absorption rates of copper compounds after inhalation from animal or human studies.

6.1.2 *Ingestion*

The gastrointestinal absorption is normally regulated by the copper status in the body. Studies using radioactive copper on rats indicated that small doses (<1 μg) were absorbed to more than 50%, but that increasing doses were absorbed to a relatively lesser extent (Owen, 1964). In contrast to most other metals copper seems to be absorbed to a large extent in the stomach, as shown in rats (Van Campen and Mitchell, 1965).

(Friberg, 1979)

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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).

(Friberg, 1979)

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Alloys with other metals are used in electrical industry and for ship propellers. Manganese dioxide is used for dry cell batteries. The chemical industry uses manganese compounds for many different purposes. The organic compound MMT has been suggested as a substitute for lead in gasoline.

5 Environmental levels and exposure

5.1 *General environment*

5.1.1 *Food and daily intake*

Daily intake of manganese from food varies considerably in different areas of the world. Intakes from 5.8 to 12.4 mg have been reported from various regions in India (Soman et al., 1969), whereas in New Zealand (Guthrie and Robinson, 1977), the U.S. (Schroeder et al., 1966; Greger et al., 1978), Canada (Méranger and Smith, 1972; Srivastava et al., 1978) and West Germany (Schelenz, 1977) average intake by adults has been estimated from 2.7 to 4.1 mg/day. In West Germany the daily intake for children 3–5 years old averaged 1.4 mg and for children 9–13 years old 2.18 mg/day (Schlage and Wortberg, 1972).

The highest manganese concentrations are found in some foods of plant origin, especially wheat and rice, where concentrations between 10 and 100 mg/kg have been reported (Schroeder et al., 1966; Guthrie, 1975). Polished rice and wheat flour contain less since most manganese is in the bran. High concentrations have also been found in tea leaves. Eggs, milk, fruits and meat generally contain less than 1 mg/kg. Peas and beans contain a few mg/kg (Guthrie, 1975). In a Canadian study by Méranger and Smith (1972) it was estimated that of a total intake of 4.1 mg, 2.2 mg (54%) came from cereals. The second largest source was potatoes, which gave 0.6 mg (14%), whereas meat, fish and poultry only provided 0.1 mg (2%). Thus, variations in manganese intake can to a large extent be explained by differences in nutritional habits. In populations with cereals and rice as main sources of food, the intake will be higher compared to areas where meat and dairy products take up a larger part of the diet. The manganese intake can also be higher in populations with a high tea consumption. WHO (1973) has estimated an intake of 2–3 mg of manganese per day to be adequate.

5.1.2 *Water, soil and ambient air*

Concentrations of about 2 μg/l have been reported in sea water (Goldberg, 1965; Shigematsu et al., 1975), whereas concentrations in fresh water vary from less than one to several hundred μg/l (Durum and Haffty, 1961; NAS, 1973; Shigematsu et al., 1975). Drinking water generally contains less than 100 μg/l. In 100 cities in the U.S. the median level was 5 μg/l (Durfor and Becker, 1964).

In soil the average manganese content has been reported to be 600–900 mg/kg, with variations from 1 to 7000 mg/kg depending on geological background, mining activities, etc. (NAS, 1973; WHO, 1979).

In ambient air, background corrections of 0.05 to 5.4 ng/m^3 over the Atlantic Ocean photometry and arrived at an estimate of 258 μg/day, which agrees very well with the data by Nodiya. Since the absorption of nickel is very low, 258 μg/day probably correspond to the daily intake as well. These data also agree fairly well with the earlier estimate by Schroeder et al. (1962). In a recent study, Myron et al. (1978) determined the nickel content of nine institutional diets in the U.S. and calculated an average intake of 165 μg. The average content per 1000 kcal was 75 μg.

5.1.2 *Water, soil and ambient air*

The nickel concentration in sea water usually ranges from 0.1 to 0.5 μg/l. Nickel has seldom been identified in ground water. In U.S. drinking water, 97% of all samples (n = 2053) contained less than 20 μg Ni/l, while about 80% had less than 10 μg Ni/l. In exceptional cases, values up to 75 μg/l were found (NAS, 1975). In areas where nickel is mined, as much as 200 μg Ni/l has been recorded in drinking water (McNeely et al., 1972). It seems reasonable to conclude that drinking water contributes less than 10 μg to the daily intake of nickel in most areas.

Farm soil around the world contains from 3 to 1000 mg Ni/kg. The wide range depends on the mineral content of the top soil (NAS, 1975).

In the U.S. average ambient air levels of nickel have been reported to be 6 ng/m^3 in non-urban areas, whereas in urban areas a yearly average of 25 ng/m^3 was found during the cold season and 17 ng/m^3 during the warm season. The highest values were found in heavily industrialized areas and in large cities, e.g. New York, which had a yearly average value of around 150 ng/m^3 (NAS, 1975). Nickel occurs in both coal and oil. Concentrations of up to 20 mg/kg have been reported (NAS, 1975).

5.1.3 *Tobacco*

In cigarettes Sunderman and Sunderman (1961) and Szadkowski et al. (1969) found an average nickel content of 2.2 and 2.3 μg per cigarette, respectively, with a range of 1.1–3.1. The latter authors also showed that 10–20% of the nickel in cigarettes was released into the main stream smoke, most nickel was in the gaseous phase. It is not yet known in what form nickel occurs in the main stream smoke, but some data indicate that it might be nickel carbonyl (Stahly, 1973). Pipe tobacco, cigars, and snuff have been reported to have nickel levels of the same magnitude as in cigarettes (NAS, 1975).

5.2 *Working environment*

Norseth (1975) measured nickel concentrations in various parts of a nickel refinery. In the roasting and smelting department, the average level was 1.3 mg/m^3, whereas in the electrolysis department it was 0.4 mg/m^3. In 2 other industries average levels of 0.11 and 0.6 mg/m^3 were found in the electrolysis departments (NIOSH, 1977). In a factory producing cadmium–nickel batteries Friberg (1950) found that the nickel concentration in air varied between 10 and 150 mg/m^3. After installation of exhaust equipment, the concentration dropped to 0.2–0.3 mg/m^3.

NIOSH (1977) has compiled data on nickel concentrations in alloy industries, welding operations, battery production, etc. The range is fairly wide, from a few micrograms per m^3 to several milligrams per m^3.

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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)

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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).

(LaSala, 1968)

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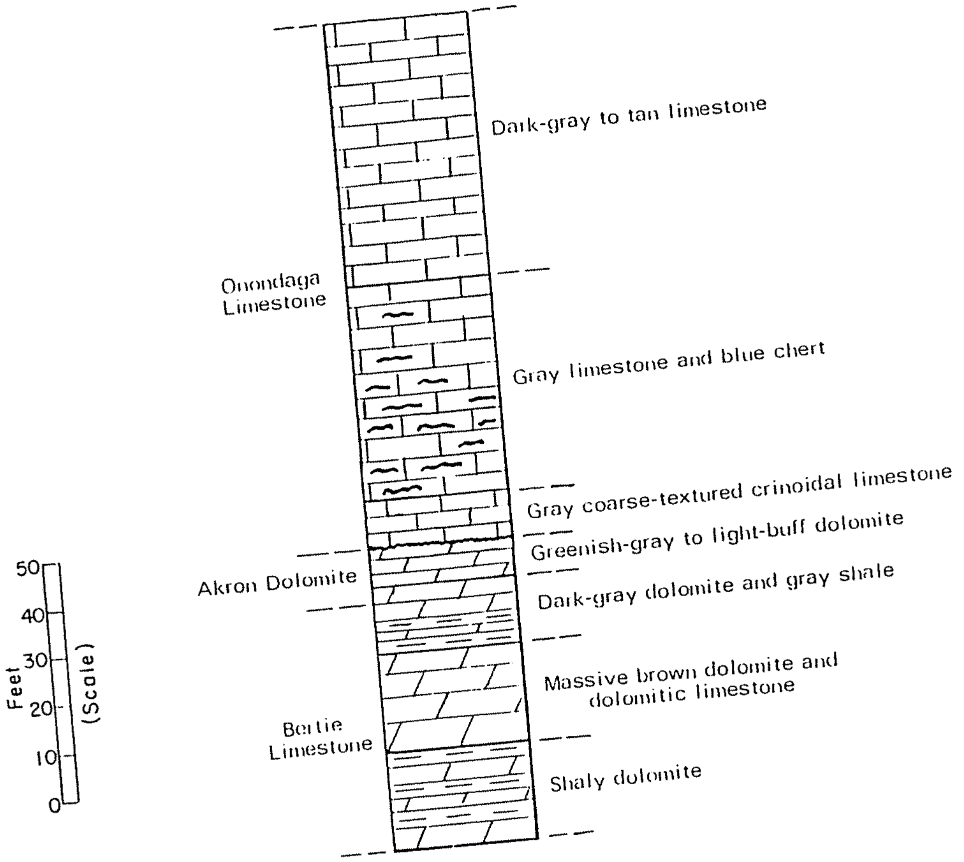

Figure 7.--Lithology of the limestone unit.

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

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(La Sala, 1968)

ıounced. The types of water-bearing joints in the limestone can be ı at the falls of Murder Creek at Akron. Not all of the flow of der 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. principal zones of discharge are at the base of the Bertie, and at a tact 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 ution-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 er to the bedding joints where the bedding joints are close to the k surface.

Locally, solution along bedding joints in the limestone unit has been eat 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 lution zone in the Onondaga Limestone discharges a large volume of water to 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 lution zone.

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

drologic and hydraulic characteristics

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

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

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Engineering Report

MARILLA STREET LANDFILL INVESTIGATION
PHASE I - HYDROGEOLOGIC INVESTIGATION UPDATE

LTV Steel Company
Republic Steel Corporation
Buffalo, New York

September, 1984
Project: 496-02-1

MALCOLM PIRNIE

ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

(Malcolm Pirnie, 1984)

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1.0 INTRODUCTION

1.1 General

Republic Steel Corporation - Buffalo Plant is located at 1175 South Park Avenue, Buffalo, New York. Although steel making operations at the Buffalo Plant have been suspended, Republic Steel continues to employ approximately 60 people at the plant. These employees are engaged in security, maintenance, reclamation and recycling, and efforts to keep the plant operable for potential sale. As a result of a merger the facilities of Republic Steel Corporation and Jones and Laughlin, Inc. are currently operated by LTV Steel Company.

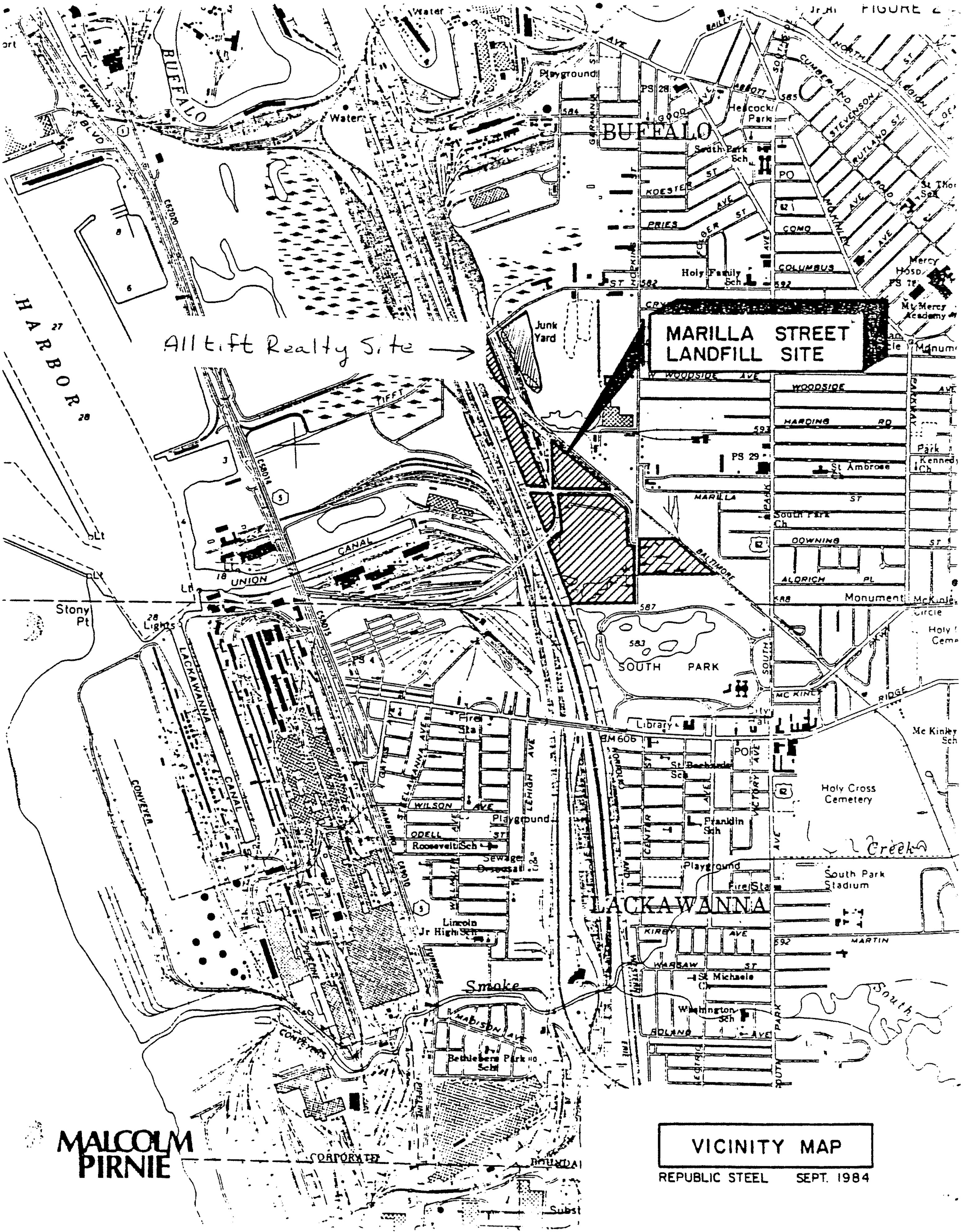
1.2 Background

The Marilla Street Landfill has been operated by Republic Steel Corporation (See Figures 1 and 2 for regional and vicinity maps, respectively) since 1930. A variety of wastes have been disposed of at the site including: slag, precipitator dust, clarifier sludge, railroad ties, checker bricks, scrap wood, tool scale, blast furnace dust, minus fines, BOD brick and construction debris. Significant amounts of brick materials deposited on the site (viz. 750 tons) were recently recycled for use as landfill berm construction material. It is Republic Steel's intent to utilize the Marilla Street Landfill for continued material reclamation and disposal of any construction debris generated as a result of plant demolition.

1.3 Purpose and Scope

Republic Steel Corp. is required to comply with Title 6, Part 360 of the New York State Compilation of Rules and Regulations (NYCRR). The New York State Department of Environmental Conservation(NYSDEC) has requested that Republic Steel take action in this regard.

FIGURE 2



MALCOLM PIRNIE

VICINITY MAP

REPUBLIC STEEL SEPT. 1984

(Malcolm Pirnie, 1984)

2.0 FIELD INVESTIGATION

2.1 General

The Marilla Street Landfill site is bordered on the south by the South Park Recreational Facilities, on the west by the Penn-Central Railroad and on the north and east by the Baltimore and Ohio Railroad. Hopkins Street, Marilla Street and the South Buffalo Railroad (See Figure 3) segregate the approximate 100-acre site into several fill areas.

2.2 Monitoring Well Installations

The first field investigation of the Marilla Street Landfill site was initiated in July 1979 by URS Engineers (Reference 1). As part of this investigation, five (5) borings were completed and nine (9) groundwater monitoring wells (viz. 5 deep - A and 4 shallow - B) were installed by Earth Dimensions, Inc. (See Figure 3 for approximate locations). Each of the wells was constructed of 2-inch diameter PVC casing with a 2-foot length of machine-slotted PVC screen. The deep wells extended approximately 20 feet into the original soil (except for well No. 3 where bedrock was encountered at 14 feet) and the shallow wells extended approximately 5 feet into the original soil. The boring logs describing and classifying the soils encountered and presenting details of the monitoring well installations are presented in Appendix A.

On March 19, 1982, Malcolm Pirnie, Inc. attempted to collect a set of groundwater samples from the groundwater monitoring wells in order to establish background quality as required under NYCRR Part 360. However, all of the monitoring wells were found to contain substantial amounts of sediment which prevented sample collection.

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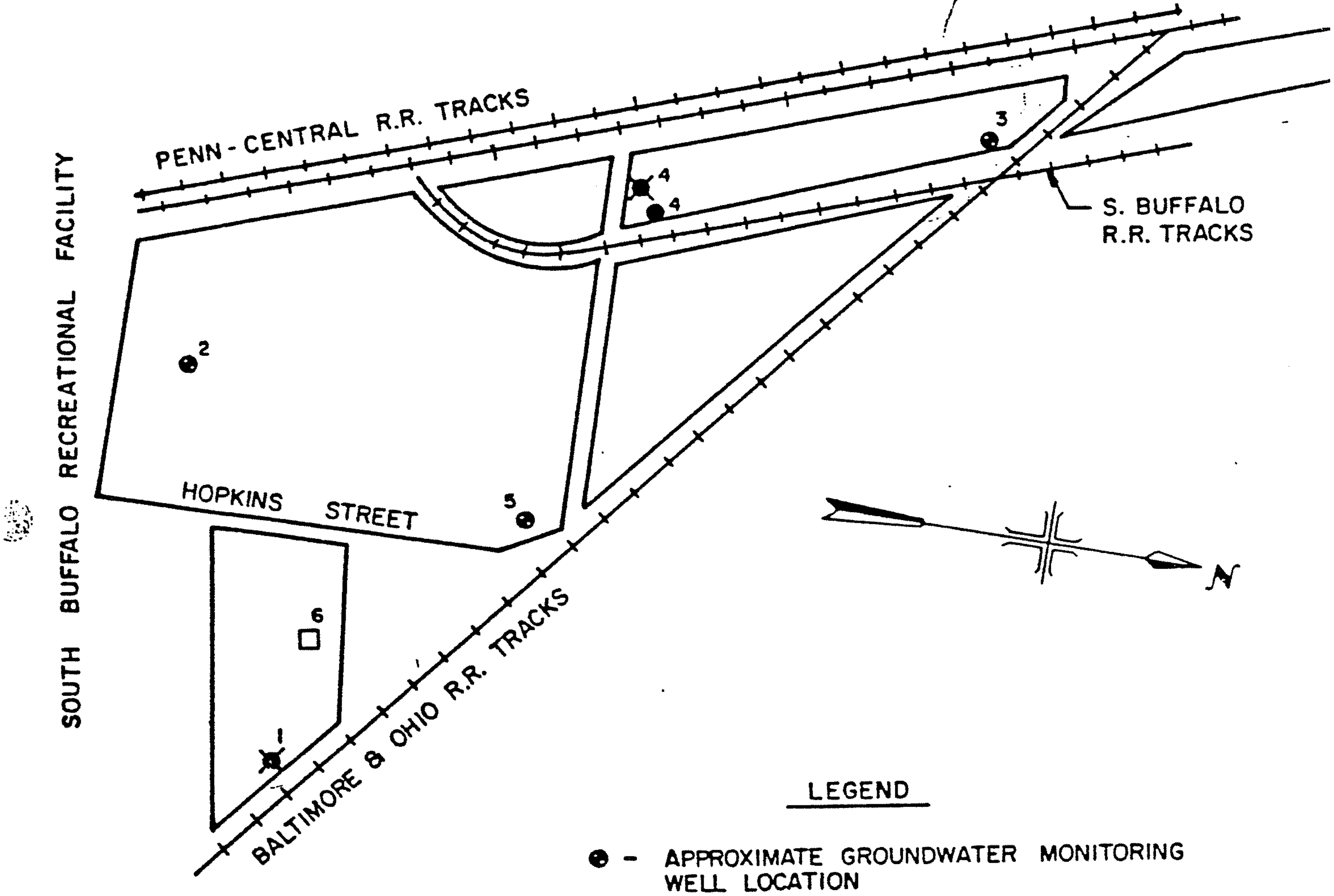

LEGEND

● - APPROXIMATE GROUNDWATER MONITORING WELL LOCATION

X - DESIGNATES ABANDONED WELL LOCATION

● - DESIGNATES NEW MONITORING WELL INSTALLED 4/21/82

☐ - DESIGNATES NEW MONITORING WELL INSTALLED 8/17/84

MALCOLM PIRNIE

MARILLA STREET LANDFILL
LOCATION MAP

REPUBLIC STEEL SEPTEMBER 1984

(Malcolm Pirnie, 1984)

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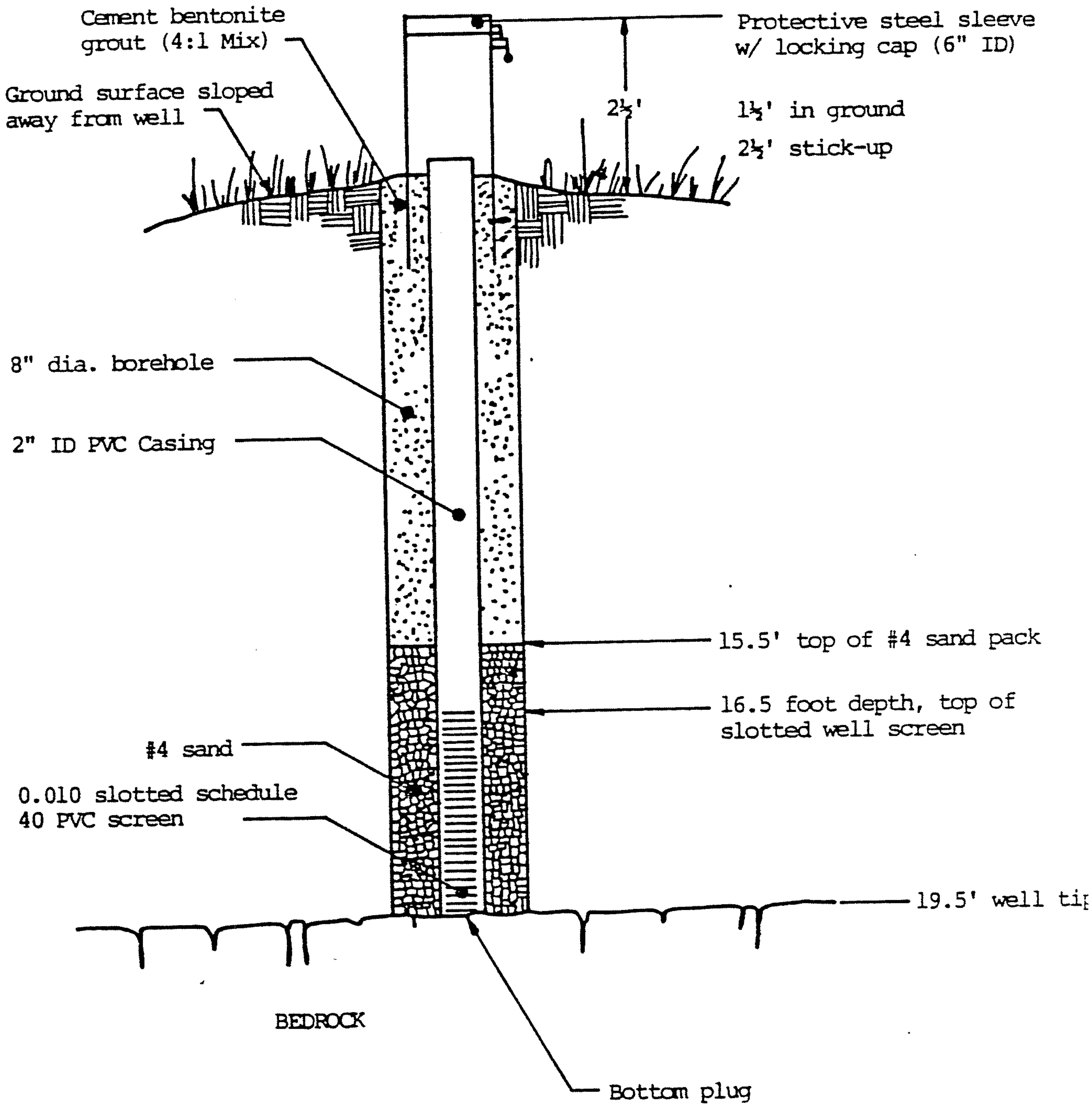
Earth Dimensions, Inc. was contracted to flush the sediment out of the monitoring wells. This was accomplished on March 29, 1982, with the cleaning of monitoring wells (i.e. shallow and deep) at locations 2,3,4 and 5. The monitoring wells at location 1 (See Figure 3) had to be abandoned because of previous damage due to vandalism. Subsequent inspections of the monitoring wells indicated that wells 2A, 2B, 3A, 5A and 5B had been successfully cleaned and would be operable. However, both wells at location 4 had refilled immediately with sediment indicating that the wells were improperly installed and/or vandalized. Therefore, these wells were abandoned and a new deep monitoring well was installed by Earth Dimensions under the supervision of Malcolm Pirnie on 4/21/82 at the location shown on Figure 3. A detail of the well installation is presented as Figure 4. In order to prevent further vandalism, protective steel casings with locking caps were placed around the deep monitoring wells at locations 2,3,4 and 5.

On July 19, 1984, Earth Dimensions, Inc. under the direction of Malcolm Pirnie attempted to install new upgradient monitoring wells (i.e. shallow and deep) at location 1. However, this initial attempt was aborted due to access problems and extensive flooding of the proposed location. The new upgradient monitoring wells were installed on August 17, 1984 at the location shown on Figure 3. The boring logs describing the soils encountered and presenting details of the monitoring well installations are presented in Appendix A.

2.3 Surface Characteristics

Due to the random nature of the previous landfilling operations, the topography of the site is extremely variable. There is standing water on the eastern portion of the site and there is a pond located at the northwest corner of the site.

FIGURE 4



MALCOLM PIRNIE

MONITORING WELL DETAIL
FOR WELL NO. 4A

REPUBLIC STEEL SEPTEMBER 1984

(Malcolm Pirnie, 1984

③

TABLE 1

REPUBLIC STEEL CORPORATION
MARILLA STREET LANDFILL
BAILER PERMEABILITY TEST RESULTS

Well No.	Permeability (cm/sec)(1)
2A	1.69×10^{-5}
3A	7.80×10^{-5}
4A	ND(2)
6A	5.16×10^{-5}
2B	6.86×10^{-5}
5B	ND(2)
6B	3.17×10^{-5}

NOTES:

(1) Based on bailer permeability tests performed in field on 8/23/84.

(2) No Data - Wells recovered too quickly to complete bailer permeability test.

(Malcolm Pirnie, 1984)

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3.0 GROUNDWATER

3.1 Geology

Examination of the boring logs (See Appendix A) for the site and performance of a site inspection indicates the geologic cross section from the surface to bedrock is as follows:

- Fill - (0' to greater than 20')
- Topsoil - (0' to 2')
- Sandy-silt - (0' to 15')
- Clayey-silt - (7' to greater than 18')
- Glacial till - (1' to 2')
- Shale bedrock - Based on the boring logs, depths to bedrock range from over 25 feet on the east side of the site to less than 14 feet at the northwest corner of the site.

3.2 Groundwater Movement

Groundwater at the landfill site exists in both perched and confined conditions. The perched groundwater system occurs in the sandy-silt deposits and/or the topsoil and fill materials which overlie the clayey-silt layer. Based on bailer permeability tests conducted on monitoring wells 2B and 6B, the permeability of the saturated zone is between 3.17×10^{-5} and 6.86×10^{-5} cm/sec. Examination of groundwater elevations in the shallow wells and topographical maps presented in the URS Engineering Report (Reference 1), suggest that the direction of groundwater flow in the perched aquifer is radially outward from the center of the landfill. This perched water is likely intercepted by peripheral ditches which flow toward the pond at the northwest corner of the site. However, actual groundwater movements in the shallow aquifer within and peripheral to the landfill site may be very complex.

(Malcolm Pirnie, 1984)

(13)

The confined groundwater system occurs in the bedrock and to a lesser extent in the immediate overburden beneath the site. Bailer permeability tests performed on wells completed in the immediate overburden indicate that the permeability of this portion of the saturated zone ranges between 5.16×10^{-6} and 7.80×10^{-5} cm/sec. These permeabilities suggest that wells completed in this zone would not yield sufficient quantities of water to be considered an aquifer.

Direction of groundwater flow in the confined aquifer is normal to isopotential contours and moves from points of higher elevation to points of lower elevation. A groundwater isopotential map (Figure 5) was developed for the site from water level measurements taken in the deep monitoring wells on August 23, 1984. Examination of this map indicates that the general direction of groundwater flow in the vicinity of the site is toward Lake Erie to the west. This is consistent with previous determinations of the direction of groundwater flow in the confined aquifer.

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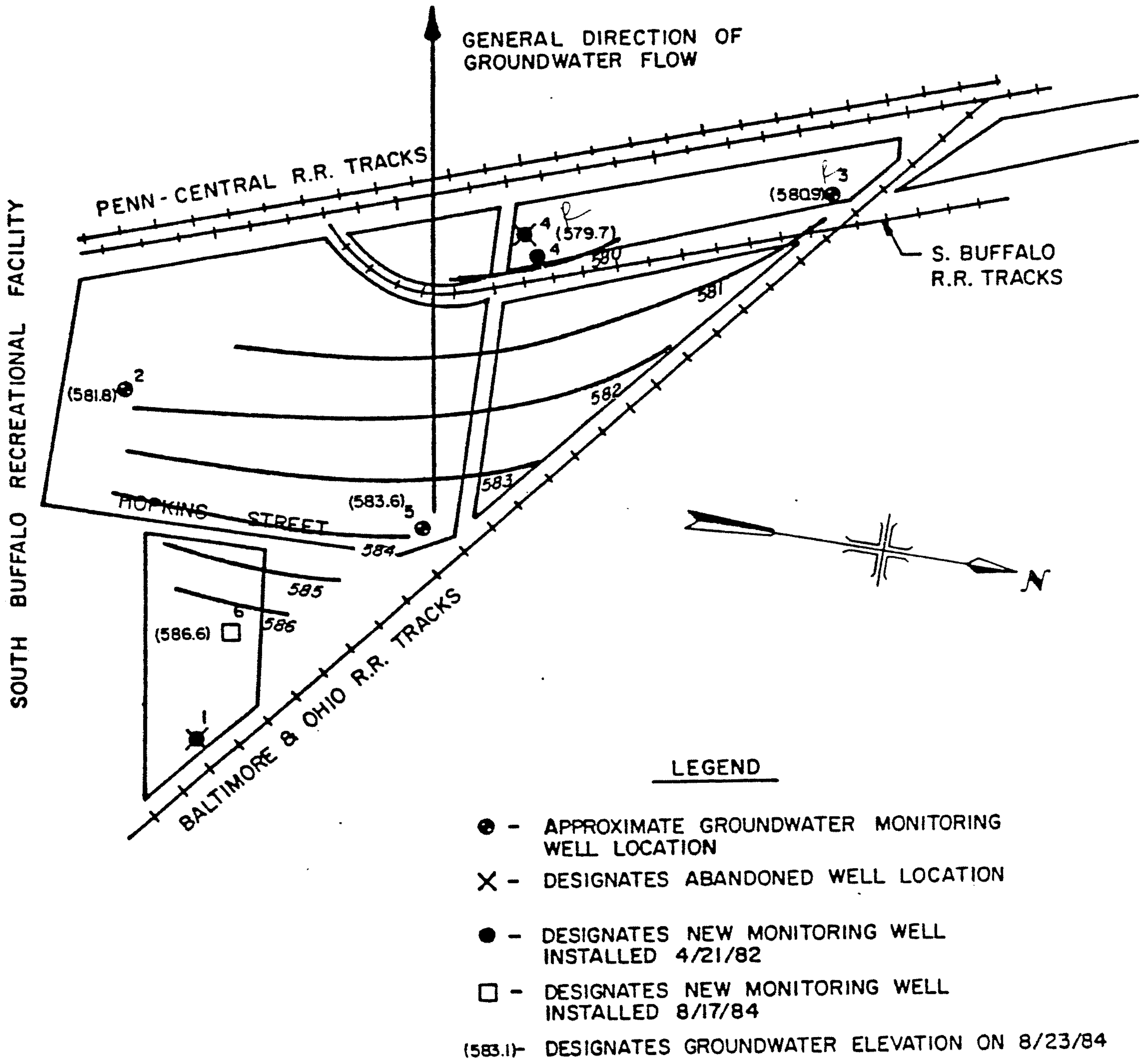

LEGEND

● – APPROXIMATE GROUNDWATER MONITORING WELL LOCATION

X – DESIGNATES ABANDONED WELL LOCATION

● – DESIGNATES NEW MONITORING WELL INSTALLED 4/21/82

☐ – DESIGNATES NEW MONITORING WELL INSTALLED 8/17/84

(583.1) – DESIGNATES GROUNDWATER ELEVATION ON 8/23/84

MALCOLM PIRNIE

GROUNDWATER ISOPOTENTIAL MAP - DEEP WELLS

REPUBLIC STEEL

SEPTEMBER 1984

(Malcolm Pirnie, 1984

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4.0 WATER QUALITY

4.1 General

Under Part 703 of the New York State Compilation of Rules and Regulations, the groundwaters of the State are classified according to best use. All fresh groundwaters are best used as sources of potable water. These waters have been given a "GA" classification as defined in Appendix B.

Groundwater quality standards stipulate that "no raw or treated sewage, industrial wastes or ineffectively treated effluents, taste or odor-producing substances or other deleterious matter may be present which may impair the quality of groundwater to render it unsuitable as a potable water supply" (Reference #2). Additional water quality standards are shown in Table 2 indicating maximum allowable concentrations of various contaminants in Class "GA" groundwater.

4.2 Water Quality Analyses

In order to assess possible impacts of the Marilla Street Landfill on the quality of ground and surface water in the vicinity of the site, several sets of water samples have been collected and analyzed since July 1979. The results of the water quality analyses are attached in Appendix C and summarized in Tables 3 (viz. background parameters) and 4 (viz. routine parameters).

Comparison of the analytical results in Table 3 to the groundwater quality standards in Table 2 indicates the following:

- o Arsenic was detected in the groundwater samples collected from well Nos. 2B,3A,5A and the Pond. However, only well No. 2B contained arsenic

(Malcolm Pirnie, 1984)
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TABLE 3

REPUBLIC STEEL CORPORATION
MARILLA STREET LANDFILL
BACKGROUND GROUNDWATER QUALITY (1)

Well No. (2) Sampling Date (3)	2A (5-4-82)	2A (5-18-82)	3A (8-2-79)	3A (8-13-79)	4A (5-4-82)	4A (5-18-82)
Ammonia (as N)	0.06	0.14	0.98	0.52	0.45	1.12
Nitrate (as N)	0.11	0.07	0.13	0.05	0.18	0.09
TKN (as N)	0.07	0.18	1.92	1.36	0.48	1.20
Biochemical Oxygen Demand (BOD_5)	3.7	4.0	1	5	4.1	4.8
Chemical Oxygen Demand	36	20	25.1	30.3	30	20
Aluminum	0.2	0.1	0.8	0.5	0.6	0.6
Arsenic	< 0.005	0.005	0.0099	0.0098	<0.005	< 0.005
Chromium (HEX)	< 0.02	0.02	<0.03	<0.03	< 0.02	< 0.02
Chromium (T)	< 0.02	0.02	< 0.05	<0.05	< 0.02	<0.02
Cadmium	< 0.005	0.005	-	-	<0.005	<0.005
Zinc	0.017	0.015	-	-	0.023	0.010
Selenium	< 0.005	0.005	-	-	<0.005	<0.005
Copper	< 0.01	0.01	< 0.04	<0.04	<0.01	< 0.01
Lead	< 0.02	0.02	0.10	<0.10	<0.02	<0.02
Mercury	< 0.001	0.001	< 0.0003	<0.0003	< 0.001	<0.001
Sodium	36	58	54	56	43	66
MBAS	0.082	0.34	0.094	0.025	0.86	1.4
Calcium	80	36	231	188	140	61
Silver	< 0.005	0.005	<0.03	<0.03	< 0.005	< 0.005
Manganese	0.025	0.020	-	-	0.020	0.010
Nickel	< 0.02	0.02	-	-	< 0.02	< 0.02
Total Solids	-	-	1114	975	-	-
Color (4)	20	10	30	40	35	15
Alkalinity	52	87	500	517.4	93	128
Hardness	115	148	665	680	185	175
Odor (Threshold)	1 (detergent)	1 (detergent)	-	-	4 (musty)	4 (musty)
E Coli (#/100 ml)	40	< 2	> 2000	25,000	< 2	< 2

NOTES:

(1) All units mg/l except where noted.

(2) A - designates deep well, B - designates shallow well

(3) 1979 samples collected by URS (Reference 1);
1982 samples collected by MPI

(4) 1979 samples measured in APHA-True units; 1982 samples measured in Pt-Co units

(Malcolm Pirnie, 1984)

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TABLE 3 (cont.)

REPUBLIC STEEL CORPORATION
MARILLA STREET LANDFILL
BACKGROUND GROUNDWATER QUALITY (1)

Well No. (2) Sampling Date (3)	5A (8-2-79)	5A (8-13-79)	2B (7-31-79)	2B (8-13-79)	POND (7-31-79)	POND (8-13-79)
Ammonia (as N)	0.33	0.35	12.60	4.10	1.64	1.19
Nitrate (as N)	0.25	0.05	0.74	0.28	0.17	0.15
TKN (as N)	1.44	1.83	18.48	15.30	1.64	2.01
Biochemical Oxygen Demand (BOD_5)	11	15	84	9	2	9
Chemical Oxygen Demand	48.7	52.2	83.1	252	34.7	46.1
Aluminum	< 0.5	0.5	3.4	1.4	< 0.5	0.5
Arsenic	0.0121	0.0056	0.084	0.0268	< 0.0005	0.0011
Chromium (HEX)	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chromium (T)	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cadmium	-	-	-	-	-	-
Zinc	-	-	-	-	-	-
Selenium	-	-	-	-	-	-
Copper	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Lead	0.10	< 0.10	0.10	< 0.10	< 0.10	< 0.10
Mercury	0.0004	< 0.0003	0.0004	0.0003	< 0.0003	< 0.0013
Sodium	109	123	431	432	201	214
MBAS	< 0.025	0.025	0.04	0.60	0.30	0.08
Calcium	99	95	67	61	64	68
Silver	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Manganese	-	-	-	-	-	-
Nickel	-	-	-	-	-	-
Total Solids	945	1036	1728	1602	956	994
Color (4)	15	20	> 70	-	20	20
Alkalinity	368.5	374.1	436.8	421.2	17.9	20.2
Hardness	600	620	115	160	175	165
Odor (Threshold)	-	-	-	-	-	-
E Coli (#/100 ml)	> 2000	7700	< 1	800	> 2000	16,000

NOTES:

(1) All units mg/l except where noted.
(2) A - designates deep well, B - designates shallow well
(3) 1979 samples collected by URS (Reference 1);
1982 samples collected by MPI
(4) 1979 samples measured in APHA-True units; 1982 samples measured in Pt-Co units

(Malcolm Pirnie, 1984)

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TABLE 4

REPUBLIC STEEL CORPORATION
MARILLA STREET LANDFILL
SUMMARY OF ANALYTICAL RESULTS FOR ROUTINE WATER QUALITY PARAMETERS

PARAMETER	pH (units)	CONDUCTIVITY (umhos/cm)	TOTAL ORGANIC CARBON (mg/l)	TOTAL DISSOLVED SOLIDS (mg/l)	IRON (mg/l)	CHLORIDES (mg/l)	SULFATES (mg/l)	PHENOLS (ug/l)
Well 2A								
5-04-82	8.9	520	10	393	0.07	175	70	12
5-18-82	8.8	625	10	497	0.43	128	88	39
6-15-82	NA	NA	NA	NA	NA	NA	NA	8
6-30-82	NA	NA	NA	NA	NA	NA	NA	11
8-24-84	8.1	800	5	373	1.57	131	6	67
Well 3A								
8-02-79	7.3	1340	6	NA	1.63	64.9	115	1
8-13-79	7.1	1360	10	NA	1.79	65.0	130	47
5-04-82	NA	NA	NA	NA	NA	NA	NA	<5
5-18-82	NA	NA	NA	NA	NA	NA	NA	<2
8-24-84	6.8	1010	4	757	2.26	70	242	28
Well 4A								
5-04-82	10.8	950	20	624	0.03	95	620	15
5-18-82	11.0	1000	15	521	0.14	45	640	4
8-24-84	7.9	640	7	306	1.82	39	72	35
Well 5A								
8-02-79	7.3	1430	5	NA	0.35	47.5	330	10
8-13-79	7.1	1360	15	NA	0.16	42.5	305	5
5-04-82	7.45	950	2	719	0.23	78	NA	10
5-18-82	7.70	1100	2	749	0.33	42	NA	5
6-15-82	NA	NA	NA	NA	NA	NA	NA	<2
8-24-84	7.5	780	8	571	1.33	39	133	37

(Malcolm Pirnie, 1984)

⑬

concentrations (i.e. 0.0268 and 0.084 mg/l) in excess of the 0.025 mg/l groundwater standard. In addition, the Pond (viz. the discharge point for the shallow aquifer monitored by well No. 2B) contained arsenic concentrations well below the groundwater quality standard.

- Lead was detected at 0.10 mg/l in the groundwater sample collected from well Nos. 2B and 5B during the initial sampling performed in 1979. However, these values are probably false positives which occurred as a result of the high detection limit (i.e. 0.10 mg/l) utilized during sample analysis. This is supported by the fact that lead was not detected in the samples collected from these wells two weeks later.
- MBAS (Foaming Agents) were detected in the groundwater samples taken from well Nos. 2B and 4A at concentrations in excess of the 0.50 mg/l groundwater standard. The source of the MBAS is not known.
- Fecal Coliform (E. Coli) has been detected in the samples collected from all the wells with the exception of well No. 4A. This is probably a result of contamination during well installation which is a common phenomenon; however, this has not been confirmed.

Examination of the analytical results for the routine water quality parameters summarized in Table 4 indicates the following:

- There is an increase in the pH of the deep aquifer in the direction of groundwater flow. The landfill site also appears to be contributing to an increase in the pH of the shallow aquifer.

TABLE 4 (cont.)

PARAMETER	pH (units)	CONDUCTIVITY (umhos/cm)	TOTAL ORGANIC CARBON (mg/l)	TOTAL DISSOLVED SOLIDS (mg/l)	IRON (mg/l)	CHLORIDES (mg/l)	SULFATES (mg/l)	PHENOLS (ug/l)
<u>Well 6A</u>								
8-24-84	7.6	1440	10	950	0.73	58	433	68
<u>Well 2B</u>								
7-31-79	11.5	2110	53	NA	4.90	217.4	125	8
8-13-79	11.2	2600	20	NA	1.20	174.9	190	184
5-04-82	NA	NA	NA	NA	NA	NA	NA	110
5-18-82	NA	NA	NA	NA	NA	NA	NA	270
6-15-82	NA	NA	NA	NA	NA	NA	NA	129
6-30-82	NA	NA	NA	NA	NA	NA	NA	143
<u>POND</u>								
7-31-79	7.9	1430	7	NA	4.00	244.9	140	100
8-13-79	7.3	1140	9	NA	2.90	244.9	255	24
5-04-82	NA	NA	NA	NA	NA	NA	NA	<5
5-18-82	NA	NA	NA	NA	NA	NA	NA	10
6-15-82	NA	NA	NA	NA	NA	NA	NA	<2
8-24-84	9.1	960	12	503	1.77	126.5	120	77
<u>Well 5B</u>								
5-04-82	9.3	1050	2	735	0.19	250	NA	<5
5-18-82	8.8	1100	8	559	0.35	175	NA	3
<u>Well 6B</u>								
8-24-84	7.2	2250	13	2020	12.10	74.5	1004	44

NA - Not Analyzed

(Malcolm Pirnie, 1984

(B)

(Malcolm Pirnie, 198

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- The conductivity, total dissolved solids and total organic carbon content of the deep and shallow aquifers do not appear to be significantly affected by the landfill site.

- The iron concentration of the groundwater samples was extremely variable between sampling occasions. There appears to be an increase in the iron concentration of the deep aquifer in the direction of groundwater flow. The iron concentrations of the shallow aquifer were extremely high with the maximum being 12.1 mg/l in the upgradient well No. 6B on 8/24/84. In general, the iron concentration of all of the samples, upgradient and downgradient, exceeded the groundwater quality standard of 0.3 mg/l (See Table 2).

- There appears to be a slight increase in the chloride concentration of the deep aquifer in the direction of groundwater flow. However, none of the samples showed chloride concentrations in excess of the 250 mg/l groundwater quality standard (See Table 2).

- Sulfate concentrations were found to be extremely variable. In general, there appears to be a decrease in the sulfate concentrations of both the deep and shallow aquifers in the direction of groundwater flow.

- Phenols were detected in all of the samples, upgradient and downgradient, in excess of the groundwater quality standard of 1 ug/l (See Table 2). Upgradient deep well No. 6A showed the highest phenol concentration of any of the deep wells for samples collected on 8/24/84. Therefore, an upgradient off-site source of the phenols in the deep aquifer is suspected. The source(s) of this phenol is not known.

(Malcolm Pirnie, 1984)
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approximately 14.1 pounds per day and 0.04 pounds per day, respectively, less any off-site contributions of these contaminants.

4.4 Water Quality Impacts

It should be emphasized that there are several solid waste disposal sites bordering on or in the vicinity of the Marilla Street Landfill. Therefore, an accurate assessment of the overall groundwater quality impacts of the Marilla Street Landfill cannot be completed and a determination of significant impact cannot be made until the impacts of the surrounding sites are considered and factored into overall groundwater quality.

Based on our current knowledge of the groundwater quality of the Marilla Street Landfill, the landfill is not having an impact on the groundwater quality in the vicinity of the site with the possible exception of phenol, iron and pH. We have attempted to quantify maximum phenol and iron contributions based upon conservative estimates of leachate quantities and quality. The amount of off-site contribution of these three parameters are not known.

(Malcolm Pirnie, 1984)

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EARTH DIMENSIONS, INC.

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

HOLE NO 3 SURF ELEV. 580.6

4G79 PROJECT Republic Steel - Monitoring well installation South Buffalo, New York LOCATION See survey (near southeas of northern pond)

CLIENT McPhee, Smith, Rosenstein Engineers, PC DATE STARTED 7/20/79 COMPLETED 7

DEPTH (feet)	SAMPLE NO.	BLOWS ON SAMPLER					DESCRIPTION & CLASSIFICATION	WELL	WATER TABLE & REMARKS
		0/6	6/12	12/18	18/24	N			
							Wet mixed industrial fill including cindery flyash, slag and brick fragments, loose 3.5	2 inch PVC pipe Bentonite	
							Wet black organic rich silt loam (SANDY-SILT), soft, nonplastic 4.5		Original su zone.
5	1	3	3	3		6	Wet greenish to yellowish brown coarse silt loam (SANDY-SILT), very friable, nonplastic 6.5		Industri to 3.5 ft. silty lake ments to 12 over loamy glacial til 13.7 ft. ov bedrock.
	2	5	7	9	12	16	Extremely moist to moist highly mottled grayish brown silty clay loam (CLAYEY-SILT) with finely laminated structure, medium to firm consistance, plastic 10.0		
10	3	2	2	3	4	5	- - - - - grades downward to - - - - Extremely moist reddish to grayish brown silty clay (CLAYEY-SILT) with thin silt lenses, soft to medium consistance, plastic, cohesive 12.0		11.0
	4	3	4	79/3			Wet dark brownish gray gravelly loam (CLAY-SAND-SILT) till with 20-25% fine & medium gravel, soft, slightly plastic 13.7	Well Screen Sand Pack	12.0 Auger res noted at ft. 14.0
	5	–	–	–	–	–	Weathered gray fissile shale, thin bedded 14.0		
15							[redacted]		Water at su at completi

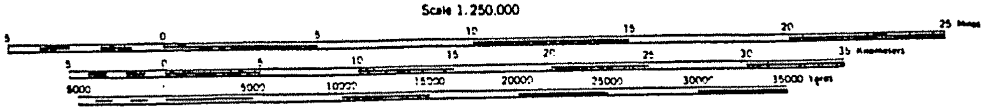
dew N = NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb WT. FALLING 30 " PER

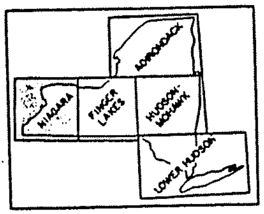
[illegible] R. Lombardt, Geologist 1 1

QUATERNARY GEOLOGY OF NEW YORK, NIAGARA SHEET

by Ernest H. Muller

Muller, Ernest H. (1977)
New York State Museum and Science Service
Map and Chart Series Number 28





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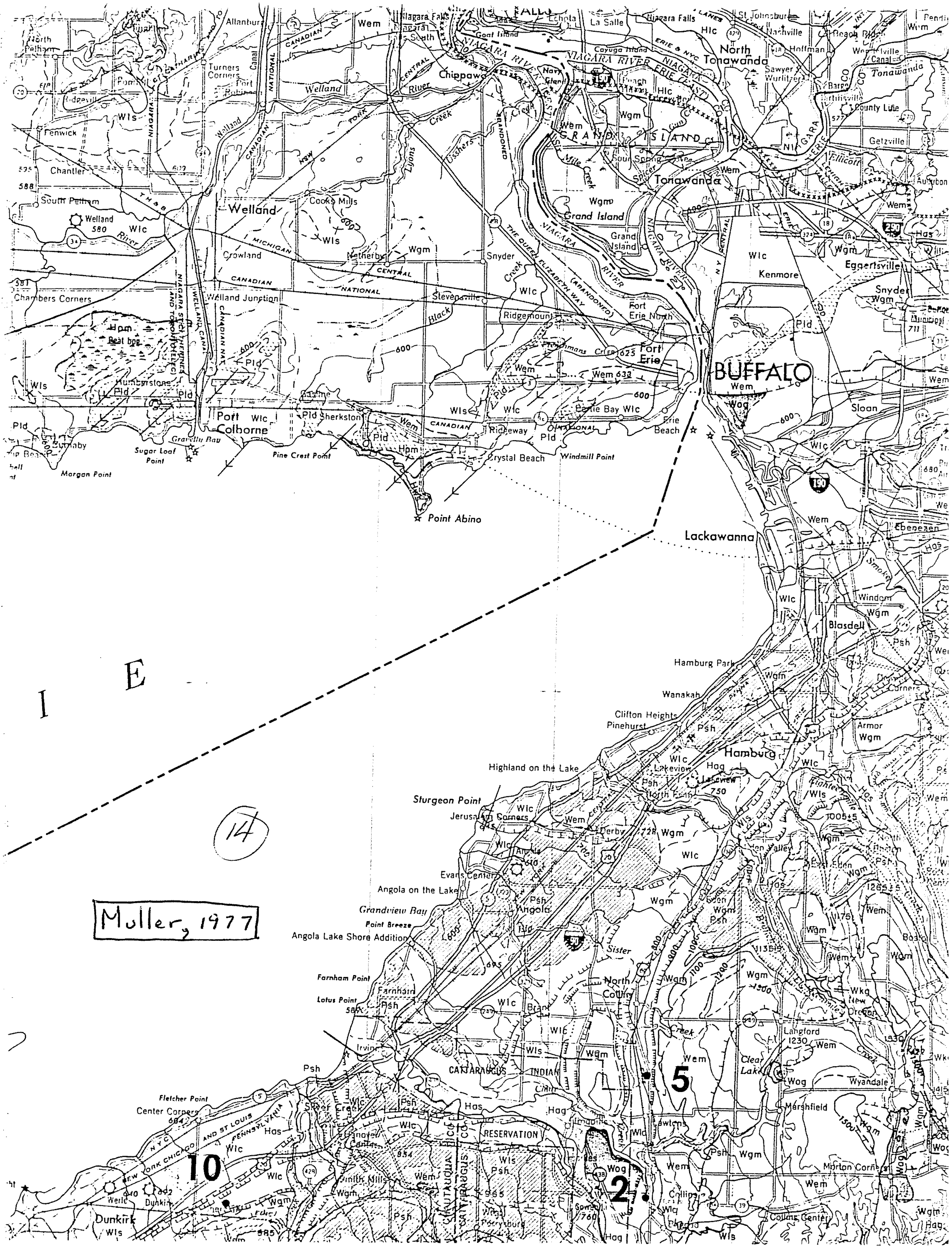

(14)

Muller, 1977

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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)

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-0001

Henry G. Williams
Commissioner

16

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

DEC
PUBLICATION

17

NYS Department of Environmental Conservation
Superfund and Contract Laboratory Protocol
January 1985

New York State/Department of Environmental Conservation

18

(Ploscyca, 1981)

July 16, 1981

Mr. Jack Ryan
Assistant Laboratory Coordinator
New York State Department of
Environmental Conservation
Bureau of Water Research
Room 519
50 Wolf Road
Albany, NY 12233

Re: Analytical Report.

Dear Mr. Ryan:

Please find enclosed Recra Research, Inc.'s results of the analyses of the samples received at our laboratories on June 17 and 18 of 1981.

If you have any questions concerning these data, do not hesitate to contact the undersigned.

Sincerely,

RECRA RESEARCH, INC.

James A. Ploscyca
Laboratory Manager

TRB/JAP/skb
Enclosure

I.D. #81-513
81-514

CRA RESEARCH, INC. P.O. Box 448 / Tonawanda, New York 14150 / (716) 838-6200
HEMICAL WASTE MANAGEMENT THROUGH APPLIED RESEARCH

File: Altift Realty ?-?-?-? (Wheatfield Site)
Reg 9
Eri Co.

File: ~~Niagara Co.~~ Reg 9
~~Refuse Dis~~

Moscyca, 1981

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John Tygert, Region 9 Solid Waste Engineer
~~Maureen Ho~~gan, Senior Chemist, Site Discovery and Investigation Section
Wheatfield and Altift Analytical Data

August 21, 1981

Please find enclosed the analytical results from our sampling efforts in June, 1981.

The following sample numbers correspond to Altift Realty. The site was sampled on June 16, 1981.

No. Assigned	Sampling Point
81-167-01	South Pond, East Bank
81-167-02	Drainage Ditch North of Pond
81-167-03	North Pond, East Bank

The following sample numbers correspond to Wheatfield, also known as Niagara County Refuse Disposal Site. This site was sampled on June 18, 1981.

No. Assigned

81-169-01
81-169-02
81-169-03
81-169-04

Refer to sample locations on enclosed map

If we can be of any futther assistance, please let us know.

MH:cl
Attachments

Ploscyda, 1981

(8)

TABLE IIB

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
GAS CHROMATOGRAPHY/MASS SPECTROMETRY
PRIORITY POLLUTANT ANALYSES
SOLID SAMPLES

Samples Received: 6/17/81
Report Date: 7/16/81

BASE/NEUTRALS

COMPOUND	UNITS OF MEASURE	SAMPLE IDENTIFICATION		
		81-167-01	81-167-02	81-167-03
acenaphthene	ug/g dry	≤20	<20	41
acenaphthylene	μg/g dry	<20	<20	<20
anthracene	ug/g dry	<20	<20	≤20
benzidine	ug/g dry	<100	<100	<100
benzo(a)anthracene	ug/g dry	<20	20	≤20
benzo(a)pyrene	ug/g dry	<40	<40	<40
benzo(b)fluoranthene	ug/g dry	<20	<20	<20
benzo(g,h,i)perylene	ug/g dry	<100	<100	<100
benzo(k)fluoranthene	ug/g dry	<20	<20	<20
bis(2-chloroethoxy)methane	ug/g dry	<40	<40	<40
bis(2-chloroethyl)ether	ug/g dry	<40	<40	<40
bis(2-chloroisopropyl)ether	ug/g dry	<40	<40	<40
bis(2-ethylhexyl)phthalate	ug/g dry	<40	<40	<40
4-bromophenylphenylether	ug/g dry	<40	<40	<40
butylbenzylphthalate	ug/g dry	<40	<40	<40
2-chloronaphthalene	μg/g dry	<20	<20	<20
4-chlorophenylphenylether	μg/g dry	<100	<100	<100
chrysene	μg/g dry	<20	–	–
dibenzo(a,h)anthracene	μg/g dry	<100	<100	<100
1,2-dichlorobenzene	μg/g dry	<20	<20	<20
1,3-dichlorobenzene	μg/g dry	<20	<20	<20
1,4-dichlorobenzene	μg/g dry	<20	<20	<20
3,3'-dichlorobenzidine	ug/g dry	<100	<100	<100
diethylphthalate	ug/g dry	<40	<40	<40
dimethylphthalate	ug/g dry	<40	<40	<40
di-n-butylphthalate	ug/g dry	<40	<40	<40

(Continued)

Ploscyca, 1981

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TABLE IIB (cont'd.)

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
GAS CHROMATOGRAPHY/MASS SPECTROMETRY
PRIORITY POLLUTANT ANALYSES
SOLID SAMPLES

Samples Received: 6/17/81
Report Date: 7/16/81

BASE/NEUTRALS

OMPOUND	UNITS OF MEASURE	SAMPLE IDENTIFICATION		
		81-167-01	81-167-02	81-167-03
,6-dinitrotoluene	µg/g dry	<100	<100	<100
,4-dinitrotoluene	µg/g dry	<100	<100	<100
i-n-octylphthalate	µg/g dry	<40	<40	<40
,2-diphenylhydrazine	µg/g dry	<100	<100	<100
luoranthene	µg/g dry	<20	41	≤20
luorene	µg/g dry	<20	<20	<20
exachlorobenzene	µg/g dry	≤20	<20	<20
exachlorobutadiene	µg/g dry	<20	<20	<20
exachlorocyclopentadiene	µg/g dry	<100	<100	<100
exachloroethane	µg/g dry	<40	<40	<40
deno(1,2,3-cd)pyrene	µg/g dry	<100	<100	<100
sophorone	µg/g dry	<100	<100	<100
phthalene	µg/g dry	<20	<20	<20
trobenzene	µg/g dry	<40	<40	<40
-nitrosodimethylamine	µg/g dry	<100	<100	<100
nitrosodi-n-propylamine	µg/g dry	<100	<100	<100
-nitrosodiphenylamine	µg/g dry	<40	<40	<40
enanthrene	µg/g dry	<20	<20	-
rene	µg/g dry	<20	25	≤20
3,7,8-tetrachlorodibenzo- -dioxin	µg/g dry	<40	<40	<40
2,4-trichlorobenzene	µg/g dry	<20	<20	<20

MMENTS: Refer to text

FOR RECRA RESEARCH, INC. Timothy R Baker

DATE 7/16/81

EARCH INC.

Ploscyca, 1981

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TABLE IVA

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
GAS CHROMATOGRAPHY
PRIORITY POLLUTANT ANALYSES
AQUEOUS SAMPLES

Samples Received: 6/17/81
Report Date: 7/16/81

PESTICIDES/PCB'S

COMPOUND	UNITS OF MEASURE	SAMPLE IDENTIFICATION 81-167-01	81-167-02	81-167-03
Aldrin	μg/l	<0.02	<0.02	<0.1
α-BHC	μg/l	<0.01	0.02	<0.1
β-BHC	μg/l	<0.04	<0.04	<0.2
δ-BHC	μg/l	<0.05	<0.05	<0.2
γ-BHC	μg/l	0.01	<0.02	<0.05
Chlordane	μg/l	<0.2	<0.3	<0.3
4,4'-DDD	μg/l	<0.02	<0.01	<0.05
4,4'-DDE	μg/l	0.09	0.09	<0.04
4,4'-DDT	μg/l	0.06	<0.02	<0.02
Dieldrin	μg/l	<0.04	<0.01	<0.04
α-Endosulfan	μg/l	0.09	<0.02	<0.02
β-Endosulfan	μg/l	<0.02	<0.01	<0.05
Endosulfan sulfate	μg/l	<0.09	<0.08	<0.08
Endrin	μg/l	<0.06	<0.01	<0.05
Endrin aldehyde	μg/l	<0.01	<0.01	<0.02
Heptachlor	μg/l	<0.04	<0.02	<0.1
Heptachlor epoxide	μg/l	<0.04	<0.02	<0.02
PCB-1016	μg/l	<0.5	<0.5	<0.8
PCB-1221	μg/l	<1	<1	<2
PCB-1232	μg/l	<0.5	<0.5	<0.8
PCB-1242	μg/l	<0.5	<0.5	<0.8
PCB-1248	μg/l	<0.5	<0.5	<0.8
PCB-1254	μg/l	<0.1	<0.1	<0.1
PCB-1260	μg/l	<0.1	<0.1	<0.1
Toxaphene	μg/l	<0.2	<0.2	<0.3

COMMENTS: Refer to text

FOR RECRA RESEARCH, INC. Larry E Rosengrant

DATE 7/16/81

RESEARCH.INC.
#81-513

Ploscyca, 1981

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TABLE IVB

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
GAS CHROMATOGRAPHY
PRIORITY POLLUTANT ANALYSES
SOLID SAMPLES

Samples Received: 6/17/81
Report Date: 7/16/81

PESTICIDES/PCB's

COMPOUND	UNITS OF MEASURE	SAMPLE IDENTIFICATION		
		81-167-01	81-167-02	81-167-03
Aldrin	μg/g dry	<0.1	<0.05	<1
α-BHC	μg/g dry	<0.1	<0.05	<1
β-BHC	μg/g dry	<0.3	<0.05	<1
δ-BHC	μg/g dry	<0.2	<0.07	<1
γ-BHC	μg/g dry	<0.1	<0.05	<1
Chlordane	μg/g dry	<2	<0.2	<10
4,4'-DDD	μg/g dry	<0.3	<0.05	<1
4,4'-DDE	μg/g dry	<0.4	0.07	<1
4,4'-DDT	μg/g dry	<0.6	<0.05	<2
Dieldrin	μg/g dry	<0.1	<0.05	<2
α-Endosulfan	μg/g dry	<0.3	<0.08	<2
β-Endosulfan	μg/g dry	<0.1	<0.05	<1
Endosulfan sulfate	μg/g dry	<0.5	<0.1	<1
Endrin	μg/g dry	<0.1	<0.05	<2
Endrin aldehyde	μg/g dry	<0.1	<0.05	<1
Heptachlor	μg/g dry	<0.1	<0.05	<1
Heptachlor epoxide	μg/g dry	<0.1	<0.05	<1
PCB-1016	μg/g dry	<1	<1	<5
PCB-1221	μg/g dry	<2	<2	<10
PCB-1232	μg/g dry	<1	<1	<5
PCB-1242	μg/g dry	<1	<1	<5
PCB-1248	μg/g dry	<1	<1	<5
PCB-1254	μg/g dry	<1	<0.5	<5
PCB-1260	μg/g dry	<1	<0.5	<5
Toxaphene	μg/g dry	<4	<0.2	<20

COMMENTS: Refer to text

FOR RECRA RESEARCH, INC. Larry E Rosengrant

DATE 7/16/81

A RESEARCH, INC.
#81-513

Ploscyca, 1981

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TABLE VA

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ATOMIC ABSORPTION
PRIORITY POLLUTANT ANALYSES
AQUEOUS SAMPLES

Samples Received: 6/17/81
Report Date: 7/16/81

METALS

COMPOUND	UNITS OF MEASURE	SAMPLE IDENTIFICATION		
		81-167-01	81-167-02	81-167-03
Total antimony	mg/l	<0.2	<0.2	<0.2
Total arsenic	µg/l	<3	<3	12
Total beryllium	mg/l	<0.005	<0.005	<0.005
Total cadmium	mg/l	<0.02	<0.02	<0.02
Total chromium	mg/l	0.012	0.016	0.116
Total copper	mg/l	0.044	0.012	0.052
Total lead	mg/l	<0.06	<0.06	0.12
Total mercury	µg/l	<15	<15	<15
Total nickel	mg/l	<0.04	<0.04	<0.04
Total selenium	µg/l	<3	<3	<3
Total silver	mg/l	<0.01	<0.01	<0.01
Total thallium	mg/l	<0.2	<0.2	<0.2
Total zinc	mg/l	0.660	0.028	0.058

COMMENTS: Refer to text

FOR RECRA RESEARCH, INC. R. V. Finn

DATE 7/16/81

(Recra, 1980)

⑲

A PART 360 APPLICATION
FOR A PERMIT TO OPERATE A SOLID WASTE MANAGEMENT FACILITY
ALLTIFT COMPANY, INC.

Prepared For:

Alltift Company, Inc.
105 Dorothy Street
Buffalo, New York 14206

Prepared By:

Recra Research, Inc.
111 Wales Avenue
Tonawanda, New York 14150

Recra Research, Inc. 80 - 075

RECRA RESEARCH, INC. P.O. Box 448 / Tonawanda, New York 14150 / (716) 838-6200
TOTAL CHEMICAL WASTE MANAGEMENT THROUGH APPLIED RESEARCH

Recra, 1980

(19)

II. GENERAL SITE INFORMATION

Climate

various times of the year. Typical climatological data, as recorded at Buffalo, New York are as follows:

Average Normal Monthly Temperature	46.7°F
Record Low Temperature	-21°F
Record High Temperature	99°F
Normal Annual Precipitation	35.65 inches
Mean Total Snowfall	80.0 inches

Wind direction is generally from west to southwest.

Service Area

Inasmuch as the site is not opened to the general public, it does not have a service area per se. At present, use of the landfill is solely for disposal of shredder waste generated by Advance Metals Recycling.

Wastes Accepted and Estimated Quantities

As stated above, only shredder waste is presently being landfilled at this site. It is estimated that the average annual volume will be 40,000 - 60,000 C.Y./yr. and this should remain fairly constant. Application is also being made for disposal of construction and demolition type debris. It is anticipated that this material will constitute a minor percentage of the total incoming volume, and will be sporadic in nature.

Estimated Life

At the present rate of incoming material, estimated site life is 10-12 years. Estimated time for completion of the first lift is 2 years.

Site Description

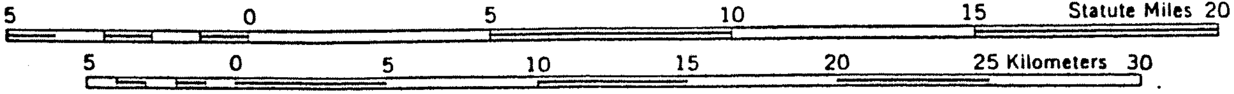
A comprehensive and detailed description of the site was presented in the previously submitted Hydrogeologic Investigation - Alltift Landfill report (1).

GEOLOGIC MAP OF NEW YORK

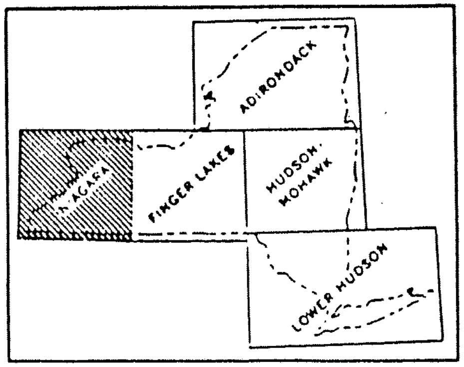
1970

Niagara Sheet

Scale 1:250,000



CONTOUR INTERVAL 100 FEET



COMPILED AND EDITED BY
Lawrence V. Rickard
Donald W. Fisher
March, 1970

Topographic Base from AMS Quadrangles 1:250,000 scale.

NEW YORK STATE MUSEUM AND SCIENCE SERVICE
MAP AND CHART SERIES NO. 15

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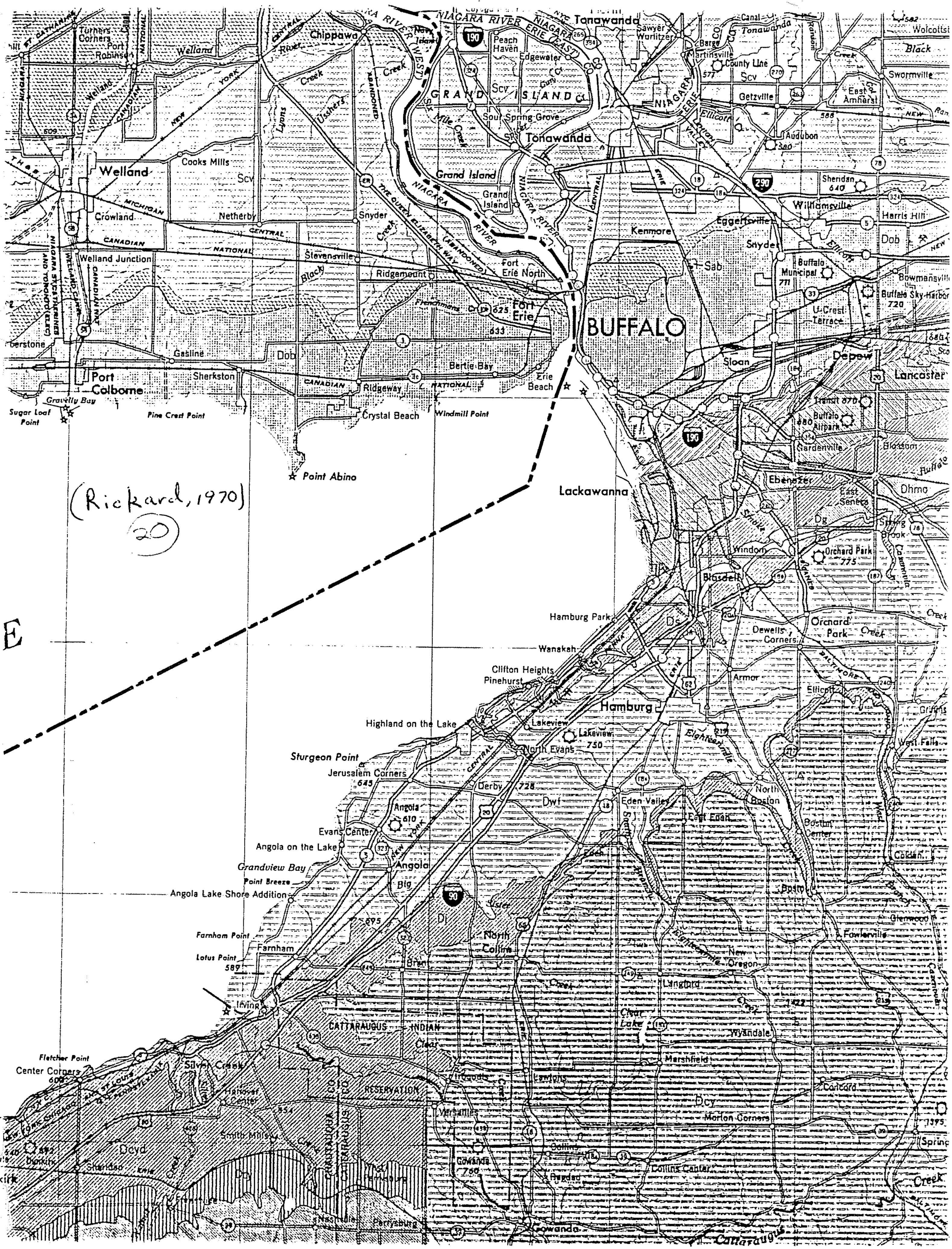

(Rickard, 1970)

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(Rishel, 1981)

(21)

COSTS OF REMEDIAL RESPONSE ACTIONS AT UNCONTROLLED HAZARDOUS WASTE SITES

By

Howard L. Rishel
Terence M. Boston
Curtis J. Schmidt
SCS Engineers
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)